

保護工人健康叢書

THE PROTECTION OF

WORKERS' HEALTH SERIES

管制工場內的有毒物質

CONTROL OF TOXIC SUBSTANCES
IN THE WORKPLACE



勞工處

職業安全及健康部

Occupational Safety and Health Branch

Labour Department

緒言

這本小冊子是「保護工人健康」叢書之一，目的是使僱主和工人知道工業有毒物質的潛在危害，並提供建議，以避免或減低這些危害帶來的健康風險。

僱主有責任去確保工作環境不致危害僱員的健康。為了達到這個目標，除了採用所有適當的設施外，更須確保僱員明白電鍍的危險，並在任何時候都嚴格遵守安全原則。

本小冊子和叢書中其他小冊子可在勞工處職業安全及健康部免費索取。

FOREWORD

This booklet forms part of a series on the protection of workers' health. It aims to highlight the potential hazards of toxic substances that can be encountered in industry and to offer advice on measures which can be adopted to minimise such hazards.

It is the responsibility of an employer to ensure that the working environment does not constitute a danger to the health of his employees. To achieve this, he must not only apply all recognised control measures but must be satisfied that his employees are aware of the danger of exposure to toxic substances and that they strictly adhere to the safety principles at all times.

This booklet and others in the series are available free of charge from offices of the Occupational Safety and Health Branch of the Labour Department.

香港勞工處
職業安全及健康部

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管制工場內的有毒物質

引言

- 一. 基本上，所有工作場所的東主均有責任在可行範圍內，確保員工在工場內使用化學品及其他物質時，達到安全而不致危害工人的健康。這本小冊子的目的是指導如何安全使用工業化學品及其他有潛在毒性的物質。小冊子內簡述了各種預防措施，並特別針對如何預防各種職業癌病。
- 二. 近年來，職業癌病的問題頗受關注。被懷疑可因工作上的接觸而引發癌症的物質越來越多。這些因工作上的接觸而引致人類患癌的物質，就是職業性致癌物。

CONTROL OF TOXIC SUBSTANCES IN THE WORKPLACE

Introduction

1. Fundamentally, it is the duty of every proprietor of a work place to ensure, as far as reasonably practicable, safety and health of the workers in the use of chemicals and other substances in his workplace. The object of this booklet is to outline precautionary measures as a guide to the safe use of chemicals and other potentially toxic substances in industry, with particular reference to the prevention of occupational cancer.
2. Occupational cancer has attracted considerable attention in recent years and there is a growing list of substances with varying degrees of suspicion as carcinogens through exposure at work. Occupational carcinogens are agents which induce cancer in humans as a result of their exposure to these agents in the employment.

三. 致癌性問題其實是使用化學品及其他物質所引起的各種毒性問題之一。大致來說，工業上使用的物質可分為以下五類：

- 一. 已證實可引致人類患癌的；
- 二. 懷疑是可引致人類患癌的；
- 三. 證實可使動物致癌的；
- 四. 已知是有毒的但並不是致癌性的；
- 五. 不知是否有毒或致癌性的。

四. 當已知某樣物質可引致人類患癌時，須採取嚴格措施予以管制，必要時更可禁用該種物質，例如，青石棉及鐵石棉是禁止使用的，而其他種類的石棉在使用時則須特別小心處理。

3. Carcinogenicity can be considered to be one facet of the wider problem of toxicity of chemicals and other substances. For the present purpose, substances used in industry can be grouped under five headings :

- 3.1 Proven human carcinogen;
- 3.2 Suspected human carcinogen;
- 3.3 Animal carcinogen;
- 3.4 Substances known to be toxic but not carcinogenic;
- 3.5 Substances not known to be toxic or carcinogenic.

4. When a substance is known to cause cancer in humans, rigorous control measures, including prohibition where appropriate, are required to keep exposure to a minimum. Prohibition of blue and brown asbestos and particular care in the use of the other forms of asbestos are examples.

- 五. 如果懷疑某樣物質是致癌性的就要因應有關證據的強弱，實施相應嚴格的管制措施。例如，處理甲苯和四氯化碳時，必須特別小心。
- 六. 如果已知某樣物質是有毒的，但並不是致癌性的，所採取的管制措施必須足以預防該種毒性所產生的影響。例如，要防止吸入鉛金屬的煙霧。
- 七. 有些物質在以往被認為既不是有毒的，又不是致癌性的，但後來才發現是致癌性的，便會產生諸多問題。因為這些物質極可能已被濫用或在使用時未有小心處理。
- 八. 因此，採取措施管制已證實和被人懷疑是致癌物的物質固然重要，制定一般性的預防政策來管理其他物質的使用，不論那些物質是否有害，亦同樣重要。

5. When a substance is suspected of being carcinogenic, increasingly strict control measures are taken, concomitant with the available evidence of carcinogenicity. For example, particular care is required in handling formaldehyde and carbon tetrachloride.
6. If a substance is known to be toxic but not carcinogenic, control measures should be appropriate to prevent the known toxic effect, e.g. prevention of inhalation of lead fume.
7. Substances which are not considered to be toxic or carcinogenic could present a problem if subsequently found to be carcinogenic since these are the substances likely to be used indiscriminately or without particular care.
8. It is therefore essential not only to exercise control measures for proven and suspected carcinogens, but also adopt a general precautionary policy for controlling the use of all substances whether or not they are known to have any harmful effect.

一般管制措施

- 九. 有毒物質可以由下列一種或幾種途徑進入人體：呼吸、吞食及經皮膚滲透體內。所以應盡量減少與有毒物質接觸。方法就是針對有毒物質進入人體的各種途徑，應用各種職業衛生的守則和技巧加以防止。一旦確定有某項危害存在，就應同時採用適當的醫療監察和環境監察措施，評估該項危害對有關人員的影響。測量該項危害後（例如在工人的呼吸範圍內抽取樣本），應將結果跟職業衛生標準值比較，或者跟其他有關毒性和接觸量的數據比較以評估該項危害的嚴重程度。勞工處職業安全及健康部已印製了一本名為(工作環境內化學品的「職業衛生標準」參考資料)的刊物。該刊物載列超過200種在工業工序中經常使用或涉及的化學品。有興趣人士可參考該表，以評估工作情況。至於未列於表內的化學品，或毒性不明的化學品，在政策上亦須作出規定，將接觸量減至最低。

General precautionary measures

9. Toxic substances enter the body by one or more of the following routes : inhalation, ingestion and absorption through the skin. Exposure should be kept as low as reasonably practicable by application of occupational hygiene principles and techniques appropriate to the route of entry. Once a hazard has been identified, its effects on exposed persons should be assessed by a combination of medical and environmental monitoring as appropriate. The hazard should be measured (e.g. by sampling in the person's breathing zone) and the results compared with occupational hygiene standards or other data relating toxic effects to exposure levels. The Occupational Safety and Health Branch of the Labour Department has published "A Reference Note on Occupational Exposure Limits for Chemical Substances in the Work Environment". It lists out more than 200 chemicals commonly used or involved in industrial processes. Interested people may make reference to the list for assessment of the working conditions. For chemicals that are not in the list or have no known health effects, there should be a policy of keeping exposure as low as it is practicable.

管制措施

- 十. 下面列出管制有毒物質的職業衛生方法，在多數情況下，不能單獨依靠任何一項方法，而須綜合多種管制方法，才能提供足夠保障。
- 一. **用較低毒性物質取代** - 盡可能使用毒性最少的物質，例如用人造纖維比用石棉安全；
 - 二. **限制接觸** - 只准有工作需要的人員接觸有毒物質，而這些人員的數目也要減至最低。接觸的時間和程度不能超過職業衛生標準；
 - 三. **分隔設備和人員** - 將生產設備完全圍封，或以遙控方法操作，以便有毒物質的工場和工作人員完全分隔；

Control methods

10. Occupational hygiene methods for the control of toxic substances are listed below. In most situations, a combination of various control methods must be used to provide adequate protection. Often, no single measure can be relied upon exclusively. Examples of controls are :
- 10.1 **Substitution with less hazardous materials** - always consider the possibility of using the least toxic substance e.g. man-made fibres such as glass wool are safer than asbestos;
 - 10.2 **Restriction of possible exposure** - minimise the number of, and restrict access only to essential personnel; limit the duration and degree of their exposure to well within the Occupational Exposure Limit (OEL);
 - 10.3 **Segregation of plant and people** - total enclosure of process plant; physical separation with remote handling techniques;

四. **控制工序放出的污染物**，以確保接觸量遠低於職業衛生標準 - 設置通風系統，特別是在靠近排放物來源處安裝局部抽氣系統；其他方法例如採用噴灑方法處理粉塵物料；將粉狀物料製成粒狀；或先將有毒物質注入密封容器內，才進行工序等；

五. **個人防護** - 穿著各種防護性衣物及使用呼吸防護設備；

六. **一般衛生** - 應用「良好廠房管理」方法，例如：使用備有適當過濾器的吸塵機；禁止在有毒物質的工場內吸煙和飲食；提供良好洗濯設施，並鼓勵工人注重個人衛生。

10.4 **Control of emissions from the process so that a person's exposure is well within the OEL** - use of ventilation techniques, particularly local exhaust ventilation applied as near as possible to the source of emissions; wetting of dusty materials; pelleting; feeding of toxic substances to process in pre-packed containers;

10.5 **Personal protection** - use various forms of protective clothing and respiratory protective equipment;

10.6 **General hygiene** - application of 'good housekeeping' techniques such as use of vacuum cleaners with suitable filters; prohibition of smoking, eating and drinking in the workplace where toxic substances are used; provision of suitable washing facilities to encourage high standards of personal hygiene.

七. **監察** - 督導員工的工作，確保員工正確地使用所有控制措施。

八. **安全及健康教育** - 向員工提供有關有毒物質的安全資訊、指導和教育，增加他們的警覺和使用控制措施的知識。

九. **保養** - 所有控制措施必須定期檢查和保養，以確保性能良好。

10.7 **Supervision** - supervise the employees to ensure that all control measures are used properly.

10.8 **Health and safety education** - provide adequate information, instruction and training to the employees so that they are aware of the dangers involved in working with the hazardous substances and the control measures required.

10.9 **Maintenance** - check and maintain all the control measures to ensure their effectiveness and efficiency of performance.

工場以外的管制措施

- 十一. 工場內採取的任何管制措施，應該以不增加外界環境的污染為原則。要考慮到的問題包括：
 - 一. 由工序本身產生或抽氣通風設備排出空氣中的排放物 - 這些設備可能須加裝過濾器，滌氣器或焚化器等；
 - 二. 廢水排放和廢物處理；

Control measures outside the workplace

11. Control measures provided for the workplace should not be installed or used in ways which may affect the outside environment. Aspects which should be considered include :
 - 11.1 Emissions to outside atmosphere, from both the process and its exhaust ventilation controls - these may need, for example, the provision of filters, scrubbers, or incineration equipment before discharge to the outside air;
 - 11.2 Effluent discharge and waste disposal;

三. **傳遞與污染** - 例如沾染有毒物質的防護性衣物及設備（靴鞋及工衣）、汽車車輪（包括私家車），或貨物等，均可能成為污染的器具和擴散途徑。

四. **意外洩漏** - 例如：在生產中，容器內的物質經減壓系統或其他部份外洩。

11.3 **Contamination by transfer** - on protective clothing and equipment (e.g. footwear and overalls), on wheels of vehicles (including private cars), on uncovered loads, etc.;

11.4 **Inadvertent discharge** - e.g. chemicals escape from pressure relief systems or other parts of the plant.

諮詢服務

- 十二. 任何人士如需有關管制工場內有毒物質的指導，可聯絡勞工處職業健康服務

地址 : 香港中環統一碼頭道 38 號
海港政府大樓 15 字樓

電話 : 2852 4041

傳真 : 2581 2049

電子郵件 : laboureq@labour.gcn.gov.hk

網址 : <http://www.info.gov.hk/labour>

Advisory service

12. Further advice on any aspect of the control of toxic substances in the workplace is available from the Occupational Health Service of the Labour Department:

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

Telephone : 2852 4041

Fax : 2581 2049

E-mail : laboureq@labour.gcn.gov.hk.

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

環境衛生控制措施

HYGIENE CONTROL METHODOLOGIES

控制毒物源頭

SOURCE CONTROL

取代危害物質

SUBSTITUTION

隔離法

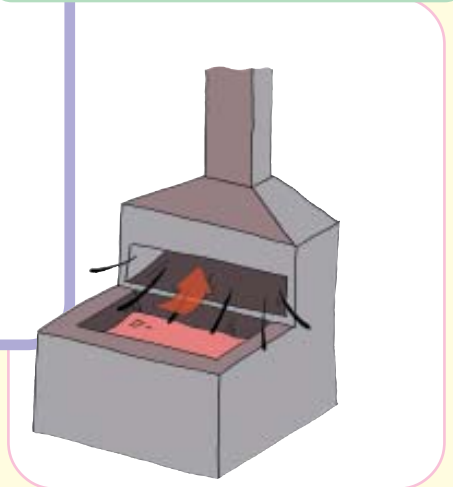
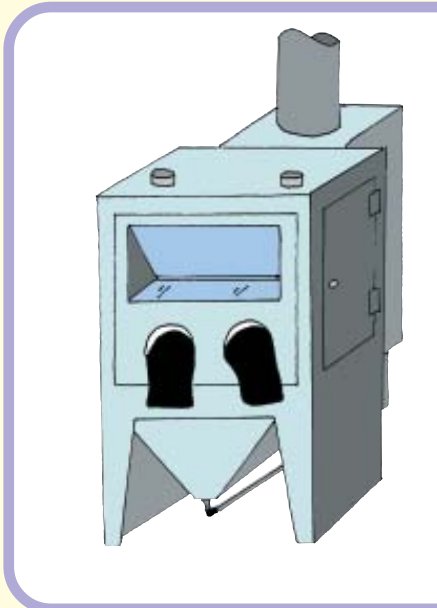
ISOLATION

控制源頭擴散(例如:灑濕法)

LOCAL SUPPRESSION, eg. WETTING

局部排氣通風

LOCAL VENTILATION



控制毒物污染環境
PATHWAY CONTROL

提供屏障板牆

BARRIERS / PARTITIONS

稀釋性通風

GENERAL VENTILATION

提供標記及告示版

SIGN / NOTICES

提供標籤及化學分類

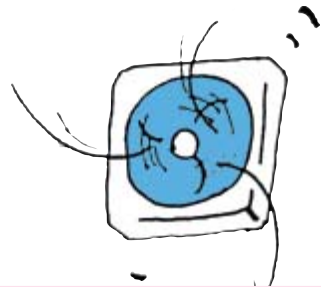
LABELLING

保持工作場地整潔

HOUSEKEEPING

環境監察

AIR MONITORING



保護措施

WORKER PROTECTION

個人防護器具

PERSONAL PROTECTIVE DEVICE

工作輪換

JOB ROTATION

安全訓練

SAFETY TRAINING

監督

SUPERVISION

健康監察

HEALTH SURVEILLANCE



毒物進入人體途徑

ROUTES OF ENTRY

生活方式 LIFE STYLE

職業衛生
OCCUPATIONAL

環境衛生
ENVIRONMENTAL

化學性污染物質

CHEMICAL CONTAMINANTS

氣體
GAS

蒸氣
VAPOR

塵粒
PARTICULATE

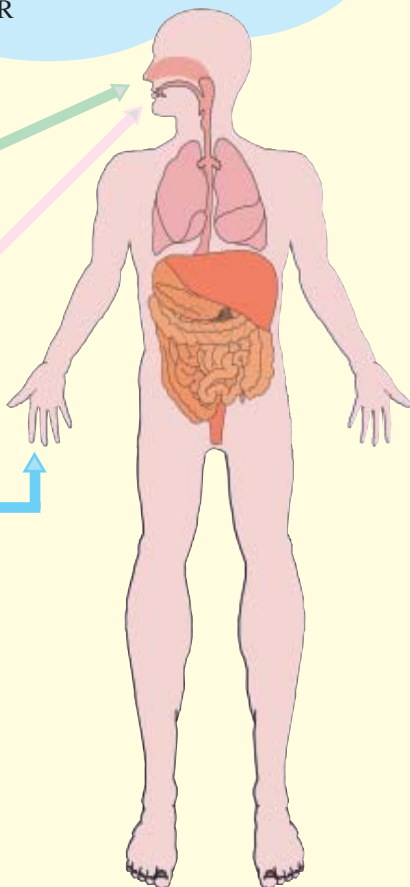
食物
FOOD
飲料
WATER

空氣
AIR

呼吸
INHALATION

吞食
INGESTION

滲透皮膚
SKIN ABSORPTION
皮膚接觸
SKIN CONTACT





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