

Air Impurities in the Workplace



safety at work



**Occupational Safety and Health Branch
Labour Department**

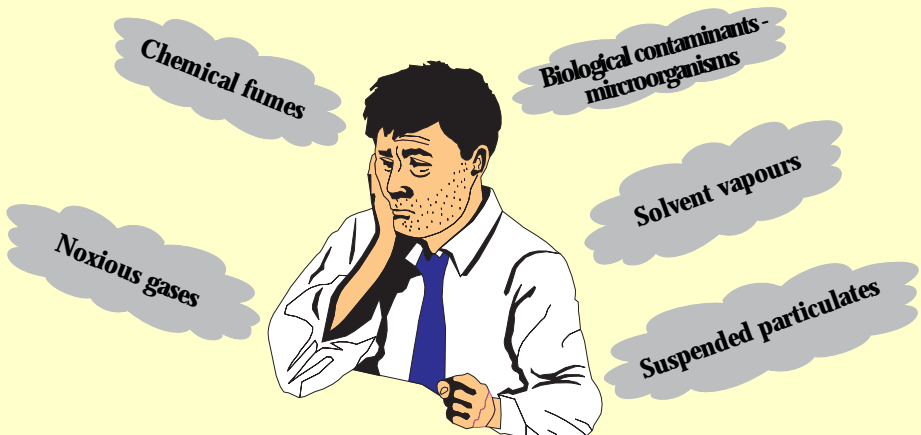
1. Introduction

Hong Kong is a cosmopolitan city and commercial centre, with a large number of establishments and servicing industries comprising the commercial, industrial and various service sectors, such as the catering, hotels, financing services, education and medical services. Every day, about 3-million strong workforce is at work in different environments. The places of work include traditional factories, industrial buildings, schools, hospitals, restaurants, commercial buildings and construction sites, etc.

Although they work in different workplaces, the employees may be subjected to various degree of health risks owing to exposures to a range of biological and chemical air impurities from the manufacturing processes and other work activities. This leaflet is intended to arouse the awareness of both employers and employees in the need to take appropriate measures to eliminate or reduce these impurities so as to safeguard the health of people at work.

2. What are air impurities in the workplace?

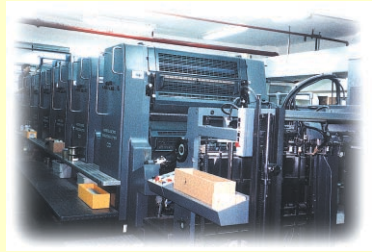
Air impurities also known as air pollutants, usually refer to substances that are not part of the fresh air content, or those substances that are present in concentration exceeding the normal range in the atmosphere.



3. What are the sources of air impurities?

3.1 Industrial Workplaces

For industrial workplaces, such as construction sites, factories and repair workshops, the air contaminants generated are arising from the handling of raw materials and operational activities. Therefore, the levels of these pollutants in the air can be relatively high and their sources of generation are mostly identifiable.

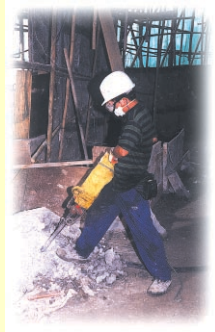


- Manufacturing Industry -

Sources of air impurities are mainly from the use and handling of chemicals in the manufacturing processes and storage of volatile chemicals. For some work processes that generate heat, fumes of the production materials may be released into the workplace atmosphere; examples are the manufacture of plastics or rubber materials. The production of paints and solvents will also involve the emission of highly volatile chemicals. Other pollutant emitting processes will include the use of degreasing solvents and machine lubricating additives, etc.



- Restaurants and Catering Establishments - The fuels used for cooking food, such as town gas and Liquefied Petroleum Gas (LPG) generate flue gases such as carbon monoxide and carbon dioxide during combustion. Chemicals used for disinfecting and degreasing kitchen utensils may also vaporize in the air when they are being used.



- Construction and Maintenance Industries - Work processes like cutting, drilling and grinding generate dust particles in the workplace. Further, if the construction materials contain silica, heavy metals or asbestos, harmful substances may be dispersed into the air when they are being used or processed and therefore forming part of the air impurities.

Other common work procedures like welding and flame cutting operations will generate a large amount of metal fumes. Paints and solvents may also release vapours of volatile chemicals when they are being used.

3 . 2 Non-industrial Workplaces

Air impurities found in non-industrial workplaces such as schools, hospitals, commercial organizations and offices usually do not originate from the production processes. The impurities are generally from multiple sources and their presence is normally in small amounts and low concentrations. Therefore, the sources of these impurities cannot be easily identified.



- Schools and Hospitals -

Air impurities may be released from the use of biological and chemical agents in the laboratories of the schools and clinical laboratories in the hospitals. Other chemicals like the cleaning and disinfecting agents may also release pollutants into the air when they are being used or stored.





- Offices and Commercial Establishments - Office equipment (such as photocopiers and laser printers) emit ozone. Other sources of air impurities include the agents used for cleaning toilets and window glazing which usually contain strong acidic or alkaline chemicals and some may contain volatile organic solvents.



- Other Sources of Organic Compounds - Radon emitted from building materials, and organic compounds emitted from carpets, furniture, cleaning agents, wax, pesticides and adhesives may contribute to the impurities in the workplace atmosphere.

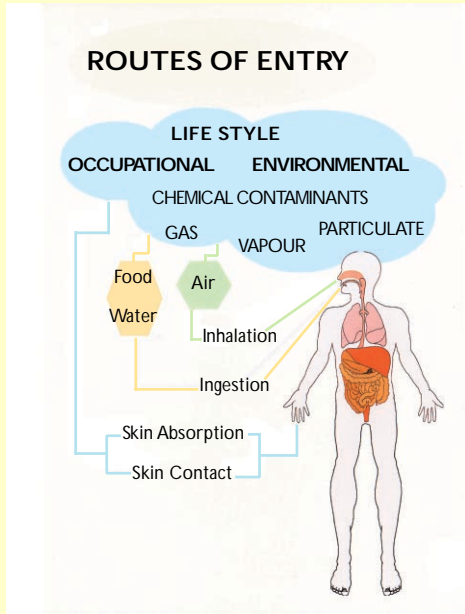


- Sources of Biochemical Substances - The presence of disease-spreading microorganisms (such as parasites, mites, bacteria, fungi and viruses) also add to the list of air pollutants in a workplace. These microbes can proliferate rapidly in a short period of time and spread widely under suitable temperature and humidity and environment favourable to their growth.

4. Health Hazards

Air impurities may enter our body through inhalation and skin contact. When the exposure to air impurities exceeds the level that the body can tolerate, people's health may be adversely affected. The following lists some of the health risks from exposure to the hazards in the workplace:

- Direct contact with acid or alkaline chemicals can cause skin burns or irritation. If the chemicals are inhaled, they will cause harm to the lung tissues;
- Toxic metals (such as lead, cadmium, manganese and mercury) and organic solvents (such as benzene, toluene, xylene, trichloroethylene, perchloroethylene, etc.) may affect the functions of the liver, kidneys and central nervous system of our body, resulting serious diseases;
- Chemical asphyxiants (such as carbon monoxide and hydrogen sulphide) in high concentration may lead to acute anoxia which can result in death;
- Suspended particulates containing substances like quartz, asbestos or raw cotton dust may induce occupational lung diseases;
- Other health hazards:
 - (i) Some people may feel unwell or develop hypersensitive symptoms even if they are exposed to non-pathogenic microbial agents or chemical substances of a low toxicity (such as mould, and small amounts of chemicals like ozone, dilute acids or alkalis).
 - (ii) Some chemicals (such as asbestos, benzene, formaldehyde or ethylene oxide) may induce cancer in humans after a long incubation period.



5. How should employers protect the health of their employees?

- **Assessment of risks to health** - Employers should assess the risks to the health of their employees caused by exposure to air impurities at work. In making assessments, employers should consider the health conditions of their employees and make reference to the information on air impurities, including material safety data sheets (MSDS), health hazards of chemicals, occupational exposure limits as well as the guidelines and codes of practice issued by the Labour Department.
- **Implementation of control measures** - When the assessment of air impurities indicates that there is a risk to health, employers should take appropriate measures such as replacing hazardous chemicals and processes with less hazardous ones, and reducing their employees' exposure by segregation or other means. Regarding the working environment, engineering controls such as an effective ventilation system should be installed to eliminate or dilute air impurities in the workplace.
- **Use of personal protective equipment** - When the exposure of employee to a high level of impurities is not avoidable after implementing all the above measures, personal protective equipment (PPE) will be required to prevent over-exposure. The protective equipment will include suitable respirators, gloves and protective clothing. It should always bear in mind that the PPE is designed for protection against specified concentration ranges of certain types of chemicals. The equipment should therefore be used according to the manufacturer's specifications. As the personal protective equipment is the last line of defense, it is important for the users to have a thorough understanding of the proper use and limitations of the equipment in the selection process. Also the equipment should be used properly and well maintained to attain the intended level of protection.



6. Reference Materials

For information on the recommended occupational exposure limits, risk assessments and control measures, please refer to the following publications prepared by the Labour Department:

- Code of Practice on Control of Air Impurities (Chemical Substances) in the Workplace
- Guidance Notes on Ventilation and Maintenance of Ventilation Systems
- The Protection of Workers' Health Series - Control of Toxic Substances in the Workplace
- Guidance Notes on Health Hazards in Construction Work
- A Simple Guide to Health Risk Assessment - Office Environment Series



7. Further Information

This leaflet is issued free of charge and can be obtained from offices of the Occupational Safety and Health Branch or downloaded from the website of the Labour Department. If you wish to enquire about this leaflet or require advice on occupational health and hygiene matters, please contact the Occupational Safety and Health Branch of the Labour Department through:

Address: 15/F, Harbour Building, 38 Pier Road, Central, Hong Kong

Telephone: 2852 4041

Fax: 2581 2049

E-mail: enquiry@labour.gov.hk

Website: <http://www.labour.gov.hk>

Information on the services offered by the Labour Department and on major labour legislation can also be found by visiting our website.

Information on the services offered by Occupational Safety and Health Council can be obtained through its hotline 2739 9000.

8. Complaints

If you have any complaint 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.

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