

Chapter 3 Acquisition of Chemical Substances

1. How to acquire chemical substances

When using chemical substances for education, research, etc. at Kumamoto University, it is necessary to acquire chemical substances from outside the campus. Acquisition methods include purchase from reagent manufacturers and transfer from joint researchers.

2. Chemical substances whose handling requires qualifications, etc.

Permission for use and qualifications, etc. may be required when handling stimulants and stimulants' raw materials (Stimulants Control Act), narcotics and psychotropics (Narcotics and Psychotropics Control Act), specified poisonous substances (Poisonous and Deleterious Substances Control Act), substances whose manufacture, etc. is prohibited (Industrial Safety and Health Act), and agrochemicals whose sale is prohibited (Agricultural Chemicals Regulation Act). It is prohibited to use some substances. The information is summarized in the table below. Keep this information in mind.

Table 3-1 Chemical substances whose acquisition is restricted in education and research at the University

Chemical substance	Details of restriction	Law
Stimulants	Designation of a stimulants researcher	Stimulants Control Act
Stimulants' raw materials	Designation of a stimulants' raw materials researcher	
Narcotics	License for a narcotics researcher	Narcotics and Psychotropics Control Act
Psychotropics	Appointment of an Operator of a Facility Conducting Experiments or Research Involving Psychotropics	
Specified poisonous substances	License for specified poisonous substance researcher	Poisonous and Deleterious Substances Control Act
Substances whose manufacture, etc. is prohibited	Permission for use	Industrial Safety and Health Act
Agrochemicals whose sale is prohibited	Use allowed for test and research	Agricultural Chemicals Regulation Act

3. How to obtain information about toxicity and hazards of chemical substances

Chemical Abstracts Service (CAS) operated by the American Chemical Society has a database of over 159 million organic and inorganic compounds, including alloys, coordination compounds, minerals, mixtures, polymers, and salts (as of January 2020). However, not all of these chemical substances have been investigated for their toxicity and hazards. For this reason, experiments have been conducted on chemical substances around the world to find out their toxicity and hazards.

Article 11 of the University Rules requires "Collection of Data on Toxicity and Hazards of Chemical Substances."

Article 11 of the Rules (Collection of Data on Toxicity and Hazards of Chemical Substances)

The Chemical Substance Managers shall, in purchasing any Chemical Substance, bringing in any Chemical Substance from outside the premises, or taking over any Chemical Substance from outside their respective Groups, collect data pertaining to the toxicity and hazards of the Chemical Substance.










The Manager's responsibility is stipulated in the Rules. Meanwhile, Handlers are also expected to learn about the toxicity and hazards of chemical substances before acquisition and use. Methods of checking toxicity and hazards of chemical substances are described below. Make sure to practice these methods. In June 2016, it was legally required to conduct risk assessment of chemical substances. Chemical substances related to the Industrial Safety and Health Act are subject to risk assessment. To start using a new chemical substance or change the usage, risk assessment must be conducted. At Kumamoto University, it is required to conduct risk assessment of chemical substances every year. Regarding risk assessment, refer to Chapter 5 (8).

(1) Check the GHS pictograms

GHS is the abbreviation for Globally Harmonized System of Classification and Labelling of Chemicals. It refers to a system to classify chemical substances based on the type and degree of hazards and toxicity in accordance with the globally standardized rules and to indicate the hazards and toxicity using labels or issue Safety Data Sheets (SDSs) so that the information is readily understandable (source: a document prepared by the Ministry of the Environment).

In Japan, about 4,200 chemical substances are classified based on the GHS (by the government as of January 2020). (The number of classified chemical substances was about 3,800 as of December 2017 and about 2,400 as of June 2011.) The GHS uses universal pictograms. Remember the following GHS pictograms.

Table 3-2 GHS pictograms (source: website of KANTO CHEMICAL CO., INC.)

	May ignite if exposed to air, heat, or sparks		May intensify combustion of other substances
	May explode if exposed to heat or sparks		May damage metal or skin, etc. which comes into contact
	High pressure gas (The gas is filled by compression or liquefaction.) May expand and explode when heated		Causes acute health damage by ingestion, contact, or inhalation, and may result in death
	Causes health toxicity, including acute toxicity, skin irritation, eye irritation, skin sensitization, respiratory irritation, and anesthetic action		May adversely affect the aquatic environment (aquatic organisms and their ecosystem) if released into the environment
	May cause health damage by ingestion, contact, or inhalation in the short or long term		

Note: The GHS pictograms started to be introduced around the world in 2008. No GHS pictograms are indicated for chemical substances that were acquired before 2008. Check toxicity and hazards of chemical substances for other methods.

Only about 4,200 chemical substances have been classified based on the GHS (as classified by the government as of January 2020). Note that lack of GHS pictograms does not necessarily guarantee that the chemical substances are free from toxicity or hazards.

In the classification based on the GHS, "Classification not possible" means that hazards and toxicity cannot be judged because the data for judging the classification is inadequate. It means that you do not know what will happen, so precautions must be taken in handling.

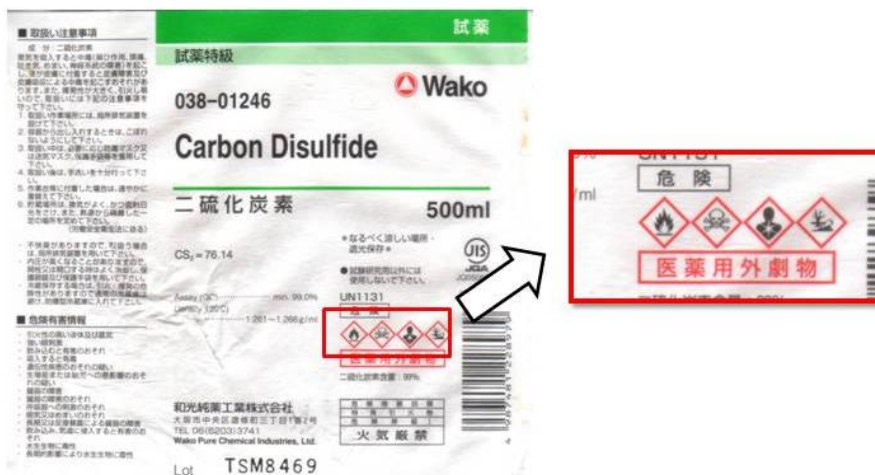


Fig. 3-1 Examples of GHS pictograms

(2) Read SDSs

SDS refers to a document that provides information about properties and handling of products that contain chemical substances. SDSs are prepared by manufacturers based on the GHS classification, focusing on chemical substances specified by the laws (Poisonous and Deleterious Substances Control Act, Industrial Safety and Health Act, Act on Confirmation, etc. of Release Amounts of Specific Chemical Substances in the Environment and Promotion of Improvements to the Management Thereof).

SDSs provide the following information. Read an SDS, if available, before handling and using the pertinent chemical substance.

Table 3-3 Matters stated in SDSs

1	Product and company identification	9	Physical and chemical properties
2	Hazards identification	10	Stability and reactivity
3	Composition and information on ingredients	11	Hazardous information
4	First aid measures	12	Information about environmental impact
5	Fire-fighting measures	13	Disposal considerations
6	Accidental release measures	14	Transport information
7	Handling and storage	15	Regulatory information
8	Exposure controls/personal protection	16	Matters deemed necessary by an operator that provides the (M)SDS in addition to 11 to 15

Note: SDSs started to be introduced around the world in 2008. SDSs may not be available for chemical substances that were acquired before 2008. Refer to SDSs of other manufacturers or follow other methods to check toxicity and hazards of chemical substances. Unavailability of SDSs does not necessarily mean that chemical substances are free from toxicity and hazards.

(3) Check regulatory information in catalogs

Catalogs prepared by most of reagent manufacturers in Japan provide regulatory information about chemical substances that they sell as products. Refer to regulatory information to determine the toxicity and hazards of chemical substances to be handled.

Table 3-4 Laws related to chemical substances and details of toxicity and hazards

Law	Type of chemical substance	Details of toxicity and hazards
Stimulants Control Act	Stimulants, stimulants' raw materials	Substances whose abuse cause addiction, affect the brain, and lead to mental disorder
Narcotics and Psychotropics Control Act	Narcotics, psychotropics (Type I, Type II, Type III)	
Poisonous and Deleterious Substances Control Act	Poisonous substances, deleterious substances, specified poisonous substances	Substances that cause health impairment when taken (Poisonous and deleterious substances are for medical use.)
Act on Securing Quality, Efficacy and Safety of Products Including Pharmaceuticals and Medical Devices (Pharmaceutical and Medical Device Act)	Poisonous and deleterious substances	
Industrial Safety and Health Act	Substances whose manufacture, etc. is prohibited	Substances that cause health impairment through oral, percutaneous, or respiratory exposure during use
	Specified chemical substances (Type 1, Type 2, Type 3, specially controlled substances, substances that require the use of protective clothes, etc.)	
	Organic solvents (Class I, Class II, Class III)	
	Substances subject to risk assessment	
	Hazardous materials	
Explosives Control Act	Explosives	Substances that may cause a fire or explosion
Fire Service Act	Hazardous materials (Type 1 to Type 6)	
High Pressure Gas Safety Act	High pressure gas	Substances that may cause a fire, explosion, or health impairment
Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. (Chemical Substance Control Act)	Specified chemical substances (Class I, Class II), monitoring chemical substances	Substance that may impair human health through the environment

Act on Confirmation, etc. of Release Amounts of Specific Chemical Substances in the Environment and Promotion of Improvements to the Management Thereof (Chemical Substances Management Act, PRTR Act)	Designated chemical substances (Class I, Class II)	Substances that are toxic for humans and the ecosystem and are deemed to be widely present in the environment
Water Pollution Control Act (or Sewerage Act)	Toxic substances	Substances that may damage human health due to polluted water and wastewater discharged from the operation site
Waste Management and Public Cleansing Act (Waste Disposal Act)	Special controlled industrial waste	Substances that are explosive, toxic, or infectious and whose properties may damage human health or the living environment
Act on Preventing Environmental Pollution of Mercury	Mercury, etc.	Substances that are highly toxic for humans and affect wildlife through the food chain

Note: There are also ordinances, etc. established by local governments. Keep them in mind.

(4) Check the labels of chemical substance products

Chemical substance products have labels that indicate the names of chemical substances and quantity, etc. Chemical substances that are regulated by the Poisonous and Deleterious Substances Control Act and the Fire Service Act are also indicated. Recently, explanations of health toxicity are also indicated on labels for chemical substances regulated by the Industrial Safety and Health Act.

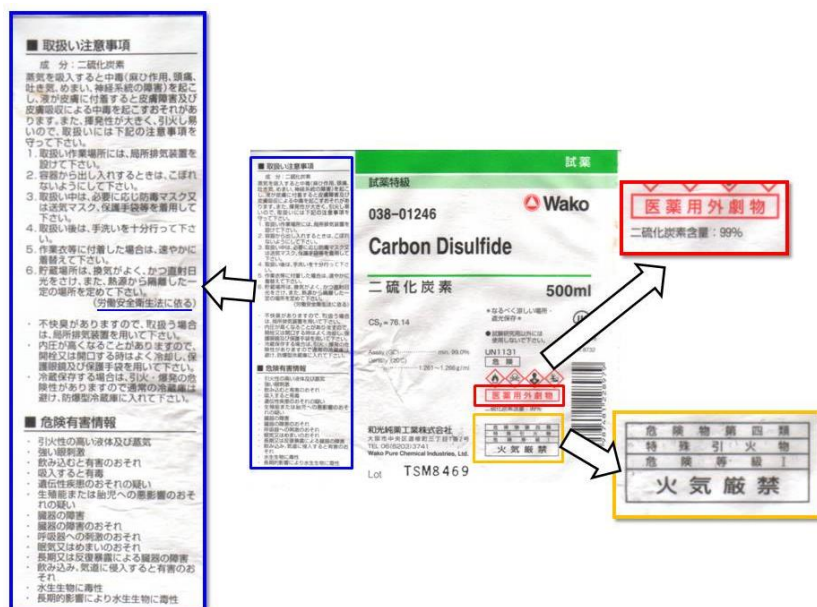


Fig. 3-2 A label of a chemical substance product

Note: A label indicates poisonous substances, deleterious substances, specified poisonous substances, hazardous materials (Type 1 to Type 6), specified chemical substances, and organic solvents. The information on environmental pollution is indicated using GHS pictograms. However, a product label does not necessarily provide all other information.

(5) Use YAKUMO

If an acquired chemical substance is registered in YAKUMO, YAKUMO shows regulatory information. When a chemical substance is registered, YAKUMO outputs a barcode label that indicates regulatory information and a Safety Data Sheet (simplified version) as necessary.

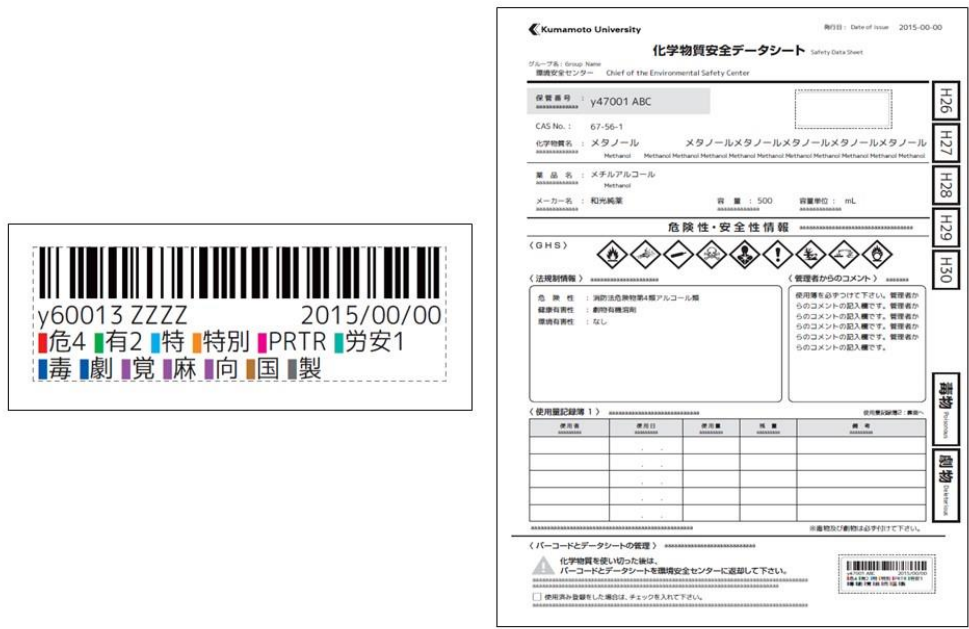


Fig. 3-3 Confirmation of regulatory information using YAKUMO

The regulatory information presented by YAKUMO is based on a database called “product master.” The product master uses data that is available free of charge from respective reagent manufacturers and compiled by the Advanced Chemicals Master Data System for Educational and Scientific Institutions (ACSES, a nonprofit organization). (The database is called “ACSES_DB.”) Note that the quality of safety information is not equivalent to that ensured by respective reagent manufacturers. For detailed information, check SDSs, etc. available from respective reagent manufacturers.

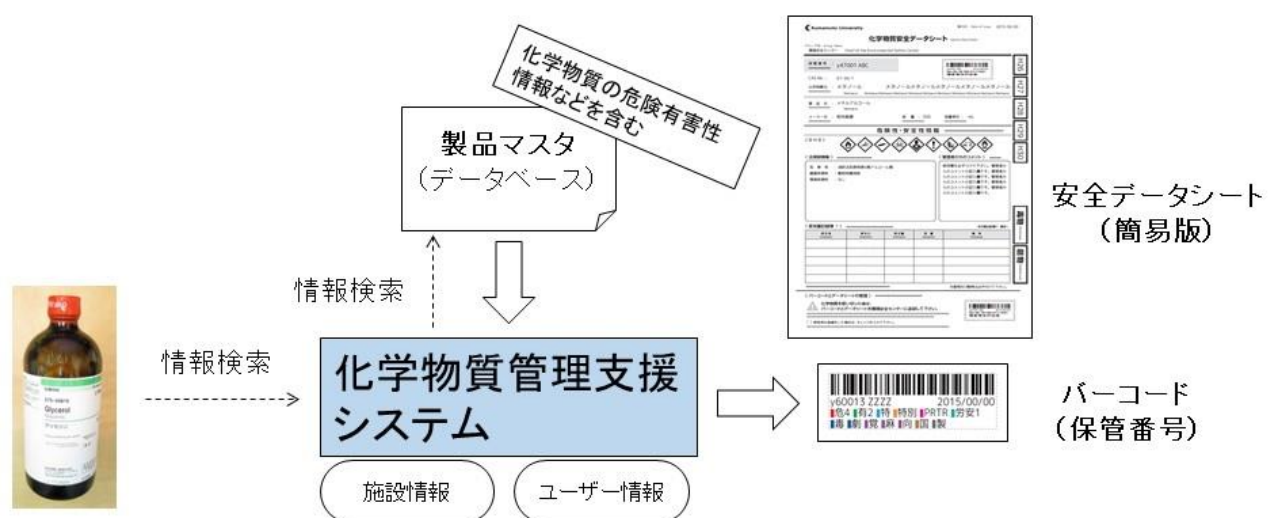


Fig. 3-4 Mechanism to collect regulatory information using YAKUMO