

## Activities of NITE, Chemical Management Center

NITE, Chemical Management Center assists with Risk Assessment, Risk Management and Risk Communication so that everyone can handle Chemical Substances more safely and conveniently.

Develops new risk assessment methods.

Provides assistance related to regulations for Chemical Management.

Provides information regarding Chemical Substances.

Acts on the Evaluation of Chemical Substances and Regulation of Their Manufacture etc.

The Act determines whether or not you can handle a specific new chemical substance.

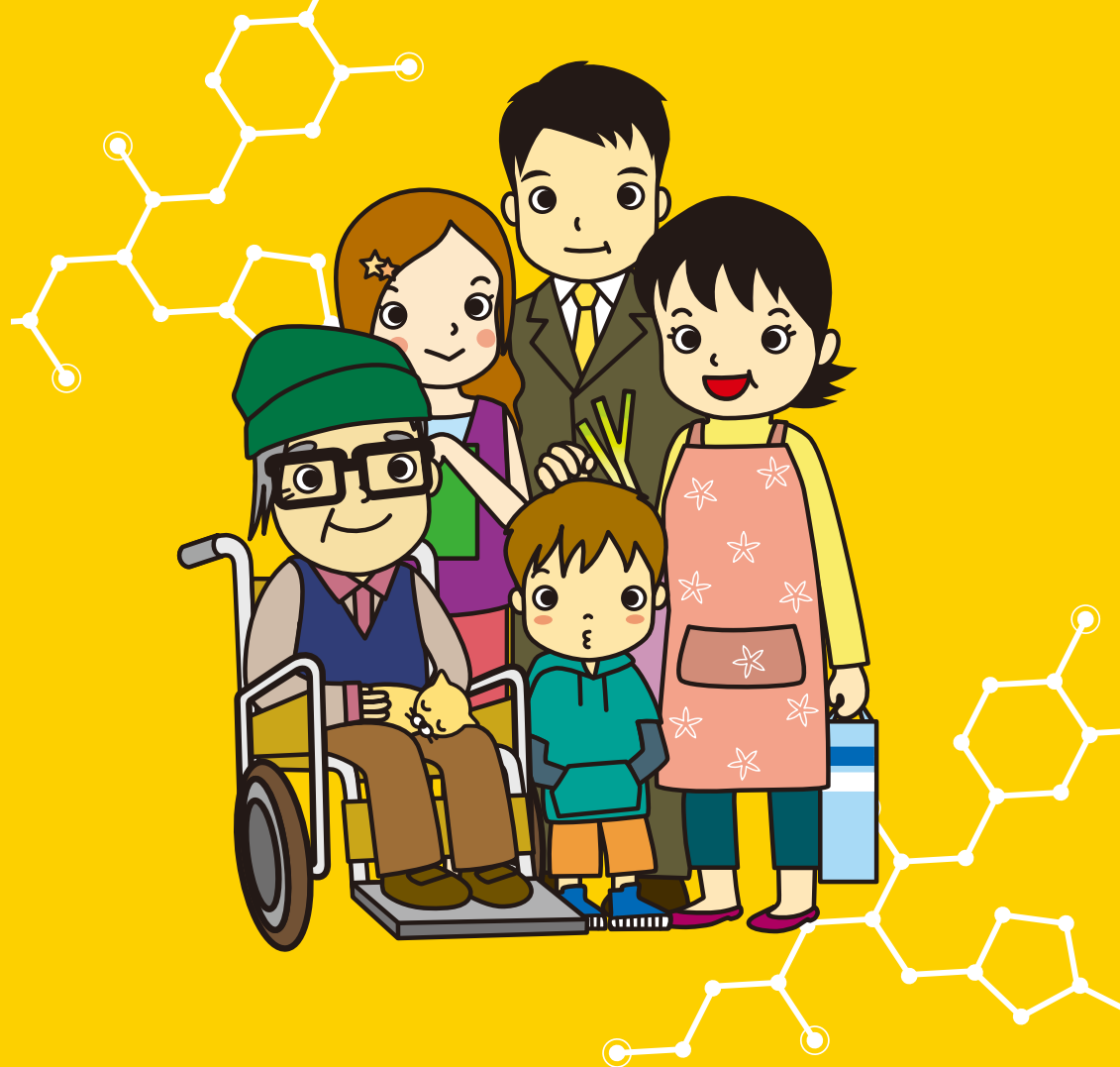
Act on Confirmation, etc. of Release Amounts of Specific Chemical Substances in the Environment and Promotion of Improvements to the Management Thereof.

Regulations for research into the amount of chemical substances released in the environment.

Constructed a database for chemical substances (CHRIP).

Chemical Risk Information Platform

Works on and provides services related to Risk Communication.



How to interact successfully with

# Chemical Substances

—Risk Assessment of chemical substances—

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# Introduction

Chemical Substances have both useful and hazardous characteristics. People enjoy the amenities of life thanks to the useful characteristics. On the other hand, hazardous characteristics of chemical substances may adversely affect us if used incorrectly.

When handling chemical substances, it is important to evaluate risk and to judge its safety by risk assessments. Refer to this booklet to learn about Risk Assessment and let's think together about ways to interact successfully with Chemical Substances.

## Table of contents

1. What are Chemical Substances?..... 2
2. What are risks posed by Chemical Substances? ..... 4
3. Types of Hazards ..... 6
4. Effects depend on the amount of Chemical Substances taken internally... 8
5. Pathways to the Human Body ..... 10
6. Avoiding Chemical Hazards ..... 12

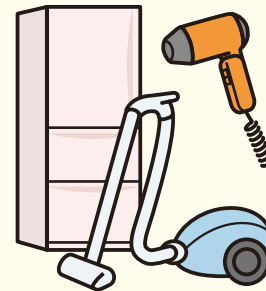
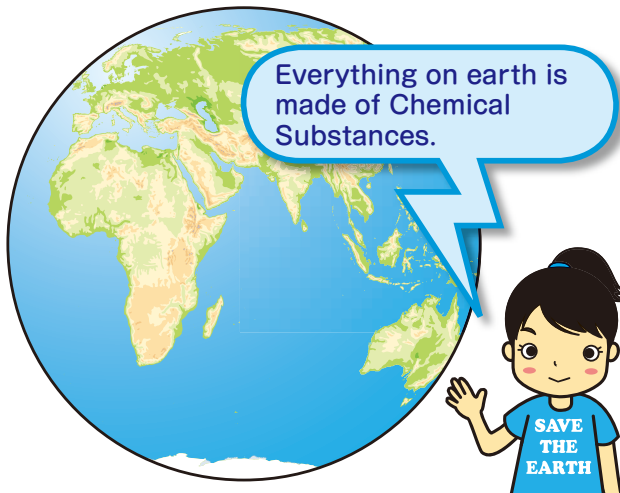


# 1. What are Chemical Substances?

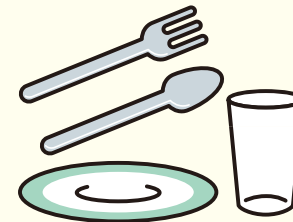
What comes to mind when you think of chemical substances?

Chemical Substances can either be natural or man-made.

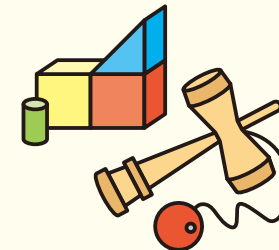
Let's see what chemical substances surround us.



Electrical appliances



Tableware



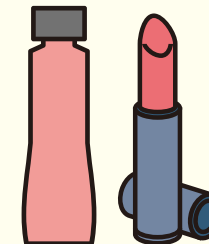
Toys



Detergents



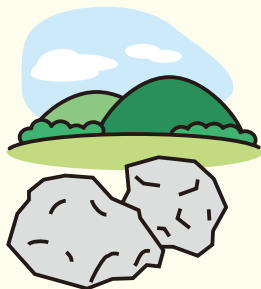
Pesticides



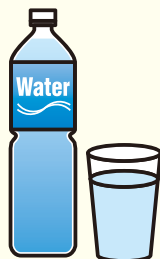
Cosmetics



Trees and fish



Mountains and rocks



Water

All of these things around us are composed of chemical substances.

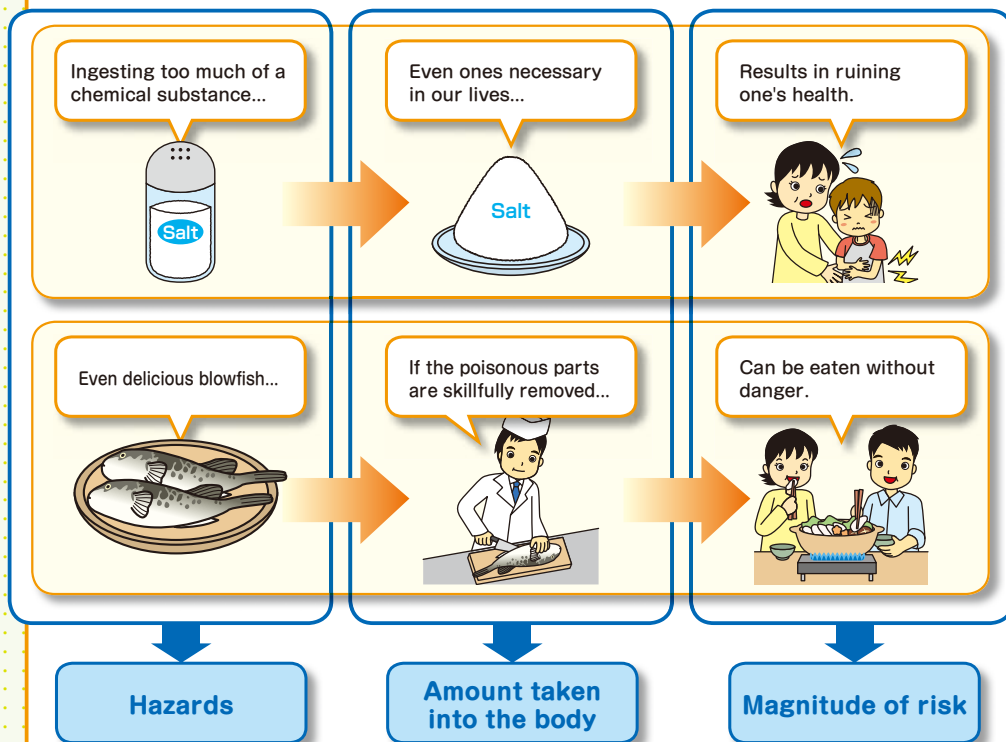
Keeping this in mind, we understand the fact that we all live in the midst of chemical substances.

## 2. What are risks posed by Chemical Substances?

We are surrounded by Chemical Substances.

Even Chemical Substances that are thought to be harmless may pose risks (possibility of hazards) if they exceed certain amounts. On the other hand, even with hazardous chemical substances, we need not worry about hazards if we do not allow them to enter our bodies.

Examples are as below.



The magnitude of risk depends on potential hazards and the amounts taken internally.

When we think about the risks of Chemical Substances, important points are to think what hazards the chemicals have, what amount results hazards and how much chemical substances were taken internally.

Let's see what hazards Chemical Substances have.

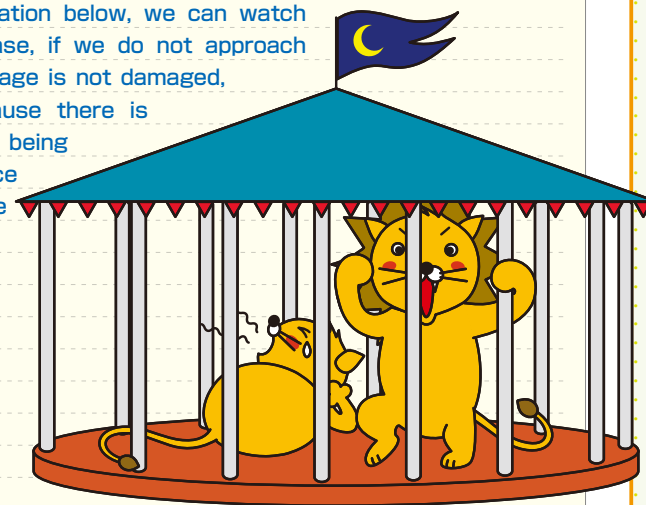
Have you heard of the word "risk" ?

The possibility of hazards is called risk. For example, lions indicate a high risk because they are dangerous animals. However, if lions are kept in a cage as described in the illustration below, we can watch them safely. In this case, if we do not approach too closely and if the cage is not damaged, risk is minimized because there is a lower possibility of being attacked. We can reduce high risk by adequate management.

Suppose these lions were replaced by chemical substances, the cage would become the device used to manage chemical substances.

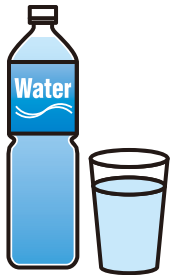
※ See pages 12 and 13 for information regarding management of chemical substances.

**Topic**  
Risk:  
Possibility of hazards

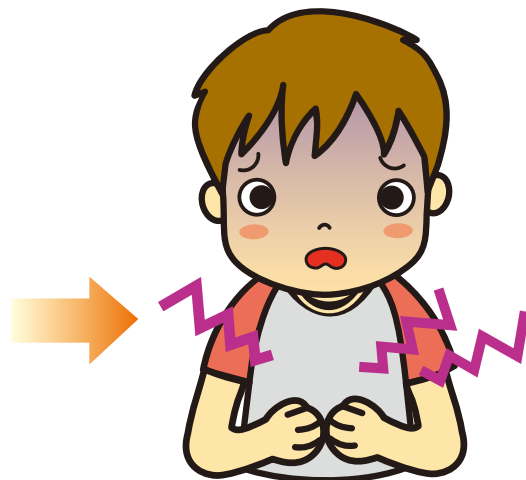
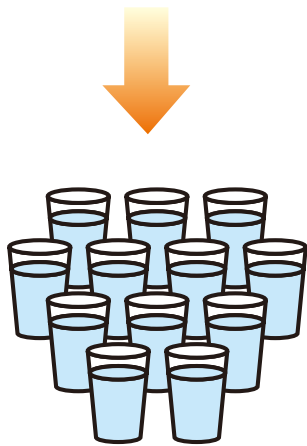


# 3. Types of Hazards

All Chemical Substances have some kind of hazards.



For example, although we cannot live without water, excessive intake may damage the digestive track or result in body swelling.



When handling chemical substances, we need to know the hazards.

Think about the kind of hazards

● **When?**

Hazards that occur instantaneously :  
Acute toxicity  
Hazards that occur as a result of long-term exposure : Chronic toxicity

● **What kind?**

Inflammation of the skin : Dermal Corrosion  
Causes allergies : Sensitization  
Causes cancer : Carcinogenic  
Affects newborns : Teratogenicity  
And so on...

# Hazards?



So, when do all the above hazards of Chemical Substances appear?

**Topic**  
Hazards of alcohol

Alcohol contains a chemical substance called Ethanol. Excessive intake causes Hazards.

Acute toxicity :

Acute alcohol poisoning results from drinking too much alcohol at one time.

Chronic toxicity :

Liver damage results from drinking too much alcohol over a long period of time.

Hazards of alcohol are categorized by the length of time until hazards appear.



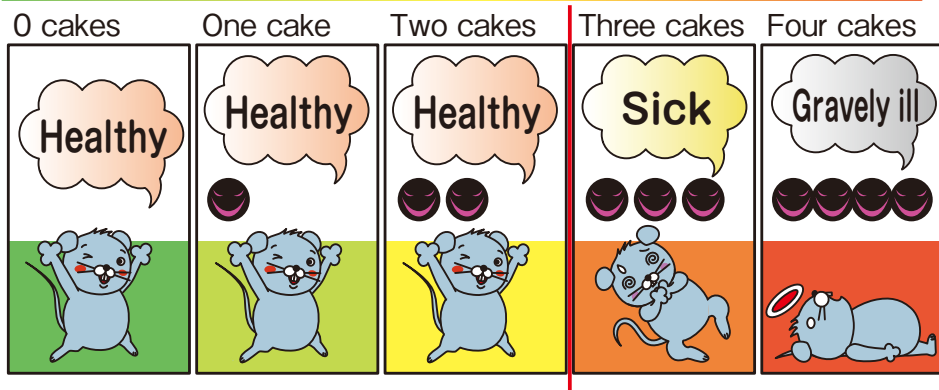
## 4. Effects depend on the amount of Chemical Substances taken internally

There is a threshold that determines whether or not hazards of chemical substances will appear. This threshold is called the No Observed Adverse Effect Level (The maximum toxic level where no adverse effect appears). If toxicity level exceeds the No Observed Adverse Effect Level, hazards may appear.

How can we examine the No Observed Adverse Effect Level?

We examine it through tests in which chemical substances are administered to laboratory animals. Suppose we provided cakes containing equal amounts of chemical substance A to mice as described in the figure below. Suppose then that the ingestion of two cakes was safe but consumption of three cakes resulted in an adverse effect,

Number of cakes: 🍪 = cakes containing equal amounts of chemical substance A



We can understand that the No Observed Adverse Effect Level of chemical substance A is no more than the amount contained in two cakes. Not to exceed the amount of chemical substance A contained in two cakes is important for the health of mice.

Are the No Observed Adverse Effect Levels same in mice and humans?

Different animals differ in their tolerance of hazards. In the case of humans, babies, the elderly, women and men all seem to have different tolerances against hazards of chemical substances.

Therefore, to calculate the safe dose for everyone, we split the No Observed Adverse Effect Level into 100 or 1000 (1/100 or 1/1000). The value, including a safety margin, is called the Uncertainty Factor.

It is important for our health, that the level of chemical substances taken internally does not exceed the No Observed Adverse Effect Level.

**Topic**  
Animal protection and welfare.

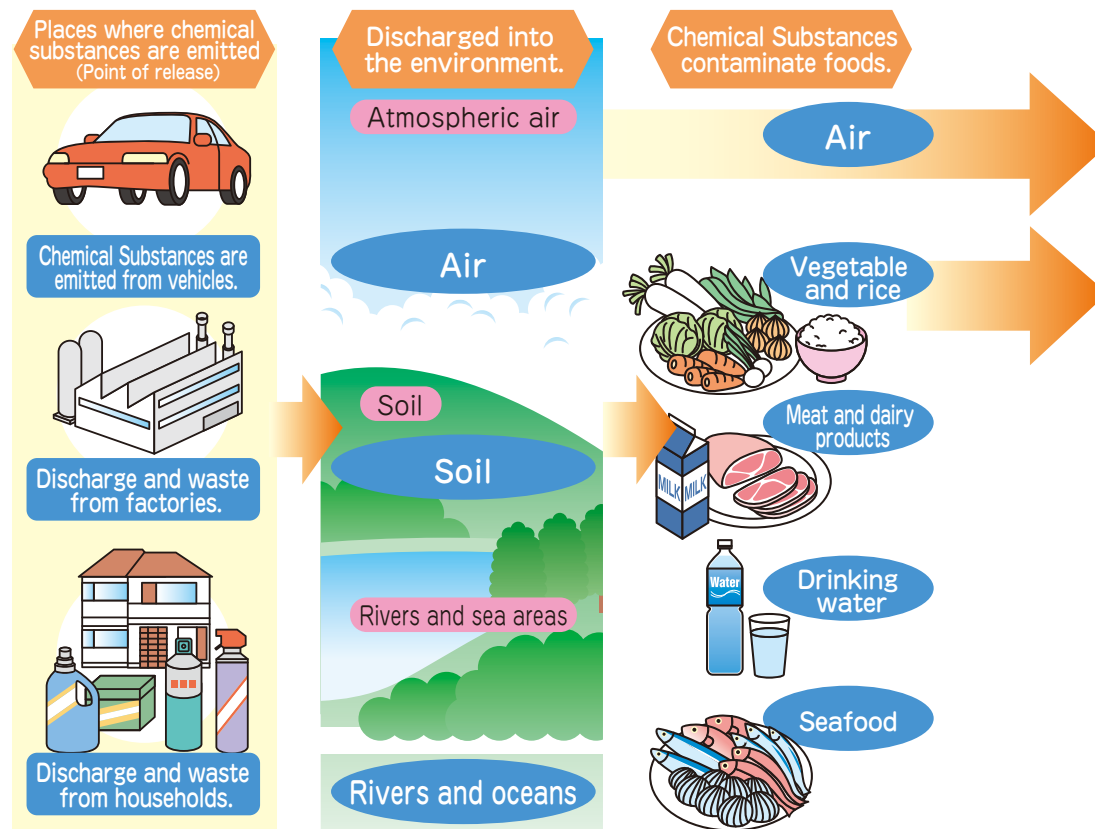
Mice, rabbits or other animals are used in tests when chemical substances are examined. Tests set out for the benefit of humans inflict painful experiences on animals. Computer methods based on the structure of chemical substances have recently been developed to examine the hazards of chemicals. [This method is called (Q) SAR.] In the future, we may enter a new age where no animals are used for tests that examine the hazards of chemical substances.



Now, let's see what pathways Chemical Substances take when entering our bodies.

# 5. Pathways to the Human Body

This section describes how chemical substances enter into our bodies. We take in chemical substances by inhaling, ingesting or handling chemical substances as described in the figure below. This is called “Exposure.” The amount taken in by the body is called the “Exposure Dose.”



We inhale, ingest and use chemical substances.

We come in contact with many products containing chemical substances in our daily lives



Day after day chemical substances enter into our bodies. However, we still live healthy. This is because chemical substances do not affect us adversely. Chemical Substances are safe if they do not exceed the amount where hazards appear.

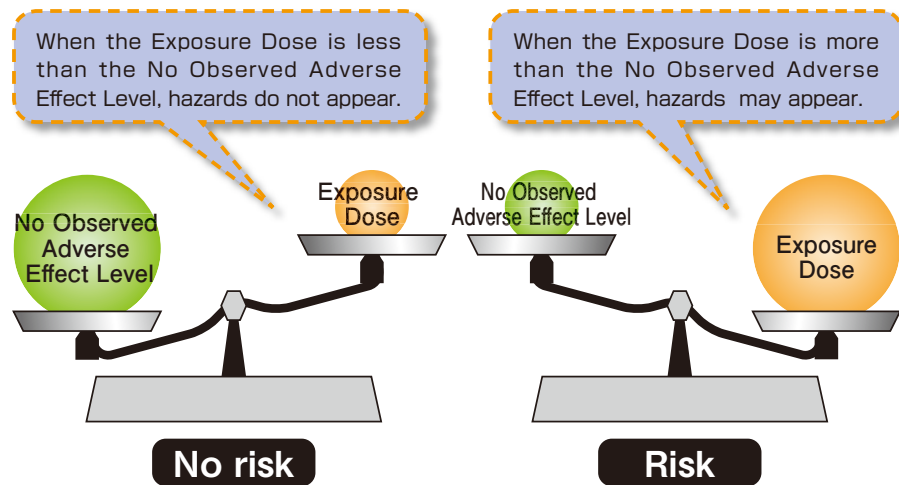
Now, let's see what we can do to avoid hazards of Chemical Substances.

## 6. Avoiding Chemical Hazards

Hazards of chemical substances terrify us.

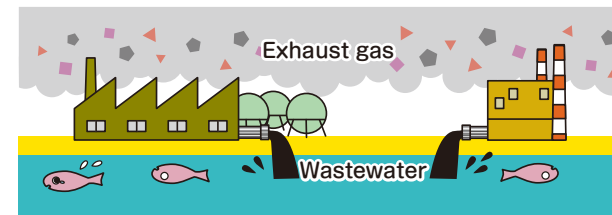
We need to determine whether or not there are risks.

To assess risks, the No Observed Adverse Effect Level (the maximum toxic level where no adverse effect appears) and the Exposure Dose (amount taken into one's body) are compared as described in the illustration below. This is called risk assessment.



When risk assessment reveals that there is a risk, we have to securely control or regulate such chemical substances. This is called Risk Management.

Chemical substances with significant hazards are controlled and their values are regulated. Standard values for exhaust from factories, as well as standard values with respect to air and water, are controlled by law.



However, hundreds of thousands of chemical substances exist all over the world, and setting values in order to meet all regulations is difficult.



Therefore, workers at factories need to assess both effects on the environment and on humans when handling and managing chemical substances.

At the same time, we need to handle products properly. We must read manuals and labels carefully and try not to dispose too much chemical substances in the environment.

In order to deal successfully with chemical substances, it is important for us to first determine whether or not the substance will have a hazardous affect (Risk Assessment). Once we understand the mechanism, we can then establish necessary rules (Risk Management). At the same time, it is also important to be aware and discuss what people are doing, what their roles are, and any opinions that they may have. This goes for all business operators and administrative institution staff and citizens (Risk Communication).