

Programme Overview and Training Arrangement

项目概况和培训安排

TÜV Rheinland
March 2019



Learning objectives 学习目标:

1. Introduce the whole programme 介绍整个项目情况
2. Introduce the arrangement of the training and tutorship arrangement 介绍培训安排和辅导安排
3. To understand the trainee's expectations 知道被培训者的期望

Target Group 目标群:

- 1) At least 1 top management participated in both intro & advanced training 至少有1名高层管理人员同时参加了入门和高级培训
- 2) At least 9 or 5% of workers participated in both intro & advanced training 至少有9%或5%的工人参加了入门和高级培训
- 3) At least 2 internal training conducted for all workers contacted with chemicals with documented record 对所有接触化学品的员工至少进行2次内部培训，并记录在案
- 4) At least 3 trained workers are able to screen substance listed on RSL or MRSL using CAS No/ chemical name. 至少3名受过培训的工人能够使用CAS编号/化学名称筛选RSL或MRSL上列出的物质

Length: 时长

1 Hour 1小时

Training outcomes 培训成果

By the end of this training, you should be able to ...

培训结束后，您应该能够

- Understand the whole chemical management programme from chemical mapping, chemical testing, chemical training, and knowledge sharing
从化学绘图、化学测试、化学培训和知识共享中了解整个化学管理方案
- Understand the detailed arrangement of the training section
理解培训部分的详细安排
- Express your expectations for the coming training
表达你们对未来培训的期望

Overall objectives of the training 这个培训的整体目标

To know what is chemical management, why it is important and who should be involved
了解什么是化学管理，为什么它很重要，应该由谁参与

To understand the key elements and benefits of a chemical management system and how you implement it at your factory
了解化学品管理系统的关键要素和好处，以及如何在工厂实施该系统

To address critical issues in chemical management to improve worker health and safety, the business environment and the factory's chemical management performance
解决化学品管理中的关键问题，提高工人的健康和安全性、商业环境和工厂的化学品管理绩效。

To get a good understanding that you can pass on to your staff and coworkers
更好地理解你所需要传给员工的知识和同事的知识

The Shoe Industry Overview 鞋业概况

- The shoe industry is an important employer for many workers in China. 在中国，鞋业是很多工人的重要雇主。
- As the available income of Chinese people continues to rise, the consumer demanding for footwear products grows. 随着中国人可支配收入的持续增长，消费者对鞋类产品的需求也在增加。
- The value of footwear in Mainland China shows a 2% year-on-year increase. 中国大陆的鞋类价值同比增长2%。
- There are currently four major footwear industry clusters in China, predominantly located in the southeast coastal regions. 中国目前有四大鞋业集群，主要分布在东南沿海地区。
- The development partnership works with factories in the districts of Guangzhou and Wenzhou, which produce for the mainland market but also for international buyers and brands. 发展伙伴关系与广州和温州地区的工厂合作，这些工厂为中国大陆市场生产，也为国际买家和品牌生产。

But the shoe industry is also the big polluters on the planet, which generate **one-fifth** of the world's industrial water pollution and use **20,000 – 40,000** chemicals to make shoes. 但是制鞋工业也是地球上最大的污染源。它产生了世界五分之一的工业水污染，并使用20000-40000种化学物质制造鞋子。

The use of harmful chemicals in the shoe industry has consequences for **worker health** 在制鞋工业中使用有害化学物质会对工人健康产生影响

They can occur in workers along the life-cycle of shoes: workers in production and retail, in consumers, in waste handlers, in the community around production and waste handling. 它们可以伴随着鞋的生命周期发生在工人身上：生产和零售工人、消费者、废物处理者、生产和废物处理周围社区的工人

Harmful chemicals are linked to many diseases:

有害化学物质与许多疾病有关：

- Infertility, lower sperm quality, different types of cancer, neurological problems, asthma, allergies, skin problems, lung problems, heart diseases and other 不孕、精子质量低下、不同类型的癌症、神经系统问题、哮喘、过敏、皮肤问题、肺部问题、心脏病等
- Most diseases lead to death or severe ill-being. This has also negative consequences for the families, due to income loss, high medical cost etc. 大多数疾病会导致死亡或严重的疾病。这也给家庭带来了负面影响，如收入损失、高昂的医疗费用等。



The use of harmful chemicals in the shoe industry has consequences for **worker health** 在制鞋工业中使用有害化学物质会对工人健康产生影响

- Oral 经口
- Inhalation 经吸入
- Dermal 经皮肤



The use of harmful chemicals in the shoe industry has consequences for **the environment** 在制鞋工业中使用有害化学物质会对环境产生影响

- Water pollution 水污染
- Pollution of soil and farmland 土壤和农田污染
- Hazardous waste generation 有害废物产生



Water pollution 水污染

- Growing cotton needs a lot of water and often used pesticides are polluting soil and groundwater
种植棉花需要大量的水，经常使用的杀虫剂正在污染土壤和地下水。
- Effluents from textile production pollute freshwater resources and eventually the ocean
纺织生产废水污染淡水资源，最终污染海洋
- Used hazardous chemicals can even build up in the food chain
使用过的危险化学品甚至会在食物链中堆积起来



Pollution of soil and farmland 土壤和农田污染

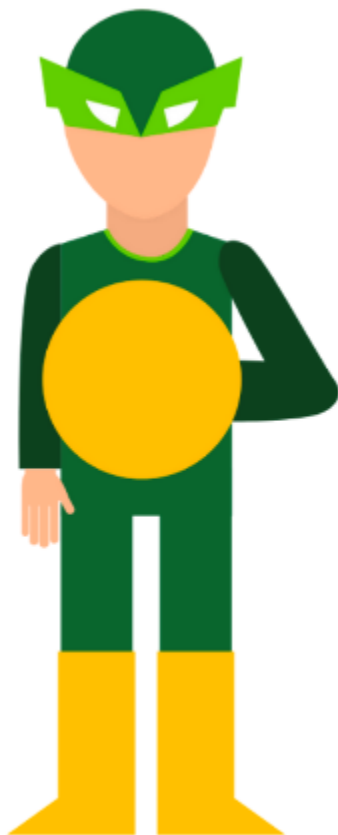
- Hazardous chemicals in wastewater can pollute soil and farmland along rivers
废水中的有害化学物质会污染河流沿线的土壤和农田
- Sewage sludge containing hazardous chemicals is being applied to land as a soil supplement
含有有害化学物质的污水段塞被用作土壤补充物
- Contaminated soil can lead to contaminated food that is grown on these fields; therefore chemicals can enter the food chain
受污染的土壤会导致种植在这些农田上的受污染的食物；因此化学品可以进入食物链



Hazardous waste generation 有害废物产生

- Hazardous waste in the textile production has to be handled professionally
纺织生产中的危险废物必须经过专业处理
- It cannot be dumped
它不能倾倒
- The less hazardous chemicals are being used in production, the less hazardous waste is generated
生产中使用的化学品危险性越低, 产生的废物危险性就越低

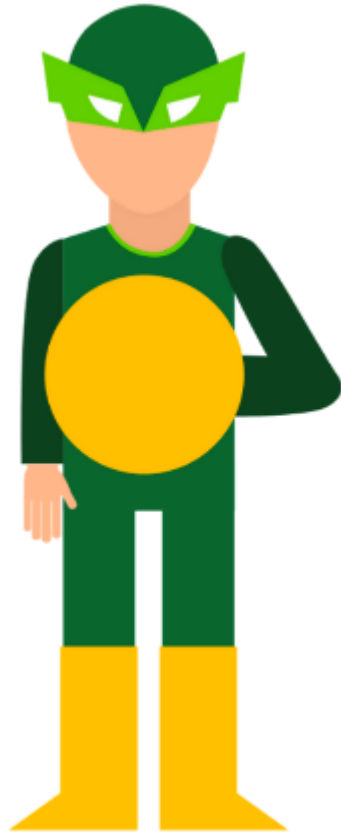




You are important! 你很重要!

Because it is up to you how **healthy and safe** you, your employees and neighbours stay and if you continue to live in a **safe environment**.

因为你、你的员工和邻居的**健康与安全**、你是否能够生活在**安全的环境中**，这些都取决于你。



What can you do to be an front-runner? 要成为一个领跑者，你需要做些什么？

- Take part in our training
参加我们的培训
- Set up an Action Plan
制定行动计划
- Implement and Monitor improvements at your factory
在工厂内执行并监控改进

➤ Improve your chemical management performance 提高你的化学品管理表现

- Establish a holistic and comprehensive chemical management system in your factory
建立一个全面的化学品管理体系
- Enable you to trace your daily work of chemical management process
能够跟踪化学品管理过程中的日常工作
- Enable you to control and improve the quality of your products 能够控制和提高产品质量
- Improve your productivity 提高生产力


➤ Improve the working conditions and safety of your workers at the workplace 改善工作场所工人的工作条件和安全

- Improve worker satisfaction and loyalty 提高员工满意度和忠诚度
- Reduce your staff turnover 减少员工流动
- Reduce the risk of costs related to any accidents at the workplace
降低与工作场所任何事故相关的成本风险

➤ Improve your business environment inside and outside 改善内外部商业环境


- Keep sustainable and long-run development of your factory under more stringent environmental regulation in China
在中国更加严格的环境法规下，保持工厂的可持续和长期发展
- Improve your factory commitment and be a strong signal to the brands buying from you
提高你的工厂承诺，成为你购买品牌的有力信号
- Increase your competitive advantage in the domestic and global market
提高您在国内外市场的竞争优势

Benefits of a Chemical Management System 化学管理系统的好处

 Maintain a license to operate 保持经营许可


 Access to global market 进入全球市场


 Maintain a competitive advantage 保持竞争优势


 Minimise excessive or replicative chemical purchases/consolidate chemical purchasing 减少过量或重复化学品购买/整合化学品采购


 Reduction in costs by reducing waste/overages 通过减少浪费/过量来降低成本


 Enforce chemical managing knowledge by expert or certified trainer 由专家或认证培训师强化化学管理知识

 Reduce down time by creating a safer work environment 通过创建更安全的工作环境来减少停机时间

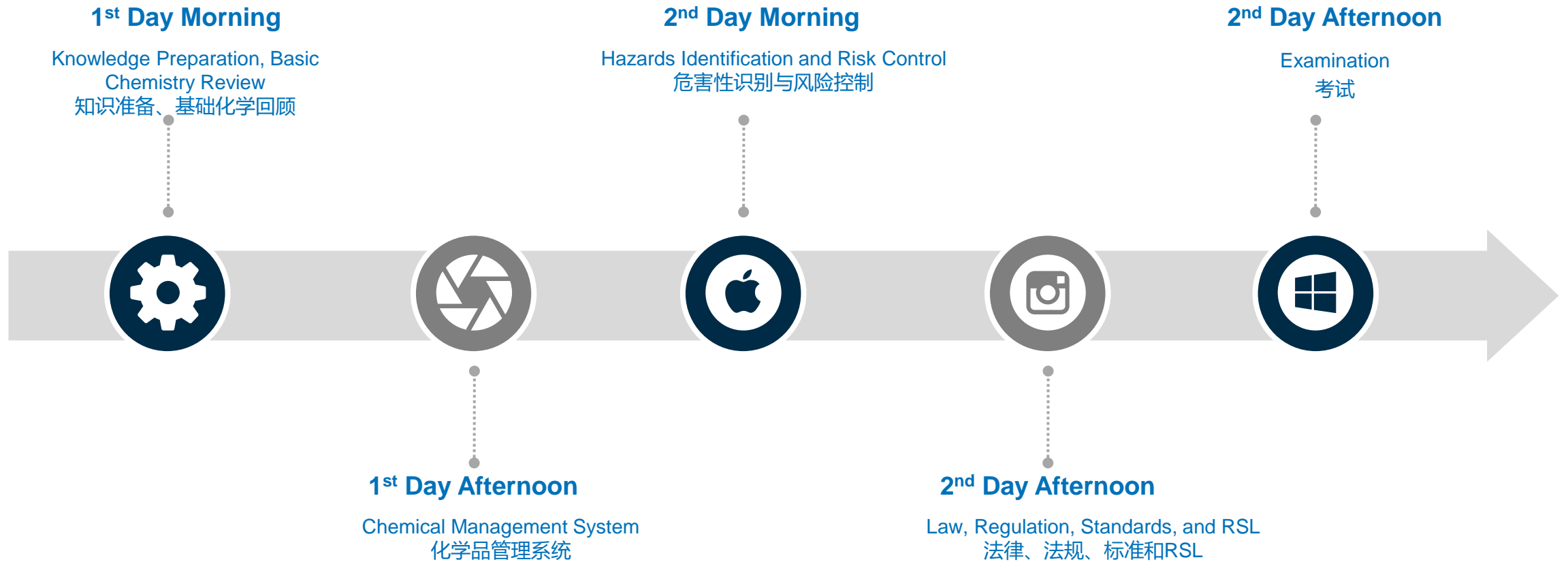
 Stop potential hazards before they become an issue 阻止潜在危险的发生

 Helps facilities ensure that RSL compliant materials are being produced; becomes invaluable in tracking down issues if they do arise 帮助设施确保生产符合RSL标准的材料;如果出现问题,就能提供非常有用的资料追溯根源

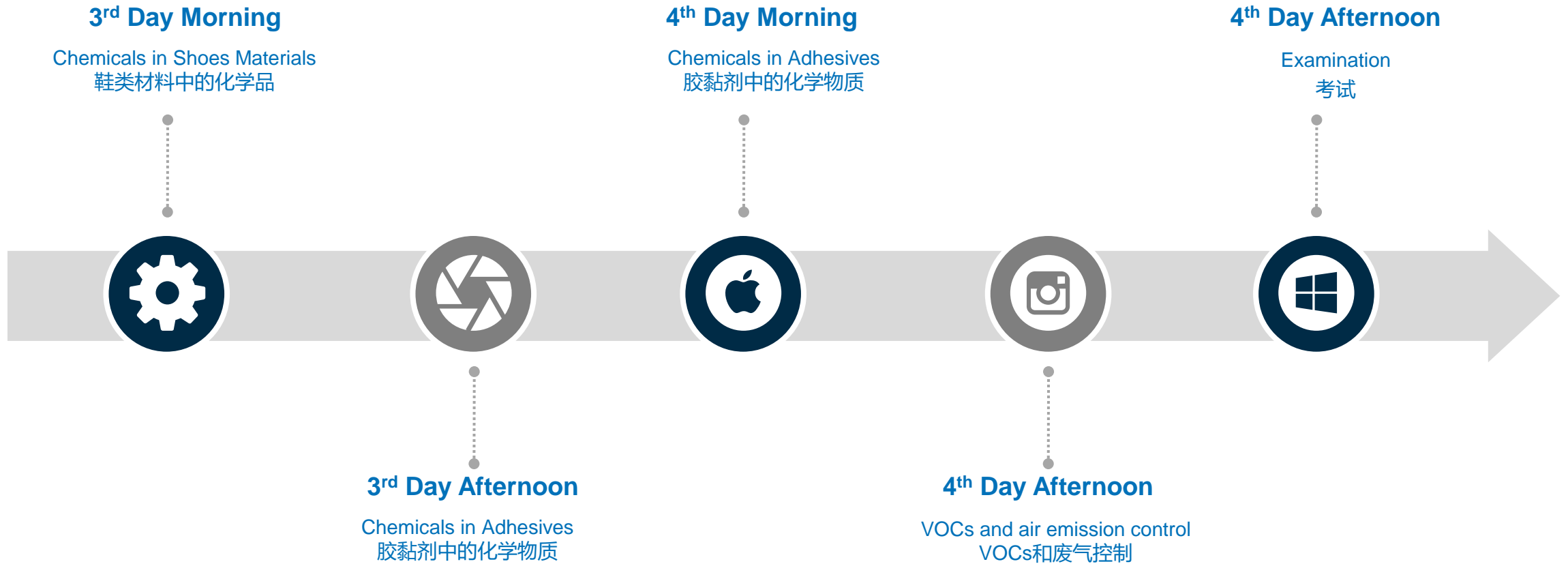
 Traceability of chemicals in the supply chain 供应链中化学品的可追溯性

 Reduction of chemicals can result in loading reduction in ETP 减少化学品会减少污水处理厂的负荷

Phase I Training – Introductory Training 第一阶段培训 – 基础培训



Phase I Training – Advanced Training 第一阶段培训 – 进阶培训



Phase I Training – Training Factory’s Trainers 第一阶段培训 – 培训工厂培训师

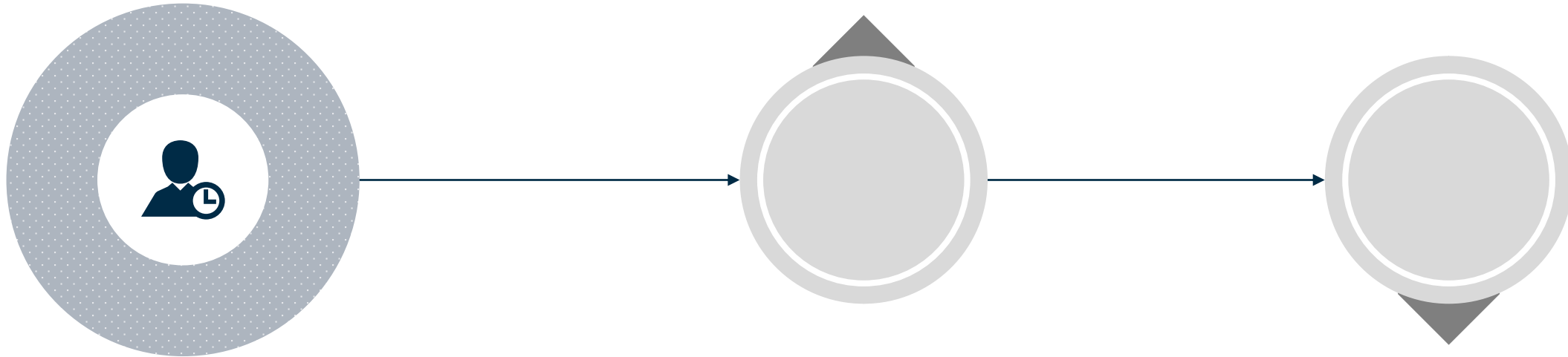
Soft Skills 软技能



Q&A on Techniques 技术答疑

Phase II Training 第二阶段培训

Internal Training roll-out to factories Part 1
工厂展开内部培训 – part I



Internal Training roll-out to factories Part II
工厂展开内部培训 – part II

The same people should go to basic training (part 1) and advanced training (part 2).

同样的人应该参加基础培训（第1部分）和高级培训（第2部分）。

Some workers, should be chosen to be the in-house expert trainers who will receive additional trainer training on soft skills.

一些工人（可能每个工厂2名）将被选为内部专家培训师，他们将接受额外的软技能培训。

Requirements on the Facility during training 培训中对工厂的要求

- Participate in training on time 准时参加培训
- Mute Cell Phone 手机静音
- Participate in interaction actively 积极参与互动
- In principle, trainee should attend the training throughout the course; if there is an emergency, trainee can leave with application. 原则上，应全程参加培训；若有紧急事务，需申请方可离开。

Activity 活动

Write down your expectations to our training courses.
写下您对我们培训课程的期望。

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Module 1: Knowledge Preparation, Basic Chemistry Review

模块一：知识准备、基础化学回顾

TÜV Rheinland
March 2019



CONTENT

What is Chemistry?
什么是化学?

01

Atoms 、 Molecules 、 Elements 、
Valence and Chemical Formula
原子、分子、元素、化合价和化学式

02

Classification of substances
物质的分类

03

04

Chemical reaction types
化学反应类型

Chemistry and human health
化学与人体健康

05

06

Q&A
问答

Learning objectives 学习目标:

1. To raise trainees' interest in chemistry 提高学员对化学的兴趣
2. To help workers without chemistry knowledge have a basic understand about chemicals帮助没有化学知识的工人基本了解化学品
3. To help workers with chemistry knowledge recall their knowledge 帮助具有化学知识的工人回忆他们的知识
4. To pave the way to the in depth topics on following topics 为以下主题的深入主题铺平道路

Target Group 目标群:

Participant 5% factory workers may include: 工厂5%的员工应包括:

- 1.High management: factory Board Chairman, Managing Director, General Manager 高层: 董事长、常务董事、总经理;
2. Department Manager in Quality, EHS, R&D, Manufacturing, Purchasing, IT, HR, Sales, and Admin 部门经理 (质量、EHS、研发、生产、采购、IT、人力资源、销售、行政)
3. All staffs in quality department, lab, and EHS department 质量部门、实验室和EHS部门的所有员工
- 4.Shift leaders in each manufacturing line, in chemical warehouse 每条生产线、每个化学品仓库领班
- 5.All interested workers are welcomed 所有感兴趣的员工
6. Miminum 10 people for each factory 每家工厂至少10人

Length: 时长

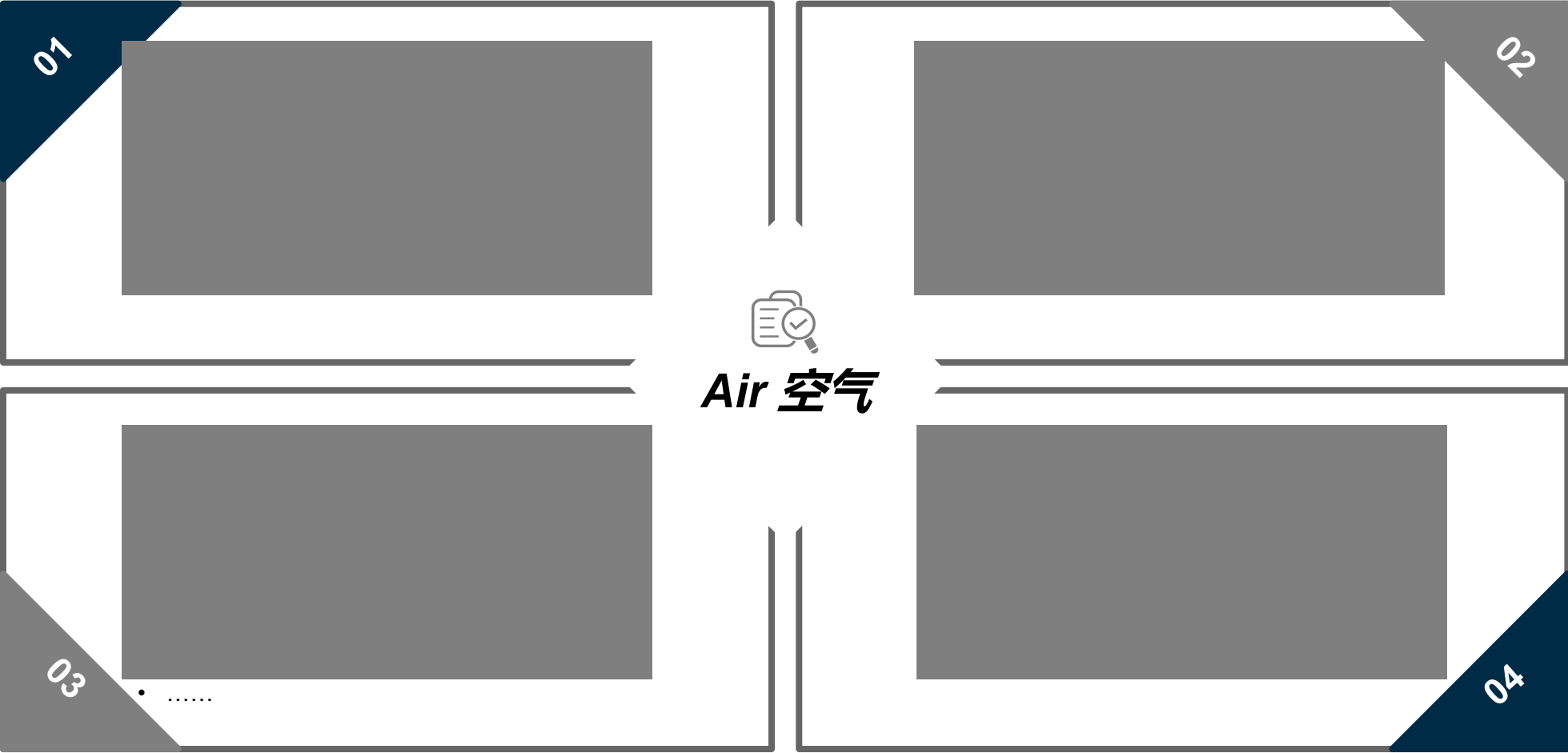
2 Hours 2小时

Training outcomes 培训成果

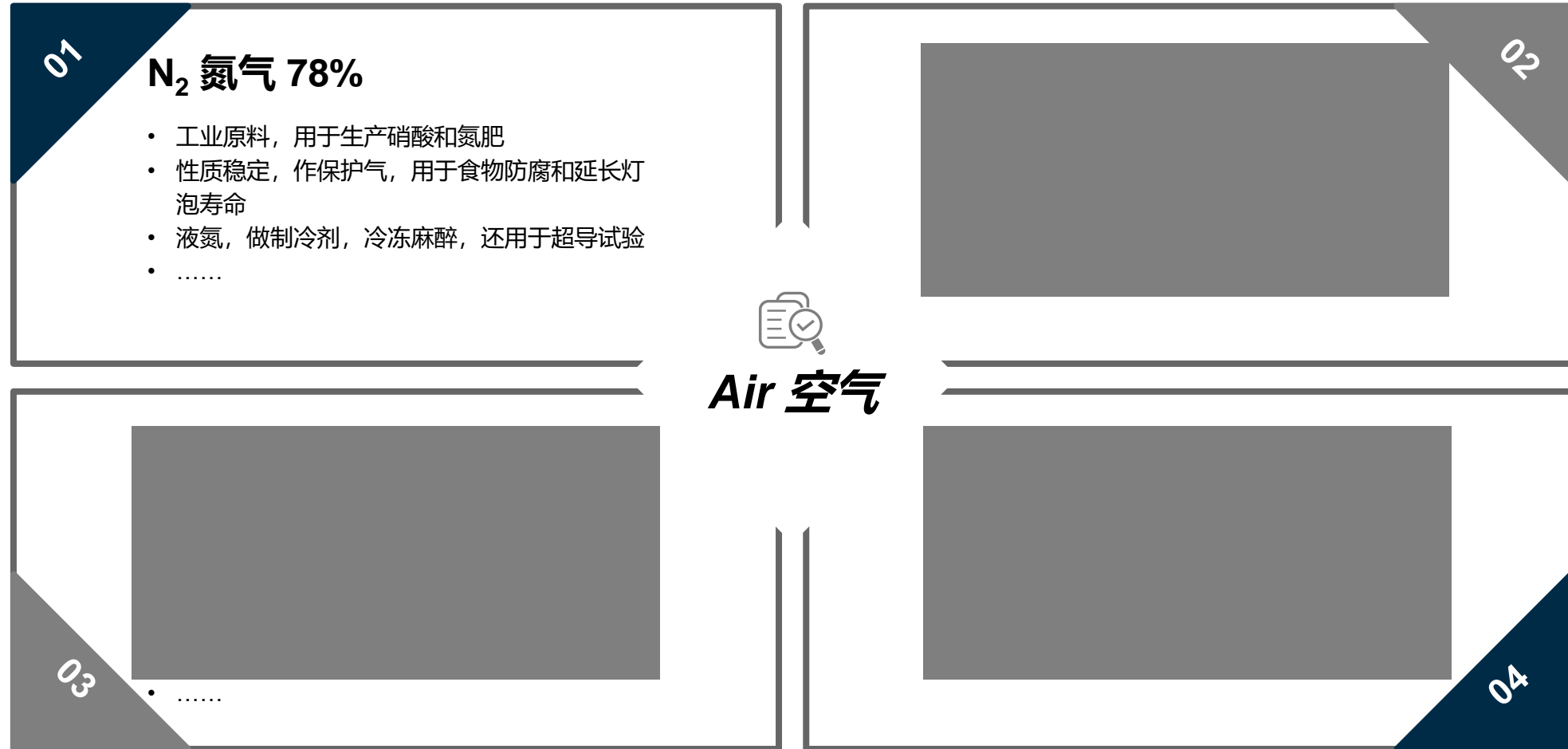
At the end of this training, the participants will be able to ...
培训结束后，参与者应该能...

- Distinguish between commonly used elements symbols
了解区别主要使用的元素符号
- Locate relevant information in the SDS.
了解SDS的最基本信息
- Classify chemicals
给化学品分类
- Relate some chemical phenomenon with chemistry principles
把一些化学现象与化学原理联系起来

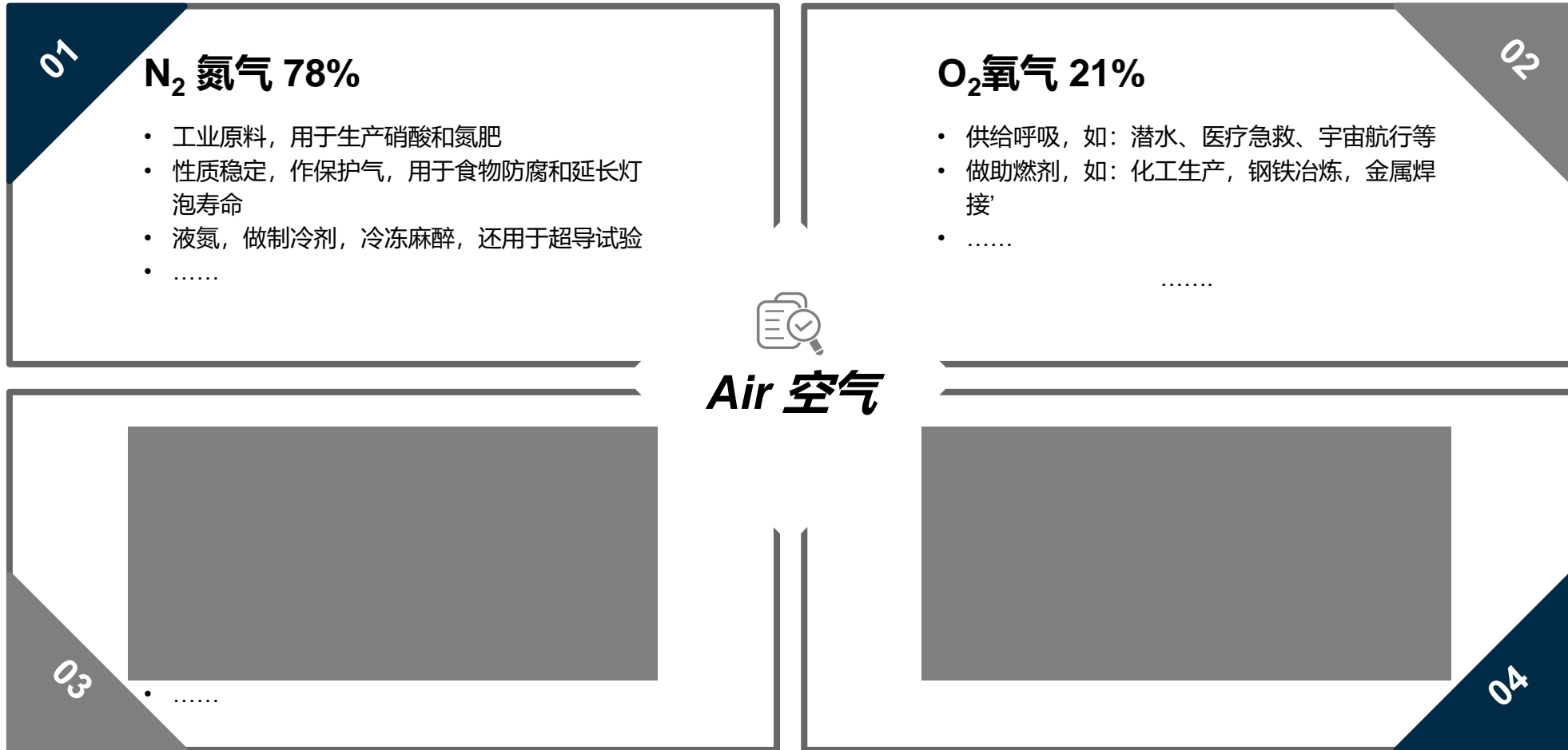
Chemicals around us 身边的化学物质



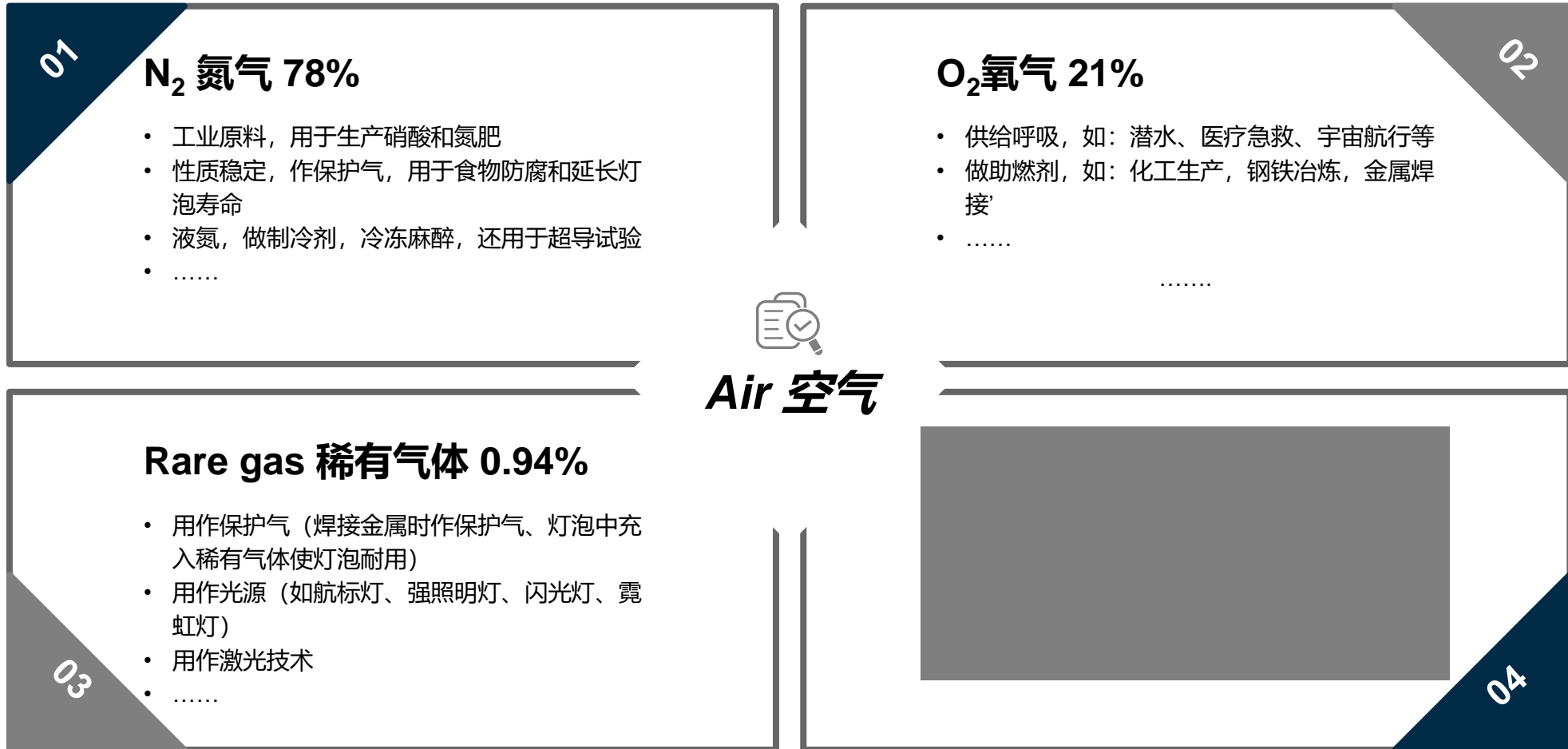
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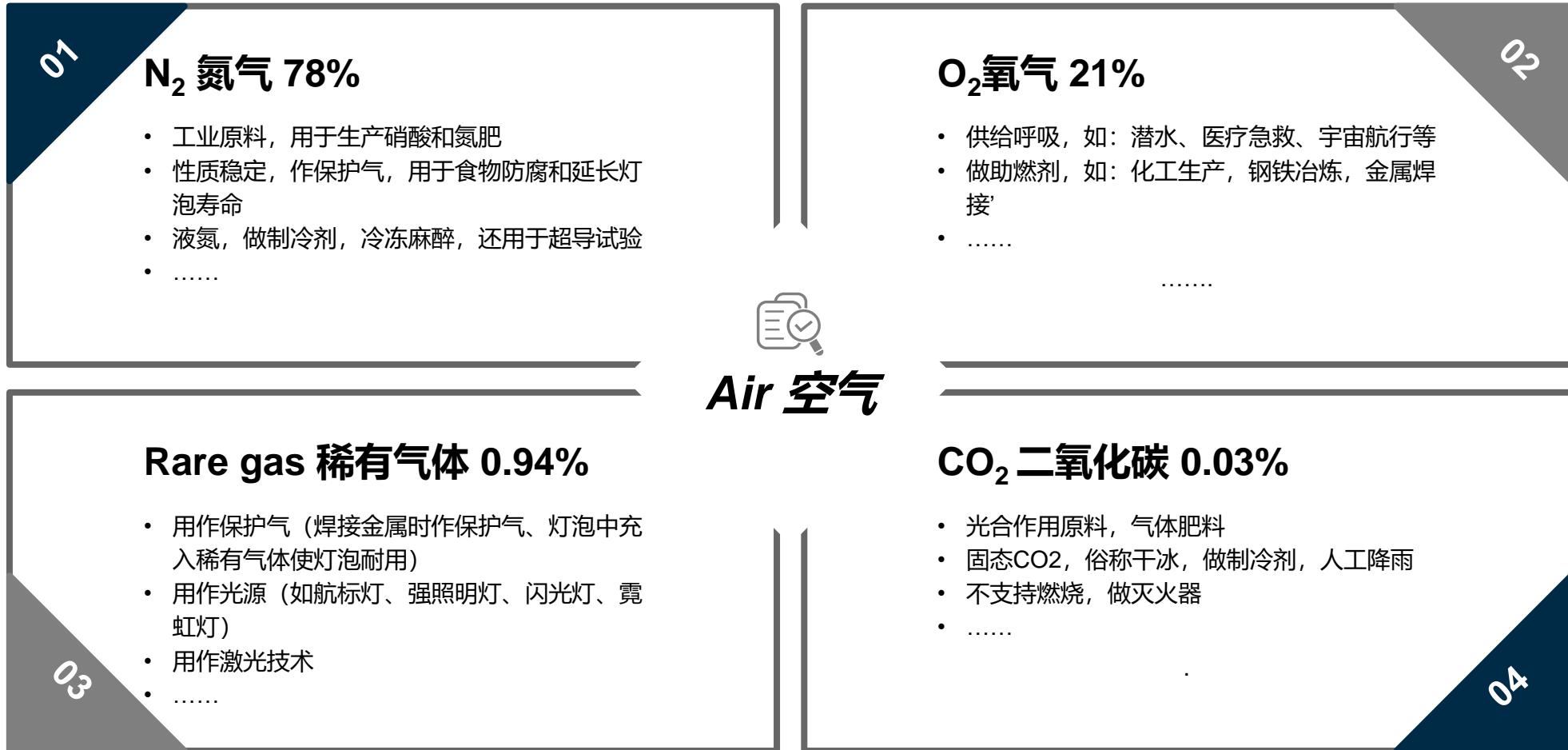
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Chemicals around us 身边的化学物质



Chemical phenomena around us and their explanations 身边的化学现象与解释

the main components of scale in kettles, thermos flasks and boilers
水壶、保温瓶和锅炉中水垢的主要成分



After frost, vegetables and radishes taste sweet
在霜降以后，青菜、萝卜等吃起来味道甜美

Rough neck disease (goiter) and dementia (cretinism)
粗脖子病（甲状腺肿大），呆小病（克汀病）



When goldfish are raised in tap water, it is necessary to bask in the sun for a period of time before water is injected into the tank water
用自来水养金鱼时，将水注入鱼缸以前需在阳光下晒一段时间

Yoghurt is produced by fermentation of lactic acid (transferred from lactose in milk).
酸奶是由乳酸发酵（由牛奶中的乳糖转化）而成



The reason why the non-stick pot does not stick to food is that the bottom of the pot is coated with a special substance.
不粘锅之所以不粘食物，是因为锅底涂上了一层特殊物质



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Calcium carbonate and magnesium hydroxide
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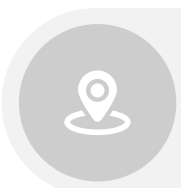



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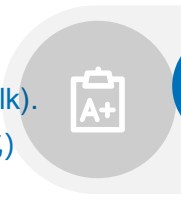
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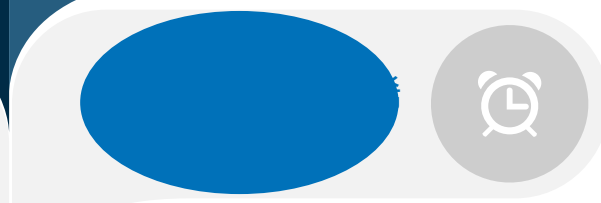
 Iodine 碘



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Glucose
葡萄糖



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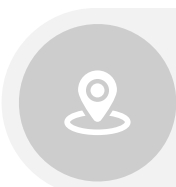


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Iodine 碘

Hypochlorite
次氯酸



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酸奶是由乳酸发酵（由牛奶中的乳糖转化）而成



lactic acid 乳酸




The reason why the non-stick pot does not stick to food is that the bottom of the pot is coated with a special substance.
不粘锅之所以不粘食物，是因为锅底涂上了一层特殊物质



Chemical phenomena around us and their explanations 身边的化学现象与解释

the main components of scale in kettles, thermos flasks and boilers
水壶、保温瓶和锅炉中水垢的主要成分

 Calcium carbonate and magnesium hydroxide
碳酸钙和氢氧化镁

Glucose
葡萄糖



After frost, vegetables and radishes taste sweet
在霜降以后，青菜、萝卜等吃起来味道甜美

Rough neck disease (goiter) and dementia (cretinism)
粗脖子病（甲状腺肿大），呆小病（克汀病）


 Iodine 碘

Hypochlorite
次氯酸



When goldfish are raised in tap water, it is necessary to bask in the sun for a period of time before water is injected into the tank water 用自来水养金鱼时，将水注入鱼缸以前需在阳光下晒一段时间

Yoghurt is produced by fermentation of lactic acid (transferred from lactose in milk).
酸奶是由乳酸发酵（由牛奶中的乳糖转化）而成

 lactic acid 乳酸

特富隆/聚四氟乙烯
Teflon/ PTFE



The reason why the non-stick pot does not stick to food is that the bottom of the pot is coated with a special substance. 不粘锅之所以不粘食物，是因为锅底涂上了一层特殊物质



What is Chemistry? 什么是化学?

Chemistry is a methodology to understand the world 化学是理解世界的方法论

Chemistry is a natural science that research the makeup, structure, characteristics, and transaction of the objectives on the molecular level.

化学是在原子层次上研究物质的组成、结构、性质、及变化规律的自然科学。

Organic Chemistry is the chemistry focus on the carbon's compounds.

有机化学是研究碳原子及其化合物的化学。

Alchemy, in western and in China, promotes the enlightenment of the chemistry.

西方炼金，中国炼丹，客观上促进了化学启蒙。

Periodic law of elements makes chemistry a science.

元素周期律的发现，使得化学真正成为了一门科学。标志性事件—铝元素的发现，其意义如同海王星的发现确立了经典力学的地位。

How does chemistry understand the world 化学是怎样理解物质世界的？

All object is made by molecule, and the force between molecule is called Van der Waals force, which is a weak interactive force between molecules;

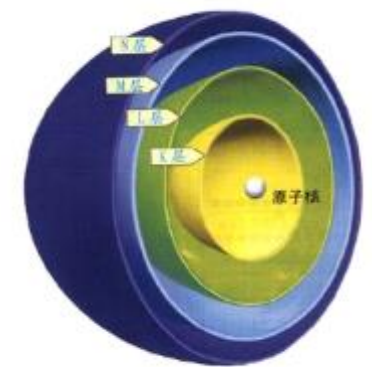
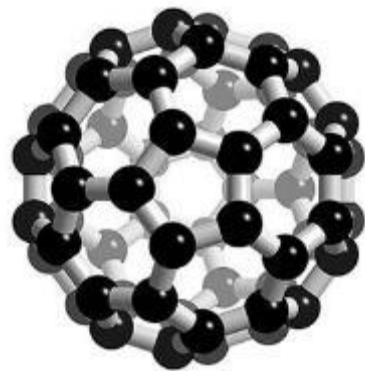
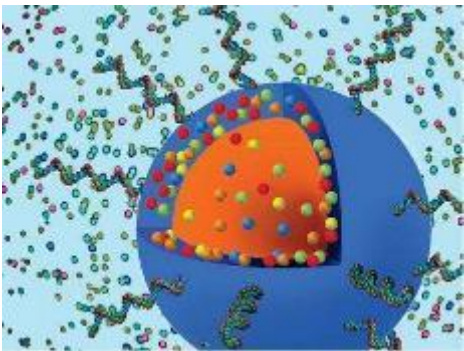
物质是由分子构成的，分子依靠范德华力存在较弱的相互作用；

Molecule is made by atoms, which are interacted by chemical bond (ionic bond, covalent bond, and metallic bond).

分子是由原子构成的，原子间依靠化学键（离子键，共价键，金属键）存在较强的相互作用；

Atom is made by nucleus and electron, the movement of the outer electrons can be described by atomic orbital theory.

原子是由原子核和核外电子构成，核外电子的运动用原子轨道理论描述。



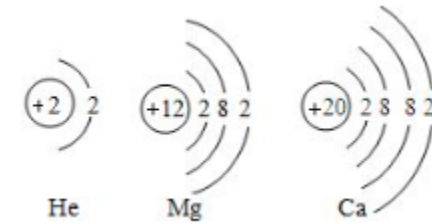
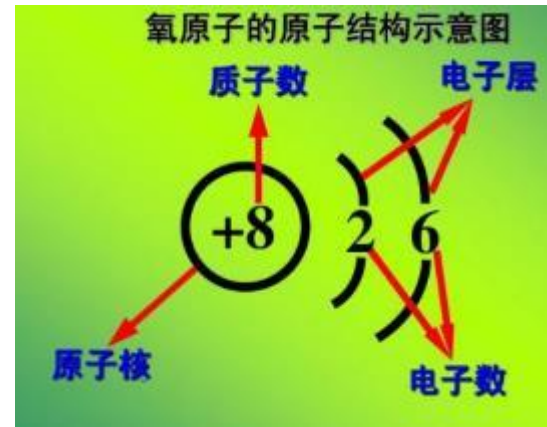
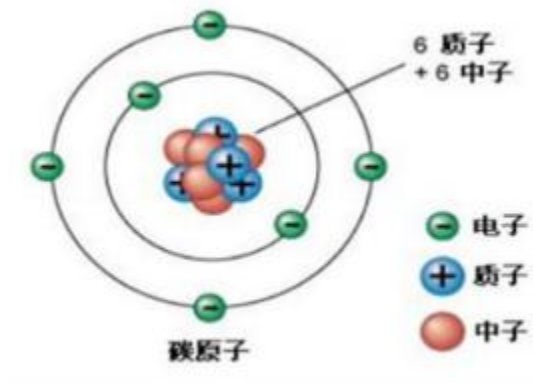
Atoms 原子

1. Atoms are the smallest particles in chemical change.

原子是化学变化中的最小微粒。

- A positive atom contains a dense nucleus and a number of negatively charged electrons surrounding the nucleus
一个正原子包含有一个致密的原子核及若干围绕在原子核周围带负电的电子；
- Positive atomic nuclei consist of positively charged protons and electrically neutral neutrons
正原子的原子核由带正电的质子和电中性的中子组成；
- When the number of protons is the same as the number of electrons, the atom is electrically neutral. Otherwise, it is an ion with positive or negative charges.
当质子数与电子数相同时，这个原子就是电中性的，否则，就是带有正电荷或者负电荷的离子
- Depending on the number of protons and neutrons, the type of atom varies: the number of protons determines which element the atom belongs to, and the number of neutrons determines which isotope the atom belongs to.
- 根据质子和中子数量的不同，原子的类型也不同：质子数决定了该原子属于哪一种元素，而中子数则确定了该原子是此元素的哪一个同位素

Atoms 原子





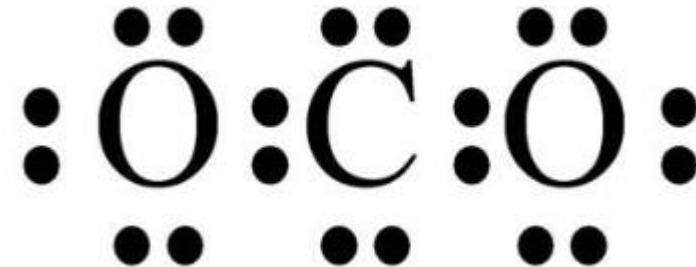
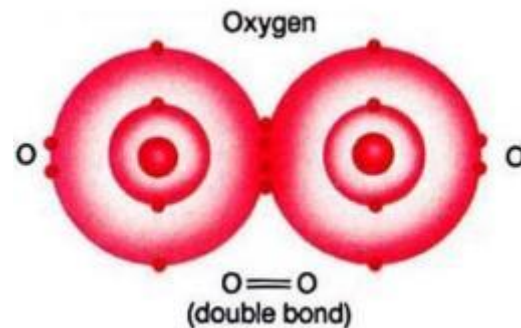
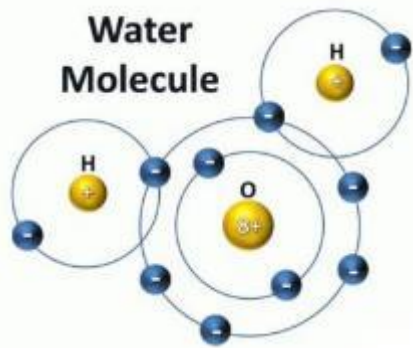
Is an atom the smallest particle of substance?
原子是构成物质的最小粒子?



Atoms can also be divided into nuclei and extranuclear electrons. The nuclei are composed of protons and neutrons. The number of protons is the basis for distinguishing different elements. Protons and neutrons can be further divided. So atoms are not the smallest particles of matter, but they are the smallest particles in chemical reactions. 原子又可以分为原子核与核外电子，原子核又由质子和中子组成，而质子数正是区分各种不同元素的依据。质子和中子还可以继续再分。所以原子不是构成物质的最小粒子，但原子是化学反应中的最小粒子。

Molecules 分子

1. Molecules are the smallest particles that keep the chemical properties of substance. 分子是保持物质化学性质的最小微粒。
- Molecules are very small particles 分子是很小的粒子
 1. Small size 体积小: If the size of water molecule is compared with table tennis, it's like comparing table tennis with the earth. 如果用水分子的大小跟乒乓球比, 就像拿乒乓球跟地球比一样。
 2. Low mass 质量小: Take water molecule as an example, the mass of a water molecule is about $3 \cdot 10^{-26}$ kg. Molecules are small and light, but they are real. 以水分子为例, 1个水分子的质量大约是 3×10^{-26} kg。分子虽然小且轻, 却是真实存在的。



Molecules 分子

➤ Molecules are always moving 分子总是在不断地运动

1. Examples of molecular movement 分子运动的例子:

2. Wet clothes dry after drying 湿衣服经过晾晒会干;

3. Flowers can be smelled far away 很远的地方就能嗅到花香;

4. While putting candy into water, candy disappears, but water becomes sweet, these are the results of continuous molecular movement. 糖块放到水里, 糖不见了, 水却变甜了, 这些都是分子不断运动的结果。

5. The experiment to verify the continuous movement of molecules 验证分子不断运动的实验:

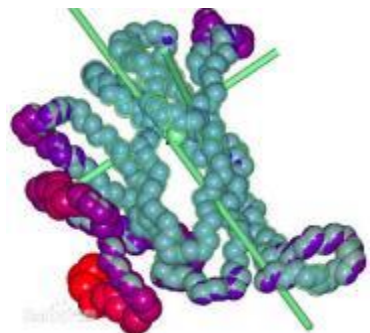
<https://v.qq.com/x/page/p0685108pzi.html>

➤ Molecular movement is related to temperature. High temperature, fast molecular movement; Low temperature, slow molecular movement. 分子的运动跟温度有关, 温度高, 分子运动快; 温度低, 分子运动慢。

1. Principle: Brownian Movement 原理: 布朗运动

Polymer compounds 高分子

- Polymer compounds (also known as polymers) have much larger molecules than low molecular organic compounds.
 1. 高分子化合物（又称高聚物）的分子比低分子有机化合物的分子大得多。
- Generally, the relative molecular weight of organic compounds does not exceed 1000, while the relative molecular weight of macromolecule compounds can be as high as 1 million.
 1. 一般有机化合物的相对分子质量不超过1000，而高分子化合物的相对分子质量可高达 $10^4 \sim 10^6$ 万
- Polymers are classified into three categories: plastics, rubber and fibers
 1. 高分子分成塑料、橡胶和纤维三大类



Molecules and Atoms 分子与原子

	Molecule 分子	Atom 原子
Similarity 相同点	Small in mass and volume 质量、体积都非常小;	
	There is a gap between each others 彼此间有间隔;	
	Always keep moving 总是不停地运动;	
	The same molecule (or atom) has the same properties, but different molecule (or atom) has different properties 同种分子（或原子）性质相同，不同种分子（或原子）性质不同;	
Differences 不同点	Molecules are the smallest particles that keep the chemical properties of substance 分子是保持物质的化学性质的最小粒子	Atoms are the smallest particles in chemical change 原子是化学品变化中的最小粒子
	In chemical reactions, molecules can be divided into atoms, which can be reassembled into new molecules. 在化学品反应中，分子可以分为原子，原子有可以重新组合成新的分子	In chemical reactions, atoms can no longer be separable and can not be changed into other atoms 在化学反应中，原子不可再分，不能变化成其他原子
	Molecules can form substances directly 分子可以直接构成物质	Atoms can form molecules or substances 原子可以构成分子，也可以构成物质

Exercise 练习

1. Which one of the following statements is incorrect 下列说法有误的是 ()
 - A. Atoms can form substances directly 原子可以直接构成物质
 - B. Molecules can be redivided, atoms can't be redivided 分子可以再分, 原子不能再分
 - C. In chemical reaction, the change of molecule and the unchange of atom indicate that the molecule is moving and the atom is stationary 化学药品反应中, 分子改变而原子不变, 说明分子是运动的, 原子是静止的
 - D. Water molecules retain the chemical properties of water 水分子保持水的化学性质
1. Resolution: Molecules and atoms can form substances directly. Molecules are made up of atoms. Atoms can be divided into protons and neutrons. Molecules are the smallest particles that keep the chemical properties of substance. Moleculars and atoms are moving irregularly.
2. 解析: 分子和原子均可以直接构成物质, 分子由原子构成, 原子可以分为质子和中子。分子是保持物质化学性质的最小微粒, 分子原子都在做不规则的运动

Elements 元素

1. Definition of Elements 元素的概念
2. A generic term for a class of atoms with the same number of charges (i.e. protons in the nucleus)
3. 具有相同电荷数（即核内质子数）的一类原子的总称。
4. Water is made up of water molecules. Water molecules are made up of hydrogen atoms and oxygen atoms; Oxygen is made up of oxygen molecules, and oxygen molecules are made up of oxygen atoms. The proton number of the same kind of atom is the same, that is, the proton number of oxygen atom in water molecule and oxygen atom in oxygen molecule are both 8. In chemistry, oxygen atom with 8 proton number is collectively called oxygen element.
5. 水是由水分子构成，水分子是由氢原子和氧原子构成；氧气是由氧分子构成的，氧分子又是由氧原子构成的。同种原子质子数相同，即水分子中的氧原子和氧分子中的氧原子的质子数都是8，化学上把质子数都是8的氧原子统称为氧元素。

Elements 元素

2. Element Symbols 元素符号

1. Internationally, the first letter of the Latin name of the element is used to represent the element. For example, the Latin name of the hydrogen element is Hydrogenium, and the element symbol is H; the Latin name of the oxygen element is Oxygenium, and the element symbol is O. If the first letter of the Latin name of several elements is the same, a lowercase letter is added to distinguish them. For example, copper is represented by Cu, calcium by Ca, chlorine by Cl, etc. These symbols used to represent elements are called element symbols.
2. 国际上统一采用元素拉丁文名称的第一个字母来表示元素，如氢元素的拉丁文名称为Hydrogenium，元素符号就是H；氧元素的拉丁文名称为Oxygenium，元素符号就写作O。如果几种元素拉丁文名称的第一个字母相同时，就附加一个小写字母来区别。例如：用Cu表示铜，Ca表示钙，Cl表示氯等等，这些用于表示元素的符号叫做元素符号。

3. 3. Periodic table of the elements 元素周期表

4. According to the atomic structure and properties of the elements, the table obtained by arranging more than 100 known elements scientifically and orderly in atomic order is called the periodic table of elements. On the periodic table of elements, the metal elements and non-metal elements are distinguished by different colors, and the relative atomic mass of the elements is marked.
5. 根据元素的原子结构和性质，将已知的100多种元素按原子序数科学有序地排列起来所得的表，叫做元素周期表。元素周期表上对金属元素、非金属元素用不同颜色做了区分，并标出了元素的相对原子质量。

元素周期表

族 周期	I A 1	II A 2	III B 3	IV B 4	V B 5	VI B 6	VIII 7	VIII 8	VIII 9	VIII 10	I B 11	II B 12	III A 13	IV A 14	V A 15	VI A 16	VII A 17	0 18 电子层 电子数	0 族 电子数	
1	1 H 氢 1s 1.008																	2 He 氦 1s 4.003	K	2
2	3 Li 锂 2s 6.941	4 Be 铍 2s 9.012											5 B 硼 2s ² 2p 10.81	6 C 碳 2s ² 2p 12.01	7 N 氮 2s ² 2p 14.01	8 O 氧 2s ² 2p 16.00	9 F 氟 2s ² 2p 19.00	10 Ne 氖 2s ² 2p 20.18	L K	8 2
3	11 Na 钠 3s 22.99	12 Mg 镁 3s 24.31											13 Al 铝 3s ² 3p 26.98	14 Si 硅 3s ² 3p 28.09	15 P 磷 3s ² 3p 30.97	16 S 硫 3s ² 3p 32.06	17 Cl 氯 3s ² 3p 35.45	18 Ar 氩 3s ² 3p 39.95	M L K	8 8 2
4	19 K 钾 4s 39.10	20 Ca 钙 4s 40.08	21 Sc 钪 3d ¹ 4s 44.96	22 Ti 钛 3d ² 4s 47.87	23 V 钒 3d ³ 4s 50.94	24 Cr 铬 3d ⁵ 4s 52.00	25 Mn 锰 3d ⁵ 4s 54.94	26 Fe 铁 3d ⁶ 4s 55.85	27 Co 钴 3d ⁷ 4s 58.93	28 Ni 镍 3d ⁸ 4s 58.69	29 Cu 铜 3d ¹⁰ 4s 63.55	30 Zn 锌 3d ¹⁰ 4s 65.41	31 Ga 镓 4s ² 4p 69.72	32 Ge 锗 4s ² 4p 72.64	33 As 砷 4s ² 4p 74.92	34 Se 硒 4s ² 4p 78.96	35 Br 溴 4s ² 4p 79.90	36 Kr 氪 4s ² 4p 83.80	N M L K	8 18 8 2
5	37 Rb 铷 5s 85.47	38 Sr 锶 5s 87.62	39 Y 钇 4d ¹ 5s 88.91	40 Zr 锆 4d ² 5s 91.22	41 Nb 铌 4d ⁴ 5s 92.91	42 Mo 钼 4d ⁵ 5s 95.94	43 Tc 锝 4d ⁵ 5s [98]	44 Ru 钌 4d ⁷ 5s 101.1	45 Rh 铑 4d ⁸ 5s 102.9	46 Pd 钯 4d ¹⁰ 106.4	47 Ag 银 4d ¹⁰ 5s 107.9	48 Cd 镉 4d ¹⁰ 5s 112.4	49 In 铟 5s ² 5p 114.8	50 Sn 锡 5s ² 5p 118.7	51 Sb 锑 5s ² 5p 121.8	52 Te 碲 5s ² 5p 127.6	53 I 碘 5s ² 5p 126.9	54 Xe 氙 5s ² 5p 131.3	O N M L K	8 18 18 8 2
6	55 Cs 铯 6s 132.9	56 Ba 钡 6s 137.3	57-71 La~Lu 镧系	72 Hf 铪 5d ² 6s 178.5	73 Ta 钽 5d ³ 6s 180.9	74 W 钨 5d ⁴ 6s 183.8	75 Re 铼 5d ⁵ 6s 186.2	76 Os 锇 5d ⁶ 6s 190.2	77 Ir 铱 5d ⁷ 6s 192.2	78 Pt 铂 5d ⁹ 6s 195.1	79 Au 金 5d ¹⁰ 6s 197.0	80 Hg 汞 5d ¹⁰ 6s 200.6	81 Tl 铊 6s ² 6p 204.4	82 Pb 铅 6s ² 6p 207.2	83 Bi 铋 6s ² 6p 209.0	84 Po 钋 6s ² 6p [209]	85 At 砹 6s ² 6p [210]	86 Rn 氡 6s ² 6p [222]	P O N M L K	8 18 32 18 8 2
7	87 Fr 钫 7s [223]	88 Ra 镭 7s [226]	89-103 Ac~Lr 锕系	104 Rf 钨* (6d ² 7s) [261]	105 Db 铪* (6d ³ 7s) [262]	106 Sg 铈* [266]	107 Bh 铈* [264]	108 Hs 铈* [277]	109 Mt 铈* [268]	110 Ds 铈* [281]	111 Rg 铈* [272]	112 Uub * [285]							

原子序数
元素名称注*的是人造元素

92 U
铀
5f⁶6d¹7s²
238.0

元素符号, 红色
指放射性元素

非金属

金属

过渡元素

外围电子层排布, 括号
指可能的电子层排布

相对原子质量 (加括号的数据
为该放射性元素半衰期最
长同位素的质量数)

镧系	57 La 镧 5d ¹ 6s 138.9	58 Ce 铈 4f ¹ 5d ¹ 6s 140.1	59 Pr 镨 4f ³ 6s 140.9	60 Nd 钕 4f ⁴ 6s 144.2	61 Pm 钷 4f ⁵ 6s [145]	62 Sm 钐 4f ⁶ 6s 150.4	63 Eu 铕 4f ⁷ 6s 152.0	64 Gd 钆 4f ⁷ 5d ¹ 6s 157.3	65 Tb 铽 4f ⁹ 6s 158.9	66 Dy 镝 4f ¹⁰ 6s 162.5	67 Ho 铈 4f ¹¹ 6s 164.9	68 Er 铈 4f ¹² 6s 167.3	69 Tm 铈 4f ¹³ 6s 168.9	70 Yb 铈 4f ¹⁴ 6s 173.0	71 Lu 铈 4f ¹⁴ 5d ¹ 6s 175.0
锕系	89 Ac 锕 6d ¹ 7s [227]	90 Th 钍 6d ² 7s 232.0	91 Pa 钷 5f ² 6d ¹ 7s 231.0	92 U 铀 5f ³ 6d ¹ 7s 238.0	93 Np 钷 5f ⁴ 6d ¹ 7s [237]	94 Pu 钷 5f ⁶ 7s [244]	95 Am 钷* 5f ⁷ 7s [243]	96 Cm 钷* 5f ⁷ 6d ¹ 7s [247]	97 Bk 钷* 5f ⁹ 7s [247]	98 Cf 钷* 5f ¹⁰ 7s [251]	99 Es 钷* 5f ¹¹ 7s [252]	100 Fm 钷* 5f ¹² 7s [257]	101 Md 钷* 5f ¹³ 7s [258]	102 No 钷* (5f ¹⁴ 7s) [259]	103 Lr 钷* (5f ¹⁴ 6d ¹ 7s) [262]

注:
相对原子质量录自2001年
国际原子量表, 并全部取4位有
效数字。

人民教育出版社化学室

Periodic Table of Elements 元素周期表

□ The periodic table, or periodic table of elements, is a tabular arrangement of the chemical elements, ordered by their atomic number, electron configuration, and recurring chemical properties, whose structure shows *periodic trends*.

1. 化学元素周期表是根据原子序数、电子结构排序的化学元素列表,其结构具有一定的周期性。

□ Table rows are commonly called periods and columns are called groups.

1. 横向一般叫做“周期”,纵向一般叫做“族”。

□ The elements, which have similar properties, are listed in the same group, such as group IA as alkali metal, group IIA as alkaline earth metal, group VIIA as halogens, group 0 as noble gases.

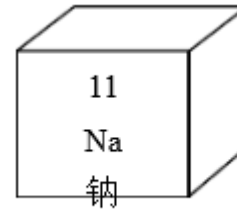
1. 具有相似性质的元素被归为一族,比如I族为碱金属,II族为碱土金属,VIIA族为卤素,0族为稀有气体。

□ The periodic table has 118 confirmed elements, from element 1 (hydrogen) to 118 (oganesson). The first 94 elements occur naturally; the remaining 24, americium to oganesson (95–118), occur only when synthesized in laboratories.

1. 元素周期表中有118种元素。前94种是天然存在的,后24种(从Am到Og)是合成的。

Exercise 练习

1. The information of sodium element in the periodic table of elements is shown in the figure. Which one is incorrect. 元素周期表中钠元素的信息如有图所示，对图中信息理解不正确的是（）
2. A. The proton number is 11 质子数为11
3. B. The name of the element is sodium 元素名称为钠
4. C. The element symbol is Na 元素符号为Na
5. D. The number of extranuclear electrons is 22.99 核外电子数为



6. Resolution: Number of extranuclear electrons = Number of protons in the nucleus
7. Relative atomic mass = proton number + neutron number
8. 解析：核外电子数 = 核内质子数
9. 相对原子质量 = 质子数 + 中子数

Activity 活动

There are two sets of cards. Each set has 20 cards. Element symbols such as “C” are on one set of cards. Elements in Chinese such as “碳” are on another set. Trainees will be grouped and pair for these elements. The purpose of this activity is to make participant be familiar with element symbol.

一共有两套卡片。每一套都有20张卡片。元素符号比如“C”在一套卡片上。中文的元素比如“碳”在另一套卡片上。将学员分组，对这些元素进行配对。这个活动的目的是让参与者熟悉元素符号。

Valence 化合价

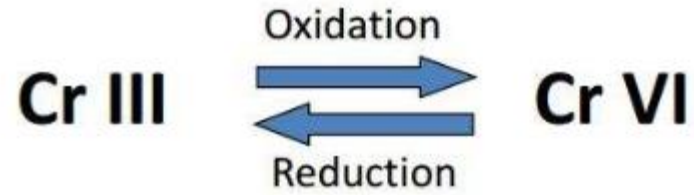
- Chelating valence is a property of an element, which is used to denote the number of atoms that combine with each other. 化合价是元素的一种性质，它用来表示原子之间相互化合的数目。
- The representation of valence is usually expressed by "+n"-n"on the top of element symbols or atomic groups, such as Mg, OH, etc. 化合价的表示方法：通常在元素符号或原子团的正上方用"+n""-n"表示，如Mg、OH等。

Element Name 元素名称	Element Symbol 元素符号	Common Valence 常见的化合价
Potassium 钾	K	+1
Sodium 钠	Na	+1
Silver 银	Ag	+1
Calcium 钙	Ca	+2
Magnesium 镁	Mg	+2
Barium 钡	Ba	+2
Zinc 锌	Zn	+2
Copper 铜	Cu	+1, +2
Iron 铁	Fe	+2, +3
Aluminium 铝	Al	+3
Manganese 锰	Mn	+2, +4, +6, +7

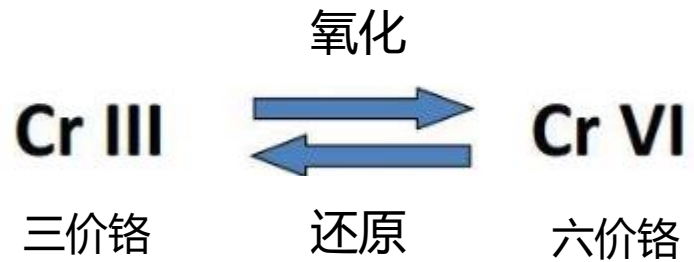
Element Name 元素名称	Element Symbol 元素符号	Common Valence 常见的化合价
Hydrogen 氢	H	+1
Fluorine 氟	F	-1
Chlorine 氯	Cl	-1, +1, +5, +7
Oxygen 氧	O	-2
Sulphur 硫	S	-2, +4, +6
Carbon 碳	C	+2, +4
Silicon 硅	Si	+4
Nitrogen 氮	N	-3, +2, +4, +5
Phosphorus 磷	P	-3, +3, +5

Valence 化合价

1. Fe³⁺:



2. Fe²⁺:



Chemical formula 化学式

1. Chemical Formula: Formulas of Material Composition Expressed by Elemental Symbols and Digital Combinations
2. 化学式：用元素符号和数字组合表示物质组成的式子
3. 2. Writing of Chemical Formula 化学式的写法：
 4. 1) Writing of chemical formulas of simple substances 单质的化学式的写法：
 - Rare gases, metals and some non-metals are directly composed of atoms. Their chemical formulas can be directly expressed by elemental symbols, such as helium (He), copper (Cu), sulfur (S). 稀有气体、金属和一些非金属是由原子直接构成的，它们的化学式可直接用元素符号表示，如：氦气 (He)、铜 (Cu)、硫 (S)；
 - For some substances consisting of diatomic or polyatomic molecules, the number of atoms in chemical formulas need to be indicated in the lower right corner of the element symbol, such as hydrogen (H₂), chlorine (Cl₂), ozone (O₃). 一些由双原子分子或多原子分子构成的物质，其化学式要在元素符号的右下角标出原子个数，如：氢气 (H₂)、氯气 (Cl₂)、臭氧 (O₃)；

Chemical formula 化学式

1. 2) Writing of Chemical Formulas of Compounds 化合物的化学式的写法:

- In a compound consisting of two elements, if it is an oxide, it is customary to write the symbol of the oxygen element on the right side and the other element on the left side. Then the number of atoms containing the element in each molecule is indicated in the lower right corner of the symbol, such as CO, CO₂ and MgO.
 1. 由两种元素组成的化合物中, 如果是氧化物, 习惯上把氧元素的符号写在右侧, 另一种元素写在左侧, 然后在元素符号右下角标出每个分子中含该元素的原子个数, 如: CO, CO₂, MgO.
- If it is a compound consisting of metallic elements and non-metallic elements, it is customary to write the symbols of metallic elements on the left and non-metallic elements on the right, and then mark the corresponding number of atoms, such as NaCl, Na₂S and BaCl₂.
 1. 如果是由金属元素和非金属元素组成的化合物, 习惯上把金属元素的符号写在左侧, 非金属元素的符号写在右侧, 然后标出相应的原子个数, 如: NaCl、Na₂S、BaCl₂.

Exercise 练习

Referring to the periodic table of elements, write down the chemical formulas of the following substances.
参照元素周期表，写出下列物质的化学式

1. 1. Non-metallic Elements: Hydrogen, Nitrogen, Oxygen, Chlorine, Phosphorus, Sulphur, Carbon
2. 非金属单质：氢气、氮气、氧气、氯气、磷、硫、碳
3. 2. Metal Elements: Sodium, Magnesium, Aluminum, Potassium, Calcium, Iron, Zinc, Copper and Barium
4. 金属单质：钠、镁、铝、钾、钙、铁、锌、铜、钡
5. 3. Common oxides: water, hydrogen peroxide, carbon monoxide, carbon dioxide, sulfur dioxide, iron oxide
6. 常见氧化物：水，过氧化氢、一氧化碳、二氧化碳、二氧化硫、三氧化二铁

Exercise 练习

1. Calcium fluoride is a transparent ceramic material, which not only resists high temperature, but also has excellent optical properties. It is used in bullet-proof glass and protective glasses. The valence of fluorine in CaF_2 is ()
- 氟化钙是一种透明陶瓷材料，不仅耐高温，而且具有优良的光学性能，用于防弹玻璃和防护眼镜等。 CaF_2 中氟元素的化合价是 ()
A. -2 B. -1 C. +1 D. +3

1. Resolution: The total valence of the compound is zero, and Ca shows the + 2 valence. Then valence of F can be calculated.
2. 解析：化合物的总化合价为零，Ca显示的是+2价，由此可计算。

2. The anti-counterfeiting ink in the new version of Renminbi contains a compound composed of magnesium and fluorine (valence - 1). Its chemical formula is as follows: ()
- 新版人民币中的防伪油墨含有一种由镁元素和氟元素（化合价为-1）组成的化合物，它的化学式是 ()
A. MgF B. Mg_2F C. MgF_2 D. Mg_2F_2

1. Resolution: The number ratio of magnesium to fluorine can be calculated according to the zero sum of the valence of the compound.

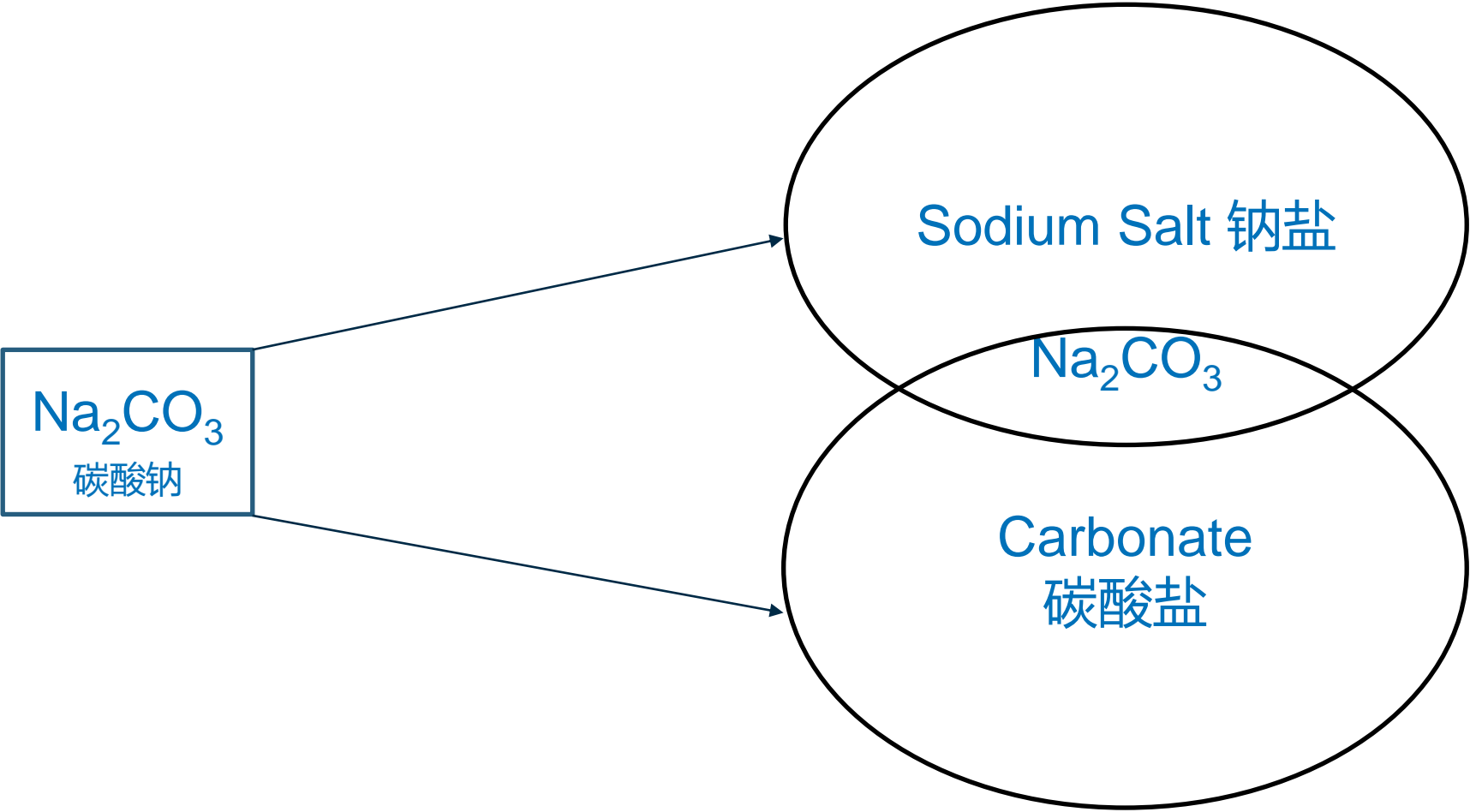
2. 解析：根据化合物化合价和为零，可计算出镁元素与氟元素的个数比。

Classification of Substances 物质的分类

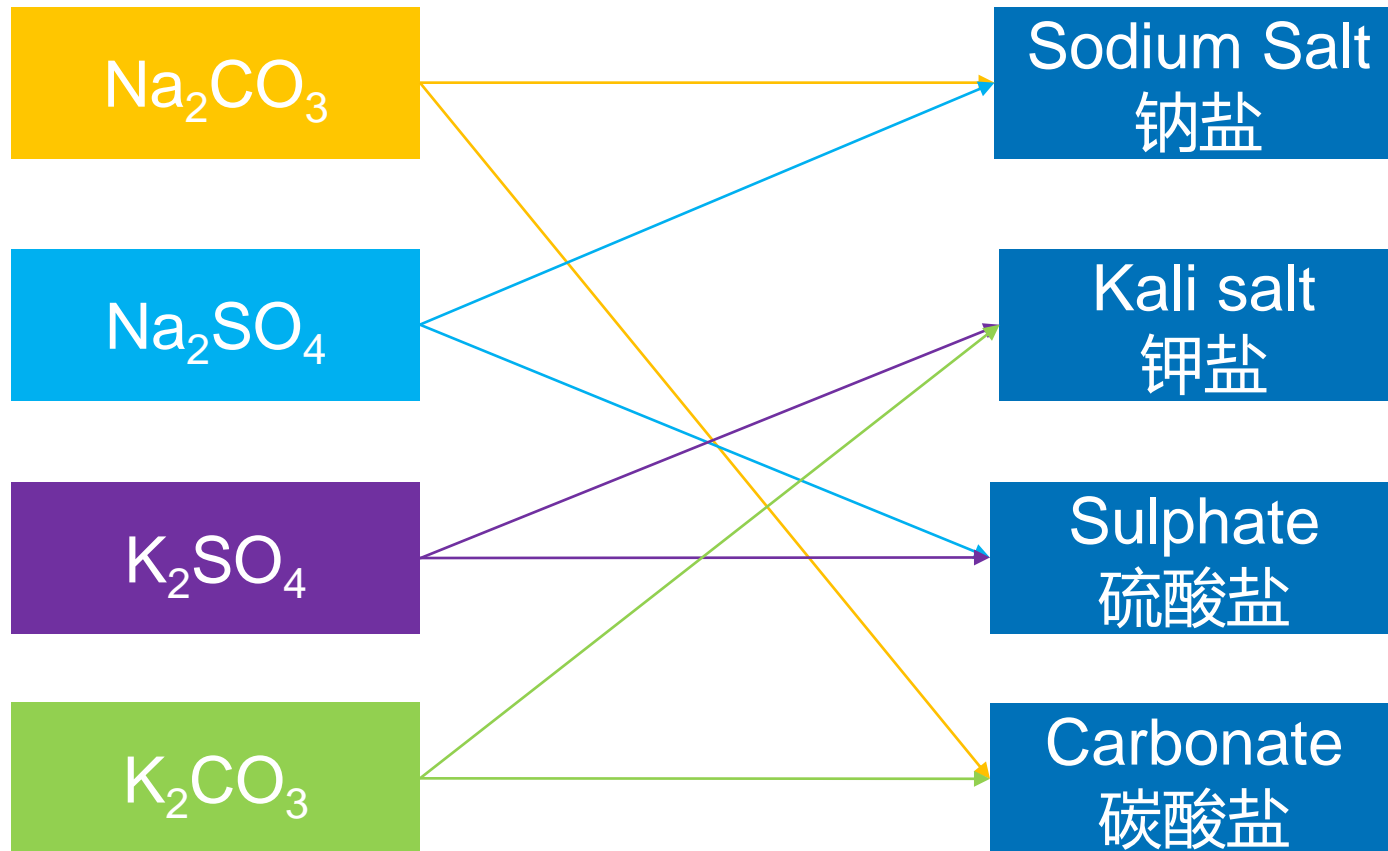
If we classify the same thing from different perspectives, will the results be the same?
对于同一事物，如果站在不同的角度分类，分类的结果是否一样？



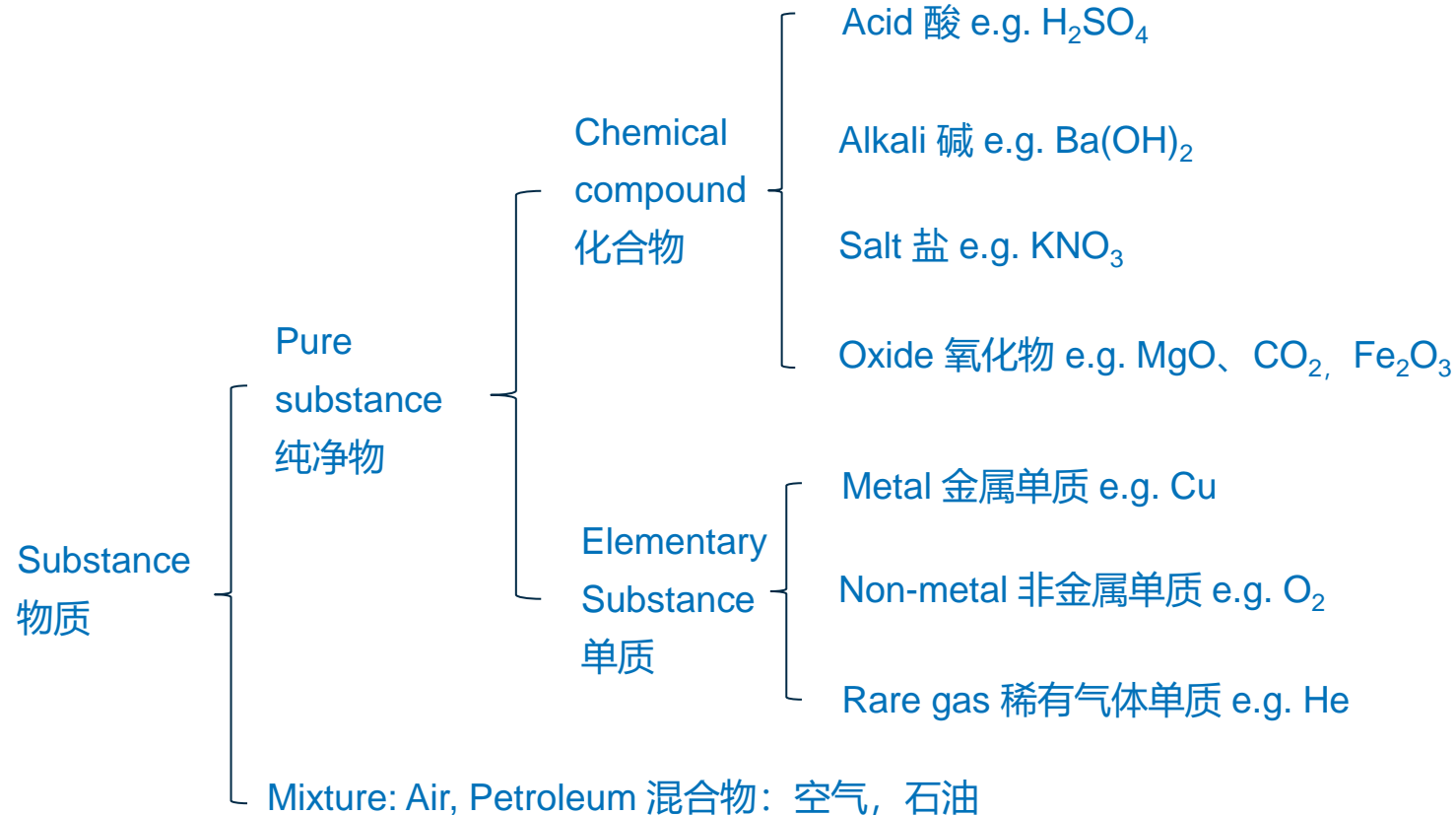
Classification of Substances 物质的分类



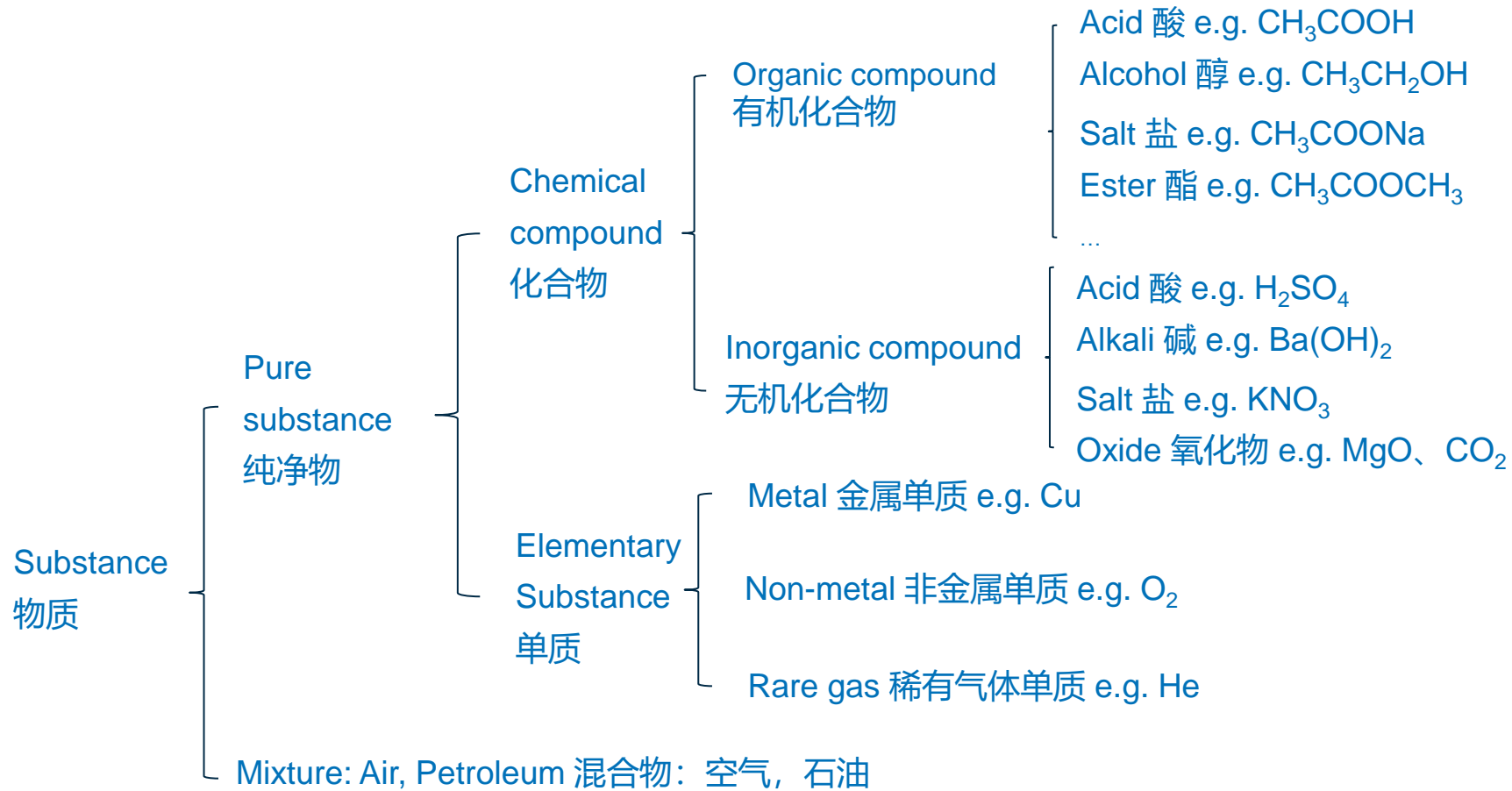
Classification of Substances 物质的分类



Classification of Substances (one kind) 物质的分类 (其中一种)



Classification of Substances (another kind) 物质的分类 (另一种)



Definition of Inorganic Compounds - 各类无机化合物的定义

1. Acid: The compounds, all the cations of which produced by ionization in aqueous solution are hydrogen ions. They include inorganic acid and organic acid.
2. 酸: 在水溶液中电离时产生的阳离子都是氢离子的化合物。其包括无机酸和有机酸。
3. Alkali: The compounds, all the anions of which produced by ionization in aqueous solution are OH-.
4. 碱: 水溶液中电离出的阴离子全部都是OH-的物质
5. Salt: The compounds, in which metal ions or ammonium ions bind to acid or non-metal ions, such as NaCl, Ca(NO₃)₂, Fe₂SO₄, CuCl₂, CH₃COONa, They include organic salt and inorganic salt.
6. 盐: 一类金属离子或铵根离子 (NH₄) 与酸根离子或非金属离子结合的化合物。如氯化钠, 硝酸钙, 硫酸亚铁和氯化铜, 醋酸钠等。可分为有机盐和无机盐。
7. Oxide: Chemical compounds that only contain element "O" and another element. They only contain two kinds of elements. One of two elements is "O". If the other one is metal element, the chemical compound is metallic oxide. If the other one is non-metal element, the chemical compound is non-metallic oxide.
8. 氧化物: 氧元素与另外一种化学元素组成的二元化合物. 其构成中只含两种元素, 其中一种一定为氧元素, 另一种若为金属元素, 则称为金属氧化物; 若另一种不为金属元素, 则称之为非金属氧化物

Exercise 练习

Referring to the periodic table of elements, write down the chemical formulas of the following substances.

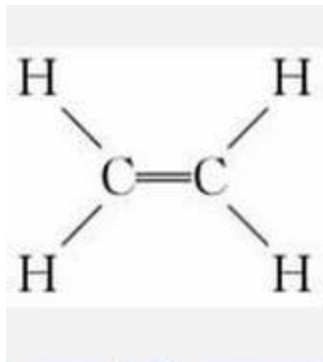
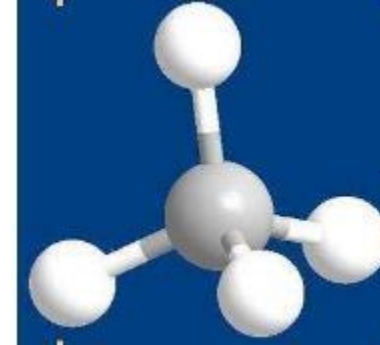
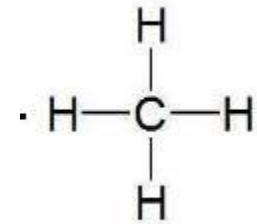
参照元素周期表，写出下列物质的化学式

1. Common acids: sulphuric acid, hydrochloric acid, carbonic acid
常见的酸：硫酸、盐酸、碳酸
2. Common alkali: sodium hydroxide, iron hydroxide, copper hydroxide
常见的碱：氢氧化钠、氢氧化铁、氢氧化铜

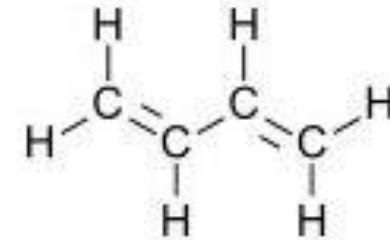
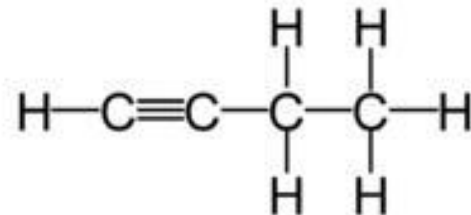
Organic chemical types - hydrocarbon compounds 有机物类型 – 烃类

The Chemical Compounds that contain only elements of carbon and hydrogen are called Hydrocarbon compounds. 仅含碳和氢两种元素的有机物称为烃。

1. 脂肪族 aliphatic organic types
2. 烷烃 alkane
3. 烯烃 alkene
4. 炔烃 alkyne
5. 二烯 butadiene



1-丁炔

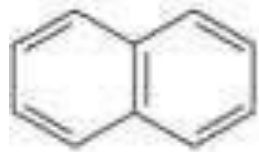
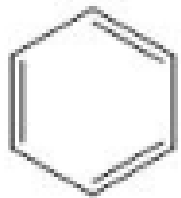


Organic chemical types - hydrocarbon compounds 有机物类型 – 烃类

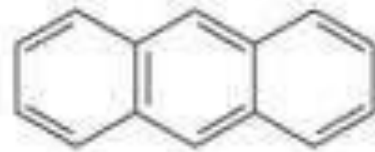
1. 芳香族 aromatic organic types

2. 苯 Benzene
3. 萘 naphthalene
4. 菲 phenanthrene
5. 蒽 anthracene
6. 芘 pyrene
7. 苯并芘 benzene (a) pyrene

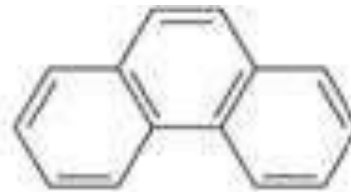
8. PAHs



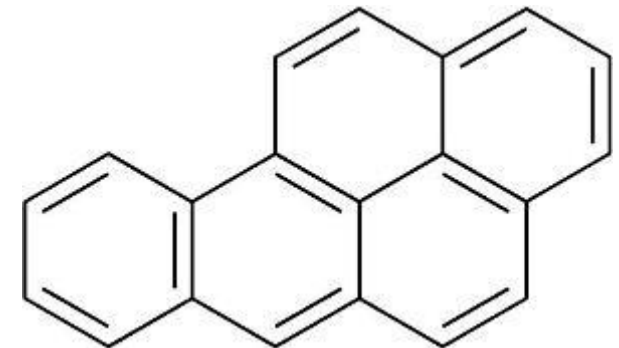
萘



蒽

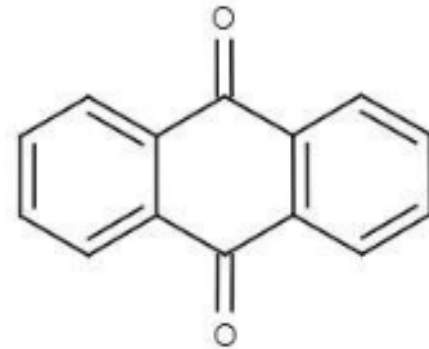
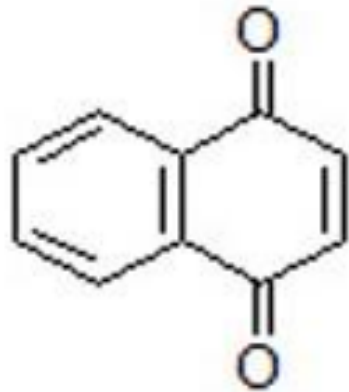


菲



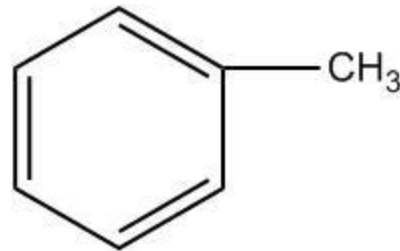
Common substituent group 常见的取代基

1. 醌类 Quinones
2. 苯醌 benzoquinone
3. 萘醌 naphthoquinone
4. 蒽醌 anthraquinone

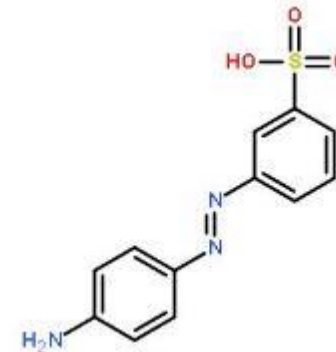
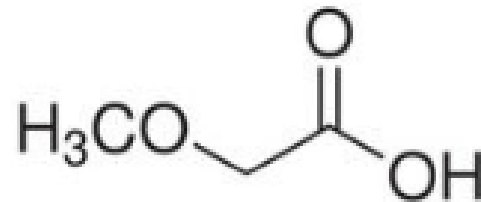
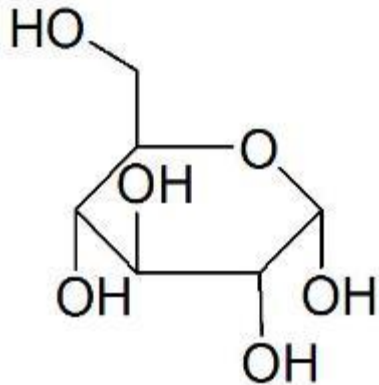
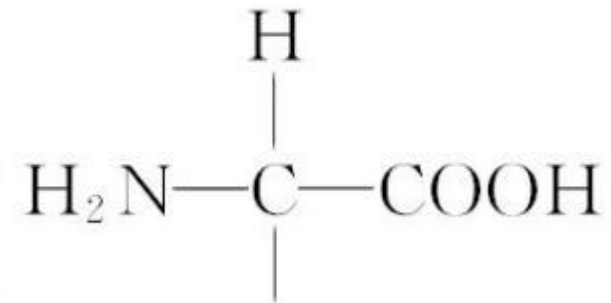
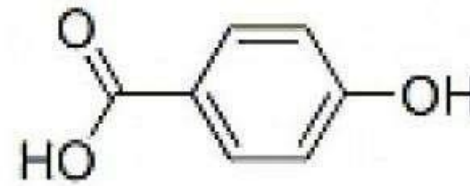
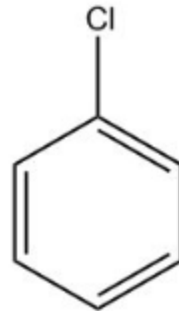
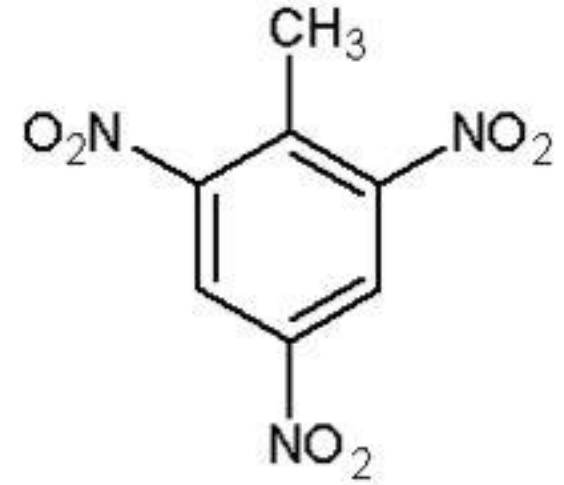
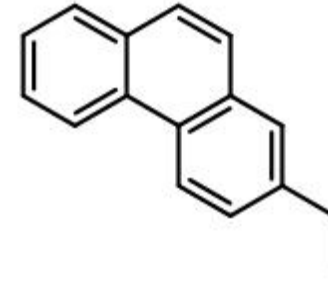


Common substituent group 常见的取代基

1. Halogen 卤素 -Cl
2. Methyl 甲基 -CH₃
3. Methoxyl 甲氧基 -OCH₃
4. Ethyl 乙基 -CH₂CH₃
5. Hydroxy 羟基 -OH
6. Nitryl 硝基 -NO₂
7. Carboxyl 羧基 -COOH
8. Amino 氨基 -NH₂
9. Sulfonyl 磺酸基 -SO₃H



Toluene
甲苯



Common substituent group 常见的取代基

Ester group 酯基

Aniline 苯胺

Azo 偶氮

s-triazine 均三嗪

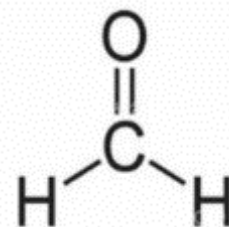
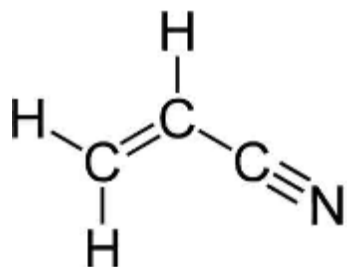
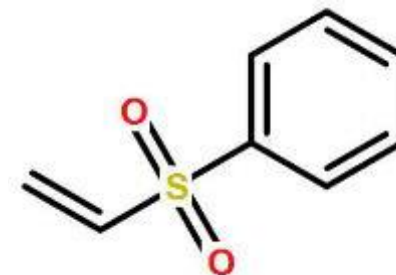
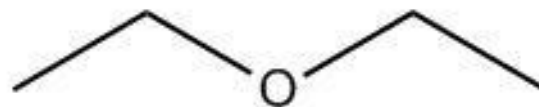
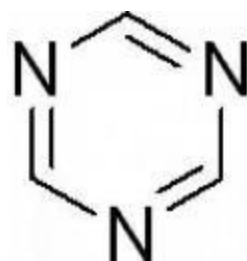
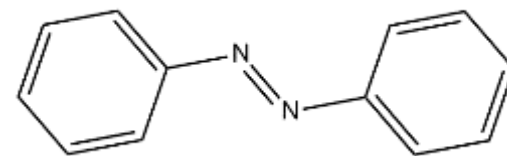
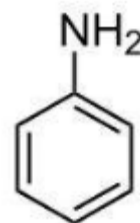
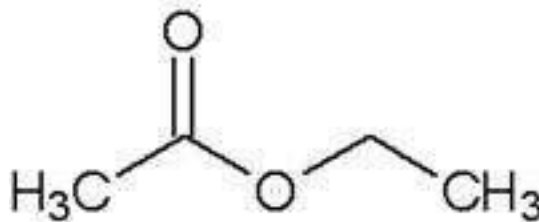
Vinyl sulfone 乙烯砜

Pyrimidine 嘧啶

Ether 醚

Cyanogen 氰

Formaldehyde 甲醛



Quiz 小测试



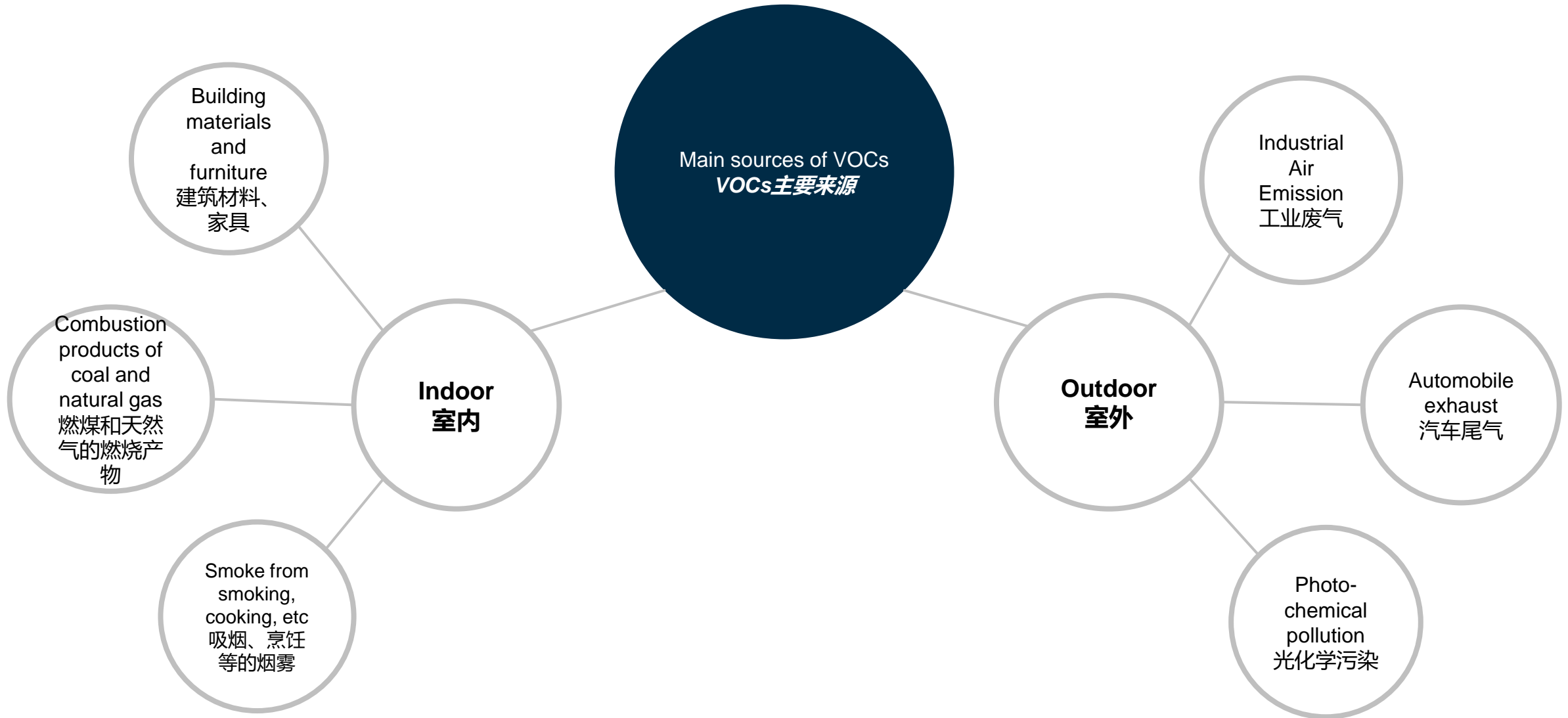
Do you know VOCs? How
could VOCs be classified?

你知道VOCs吗？如何对
VOCs进行分类？

Definition of VOCs 可挥发性有机物的定义

- Volatile Organic Compounds, commonly referred to as VOCs, are abbreviations for the first letter of the three words Volatile Organic Compounds. Total VOCs are sometimes represented by TVOC.
挥发性有机物，常用VOCs表示，它是Volatile Organic Compounds三个词第一个字母的缩写，总挥发性有机物有时也用TVOC来表示。
- According to WHO definition, VOCs is a class of organic compounds with boiling point between 50 and 250 degree, saturated vapor pressure over 133.32 Pa at room temperature, and existing in the air as vapor at room temperature
按照世界卫生组织的定义沸点在50°C-250°C的化合物，室温下饱和蒸汽压超过133.32Pa，在常温下以蒸汽形式存在于空气中的一类有机物。
- EPA defines it as any carbon-containing compound participating in atmospheric photochemistry except CO, CO₂, H₂CO₃, metal carbides, metal carbonates and ammonium carbonate
美国环境保护局对其的定义是除CO、CO₂、H₂CO₃、金属碳化物、金属碳酸盐和碳酸铵外，任何参加大气光化学反应的含碳化合物。

Main sources of VOCs 可挥发性有机物的主要来源



List of VOCs 可挥发有机物一览表

- Fossil fuels
化石燃料
- Benzene 苯
- Methylene chloride
二氯甲烷
- Perchloroethylene
全氯乙烯
- Methylene chloride
二氯甲烷
- Perchloroethylene
全氯乙烯
- Formaldehyde 甲醛
- Tetrahydrofuran
四氢呋喃
- Cyclohexane
环己烷
- Methyl Ethyl Ketone (MEK) 甲乙酮
- Toluene, Acetone, Hexane
甲苯、丙酮、己烷
- 1,1,1-Trichloroethane
1,1,1-三氯乙烷
- Methyl-Iso-Butyl Ketone (MIBK)
甲基异丁基酮



Chemical Reaction 化学反应

- Chemical reaction refers to the process in which molecules break into atoms and atoms rearrange and combine to form new molecules;
 1. 化学反应是指分子破裂成原子，原子重新排列组合生成新分子的过程；

- Chemical Reaction condition: Methods necessary or possible to increase the reaction rate in chemical reactions, such as heating (Δ), ignition, high temperature, electrolysis, electrification (electrolysis), ultraviolet radiation or catalysts, etc
 1. 化学反应所必须或可提高反应速率的方法，如：加热 (Δ)、点燃、高温、电解、通电（电解）、紫外线或催化剂等

- The reaction is often accompanied by luminescence, fever, discoloration, precipitation and so on
 1. 在反应中常伴有发光、发热、变色、生成沉淀物等

- Magic Chemical Reactions 神奇的化学反应
 1. <https://baijiahao.baidu.com/s?id=1597956351529137761&wfr=spider&for=pc>

Chemical reaction types 化学反应类型

Four Basic Types 四大基本类型

1. **Synthesis:** Two or more simple substances combine to form a more complex substance.
2. 化合反应: 由两种或两种以上的物质反应生成一种新物质的反应
3. **Decomposition:** A decomposition reaction is when a more complex substance breaks down into its more simple parts
4. 分解反应: 由一种物质生成两种或两种以上其它的物质的反应
5. **Single replacement:** a single uncombined element replaces another in a compound; in other words, one element trades places with another element in a compound
6. 置换反应: 一种单质与化合物反应生成另外一种单质和化合物的化学反应
7. **Double replacement:** the anions and cations of two compounds switch places and form two entirely different compounds
8. 复分解反应: 由两种化合物互相交换成分, 生成另外两种化合物的反应

Chemical reaction types 化学反应类型

Four Basic Types 四大基本类型

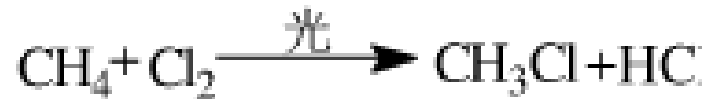


Representation of four basic chemical reactions types: synthesis, decomposition, single replacement and double replacement. 

Chemical reaction types 化学反应类型

Basic Reaction Types of Organic Chemistry 有机化学基本反应类型

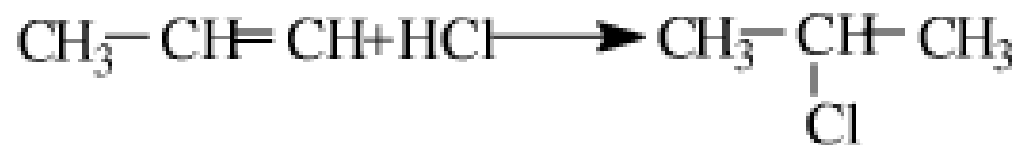
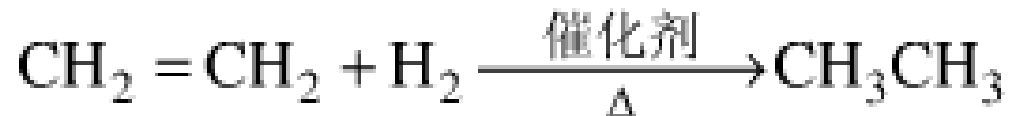
1. **Substitution:** In a substitution reaction, a functional group in a particular chemical compound is replaced by another group
2. 取代反应: 一个官能团被另一个所取代



Chemical reaction types 化学反应类型

Basic Reaction Types of Organic Chemistry 有机化学基本反应类型

1. **2. Addition and elimination:** reactions which change the number of substituents on the carbon atom, and form or cleave multiple bonds
2. 加成或消去反应：改变碳原子上取代基的个数，形成重键的反应。



The Application of Chemistry in Our Life 化学在生活中的应用

- Clothing: Brightly coloured clothing requires chemical treatment and dyeing
1. 衣：色泽鲜艳的衣料需要经过化学处理和印染
- Food: Processing and manufacturing food with good color, fragrance and flavor can not be separated from various food additives, such as sweeteners, preservatives, spices, condiments and pigments.
食：加工制造色香味俱佳的食物，离不开各种食品添加剂，如甜味剂、防腐剂、香料、调味剂和色素等
- Residence: Cement, lime, paint, glass and plastics used in modern buildings are all chemical products.
住：现代建筑所用的水泥、石灰、油漆、玻璃和塑料等材料都是化工产品
- Movement: All kinds of modern tools used as substitutes need not only gasoline and diesel as power, but also various gasoline additives, antifreeze and lubricants for mechanical parts.
行：用以代步的各种现代工具，不仅需要汽油、柴油作动力，还需要各种汽油添加剂、防冻剂以及机械部分的润滑剂



Chemistry and Human Health 化学与人体健康



Protein 蛋白质

Lipid 脂肪

Carbohydrate 糖类



Human essential nutrients
人体必须营养素

Mineral 无机盐

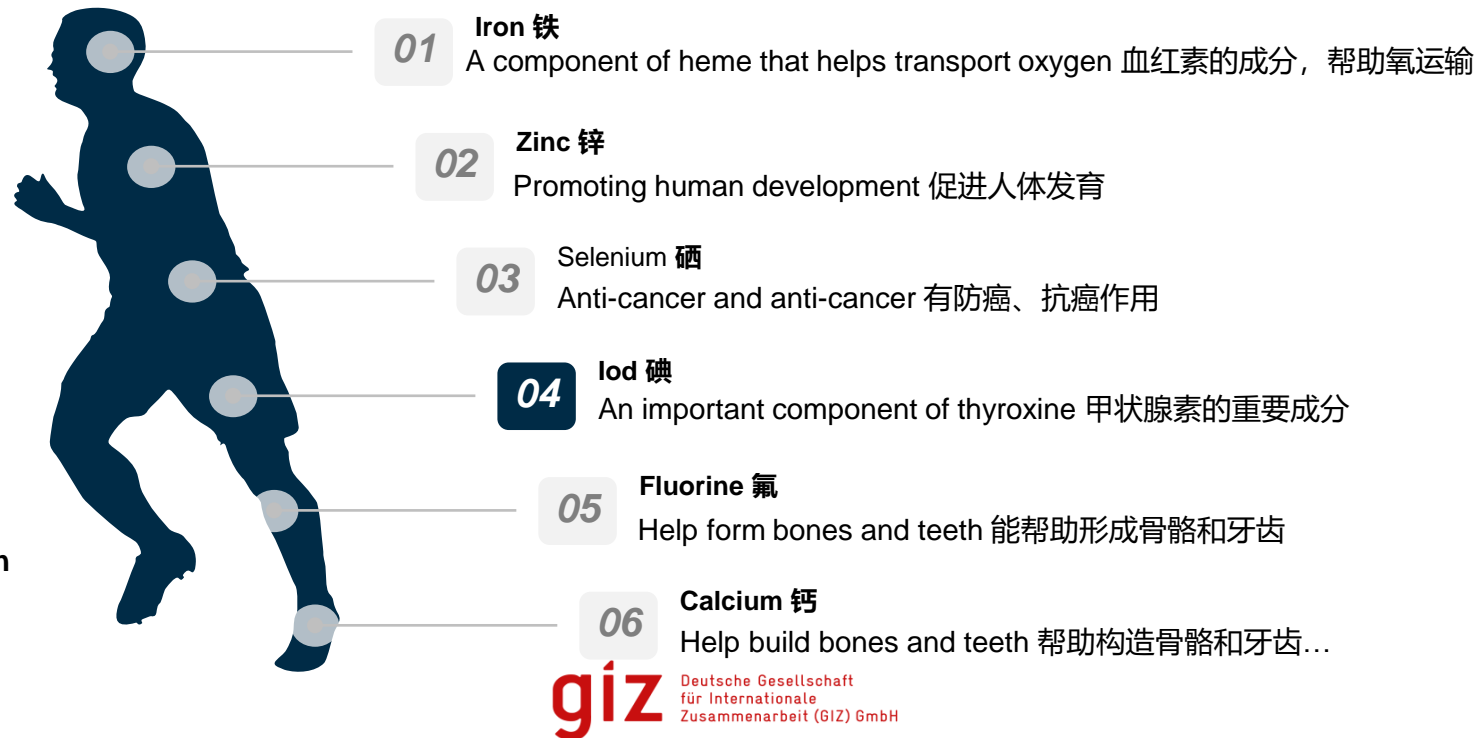
Vitamin 维生素

Water 水



Chemistry and Human Health 化学与人体健康

- There are more than 50 elements in human body. There are 11 kinds of elements in human body. 组成人体的元素共50多种。人体中含量较多的元素有11种。
- Elements with a content of more than 0.01% in the human body are called constant elements. Such as oxygen, carbon, hydrogen, nitrogen, calcium, etc. 在人体内含量超过0.01%的元素，称为常量元素。如氧、碳、氢、氮、钙等
- Elements containing less than 0.01% are called trace elements. Such as iron, copper, zinc, fluorine, iodine, selenium, etc. 含量在0.01%以下的元素，称为微量元素。如铁、铜、锌、氟、碘、硒等



The effect of some elements on human body.
一些元素对人体的作用

Chemistry and Human Health 化学与人体健康

Keep away from harmful substances 远离有害物质

- Prevention of heavy metal poisoning 预防重金属中毒
 1. When proteins are heated or exposed to nitric acid, formaldehyde, heavy metal salts and other chemical substances, their structures will be destroyed and their physiological activities will be lost. 蛋白质受热或遇到浓硝酸、甲醛、重金属盐等化学物质时，结构就会被破坏，失去生理活性。
- Do not eat spoiled food 不吃变质食品
 1. Deteriorated food contains toxic mycotoxins, of which aflatoxin is the most toxic. 变质食品中含有有毒的霉菌毒素，其中黄曲霉毒素的毒性最大
- Preventing harmful substances in life 防范生活中的有害物质
 1. Formaldehyde: moderately poisoned, denaturing proteins, mainly from decoration materials and aquatic products soaked in formaldehyde 甲醛：中等中毒，可使蛋白质变性，主要来源于装修材料和用甲醛浸泡过的水产品
 2. Methanol: blindness or even death 甲醇：使人双目失明甚至死亡
 3. Nitrite: highly toxic 亚硝酸盐：剧毒



Chemistry and Human Health 化学与人体健康

Keep away from harmful substances 远离有害物质

- Refuse tobacco 拒绝烟草

1. Cigarette contains a lot of toxic substances, among which CO, nicotine, tar and heavy metal salts are the most harmful. 香烟的烟雾中含有非常多的有毒物质，其中对人体危害最大的有CO、尼古丁、焦油和重金属盐

- Stay away from drugs 远离毒品

1. Drugs have sedative, analgesic and exciting effects, which can make people dependent 毒品具有镇静、止痛和兴奋的作用，可使人产生依赖性。



Module 2: Chemical Management System 模块二: 化学品管理系统

TÜV Rheinland
March 2019



CONTENTS 目录

01. Chemical Management Framework 化学品管理框架

02. Chemical Management Policy 化学品管理政策

- Chemical Procurement Policy 化学品采购政策
- Health and Safety Policy 健康和安全政策
- Environmental Management Policy 环境管理政策
- Waste Management Policy 废物管理政策
- Deadstock Management Policy 呆滞存货管理政策

03. Chemical Management Implementation 化学品管理的实行

- Chemical Management organization chart 化学品组织架构图
- Chemical Purchase 化学品采购
- Chemical Transport 化学品运输
- Chemical Storage 化学品存储
- Chemical Handling 化学品操作
- Chemical Disposal 化学品废弃
- Chemical Emergency response 化学品应急
- Chemical Training 化学品培训
- Chemical Management Audit 化学品管理审核

Learning objectives 学习目标:

1. To learn chemical management framework 学习化学品管理框架
2. To know the benefit to have a chemical management system in the factory 了解在工厂建立化学管理系统的好处
3. To learn the importance of policies and how to develop a chemical management policy 了解政策的重要性以及如何制定化学品管理政策
4. To learn how to establish a chemical management team and each team's responsibility 学习如何建立化学管理团队和每个团队的职责
5. To learn the key components in chemical management system 学习化学管理系统的关键组成部分
6. To learn how to develop SOPs in different sections in Chemical management system 学习如何在化学管理系统的不同部分开发SOP
7. To learn good practice of chemical management 学习化学管理的良好实践

Target Group 目标群:

Participant 5% factory workers may include: 工厂5%的员工应包括:

1. High management: factory Board Chairman, Managing Director, General Manager 高层: 董事长、常务董事、总经理;
2. Department Manager in Quality, EHS, R&D, Manufacturing, Purchasing, IT, HR, Sales, and Admin 部门经理 (质量、EHS、研发、生产、采购、IT、人力资源、销售、行政)
3. All staffs in quality department, lab, and EHS department 质量部门、实验室和EHS部门的所有员工
4. Shift leaders in each manufacturing line, in chemical warehouse 每条生产线、每个化学品仓库领班
5. All interested workers are welcomed 所有感兴趣的员工
6. Minimum 10 people for each factory 每家工厂至少10人

Length 时长:

6 Hours 6小时



Training outcomes 培训成果

At the end of this training, the participants will be able to ...

培训结束后，参与者应该能够

- Explain the key elements and benefits of a chemical management system
解释化学管理系统的关键要素和好处
- Formulate/develop a chemical management policy to reflect factory`s chemical management engagement
制定/制定化学管理政策，以反映工厂化学管理的参与程度
- Prepare an organigram/ organisational chart indicating departments to be involved in chemical management
准备一份组织结构图/组织结构图，指出参与化学管理的部门
- Define the responsibilities of departments and persons in chemical management
明确化学管理部门和人员的职责
- Prepare SOPs for different sections in chemical management system
为化学管理系统中的不同部分准备SOP

Chemical Management Framework
化学品管理框架

01

Quiz 小测试



**Which areas do you think
need to be involved in
chemical management?
你认为哪些方面需要包含在化
学品管理中?**

Exercise 练习

Team-up with colleagues of Your facility.

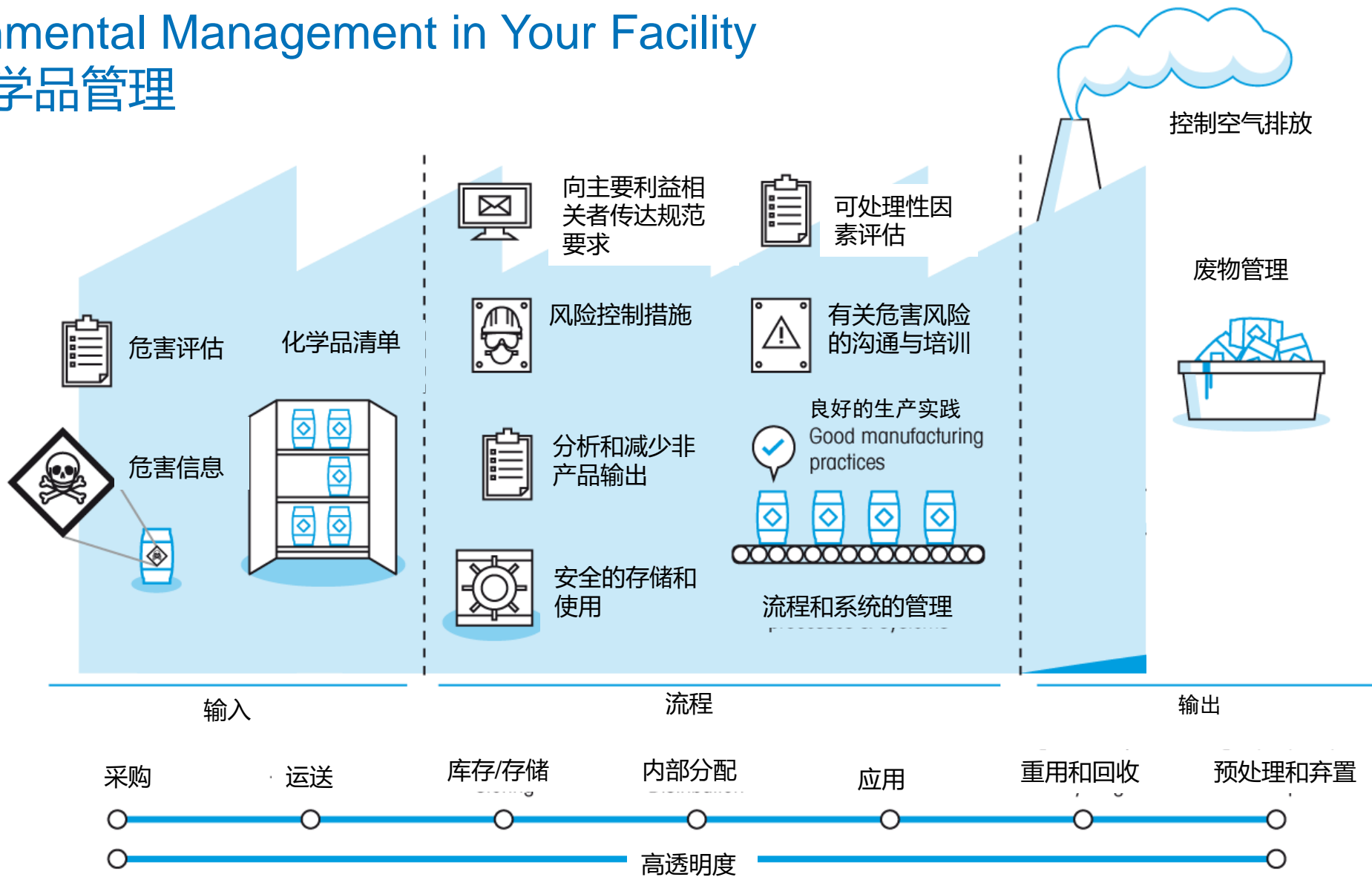
Assess the maturity of the Chemical Management System in Your facility.

与您的工厂的同事组队。

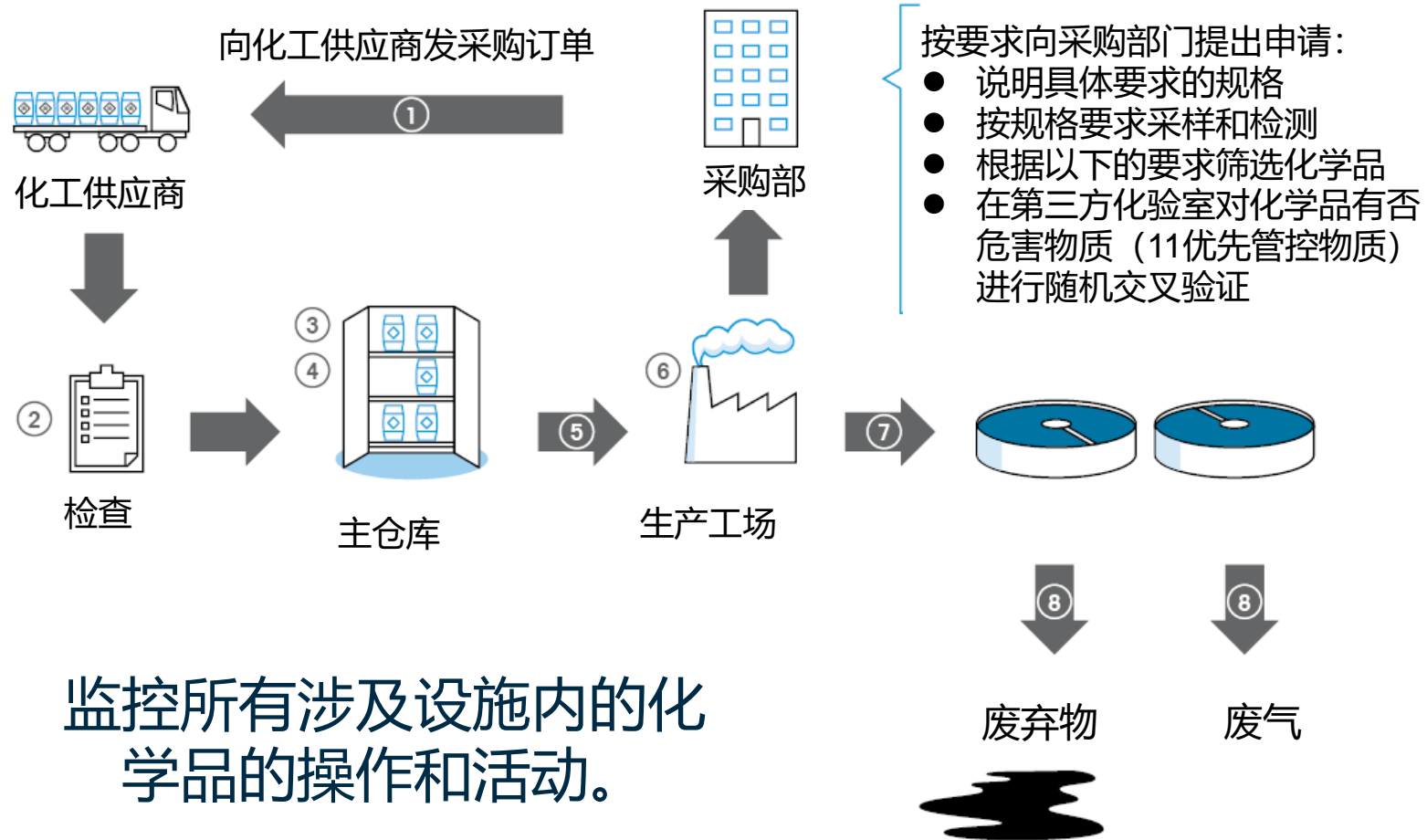
评估您的设施中化学品管理系统的成熟度。

Environmental Management in Your Facility

现场化学品管理



Chemical Management System 化学品管理系统












Quiz 小测试



**What are the benefits of a
Chemical Management
System?
化学品管理体系有什么好处?**

Benefits of a Chemical Management System and Resource Efficiency

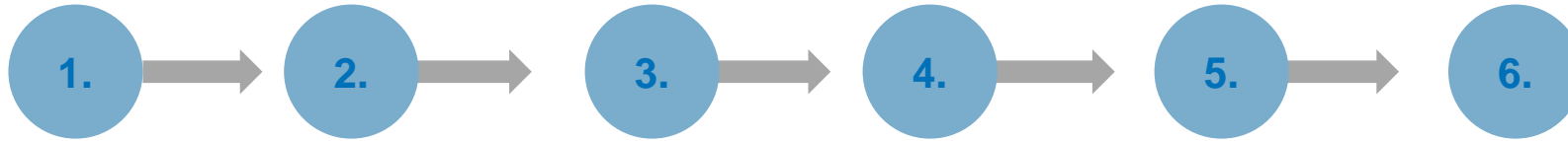
化学品管理体系和资源效率的好处

-  Maintain a license to operate/保持经营许可
-  Access to global market/进入全球市场
-  Maintain a competitive advantage/保持竞争优势
-  Minimise excessive or replicative chemical purchases/consolidate chemical purchasing/减少过量或重复化学品购买/整合化学品采购
-  Reduction in costs by reducing waste/overages/通过减少浪费/过量来降低成本
-  Reduce down time by creating a safer work environment/通过创建更安全的工作环境来减少停机时间
-  Stop potential hazards before they become an issue/阻止潜在危险的发生
-  Helps facilities ensure that RSL compliant materials are being produced; becomes invaluable in tracking down issues if they do arise/帮助设施确保生产符合RSL标准的材料;如果出现问题,就能提供非常有用的资料追溯根源。
-  Traceability of chemicals in the supply chain/供应链中化学品的可追溯性

Effective Implementation of Management Action Plan

管理行动计划的有效实施(MAP)

Steps for the effective implementation of a Management Action Plan: 有效实施管理行动计划的步骤:



1. Document the improvement area
记录改善领域

Identification of improvement areas for your facility at the point of assessment in order to control input of chemicals and substitute hazardous chemicals in production processes.

在评估时确定设施的改善领域，从而在生产过程中控制化学品的输入和替代危险化学品

2. Analyse the improvement area
分析改善领域

Analyse the root cause of an improvement area to develop the most appropriate MA. 分析改善领域的问题根源，制定最合适的管理行动。

3. Define the MA
定义管理行动 (MA)

Formulate the most appropriate MA to an improvement area. 为改善领域制定最合适的MA

4. Create ownership to MA
对管理行为创建拥有权

Assign the responsible persons and deadlines to each MA. 给每个MA分配负责人和最后期限

5. Implement the MAP
实施管理行动计划

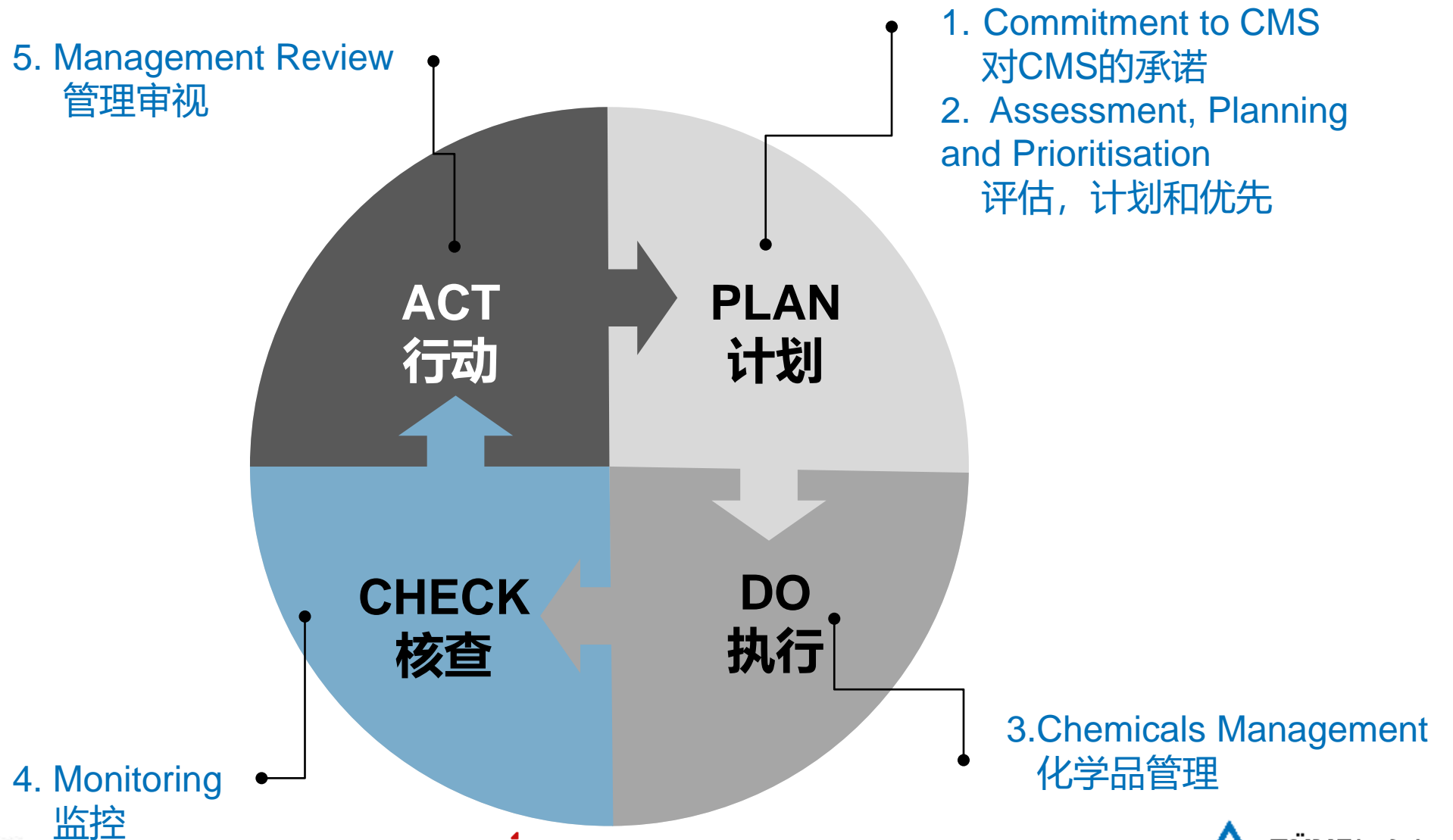
Implement the MAP with the help of your Chemical Management System Team. 在化学品管理系统团队的帮助下实施MAP.

6. Monitor and review MAP
监视并查看MAP

Systematically monitor the progress on implementing the MAs, monitor effectiveness of implemented actions and review the MAP in case any modification is required.

有系统地监控实施MA的进展情况，监督实施行动的有效性，并在需要修改的情况下再审视MAP。

PLAN, DO, CHECK, ACT 规划, 执行, 查核与行动



Chemical Management Declaration 化学品管理声明

The preparation of the management statement was supported by senior leaders and clearly conveyed the objectives and vision of chemicals management. Management statements are intended to clearly communicate organizational objectives to internal and external stakeholders. Management Statement drafted by the organization adopting CMS:

管理声明的编写受到高层领导的支持，明确传达了有关化学品管理的目标和愿景。管理声明旨在向内部和外部利益相关者明确传达组织目标。采纳CMS 的组织草拟的管理声明：

1. Zero Emission Target of Hazardous Chemicals Including the Whole Life Cycle of Products 包括产品整个生命周期的有害化学品物质零排放目标
2. Be able to record, implement and maintain 得以记录、实施和维护
3. Extensive dissemination within and outside the organization 在组织内部和外部广泛传播
4. Supporting Sustainable Chemical Practice 支持可持续性化学实践
5. Incorporate commitments to comply with requirements and continuously improve CMS efficiency 纳入遵守要求并持续提高CMS 效益之承诺
6. Consistent with the purpose of the organization 与组织的目的相符
7. To be audited to determine its continuing suitability 得到审核以确定其持续适宜性

Chemical Management Policy
化学品管理政策

02

Quiz 小测试

Which policies are important for a strong Chemical Management System?
哪些政策对强大的化学品管理体系至关重要?



Key Policies 主要政策

Policy Name 政策名称	What it covers 它涵盖了什么	Aim 目标
Chemical Procurement Policy 化学品采购政策	<p>Description of how the procurement process of chemicals shall take place in respect to regulatory requirements, transparency, packaging, chemical specifications, documentation, quantity and cost considerations.</p> <p>说明化学品的采购过程如何在监管要求，透明度，包装，化学规格，文件，数量和成本考虑方面进行</p>	<p>Ensure minimal impact of chemicals on human health and the environment. Chemicals are bought in line with all applicable regulatory requirements.</p> <p>Cost savings.确保化学品对人体健康和环境的影响最小。化学品的购买符合所有适用的法规要求。</p> <p>节约成本</p>
Health and Safety Policy 健康和安全政策	<p>Description of how protection of health and safety of workers who are in contact with or are working with chemicals takes place.</p> <p>说明如何保护与化学品接触或正在使用化学品的工作人员的健康和安全</p>	<p>Ensure greatest possible protection of health and safety of people. Reduction of absenteeism.确保尽可能保护人们的健康和安全。减少旷工</p>
Waste Management Policy 废物管理政策	<p>Description of how waste needs to be monitored, segregated, stored and disposed of.</p> <p>描述如何监测，隔离，储存和处理废物</p>	<p>Ensure adherence to all regulatory requirements and protection of the health and safety of people and the environment. Enabling reduction, reuse and recycling of waste.确保遵守所有监管要求，保护人员和环境的健康和安全。促进废物的减量化，再利用和循环再用</p>
Environmental Management Policy 环境管理政策	<p>Description of how the impacts on the environment from all business activities are identified and controlled.说明如何识别和控制所有业务活动对环境的影响</p>	<p>To ensure the least environmental impact possible from operations.确保运营可能造成的环境影响最小</p>
Deadstock Management Policy 呆滞存货管理政策	<p>Description of how deadstock will be identified, prevented and reduced.描述如何识别，预防和减少呆滞存货</p>	<p>To ensure least environmental impact and greatest possible protection of health and safety for people. Information to improve procurement practices.确保最小的环境影响和尽可能最大限度地保护人们的健康和安全。信息可改善采购实践。</p>

Chemical Purchase Policy 化学品采购政策

Chemical Procurement Policy Considerations 化学品采购政策的考虑

- **Tighten purchasing controls:** Buy only what you need. The amount of chemicals should be ordered according to the rate of use, chemical storage capacity & product expire date. Do not buy extra chemicals in bulk for anticipated savings.
 1. **严格采购控制:** 只采购需要的化学品。化学品的数量应按使用率、化学储存容量和产品过期日期进行订购。不要整批购买以期节省。
- **Consider disposal cost at time of purchase:** Disposal costs may exceed chemical costs by 20-50 times.
 1. **采购时就应该考虑弃置成本:** 弃置的成本可能比化学品的采购成本高20-50倍
- **Consider handling and disposal requirements:** Ensure you have adequate storage and try to use non-hazardous chemicals whenever possible.
 1. **考虑操作和弃置要求:** 确保正确地储存, 只要可能就使用非有害化学品
- **Reduce expired stock:** Negotiate expiration dates of chemicals with suppliers and order reagents only in quantities needed.
 1. **减少过期储存:** 向供应商了解化学品的保质期, 且只采购需要的量
- **Use older stock first:** First in, first out policy.
 1. **先使用老库存:** 先进先出原则
- **Avoid chemical donations:** Do not accept donated chemicals and free samples.
 1. **避免使用捐赠的化学品:** 不要接受捐赠化学品和免费样品



Steps to Developing a Chemical Purchasing Policy 化学品采购政策制订步骤

➤ Identify a Purchasing Coordinator 确定采购协调员

1. Ideally this should be a designated administrator or someone from the business office who can oversee budget issues and approve purchases across all departments and who has an understanding of chemical issues.
2. 最好是指定的管理员或业务办公室中能够跨所有部门监督预算问题并审批采购且对化学品问题有所了解的工作人员。为了降低成本，应从工厂层面采购化学品。工厂的购买力比单个部门的购买力强。

➤ Identify Department Representatives to Participate in the Review Process 确定参与审核流程的部门代表

1. This group will participate in the development and implementation of the purchasing policy and purchase review criteria. Identify a representative from all departments that purchase chemicals. This representative must have the requisite skills and authority to review their department's purchase requests.
2. 该小组将参与采购政策和采购审核标准的制订和实施。确定所有部门的化学品采购代表。该代表必须具备审核其部门的采购请求所需的技能和权限。

Steps to Developing a Chemical Purchasing Policy 化学品采购政策制订步骤

➤ Review Current Purchasing Procedures 审核当前采购程序

1. Identify how chemical purchasing is currently done within each department, individual buildings and complexes with multiple buildings. Explore how to integrate the chemical purchase request review within the existing purchasing system.
2. 确定目前在每个部门、单个建筑和多个建筑群内如何进行化学品采购。探讨如何在现有采购系统中整合化学品采购申请评审。

➤ Assess Chemical Inventory System 评估化学品清单

1. If there is no existing chemical inventory system in the facility, initiate the development of a facility-wide system. This will enable departments to screen purchase orders against what already is in stock across the facility.
2. 如果工厂现在没有化学品清单，则启动开发整个工厂的此类系统。这样，各部门就可根据工厂的存货筛选采购订单

➤ Ensure to include the latest ZDHC MRSL compliance requirements into the purchasing policy document 确保包括最新的ZDHC MRSL合规要求为采购政策文件

1. ZDHC MRSL compliance shall be one of the most important factors to consider prior to any chemical purchasing activities.



Steps to Developing a Chemical Purchasing Policy 化学品采购政策制订步骤

➤ Before ordering chemicals, staff and other personnel should: 订购化学品之前, 职员和其他工作人员应:

- Make sure the chemical is on the facility system's list of approved chemicals and check against ZDHC MRSL in effect in the facility. 确保化学品已列入工厂系统的获批化学品清单和并根据工厂有效的任何ZDHC MRSL 对其进行检查。
- Train personnel so that they are capable of assessing chemical hazards and know how to handle the hazards. 培训工作人员, 使其能够评估化学品危险知道如何处理有害物质
- Train personnel to be sufficiently knowledgeable in recognizing requests from others for nonessential chemicals. 培训工作人员, 使其充分了解如何识别他人对非重要化学品的请求
- Develop a current inventory of existing chemicals. 为现有化学品制订最新清单

1. If a chemical that is used is not an approved chemical by the factory, i.e. it is a new chemical, then follow the policy specified here: 如果所使用的化学品不是工厂认可的化学品, 即是一种新的化学品, 则按照这里规定的政策执行。

- Relative hazard level of the chemical 化学品相对危险度
- Research value of using the chemical 研究化学应用价值
- If the staff has sufficient experience in using the substance 工作人员有否足够的使用该物质的经验
- Degree to which the laboratory/factory is equipped for safe use of the chemical 工作人员有否足够的使用

Steps to Developing a Chemical Purchasing Policy 化学品采购政策制订步骤

➤ Identify a Purchasing Coordinator 确定采购协调员

1. Ideally this should be a designated administrator or someone from the business office who can oversee budget issues and approve purchases across all departments and who has an understanding of chemical issues.
2. 最好是指定的管理员或业务办公室中能够跨所有部门监督预算问题并审批采购且对化学品问题有所了解的工作人员。为了降低成本，应从工厂层面采购化学品。工厂的购买力比单个部门的购买力强。

➤ Identify Department Representatives to Participate in the Review Process 确定参与审核流程的部门代表

1. This group will participate in the development and implementation of the purchasing policy and purchase review criteria. Identify a representative from all departments that purchase chemicals. This representative must have the requisite skills and authority to review their department's purchase requests. Following points shall be included in the Chemical Purchasing Policy:
2. 该小组将参与采购政策和采购审核标准的制订和实施。确定所有部门的化学品采购代表。该代表必须具备审核其部门的采购请求所需的技能和采限

Example Chemical Procurement Policy 化学品采购政策示例

Company ABC procures textile dyes & chemicals with a particular focus on their environmental, health and safety as well as global ecological impacts to ensure business is done in an environmentally sustainable manner. The responsible team of company XYZ will look out for innovations in chemical applications and continuously search for and assess safer chemicals. For the implementation of this policy, company XYZ will adhere to the relevant national rules and regulations. Furthermore, the company will comply with xxx (e.g. REACH, EPA,...) standards as well as conform to requirements of (ZDHC/Detox/bluesign) MRSL and its buyers' restricted substances lists in the selection of chemicals.

ABC 公司采购纺织染料和化学品，特别关注它们的环境、健康、安全以及对全球的生态影响，确保以环境可持续的方式采购使用化学品。XYZ 公司的负责团队探寻化学品应用的创新、不断地寻找和评估更安全的化学品。对于政策的执行，公司将遵循相关的国家法规。此外，公司在筛选化学品时，应符合 XXX（如 REACH, EPA,...）标准，以及满足（ZDHC / Detox / bluesign）MRSL 的要求和买家的禁用化学品清单。

Material Regulatory Requirement 满足所有的法规要求

➤ **Some important regulations in your territory might include:重要的当地法规包括:**

- The amount of chemicals that can be stored at the facility.工厂可以储存的化产品的量
- Worker safety protocols and engineering controls.工人的安全条款和工程控制
- Storage requirements.储存要求
- Effluent, sludge, or hazardous waste storage and disposal rules. 污水、污泥或危险废物和弃置规则

➤ **Check your regulatory requirements inventory and ensure you adhere to all aspects when procuring chemicals.检查你的法规要求名录，确保在采购化学品时遵循所有要求**

No.	Title	Descriptions	Applicable to		Are Applied
			Company	Contractor / Supplier	
01	Environment Conservation Act 1996 (section 46)	Provides for the control of air pollution from stationary sources and motor vehicles. Also enables promulgation of regulations.	✓	✓	Air emission plant (e.g. generator, generator vehicles),
02	Environment Conservation Act 1996 (section 46)	Provides for the control of water pollution, including reference to specific discharge standards.	✓		Discharge water from production processes in company.
03	Sludge ordinance	Provides for the control of management and disposal of treatment sludge.	✓		Disposal of sludge from a TP.

Know Your Chemical Suppliers And Established An Approval/Removal Process

了解你的化学品供应商并建立批准/移除流程

- **Identify and document suppliers** for each of the chemicals listed in the chemical inventory.
 1. 对于列在化学品清单上的每一个化学品，**识别和记录其供应商**

- For urgent technical support or other emergencies, **document their relevant contact information** such as point-of-contact name, phone number and address.
记录相关联系方式，例如姓名，电话和地址等等，作为紧急情况时使用

- Establish, document and implement a **process for using preferred suppliers and removing them**.
 1. 建立、记录和执行一个**核准和移除供应商的流程**

- Minimum Requirements on suppliers: Provide **SDS in local language** in line with **GHS Labelling** standard in order to **adhere to relevant regulations**.
 1. 对供应商的最低要求：提供以**当地语言书写的 SDS 文件**，与 **GHS 标签**的标准一致，**满足相关法规**

Purchase from Approved Supplier从核准的供应商处采购化学品

➤ Supplier approval criteria:

- Service possibility. 服务的可能性
- Ability to provide MSDS, TDS, COA and test reports. 提供 MSDS, TDS, COA 和测试报告的能力
- Credible quality control system. 可靠的质量控制系统
- Provision of chemicals in various packaging sizes with standard packaging. 提供各种包装尺寸和标准包装的化学品
- Capacity to perform root cause analysis in case of failure. 有能力对不合规进行根源分析
- Commitment to follow-up on the failure resolution process. 承诺跟踪不合规的整改过程

Health and Safety Policy 健康和安全政策

Identification of Mechanisms to Protect Health and Safety 识别保护健康与安全机制

Ensure Good Personal Hygiene

- Provide suitable eating and smoking areas
- Provide washing facilities near the work areas where skin exposure may occur
- Advise workers to remove splashes/spills on skin immediately
- Advise workers to thoroughly wash exposed parts of the body after work is completed
- Prevent contaminated items from being moved around the facility
- Remove and wash separately any contaminated item of work clothing after using chemicals

Properly Use and Maintain PPE

- Select the correct type (for the chemical in question) and fit of PPE, considering potential exposure (use guidance from the SDS)
- Provide clear instruction to workers on the proper use of PPE (when, where, how)
- Ensure proper PPE is worn for as needed
- Provide storage, cleaning and maintenance of PPE
- Plan and budget for PPE replacement at recommended intervals

Reference: ZDHC Chemical Management Guidance System Manual

Identification of Mechanisms to Protect Health and Safety 识别保护健康与安全机制

确保良好的个人卫生

- 提供合适的进餐和吸烟区域
- 在可能出现皮肤接触的工作区域提供清洗设施
- 建议工人清除溢出/喷溅到皮肤上的化学品
- 建议工人在完成作业之后彻底清洗接触到化学品的身体部位
- 防止在工厂中四处移动受污染物品
- 使用化学品之后脱下工作服，单独清洗上面的污染物。

妥善使用和维护 PPE

- 考虑到可能接触到的化学品（使用 SDS 指导）选择正确类型（根据相关的化学品）的合适 PPE
- 向工人提供有关如何正确使用 PPE 的说明（何时、何处及如何）
- 确保在需要时穿戴合适的 PPE
- 提供 PPE 的储存、清洁和维护
- 按建议的时间间隔为 PPE 更换做出计划和预算

Reference: ZDHC Chemical Management Guidance System Manual

Environmental Management Policy 环境管理政策

Environmental Management system 环境管理系统

- Environmental **Environmental management** system (EMS) refers to the **management** of an organization's **environmental** programs in a comprehensive, systematic, planned and documented manner. It includes the organizational structure, planning and resources for developing, implementing and maintaining policy for **environmental** protection.

环境管理体系(EMS)是指以全面、系统、有计划、文件记录的方式对组织的环境项目进行管理。它包括制定、执行和维持环境保护政策的组织结构、规划和资源

- Why is an EMS important?

It is impossible to make incremental environmental improvements within a company without a comprehensive plan, companies can only maximize environmental performance by creating a structured system and setting a long-term strategy that informs decision-making on environmental management.

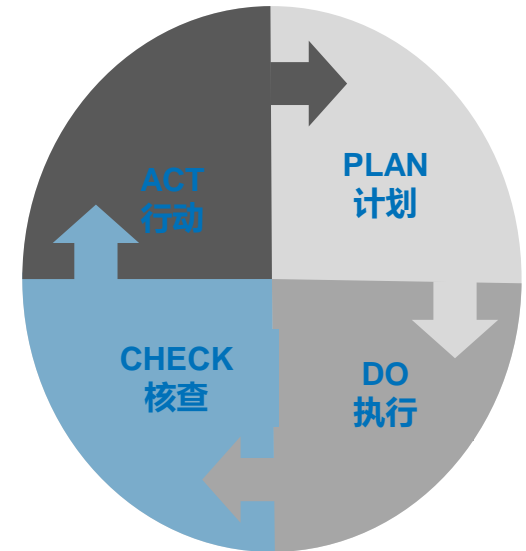
在没有全面计划的情况下，公司无法在公司内部进行增量环境改善。只有通过建立一个结构化的系统并制定一个长期战略来通知环境管理决策，公司才能最大限度地提高环境绩效

Most commonly used framework 最常用框架

- ISO 14001 standard
- 环境管理系统 ISO14001
- Based on Plan-Do-Check-Act methodology
- 计划-行动-检查-改善用

Five main stages as defined by ISO 14001: ISO 14001 定义的五个主要步骤:

- **Stage 1:** Commitment and establishing the baseline.
- **步骤1:** 承诺和建立基准
- **Stage 2:** Identifying and ensuring compliance with legal and other requirements.
- **步骤2:** 识别并确保对法规和其它要求的合规
- **Stage 3:** Developing objectives, targets and programmes.
- **步骤3:** 建立目的、目标和计划
- **Stage 4:** Implementing and operating EMS.
- **步骤4:** 执行和操作环境管理系统
- **Stage 5:** Checking, auditing and management reviews.
- **步骤5:** 检查、审计和管理审核
- **Stage 6:** Acknowledgement under a selected scheme.
- **步骤6:** 确认计划



Environmental Management Policy 环境管理政策

1. An Environmental Policy is the foundation of an EMS that guides the development of the EMS. It's also a means to communicate environmental goals internally and to external stakeholders (i.e. customers, suppliers , the public)
2. 环境政策是指导EMS发展的环境管理体系的基础。它也是一种内部和外部利益相关者（即客户、供应商、公众）交流环境目标的方法。
3. The policy should be appropriate to the organization and provide: 该政策应适合本组织，并提供：
4. Commitment to legal compliance and pollution prevention 遵守法律和防止污染的承诺
5. Frameworks for setting environmental objectives and targets 制定环境目标和指标的框架
6. Commitment to continual improvement 持续改进的承诺
7. Commitment to communicate the policy with internal/external stakeholders 承诺与内部/外部利益相关者沟通政策
8. The policy should be specific, achievable and clearly written. It must be signed by a senior executive to demonstrate that it's a company policy and reviewed at regular intervals.
9. 该政策应具体、可实现且书面明确。它必须由高级管理人员签署，以证明它是一项公司政策，并定期进行审查。

Waste Management Policy 废弃物管理政策

Considerations Waste Management 废物管理的考虑

- Systematically identify and quantify all chemical wastes (NPOs) in your company and make their costs visible 系统地识别工厂的所有化学废物（NPOs），使其成本可视
- Identify, separate and classify hazardous wastes. 危险废物的识别、分离和分类
- Create a waste inventory table further off-site treatment and disposal 创建在厂区外处理和弃置的废物清单表
- Correctly separate waste at generation point. 在产生废物的地点正确地隔离废物
- Have an internal report on all waste. 一个关于所有废物的内部报告
- Arrange for safe on-site collection, labelling and storage of all waste. 安排在现场安全地收集、标识和储存所有废物
- Carry out preliminary treatment on-site. 现场进行预处理
- Arrange for off-site treatment and disposal. 安排厂区外的处理和弃置
- Set-up a waste action plan 建立废物改进计划

Set up a Waste Action Plan 建立废物行动计划

Step1 - Establish waste inventories to classify hazardous and normal wastes as required by legislation.

第一步 – **建立废物清单**，根据法规要求来分类危险废物和普通废物

Step 2 - Evaluate the possibility of upcycling and recycling the waste. *(Depending on the category of the sludge, specific sludge management options in compliance with the requirements given in this document may be chosen. These include anaerobic digestion, land application, thermal incineration, controlled landfill and recycling in making construction materials).*

第二步 – **评估升级改造和循环使用废物的可能性** (取决于污泥的分类, 按本文件给出的要求选择特殊的污泥管理选项, 包括厌氧消化、土地应用、热焚烧、控制填埋、制造建筑材料时循环使用)

Step 3 - Establishment of hazardous waste warehouses for the **storage of hazardous waste**, which do not pollute the environment

第三步 – **建立危险废物仓库来储存危废**，保证不得污染环境

Step 4 - Dispose of hazardous waste to contractors with relevant qualifications and retain all transfer records

第四步 – 交给相关有资质的承包商来**弃置危险废物**，并保持记录



Considerations Waste Action Plan 废物行动计划的考虑

- Persons in charge 负责人
- Persons in charge 收集废物产生的数据
- Investment (capital) and running cost associated with waste.
在废物上的投资及日常营运成本
- Measures for reducing waste 减少废物的措施
- Timeframe to reduce waste 减少废物的时间表
- Expected environmental benefits from monitoring/evaluating.
通过监控/评估期望得到的环境效益
- Qualification of personnel involved in handling hazardous waste:
负责处理危险废物人员的资质:
 - Presence of specific materials 存在特殊的材料
 - Potential physical and health hazards associated with these materials
与这些材料相关的潜在物理和健康危害
 - Proper procedures for handling and use of these materials, including the use of PPE (e.g., gloves and protective goggles)
操作和使用这些材料的合适流程, 包括使用 PPE (如手套和护目镜)
 - Location and appropriate use of the chemical SDSs.
化学品的 SDS 文件放置的位置、合理的使用
- Procedures to be followed in the event of an emergency.
紧急情况下应采取的流程



The 3 rs in the Circular Economy Concept (reduce, reuse, recycle) 循环经济概念中的 3 个 R (减少、再用、循环)

Reduce 减少

A proper waste management plan should be implemented to promote waste minimization at source. If waste generation is unavoidable then the potential for recycling or reuse should be explored and opportunities taken.

执行一个合适的废物管理计划，从源头使废物最少。如废物的产生不可避免，则应讨论循环和再用的可能性，并采取行动

Reuse 再生产/再使用

Substitution of textile ETP sludge for cement. Up to a maximum of 30%, may be possible in the manufacture of non-structural building materials.

使用纺织污水处理厂的污泥来制水泥，在制作非结构性的建筑材料中最多可用 30%

Recycle 循环

Recycled as much of your waste as possible.

尽可能多地把废物循环再生



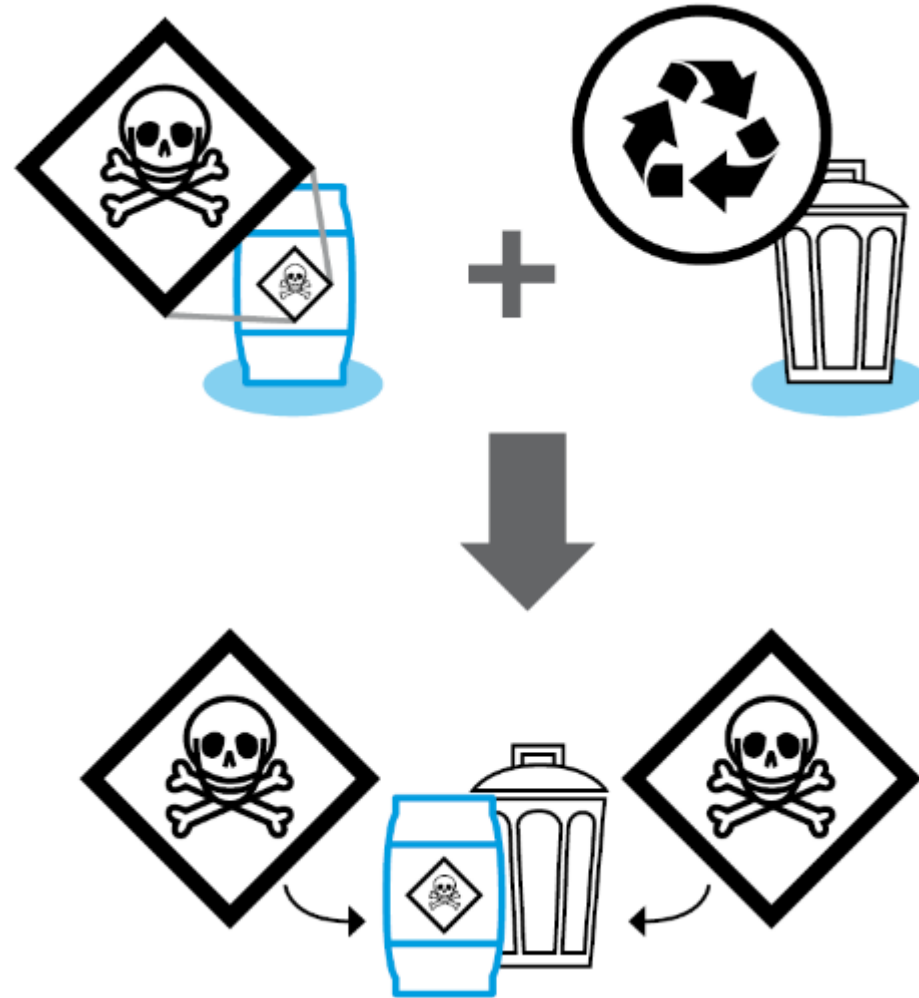
Waste Inventory Table 废弃物清单表

Company/Section		Prepared/ revised on	
		Prepared/ revised by	
		Next revision on	

Waste Name	Category / Type	Source Process	Storage Area	Yearly Quantity	Associated Hazards	Disposal Method (actual/recommended)	Waste Disposal Vendor Address	License Number	License Validity Time

Separate Hazardous and Non-hazardous Waste 危险废物和非危险废物的分离

- Combined waste is considered hazardous.
混合了危险废物和非危险废物的混合物分类为危险废物
- Ensure separation during collection, storage and disposal routes.
收集、储存、弃置时确保分离



Segregate Incompatible Hazardous Waste 不相容危险废物的隔离

Segregate incompatible hazardous waste to prevent possible disasters (e.g. chemical reactions leading to explosions):
隔离不相容的危险废物以防止可能的灾难
 (如可能导致爆炸的化学反应)：

- Use different waste containers.
使用不同的废物容器
- Separation of waste containers.
废物容器的分离

CLASS		1	2	3	4	5	6	7	8				
Chemical Segregation By Chemical Group													
Explosive	1.0 Explosive		Segregate From	Segregate From	Segregate From	Segregate From	Segregate From	Segregate From	Segregate From	Segregate From	Segregate From	Segregate From	
Compressed gases	2.1 Flammable	Segregate From		Keep Apart	Segregate From	Segregate From	Segregate From	Segregate From	Segregate From	ISOLATE	Keep Apart	Keep Apart	
	2.2 Non Toxic	Segregate From	Keep Apart		Keep Apart	Segregation may not be necessary	Segregation may not be necessary	Segregation may not be necessary	Segregation may not be necessary	Segregate From	Segregation may not be necessary	Keep Apart	
	2.3 Toxic	Segregate From	Segregate From	Keep Apart		Segregate From	Keep Apart	Segregate From	Keep Apart	Segregation may not be necessary	Segregate From	Segregation may not be necessary	
Flammable liquids		Segregate From	Segregate From	Keep Apart	Segregate From		Keep Apart	Segregate From	Segregate From	Segregate From	ISOLATE	Keep Apart	
Flammable solids	4.1 Readily combustible	Segregate From	Segregate From	Segregation may not be necessary	Keep Apart	Keep Apart		Keep Apart	Segregate From	Segregate From	Segregate From	Keep Apart	Segregation may not be necessary
	4.2 Spontaneously combustible	Segregate From	Segregate From	Segregate From	Segregate From	Segregate From	Keep Apart		Keep Apart	Segregate From	ISOLATE	Keep Apart	Keep Apart
	4.3 Dangerous when wet	Segregate From	Segregate From	Segregation may not be necessary	Keep Apart	Segregate From	Segregate From	Keep Apart		Keep Apart	Segregate From	Segregation may not be necessary	Segregation may not be necessary
Oxidizing substances	5.1 Oxidizing substance	Segregate From	Segregate From	Segregation may not be necessary	Segregation may not be necessary	Segregate From	Segregate From	Segregate From	Keep Apart		Segregate From	Keep Apart	Keep Apart
	5.2 Organic peroxide	Segregate From	ISOLATE	Segregate From	Segregate From	ISOLATE	Segregate From	ISOLATE	Segregate From	Segregate From		Keep Apart	Keep Apart
Toxic		Segregate From	Keep Apart	Segregation may not be necessary	Segregation may not be necessary	Keep Apart	Keep Apart	Keep Apart	Segregation may not be necessary	Keep Apart	Keep Apart		Segregation may not be necessary
Corrosive		Segregate From	Keep Apart	Keep Apart	Keep Apart	Keep Apart	Segregation may not be necessary	Keep Apart	Segregation may not be necessary	Keep Apart	Keep Apart		Segregation may not be necessary

Labelling of Waste Containers 废物容器的标签

Correct labelling 正确的标签:

- Warning “hazardous waste”.警告“危险废物”
- Description of contents, in layman’s terms.使用通俗语言描述内容物
- Indication of hazard properties - e.g. “flammable”, “corrosive”, “toxic”, “explosive”. Similar to labels and pictograms used for hazardous chemicals.表明危险性质 – 如“易燃”、“腐蚀性”、“有毒”、“爆炸性”。与危险化学品使用的标签和象形图类似
- Department/section where the waste was generated.产生废物的部门
- Name and telephone number of the employee responsible for internal hazardous waste management.
内部负责危废处理的员工的姓名和电话
- Date container was filled.装桶时间

**HAZARDOUS
WASTE**

Contents: Paint and Varnish Sludge (08 01 13*)

Hazardous property: Flammable!

Department: ABC Date: 01/12/2008

HANDLE WITH CARE!

CONTAINS HAZARDOUS OR TOXIC WASTE

Contact: Dep. HAZ or hazwaste@company.de for disposal

Engaging External Waste Service Providers 与外部的废物服务商协助

Establish procedure and criteria for selection of waste service providers:

建立筛选废物服务商的流程和标准:

- Licensing/permit requirements in your country for collection.
收集国家所要求的执照/许可
- Transport 运输
- Treatment and disposal of waste
废物的处理和弃置

Consider extended responsibility for managing and disposal of chemical waste:

考虑化学废物管理和弃置的延伸责任:

- Ensure safe packaging and transport, e.g.:
确保安全包装和运输, 如:
 - Condition of vehicle 车辆的状况
 - Qualification of driver 司机资质
- Avoid environmental impacts, e.g.:
避免环境影响, 如:
 - Safe storage facilities 安全储存设备
 - Control and treatment of leachate 泄漏液的控制和处理
 - Air emissions 废气



Chemical Management Implementation
化学品管理执行

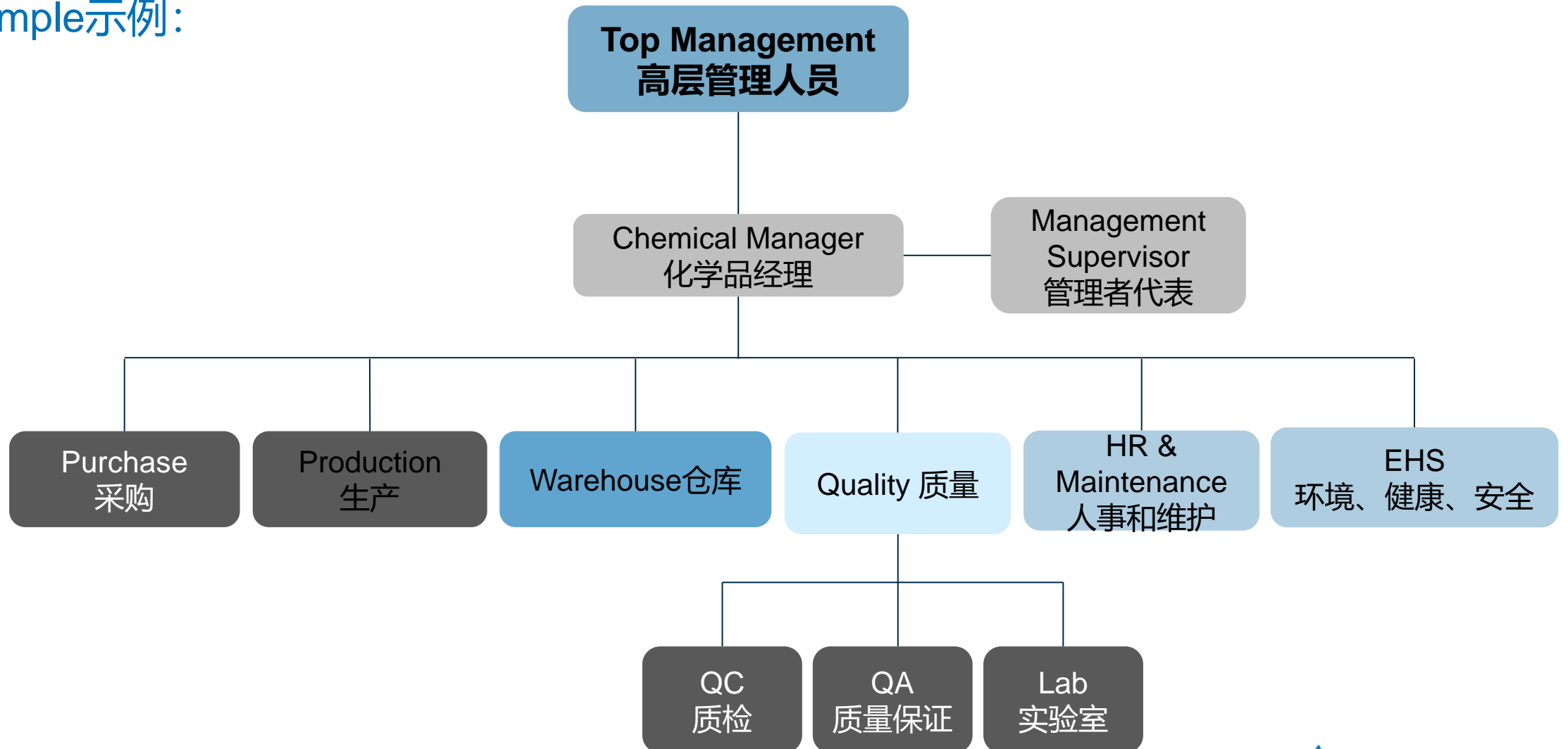
03

Chemical Management Team 化学品管理团队

1. Responsibility for managing chemicals **NOT** be the sole responsibility of one person but rather a TEAM. → strongly recommends involving the following team: 管理化学品非一人之责，而需一个团队。建议团队包括：
 - **Chemical Management Manager** - Oversee the entire chemical management system
化学品管理经理——纵览整个化学品管理体系
 - **Product Quality Manager** - ensure performance quality of the purchased chemicals / compliance with the ZDHC / Brand MRSL
 1. 产品质量主管——确保采购化学品工作质量以使化学品符合ZDHC/品牌MRSL要求
 - **Operations/Production Manager** - ensure the proper application of chemicals for the production of products
 1. 运营/生产主管——确保生产时使用合适的化学品
 - **Purchasing/Procurement Manager/Officer** - ensure alignment of purchasing chemicals in compliance with the ZDHC / Brand MRSL
 1. 采购主管/部员——确保采购的化学品符合ZDHC/Brand MRSL要求
2. Team members should work together and communicate regularly amongst themselves and factory management.

Chemical Management Team 化学品管理团队

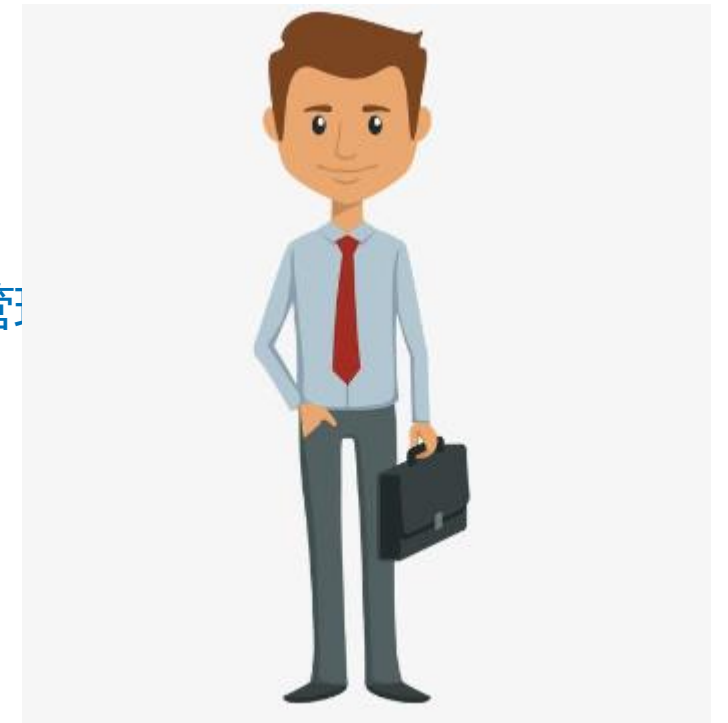
Example 示例:



Chemical Management Team 化学品管理团队

Top Management 高层管理人员

1. Roles 角色:
2. Direct the whole factory to conduct chemical management 指明公司化学品管理的方向
3. Responsibilities 职责:
 - Approve chemical management policy 批准化学品管理政策
 - Provide financial and manpower support 提供资金、人力支持
 - Participant in regular chemical management meeting 参与日常的化学品管理



Chemical Management Team 化学品管理团队

Chemical management manager 化学品管理经理

1. Roles 角色:

2. Lead the chemical management in the whole factory 带领整个工厂的化学品管理

3. Responsibilities 职责:

- Responsible for day-to-day management of CMS 负责 CMS 的日常管理
- Have sufficient knowledge/experience on chemical management including identifying what is a qualified SDS/GHS
有足够的化学管理知识/经验，包括识别什么是合格的SDS/GHS
- Reports to leadership about the chemical management 向领导报告化学品管理的工作
- Responsible for tracking progress on key performance indicators (KPIs) and goals
负责跟踪关键绩效指标 (KPI) 和目标的进展



Chemical Management Team 化学品管理团队

KPI 关键绩效指标

序号	KPI	单位	追踪流程 (资源)	计算
1.1	执行的内部审计次数	No.	审核文件	
1.2	进行的外部审计次数	No.	审核报告	
1.3	所有审计时发现的不符合项	No.	审核报告	
1.4	MRM 在MRM讨论和关闭的不符合项	No.	根据MRM会议记录和再审计报告	
1.5	收到的投诉	No.	收到的投诉量 (口头、电子、书面) 登记记录	
1.6	无事故日数	No.	事故记录	
1.7	报告的事故数目	No.	事故记录	
1.8	受到过职业风险和操作风险培训的工人的百分比	%	HR 培训记录	

Chemical Management Team 化学品管理团队

KPI 关键绩效指标

序号	KPI	单位	跟踪流程 (资源)	计算
2.1	化学品年消耗量	Tons	购买的化学品总量 - 存储的吨数	
2.8	有害化学品储存量	Kgs	化学品名录. 存储的有害化学品总量	
2.9	无标签和因使用损坏了标签的化学品数量	No.	内审或热点识别, 记录热点进行检视	
2.10	每年存储的生态毒性化学品数量	No.	化学品名录, 标签上标识为生态毒性的化学品数量	
2.11	未使用合适二次防漏装置的生态毒性化学品数量	No.		
2.12	报告的化学品伤害数	No.		
2.13	接受过风险评估培训的员工数目	No.	HR 培训记录	
2.14	受过应急响应培训的员工数目	No.	HR 培训记录	

Chemical Management Team 化学品管理团队

KPI 关键绩效指标

序号	KPI	单位	跟踪流程 (资源)	计算
2.18	每年使用的化学品与存储或使用的有害化学品的比例	%	从化学品清单中识别出有害化学品	有害化学品 / 全部化学品
2.19	过期或弃置的化学品量	Tons	据台帐、发票等查因过期弃置的化学品量	
2.20	每年产生的非产品输出 NPO	Tons	记录所有工艺的NPO的量	
2.21	每年污水处理的成本	€	据账户信息、发票和成本查每年的污水处理成本	
2.22	每吨产品每立方米污水的处理费	€	发票显示的污水处理成本	废水处理成本/总产量 (吨)
2.23	每吨产品的NPO成本	€	每吨产品的非产品输出的成本	非产品输出成本 / 总产量 (吨)
3.1	每年RSL不合规数	No.	记录所有RSL不合规和测试不合规	

Chemical Management Team 化学品管理团队

KPI 关键绩效指标

序号	KPI	单位	跟踪流程 (资源)	计算
2.3	每年使用的进水量	m3	流量计和发票	进水的发票记录或流量计的记录
2.15	每年每吨产品的用水量	%	2.3, 生产	用水 (立方米) / 产品 (吨)
2.16	每年每吨产品产生的废水量	%	2.4, 生产	废水 (立方米) / 产品 (吨)
2.17	使用的进水和产生的废水的比例	No.	2.3, 2.4	进水 (立方米) / 废水 (立方米)

Chemical Management Team 化学品管理团队

KPI 关键绩效指标

序号	KPI	单位	跟踪流程 (资源)	计算
2.4	每年产生的污水量	M3	依据流量计、估量或发票计算进入平衡池的污水量	
2.5	每年产生的固废量	Tons	WWTP 的记录, 和委托商有关弃置固废的发票	
2.6	每年产生的有害固废的量	kgs	有害废物的清单	
2.7	每年产生的固体污泥量	tons	WWTP的记录, 固体污泥(有/无记录)的重量记录	

Chemical Management Team 化学品管理团队

KPI 关键绩效指标

序号	KPI	单位	跟踪流程 (资源)	计算
3.2	对 RSL 和 ZDHC 的 MRSL 的不合规的下降百分比	%	据生产记录查 RSL 和 MRSL 的不合规情况	$(\text{过去的违规数} - \text{目前的违规数}) / \text{过去违规数} \times 100$
3.3	WWTP ZDHC 参数不合规的下降的百分比	%	测试结果和WWTP数据	$(\text{过去的违规数} - \text{目前的违规数}) / \text{过去违规数} \times 100$
3.4	有害废物减少的百分比	%	WWTP的废物名录	$(\text{过去的有害废物量} - \text{目前的量}) / \text{过去的量} \times 100$
3.5	固废减少的百分比	%	废物名录	$(\text{过去的有害废物量} - \text{目前的量}) / \text{过去的量} \times 100$
3.6	使用的有害化学品减少的百分比	%	化学品名录和储存日期	$(\text{过去的有害化学品量} - \text{现在的量}) / \text{过去量} \times 100$
3.7	污水处理报告中检测到的优先管控的化产品的下降百分比	%	废水的测试结果	$(\text{过去测得的有害化产品的量} - \text{现在的量}) / \text{过去的量} \times 100$
3.8	SDS文件信息缺失的减少百分比	%	SDS和评估记录	$(\text{过去的缺失数} - \text{目前缺失的数}) / \text{过去的缺失数} \times 100$
3.9	使用工程手段进行控制减少百分比	%	评估时的评价	$(\text{过去实施的工程控制数} - \text{目前的数}) / \text{过去的数} \times 100$
3.10	有害物质处置时间的减少百分比	%	热点走厂和评估走厂	$(\text{过去处理有害物质花费的时间} - \text{目前的时间}) / \text{过去的时间} \times 100$

Chemical Management Team 化学品管理团队

KPI 关键绩效指标

序号	KPI	单位	跟踪流程 (资源)	计算
3.11	事故下降的百分比	%	检查事故日志	$(\text{过去的事故数} - \text{目前的记录数}) / \text{过去的数目} \times 100$
3.12	泄漏量的减少百分比	%	检查 HR 提供的事故记录	$(\text{过去泄漏的量} - \text{现在的量}) / \text{过去的量} \times 100$
3.13	生产率增加的百分比	%	检查生产数据和 MRM 会议记录	$(\text{目前的生产量} - \text{过去的生产量}) / \text{目前的生产量} \times 100$
3.14	标准化的能源使用量的下降百分比	%	检查能源账单、发票和生产数据	$(\text{过去每公斤产品消耗电的千瓦数} - \text{目前的耗电千瓦数}) / \text{过去的数目} \times 100$
3.15	被取代的有害化学品的百分比	%	检查化学品名录	$(\text{过去的有害化学品数} - \text{现在的数目}) / \text{过去的数目} \times 100$
3.16	固废下降的百分比	%	检查固废名录	$(\text{过去的固废量} - \text{先前的量}) / \text{过去的量} \times 100$
3.17	有害固废下降的百分比	%	检查废物清单	$(\text{过去的有害废物量} - \text{现在的量}) / \text{过去的量} \times 100$
3.18	不合规的废水排放参数下降的百分比	%	检查废水测试报告	$(\text{过去 WWTP 指标超标的数} - \text{现在的数}) / \text{过去的数} \times 100$

Chemical Management Team 化学品管理团队

Chemical purchase 化学品采购

1. Roles 角色:

2. Purchase chemicals, ensure which meet legal and clients' requirements 采购化学品, 确保符合法规和客户要求

1. Responsibility 职责:

- Develop and implement controls of materials 制定和实施材料控制
- maintain inventory 维护库存
- procure information on material hazards, environmental impacts and eco-friendly alternatives 获取有关材料危害、环境影响和生态友好替代品的信息

Chemical Management Team 化学品管理团队

Production Department 生产部门

1. Roles 角色:
2. Produce products meeting clients' requirements 生产满足客户要求的产品
3. Responsibilities 职责:
4. Develop production plan 制定生产计划
5. Ensure all used chemicals meet individual client's requirement 确保使用的化学品满足单个客户的要求
6. Ensure all produced products meet client's requirement 确保生产的产品满足单个客户的要求



Chemical Management Team 化学品管理团队

Chemical warehouse 化学品仓库

1. Roles 角色:

2. Chemical Warehouse Management 化学品仓库管理

3.

4. Responsibilities 职责:

- Check labels and SDS when chemicals are in storage 化学品入库时, 检查标签以及SDS
- Chemicals logged in and out 化学品登入和登出
- Store chemicals safely and orderly 安全有序存储化学品
- For stored dangerous chemicals, regular inspection should be carried out 对存储的危险化学品, 应定期检查



Chemical Management Team 化学品管理团队

Waste warehouse 废弃物仓库

1. Roles 角色:
2. Waste management 废弃物管理
3. Responsibilities 职责:
4. Maintain waste inventory 维护废弃物清单
5. Segregate and store all waste properly 正确分隔和存储废弃物
6. Treat waste according to instruction of EHS department 根据EHS部门指示处理废弃物



Chemical Management Team 化学品管理团队

Human Resources 人力资源

1. Roles and Responsibilities 角色和职责:

- Define competency requirements and job descriptions for various roles in chemical management

1. 为化学品管理中的各种角色定义能力要求和工作描述

- Develop training programmes based on a needs analysis

1. 根据需求分析制定培训计划

- Integrate the chemical management system into reward, discipline and appraisal

1. 将化学品管理系统集成到奖励、纪律和评估系统中



Chemical Management Team 化学品管理团队

Maintenance 维护

1. Roles and Responsibilities 角色和职责:

- Establish machine maintenance procedure 建立机器维护程序
 - Implement preventive maintenance for key equipment 对关键设备实施预防性维护
 - Track equipment performance and efficiency etc. 跟踪设备性能和效率等
 - maintain logs and inventory on equipment, machine parts, etc.
 1. 维护设备、机器零件等的日志和库存
- Dedicated person should be assigned to this position. 应指派专人担任该职位。



Chemical Management Team 化学品管理团队

EHS 环境、健康、安全

1. Roles 角色:

2. Protect environment & health and safety of workers 保护环境、工人的健康和安全

3. Responsibilities 职责:

- Participate in the formulation of company's annual work objectives on safety, environment and occupational health 参与制定公司的安全、环境、职业卫生年度工作目标
- Responsible for the company's "three" wastes operation and management 负责公司的三废运行管理
- Equip proper PPE and engineering controls in related points. 在相关点配备适当的PPE和工程控制装置
- Organize emergency drills (chemical leakage, fires etc.) 组织应急演练 (化学品泄漏、火灾等)
- Conduct internal audit in environment management, health & safety areas 在环境管理、健康与安全领域进行内部审计
- Conduct investigation in case of any accidents 进行事故调查

Chemical Purchase 化学品采购

- Collect chemical purchase requirements from Production department
 - 1. 收集生产部门的化学品采购要求
- Obtain an assessment and approval from environment, health and safety (EHS) personnel
 - 1. 获取EHS的评估和批准
- Choose the LEAST hazardous chemical suitable for use
 - 1. 选择危害性最小的化学品
- Obtain the most updated SDS for every chemical
 - 1. 获取每种化学品的SDS
- Ask for a RSL/MRSL Confirmation or Guarantee Letter
 - 1. 要求提供RSL/MRSL符合性声明或保证书
- Get approval from customs office and other relevant government authorities, if needed
 - 1. 如果需要，获取海关及其他相关政府机构授权
- Maintain hazardous chemical purchase and transportation documentation in accordance with regulatory requirements, including items such as the license for hazardous chemicals and personnel qualifications
保证有害化学品采购和运输文件与法规要求一致，包括有害化学品和个人资格证书等执照



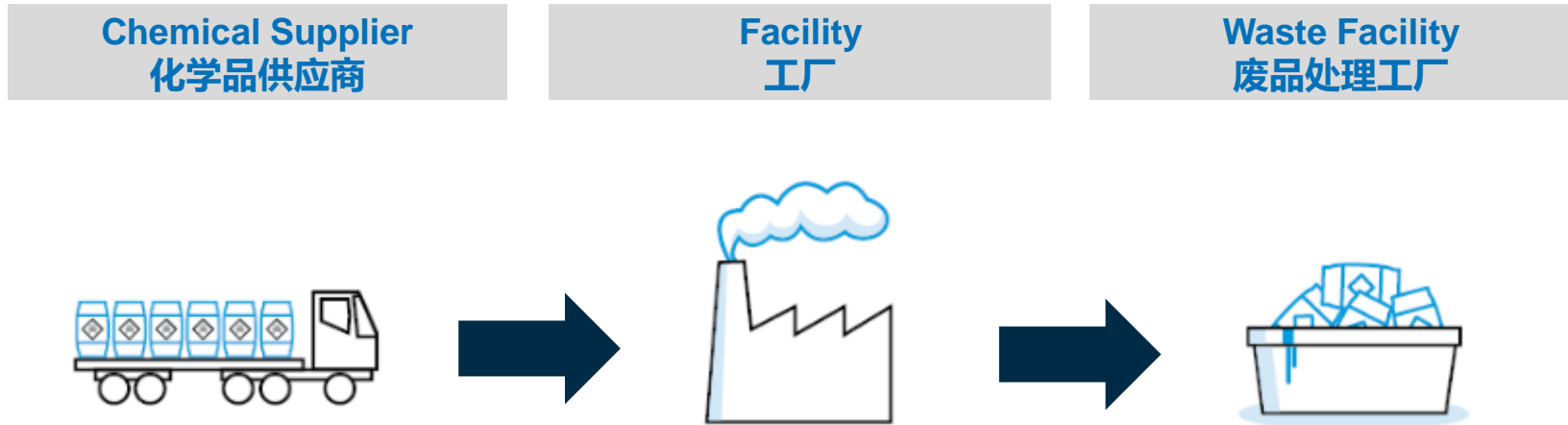
Chemical purchase 化学品采购

Positive chemical list 化学品正面清单

1. List of substances which have been assessed for their human and environmental health impacts and performance properties 已评估其人类和环境健康影响和性能特性的物质清单
 - Substances are recommended for use to lower risks to the environment and human health safety. 物质建议使用以降低对环境和人类健康安全的风险
 - Organizations such as bluesign, OEKO-TEX 组织如bluesign, OEKO-TEX
 - Individual chemicals suppliers may also produce positive (or MRSL compliant) chemistry lists that are recommended for use. 个别化学品供应商也可编制推荐使用的正面（或符合MRSL的）化学清单



Chemical Transport 化学品运输



External 外部

Transport of chemicals to or chemical waste from your company
运送化学品至工厂和从工厂运出化学废物

Internal 内部

- Receiving and unloading of chemicals.
化学品的收货和卸货
- Internal transport and conveyance of chemicals and waste, e.g. transport to warehouse, from warehouse to production areas, within production areas, etc.
内部运输化学品和废物，如运至库房、从库房到生产车间、生产车间内等

Chemical Transport 化学品运输

External Transport 外部运输

Considerations 考虑:

- Who is **responsible**? Refer to scope of your chemical management system.
谁负责? 参照化学品管理系统的范围
- Does your company **provide instructions** for the safe external transport of chemical?
公司**提供**有关化学品外部运输的**说明**吗?
- What are the **national requirements** for the safe transport of chemicals and waste?
化学品和废物运输的**国家法规**有哪些?
- Making and labelling of packages during transport.
制作标签, 并在运输包装上标识
- **Vehicle requirements** (such as transport documents, transport, emergency provisions).
车辆要求 (如运输文件、运输和应急设备)
- **Qualification of drivers** (e.g. special license, training).
司机资质 (如特别执照、培训)
- **Loading requirements** with regard to quantity, mixing with other loads (e.g. compatibility issue).
根据数量、与其它货物混装情况的**装载要求** (如相容性)



Chemical Transport 化学品运输

External Transport 外部运输

- **Before transport**, SDS and labels needs to be checked.
 1. **运输前**, 必须先检查 SDS 和标签
- All **broken, torn or incorrectly** located labels need to be replaced.
 1. **损坏、撕毁、不正确的**的额标签需要完全得到更换
- During the transport of a chemical **proper PPE safeguards** need to be available in case of leakage or unexpected spill or rupture of the container.
 1. 在化学品运输过程中使用**合适的 PPE**, 以备万一泄漏、溢出或容器破裂
- It needs to be ensured that all **chemical containers are properly closed** before transportation.
 1. 需要确保运输前**盖紧所有化学品容器的盖子**
- **Mode of transport needs to be secure**: e.g. wheels on a trolley must be fully functioning.
 1. **运输模式需要稳妥**: 如推车的轮子必须功能完善
- **Material of Construction (MoC)** of transportation of chemicals need to be looked at carefully to avoid contamination as well as accidents.
 1. 需要仔细考虑化学品运输所用容器设备的**材料 (MoC)**, 以避免事故和污染

Chemical Transport 化学品运输

Internal Transport 内部运输

1. Considerations 考虑:

- Chemicals transported **by forklift truck should travel on clearly marked passageways**, of adequate width, to reduce the possibility of collision and spillage.

使用铲车运输化学品应在**明确标识的通道**上运行，以避免可能的碰撞和泄漏

- **Containers for flammable liquids should be specially constructed** with spring-located caps and flame arresters in their spouts.

可燃液体的容器应特别装置**弹簧盖**和**含阻火器的喷口**

- The **transfer of flammable liquids** should only be conducted in **well-ventilated areas with the containers earthed and bonded**.

可燃液体的运输要求在**通风良好区域**进行，容器应**接地并固定在一起**

- **Avoid shaking hazardous chemicals** to prevent leaking due to over volatilisation.

避免摇动危险化学品，以防止过度挥发造成泄漏

- **Leak-proof equipment** should be used when transporting small amounts of hazardous chemicals.

2. 使用小量的危险化学品时应当使用**防漏设备**



Chemical Transport 化学品运输

Contamination from transport 运输造成的污染

Spillage and/or contamination during transport from: 运输时溢出和/或污染源自:

- Insufficient maintained transport equipment (e.g. wheels of trolley not running well).
运输工具维护不善 (如推车的轮子损坏)
- Surfaces not smooth.
地表面不平
- Material of construction of containers not appropriate for the type of chemical.
制造容器的材料不适宜于所储存的化学品



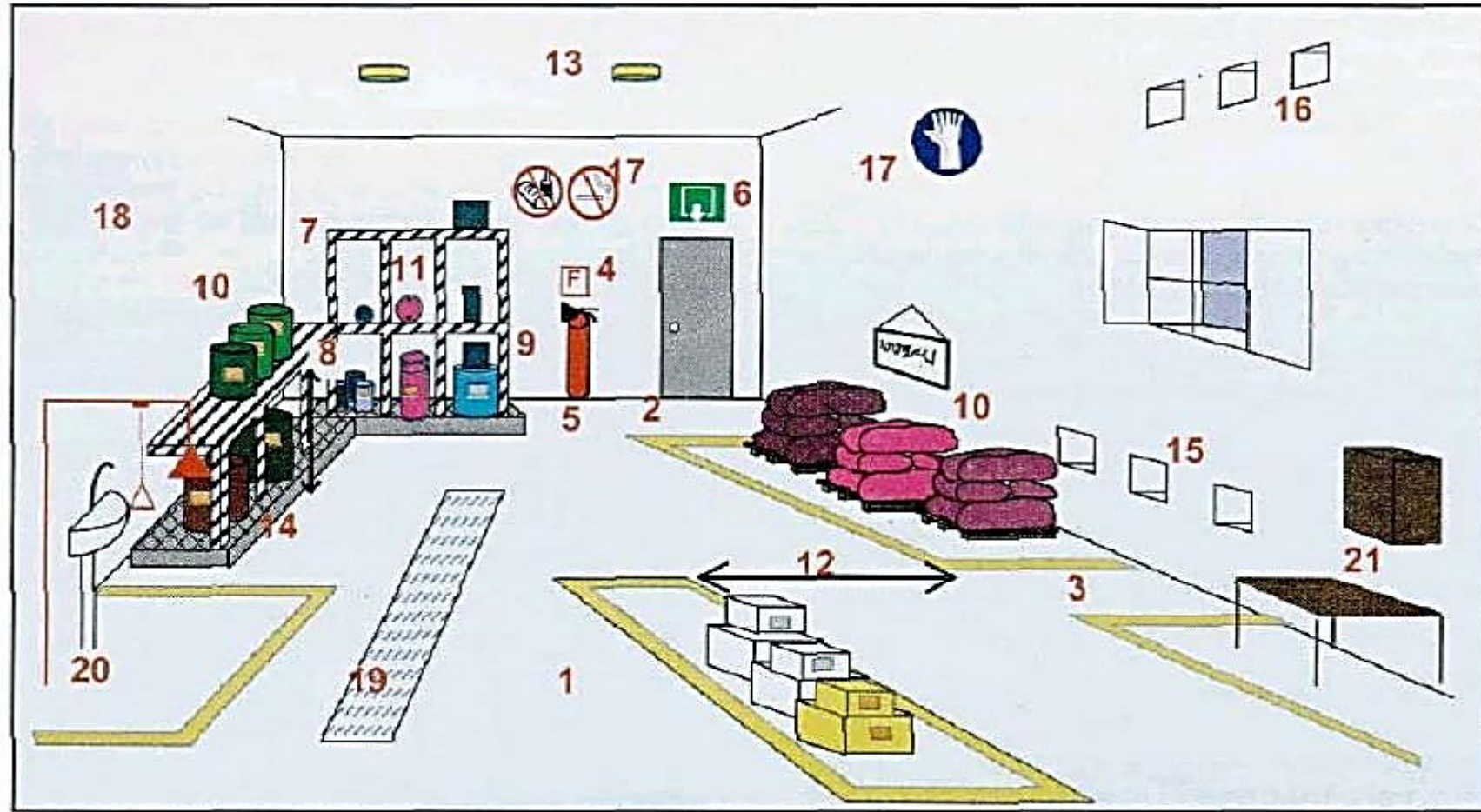
Chemical Storage 化学品储存

1. Consideration 考虑:

2.

- Available SDS. 可用的SDS文件
- SOPs and checklists. SOPs 和检查表
- Ventilation and grounding. 通风和接地
- Separation of incompatible chemicals. 分离不相容的化学品
- Handling spillages and leaking containers. 化学品溢出和容器泄漏的处理
- Provision for a draining system connected to the effluent treatment plant. 连接污水处理厂的排水系统的条款
- Adequate storage of flammable liquids. 正确地储存易燃液体
- Fire protection measures. 消防措施

MODEL LAYOUT OF A CHEMICAL STORE 化学品库房布局示例



Chemical Storage 化学品储存

Good Storage Condition 良好存储条件

Appropriate Building Construction/Protections 适当建筑/保护措施:

- Chemical storage areas should have sufficient enclosures or protections to prevent exposure to the environment (i.e. rain, direct sunlight)

化学品储存区应具有足够的外壳或保护措施，以防止暴露在环境中（如下雨、阳光直射）。

- The floor of the chemical storage areas should be

- Impermeable to liquids 不透水
- Made from concrete and sealed with resin 混凝土结构，表面涂层树脂
- Resistance against organic solvents 耐受有机溶剂
- Smooth surface, but not slippery 表面平整，但不滑
- Free from cracks to allow for easy cleaning 无裂纹，易于清洁

- The chemical storage areas should have Ventilation for: 化学品仓库应通风:

- Reduction of accumulation of dust or vapours 减少灰尘和蒸气的蓄积
- Controlled temperature and humidity 控制温湿度
- Combination of roof and wall ventilation 屋顶通风和墙面通风相结合

Chemical Storage 化学品储存

Good Storage Condition 良好存储条件

Regular clean-out 定期清除:

- Dispose of expired chemicals in timely manner 及时处理过期的化学品
- Inventorise all unwanted chemicals 处理所有不需要的化学品
- Remove spills immediately 立即清除泄漏物

Separate incompatible chemicals 不相容化学品的分隔:

- Materials should always be segregated and stored according to their chemical family or hazard classification 根据化学类别和危险性分类来隔离和储存化学品
- Do not store chemicals alphabetically unless they are compatible 不可按字母顺序排列, 除非这些化学品相互兼容
- Most common hazard classes include: flammables/combustibles, corrosive acids, corrosive bases, toxics, highly toxics, oxidizers, compressed gases, cryogenics, pyrophorics, water reactive, explosives 大部分普通危险分类包括: 易燃/可燃、腐蚀性酸、腐蚀性碱、毒性、高毒、氧化剂、压缩气体、冷冻剂、自燃物、遇水反应、爆炸性



Chemical Storage 化学品储存

Good Storage Condition 良好存储条件

Entry should be restricted to authorized personnel. 由经授权的专人控制进出.

Layout 陈列:

- Plan storage layout 计划储存布局
- Assign areas for storage and movement 指定用于储存和移动的区域
- Use colour markings 使用颜色标志
- Allow for storage on pallets for easier rearrangement 储存在托盘上, 以方便调整存放位置

Emergency Response 应急响应:

























Secondary containment should be in place to contain spills or leaks. 二次容器应到位, 以防止溢出或泄漏

Consult the SDS or chemical suppliers for recommended storage conditions.

关于储存条件, 参考 SDS 文件和化学品供应商



Chemical compatibility form 化学品兼容性表格

			C	Xi, Xn	T, T+	F, F+	O	E
								
								
C			✓	✓	o	x	x	x
Xi Xn			✓	✓	✓	✓	o	x
T, T+			o	✓	✓	o	x	x
F, F+			x	✓	o	✓	x	x
O			x	o	x	x	✓	x
E			x	x	x	x	x	✓

C 腐蚀性

Xi 刺激

Xn 有害

T 有毒

T+ 高毒

F 易燃

F+ 高易燃

O 氧化

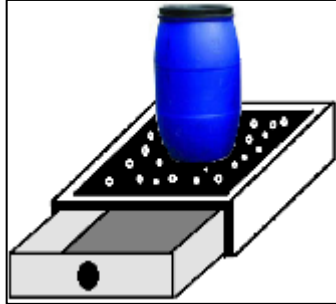
E 爆炸性

✓ 允许储存在一起

o 允许储存在一起，但应有特别防护

x 不允许储存在一起

Secondary containment of Hazardous Chemicals 二次容器



A good practice is that secondary containment should be at least 110% of the volume of the largest container stored and greater than 10% of the total volume of the stored substances(s).

一个好的做法是，二次容器应至少为储存的最大容器体积的110%，且大于储存物质总体积的10%

Example of Good Practice 良好实践的示例



Chemical Management – Storage of Hazardous Chemicals

化学品管理——存储有害化学品

1. DAMANGED CONTAINERS SHOULD NOT BE USED 不用破损容器



Chemical Containers With Drip Tray



Damaged Container

Chemical Management – Storage of Hazardous Chemicals

化学品管理——存储有害化学品

1. CONTAINERS SHOULD BE PROPER LABELLED 容器上要有标识



Chemical Handling 化学品操作

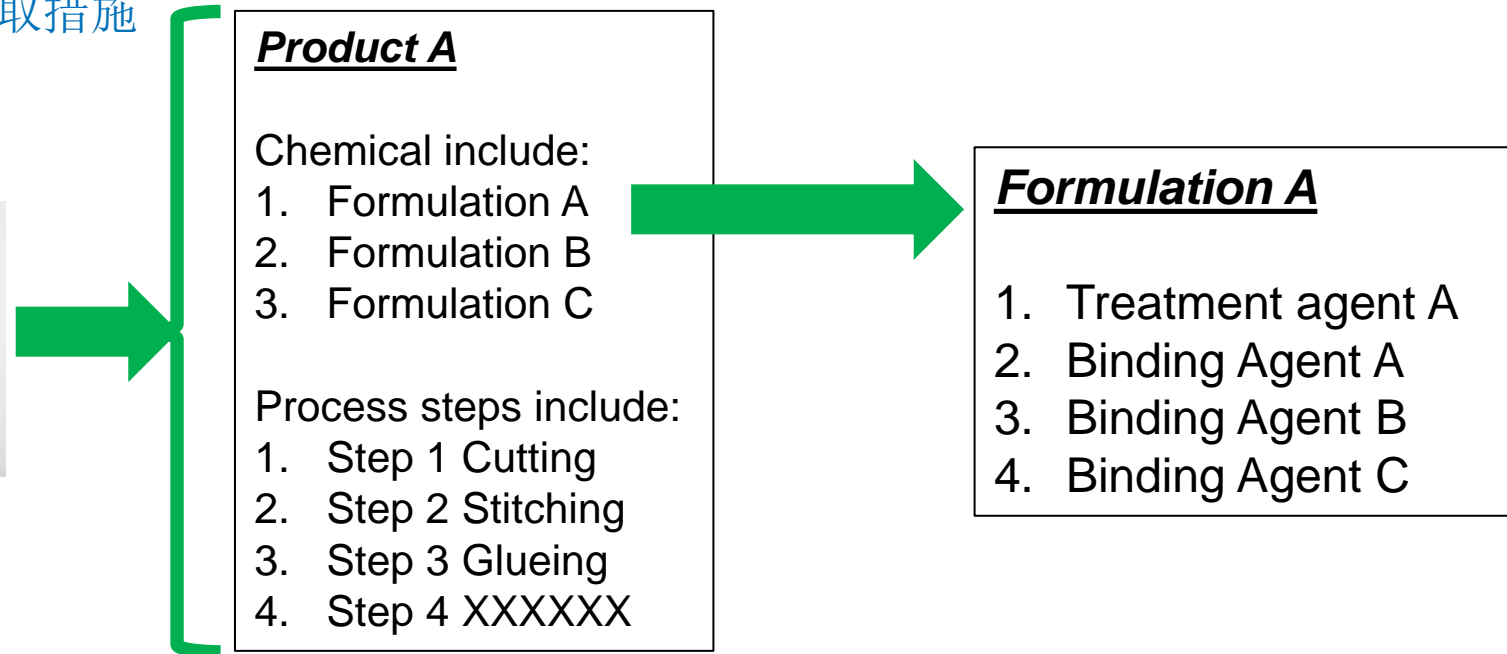
Chemical, Raw material and manufacturing process Traceability 化学品、原材料和生产过程可追溯性

- TRACEABILITY → determine whether the chemical components and raw material involved in the production can be traced “Backward”. 可追溯性，判断化学品和原材料在生产中是否能够向前追溯
- Pick out a finished products (the finished products should be linked to product order) , whether it is possible to trace the chemical components and raw material that are used to produce that particular finished product (Producer, Production details, Production date, batch number etc.) ,
选择一件成品（该成品需与产品订单号关联），通过它是否能够找到生产它时对应使用的化学品和原材料（生产商、产品信息、产品日期，批次号等）
- Help support root cause investigations in case any quality or compliance issue occurred due to any particular chemical
有助于调查由于化学品质量和符合性问题产生的根本原因
- If a recall of a product is needed, possible to recall the particular chemical products that are involved
若产品需召回，或许化学品也需要召回

Chemical Handling 化学品操作

Chemical, Raw material and manufacturing process Traceability 化学品、原材料和生产过程可追溯性

1. Trace the source 追踪来源
2. Trace what chemicals are used and when was used 追踪使用的是什么化学品
3. Assess the source of a RSL (for Product) & MRSL (for process input chemicals) failure and take action 评估检出的RSL/MRSL来源并采取措



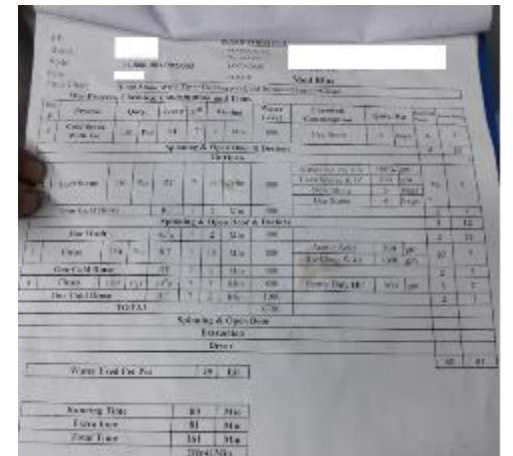
Chemical Handling 化学品操作

Chemical, Raw material and manufacturing process Traceability 化学品、原材料和生产过程可追溯性

1. Traceable information (e.g. chemical name & available quantity) should be recorded in : 可追溯信息 (化学品名称, 可用量) 将被记录在

- Production Recipe cards & Formulation sheets 生产配方卡&合成表
- Process instructions 处理指令
- Chemical Inventory (CIL) 化学品清单
- Chemical mixing/blending process log, lab records 化学品混合日志, 实验室记录
- Chemical storage log, including temporary/working storage and main warehouse with consistent records i.e. 化学品存储日志, 包括暂时存储以及主要仓库的记录一致性

- storage in/out log with chemical lot number, 存储/领用的化学品批号
- quantity, 数量
- dates (stored and dispatched for usage) 生产日期



Chemical Disposal 化学品的废弃

**How should you
handle empty
chemical waste
containers?
应该如何处理
化学废物空桶?**



Chemical Disposal 化学品的废弃

Storage and Treatment of Empty chemical buckets 化学品空桶的存储和处理



- Size of the storage area. 储存区域的大小
- Sufficient ventilation. 充分通风
- Entry should be restricted to authorized personnel. 由经授权的专人控制进出
- Area should be protected from sun and rain. 该区域不得暴晒和雨淋
- Take measures to contain leakage or spillage. 采取措施防止泄漏
- Leave enough air space in containers for liquid waste (minimum 5 cm).
液体桶中至少留出 5cm 空间
- Take protective measures to protect the environment in case of accidents
发生事故时采取措施保护环境



Chemical Disposal 化学品的废弃

Storage and Treatment of Empty chemical buckets 化学品空桶的存储和处理

- Good housekeeping practices.良好的管理
- Waste storage area kept clean.保持废物储存区清洁
- Hazardous waste containers kept closed at all times except when discarding waste.除排放时外，装有危废的容器必须保持密闭
- Working procedures and instructions on the safe handling and emergency response readily accessible.完全操作和应急响应的工作流程和指导易于拿取
- Appropriate personal protective equipment provided and used in line with MSDS requirements.提供和使用符合 SDS 要求的适合的个人防护设备



Chemical Disposal 化学品的废弃

- Clean chemical containers before storage and disposal.
储存和弃置前清洁化学品容器
- Work with a registered waste service provider for final disposal.
与一个注册过的废物服务商协助进行最终弃置工作
- Verify that the hazardous chemical containers are not reused for storage of food items.
确保有害化学容器不得再用于储存食物
- Explore with your chemical supplier, the possibility of a take back system of the chemical containers.
与化学品供应商讨论，建立化学品容器回收系统的可能性



Chemical Emergency Response 化学品应急

Spillages and Leaks 溢出和泄漏(1/2)

Even in the best managed chemicals stores and areas, where chemicals are repacked, transferred into other containers or mixed, there will be spills occasionally. 即便是管理最好的化学品储存区域，如进行分装、转移至其它容器、或混合，偶尔也将发生遗撒

Prevention: 预防:

- Check containers on delivery. 交货时检查容器
- Use good quality containers. 使用高质量的容器
- Ensure good and careful handling practices. 确保良好和仔细的操作实践
- Bad handling and long storage under bad conditions increase the risk of spills and leaks. 不良操作和在不良条件下的长时间储存和增加溢出和泄漏的风险
- Inform yourself in advance on measures and provisions in case of spillages or leakages. 提前了解有关万一发生溢出和泄漏时的措施和设备
- Refer to material Safety Data Sheet and manufacturer's instructions for corrective action. 提前了解有关万一发生溢出和泄漏时的措施和设备



Chemical Emergency Response 化学品应急

Spillages and Leaks 溢出和泄漏(2/2)

Response 反应:



- Keep spill control kits ready.准备好遗撒控制工具包
- Adequate with additional provisions needed to clean up materials that may spill, to be ready for use in the store at all times.适用的附加设备用于清洁泄漏的材料，保持在库房始终可用
- Spill control kits are commonly available from chemicals or other specialized distributors.遗撒控制工具包通常可以从化学品或其它特别的分销商处获取



Plan for external emergencies 对外部意外情况的预案: :

- How and which external agencies to alert?应如何警示外部机构? 哪些记过?
- How to cooperate with emergency services?如何与应急服务商合作?
- How to contain further releases?如何含有进一步的释放?
- How to respond to outside emergencies?如何对外部的紧急情况进行反应?

Emergency Planning and Emergency Plan 应急规划和应急计划

On-site and off-site emergency planning 厂区内外的应急方案:

- **On-site:** Dealing with effects of accident/incident confined to factory premises, involving only persons working in the factory and property inside the factory.

厂内: 方案涉及发生在厂界内的事故, 仅涉及工厂员工和厂内的财产

- **Off-site:** Dealing with effects uncontrollable inside the factory spreading outside the factory premises To be coordinated with outside stakeholders (municipality, industrial zone).

厂外: 方案涉及那些在工厂内发生的事故, 因不可控其影响扩散至厂界以外, 应与外部的利益相关方 (市政、工业区) 协助



Information sources and references 信息源和参考

- Safety data sheets. 安全技术说明书
- Technical data sheets. 技术数据表
- Chemical inventory. 化学品清单
- Hazard and risk maps. 危害性和风险图
- Incidence/Accident reports. 事故报告

For detailed guidance refer to UNEP APPELL www.unep.org/apell/ 详情参照 UNEP APPELL www.unep.org/apell/

Chemical Training 化学品培训

- Chemical Management training should be planed by Human Resources. 化学品管理培训应由人力资源计划安排。
- All workers should be trained periodically. 所有的员工应定期被培训。
- New Employee should be trained before actual working. 新员工在上岗前需进行培训。

- The training courses should include:
 - ✓ Chemical handling 化学品操作
 - ✓ Proper storage & Spill Protection 合适的存储防溢保护
 - ✓ Chemical Disposal Procedures 处置方式
 - ✓ Safety procedures (proper usage of PPE) 安全措施 (正确使用PPE)

- All training records including photos, attendee list and training material should be kept. 包括照片、签到表和培训材料在内的所有培训记录都应保留。
- The factory should set up a mechanism to monitor training effectiveness, such as an exam. 工厂应建立培训有效性监控机制, 比如说考试。
- 1. A good practice is to set up a whole year training plan in the beginning of this year. 一个比较好的做法是在年初建立整年度的培训计划。

Internal/external chemical management audit 内/外化学品管理审核

- External audit (外部审核) : Higg FEM 3.0, BEPI CMA, Bluesign certification, Oeko-tex Standard
- Internal audit (内部审核) :
 - Internal audit procedure 内审程序
 - Internal audit checking list 内审清单
 - Internal audit report 内审报告
 - Internal audit corrective action plan 内审整改计划

Case Study 案例分析

1. The sprayer factory A has several employees suffering from dizziness and pains when breathing. Absenteeism has risen and action is necessary. According to the test report, the content of VOCs in the air is seriously over the standard. They employed you as consultant to assess hazards and risks and identify any control gaps. They also ask you to suggest exposure control measures and environmental management, including personal protection equipment. What will you advise them?
2. 喷涂工厂A的若干员工感觉头晕和呼吸疼痛、出现缺勤，需要采取必要的整改行动。根据测试报告显示，厂区空气中VOCs的含量严重超标。工厂请你作为顾问来评估危害和风险，以及识别是否存在任何控制不足。还要求你给出有关曝露控制措施以及环境管理方面的建议，包括个人防护设备。你将提出什么样的建议呢？
3. Work in groups of 4 and present your results to your peers.分四组进行，并将结果向同伴展示。

Case Study 案例分析

1. The situation on site is the following: 现场情况如下:

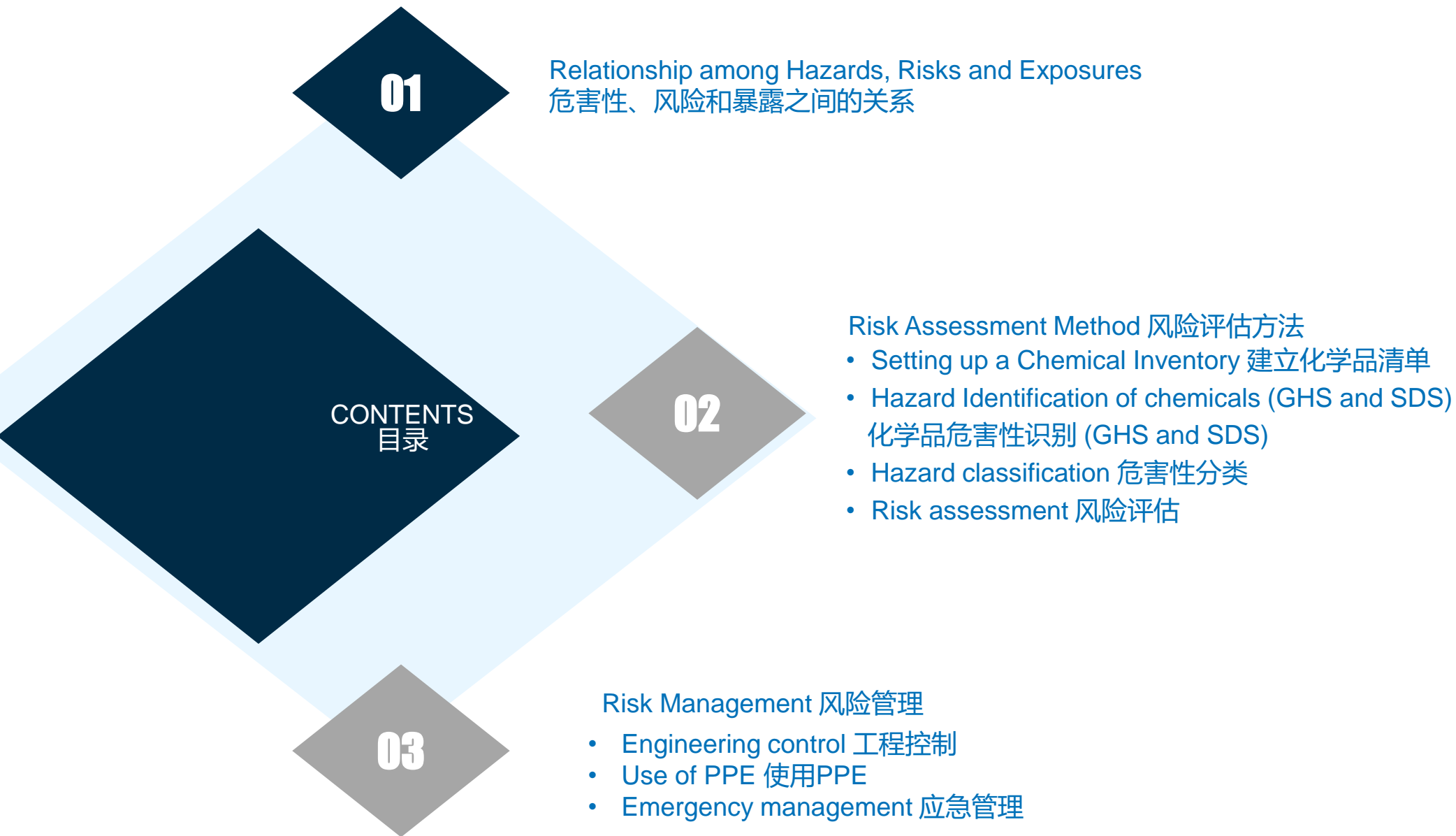
- Workers are engaged 10 hour shifts in the spraying area, working for about six to eight hours a day, with one hour lunch break and one 15minute tea break each in the morning and afternoon and the rest of the time waiting for material to be moved. 工作人员在喷涂区工作10小时，每天工作约6至8小时，每天上午和下午一小时午餐休息和一个15分钟茶歇，剩下的时间等待材料安排。
- Most workers remain in the work area during the tea breaks. 在茶歇期间，大多数工人都留在工作区域
- Air quality measurement indicates average concentration of 0.4 mg/m³ TWA, with peaks of 0.8 mg/m³ in the work area and 1.5 at the point of spraying operation. 空气质量测量指示平均浓度为0.4毫克/立方米 TWA，工作区内峰值为0.8毫克/立方米，喷雾操作时为1.5
- As per the SDS, TWA is 0.1 mg/m³. 根据SDS, TWA为 0.1毫克/立方米
- The spray areas are equipped with water curtains, but these are not switched on. 喷涂区域配有水幕，但不能打开。
- The area is ventilated by large extraction fans mounted at the wall above the spraying booth which blow the exhaust air towards the neighbouring garment unit. 喷涂室上方的墙壁上安装了大型抽气扇对区域进行通风，将废气吹向邻近的服装单元。
- The workers in the area wear surgical masks, which look new and fairly clean at the time of your visit. 该地区的工作人员佩戴手术口罩，在您访问时看上去很新，相当干净

Module 3: Hazards Identification and Risk Control

模块三：危害性识别与风险控制

TÜV Rheinland
March 2019





Learning objectives 学习目标:

1. To gain knowledge on hazards, risks and exposures of chemicals 了解化学品的危害、风险和暴露
2. To learn how to do conduct a risk assessment 学习如何进行风险评估
3. To Learn the basic knowledge about GHS 了解GHS的基本知识
4. To learn SDS and its information items 学习SDS及其信息项
5. To learn how to choose right PPEs 学习如何选择正确的PPE
6. To learn about control measures 了解控制措施

Target Group 目标群:

Participant 5% factory workers may include: 工厂5%的员工应包括:

- 1.High management: factory Board Chairman, Managing Director, General Manager 高层: 董事长、常务董事、总经理;
2. Department Manager in Quality, EHS, R&D, Manufacturing, Purchasing, IT, HR, Sales, and Admin 部门经理 (质量、EHS、研发、生产、采购、IT、人力资源、销售、行政)
3. All staffs in quality department, lab, and EHS department 质量部门、实验室和EHS部门的所有员工
- 4.Shift leaders in each manufacturing line, in chemical warehouse 每条生产线、每个化学品仓库领班
- 5.All interested workers are welcomed 所有感兴趣的员工
6. Miminum 10 people for each factory 每家工厂至少10人

Length 时长:

4 Hours 4小时

Training outcomes 培训成果

At the end of this training, the participants will be able to ...
培训结束后，参与者应该能够...

- Set up and maintain factory`s own chemical inventory (in line with sample template)
建立并维护工厂自己的化学品清单（与样版一致）
- Verify the quality of the safety datasheet (e.g. up-to-date, complete, GHS conform)
验证安全数据表的质量（比如：有效期、完成度、GHS符合性）
- Locate relevant information in the SDS 在SDS中查找相关信息
- Identify hazard types and levels/bands for each chemical 确定每种化学品的危险类型和等级/波段
- Prepare and use procedure for conducting risk assessment for different positions where chemicals are handled
制定并使用针对不同处理化学品位置的风险评估程序
- Distinguish between different risk control methods 区分不同的风险控制方法
- Select appropriate/recommended method to prevent and control risks (in line with risk assessment and recommendations in SDS) 选择适当/推荐的方法来预防和控制风险（符合SDS中的风险评估和建议）
- relate the recommended/required personal protective equipment against hazard categories and types of exposure
将推荐/要求的个人防护设备危险与危险类别和暴露类型联系起来
- Prepare and respond to emergencies 准备和应对紧急情况

**Relationship among Hazards,
Risks and Exposures**
危害性、风险和暴露之间的关系

01

Relationship among Hazards, Risks and Exposures 危害性、风险和暴露之间的关系



Tiger in a cage
笼中之虎

HAZARD
危害性

A hazard is an intrinsic property of a chemical that is independent of usage, exposure or other criteria. Property examples:
危害性是化学品的固有性质，与使用、暴露或其它因素无关。例如以下各项性质：

- Gasoline is flammable. 汽油是易燃的
- PCBs are persistent in the environment. PCB在环境中持久不降解
- Some uranium isotopes are radioactive. 某些铀同位素有放射性



Tiger in a city
城中之虎

RISK
风险

The risk also considers the exposure potential when using a chemical, the engineering controls in place, PPE, etc. Thus, in general terms, Risk is a function of:
风险还需要考虑化学品使用时的潜在暴露，适当的工程控制、PPE等。因此一般来说，风险是以下函数：



Exposure Pathways 暴露途径

Exposure is the process of coming in contact with a hazard

暴露是与危害接触的过程

Production

Factory personnel exposure (manager, supervisor, worker, contractors).

生产

工厂的员工暴露 (经理、主管、工人、承包商)

Sale and use-phase Consumer and environment exposure (air, water, soil).

销售和使用阶段

消费者和环境暴露 (空气、水、土壤)



Transportation

Interim handling personnel (transporters, customs officials, point of sale staff, etc.).

运输

临时操作人员 (运输、海关官员、销售人员等)

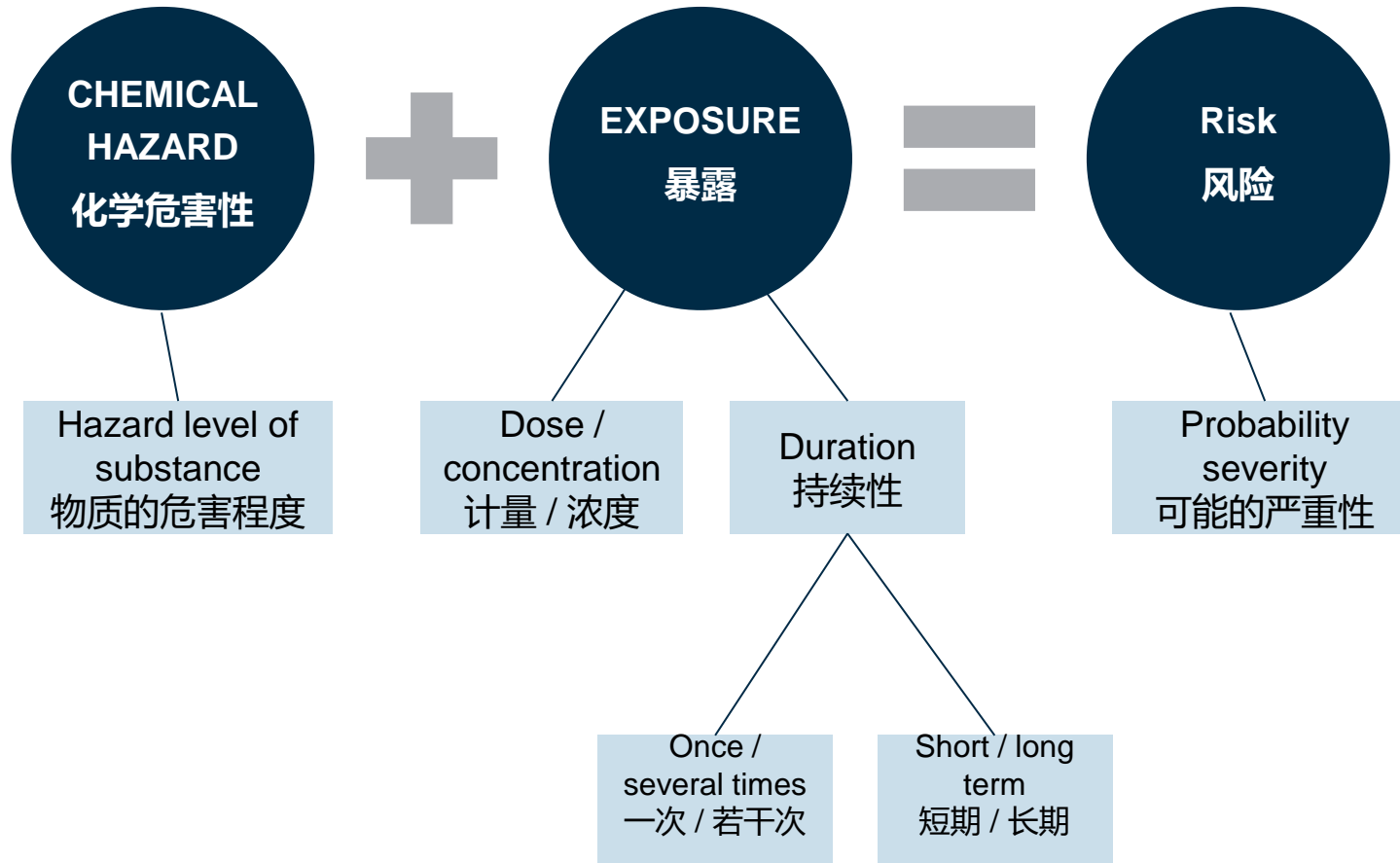
Post-use

Society exposure (neighbourhood, downstream population).

使用后

社会暴露 (邻里、下游人口)

Influencing Factors 影响因子



Risk Assessment Method
风险评估方法

02

Risk assessment of hazardous chemicals

When carrying out chemical risk assessment, several questions need to be asked:

执行化学品危险风险评估时，需要提出多个关键问题：

1. What potential exposure may occur? 工人接触到哪些物质？

- Use chemical inventory, consider all persons who may be affected. 使用化学品清单考虑可能接触或暴露与化学品的所有人员
- Review PPE in use to make sure it is appropriate. 审查个人防护设备，确保其适合
- Review environmental controls to ensure they are adequate. 审查环境控制措施，确保其充分

2. What hazards are indicated for the chemicals? 化学品可能引起哪些伤害？

- Information can be found on packaging labels, from SDS, supplier or a specialist in your factory. 化学品信息可在包装标签、SDS、化学品供应商、贵厂的专家或互联网获取。

3. What activities can give rise to exposure? 哪些活动会增加暴露风险？

- When is it possible for spills or splashes to occur? 什么时候会发生溢出或喷溅？
- Are there steps in a process that increase the potential for exposure? Can these steps be eliminated or changed? 在生产中有哪些步骤会增加暴露的可能？这些步骤可以取消或者改变吗？

4. What risks need to be controlled? 哪些风险需要控制？

The significance may depend on duration and frequency of exposure as well as the concentration of the substances involved. 风险重要性可能取决于暴露的持续时间和频率以及涉及到的物质的浓度。

The 4-Step Risk Assessment Process 四步风险评估过程



Hazard Identification 有害物质的识别

What health problems will be caused by the pollutant ?



Exposure Assessment 暴露评估

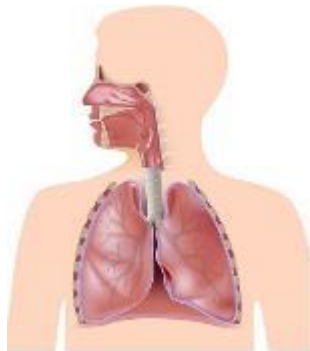
What is the amount / conc. Of the pollutant do people inhale during a specific time period?

How many people are exposed?

Dose-Response Assessment

响应评估

What are the health problems at different exposures?

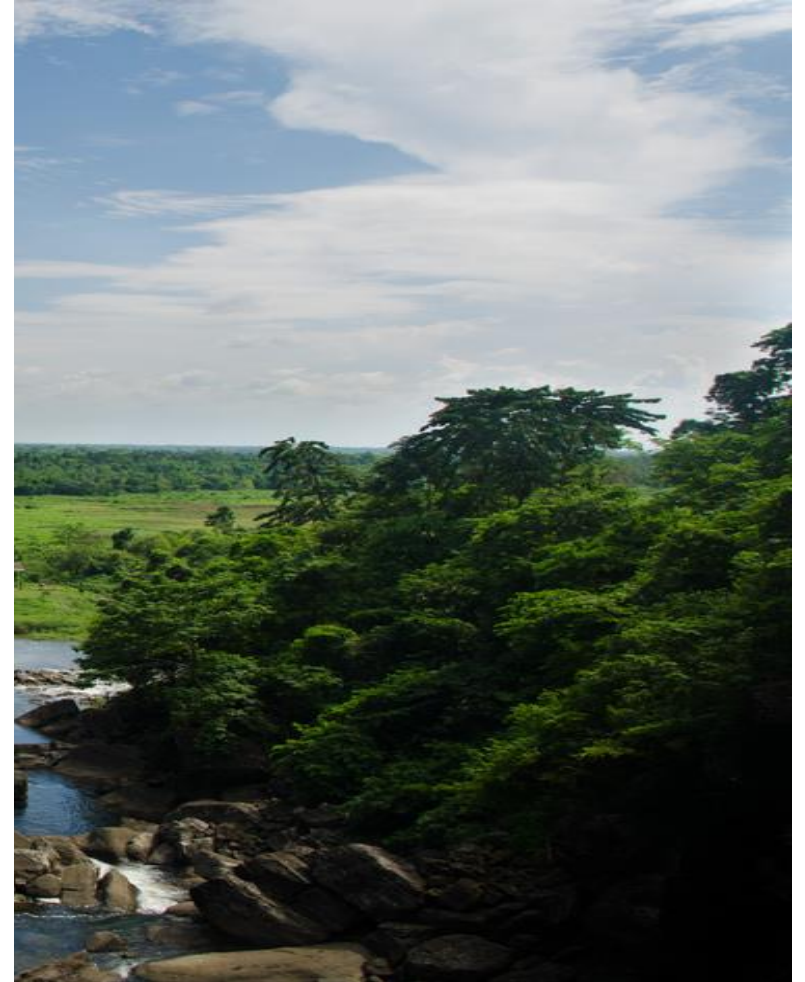


Risk Characterization 风险表征

What is the extra risk of health problems in the exposed population?

Risk Assessment using control banding 使用分级管控 (Control Banding) 来进行风险评估

- Qualitative or semi-quantitative risk assessment and management approach to promoting occupational health and safety. 定量或半定量的风险评估和管理方法，促进职业健康和安全
- Recognised methodology, developed under ILO Control Banding, HSE (UK, COSHH Essentials), BAUA GHS Column Model (Germany).
在 ILO Control Banding, HSE (UK, COSHH Essentials), BAUA GHS Column Model (Germany) 下制定的公认方法
- Emphasis on controls needed to prevent hazardous substances from causing harm (e.g. to people at work).
强调所需要的控制，预防有害物质引起（如对工作人员）的危害
- Building on hazard banding approach. 建立于危害分级的方法



Control Banding Concept 分级管控 (Control Banding)概念

Basic concept:基本概念:

The greater the potential for harm (= hazard band), the greater the degree of control needed to manage the given situation and make the risk “acceptable”.

潜在危害 (=危害级别) 越大, 需要控制的程度就越大, 以使其风险可“接受”

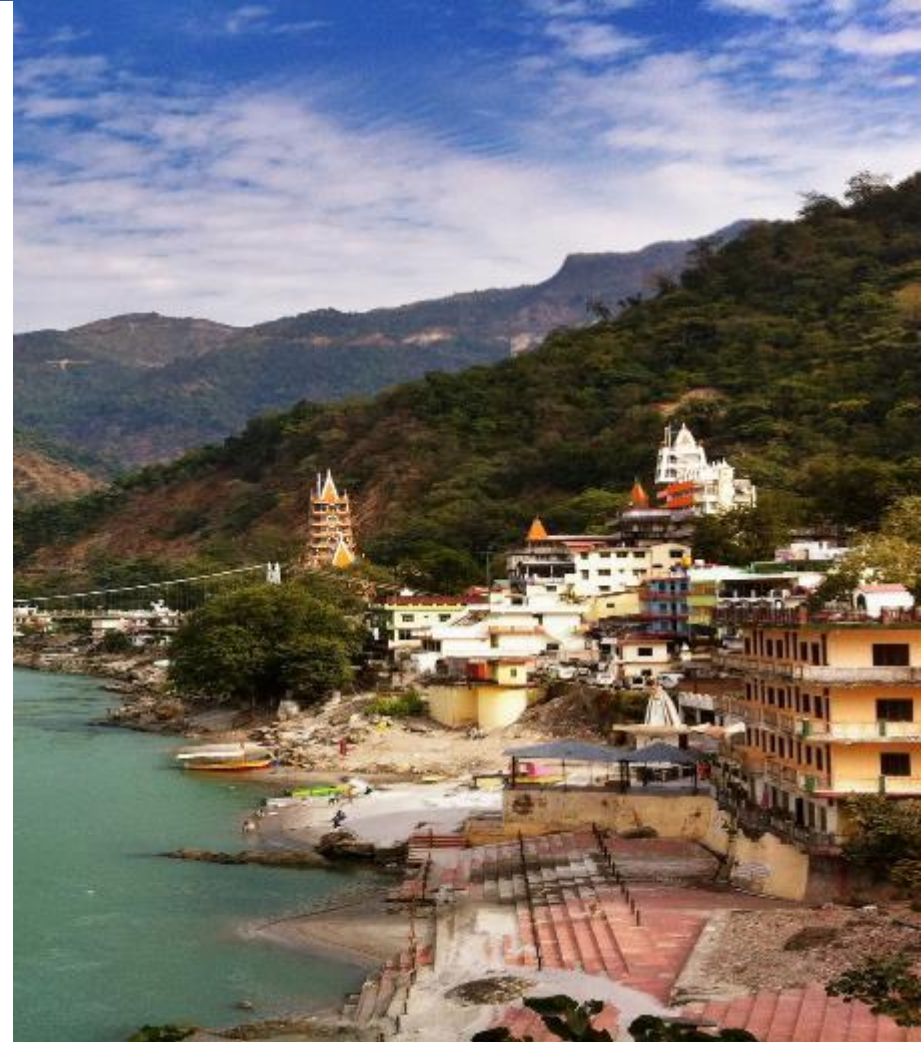
Final result:最终结果:

Value indicating control band. Action oriented control /risk band or range of exposures matched with a specific control technology or strategy (= control approach).

行动取向的控制/ 风险级别 或曝露的程度相匹配的控制技术和策略 (=控制方法)

Hazards covered:危害性

- Physical (e.g. building structure).物理危害
- Human Health.健康危害
- Environmental.环境危害



Steps to implement control banding 实施分级管控的步骤



Make inventory of all chemicals used in your company.

为工厂使用的所有化学品创建清单



Identify hazardous chemicals and their hazards (using the symbols indicated on the labels, hazard / risk statements from SDS).

识别危害化学品以及它们的危害性 (使用标签上的符号和SDS文件中的危害/风险语句)



Carry out hazard ranking.
进行危害分级



Assess risks (linking hazard information to hazard groups, amounts used and dustiness / volatility and probability of effects) and identify recommended control approaches for given risk levels.
风险评估 (将危害信息和危害分组、使用量、扬尘性/挥发性和作用的可能性链接起来), 识别出应对给定风险级别的控制方法

Setting up a Chemical Inventory 建立化学品清单

What is CHEMICAL INVENTORY LIST (CIL)? 什么是化学品清单?

Chemical inventory list is a document which contains all the chemicals used in the facility.
Chemicals used maybe exist in:

化学品清单是包含有工厂使用的所有化学品的文件。这些化学品可能包含在:

- ❖ General production process 常规生产过程
- ❖ Wastewater treatment process 污水处理过程
- ❖ Other processes in boilers, incoming water pretreatment etc. 锅炉加工, 进水预处理等
- ❖ Warehouse chemicals 仓库中的化学品
- ❖ Production line chemicals (including intermediate/mixed chemicals) 生产线中的化学品, 包括中间/混合的化学品
- ❖ Discarded chemicals 废弃化学品
- ❖ Household chemicals 日用化学品
- ❖ Packaging added chemicals like preservatives and other additives 包装化学品如防腐剂及其他添加剂



What content should a CIL contain? 化学品清单需要包括哪些内容?

A CIL should at least contain below information: 化学品清单至少应该包含以下信息:

Chemical name 化学品名称

Chemical supplier information 化学品供应商名称

Chemical manufacturer information 化学品制造商名称

Chemical components / substances, CAS number, Content percentage 化学成分信息, CAS 号, 含量百分比 (The factory can use CAS no./RSL testing report/chemical name to screen at least 70% Manufacturing chemicals for RSL/MRSL. 工厂使用CAS号/RSL测试报告/化学名称筛选至少70%的RSL/MRSL制造化学品。)

Chemical hazardous information 化学品危害性信息

ZDHC / Brands MRSL screening result ZDHC / 品牌MRSL筛选结果

SDS provision screening SDS 是否提供

Monthly usage amount statistics 化学品月度使用量统计

Monthly update principal information 化学品每月更新负责人信息

Update date 更新日期

etc.

Responsible by/负责人:		Date updated/更新时间:		MDS available 是否有MDS		Ingredient 物料组成成分	Concentration of Substance (%) 浓度百分比	CAS No.	MRSL compliance 是否有禁限物质	Substance use and application 使用场合/工艺	Chemical hazard/危险标示						Container/ 化学品包装		Quality Register Check 质量检查时间		Average consumption kg/month 月平均消耗 (kg)	PPE required 所需防护用品
No.	Commercial Name 化学品名称	Common Name 俗名	Name/ 供应商名称	Contact info (add, phone, email) 联系方式 (地址, 电话, 邮件)	Chinese 中文						English 英文	Others 其他	Flammable 易燃性	Explosive 易爆性	Corrosive 腐蚀性	Acid/Alkali 酸性/碱性	Toxic 毒性	Irritant 刺激性	Environment 环境	Label 是否有标签		
1	CP-UV黄		KISCO	韩国, 82-2-3560-7873	是		HX. Reactive 50-60 1195707-42-2 添加剂 30-40 7757-82-5 防生剂 0.5-1 10024-47-2		合	染色												
2	K-8橙		KISCO	韩国, 82-2-3560-7873	是		添加剂 50-60 7757-82-6 乙基二硝氨基 30-40 81867-04-6 防生剂 0.5-1 10024-47-2		否	染色												

Management of Chemical Inventory 化学品清单管理

An inventory of chemicals should be maintained in following rules: 化学品清单需要按照以下要求维护:

- ❑ When new chemicals are acquired, they must promptly be added to the inventory.
当获得化学品后，必须迅速加入化学品清单
- ❑ When chemicals are expended or disposed, they must be removed from the inventory or a single line shall be drawn through them. 当化学品用完或处置后，必须从清单中移除或者标注删除线
- ❑ This inventory must be examined and updated periodically (at least annually).
该清单必须定期被更新和校对
- ❑ The inventory must be readily available to anyone entering the work area.
该清单必须随时可让任何人进行工作使用

负责人：													
负责人职位：													
更新日期：													
化学品供应商	化学品生产商	化学品商品名	化学品名称	CAS No.	危害性分类	用途/使用工序	月消耗量	DS Availab	MRSL Compl	ign recogn	风险评估等级	PPE	

Activity 活动

We have prepared 10 SDSs. Please use these SDSs to create a chemical Inventory.

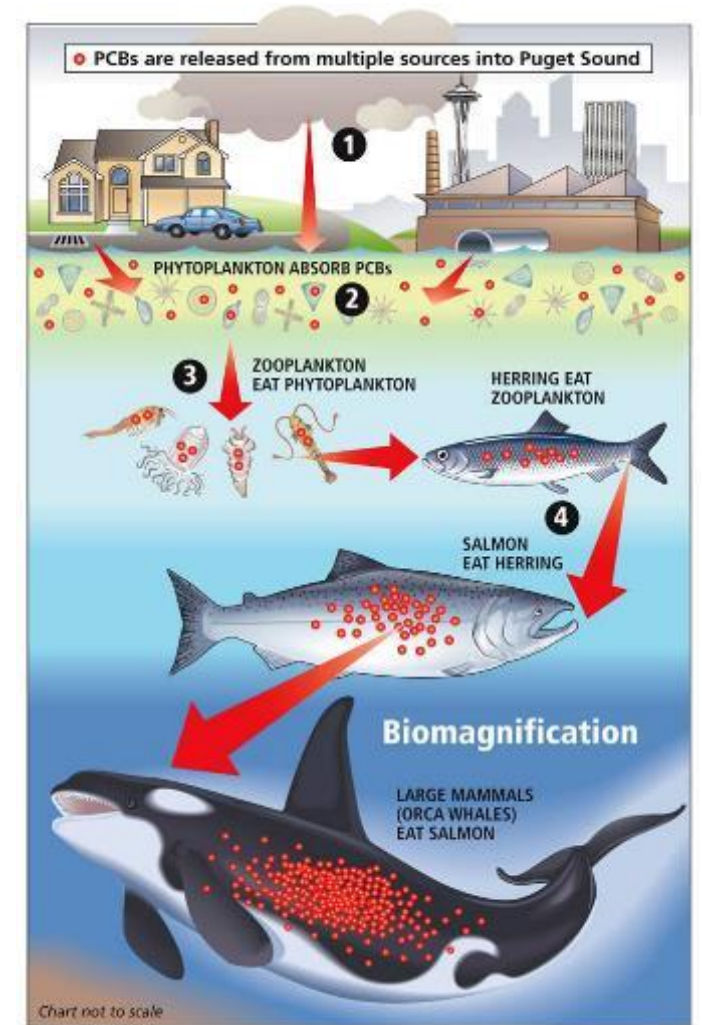
我们准备了10份SDS，请利用这些SDS制作一份化学品清单。

Hazard Identification of chemicals

化学品危害性识别

Definition of Hazardous Chemicals 有害化学品的定义

- Showing intrinsically hazardous properties: 其固有的有害特性表现
- Persistent, bio-accumulative and toxic (PBT) 持久性, 生物累积性, 毒性
- Very persistent and very bio-accumulative (vPvB) 高持久性, 高生物累积性
- Carcinogenic, mutagenic and toxic for reproduction (CMR) 致癌, 致突变, 遗传毒性
- Endocrine disruptors (ED); or those of equivalent concern, not just those that have been regulated or restricted in other regions 内分泌干扰物; 或者其他有相同关注的物质, 不只是在其他地区受到规定或限制的物质



Reference: Washington State Department of Ecology. (2017). http://www.ecy.wa.gov/programs/hwtr/RTT/pbt/images/PI_PCB.jpg

**What is UN's Globally Harmonised System?
什么是联合国全球统一制度?**

Globally Harmonized System of Classification and Labelling of Chemicals (GHS)全球化学品统一分类和标签制度(GHS)

- Created by the United Nations in 1992.
1992由联合国于年创立
- Common language for chemical identification. 化学品分类和标签的通用语言
- Aims at international harmonisation of classification and labelling. 旨在对分类和标签进行国际统一
- Replacement of national labelling standards. 替代国家标签标准
- Consistent, global criteria. 一致的全球标准
- Used to reduce the risks to both human and animal health and the environment. 用于减少对人类和动物健康和环境的风险

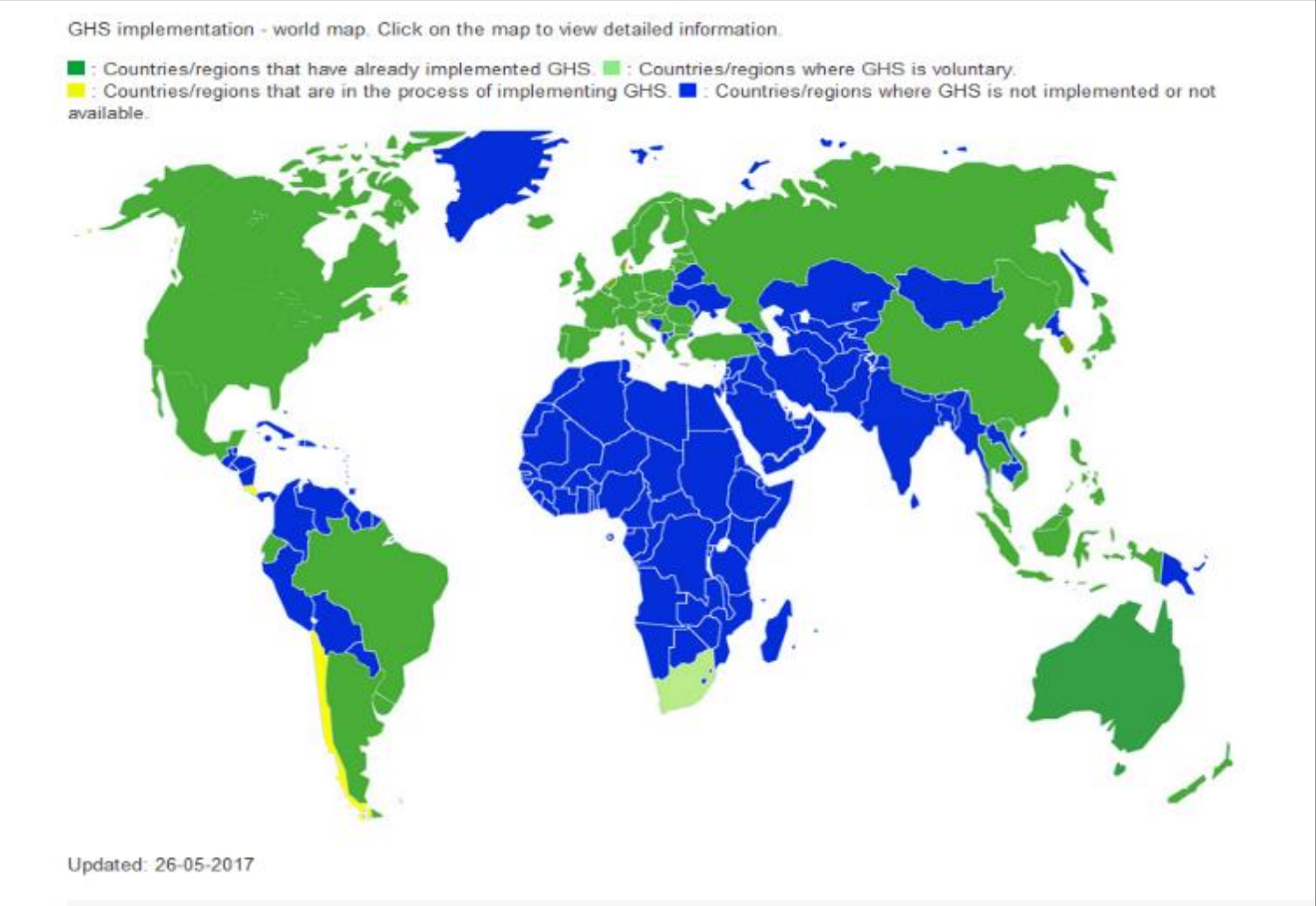


GHS Labelling GHS标签

<ul style="list-style-type: none"> • 氧化剂 	<ul style="list-style-type: none"> • 易燃性 • 自反应 • 自燃 • 自热 • 遇水放出可燃性气体 • 有机过氧化物 	<ul style="list-style-type: none"> • 爆炸物自反应 • 自反应 • 有机过氧化物
<ul style="list-style-type: none"> • 急性毒性 (严重) 	<ul style="list-style-type: none"> • 腐蚀 	<ul style="list-style-type: none"> • 高压气体
<ul style="list-style-type: none"> • 致癌性 • 呼吸过敏 • 生殖毒性 • 特异性靶器官毒性 • 生殖细胞致突变性 • 吸入危险 	<ul style="list-style-type: none"> • 危害环境 	<ul style="list-style-type: none"> • 刺激性 • 皮肤过敏 • 急性毒性 (有害) • 麻醉作用 • 呼吸道 • 危害臭氧层

Source: ZDHC

GHS Implementation Globally GHS在全球实施



Source: UNECE

GHS in EU 欧盟的GHS

In EU the following regulations are relevant:在欧盟，以下法规是相关的:

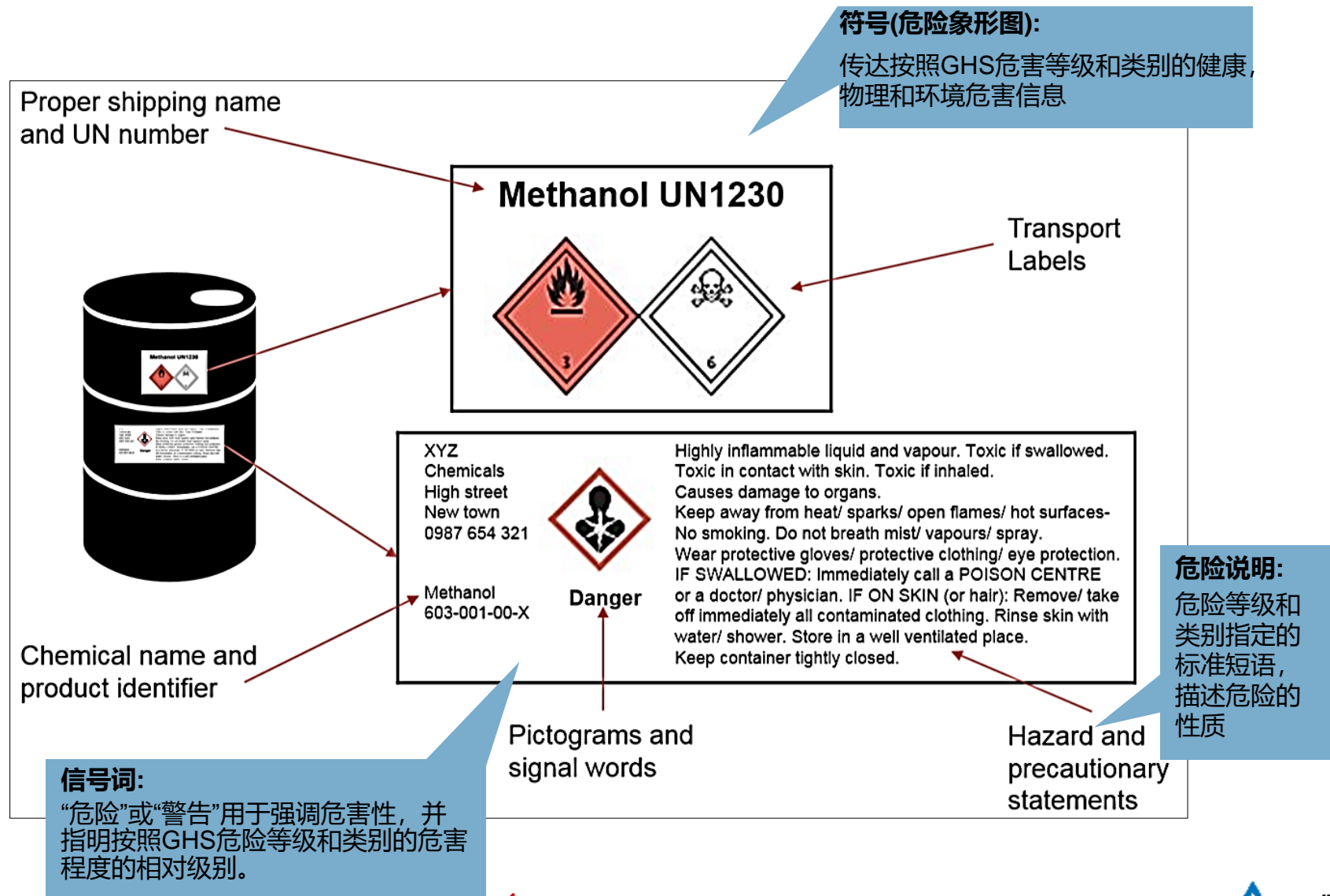
- For supply and use sectors:
Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006
REACH Regulation (EC) 1907/2006 (Regulation on Registration, Evaluation, Authorization and Restriction of Chemicals).
供应和使用部分：欧洲议会和理事会2008年12月16日关于物质和混合物的分类，标签和包装的第1272/2008号法规（EC），修订和废止指令67/548 / EEC和1999 / 45 / EC修订REACH法规（EC）1907/2006（关于化学品注册，评估，授权和限制的法规）。
- For inland transport of dangerous goods:
within or between EU Member States: Directive 2008/68/EC.
- 内陆运输危险货物：欧盟成员国内部或欧盟成员国之间：指令2008/68 / EC。

GHS in China 中国的GHS

In China the following regulations are relevant 在中国，以下法规是相关的：

- **GB 190-2009 (packaging):** implements the 15th revised edition of the UN recommendations on the Transport of Dangerous Goods.
GB 190-2009 (包装): 实施联合国关于危险货物运输建议的第15修订版。
- **GB T 16483–2008:** Safety Data Sheet for chemical products content and order of sections (applicable from 1 February 2009).
GB T 16483–2008: 化学品安全技术说明书内容和项目顺序 (自2009年2月1日起适用)
- **GB/T 17519-2013:** Guidance on the compilation of Safety Data Sheet.
GB/T 17519-2013: 编制安全数据表的指南
- **GB 15258–2009:** General rules for preparation of precautionary labels for chemicals (applicable from 1 May 2010).
GB 15258–2009: 制定化学品防护标签的一般规则 (自2010年5月1日起适用)
- **GB 13690–2009:** General rule for classification and hazard communication of chemicals (applicable from 1 May 2010).
GB 13690–2009: 化学品分类和危险性公示通则 (自2010年5月1日起适用)
- **GB 30000-2013:** (full implementation). **GB 30000-2013:** (完全实施).

Elements of a GHS Standardised Label GHS标准化标签的要素



The Basic Parts of a GHS-compliant Label 符合GHS标准的标签基本要求



1. **Product Identifier:** Should match the product identifier on the Safety Data Sheet. **产品标识符:** 应對應安全数据表上的产品标识符.
2. **Signal Word:** Either use “Danger” (severe) or “Warning” (less severe). **信号字:** 使用“危险” (严重) 或“警告” (較不严重) .
3. **Hazard Statements:** A phrase assigned to a hazard class that describes the nature of the product’s hazard. **危害说明:** 危险类别中的短语, 描述产品危害的性.
4. **Precautionary Statement:** Describes recommended measures to minimise or prevent adverse effects resulting from exposure. **防护说明:** 介绍建议采取的措施, 尽量减少或防止因接触而产生的不良影响
5. **Supplier Identification:** The name, address and telephone number of the manufacturer or supplier. **供应商标识:** 制造商或供应商的名称, 地址和电话号码.
6. **Pictograms:** Graphical symbols intended to convey specific hazard information visually. **象形图:** 旨在視覺传达特定危险信息的图形符号

**Which of the 16 elements of the Safety Data Sheet
do you know?**

你知道安全数据表的16个元素吗?

Elements of SDS – GHS Format SDS元素 - GHS格式

- Section 1: Chemical Product and Company Identification 化学品名称及生产商信息
- Section 2: Hazard Identification 危害标识信息
- Section 3: Composition, Information or Ingredients 成分或组分信息
- Section 4: First Aid Measures 急救措施
- Section 5: Fire-Fighting Measures 消防措施
- Section 6: Accidental Release Measures 泄漏应急处理措施
- Section 7: Handling and Storage 操作与存储
- Section 8: Exposure Controls and Personal Protection 接触控制和个人防护措施
- Section 9: Physical and Chemical Properties 理化特性
- Section 10: Stability and Reactivity 稳定性和反应性
- Section 11: Toxicological Information 毒理学信息
- Section 12: Ecological Information 生态学信息
- Section 13: Disposal Considerations 废弃处置
- Section 14: Transport Information 运输信息
- Section 15: Regulatory Information 法规信息
- Section 16: Other Information 其他信息

SDS SECTION 1 – Hazard identification SDS第一章：化学品名称及生产商信息

Identifies the chemical on the SDS as well as the recommended uses:

SDS上的化学品名称以及推荐的用途：

- Product identifier used on the label and any other common names or synonyms by which the substance is known.
标签上使用的产品名称以及物质已知的任何其他常见名称或同义词
- Recommended use of the chemical and any restrictions on use, including recommendations given by the supplier.
化学品的使用建议和限制，包括供应商给出的建议

Provides essential contact information of supplier:

提供供应商必要的联系信息：

- Name, address, phone number of the manufacturer, importer, or other responsible party, and emergency phone number.
制造商，进口商或其他责任方的名称，地址，电话号码和紧急电话号码

SDS SECTION 2 – Hazard identification SDS第二章: 危害标识信息

Hazards of the chemical and appropriate warning information associated with those hazards:

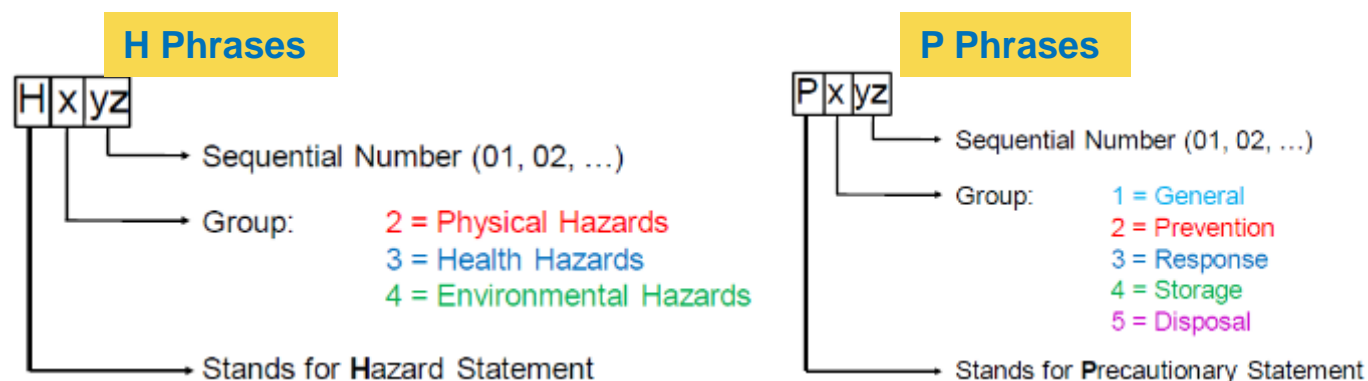
化学品的危害性质与这些危害有关的适当警告信息:

- Hazard statement(s) – **H Phrases** - describe the nature of the hazard(s) of a chemical, including, where appropriate, the degree of hazard.

危险说明– 描述化学品危害的性质, 包括在相关情况下危害的程度。

- Precautionary statement(s) – **P Phrases** - describe recommended measures that should be taken to minimize or prevent adverse effects resulting from exposure to the hazardous chemical or improper storage or handling.

防护说明– 描述为减少或防止因接触危险化学品或不当储存或处理而产生的不良影响而应采取的推荐措施。



For further details: <https://www.osha.gov/Publications/OSHA3636.pdf>

SDS SECTION 3 - Composition, information or ingredients

SDS第三章：成分或组分信息

Substance: 物质:

Chemical identity, common name / synonyms, CAS No. and other unique identifiers and impurities or other additives which are classified and can contribute to classification of substance.

化学名称，通用名称/同义词，CAS号码以及其他独特名称和杂质或其他已被分类的添加剂并可有助物质的分类。

Mixture:混合物:

The chemical identity and concentration range of all hazardous ingredients as per the definition of GHS presented above the cut off levels.

所有按照GHS高于限量的危险成分的化学名称和浓度范围。



SDS – SECTION 4 First Aid Measures SDS第四章：急救措施

Describes initial care that should be given by responders to an individual who has been exposed to chemicals.

描述应急人员对接触过化学品的人员的初步照顾

The required information consists of:

所需的信息包括:

- Necessary first-aid instructions defined by means of exposure (inhalation, skin and eye contact, and ingestion). 暴露後 (吸入, 皮肤和眼睛接触和摄入) 必要的急救说明
- Description of the most important symptoms or effects and any symptoms that are acute or could show delayed. 描述最重要的症状或影响以及任何急性或可能延迟的症状
- Recommendations for immediate medical care and special treatment needed. 需要立即就医和特殊治疗的建议



SDS – SECTION 5 Firefighting Measures SDS第五章: 消防措施

Recommendations for fire fighting caused by chemicals. 针对化学品消防建议

The required information consist of:
所需信息包括:

- Recommendations of suitable extinguishing equipment and information on extinguishing equipment that is not appropriate for a particular situation. 建议合适的灭火设备及避免不适合的灭火设备
- Advice on specific hazards that develop from the chemical during the fire, such as any hazardous combustion products created when the chemical burns. 有关火灾期间化学物质产生的具体危害的信息, 例如化学物质燃烧时产生的有害燃烧产物
- Recommendations on special protective equipment or precautionary measures for firefighters. 关于特殊防护设备或消防员预防措施的建议



SDS – SECTION 6 Accidental Release Measures SDS第六章: 泄漏应急处理措施

Recommendations on the appropriate response to spills, leaks, or releases, including contamination and cleanup practices to prevent or minimise exposure to people, properties and the environment.关于溅出, 泄漏或释出的适当应对措施的建议, 包括污染和清理措施, 以防止或尽量减少对人员, 财产和环境的暴露。

Recommendations given distinguish between large and small spills and where the spill volume has a significant impact on the hazard. 给出的建议区分大泄漏和小泄漏, 以及当泄漏量对危害有重大影响时。

The required information may consist of:所需信息包括:

- Use of personal precautionary measures and protective equipment to prevent the contamination of skin, eyes and clothing.使用个人预防措施和防护设备, 以防止皮肤, 眼睛和衣服受到污染
- Emergency procedures, including instructions for evacuations, consulting experts when needed and appropriate protective clothing.紧急程序, 包括疏散指示, 必要时咨询专家和适当的防护服
- Methods and materials used for contamination.被污染时的处理方法和材料
- Cleanup procedures (e.g. appropriate techniques for neutralisation, decontamination, cleaning or vacuuming, adsorbent materials, and/or equipment required for containment/clean up).清理程序 (如适当的中和, 净化, 清洁或吸尘, 吸附材料, 和/或包装/清理所需的设备)



SDS SECTION 7 – Handling and Storage SDS第七章：操作与存储

All hazards must be taken into account when USING, HANDLING and STORING chemicals.
使用，搬运和储存化学品时，必须考虑到所有的危害

Focus on: 专注于:

- Ammonia Liquid 氨液
- Formic Acid 甲酸
- Glacial Acetic Acid 冰醋酸
- Hydrochloric Acid 盐酸
- Hydrogen Peroxide 50% 过氧化氢50%
- Phosphoric Acid 磷酸
- Sodium Hydroxide (NaOH) 氢氧化钠
- Sodium Silicate 硅酸钠
- Sulphuric Acid 硫酸



SDS SECTION 8 - Exposure Controls/Personal Protection

SDS第八章：接触控制和个人防护措施

- **Control parameters** – occupational exposure limit values or biological limit values.

控制参数-职业接触限值或生物限值

- **Engineering controls** such as airflow requirements.

工程控制-如通风要求

- **Exposure controls** – includes information on proper PPE. A good quality SDS will clearly indicate the precise type of PPE required for protection of the eye/face, skin, body, hands, respiratory and how to control environmental exposure.

暴露控制包括有关正确的PPE的信息。高质量的安全数据表将清楚地显示保护眼睛/面部，皮肤，身体，手部，呼吸系统以及如何控制环境暴露所需的个人防护装备的确切类型

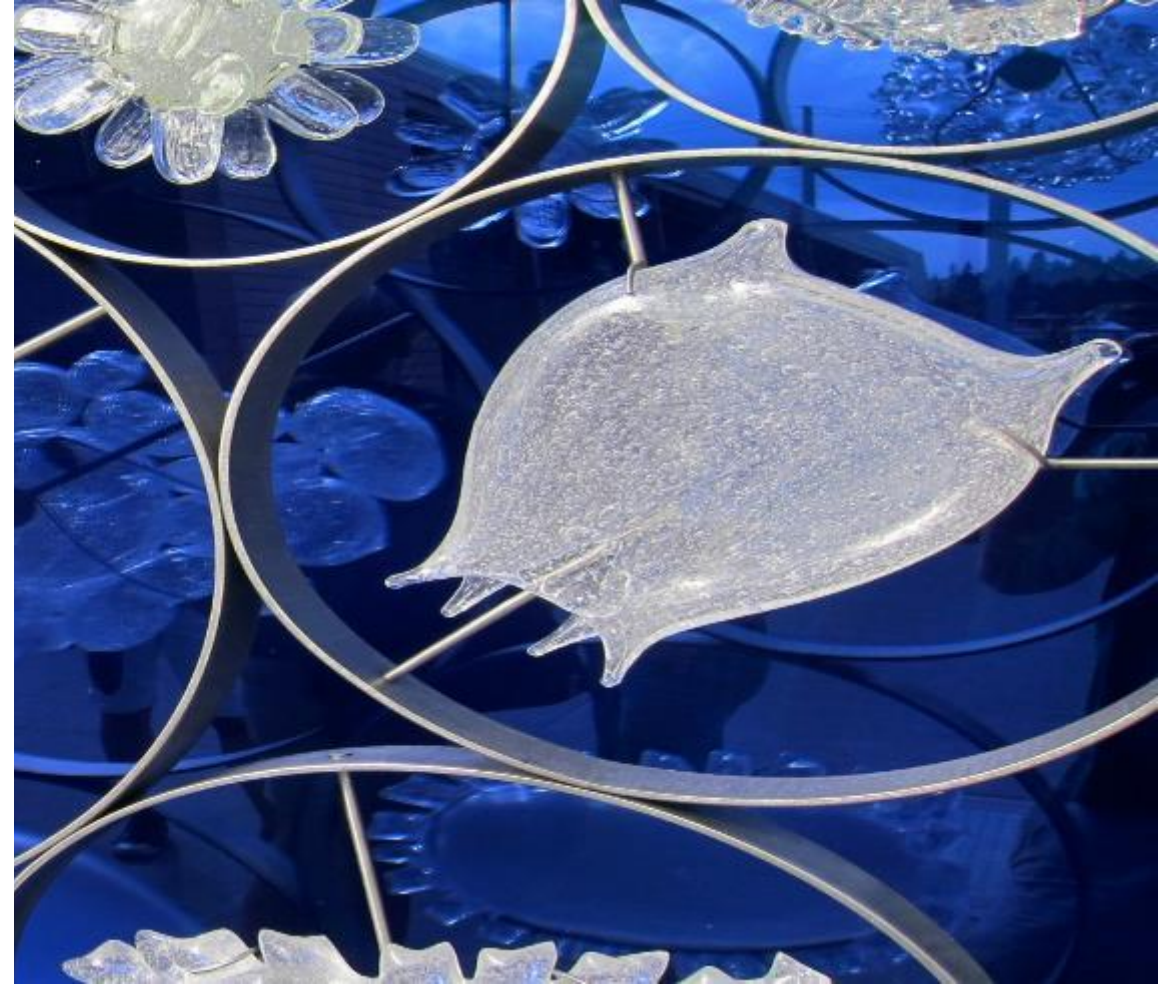


SDS SECTION 9 - Physical and Chemical Properties SDS 第九章: 理化特性

- Appearance (physical state, colour etc.).外观 (物理状态, 颜色等)
- Odour.气味
- Odour threshold.气味阈值
- pH. PH值
- Melting point/freezing point.熔点/冰点
- Initial boiling point and boiling range.初沸点和沸程.
- Flash point.闪点
- Evaporation rate.蒸发率
- Flammability (solid, gas).易燃性 (固体, 气体)
- Upper/lower flammability or explosive limits.上/下可燃性或爆炸极限
- Vapour pressure.蒸汽压力
- Vapour density.蒸气密度
- Relative density.相对密度
- Solubility(ies).溶解度
- Partition coefficient: n-octanol/water.分配系数: 正辛醇/水
- Auto-ignition temperature.自燃温度
- Decomposition temperature.分解温度
- Viscosity.粘度

SDS SECTION 10 – Stability and Reactivity SDS第十章:稳定性和反应性

- Reactivity.反应
- Chemical stability.化学稳定性
- Possibility of hazardous reactions.有可能的危害反应
- Conditions to avoid (e.g. static discharge, shock or vibration).应避免的条件 (如静电放电, 冲击或振动)
- Incompatible materials.不兼容的材料
- Hazardous decomposition products.分解危害产物



SDS SECTION 11 - Toxicological Information SDS第十一章:毒理学信息

Concise, but complete and comprehensible, description of the various toxicological (health) effects and the available data used to identify those effects, including: 简明扼要, 但完整且易于理解, 描述各种毒理学 (健康) 影响以及用于识别这些影响的可用数据, 其中包括:

- Information on the likely routes of exposure, (inhalation, ingestion, skin and eye contact).
有关可能接触途径的信息, (吸入, 摄入, 皮肤和眼睛接触)
- Symptoms related to the physical, chemical and toxicological characteristics. 与物理, 化学和毒理学特征有关的症状
- Delayed and immediate effects and also chronic effects from short and long term exposure.
延迟和即时效应, 以及短期和长期暴露的慢性影响
- Numerical measures of toxicity, (such as acute toxicity estimates).
毒性的数值测量 (如急性毒性估计)



SDS SECTION 12 - Ecological Information SDS 第十二章：生态学信息

Provides information to evaluate environmental impacts of chemical(s) released into the environment. 提供化学物质释放到环境中评估对环境的影响信息

Information may include: 信息可能包括:

- Data from toxicity tests performed on aquatic and/or terrestrial organisms, where available.
在可能的情况下对水生和/或陆生生物进行毒性试验的数据
- Whether there is a potential for the chemical to persist and degrade in the environment either through biodegradation or other processes, such as oxidation or hydrolysis. 无论是通过生物降解还是氧化或水解等其他过程，化学品在环境中是否存在潜在持久性或降解性
- Results of tests of bioaccumulation potential, making reference to the octanol-water partition coefficient and the bio concentration factor where available.
潜在生物积累性的测试结果，参考辛醇 - 水分配系数和生物浓缩系数
- Potential for a substance to move from the soil into groundwater.
物质从土壤迁移到地下水的潜在性
- Other potential adverse effects: environmental fate, ozone layer depletion, photochemical ozone creation, endocrine disrupting and/or global warming potential.
其他潜在的不利影响：环境影响，臭氧层变薄，产生光化学臭氧，干扰内分泌和/或全球升温

SDS – SECTION 13 Disposal and Consideration SDS第十三章：废弃处置

Provides guidance on proper disposal practices, recycling or reclamation of the chemical(s) or its container, and safe handling practices. 提供正确的处置方法，化学品或其容器的重用或回收加以利用及安全处理方法的指导。

The information may include: 信息可能包括:

- Description of appropriate disposal containers to use. 描述适当使用弃置的容器
- Recommendations of appropriate disposal methods to employ. 建议采用适当的处置方法
- Description of the physical and chemical properties that may affect disposal activities. 描述可能影响处置活动的物理和化学特性
- Language discouraging sewage disposal. 说明不应弃置于污水系统
- Any special precautions for landfills or incineration activities 对垃圾填埋或焚烧活动有特别的预防措施



SDS – SECTION 14 Transport Information SDS 第十四章: 运输信息

Provides information on shipping and transporting of hazardous chemical(s) by road, air, rail, or sea. 提供有关通过公路, 航空, 铁路或海运运输危险化学品的信息

The information may include: 信息包括:

- UN (United Nations) number (e.g. four-digit identification number of the substance).
UN (联合国) 号码 (例如物质的四位数字识别号码)
- UN proper shipping name. UN正确运输名称
- Transport hazard class(es). 运输危险等级
- Packing group number, if applicable, based on the degree of hazard. 包装组编号, 如果适用应根据危害程度
- Environmental hazards (e.g. identification if chemical is a marine pollutant according to the International Maritime Dangerous Goods Code).
环境危害 (例如, 根据“国际海运危险货物规则”, 化学品是否海洋污染物)
- Guidance on transport in bulk. **大规模**运输指导
- Any special precautions which an employee should be aware of or needs to comply with, in connection with transport or conveyance either within or outside their premises. 任何员工应该知道或需要遵守与其处所内外的运输有关的特别预防措施



SDS – SECTION 15 Regulatory Information SDS 第十五章:法规信息

This section identifies the safety, health, and environmental regulations specific for the product that is not indicated anywhere else on the SDS.

本部分提供了安全数据单其他章节中没有提到的安全，健康和环境法规

The information may include:信息可能包括:

- Any national and/or regional regulatory information of the chemical or mixtures (including any OSHA, Department of Transportation, Environmental Protection Agency, or Consumer Product Safety Commission regulations).
包括OSHA，运输部，环境保护局或消费品安全委员会规定).任何国家和/或区域对化学品或混合物的监管



SDS – SECTION 16 Other Information SDS 第十六章:其他信息

- This section indicates when the SDS was prepared or when the last known revision was made. 本部分指出何时准备好安全数据单或何时进行最后一次修订
- State where the changes have been made to the previous version. 说明对以前版本所做的更改
- Contact the supplier for an explanation of the changes. 联系供应商以获取有关更改的说明.
- Other useful information 其他有用的信息



Hazard Ranking 危害分级

Carry out Hazard Ranking
进行危害分级

Hazard Ranking 危害分级

- Ranking or prioritising hazards is one way to help determine which hazard is the most serious and thus which hazard to control first. Priority is usually established by considering the employee exposure and the potential for accident, injury or illness. By assigning a priority to the hazards, you are creating a ranking or an action list. 对危险进行评级或确定优先级有助于确定哪些危险最严重，从而哪些危险需要首先控制。通常通过考虑员工暴露和事故、伤害或疾病之可能性而确定优先级。向危险分配优先级后，就可创建评级或措施清单。
- The following factors play an important role: 以下因素发挥重要作用：
 - Percentage of workforce exposed 暴露的劳动力百分比
 - Frequency of exposure 暴露频率
 - Degree of harm likely to result from the exposure 暴露有可能造成的伤害程度
 - Probability of occurrence 事故发生概率
- There is no simple or single way to determine the level of risk. Ranking hazards requires the knowledge of the workplace activities, urgency of situations and, most importantly, objective judgement. 没有简单或唯一方法确定风险级别。危险评级需要了解工作场所活动、情况紧急性，最重要的是客观判断。

Hazard Ranking 危害分级

Definitions for Severity of Harm 伤害严重性之定义

1. Slightly Harmful – For example, superficial injuries, minor cuts and bruises, eye irritation from dust, nuisance and irritation and ill-health leading to temporary discomfort.
轻微有害 – 例如，体表伤害、小切口和瘀伤、灰尘引起眼睛发炎、恶心和刺激以及导致临时不适的健康不佳。
2. Harmful – For example, lacerations, burns, concussion, serious sprains, minor fractures, deafness, dermatitis, asthma, work-related upper limb disorders and ill-health.
有害 – 例如，裂口、灼伤、脑震荡、严重扭伤、小骨折、失聪、皮炎、气喘、工作引起的上肢劳损和健康不佳。
3. Extremely Harmful – For example, amputations, major fractures, poisonings, multiple injuries,
极为有害 – 例如，截肢、大骨折、中毒、多处受伤、致命受伤、职业性癌症以及其他危及生命的疾病和急性致命疾病。

Hazard Ranking 危害分级

Definitions for Likelihood of Harm 伤害可能性之定义

- Very Likely – Typically experienced at least once every six months by an individual.
很有可能 – 一个人通常至少每半年遇到一次。
- Likely – Typically experienced once every five years by an individual.
有可能 – 一个人通常每五年遇到
- Unlikely – Typically experienced once during the working lifetime of an individual.
不太可能 – 一个人通常在其整个工作生涯中遇到一次。
- Very Unlikely – Less than 1 percent chance of being experienced by an individual during their working lifetime.
极不可能 – 一个人在其整个工作生涯中遇到的概率不到百分之一。

Risk Assessment 风险评估

Risk Assessment 风险评估

Risk Assessment Severity and Likelihood 风险评估严重性和可能性

Likelihood of Harm 伤害可能性	Severity of Harm 伤害严重性		
	Slight Harm 略微伤害	Moderate Harm 中等伤害	Extreme Harm 严重伤害
Very unlikely 极不可能	Very low risk 风险极低	Very low risk 风险极低	High risk 高风险
Unlikely 不太可能	Very low risk 风险极低	Medium risk 中等风险	Very high risk 风险很高
Likely 有可能	Low risk 低风险	High risk 高风险	Very high risk 风险很高
Very likely 很有可能	Low risk 低风险	Very high risk 风险很高	Very high risk 风险很高

Risk Assessment 风险评估

Definition for Risk Level 风险级别之定义

- Very Low – These risks are considered acceptable. No further action is necessary other than to ensure that the controls are maintained.
非常低 – 这些风险视为可接受。只需确保维护控制，无需采取进一步措施
- Low – No additional controls are required unless they can be implemented at very low cost (in terms of time, money and effort). Actions to further reduce these risks are assigned low priority. Arrangements should be made to ensure that the controls are maintained.
低 – 无需采取附加控制措施，除非其实施成本极低（时间、金钱和工作量）。向进一步降低这些风险的措施分配低优先级。应做出相应安排以确保维护控制措施。
- Medium – Consideration should be as to whether the risks can be lowered, where applicable, to a tolerable level and preferably to an acceptable level, but the costs of additional risk reduction measures should be taken into account. Risk reduction measures should be implemented within a defined time period. Arrangements should be made to ensure that controls are maintained, particularly if the risk levels are associated with harmful consequences.
中等 – 应考虑到能否将风险降到可容忍的级别（如适用）以及至可接受的级别，但也应考虑到附加风险降低措施的成本。风险降低措施应在指定时限内实施。应做出相关安排，确保维护控制措施，特别是当风险级别与有害后果相关联时。

Risk Assessment 风险评估

Definition for Risk Level 风险级别之定义

- High – Substantial efforts should be made to reduce the risk. Risk reduction measures should be implemented urgently within a defined time period. It might be necessary to consider suspending or restricting the activity or to apply interim risk control measures until this has been completed. Considerable resources might have to be allocated to the additional control measures.

高 – 应加大风险降低力度。风险降低措施应在指定时限内紧急实施。可能需要考虑暂停或限制活动或运用临时风险控制措施，直到其得以完成。可能必须应附加控制措施分配大量资源。应做出相关安排，确保维护控制措施，特别是当风险级别与极为有害或非常有害后果相关联时。

- Very High – These risks are unacceptable. Substantial improvements in risk control measures are necessary so that the risk is reduced to a tolerable or acceptable level. The work activity should be halted until risk controls are implemented that reduce the risk so that it is no longer very high. If it is not possible to reduce the risk, the work should remain prohibited.

很高 – 这些风险不可接受。需要大大加强风险控制措施，以便将风险降低至可容忍或可接受的级别。应停止工作活动，直到已实施降低风险的风险控制措施以使风险不再为很高。如果无法降低风险，则仍应保持禁止该工作。

Activity 活动

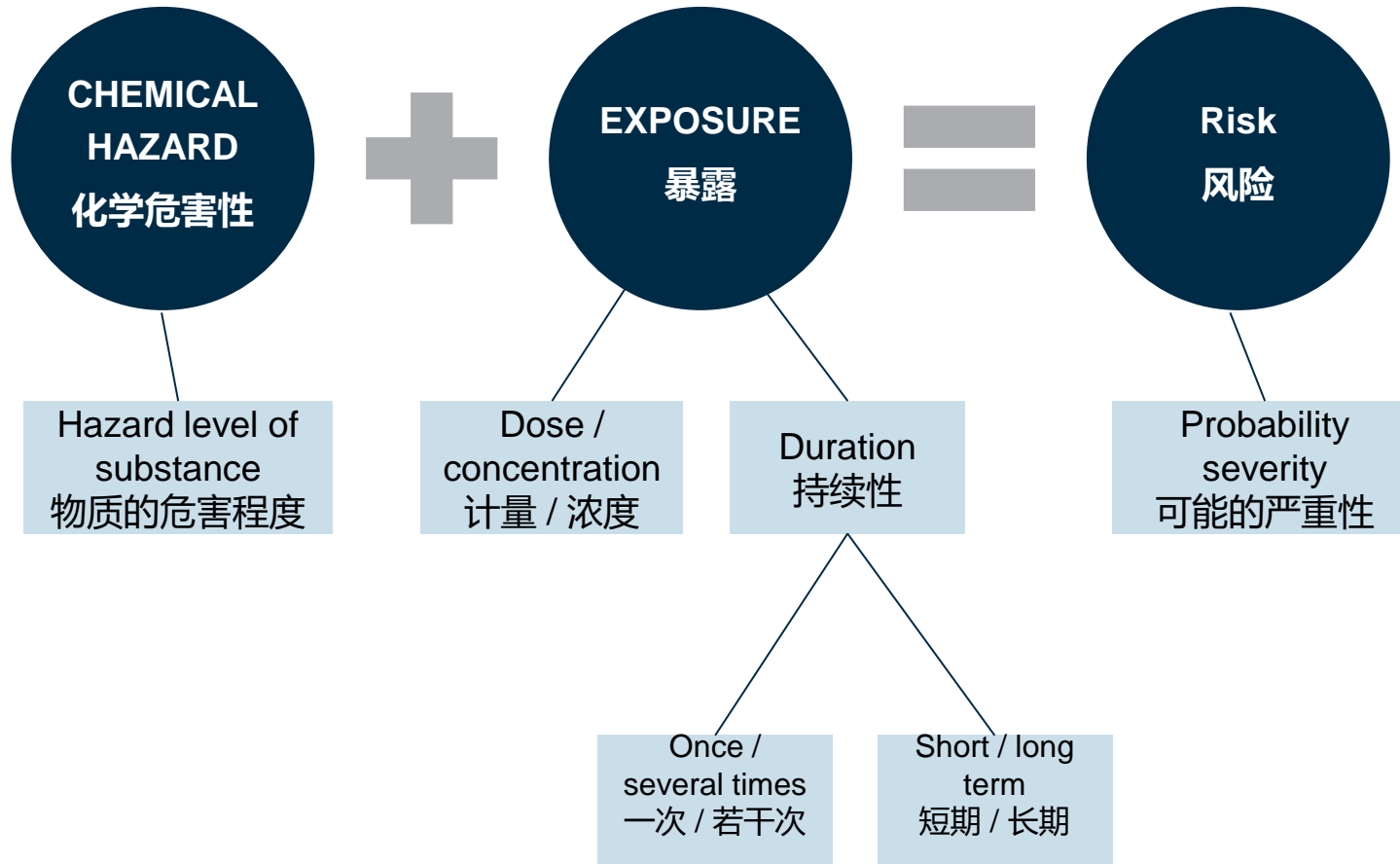
Please list all chemicals that you are using and conduct risk assessment for them.

请列出工厂现使用的所有化学品，
并对其进行风险评估。

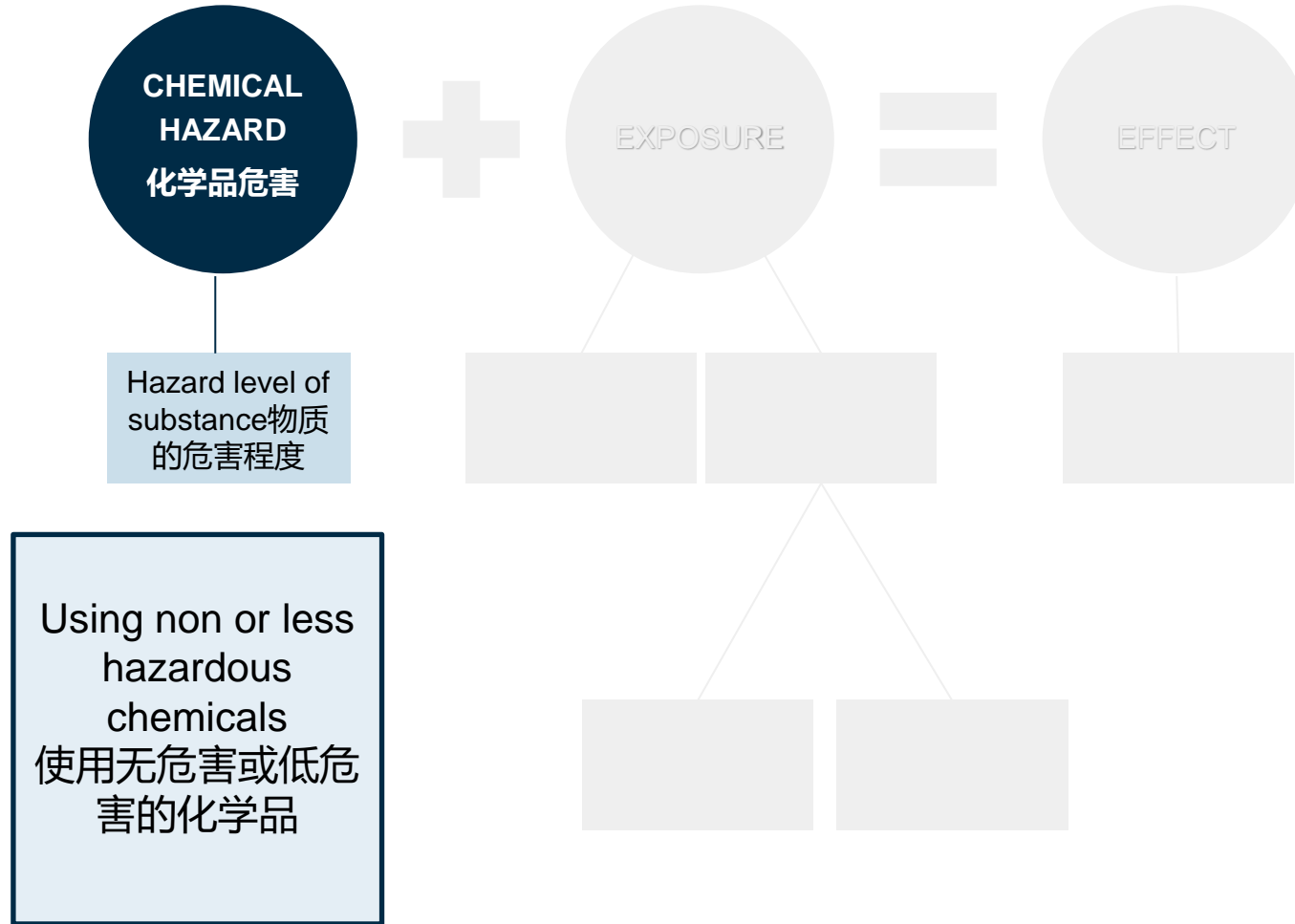
Risk Management
风险管理

03

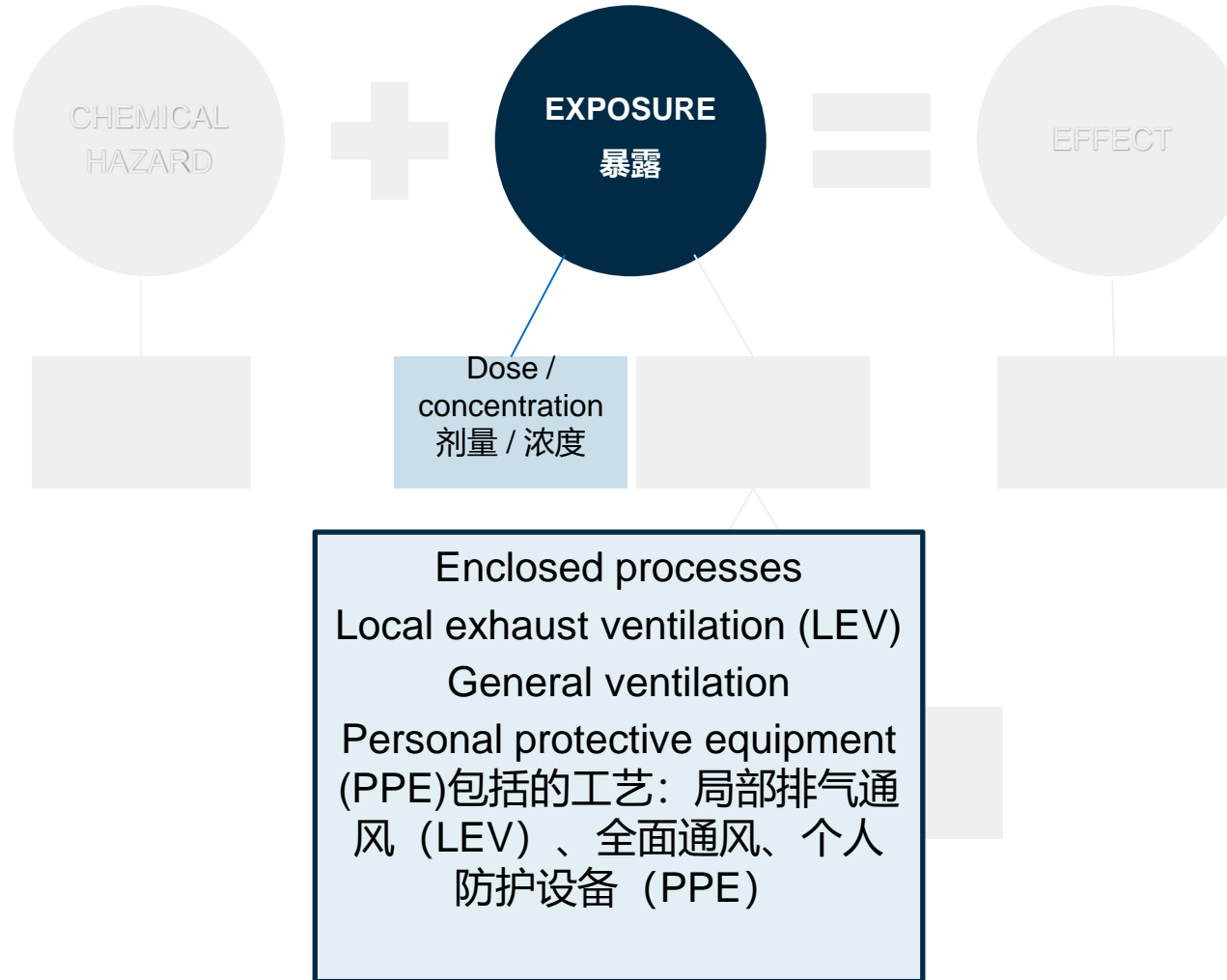
Starting Points for Risk Management 风险管理的起点



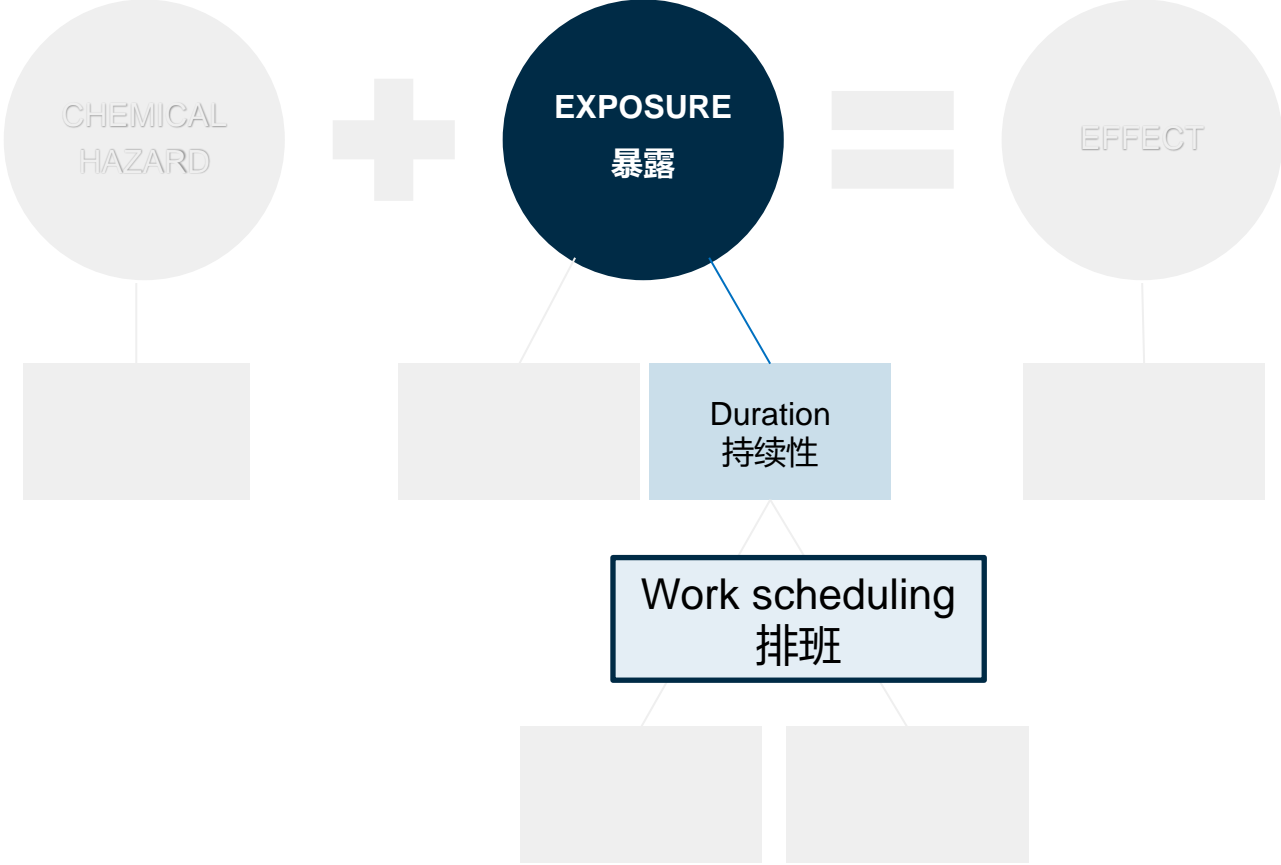
Starting Points for Risk Management 风险管理的起点



Starting Points for Risk Management 风险管理的起点

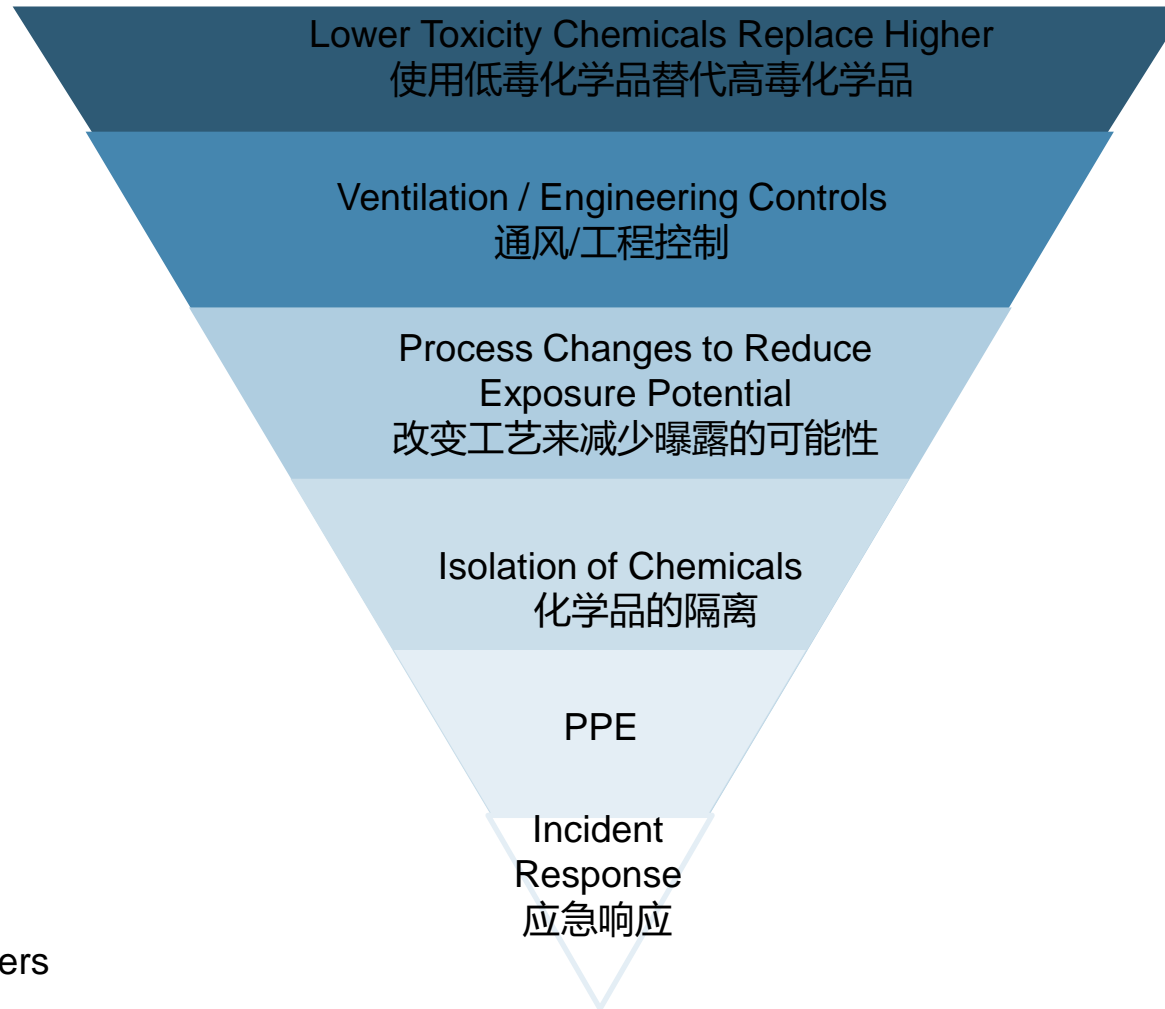


Starting Points for Risk Management 风险管理的起点



Chemical Risk Control Hierarchy 化学品风险管控层级

Best method of risk reduction
减少风险的最佳方法



Last resort to protect workers
保护工人的最后手段

Quiz 小测试

Which risk reduction methods are you aware of?
知道哪些减少风险的方法?

Typical Risk Reduction Methods when Working with Chemicals 工作中使用化学品时典型的减少风险方法

- Know the hazard before procuring new chemicals – review SDS. 采购新化学品前了解其危害性 – 检视 SDS
- Understand the amount of chemicals that can be safely stored. 理解可以安全储存的化产品的量
- Does the chemical require separation from the other chemicals? 这个化学制剂需要与其它化产品分隔吗?
- Determine if engineering controls (for example hoods and drains) are adequate to handle the anticipated usage level. 决定工程控制 (如通风罩和排水沟) 是否适合于操作和预期的用量水平
- Verify proper PPE is available to all workers using the chemical. 核实是否所有使用化产品的工人都能获得合适的 PPE
- Ensure spill kits contain adequate amounts of the proper sorbent that are available to handle a spill. 确保溢出工具箱中含有足够量的合适的吸附材料, 用于处理化产品溢出泄露
- Train staff appropriately to a spill. 对员工进行有关溢出的培训

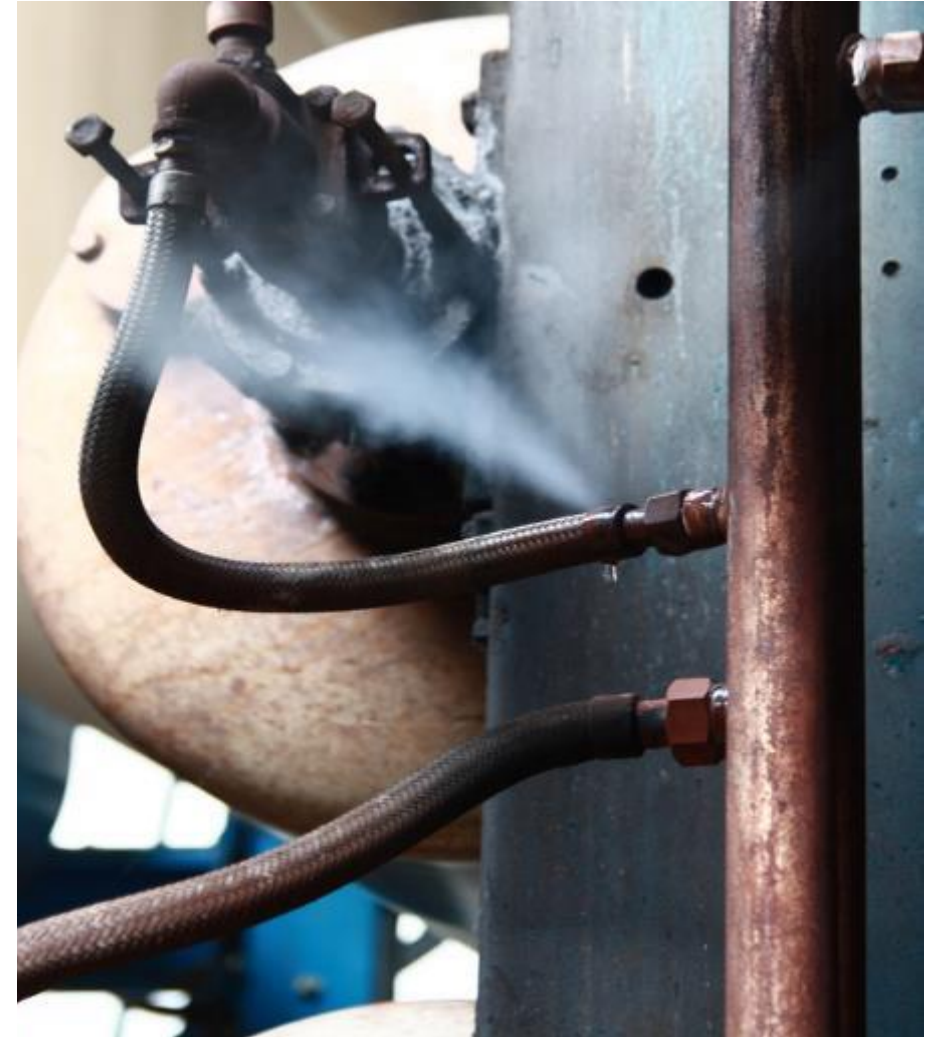
Reference: ZDHC Chemical Management for the Textile Industry, Module 2

Engineering control 工程控制

Engineering Controls – Equipment 工程控制 -- 设备

Depending on the type of production your facility is engaged in, there are many types of equipment that can be useful for monitoring and avoiding potential risks:
根据工厂的生产类型，有许多类设备能用于监控和避免潜在的风险：

- Anti-leak equipment 防漏设备
- Gas leak detection devices 漏气检测装置
- Oxygen meters 氧气表
- Spill kits/adsorption materials 防溢出工具包 / 吸附材料
- Emergency showers & eye washes 应急冲淋器和洗眼器
- First aid kit 急救包
- Fire fighting devices 灭火器材
- Appropriate PPE 个人防护设备 (PPE)



Engineering Controls – Ventilations 工程控制 – 通风

Ventilation is a method of control that strategically "adds" and "removes" air in the work environment:

通风是一种控制方法，“增加”或“移动”工作环境的空气：

- Ventilation can remove or dilute an air contaminant if designed properly.
如正确设计，通风可以移动或稀释污染
- Local exhaust ventilation is very adaptable to almost all chemicals and operations.
局部排风通风适合绝大多数化学品和操作
- It removes the contaminant at the source so it cannot disperse into the work space and it generally uses lower exhaust rates than general ventilation.
能够在源头去除污染，以使其不得在工作场所扩散，一般来说比整体换气的排风率低



Engineering Controls in Practice 工程控制实践



Fire Alarm 火警警报器



Secondary Containment 二次防漏装置



Water sprinkler Alarm 水喷淋报警



Fuming Hood 烟雾罩

Use of PPE 使用PPE

Personal Protective Equipment (PPE)个人防护设备 (PPE)

To protect workers against risks of hazardous chemicals entering body through inhalation or skin contact. 为了保护工人，避免有害化学品通过呼吸和皮肤接触进入人体的风险

Appropriate PPE should be selected with regard to the hazards, physical nature and routes of entry of the chemicals into the human body. 应当根据危害性、物理性能、和化学品进入人体的方式来选用合适的 PPE

PPE should only supplement and not replace the preventive measures. PPE 应当是增补而不是取代的预防措施



Respiratory Protection 呼吸保护

Inhalation is one of the quickest, most efficient ways to introduce lethal levels of hazardous materials into the body.呼吸是最快捷、最有效的向人体引入致死水平有害物质的方法

Respiratory protection protects against exposure to dusts, gases, fumes and vapours, but exposure duration should be kept short.呼吸保护防护粉尘、气体、烟雾、蒸气，应当维持曝露时间短暂

Where engineering control may not be reasonably practicable such as during routine maintenance, cleaning, or in fire or in other emergencies where hazardous fumes are generated from significant chemical spillage or inadvertent mixing of incompatible chemicals, respiratory protection should be used to protect the workers.当工程控制不可能有效地实施时，如日常维护、清洁、火灾、或其它由明显的化学品泄露产生有害烟雾的意外事故，应该使用呼吸防护来保护工人

The choice of respiratory protection depends on the physical and chemical nature of the exposed hazard, the concentration of hazardous substances and the duration of exposure.

It must fit the wearer's face and its breathing resistance should be tolerable to the wearer.呼吸器的选择却决于曝露的化学品的性质、有害物质的浓度、何曝露持续时间。它必须贴合穿戴者的面部，而且其呼吸阻力应当为穿戴者所接受

For fire and other major emergencies where inhalation of toxic gases is possible, respiratory protection should comprise full breathing apparatus.对于火灾和其它可能吸入有毒气体的主要事故，应当使用自主呼吸装置呼吸器进行呼吸保护



Types of Respirator 呼吸器类型

Respirator
Types
呼吸器类型



**Air Purifying
Respirators (APR)**
空气纯化呼吸器
(APR)

**Half-face
半面具**

**Full-face
全面具**



**Powered Air
Purifying
Respirators (PAPR)**
有动力装置的空气纯
化呼吸器 (PAPR)



**Self-Contained
Breathing
Apparatus (SCBA)**
自主呼吸装置
(SCBA)

Face and Eye Protection 面部和眼部防护

Suitable eye protectors or face shields should be worn, whenever there is a risk of eye injury through splashing.
当有飞溅化学品伤眼的风险时，应当佩戴合适的护目镜或护面罩，

Safety spectacles can be fitted with prescription lenses if required, while safety goggles that completely enclose the eyes provides superior eye protection.
如需要，安全眼睛可以装上处方镜片，而完全包裹眼部的安全眼睛能够提供最好的保护

If protection to face, mouth and nose is required in addition, face shield should be used.
如此外还需要保护面部、口腔、鼻子，应使用护面罩



Hand Protection 手部保护

Impervious gloves protect the hands of the worker from contacting hazardous chemicals. 不受影响的手套保护接触有害化学品的工人手部

They should be made of appropriate material that would not be corroded or damaged by the hazardous chemicals involved in the operation. 手套应当由合适的材料制成，不会被特别的有害化学品所腐蚀和损坏

If you are working with chemicals, always check the MSDS to know what type of glove you should wear. 如进行化学操作，检查 SDS 文件，以了解需要使用哪类手套



Selecting Hand Protection 筛选手部防护方法

- Chemical-resistant gloves耐化学手套
- Kevlar, metal mesh, cut-resistant gloves凯夫拉纤维、金属网、耐割手套
- Leather work gloves劳保皮手套
- Extreme temperature gloves耐高温手套
- Electrical work gloves电工手套



Butyl Rubber

Protects against peroxides, acids, bases, alcohols

Don't use with halogenated solvents or petroleum based products.

不可用于氯化溶剂或含汽油的产品

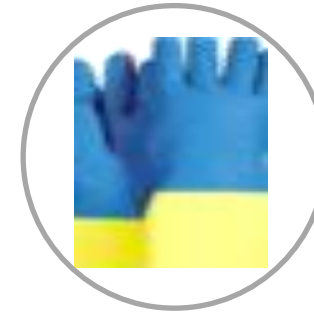


Nitrile

Protects against oils, greases, some acids and bases, some solvents

Don't use with oxidizing agents, strong organic solvents.

不可用于氧化剂、强有机溶剂



Neoprene

Protects against gasoline, some alcohols, hydraulic fluids, organic acids and alkalines

Don't use with strong organic solvents

不可用于强有机溶剂

Glove Care 手套防护

- Inspect your gloves routinely for holes and cracks.
日常检查手套是否有漏洞和裂纹
- Discard your gloves at any sign of deterioration.
丢弃已损坏的手套
- If gloves are reusable type, clean and allow to dry before next use.
可重复使用的手套，下次使用前清洁并干燥



Emergency management 应急管理

Dealing with Chemical Emergencies 处理化学品意外事故

1. Prevention 预防

2. Preparation 准备

3. Response 相应

4. Recovery 复原

Prevention is always better than cure! 预防永远优于治疗!

Common Causes of Chemical Emergencies 化学品意外的一般原因

Unsafe acts: 不安全的动作	Unsafe conditions: 不安全的条件	“Force majeure”: 不可抗力
<p>Derived from people’s actions. Most common, but most difficult to address, changing behaviour is challenging. 源自人为行为。 最常见也是最困难的，行为的改变是挑战</p>	<p>Derived from environmental conditions. Easiest to correct (and very cost effective). 源自环境条件 最易于改正（成本效率高）</p>	<p>Derived from an event outside own control (e.g. flooding, off-site industrial accident in other company). 源自不可控的事件（如洪水、厂区外的工业事故等）</p>
<p>Prevention through: 预防</p> <ul style="list-style-type: none"> • Developing a “safety culture”. 发展“安全文化” • Defining safety responsibilities in your company. 定义公司内的安全负责人 • Establishing accountability for safety in your company. 建立公司的安全责任 	<p>Prevention through: 预防</p> <ul style="list-style-type: none"> • Internal or external safety audits. 内部或外部的安全审计 • Implementing regular safety inspections. 进行定期的安全检查 • Adhering to maintenance schedules for equipment. 坚持执行设备的维护计划 	<p>Prevention through: 预防</p> <ul style="list-style-type: none"> • Preparedness for possible scenarios main option. 为可能出现的主要情况作准备

QUIZ 小测试

**What are examples on emergency prevention?
有什么预防突发事故的例子吗?**

Preventing Emergencies 预防意外事故

- Identify and assess hazards/risks identification. 识别和评估危害性 / 风险评估
- Eliminate and reduce risk hazards. 去除和减少风险危害
- Conduct safety training and foster safety culture at work. 进行安全培训, 工作中培育安全文化
- Inform workers on chemical hazards and risks. 告知工人有关化学危害和风险
- Prepare for possible emergencies (provisions). 准备可能的应急设备
- Strengthen emergency response capabilities (planning, practice and drills). 加强应急反应能力 (计划、实践和演习)



Preventing and Responding to Emergencies - Fire and Explosions

预防和相应紧急状况 – 火灾和曝露

Risk of fire - three basic factors 火灾风险 – 三个基本因素

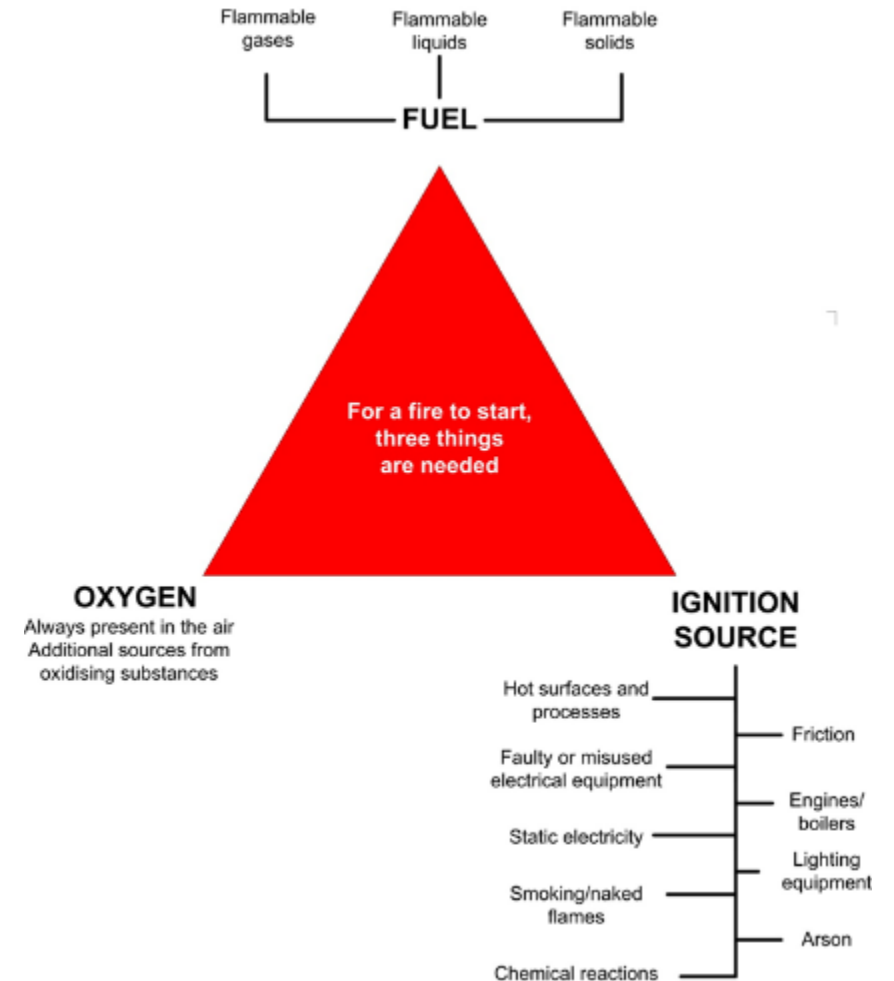
1. availability of fuel (differentiated by flammability degree of substance);
存在燃料 (依物质的可燃度加以区分)
2. availability of source of ignition/heat; 火源 / 热源的存在
3. ambient conditions such as the temperature and presence of oxygen.
外界条件如温度和氧气

Active and passive fire fighting facilities and/or fixed Fire Protection Installations, suitable for particular chemicals or liquids or material.
主动和被动消防设备和/或固定的防火装置, 适用于特殊的化学品/液体/材料等

Prevention 预防

Ventilation of areas with flammable substance to reduce possible accumulation of dangerous concentrations. 易燃物储存区需要良好通风, 以降低危险物浓度的累积

- Removal of possible ignition sources. 消除指定危险区域
- Assignment of hazard zones. 危险区域的分配
- Substitution of hazardous chemicals. 危险化学品的取代
- Containment (closed containers). 容器 (密闭容器)
- Segregation of incompatible chemicals (storage, use, disposal).
区分不相容化学品 (储存、使用、弃置)



Classes of Fire 火灾分类

Class A 类别 A	Class B 类别 B	Class C 类别 C	Class D 类别 D
Ordinary combustibles (wood, paper, trash, cloth) 普通可燃物 (木头、纸张、垃圾、布料) .	Flammable and combustible gases and liquids. 易燃和可燃气体及液体	Energised electrical equipment. 带电的电器设备	Combustible metals (e.g. Magnesium, titanium, potassium, sodium).可燃金属 (如镁、钛、钾、钠)
Routine housekeeping and cleaning.日常清理和清洁	Good handling and storage practices.良好操作和储存实践	Good maintenance and prevention of misuse.良好的维护, 避免误用	Follow special advice.遵循特别的建议
Make sure storage and working areas kept free of trash. 确保储存和工作区域没有垃圾	Reduce ventilation to prevent build-up flammable vapour or gas concentrations. 良好通风以避免可燃蒸气或气体的浓度累积 Storage of substances in tightly sealed containers.储存在密闭的容器中 Storage away from spark-producing sources. 远离火花源 Limit portable storage containers to 20 litres each.每个移动储存容器不大于20升 Avoid storage of more than 100 litres of flammable liquids inside a building unless in approved storage containers.室内不可储存100升以上的易燃液体, 除非使用经核准的储存容器	Regularly check electrical equipment for old/worn wiring or broken/damaged fittings. Report any hazardous conditions to your supervisor.定期检查电器设备的旧线路和损坏的配件, 如有报告任何危险状况及时报告主管 Prevent electric motors from overheating by keeping them clean and in good working order.预防电动机过热, 保持清洁和良好工作状态 Never install a fuse rated higher than specified for a circuit.绝不可使用大于电路电流的保险丝 Never overload wall sockets. One outlet should have no more than two plugs.壁式插座不可过载, 插座上不得插两个插头 Don't plug more than one heat-producing appliance into an outlet.插座上不得使用多于一个产热电器 Investigate any appliance or equipment that smells strange. This is often the first sign of a fire.检查任何发出异味的电器或设备, 这往往是火灾的迹象 Use utility lights that have some type of wire guard over them. Direct contact with an uncovered light bulb can ignite combustible material.使用装钢丝护网的工具灯。与无保护的灯泡直接接触可能引燃可燃物	

Fire Fighting Measures 消防措施

Each fire extinguisher displays a rating on the faceplate showing the class of fire (see above) it is designed to put out. Some extinguishers are marked with multiple ratings such as AB, BC or ABC. 每个灭火器材的面板上都标注了其可以扑灭的火灾类别。某些灭火器标注有多个类别，如AB, BC或ABC.

Extinguisher	Description
Class A	Class A extinguishers are effective on ordinary combustibles. The extinguisher cools the temperature of the burning material below its ignition temperature. The extinguishers use pressurised water, foam or multi-purpose dry-chemical agents. Class A extinguishers carry a numerical rating that indicates how large a fire you can safely put out with that extinguisher. A 级灭火器对普通可燃物有效，灭火器冷却燃烧物的温度至燃点以下。灭火器使用加压水、泡沫、或多用途的干化学试剂。A 级灭火器带有一个数据分级，说明可能安全地扑灭多大规模的火灾
Class B	Class B extinguishers should be used on flammable liquids or gases. Class B extinguishers may come in several types including foam, carbon dioxide, ordinary dry-chemical, multi-purpose dry-chemical or halon replacements. B 级灭火器应当用于易燃液体或气体。B 级灭火器可能有若干种，包括泡沫、二氧化碳、普通干化学品、多功能干化学品或卤素替代品
Class C	Class C extinguishers are to be used specifically on electrical fires. Class C extinguishers may contain carbon dioxide, ordinary dry-chemical, multi-purpose dry-chemical or halon replacements. Carbon dioxide or halon replacements, which do not leave a harmful residue, are preferable for computers and other sensitive equipment. Never use water extinguishers or any extinguishing agent capable of conducting electricity on Class C fires. Class C extinguishers carry a letter rating only to indicate that the extinguishing agent will not conduct electricity. C 级灭火器特别用于电器火灾。C 级灭火器可能含有二氧化碳、普通干化学品、多功能干化学品或卤素替代品。不会残留有害物质的二氧化碳或卤素替代品应更适合用于电脑和其它敏感设备。不可使用含水灭火器材或任何可能导电的灭火介质。C 级灭火器只带有一个字母分级说明该灭火剂不导电
Class D	Class D extinguishers should only be used on combustible metals. Class D extinguishers are made with agents specially designed for the material involved. In most cases, they absorb heat and cool the material below its ignition temperature. Class D fires react violently to water and other types of chemicals. Class D extinguishers carry only a letter rating to indicate their effectiveness on certain amounts of specific metals. D 级灭火器只应用于可燃金属，该灭火器由特殊的材料制成。多数情况下，它能吸热并将物质温度降至燃点以下。D 级火灾与水和其它化学品剧烈反应。D 级灭火器只带有一个字母分级说明该灭火器对一定量的特殊金属有效

Select Fire Fighting Measures 选择消防措施

	WATER	FOAM SPRAY	CO2	ABC POWDER	WET CHEMICAL
 A Wood, paper and textiles.	✓ Safe for	✓ Safe for	⊘ Not safe for	✓ Safe for	✓ Safe for
 B Flammable liquids.	⊘ Not safe for	✓ Safe for	✓ Safe for	✓ Safe for	⊘ Not safe for
 C Gaseous fires.	⊘ Not safe for	⊘ Not safe for	⊘ Not safe for	✓ Safe for	⊘ Not safe for
 F Cooking oils and deep fat fires	⊘ Not safe for	⊘ Not safe for	⊘ Not safe for	⊘ Not safe for	✓ Safe for
 Live electrical equipment.	⊘ Not safe for	⊘ Not safe for	✓ Safe for	✓ Safe for	⊘ Not safe for

Spillages and Leaks 溢出和泄漏(1/2)

Even in the best managed chemicals stores and areas, where chemicals are repacked, transferred into other containers or mixed, there will be spills occasionally. 即便是管理最好的化学品储存区域，如进行分装、转移至其它容器、或混合，偶尔也将发生遗撒

Prevention: 预防:

- Check containers on delivery. 交货时检查容器
- Use good quality containers. 使用高质量的容器
- Ensure good and careful handling practices. 确保良好和仔细的操作实践
- Bad handling and long storage under bad conditions increase the risk of spills and leaks. 不良操作和在不良条件下的长时间储存和增加溢出和泄漏的风险
- Inform yourself in advance on measures and provisions in case of spillages or leakages. 提前了解有关万一发生溢出和泄漏时的措施和设备
- Refer to material Safety Data Sheet and manufacturer's instructions for corrective action. 提前了解有关万一发生溢出和泄漏时的措施和设备



Spillages and Leaks 溢出和泄漏(2/2)



Response 反应:

- Keep spill control kits ready. 准备好遗撒控制工具包
- Adequate with additional provisions needed to clean up materials that may spill, to be ready for use in the store at all times. 适用的附加设备用于清洁泄漏的材料，保持在库房始终可用
- Spill control kits are commonly available from chemicals or other specialized distributors. 遗撒控制工具包通常可以从化学品或其它特别的分销商处获取



Plan for external emergencies 对外部意外情况的预案: :

- How and which external agencies to alert? 应如何警示外部机构? 哪些记过?
- How to cooperate with emergency services? 如何与应急服务商合作?
- How to contain further releases? 如何含有进一步的释放?
- How to respond to outside emergencies? 如何对外部的紧急情况进行反应?

Emergency Planning and Emergency Plan 应急规划和应急计划

On-site and off-site emergency planning 厂区内外的应急方案:

- **On-site:** Dealing with effects of accident/incident confined to factory premises, involving only persons working in the factory and property inside the factory.

厂内: 方案涉及发生在厂界内的事故, 仅涉及工厂员工和厂内的财产

- **Off-site:** Dealing with effects uncontrollable inside the factory spreading outside the factory premises To be coordinated with outside stakeholders (municipality, industrial zone).

厂外: 方案涉及那些在工厂内发生的事故, 因不可控其影响扩散至厂界以外, 应与外部的利益相关方 (市政、工业区) 协助



Information sources and references 信息源和参考

- Safety data sheets. 安全技术说明书
- Technical data sheets. 技术数据表
- Chemical inventory. 化学品清单
- Hazard and risk maps. 危害性和风险图
- Incidence/Accident reports. 事故报告

For detailed guidance refer to UNEP APPELL www.unep.org/apell/ 详情参照 UNEP APPELL www.unep.org/apell/

Information Sources and References 信息来源和参考文件(1/2)

Safety Data Sheets安全技术说明书 SDS

Information on possible emergency situations:可能的紧急情况的信息:

- Prone to catch/fuel fire or explode.易于着火或爆炸

Information on preventive and response measures:预防和相应措施的信息:

- Suitable fire fighting equipment.合适的消防器材
- Leak control materials.泄漏控制材料
- First aid measures.急救措施

Technical Data Sheets技术说明书 TDS

Information on possible emergency situations:可能的紧急情况的信息:

- Concentration of the materials.材料的浓度
- Chemical properties.化学性能
- Toxicological data.毒性数据

Information on preventive and response measures: 预防和相应措施的信息:

application area: 应用领域

- Adverse effects on health and environment when exposed to or released.
当曝露和释放时对健康和环境的负面影响
- Adverse health effects as consequence of accidental mixing, exposure to heat, fire.
由于意外混合、曝露于热环境下对健康的负面影响

Information Sources and References 信息来源和参考文件(2/2)

Chemical inventory 化学品清单

- Information on possible emergency situations: storage quantity, hazard type, hazard group, risk band, MRSL.
可能的紧急情况的信息：储存数量、危害类型、危害组、风险级别、MRSL
- Information on preventive and response measures. 预防和反应措施的信息
- Control approach. 控制方法
- Risk assessment inventory. 风险评估清单

Hazards and risks maps 危害和风险图

- Information on possible emergency situations: situation of hazardous chemicals, situation of hazardous processes.
可能的紧急情况的信息：有害化学品的情况、危害操作的情况
- Information on preventive and response measures: situation of emergency equipment.
预防和反应措施的信息：应急设备的情况

Incidence/Accident reports 事故报告

- Information on possible emergency situations: number of accidents, severity of accidents, number of victims.
可能的紧急情况的信息：事故数量、事故的严重性、受害人数
- Information on preventive and response measures: type of measure, remedy.
预防和反应措施的信息：措施的类型、补救方法

Emergency Planning - Safety Responsibility Examples 意外规划 – 安全负责人示例

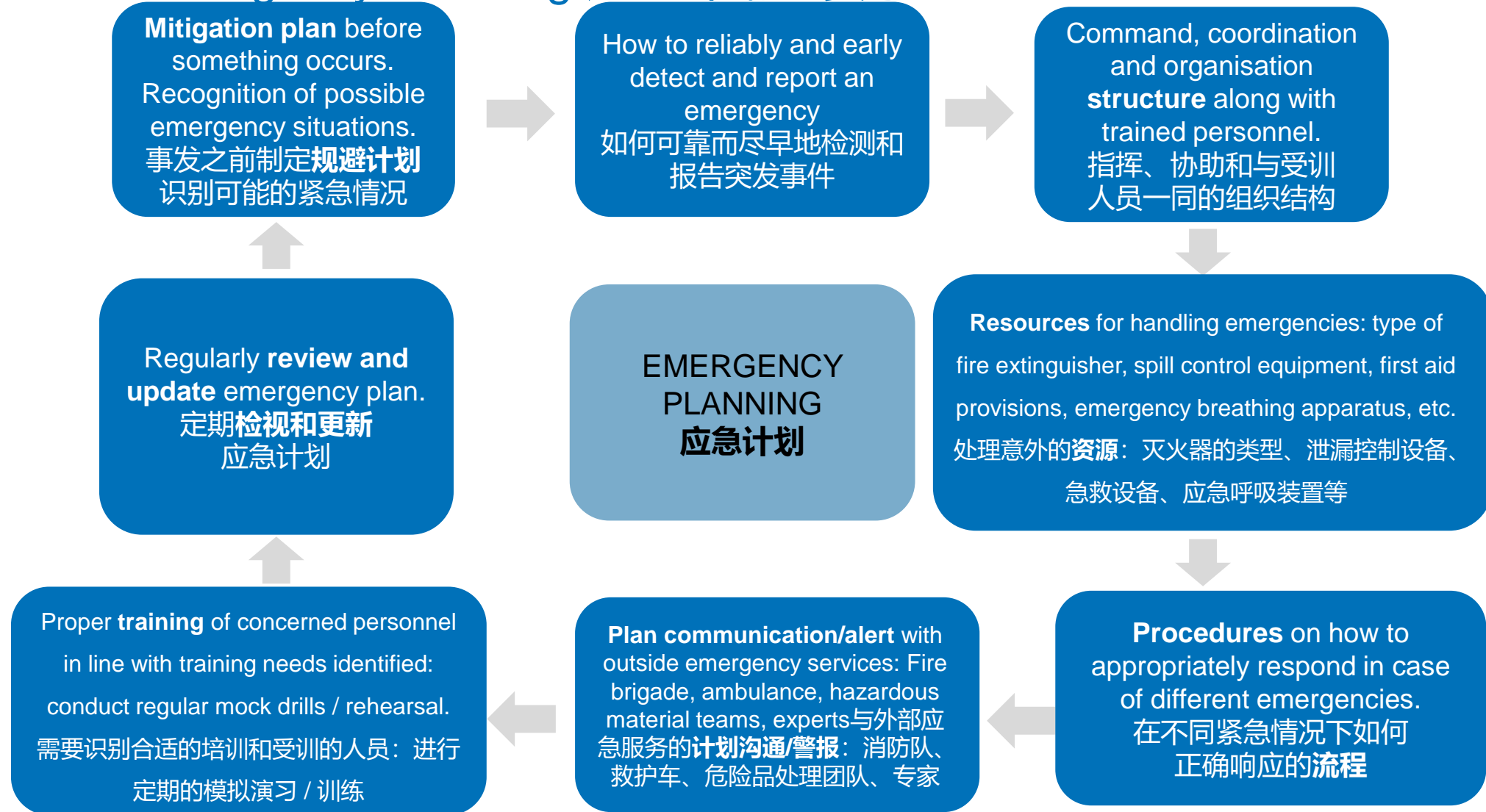
Employee responsibilities 雇员的责任

- Recognizing safety hazards. 认知安全危害
- Reporting safety hazards. 报告安全危害
- Maintaining good housekeeping. 维持良好的现场管理
- Working safely. 安全地工作
- Using personal protective equipment (PPE). 使用个人防护设备
- Making the most of safety training. 尽量利用安全培训

Employer responsibilities 雇主的责任

- Providing training. 提供培训
- Hazard Communications. 危害性沟通
- Annually and within first 30 days of employment, also when new hazards are introduced.
年度培训、入职头30天的培训、以及引入新危害性时的培训
- Special safety training. 特殊的安全培训

Elements of Emergency Planning 应急计划的要素



Emergency Response Plan 应急响应计划

Emergency Response Plan

A written, up-to-date Emergency Response Plan for your company (covering all workplaces) is essential. It should include detailed instructions on how to evacuate the building and contain contact names/information for individuals in charge of the evacuation.

- Primary and secondary escape routes with simple instructions should be posted at significant spots, at entrances and near elevators and telephones.
- Emergency Response Leaders should be assigned specific duties, such as verifying that all workers have been evacuated.
- Disabled workers and those with a history of certain medical conditions should be assigned an Emergency Response Leader to guide them to safety.
- Stairways should be kept free of materials that could block or hinder an evacuation.
- Regular fire drills should be conducted to identify problems before an actual fire occurs. Treat the drills as if they were an actual emergency.
- Important telephone numbers such as emergency, fire department and internal Emergency Response Leaders should be posted close to every telephone.

In addition to the Emergency Response Plan:

- Maintain an emergency shower and eye wash station for removing chemicals that may contact the skin or eyes.
- Keep a first aid kit that is clearly marked, easily accessible and protected against dust and water. The kit should include:
 - An inspection tag to document monthly checks
 - Written first aid instructions in the local language

应急预案 (ZDHC 3.6)

一份手写的最新应急预案对你的公司（包括所有的工作场所）至关重要。其中应包括如何从建筑物撤离的详细指导以及负责撤离人员的联系姓名/信息。

- . 带有简单指示的主要和次要逃生路线应该在明显地点，入口和电梯和电话附近
- . 应急负责人应具有特定职责，如确认所有人员已撤离
- . 残疾员工和有疾病历史的员工应由应急负责人带领撤离
- . 楼梯应保持通畅，不得堆放阻塞或妨碍撤离的物质
- . 在真实火灾发生前应进行定期的消防演习。应该将消防演习当做真正的火灾情况对待。
- . 重要电话号码，例如紧急求救号码，消防救灾号码，和建筑物内部应急负责人号码应张贴在每一个公用电话机上。

除应急预案外，还应做到：

- . 维护应急淋浴室和眼部清洗站，用于清洗可能与眼睛或皮肤接触的化学品
- . 配备带有清晰标记的急救箱，以便能方便取出工具，注意防水和防尘。急救箱工具包括：
 - 一个用于记录每月检查的检验标签
 - 用当地语言手写的急救指示

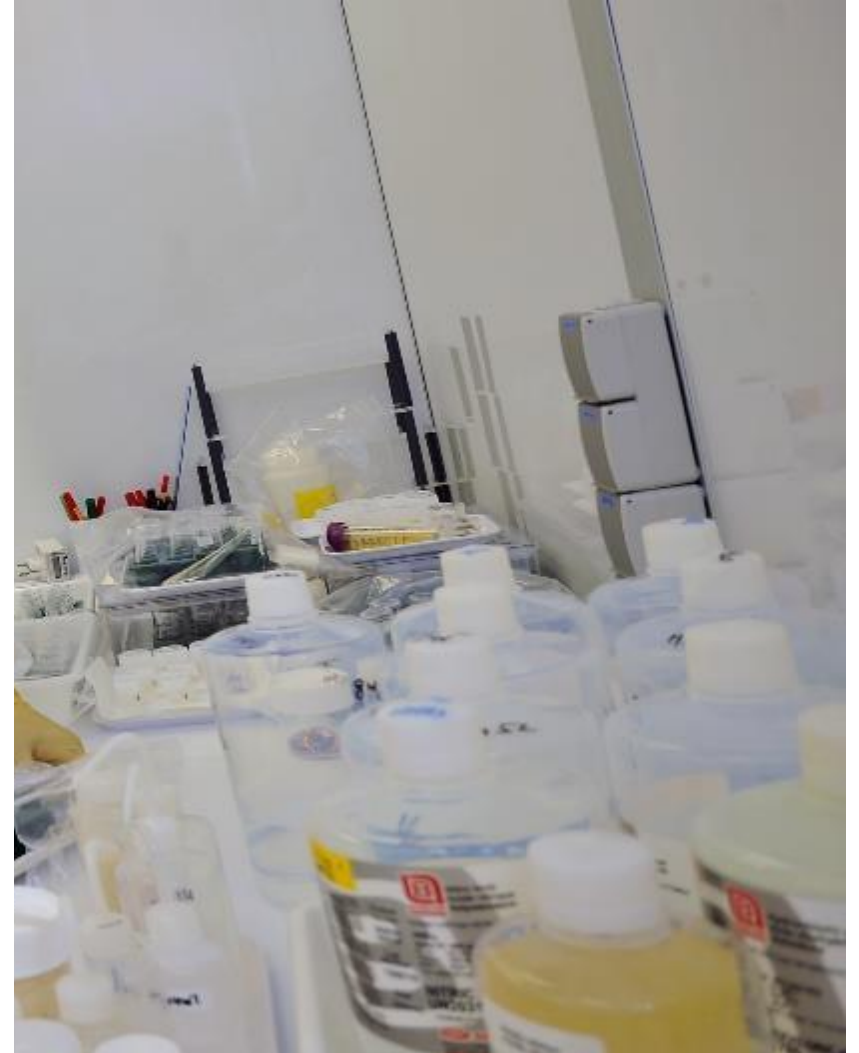
Reference: ZDHC Chemical Management Guidance System Manual

Prevent and Prepare for Medical Emergencies Involving Chemicals 预防和准备涉及化学品的医疗紧急情况

- Assessing possible medical emergency situations in your company. 评估工厂可能的医疗紧急情况
- Review information in the (M)SDS and chemical inventory. 检视 SDS 和化学品清单
- Map out areas with risk of medical emergencies in the factory. 在地图上标识出工厂可能有医疗紧急情况的区域

Example: 示例:

- Chemical burns. 化学燃烧
- Chemical poisoning. 化学中毒
- Asphyxiation. 窒息
- Confined space accidents (e.g. effluent treatment plants, underground tanks, closed vessels). 密闭空间事故 (如污水处理厂、地下槽罐、密闭容器)



Eye/wash Station Emergency Shower 洗眼器 / 紧急喷淋装置

Considerations: 考虑

- Are emergency eye wash/showers located close to work areas where chemicals with irritant/corrosive properties to skin and eye are used? 紧急洗眼装置/喷淋装置是否安放在使用化学品的区域? 这些化学品对皮肤和眼睛有刺激/腐蚀性
- As per OSHA, are they reachable in no more than 10 seconds? Consult a medical professional to determine appropriate distance for harsh acids and caustics (high hazard = closer distance):

根据 OSHA, 是否可在10秒以内到达? 咨询专业医疗人员来决定对于强酸和氢氧化钠的合适距离 (危害性越大, 距离应该越短) :

- In a well-lit area and identified with a sign. 在一个照明良好的区域识别标识
- Located on the same level as the hazard. 安置在危害物放置的位置
- Functioning to be check at least once a week. 至少每周一次检查其功能性



First Aid Provisions 急救设备



Considerations 考虑:

- Has the company checked the (M)SDS for any first aid requirements going beyond the standard content of first aid kits? 公司是否检查过 SDS 文件中关于急救的要求，是否超过标准急救箱的配置？
- Are these additional provisions available? 这些额外的配置是否可获得？
- Do the work instructions placed in work locations reflect the first aid recommendations of the respective (M)SDS? 工作场所设置的工作说明是否反应了相关 SDS 文件中对于急救的建议？
- Has the company verified how long it will take for medical emergency service to arrive? 公司是否核实过医疗急救服务需多长时间能到达现场？
- Has the company doctor been informed about which hazardous chemicals are used in the company? 工厂的医生是否知晓工厂在使用哪些危险化学品？

Checklist – Emergency Preparation Work Floor 检查表 – 车间的应急准备

Emergency preparedness aspect 应急准备方面	Your assessment 评估
Emergency scenario assessment conducted to determine what emergencies might arise 进行紧急方案评估来决定何种意外可能发生	
Emergency plans and procedures developed for potentially catastrophic events such as 为潜在的灾难事件开发应急预案和流程	
• Fires 火灾	
• Blasts and explosions 爆炸	
• Leaks and spills 泄露和溢出	
• Floods 洪水	
• Tsunami 海啸	
• Earthquake 地震	
• Civil unrest (mob attack) 内乱 (暴徒袭击)	
Emergency plans provide for procedures for extinguishing different types of fires, which might occur in the factory/office 应急预案提供扑灭各种火灾的流程，可能发生在工厂和办公区域	
Emergency plans include evacuation and recovery procedures for each type of emergency 应急预案为每一种紧急情况涉及疏散流程和回复流程	
Roles and responsibilities assigned in the plan to specific persons during emergencies 方案分配紧急状况下人员的角色和责任	
These persons aware of their responsibilities 这些人员了解他们的责任	
Persons qualified/trained to carry out necessary actions (Training records/certificates available) 这些合格/经培训的人员采取必要的行动 (培训记录/证书)	
Qualify emergency personnel designated and on station during and after office/working hours 指定合格的应急相应人员，工作时间或下班后都需就位	
Different communication channels assigned to support emergency measures 指定不同的沟通渠道来支持应急措施	

Propagating Good Personal Protection Practices 传播良好的个人防护实践

Remember to provide required training (initial, refresher) on:

记得提供需要的培训（初始培训，重复培训）：

- Hazards and effects of contact with chemical. 危害性和与化学品接触的作用
- Limitations of personal protective equipment. 个人防护设备的限度
- When and how to use. 何时使用及如何使用
- When and how to clean or dispose. 何时及如何清洁或弃置



Chemical Emergency Drills 化学品应急演练

- An Accident log book should be set up, including:
应建立事故日志，包括：
 - (i) name of worker injured (near miss), area of their work
受伤（未遂）工人姓名、工作区域
 - (ii) duration in position 到位时间
 - (iii) date of injury / accident / near miss 伤害/事故/未遂事件发生日期
 - (iv) summary of injury / accident / near miss (what happened, where did it happen, how did it happen, actions taken, etc.) 伤害/事故/未遂事件总结（发生的情况、发生的地点、发生的方式、采取的措施等）
 - (v) follow-up measures taken 采取的后续措施
- Chemical Accident Emergency Drills and fire drills should be practiced periodically (at least once a year). 化学品事故应急演练和消防演习需定期举行（至少一年一次）。
Related records should be kept. 对应的记录应保留。



Module 4: Law, Regulation, Standards, and RSL

模块四：法律、法规、标准和RSL

TÜV Rheinland
March 2019



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Overview 概述

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Laws and Regulations 法律法规

- Requirements on shoes in EU 欧盟法规
- Requirements on shoes in the USA 美国法规
- Requirements on shoes in China 中国法规
- Requirements on chemicals in China 中国法规
- Requirements on chemicals in Europe 欧盟法规

03

Conventions and Initiatives
公约和倡议

- POPs
- Detox

Learning objectives 学习目标:

1. To have a understanding of the regulatory of chemicals in China and in Europe 了解中国和欧洲的化学品监管

Target Group 目标群:

Participant 5% factory workers may include: 工厂5%的员工应包括:

- 1.High management: factory Board Chairman, Managing Director, General Manager 高层: 董事长、常务董事、总经理;
2. Department Manager in Quality, EHS, R&D, Manufacturing, Purchasing, IT, HR, Sales, and Admin 部门经理 (质量、EHS、研发、生产、采购、IT、人力资源、销售、行政)
3. All staffs in quality department, lab, and EHS department 质量部门、实验室和EHS部门的所有员工
- 4.Shift leaders in each manufacturing line, in chemical warehouse 每条生产线、每个化学品仓库领班
- 5.All interested workers are welcomed 所有感兴趣的员工
6. Miminum 10 people for each factory 每家工厂至少10人

Length 时长:

3 Hours 3小时

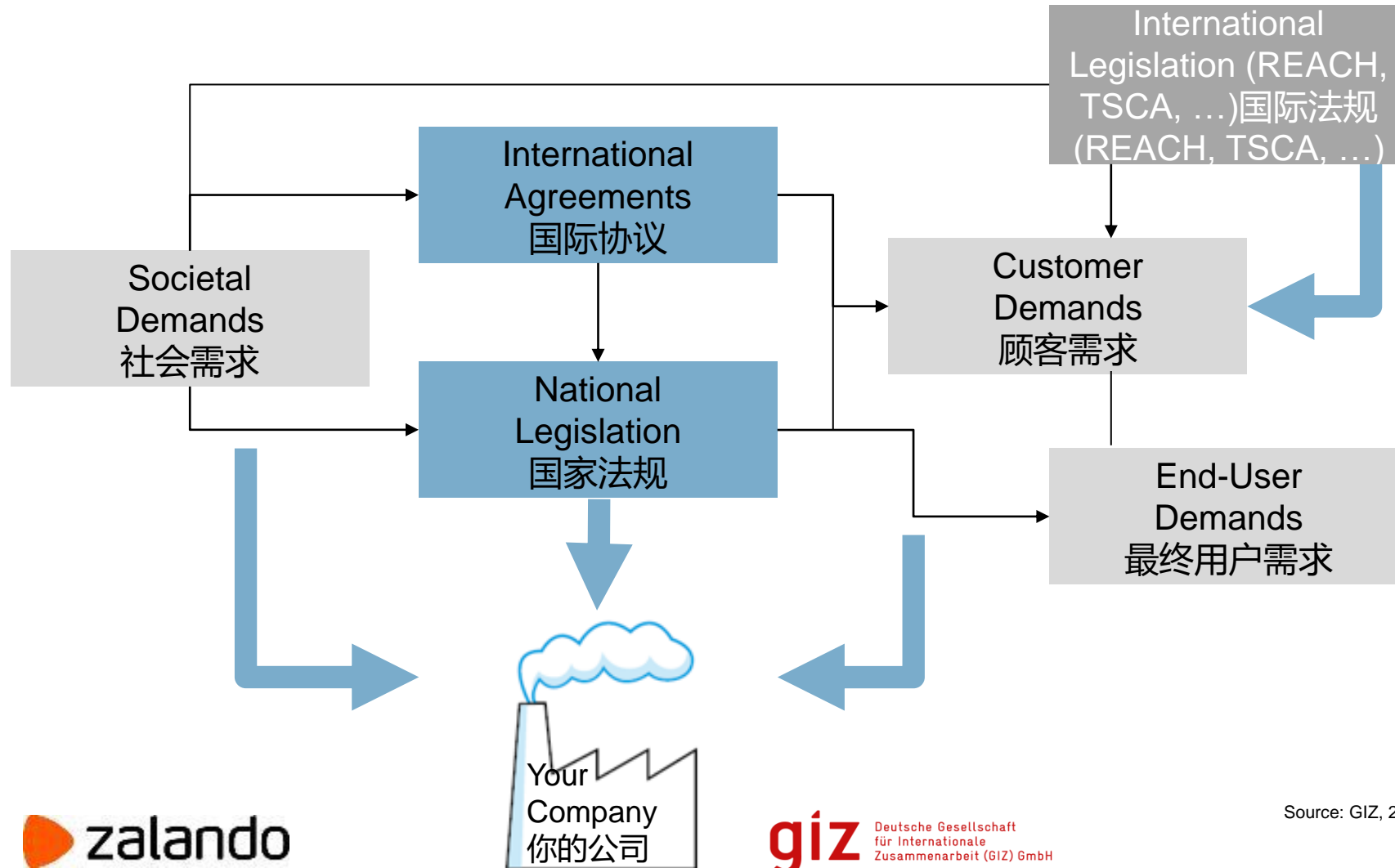
Training outcomes 培训成果

At the end of this training, the participants will be able to ...

培训结束后，您应该能够...

- Name the mandatory regulations regarding chemical management
列出关于化学品管理的强制性规定
- Prepare and maintain an inventory of legal and other requirements (source, area of applicability)
编制和维护法律和其他要求清单（来源、适用范围）
- Name major problems with regard to RSL test
列出有关RSL测试的主要问题
- Conduct a root cause analysis with regard to RSL test
对RSL测试进行根本原因分析
- Purchase chemicals and raw material by considering these regulations
考虑到这些规定购买化学品和原材料

Overview 概述



Societal, Customer and End-user Demands 社会，顾客和最终用户需求

Conventions & International Agreements: 公约和国际协议



- Agenda 21
- Stockholm, Rotterdam and Basel Convention 斯德哥尔摩，鹿特丹和巴塞尔公约
- ILO Convention 170

National Legislations 国家法规



- Factory Act
- Rules & Regulations
- Environmental
- Health & Safety

Societal, Customer and End-Consumer Demands 社会，顾客和最终用户要求



- MRSL, RSL生产限用物质清单和限用物质清单
- Protection of Human Health and the environment保护人类健康和环境

QUIZ 小测试

How many existing laws, standards, international conventions you know or comply with in your factory?

您知道或遵守的现有法律、标准、国际公约有多少？

Laws and Regulations
法律法规

01

Laws and Regulations on shoes

鞋子法律法规

Regulations in EU 欧盟法规

1. Voluntary requirements 自愿要求

2. Mandatory requirements 强制要求

— member countries 成员国层级

— EU 欧盟层级



— REACH

— EU POPs

— 94/62/EC

— GPSD

—



— RoHS

— 2009/48/EC

— 1935/2004

— ELV

—

EU level regulations requirements 欧盟水平法规要求

Regulations in EU – REACH 欧盟法规 - REACH

法规编号： (EC) No 1907/2006

Registration 注册

Evaluation 评估

Authorisation and Restriction of 授权和限制

Chemicals 化学品

时间表： 2007-06-01正式生效， 2008-06-01正式实施。

主管机构： 欧洲化学品管理局（ECHA）

意义： 对欧盟市场的所有化学品进行统一预防性管理。



Regulations in EU – REACH 欧盟法规 - REACH

scope of application 适用范围

- A substance on its own, in a preparation or in an article which meets the criteria for classification as carcinogenic, mutagenic or toxic to reproduction, category 1 or 2, and could be used by consumers should be restricted or carried out information requirement 物质自身，其配制品或物品满足分类规则的致癌、致畸或生殖毒性（CMR）1类或2类，则限制使用于消费品或需要进行信息传递。
- Applicable to various industries, such as chemicals, dyeing, printing, textiles, footwear, toys, electronic products, power tools etc. 适于各行业，如化学品、染色、印刷、纺织品类、鞋类、玩具、电子产品、电动工具等。



Regulations in EU – REACH 欧盟法规 - REACH

Substance

物质



A chemical element and its compounds in the natural state or obtained by any manufacturing process, with CAS No. or/ and EC No. 天然或人工合成的一种化学元素或它的化合物，有相应的CAS号或/和 EC号。

Preparation

配制物



a mixture or solution composed of two or more substances 两种或两种以上物质构成的混合物或溶液

Article

物品



an object which during production is given a special shape, surface or design which determines its function to a greater degree than does its chemical composition. 赋予了用于体现其优于化学混合物的功能的一定形状，外观或设计的物体。

Regulations in EU – REACH 欧盟法规 - REACH



注册 Registration

- ❖ 年产量或进口量超过**1吨**的所有化学物质需要**注册**；
- ❖ 年产量或进口量**10吨**以上的物质还应提交**化学安全报告**。



评估 Evaluation

- ❖ **档案评估** --- 核查提交注册卷宗的完整性和一致性；
- ❖ **物质评估** --- 确认化学物质的风险性。



授权 Authorisation

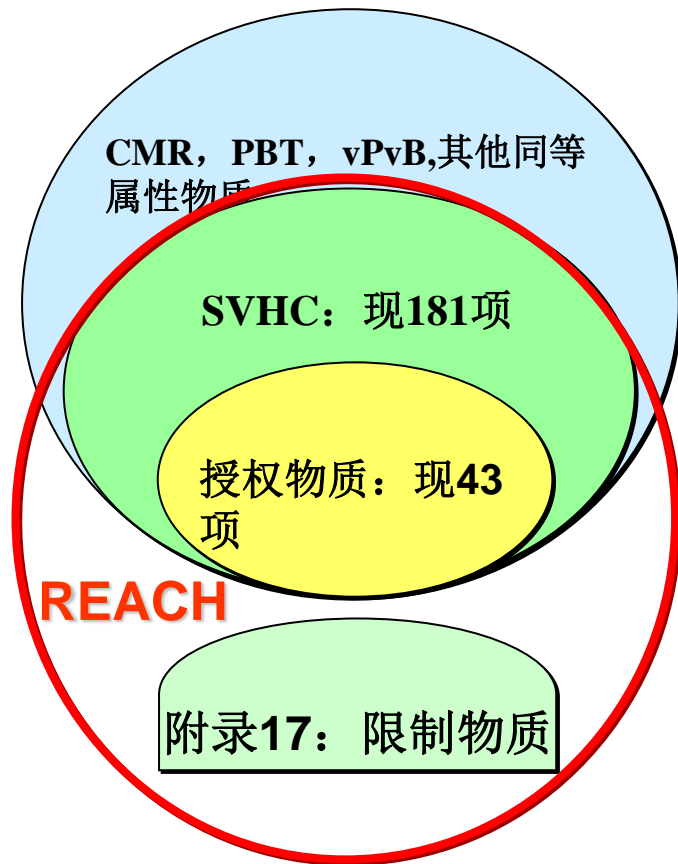
- ❖ 对CMR, PBT,vPvB的化学物质的生产和进口进行授权。
- ❖ 企业需要对列入**附件XIV**的物质申请授权方能使用。



限制 Restriction

- ❖ **附件XVII**列明了对某些危险物质、配制品和物品制造、投放市场和使用的限制，被称为限制物质清单。

Regulations in EU – REACH 欧盟法规 - REACH



- ★ Annex XIV: 授权物质清单
- ★ Annex XVII: 限制物质清单
- ★ SVHC: 高度关注物质 (候选清单)

1

■ 欧洲化学品管理局ECHA决定是否将SVHC物质纳入“候选清单”，候选清单中的物质有可能会进一步纳入授权清单（附录XIV）。

2

■ 使用列于XIV的物质，日落之日前需申请授权，日落之后禁止使用。但授权要求不适用于已用于产品中的物质。

3

■ 授权物质在日落之日后，可能会变为限制性物质。

Regulations in EU – REACH 欧盟法规 - REACH

Responsibility and Obligation 责任和义务

	Annex XVII Restricted substance 限制物质		SVHC Substances of Very High Concern 高度关注物质
	<ul style="list-style-type: none">▪ 产品需满足附录17限制要求；▪ 产品如不满足则禁止进入欧盟。		<ul style="list-style-type: none">▪ 通报▪ 主动进行信息传递，▪ 45天内信息传递

- 应消费者要求，物品的所有供应商应该收到请求的45天内，提供给消费者其可获取的充足信息，以使物品安全使用。这些信息至少包括物质的名称。



Microsoft Word
17 - 2003 Documen



Microsoft Word
17 - 2003 Documen

REACH Annex XVII regular test items 附录17常规测试条目



Flame Retardants 阻燃剂系列

Entry No.	Substance	Entry No.	Substance
1	PCTs	8	PBB
4	TRIS	45	octaBDE
7	TEPA	67	decaBDE

Metal Element 金属元素系列

No.	Substance	No.	Substance
23	Cadmium	27	Nickel
62	Phenylmercury	63	Lead

Phthalates 邻苯系列

Entry No.	Substance	Entry No.	Substance
51	DEHP, DBP, BBP	52	DNOP, DIDP, DINP



REACH Annex XVII regular test items 附录17常规测试条目

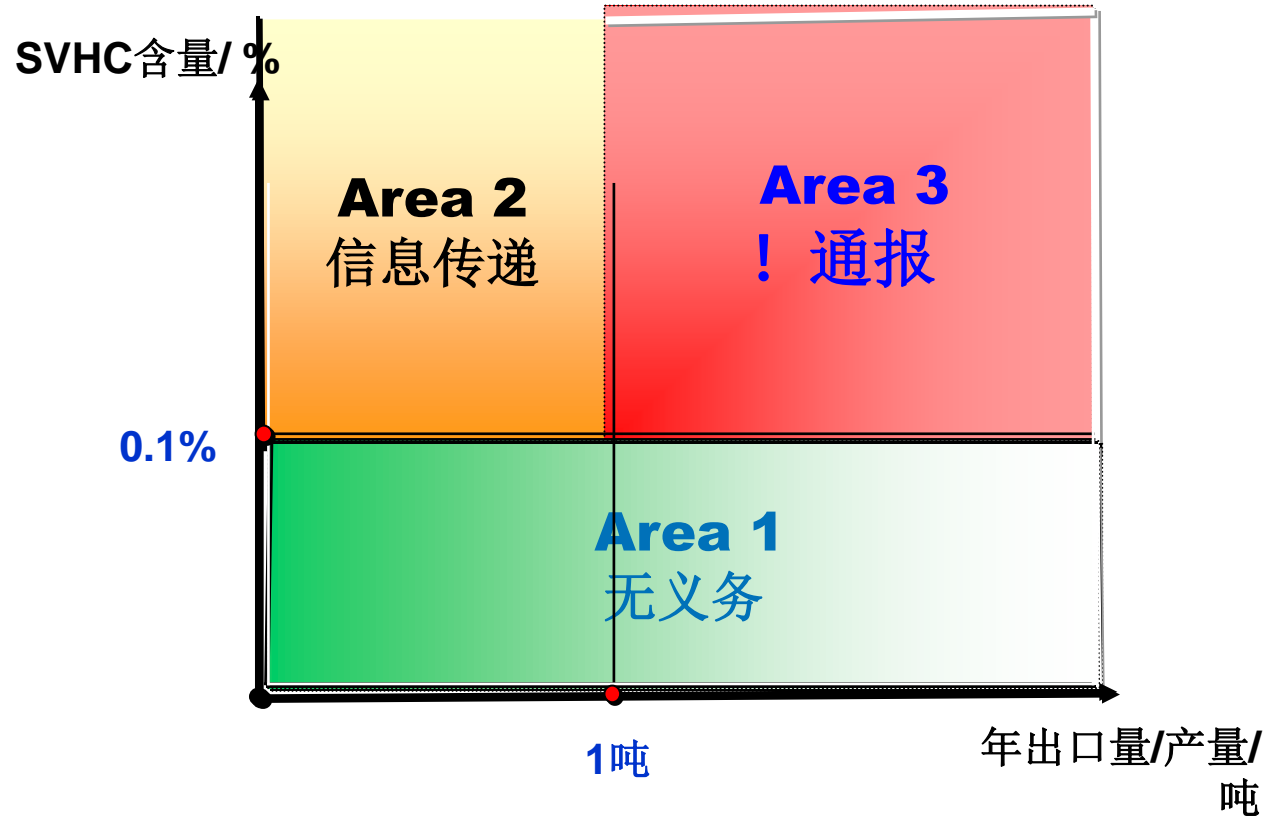
Other conventional items 其他常规测试项目

Entry No.	Substance	Entry No.	Substance
5	Benzene	47	Chromium VI
20	Organostannic	48	Toluene
22	Pentachlorophenol	50	PAHs
43	Azodyes	61	DMFu
46	Nonylphenol	66	BPA
46a	Nonylphenol ethoxylates	68	PFOA



Entry 66
Bisphenol A CAS No 80-05-7 EC No 201-245-8
Conditions of restriction
Shall not be placed on the market in thermal paper in a concentration equal to or greater than 0,02 % by weight after 2 January 2020.

Regulations in EU – REACH 欧盟法规 - REACH



- Area1 —— 产品中SVHC < 0.1%，无需通报和主动进行信息传递；
- Area2 —— 产品中SVHC ≥ 0.1%，且年出口量 < 1吨，必须向下游进口商进行信息传递；
- Area3 —— 若产品中SVHC ≥ 0.1%，且年出口量 ≥ 1吨，必须向ECHA进行通报工作；

Rapid Alert and recall system in EU 欧盟快速预警和召回系统

The image displays two overlapping web browser screenshots. The background screenshot is the CPSC Recall List page, showing a search bar and a list of recalls. The foreground screenshot is the European Commission's Rapid Alert System Weekly Report, detailing a specific recall for women's shoes.

CPSC Recall List (Background):

- United States CONSUMER PRODUCT SAFETY COMMISSION
- Recall List
- Recalls CSY
- Recalls RSS
- Spanish
- Date: Search All
- Apply
- AUGUST 24, 2017
- Dr. Martens Vegan Boots Recalled by Airwair Due to Chemical Exposure Hazard**
- Prolonged and direct contact with the boot tongue lining can expose the wearer to the chemical benzidine.
- Remedy:** Consumers should immediately stop using the recalled boots and

European Commission - Rapid Alert System (Foreground):

- Rapid Alert System - Weekly Report
- Report 34 (Published on: 25/08/2017)
- Product category: Clothing, textiles and fashion items
- Notifying country: -- choose --
- Type of risk: Chemical
- Alert number: -- choose --
- Weekly report on consumer products
- Serious risk**
- Alert number: A*201725/17
- Category: Clothing, textiles and fashion items
- Product: Women's shoes
- Brand: Empus
- Name: Unknown
- Type / number of model: R1605-2
- Batch number / Barcode: Unknown
- Risk type: Chemical
- The amount of chromium (VI) found in the leather is too high (measured value 8.7 mg/kg). Chromium (VI) is sensitizing and may trigger allergic reaction.
- The product does not comply with the REACH regulation.

Case study: 案例分析

1. A synthetic leather supplier in China is going to export 10 ton PU leather to an EU country, and all the PU leather is going to be used in the automobile seat. A chemical test report on the PU leather indicates DMFa (62-12-2), 134 mg/kg; DINP(28553-12-0) 1200 mg/kg. According to REACH regulation, should this product be allowed to enter EU market? What obligation should be fulfilled by the supplier?
2. 位于我国的一家合成革生产企业2017年计划向欧洲出口PU合成革10吨，产品完全用于制作汽车座椅，经过检测发现材料中：DMFa (62-12-2)含量为134 mg/kg, DINP(28553-12-0)含量为1200 mg/kg, 根据REACH法规，该产品是否能出口欧洲？，应履行哪些义务？

Activity 活动

Your facility is producing one batch shoes , which will be sold to Germany. Which regulations should you comply? Write down your answers. 你的工厂正在生产一批鞋，准备销往德国。你需要满足什么法规要求？写出你的答案。

Regulation in China 中国法规

GB/T 29292-2012, ISO/TR 16178:2010 鞋类和鞋类部件中存在的限量物质



Adobe Acrobat Document



表 1 鞋类和鞋类部件中存在的限量物质

物质名称 (参见附录 B)	试验方法	皮革			合成材料								天然材料				其他材料				
		皮革	涂层皮革	皮板	聚氯乙烯 PVC	乙烯-乙酸乙烯聚合物 EVA	橡胶	PU-TPU 氨纶	PE-TP	聚酯	聚酰胺	含氯纤维	聚丙烯酸	乳胶	天然织物	蛋白质物	木头-软木	粘合剂	金属件	纺织品用染料	纤维板
丙烯腈	—						5											5			
AZO-芳香胺	ISO 17234-1	1	1	1																	
AZO-芳香胺 当怀疑有 4-氨基偶氮苯	ISO 17234-2	1	1	1																	
AZO-芳香胺	EN 14362-1									1	1	1		1	1						1
AZO-芳香胺	EN 14362-2									1											1
AZO-芳香胺 当怀疑有 4-氨基偶氮苯	EN 14362-3									1	1	1	1	1	1						1
镉 针对 PVC 要求	EN 1122		1		1	1	1	1	1												1
有机氯载体	—									3											
六价铬	ISO 17075	2	2	2																	

Regulation in China 中国法规

GB 30585 – 2014 儿童鞋安全技术规范

- This standard is suitable for footwear made of various materials for children under 14 years of age (footwear size not more than 250mm) for daily wear; 本标准适用于各种材料制作的, 供14岁以下儿童 (鞋号不大于250mm) 日常穿用的鞋类;

- This standard does not apply to children's rubber shoes. 本标准不适用于童胶鞋。



Adobe Acrobat
Document



序号	项 目	指 标
1	皮革和毛皮中的六价铬	≤10 mg/kg
2	可分解有害芳香胺染料(纺织品)	≤20 mg/kg

2



GB 30585—2014

表 1 (续)

序号	项 目		指 标	
3	可分解有害芳香胺染料(皮革和毛皮)		≤30 mg/kg	
4	甲 醛	婴幼儿鞋	≤20 mg/kg	
		直接接触皮肤的材料	≤75 mg/kg	
		非直接接触皮肤的材料	≤300 mg/kg	
5	重 金 属 总 量	砷	≤100 mg/kg	
		铅	≤100 mg/kg	
		镉	≤100 mg/kg	
6	富马酸二甲酯		≤0.1 mg/kg	
7	橡胶部件中的 N-亚硝胺类*(婴幼儿鞋)		不应检出	
8	邻苯二甲酸酯 [†]	婴幼儿鞋	DINP, DIDP, DNOP	≤0.1%
			DEHP, DBP, BBP	≤0.1%
		儿童鞋	DEHP, DBP, BBP	≤0.1%

* 橡胶部件中禁用 N-亚硝胺类物质种类见附录 B。
† 限用邻苯二甲酸酯类增塑剂种类见附录 C。



Regulation in China 中国法规

Matched determination method 配套的测试方法

Standard	Substances
GB/T 17592-2011	Determination of harmful aromatic amine dyes in textile 可分解有害芳香胺染料 纺织品
GB/T 19942-2005	Determination of harmful aromatic amine dyes in Leather 可分解有害芳香胺染料 皮革
GB/T 2912.1-2009	Determination of Formaldehyde in Textile 纺织品中甲醛含量检验
GB/T 19941-2005	Determination of Formaldehyde in Leather 皮革中甲醛含量检验
ISO 17075 - 2007 IUC 18	Determination of Cr(VI) in Leather 皮革中Cr(VI)含量的检验
GB/T 7573-2009	Determination of PH Value pH值
GB/T 17593-2007	Determination of extractable heavy metals 可萃取重金属检验
GB/T 18414-2006	Determination of Chlorinated Phenols in Textile 纺织品中含氯苯酚的测定
GB/T 24153-2009	Determination of N-nitrosamine in rubber and elastic material 橡胶和弹性制品中N-亚硝基胺的测定
GB/T 26713-2011	Determination of DMFu in shoes 鞋类 富马酸二甲脂(DMFu) 的测定

Laws and Regulations on chemicals

化学品法律法规

Regulation in China 中国法规

GB12268-2012 List of dangerous goods 危险货物物品名录

危险货物物品名表

1 范围

本标准规定了危险货物物品名表的一般要求、结构和危险货物物品名表。
本标准适用于危险货物运输、储存、经销及相关活动。

2 规范性引用文件

下列文件对于本文件的应用是必不可少的。凡是注日期的引用文件,仅注日期的版本适用于本文件。凡是不注日期的引用文件,其最新版本(包括所有的修改单)适用于本文件。

GB 6944 危险货物分类和品名编号

联合国《关于危险货物运输的建议书 规章范本》(第16修订版)

联合国《关于危险货物运输的建议书 试验和标准手册》(第5修订版)

3 术语和定义

联合国《关于危险货物运输的建议书 规章范本》(第16修订版)和GB 6944界定的术语和定义适用于本文件。

4 一般规定

4.1 危险货物的危险性按照GB 6944分为9类,有些类别再分成项别,判断见GB 6944。类别和项别分列如下:

第1类:爆炸品

1.1项:有整体爆炸危险的物质和物品;

1.2项:有迸射危险,但无整体爆炸危险的物质和物品;

1.3项:有燃烧危险并有局部爆炸危险或局部迸射危险或这两种危险都有,但无整体爆炸危险的物质和物品;

1.4项:不呈现重大危险的物质和物品;

Regulation in China 中国法规

GB15603-1995 Rule for storage of chemical dangers 常用化学危险品贮存通则

1 主题内容与适用范围	1
2 引用标准	1
3 定义	1
4 化学危险品贮存的基本要求	1
5 贮存场所的要求	2
6 贮存安排及贮存量限制	2
7 化学危险品的养护	3
8 化学危险品出入库管理	3
9 消防措施	4
10 废弃物处理	4
11 人员培训	4
附录 A 常用化学危险品贮存禁忌物配置表(参考件)	插页
附录 B 常用化学危险品的安全贮存(参考件)	5
B1 第一类 爆炸品	5
B2 第二类 压缩气体和液化气体	12
B3 第三类 易燃液体	20
B4 第四类 易燃固体、自燃物品和遇湿易燃物品	32
B5 第五类 氧化剂和有机过氧化物	100
B6 第六类 毒害品	120
B7 第七类 放射性物品	153
B8 第八类 腐蚀品	157
附录 C 化学危险品品名汉语拼音索引(参考件)	206

Regulation in China 中国法规

GB 50016-2014 Code for fire protection design of buildings 建筑设计防火规范

前 言

本规范是根据住房和城乡建设部《关于印发〈2007年工程建设标准规范制订、修订计划（第一批）〉的通知》（建标[2007]125号文）和《关于调整〈建筑设计防火规范〉、〈高层民用建筑设计防火规范〉修订项目计划的函》（建标[2009]94号），由公安部天津消防研究所、四川消防研究所会同有关单位，在《建筑设计防火规范》GB 50016—2006和《高层民用建筑设计防火规范》GB 50045—95（2005年版）的基础上，经整合修订而成。

本规范在修订过程中，遵循国家有关基本建设的方针政策，贯彻“预防为主，防消结合”的消防工作方针，深刻吸取近年来我国重特大火灾事故教训，认真总结国内外建筑防火设计实践经验和消防科技成果，深入调研工程建设发展中出现的新情况、新问题和规范执行过程中遇到的疑难问题，认真研究借鉴发达国家经验，开展了大量课题研究、技术研讨和必要的试验，广泛征求了有关设计、生产、建设、消防监督、研究和教学等单位意见，最后经审查定稿。

本规范共分12章和3个附录，主要内容有：生产和储存的火灾危险性分类、高层公共建筑的分类要求，厂房、仓库、住宅建筑和公共建筑等工业与民用建筑的建筑耐火等级分级及其建筑构件的耐火极限、平面布置防火分区与防火分隔、建筑防火构造、防火间距和消防设施设置的基本要求，工业建筑防爆的基本措施与要求；工业与民用建筑的疏散距离、疏散宽度、疏散楼梯设置形式、应急照明和疏散指示标志以及安全出口和疏散门设置的基本要求；甲、乙、丙类液体、气体储罐（区）

Regulation in China 中国法规

GB190-2009 packing symbol of dangerous goods 危险货物包装标志

GB 190—2009

前 言

本标准的第3章、第4章为强制性的,其余为推荐性的。

本标准修改采用联合国《关于危险货物运输的建议书 规章范本》(第15修订版)第5部分,托运程序第5.2章,标记和标签。本标准与其相比,存在以下技术性差异:

——标志图形采用表格形式叙述;

——删除了与标志使用无关的内容。

本标准代替 GB 190—1990《危险货物包装标志》。本标准与 GB 190—1990 相比主要变化如下:

——爆炸品标签从原有的3个增加为4个;

——气体标签从原有的3个增加为5个;

——易燃液体标签从原有的1个增加为2个;

——第4类物质标签,从原有的3个增加为4个;

——第5类物质标签中,有机过氧化物变动较大;

——毒性物质标签,从原有的3个减少为1个;

——第7类物质标签中,增加裂变性物质标签;

——增加4个标记;

——增加标记和标签使用要求(附录A)。

本标准的附录A为规范性附录。

本标准由全国危险化学品管理标准化技术委员会(SAC/TC 251)提出并归口。

本标准负责起草单位:铁道部标准计量研究所。

本标准主要起草人:张怡、赵靖宇、赵华、兰淑梅、苏学锋。

本标准所代替标准的历次版本发布情况为:

——GB 190—1985,GB 190—1990。

Regulation in China 中国法规

GHS Implementation in China GHS在中国执行



中华人民共和国工业和信息化部
Ministry of Industry and Information Technology of the People's Republic of China

Regulation in China 中国法规

Catalogue of substitutes for toxic and harmful raw materials (products) encouraged by the State 国家鼓励的有毒有害原料（产品）替代品目录

附件

国家鼓励的有毒有害原料（产品）替代品目录

（2016年版）

序号	替代品名称	被替代品名称	替代品主要成分	适用范围
一、研发类				
（一）重金属替代				
1	无汞催化剂	含汞催化剂	贵金属/非贵金属	乙炔法氯乙烯合成
2	三价铬硬铬电镀工作液	六价铬电镀液	三价铬	汽车减震器、液压部件等
3	稀土脱硝催化剂	钒基脱硝催化剂	镧、铈、钇等稀土元素的无机和有机化合物	电厂、窑炉等工业脱硝，机动车尾气净化，石油裂化裂解，有机废气处理
4	环保稀土颜料	铅基和镉基颜料	硫化铈等稀土硫化物	塑料、陶瓷、油漆、尼龙以及化学品等领

Regulation in Europe

GHS Implementation in Europe – CLP GHS在欧洲执行 – 化学品分类、标签和包装

► **B** REGULATION (EC) No 1272/2008 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 16 December 2008

on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006

(Text with EEA relevance)

(OJ L 353, 31.12.2008, p. 1)

Amended by:

Official Journal

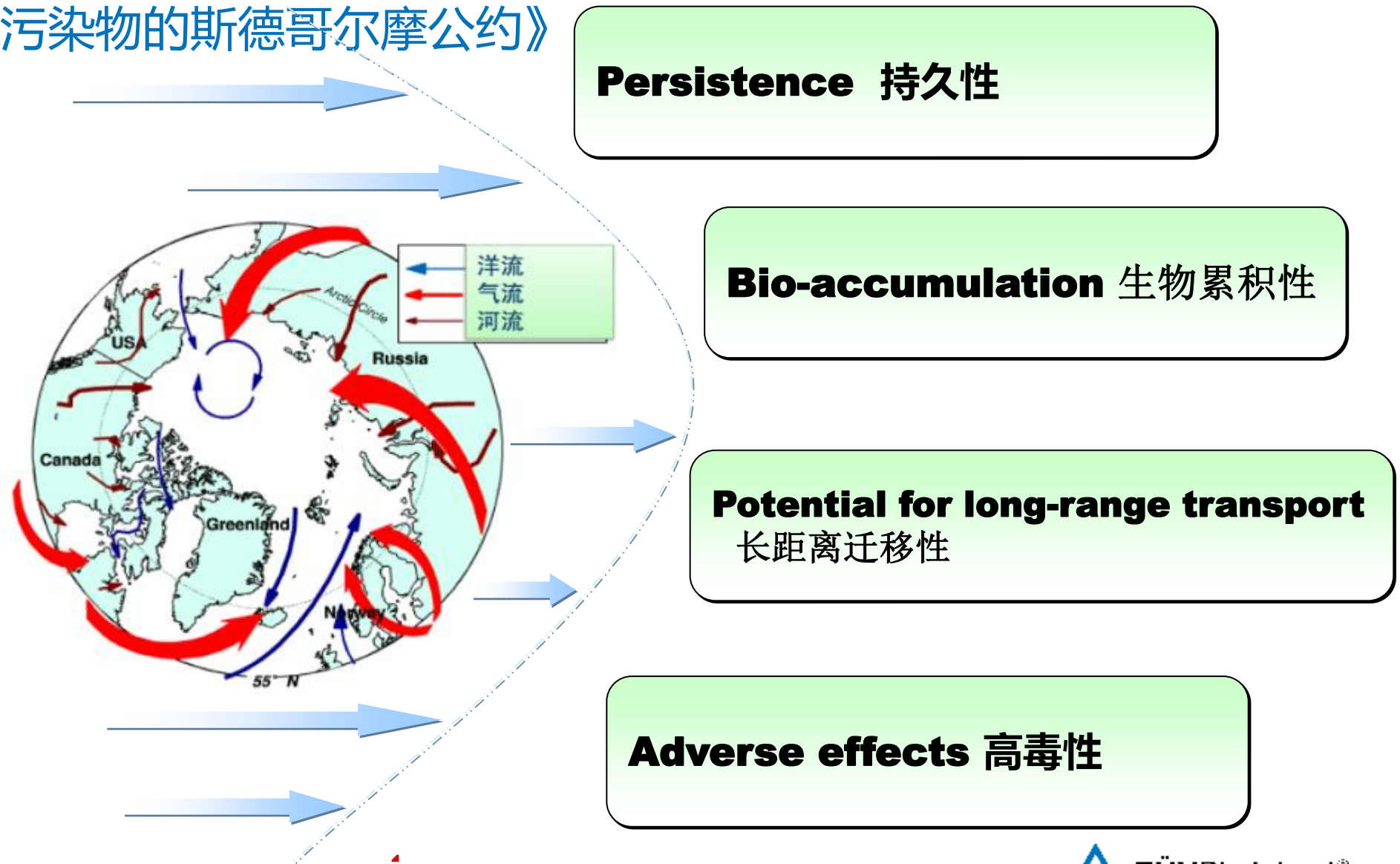
		No	page	date
► <u>M1</u>	Commission Regulation (EC) No 790/2009 of 10 August 2009	L 235	1	5.9.2009
► <u>M2</u>	Commission Regulation (EU) No 286/2011 of 10 March 2011	L 83	1	30.3.2011
► <u>M3</u>	Commission Regulation (EU) No 618/2012 of 10 July 2012	L 179	3	11.7.2012
► <u>M4</u>	Commission Regulation (EU) No 487/2013 of 8 May 2013	L 149	1	1.6.2013
► <u>M5</u>	Council Regulation (EU) No 517/2013 of 13 May 2013	L 158	1	10.6.2013
► <u>M6</u>	Commission Regulation (EU) No 758/2013 of 7 August 2013	L 216	1	10.8.2013

Conventions and Initiatives 公约和倡议

02

The Stockholm Convention on Persistent Organic Pollutants

《关于持久性有机污染物的斯德哥尔摩公约》



The Stockholm Convention on Persistent Organic Pollutants 《关于持久性有机污染物的斯德哥尔摩公约》

目的： 为推动POPs的淘汰和削减、保护人类健康和环境免受POPs的危害。

行动： 在联合国环境规划署（UNEP）主持下，国际社会于2001年5月23日在瑞典首都共同缔结的专门环境公约，其全称是《关于持久性有机污染物的斯德哥尔摩公约》。

生效日期： 公约于2004年5月17日正式全球生效。

限制物质： 首批列入公约控制的POPs共有12种（类），它们被合称为“肮脏的一打（dirty dozen）”。



Link to Stockholm Convention: <http://www.pops.int/>

EU POPs — (EC) No 850/2004 and its amending regulations

欧盟POPs-850/2004号法案及其更新法规

在欧盟，执行“斯德哥尔摩公约”的法律条文是法规**(EC) No 850/2004**。

该法规于2004年5月20日生效，并随即适用于所有欧盟国家。

(EC) No 850/2004更新列表

- 2006年发布法规 (EC) No 1195/2006
- 2007年发布法规 (EC) No 172/2007和 (EC) No 323/2007
- 2009年发布法规 (EC) No 219/2009和 (EC) No 304/2009
- 2010年发布法规(EU) No 756/2010和(EU) No 757/2010
- 2012年发布法规(EU) No 519/2012
- 2014年发布法规(EU) No 1342/2014
- 2015年法规法规(EU) 2015/20302016年发布法规 (EU) 2016/
和 (EU) 2016/460



EU POPs-850/2004 Annex I (24 items) 附录I

etrabromodiphenyl ether (TeraBDE, 四溴联苯醚)	DDT (滴滴涕)
Pentabromodiphenyl ether (PentaBDE五溴联苯醚)	Chlordane (氯丹)
Hexabromodiphenyl ether (HexaBDE六溴联苯醚)	Hexachlorocyclohexanes, including lindane (林丹)
Heptabromodiphenyl ether (HeptaBDE七溴联苯醚)	TDieldrin (狄氏剂)
Alkanes C10-C13, chloro (short-chain chlorinated paraffins) (SCCPs 短链氯代石蜡)	Endrin (异狄氏剂)
Polychlorinated naphthalenes (PCNs 多氯萘类)	Heptachlor (七氯)
Polychlorinated Biphenyls (PCBs 多氯联苯)	Endosulfan (硫丹)
Hexabromobiphenyl (HexaBB 六溴联苯)	Hexachlorobenzene (六氯苯)
Hexabromocyclododecane (HBCD/HBCDD六溴环十二烷)	Aldrin (艾氏剂)
Perfluorooctane sulfonic acid and its derivatives (PFOS 全氟辛烷磺酸盐)	Mirex (灭蚊灵)
Hexachlorobutadiene (六氯丁二烯)	Toxaphene (毒杀芬)
Pentachlorobenzene (五氯苯)	Chlordecone (十氯酮)

Flame retardants (apply to plastics, polymers, textiles, leather, paper and electronics)

PFOS:进行过防污、防油和防水处理的纺织品、皮革、涂层 和纸张等。

六氯丁二烯: 用作溶剂、热载体、热交换剂、水力系统用液体、洗液, 也用于合成橡胶工业

Stockholm Convention 斯德哥尔摩公约

POPs in China 中国持久性有机污染物的斯德哥尔摩公约

English Version

www.china-pops.org

国家履行斯德哥尔摩公约工作协调组办公室
Office of the National Coordination Group for Stockholm Convention Implementation

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项目网站 >>>

- 白蚁防治氟丹灭蚊灵示范替代项目
- 三氯杀螨醇生产控制和IPM技术应...
- 中国用于防污染生产的DOT替代项目网

专题活动 >>>

- “小手拉大手”电子废物环保宣...
- 中国电子废物POPs减排全副示范...
- 关注POPs 引导青少年深入思考环...
- 全国青少年儿童POPs环保艺术大...
- “全国青少年儿童持久性有机污...

学术动态 >>>

- 母亲暴露在污染环境会增加孩...
- 漏网的多代影响可导致肥胖

站内搜索

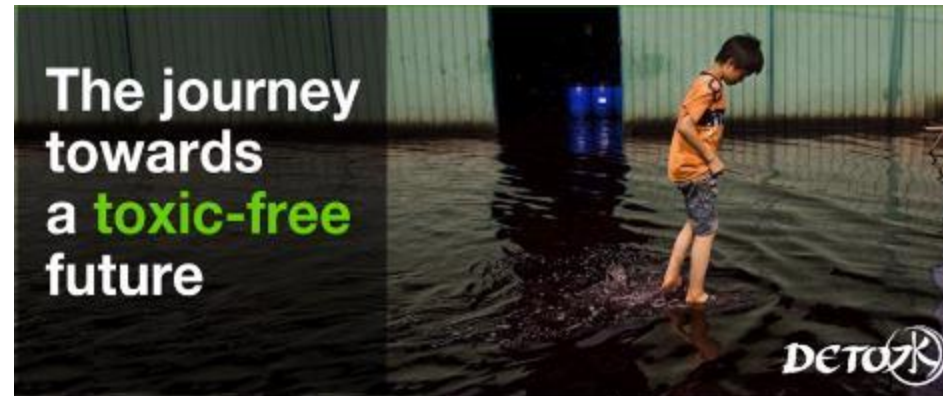
履约动态 | News >>>

- 1 中国POPs废物环境无害化管理项目顺利结项, 获... (2018-11-20)
- 2 11·11《关于持久性有机污染物的斯德哥尔摩公... (2018-11-15)
- 3 华东及华南地区POPs统计调查制度数据审核会在... (2018-09-26)
- 4 国家履行斯德哥尔摩公约工作协调组第二十六次... (2018-09-14)
- 5 我中心与部国管中心领导就环境公约履约与化学... (2018-07-13)
- 6 2018年土壤环境管理培训班在京举办 (2018-07-12)
- 7 陈高主任率团赴印度尼西亚进行POPs履约管理政... (2018-07-09)
- 8 陈高主任与巴基斯坦气候变化部部长助理艾哈迈... (2018-07-09)

华东及华南地区POPs统计调查制度数据审核会

Greenpeace – Detox Campaign 绿色和平-去毒运动

- Greenpeace is campaigning to stop industry poisoning waterways around the world with hazardous, persistent and hormone-disrupting chemicals. 绿色和平组织致力于阻止全球范围内的工业使用危害性、持久性和激素破坏性化学品时水”中毒”。
- Fieldworks and investigations in key manufacturing countries, along with testing of branded garments for traces of hazardous chemicals 在关键制造国家的实地工作和调查，以及对品牌服装进行有害化学品痕迹的检测。

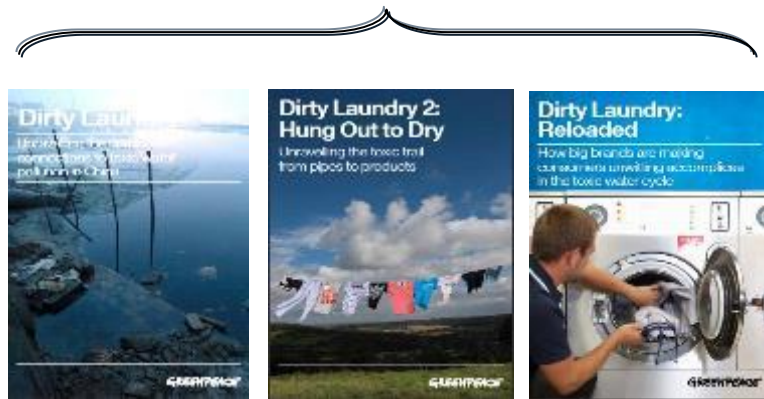


An excerpt from Greenpeace's website.

Greenpeace – Detox report

- First set of Detox reports is called “Dirty Laundry”. 第一版去毒报告为“时尚之毒”
- Afterwards, Greenpeace published another set of reports called “Toxic Threads” intensifying the message conveyed. 随后，绿色和平发表了新一版的报告“潮流。污流”加快了相关信息的传递

Dirty Laundry



Toxic Threads



•Detox Campaign start

•July 2011

•Aug 2011

•Mar 2012

•Nov 2012

•Dec 2012

•Apr 2013

Greenpeace – Detox Reports 2014

- More reports about toxic chemicals used in textile industry were being published in 2014 更多的相关报道
- Greenpeace also organized many demonstrations to get people's attention to Detox campaign 更多的社会活动



2014



Manufacturing Restricted Substances List (MRSL) and Restricted Substances List (RSL)

The difference between the Manufacturing Restricted Substances List (MRSL) and Restricted Substances List (RSL) is: 生产限制物质清单与限制物质清单的分别:

MRSL
Input Chemistry
输入化学



MRSL sets chemical limits for
chemical formulations
MRSL 设定化学限制于
化学制剂

RSL
Product Chemistry
成品化学



RSL sets limits for chemicals in
materials
RSL 设定化学限制于
物料

The MRSL is a valuable tool for procuring chemical formulations that will help suppliers meet sustainability targets.

MRSL是采购化学制剂的有用工具，可帮助供应商达到可持续发展目标

Maintaining Inventory of Regulatory Requirement 维持法规要求的清单

No. 编号	Title 标题	Descriptions 说明	Applicable to		Area of Applicability 公司	Licenses / Compliance Records Required 需要许可/ 合规记录	Reviewe d 审查
			Compan y 公司	Contracto r / Supplier 承包商			

- The factory should update this list every year. 工厂应每年更新该清单。
- The factory should set up a procedure to monitor the update of regulatory and laws. 工厂应该建立一个程序来监控法规和法律的更新。

Activity 活动

Form groups of 5-6 persons as a team to create an inventory of international and national regulatory requirements that are applicable in your factory.

5-6人一组作为一个团队创建一个适用于工厂的国际和国家法规要求的清单。



General Remarks

Origins and Purpose



These training slides, including both basic and advanced trainings, as well as Train-the-Trainer training materials, are part of factory qualification program jointly initiated by Zalando and GIZ with in the develoPPP.de program by the German Federal Ministry for Economic Cooperation and Development. The partners aim at addressing the industry-wide challenge faced by the polyurethane shoe sector in reducing the harmful impact of chemicals on workers and environment and improving chemical handling processes as well as ensuring safer working conditions.

The training slides have been developed on basis of the earlier GIZ Chemical Management Toolkit. The toolkit refers to publications of UNEP, UNIDO, ILO, HSE (UK), BAUA (Germany) and ICCA.

Furthermore, it integrates more than a decade of practical implementation experience of the “Resource Efficient Management of Chemicals” (REMC) cycle and was updated and in orientation to structure and content of the training materials developed under the develoPPP.de partnership with Tchibo and REWE “Sustainable chemicals and environmental management in the textile sector”.

While the original toolkit target group focused on chemical management especially for Small and Medium Scale Enterprises, this adapted version includes comprehensive chapters, especially on Volatile Organic Compounds (VOCs) management and hazardous chemicals substitutions in the polyurethane shoe sector to support also larger companies with the implementation of **ZDHC** and **Higg Facility Environmental Module (Higg FEM)** requirements.



These training materials, based on the GIZ [REMC](#) (Resource-efficient management of chemicals) toolkit, the [training materials](#) developed under the develoPPP.de partnership with Tchibo and REWE “Sustainable chemicals and environmental management in the textile sector”, as well as additional materials provided by TÜV Rheinland, were prepared for Zalando and GIZ by:

- TÜV Rheinland (Guangdong) Ltd. – Mr. Ray Niu and his team

Many thanks to our partners, GIZ colleagues and external consultants for comprehensive review and feedback, especially to

- Mr. Carl Chan, Sustainability Manager, Zalando SE
- Mr. Gundolf Klaehn, Head of Environment, GIZ Textile Cluster Dhaka
- Dr. Jürgen Hannak, Head of Programme Circular Economy, Adelphi



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