Chemical Safety in the Workplace

Cutolance Notes on Chemical Safety in the Catering Industry





Occupational Safety and Health Branch Labour Department



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Occupational Safety and Health Branch Labour Department

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1 Preface

The catering industry is one of the major industries in Hong Kong. Workers in the industry use various types of chemical products and fuels such as cleaning agents, drain cleaners, disinfectants, town gas and liquefied petroleum gas, etc. If the chemical products are not properly handled, they could pose occupational hazards to workers. Fire and explosion are the major hazards associated with the use of fuels in the catering industry. Devastating gas explosion incidents could cause serious injuries or loss of life. Employers have the legal obligation to ensure, as far as reasonably practicable, the safety and health of their employees at work. They have to take adequate safety measures to protect the safety and health of the workers. In this respect, employers may, if necessary, consult safety professional for advice.

This set of Guidance Notes is intended to be read by management personnel or safety personnel of catering establishments and it serves as a reference to facilitate users in identifying the hazards arising from the use of chemicals in the catering industry and taking effective precautionary measures. Users may draw reference to the information provided in these Notes to establish a chemical safety plan which suits their working situations.

2 Introduction

Different types of cleaning chemicals such as soap, detergent, ammonia solutions, acids and alkalis are used in the catering industry. Some of the chemicals might cause skin and eye irritation. High concentrations of acid and alkali cleaning agents are corrosive and they could induce chemical burns to the skin and eyes on contact. Chemical disinfectants are used to control or destroy disease-causing microorganisms. All chemical disinfectants are, by nature, potentially harmful or toxic to living organisms. Some of the chemical disinfectants are flammable and can be explosive. There are disinfectants that would react violently with incompatible chemicals and generate toxic gases. Occasionally, household pest control products may be used to control or kill pests in the catering premises. These products contain pesticides, which are toxic chemicals. Adequate safety measures must be adopted in the use of the chemical pest control products.

Town gas, liquefied petroleum gas (LPG), kerosene and diesel are typical fuels for cooking in the catering industry. Alcohol is a fuel commonly used for food warming and reheating. Town gas and LPG are highly flammable gases that readily form explosive mixtures with air. Kerosene and diesel fuels are petroleum distillate products containing flammable hydrocarbon mixtures. Improper use and handling of these flammable chemicals could cause fire and explosion hazards. Workers in the catering industry have to use various kinds of chemicals and fuel in their work. Some of these chemicals are corrosive, flammable, explosive, and might pose health hazards. To protect the safety and health of workers, appropriate safety measures should be in place.

3 Chemicals Used in the Catering Industry

The catering industry commonly use a range of chemical products, for example, all-purpose cleaner, ammonia-based cleaner, bleach, metal polish, dishwashing cleaner, disinfectant, drain cleaner, glass cleaner, oven cleaner, scouring powder, deodorant and fuel. Workers in catering establishments such as hotels, restaurants, fast food outlets, café and contract caterers in various industrial and commercial premises could be exposed to the hazards arising from the use of various chemical products in their work. Chemicals commonly found in the products used by workers in the catering industry workers are set out in the following.

3.1 Acids

Workers in the catering industry may have to use products, which contain acids such as sulphuric acid, hydrochloric acid and phosphoric acid. Concentrated sulphuric acid and hydrochloric acid are the major ingredients in the acid drain cleaners that are commonly used in the catering establishments to clear clogs in sinks and toilets drainpipes. Sulphuric acid and phosphoric acid could also be found in some metal polishes used to polish metal surface of cutlery. The concentrated acids are corrosive chemicals that can cause chemical burns on contact with the skin.

3.2 Alcohols

Ethyl alcohol, isopropyl alcohol and methyl alcohol are flammable liquids that could be used as fuel for heating. They are the main ingredients in gelled fuel widely used in the catering industry for reheating or warming food.

3.3 Ammonia

Ammonia is an alkali chemical with a sharp irritating odour and can be found in some household cleaners, wax removers, glass and window cleaners and oven cleaners, etc. The household ammonia products usually contain 5-10% ammonia.

3.4 Alkalis

Degreaser, stove cleaner and oven cleaner are the products used in the catering industry to remove dirt and oil on the hood, vent and surface of the stove and oven. The products may contain alkali chemicals such as caustic soda (sodium hydroxide) or caustic potash (potassium hydroxide) as the major ingredients. Some chemical drain cleaners also contain concentrated caustic alkalis, which are corrosive chemicals.

3.5 Chemical disinfectants

Disinfectants are substances used to control or destroy harmful microorganisms such as bacteria, viruses or fungi. Chemical disinfectants used in the catering industry include alcohols, chlorine compounds, peracetic acid, quaternary ammonium compounds and phenols, etc. Chlorine bleach (sodium hypochlorite) is widely used to clean and disinfect catering premises. Quaternary ammonium compounds, which have disinfectant effect and detergency action, are the main components in some cleaning products. Phenolic disinfectants are used in sanitizing products such as sanitizing hand wash liquid. Alcohols, usually in the form of 70% isopropyl alcohol or 60-80% ethyl alcohol are used for disinfecting surfaces. Some types of topical antiseptic and hand sanitizing lotions contain alcohols as the major ingredient. Peracetic acid is used in the catering industry to disinfect catering equipment.

3.6 Surfactants

Detergent and soap are surfactants, the surface-active agents that are able to remove dirt from surface when dissolved in water. Surfactants comprise of both hydrophobic and hydrophilic parts. The hydrophilic part is the functional unit, which enhances water solubility to produce the cleaning effect. Surfactants can be categorized according to the charge present in the hydrophilic part, namely anionic surfactant (i.e. negatively charged surfactant), cationic surfactant (i.e. positively charged surfactant), nonionic surfactant (i.e. surfactant of neutral charge) and amphoteric surfactant (i.e. the surfactant that carries both negative and positive charges). Surfactants are the major components of the cleaning products used in the catering industry, for example, all-purpose cleaners, automatic dishwasher cleaners and hand dishwashing cleaners. Fatty acid salt (soap), linear alkylbenzensulphonate, alkyl sulphate, alcohol ethoxylate and sodium lauryl sulphate are the widely used surfactants in cleaning products.

3.7 Fuel gas

Town gas and liquefied petroleum gas (LPG) are typical fuels for cooking in the catering industry. Town gas is a mixture of hydrogen and methane that can be used in a way similar to natural gas. Most of the cooking appliances (e.g. stove and heater) in the catering industry are fuelled by town gas. Liquefied petroleum gas (LPG) is a complex mixture of hydrocarbons consisting predominantly of propane, butanes, propene and butenes. LPG is an extremely flammable liquefied gas.

4 Hazards

4.1 Introduction

- 4.1.1 Chemical products commonly used in the catering industry contain different types of potentially hazardous chemicals, such as acids, alkalis, surfactants, solvents, ammonia compounds and disinfectants. Some of the chemicals are corrosive and can cause chemical burns to the skin and eyes on contact. Other chemicals such as surfactants and solvents may cause skin irritation when used without proper personal protection equipment. Violent chemical reactions may occur with the possibility of generating hazardous reaction products when incompatible chemical substances are mixed. Household pest control products, which contain pesticides, may be used in the premises to prevent or kill pests such as rodents and cockroaches. Pesticides are toxic chemicals and are harmful to human. It could be dangerous if contamination of food occurs during the application of pest control products.
- 4.1.2 When using chemical products, workers should take note of the hazardous properties and adopt appropriate safety measures. They must read and understand the Material Safety Data Sheet (MSDS) for chemical products. They should seek professional advice from competent persons in the use of pest control products and adopt adequate safety measures.
- 4.1.3 Town gas, liquefied petroleum gas (LPG) and alcohol are a few kinds of commonly used fuel in the catering industry and are highly flammable chemicals, which pose fire and explosion risks. Gas fuel readily forms explosive mixtures with air, some of which could be ignited by a distant source causing an explosion. Misuse of gas-fired equipment and lack of proper maintenance could be dangerous. Improper installation of gas-fired equipment and unsafe storage of bottle gas fuel could lead to serious accidents.

4.2 Chemical hazards

- 4.2.1 Fire and explosion are the major chemical hazards associated with the use of chemicals and fuel. Ethyl alcohol and isopropyl alcohol are flammable chemicals and they could be ignited if used near a flame or any other ignition source in particular when used as spraying mist disinfectants. Some of the chemical disinfectants could also pose fire and explosion hazards. Sodium hypochlorite (chlorine bleach) in aqueous solutions is not explosive but anhydrous sodium hypochlorite is potentially explosive. Calcium hypochlorite is not flammable but it acts as an oxidizer with combustible materials and enhances burning.
- 4.2.2 Mixing chemical disinfectants with other chemical substances could be hazardous. Chlorine, a toxic gas, is rapidly released from sodium hypochlorite solutions (chlorine bleach) if mixed with acids, e.g. acidic cleaning agents. Calcium hypochlorite could react violently with ammonia or amines, the ingredients found in cleansing preparations.
- 4.2.3 Hydrogen and methane are the main components of town gas that is commonly used for cooking. Hydrogen and methane are highly flammable gases, and readily form explosive mixtures with air. Liquefied petroleum gas (LPG), a complex mixture of hydrocarbons consisting predominantly of propane, butanes, propene and butenes, is widely used as an industrial, commercial and domestic fuel. LPG is an extremely flammable liquefied gas and its vapour is heavier than air. The vapour sinks to and spreads along the ground and tends to accumulate in cellars, pits and drains. Distant ignition of the LPG leakage could occur and the flame could flash back to the source. Gelled alcohol fuel, widely used as food warming fuel, contains ethyl alcohol, isopropyl alcohol or methyl alcohol, which are flammable chemicals, and could create fire hazard.

4.3 Health hazards

4.3.1 Cleaning work is one of the major processes in the catering industry. It is often done with the aid of cleaning products. Some of the chemical agents are corrosive and can cause skin and eye burns if splashed onto the body accidentally. Cleaning solvents such as alcohols and glycol ethers could have degreasing properties on the skin. Some of the chemical agents can cause skin sensitisation leading to allergic contact dermatitis. LPG could cool equipment to such a degree that it may cause cold burns to the skin in circumstances where rapid vapourisation occurs. In a confined environment, high concentration LPG could become an asphyxiant, which displaces air. There are occasions in which household chemical pest control products are used at the workplace. Pest control products contain toxic chemicals, which could cause poisoning if the products are improperly handled or misused.

5 Chemical Safety Plan

5.1 Introduction

5.1.1 A chemical safety plan is essential for ensuring the safety and health of employees in using chemicals. Employers should develop a chemical safety plan suitable for their catering establishments to minimize the risk of chemical hazards in the workplace. The chemical safety plan should be properly organized and integrated into the management system of the workplace. Employers should deploy adequate manpower and resources for the development, implementation and maintenance of the chemical safety plan and seek advice from safety professional, if necessary.

5.2 Major components

- 5.2.1 The major components of a chemical safety plan in the catering industry should include
 - (a) risk assessment an evaluation process to assess the likely hazards to workers of the chemical or operation involving chemicals and the severity of such hazard. The process provides the necessary information for establishing the appropriate safety measures and procedures;
 - (b) safety measures measures established and maintained on the basis of the risk assessment to eliminate or reduce the hazards associated with chemicals or operations involving chemicals to ensure the safety and health of the employees;
 - (c) emergency preparedness quick and effective response in the event of emergencies such as fire, explosion and chemical spill to minimize injuries and damage;
 - (d) hazard communication the means for disseminating to employees safety and health information about the chemicals and processes;

- (e) information, instruction and training providing information, instruction and training to help employees acquiring the skills, knowledge and attitude to protect their safety and health at work; and
- (f) review safety measures should be reviewed periodically to monitor their effectiveness particularly when there are new requirements or significant changes in the chemical materials or processes. Safety measures should be revised, where necessary, taking into account the review findings.

6 Risk Assessment

6.1 Introduction

6.1.1 Risk assessment is a process to estimate the level of risk and decide whether the risk is tolerable or acceptable. Before risks can be assessed, the hazards related to the process and associated chemicals have to be identified, for example, chemical burns caused by accidental spill of acid drain cleaner in cleaning drainage. The risks are then estimated in terms of the people who might be involved and their exposure, the likelihood and potential consequences of the identified hazards. Suitable safety measures will then be developed and implemented with periodic monitoring and review. Employer should appoint competent safety personnel to carry out risk assessment. Further information about the approaches to conducting the risk assessment related to chemical hazards systematically are provided in "The Chemical safety in the Workplace: Guidance Notes on Risk Assessment and Fundamentals of Establishing Safety Measures" published by the Labour Department. Where necessary, professional advice should be sought in performing the risk assessment.

6.2 Factors for consideration in the risk assessment

- 6.2.1 The formulations of many of the chemical products used in the catering industry are proprietary. The chemical components of the products may not be shown in detail on the containers. Where necessary, hazard information of the chemical components and user safety precautions should be obtained from the supplier or manufacturer.
- 6.2.2 The "Code of Practice on Control of Air Impurities (Chemical Substances) in the Workplace" issued by the Labour Department should be referred to when assessing the airborne exposure in risk assessment.

- 6.2.3 Reference should also be made to relevant legislation, codes of practice, guidelines and best trade practices to decide on the need and adequacy of safety measures. Employers should keep an inventory of all chemical substances in the workplace, identify whether they are hazardous and ensure that they are handled and stored safely. It is also essential to obtain the Material Safety Data Sheet (MSDS) of the chemicals from the suppliers to ensure sufficient information for risk assessment and drawing up of safety measures and an emergency plan.
- 6.2.4 The risk assessment should be reviewed regularly, and whenever there is any indication that it is no longer valid or there has been a significant change in the circumstances. In particular, the risks associated with the work procedures and chemical products should be reviewed
 - (a) where there are changes to any part of the procedures or their scale;
 - (b) where there are changes in the materials used; or
 - (c) where safer procedures or improved preventive measures are available or reasonably practicable in light of technological advancement.

7 Safety Measures

7.1 Introduction

- 7.1.1 Employer has the responsibility to ensure the safety and health of his workers by adopting appropriate and adequate safety measures. He may appoint safety personnel to set up safety measures. The primary consideration in setting up safety measures is adopting appropriate preventive measures to remove the hazards at source direct. Safety measures to reduce or remove hazards include substitution, elimination and engineering control, etc. For example, an electric heater could, where applicable, substitute for alcohol gel in reheating food. This could eliminate the fire risk caused by the flammable chemical. Other safety measures such as setting up safe work guidelines and the use of personal protective equipment could also reduce workers' exposure to hazards.
- 7.1.2 All safety measures should be documented, for example, in the standard operating procedures (SOP), and should be made known to the workers concerned. The effectiveness of such measures should be constantly monitored and reviewed to ensure adequacy of the adopted safety measures. If any changes are made to the SOP in respect of the processes and materials used, a fresh risk assessment should be conducted. Any changes made to the protective measures should be documented in the SOP accordingly.

7.2 Substitution/ Elimination

7.2.1 There are occasions where less harmful chemicals could substitute for hazardous chemical to reduce or eliminate risks. For example, a mild cleaning agent might be used to clean ovens instead of caustic alkaline cleaner. The use of hazardous chemicals could under suitable circumstances be eliminated by changing the work method such as using physical means to clean clogs in drainpipes instead of the corrosive chemical drain cleaners.

7.3 Engineering control measures

7.3.1 The primary objective of adopting engineering control is to eliminate or reduce the risks at source. Engineering controls include ventilation, enclosure and isolation. In the catering industry, ventilation is a commonly adopted engineering control method against chemical hazards. Ventilation removes the airborne substances from cooking processes and discharges them to external location. The discharge of exhaust air has to comply with relevant environmental protection legislation. Ventilation would also introduce fresh air to cooking areas and prevent production of dangerous carbon monoxide due to incomplete combustion of the cooking gas. Ventilation should be used in conjunction with other methods of control to strengthen protection.

7.4 Administrative control measures

- 7.4.1 Administrative control measures include arrangement for work procedures and stipulating safe work practices to reduce the risk of exposure of individual employees to hazardous chemicals. Employers should ensure that these are incorporated into the management system as far as practicable. Typical safe work procedures include
 - (a) keeping containers of chemicals closed when not in use;
 - (b) avoiding skin contact with chemicals;
 - (c) keeping a minimum amount of chemicals for use in the workplace, usually for no more than half a day's needs or one shift's supply; and
 - (d) adopting general practices of good housekeeping.

7.5 Personal protective equipment (PPE)

- 7.5.1 The purpose of using PPE is to supplement other control measures to minimize workers' risks of exposure to hazardous chemicals through inhalation or skin contact. For example, worker should wear appropriate PPE such as gloves and goggles to prevent accidental spill on the eyes and skin when diluting concentrated bleach solution. Being only passive protective measures, PPE cannot replace preventive measures. In general, it should be considered as a last resort in respect of safety measures outlined in this section.
- 7.5.2 Appropriate PPE should be chosen with regard to the hazards and physical properties of the chemicals, the routes through which they enter the human body. Information in the material safety data sheets (MSDS) and risk assessment will help determine the PPE requirements. Before and after use, PPE should be inspected for any signs of damage. It should be regularly cleaned and stored in good condition. Contaminated PPE should be properly treated or disposed of as appropriate, and replacement sets kept readily available. Moreover, as no PPE will give long-term protection, a programme should be in place for its regular replacement.
- 7.5.3 Wrongly selected, and improperly used or maintained PPE may do more harm than good as the user may have a false sense of security. Readers should refer to the "*Chemical Safety in the Workplace: Guidance Notes on Personal Protective Equipment for Use and Handling of Chemicals*" for details.

Protective clothing

7.5.4 Protective clothing protects the skin or personal clothing from contact with hazardous chemicals and prevents spread of contamination. When handling chemicals such as dispensing and storage, or conducting work processes involving chemicals, employees should always wear suitable protective clothing. Employers should also provide their employees with special clothing for use in emergencies. Protective clothing includes gloves, aprons, gowns

and overalls. It is important to choose protective clothing made of materials that resist penetration or damage by the chemicals used.

Face and eye protection

7.5.5 Where there is a reasonably foreseeable risk of eye injury, suitable goggles, eyecup or cover-type eye protectors should be worn when, for example, handling acidic and caustic chemical drain cleaners.

Respiratory protective equipment

7.5.6 Respiratory protective equipment (RPE) protects workers against exposure to dusts, gases, fumes and vapours. For example, workers should wear appropriate RPE when spraying peracetic acid formulations to disinfect catering equipment. There are different types of RPE, including disposable mask used to protect workers against particles and liquid aerosols, and airline breathing apparatus. The choice of RPE depends on the harmful nature of the airborne substances and the work environment. The choice of the appropriate type of respirator should take into account the limitation in its application.

7.6 Precautions during handling and storage

7.6.1 When selecting a chemical product for use by workers, employer should consider its health effect on human, the extent of exposure, and the appropriate health and safety precautions. In this respect, the employer may seek advice from safety personnel or safety professionals, if necessary. Different chemical products should not be mixed or used in combination without proper assessment of the risks and the potentially hazardous reactions, and taking proper safety measures. It should be noted that chemicals must not be mixed with other incompatible chemicals. For example, user should never mix bleach with ammonia or acidic products, e.g. drain, toilet bowl, and metal cleaners. Toxic fumes (strong enough to be fatal) will be produced as a result. If necessary, use detergents first and rinse thoroughly with water before using bleach for disinfection.

- 7.6.2 It is a poor practice to dilute chemical concentrates by manually tipping drums. Since it is likely to result in a spill risk, it should not be carried out. Proper dispensing device or equipment should be used to prevent spillage during the transfer of chemical concentrates for dilution. Mixing of solution should also be performed carefully to avoid splashing. The person responsible for the work should select a workplace with adequate ventilation. Proper personal protective gear should be used when the chemical products are handled. Where possible, it would be safer to purchase chemical products in their dilute form or in pre-packed quantities.
- 7.6.3 Chemical products should be stored separately from other incompatible chemical products in a cool and well-ventilated area protected from direct exposure to sunlight. For example, chlorine bleach should not be stored together with cleaning products containing ammonia or acidic cleaners.
- 7.6.4 Alcohol disinfectant and alcohol fuel are flammable chemicals and require appropriate precautions in storage and use. Small quantities of alcohols should be stored in a fire-resisting cupboard or bin with clear markings outside the container when not in use. Large quantities of alcohols should be stored in a separate fire-resisting room constructed in accordance with the requirements of the *Dangerous Goods Ordinance (Cap. 295)*.
- 7.6.5 Waste chemicals such as unused caustic cleaner, acid cleaner and bleach solution should be properly disposed of. The containers holding the chemicals should be thoroughly flushed with water before discarded. Where applicable, comply with relevant rules and regulations, for example, the *Waste Disposal Ordinance (Cap. 354)* in the disposal of chemical waste.

- 7.6.6 Catering establishments should comply with relevant codes of practice and relevant rules and regulations in the use of fuel gas. In Hong Kong, the container used to contain liquefied petroleum gas (LPG) shall be of the type approved in accordance with the *Gas Safety (Gas Supply) Regulations*. Operators should observe the instructions and warning as given on the gas containers. LPG should be stored at cool, dry and well-ventilated location, and should be kept away from flame and heat. The quantity of LPG stored should comply with the *Gas Safety Ordinance (Cap. 51)*. The disposable type LPG gas cartridges should never be refilled. Care has to be taken in the disposal of used LPG containers in which there may be residual gases generating fire or explosive hazards.
- 7.6.7 There are occasions in which workers in the catering industry might use household pest control products to kill cockroaches, ants and rats. When using pests control products, select those containing pesticides registered in Hong Kong and the ingredients are clearly labelled in accordance with the law. Do not store pesticide products together with food or drinks. The pesticide products should be locked. Before application of pesticide, remove food, utensils and crockery. Air conditioners should be switched off and ventilation openings covered up. When applying the pesticide, operators should wear appropriate protective gear and adhere strictly to the operational safety guidelines and instructions on the label of the pesticide for application. Avoid applying the pesticide to the area indiscriminately. Take note of relevant legislation related to the use of pesticide including the Occupational Safety and Health Ordinance (Cap. 509), the Pesticide Ordinance (Cap. 133), the Dangerous Goods Ordinance (Cap. 295) and the Waste Disposal Ordinance (Cap. 354) and comply with these ordinances where applicable. It is advisable that the pest control work should be performed by pest control professionals who are knowledgeable about the hazards associated with the pesticides and related processes.

8 Emergency Preparedness

8.1 Introduction

8.1.1 Even with all practicable control measures in place, an emergency situation could still occur, for example, a spill of acid drain cleaner, sudden emission of noxious fume from unstable bleach solution, and a fire incident caused by cooking gas. The employer or the assigned personnel responsible for safety should establish an emergency response plan to deal with all foreseeable emergency situations. The plan should be communicated to all workers and be made readily accessible to managers and supervisors.

8.2 Emergency response plan

- 8.2.1 An emergency response plan should include the following
 - (a) an alarm system;
 - (b) the procedures for reporting and declaring emergency and, when the incident is over, announcing a return to normal;
 - (c) location of a control centre and the resources in the centre such as lighting equipment, communication equipment, and a list of supporting personnel, etc;
 - (d) an emergency organisational structure indicating the duties and responsibilities of emergency personnel;
 - (e) procedures to be followed by employees who must remain to perform critical operations before evacuation;
 - (f) special teams with specific duties to deal with the fire in safe circumstances, to provide first aid and other necessary operations before the arrival of emergency services;
 - (g) training of special team members and workers ;
 - (h) facilities and equipment (such as fire extinguishers, spill containment materials, masks, first aid boxes, and instruction signs/lights, etc.) to handle emergencies;

- (i) an evacuation route map and a safe assembly point;
- (j) a schedule for emergency drills; and
- (k) a list of the authorities to contact in case of emergency.
- 8.2.2 After an emergency response plan has been put together, it should be kept in an emergency manual. The manual should include all information necessary to respond to various emergencies such as evacuation routes, names and locations of first aid team members, locations of safety equipment, telephone numbers of key personnel and emergency services. The employer or the assigned person with the overall responsibility should keep the document in a suitable area easily accessible to emergency personnel. In addition, a notice outlining the plan should be posted up at visible locations. All employees should know their role during any emergency response team should be charged with the responsibility to ensure that the emergency response plan is effectively implemented and all emergency equipment is well maintained.

8.3 Emergency equipment

- 8.3.1 Appropriate emergency equipment should include but are not limited to
 - (a) fire alarm;
 - (b) fire-fighting equipment, such as fire hoses, fire extinguishers and fire blankets;
 - (c) emergency lights and backup for fume extraction in case of power failure;
 - (d) flushing facilities and eyewashes;
 - (e) first aid facilities, such as first aid kit; and
 - (f) absorbent material for cleaning up minor chemical spills.
- 8.3.2 The employer or the assigned person with the overall responsibility should ensure that all emergency equipment is properly maintained and regularly inspected for proper performance. Expired items should be replaced. Locations of emergency equipment in the workplace should be made known to all staff.

9 Hazard Communication

9.1 Introduction

- 9.1.1 Under the *Occupational Safety and Health Ordinance (Cap. 509)*, employers are obliged to provide such information as is necessary to ensure the safety and health of their employees at work.
- 9.1.2 The hazard information is indispensable for the identification of potential hazards related to the use and handling of workplace chemicals during risk assessment and preparation of emergency response plans.

9.2 Sources of hazard information

9.2.1 Limited but essential information on the hazards can be found on the label of the container of the substances. Detailed information can be obtained from the suppliers (chemical manufacturers, importers or distributors).

9.3 Means of hazard communication

9.3.1 Employers should ensure that their employees know the hazards of the chemical products they use at work. Typical means of hazard communication include labels, MSDS, standard operating procedures and employee training. Employers may also find placards, notices and signboards useful for their workplaces.

Labels

- 9.3.2 Labelling each container containing hazardous substance such as bleach solution and caustic cleaner, is the most direct means of hazard communication. The label should include the following information —
 - (a) identity of the substance chemical name(s) and/or common name(s);
 - (b) hazard classification and symbol(s);

- (c) an indication of the particular risks inherent in the substance; and
- (d) an indication of the required safety precautions.
- 9.3.3 If it is not reasonably practicable to put full information on a container, the container should at least be labelled with the identity of the chemical and the hazard group(s) and symbol(s). Other required information can be given in an information sheet placed in the close vicinity. Statutory requirements for labelling of dangerous substances are prescribed in the *Factories and Industrial Undertakings (Dangerous Substances) Regulations.*

Material Safety Data Sheet (MSDS)

- 9.3.4 Material Safety Data Sheets give detailed hazard information. A copy of the MSDS of each hazardous substance should be kept in the workplace and be readily accessible by the employees. These safety data sheets are vital in the risk assessment of the hazards associated with the use and handling of the substance.
- 9.3.5 A standard MSDS, for example, ISO 11014-1 format, should contain the following information
 - (a) product and company identification;
 - (b) composition/information on ingredients;
 - (c) hazards identification;
 - (d) first-aid measures;
 - (e) fire-fighting measures;
 - (f) measures to tackle accidental release;
 - (g) handling and storage;
 - (h) exposure control/personal protection;
 - (i) physical and chemical properties;
 - (j) stability and reactivity;

- (k) toxicological information;
- (I) ecological information;
- (m) disposal considerations;
- (n) transport information;
- (o) regulatory information; and
- (p) other information.

Standard operating procedures (SOP)

9.3.6 SOP is a set of systematic step-by-step written procedures to be followed for completing a process or operation and it can be a means to communicate hazard information. For the processes involving hazardous substances such as disinfecting catering equipment with chemical disinfectants, the relevant SOP should state the hazard information and risk control measures clearly and the employees concerned should be informed accordingly.

Training (also see Section 10.3)

9.3.7 Employers should provide training for their employees to ensure that the employees know how to access the available hazard information and make use of the information on the labels and MSDS of the chemical products.

10 Information, Instruction and Training

10.1 Introduction

10.1.1 After assessing the risks in the workplace and adopting appropriate preventive measures, employers should make sure that their employees know the risks at work, and the work practices that can help them do their jobs safely. To achieve this, they should provide employees with adequate safety information, instruction and training.

10.2 Information and instruction

- 10.2.1 Employees should be informed of the following --
 - (a) safety information about the chemical products regarding the risks that they may be exposed to, including the nature of hazards, exposure standards, possible routes of entry into the body and risks to health;
 - (b) correct labelling of substances and the meaning of label details;
 - (c) content and meaning of MSDS;
 - (d) measures to reduce the risks of exposure to hazardous substances, including the practice of personal hygiene;
 - (e) safe work procedures on the use, handling, storage, transportation, cleaning up and disposal of hazardous substances;
 - (f) information on the safe handling of equipment;
 - (g) emergency response procedures, including the location and use of emergency equipment and facilities for first aid, decontamination and firefighting;
 - (h) procedures for reporting faults and incidents, including spills; and
 - (i) proper selection, use and maintenance of PPE.

10.2.2 Information and instruction should be provided to employees by --

- (a) locating SOPs, safety manuals and emergency procedures prominently in the workplace, making them easily accessible by employees; and
- (b) other means such as notice, poster and video show to arouse the safety awareness of everyone on handling hazardous substances and relating processes.

10.3 Employee training

- 10.3.1 Training helps employees to acquire the necessary skills and knowledge to enable them to follow safe working procedures, take appropriate control measures, use appropriate personal protective equipment and follow emergency procedures.
- 10.3.2 Employers should ensure that all persons involved in the use of chemicals, including workers, supervisors, store personnel, emergency personnel and safety and health representatives, are adequately trained.
- 10.3.3 Employers should ensure that employees are informed of the hazards arising from the use of chemical products. Training in proper handling and storage of chemical products should be provided, and employees should be familiarised with the SOP if there are any. The training should also include emergency procedures for dealing with incidents. The training programme should include all these information.
- 10.3.4 Employers should arrange periodic refresh training. There should also be an ongoing process of training so that employees can learn about the latest developments of workplace safety and continue to improve their relevant knowledge and skills.

- 10.3.5 Employers should periodically review the training programme to make sure that employees gain the skills and knowledge that they need. Employers should also ensure that their employees, after undergoing appropriate training, understand what they have been taught.
- 10.3.6 Employers should keep track of the training and maintain proper record of training, which should include at least the following
 - (a) names of employees receiving training, and dates of attendance;
 - (b) outline of the course content; and
 - (c) names and credentials of the trainers.

11 Review of the Safety Measures

- **11.1** Safety measures should be reviewed and revised periodically to ensure their continued effectiveness to cope with existing and new requirements, or significant changes in the processes and/or chemical materials. The review should also aim at finding out areas for improvement. In the course of the review, opportunities to eliminate hazards should always be sought and initiatives are taken to strengthen protection. Long-term plans should be established for further improvement of safety and health at work.
- **11.2** Employers should check whether all measures have been properly implemented. Employees should report promptly to their employers or supervisors any defects that they have noticed in the safety measures, equipment, facilities and labelling.

Appendix I

Characteristics of the chemicals used in the catering industry

The following paragraphs describe the characteristics of some chemicals used in the catering industry.

- Ammonia has a sharp irritating odour and the chemical can be found in household cleaners, wax removers, glass and window cleaners and oven cleaners. Household ammonia products contain 5-10% ammonia and its vapour, even in low concentrations, can irritate the eyes and nose. At high concentrations, ammonia is corrosive and causes burns and irritation to the skin and eyes.
- 2. **Anticoagulants** are substances that hinder clotting of blood. Bromadiolone, brodifacoum and coumatetralyl are anticoagulant pesticides designed to control rodents. The anticoagulant pesticides are usually formulated in a variety of pellet, granular, block, and bait products. The anticoagulant pesticides are harmful chemicals, which could be readily absorbed into the gastrointestinal tract. Severe cases of poisoning could result in death.
- 3. Limonene, dextrorotary derivative (d-limonene) is a chemical derived from citrus fruits, which is a component of solvents often used to replace many undesirable and dangerous solvents, such as mineral spirits, toluene and most of the chlorinated solvents. The chemical is a colourless liquid with a strong smell of orange. Products, such as hand cleaners, industrial cleaners, degreasers and strippers may contain limonene as solvent. It is also widely used as fragrance additive in cleaning and cosmetic preparations. d-Limonene is non-caustic and non-toxic. In contact with air or light, d-limonene would form oxidation products, which can cause skin allergy. d-limonene is a mild skin and eyes irritant. It is a flammable liquid, which is insoluble in water, and its vapour forms flammable mixtures with air.

- 4. **Ethyl alcohol** (Ethanol), is the second member of the aliphatic alcohol series. It is a colourless, volatile, highly flammable liquid with characteristic odour. Ethyl alcohol could be found in a wide range of products such as household cleaners and polishes, disinfectants, etc. It is used as a fuel and fuel additive. Ethyl alcohol is also used as disinfectant in medical wipes and in antibacterial hand sanitizer gels. Ethanol and solutions containing more than 50% ethanol are flammable liquids. Excessive exposure to ethanol could pose health hazards.
- 5. **Hydrochloric acid** is a colourless, non-flammable liquid with an irritating and pungent odour. Hydrochloric acid is a strong inorganic acid and is an important industrial chemical for many applications. It could be found in many cleaning products, including toilet cleaners, metal cleaners and scale removers. Hydrochloric acid is corrosive to the skin, eyes, and mucous membranes. Acid mists from high concentration hydrochloric acid solutions could cause skin and eye irritation and pain on exposure. Hydrochloric acid is toxic by ingestion and inflicts burns to the mouth and stomach. Upon mixing hydrochloric acid with oxidizing chemicals, such as bleach (sodium hypochlorite) or permanganate, toxic chlorine gas is produced.
- 6. **Isopropyl alcohol** is a flammable colourless liquid with an odour reminiscent of ethanol or acetone. Isopropyl alcohol is found in alcohol sponges, cleaning agents, and rubbing alcohol. The rubbing alcohol generally contains 70% isopropyl alcohol. Isopropyl alcohol causes irritation of the eyes and mucous membranes. Prolonged skin contact with isopropyl alcohol may cause eczema. Isopropyl alcohol vapour is heavier than air and is highly flammable and it should be kept away from heat and open flame.
- 7. Linear alkyl benzenesulphonates are anionic surfactants, which are generally used in cleaning preparations in the form of the sodium salt. Linear alkyl benzenesulphonates are a mixture of homologues and phenyl positional isomers. The properties of linear alkyl benzenesulphonates differ greatly depending on the alkyl chain length. Linear alkyl benzenesulphonates lower the surface tension of water so that it can wet and penetrate fabrics more easily to loosen and remove soils and stains. Important properties of linear alkyl benzenesulphonates are detergency,

foaming, wetting, and surface tension, which reach their optimal values generally when the alkyl chain length is about 12 carbon atoms. Linear alkyl benzenesulphonates are the major surface-active agents used in shampoos, dish-washing products, household cleaners, laundry detergents, and other applications such as industrial cleaners. Linear alkyl benzenesulphonates are mildly to moderately irritating to human skin, depending on the concentration.

- 8. **Organophosphates** are the basis of many insecticides and herbicides. They work by interfering with the nervous system of insects as well as mammals, birds and fishes. Commonly used organophosphates included parathion, malathion, methyl parathion, chlorpyrifos, diazinon, dichlorvos, phosmet, azinphos methyl, etc. Organophosphate pesticides are among the acutely toxic pesticides, which could cause death upon excessive exposure.
- 9. Peracetic acid (or peroxyacetic acid) is a colourless liquid with a strong vinegary odour. Peracetic acid is an irritant and it decomposes to acetic acid, oxygen and water. Peracetic acid is a strong oxidizing agent that rapidly kills a wide range of microorganisms. Peracetic acid is used as disinfectant in food processing and the catering industry. The disinfectant is applied as a spray, or as a mop-on solution.
- 10. **Potassium hydroxide**, sometimes known as caustic potash, potash lye and potassium hydrate, is a strong alkali. Pure potassium hydroxide is a white, deliquescent crystal. It is usually available in pellets, flakes and granules. A significant amount of heat is released when potassium hydroxide dissolves in water to form a strong alkaline solution. Potassium hydroxide could be found in some of the cleaning products. It is corrosive and may causes severe burns to the skin and eyes on contact.
- 11. **Pyrethrins** and **pyrethroids** are common ingredients in commercial products such as household insecticides and insect repellents. Pyrethrins are insecticides that are derived from the extract of chrysanthemum flowers. Pyrethroids are synthetic forms of pyrethrins. Pyrethrins are only slightly soluble in water but they dissolve in organic solvents like alcohol, chlorinated hydrocarbons, and kerosene. Pyrethrins and

pyrethroids act as contact poisons, affecting insect's nervous system by interfering with the way that the nerves and brain function. Pesticide products containing pyrethrins usually contain synergist, which enhances insecticide effectiveness. Inhaling pyrethrins can cause breathing problems. On contact with the skin, pyrethrins could cause irritation. Permathrin, deltamethrin, bifenthrin, and cypermethrin, are commonly used synthetic pyrethroids.

- 12. **Quaternary ammonium compounds** are cationic surfactants. They are effective fungicides and bactericides. The compounds are commonly used as active ingredients in disinfectant products for cleaning and sanitising food process equipment. They are stable in storage but could be easily inactivated by organic matters, anionic detergents, soaps and hard water. Quaternary ammonium compounds are generally considered non-toxic at use-dilution concentrations. However, prolonged contact of the chemical compounds at high concentrations can be irritating.
- 13. **Sodium dichloroisocyanurate dihyrate**, a stable source of chlorine, is used as chlorinated sanitizer for food process equipment. The chemical is an oxidizing agent, which is incompatible with organic materials, ammonia, acids, reducing agents, nitrogen-containing materials, oxidizing materials, metals and moisture. Toxic gases are released on contact with acids. Sodium dichloroisocyanurate dihyrate could cause skin irritation and prolonged contact with the chemical may lead to dermatitis.
- 14. **Sodium hydroxide**, also known as lye, soda lye or caustic soda, is often found in drain cleaners, oven cleaners and in non-phosphate detergent products. It is a strong caustic alkali. Pure sodium hydroxide is a white solid, usually available in pellets, flakes and granules. It is deliquescent and readily absorbs carbon dioxide from the air. Sodium hydroxide is soluble in water to form a strongly alkaline solution with liberation of heat. The resulting heat may cause heat burns or ignite flammable materials. Sodium hydroxide is used as an agent for degreasing or unblocking drains. Such drain cleaners are highly caustic and should be handled with care. Solid sodium hydroxide or solutions containing high concentrations of sodium hydroxide on contact with the skin or mucous membranes may cause burns.

- 15. **Sodium hypochlorite** is the active ingredient in common bleach. It is one of the most widely used chlorine containing disinfectant. Sodium hypochlorite solution is used for bleaching, odour removal and water disinfection. Liquid chlorine bleach usually contains 5.25% solution of sodium hypochlorite as disinfectant. Diluted hypochlorite solutions lose potency quickly and therefore it should be made freshly prepared before use. Sodium hypochlorite solution is corrosive to metal surfaces at high concentrations. Mixing hypochlorite solution with an acid would rapidly release chlorine, a toxic gas. Household bleach may cause skin, eyes, and respiratory tract irritation.
- 16. **Sodium laureth sulphate (Sodium lauryl ether sulphate)**, an anionic surfactant composes of an alkyl chain typically with 12-14 carbon atoms, which are combined with a number of ethoxylate groups via an ester linkage. The chemical, an effective foamer, is used in various cleaning products. Sodium laureth sulphate is stable under ordinary conditions of use and storage but is incompatible with strong acids or strong oxidizing agents. Sodium laureth sulphate is a known irritant and the chemical may induce eye and skin irritation.
- 17. **Sulphuric acid** is a colourless oily acidic liquid, which is the major ingredient in acid drain cleaners. It is incompatible with most metals, organic materials, strong reducing agents, bases, hypochlorites, alcohols and strong oxidizing agents. Sulphuric acid solutions react rapidly with metals generating hydrogen, which creates fire and explosion hazards. Concentrated sulphuric acid reacts with water exothermically liberating excessive heat. Sulphuric acid is corrosive and concentrated solutions can cause serious burns to the mouth, eyes and skin. The acid is harmful through ingestion and skin contact. Exposure to sulphuric acid mist can irritate the eyes, nose and throat, and may cause pulmonary oedema in serious cases.
- 18. **Triclosan** is a white powdered solid with a slight aromatic/phenolic odour. It is a chlorinated aromatic compound, which has functional groups representative of both ethers and phenols. Triclosan is slightly soluble in water, but soluble in ethanol. It is used in many household products such as soap products, deodorants and cleaning supplies. The chemical is used as disinfectant in cleaning products.

19. **Tripotassium phosphate** is a white odourless deliquescent crystal or powder. The chemical can be used as a cleaning agent, stain remover and degreaser. Tripotassium phosphate has good solubility in water to give an alkaline solution. Its functional properties, which contribute to the overall detergency by controlling the alkalinity, lowering the critical micelle concentration, sequestering metal ions, and decreasing soil redeposition, are generally considered to be the reason for their wide uses. Tripotassium phosphate is stable but incompatible with strong oxidizing agents and it is a skin and eye irritant.

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Enquiries

If you wish to obtain further information about this guide or require advice on occupational safety and health, please contact the Occupational Safety and Health Branch of the Labour Department through:

Telephone	:	2559 2297 (auto-recording after office hours)
Fax	:	2915 1410
E-mail	:	enquiry@labour.gov.hk

Information on the services offered by the Labour Department and on major labour legislation can also be found by visiting our Home Page at http://www.labour.gov.hk.

You can also obtain information on the various services provided by the Occupational Safety and Health Council through its telephone hotline at 2739 9000.

Complaints

If you have any complaints about unsafe workplaces and practices, please call the Labour Department's occupational safety and health complaint hotline at 2542 2172. All complaints will be treated in the strictest confidence.

