



## Controlling exposure to disinfectants used in the food and drink industries

### Food Information Sheet No 29

#### Introduction

This information sheet advises employers in the food and drink manufacturing industries on selecting and using disinfectants safely, without compromising food hygiene. Guidance is provided on the actions and precautions required to ensure that employees' exposure to disinfectants is adequately controlled.

Disinfectants are biocidal chemicals used to control food contamination by micro-organisms. Disinfectants are classified as hazardous substances. Although disinfectants used in the food and drink industries are especially selected so that potential residues left on surfaces etc do not taint the food or are harmful to the consumer, many affect the skin, eyes or respiratory system and can be harmful if ingested in sufficient quantity.

#### Legal requirements

There are workplace legal requirements which apply to the use and supply of disinfectants. These include:

- the Control of Substances Hazardous to Health Regulations 1999 (COSHH),<sup>1</sup> which require employers to assess the risk to health, and provide adequate control measures when using hazardous chemicals such as disinfectants;
- the Chemicals (Hazard Information and Packaging for Supply) Regulations 1994 (CHIP),<sup>2</sup> which deal with the classification and labelling of substances and preparations for supply; and
- the Biocidal Products Regulations (BPR),<sup>3</sup> which are intended to ensure a high level of health and environmental protection through a product authorisation scheme. Biocidal products and their active ingredients are required to be rigorously tested to ensure that risks are minimised for people, animals and the environment.

#### Disinfection policy

To maximise effective and efficient use of disinfectants, employers should produce a disinfection policy (sanitisation programme<sup>4</sup>). Primarily, this will be concerned with controlling microbial contamination, ensuring that operatives are familiar with cleaning procedures and the chemicals to be used. Producing a policy should produce cost savings by eliminating the unnecessary use of disinfectants and by restricting the range available.

However, the policy should also address the hazardous nature of the chemicals and take account of the risks to operatives presented by the application technique. For example, where two disinfectants are equally effective, the least hazardous formulation should be used.

Considering the potential risk at the planning stage is important and will require a COSHH assessment to be undertaken.

#### COSHH assessment

The COSHH assessment<sup>1</sup> should identify the purpose of the disinfectants and eliminate their use where appropriate, eg where cleaning alone is adequate or heat can be used. The assessment of disinfectants which are required should include:

- a list of all chemicals to be used;
- their hazards;
- measures provided to control operator exposure, covering
  - safe storage;
  - chemical compatibility;
  - working concentrations and safe dilution procedures;
  - application procedures and equipment;
- any air monitoring or health surveillance requirements;
- information and training requirements;
- provision of washing facilities;
- an emergency action plan (eg for spillage);
- waste disposal - environmental considerations should be contained in the material safety data sheet (MSDS).

The assessment should be able to demonstrate that the measures provided to control operator exposure are effective.

## Hazards of disinfectants

Disinfectant suppliers use the material safety data sheet to set out the hazardous properties of their products. It provides information about the health hazards, physical and chemical characteristics, first aid, and how to use the chemical safely.

Disinfectants commonly used in the food, drink and catering industries include the following:

- **Surface active agents** (surfactants) - these are detergents, some of which exhibit biocidal properties. These include the amphoterics (based on amyl alkyl glycines), the cationics (quaternary ammonium compounds - known as QACs or quats) and biguanides/diguanides. Many of the amphoterics and cationics are classified as skin, eye and respiratory irritants. Biguanides/diguanides are of low toxicity and irritancy and are useful skin disinfectants.
- **Alcohols** - these are used as skin cleaners as well as a transport medium for other active ingredients, but nevertheless are irritant to eyes, nose and throat at high airborne concentrations and can be a fire risk.
- **Aldehydes** - glutaraldehyde is classified as a skin and respiratory sensitiser. Formaldehyde is a strong respiratory irritant and is also classified as a category 3 carcinogen.
- **Peracetic acid** is a powerful oxidising agent used in the food and drink industries and is also extremely corrosive.
- **Hypochlorite** and organic chlorine-releasing compounds are corrosive in their concentrated form and are classified as eye and skin irritants in their dilute form (5<10%).

Normally disinfectants identified as containing chemicals that are toxic by inhalation or to the skin, or are classified as sensitisers, should be avoided (eg some aldehydes) unless the sanitation programme identifies an absolute requirement. In such cases, strict safety measures to control exposure will be required.

## Controlling exposure

### Storage

The potential for chemical reaction should be considered when more than a single disinfectant is used. Incompatible chemicals should be stored separately. For example, chlorine-based disinfectants release toxic chlorine gas when in contact with acid or oxidising detergents. Also, hypochlorites form irritant nitrogen halide vapours in contact with amines (eg QACs) and should be stored separately. Disinfectants containing

peracetic acid form explosive mixtures with cleaners containing acids or alkalis.

## Handling concentrates and dilution procedures

Full-strength concentrates are seldom used for disinfection purposes. Working concentrations should not exceed manufacturers' specifications as overdosing increases the risk to operatives, in addition to being wasteful, and may damage plant and equipment.

Where costs allow, purchasing disinfectants in their dilute form or in pre-pack quantities for direct dilution are the safer options. Where these are not available or incur prohibitive costs, diluting concentrates by auto-metering, or positive displacement using drum pumps, are considered safer than gravity feed from taps. The latter may jam or be displaced, resulting in uncontrolled leakage into the workroom.

Diluting concentrates by manually tipping drums or carboys is extremely poor practice; it will inevitably cause a spill risk and should not be carried out.

## Application procedures

### Clean-in-place (CIP) systems

These systems are the safer option for internal disinfection of plant and equipment. This minimises exposure to operatives so long as the plant is maintained and safe systems of work are used.

### Mist and foam spraying

This generates aerosol likely to produce whole-body exposure to the disinfectants. A greater risk is presented by pressure mist spraying where higher levels of aerosol will be generated. Suitable personal protective equipment (PPE) and respiratory protective equipment (RPE) should be provided.<sup>5,6</sup> Suitable RPE will range in type from disposable masks, used to protect against liquid aerosols (particle filters marked SL), to airline breathing apparatus, depending on the toxic nature of the disinfectant and personal and work-related factors. PPE may include chemical suit or wetproof apron/overalls, boots, gloves/gauntlets and a visor for eye protection. For example, spraying aldehyde or peracetic acid formulations is likely to require the provision of airline breathing apparatus with full face mask or visor, in addition to full chemical protective clothing, boots and gloves or gauntlets.

### Fogging

This employs similar disinfectants and concentrations to those used in mist and foam applications. However, fogging presents a particular risk to the respiratory system as it produces smaller droplets than spraying. These can remain suspended in air for 45-60 minutes or longer, depending upon the droplet size. This method

requires a risk assessment for each type of agent used and strict management procedures to prevent early re-entry of people into fumigated areas, particularly where the more hazardous disinfectants are used (eg aldehydes or peracetic acid). The effectiveness of fogging (and associated health and safety considerations) are fully described in published guidance.<sup>7</sup>

Soak tanks and manual disinfection (bucket, mop, cloth and brush)

These present a risk of skin and eye exposure (the latter from splashes) which, in many cases, will require the use of an impermeable apron, overalls, gloves/gauntlets and safety spectacles/visor for protection. In addition, where volatile chemicals or respiratory irritants/sensitisers are used (eg alcohols, formaldehyde, glutaraldehyde), there may be a requirement for respiratory protection, particularly when disinfecting in enclosed spaces.

Disinfectant penetration and contamination of PPE

It is important to ensure that garment, glove and boot selection have the ability to resist penetration by the disinfectant concerned. Manufacturers and suppliers have duties to supply this information. However, it should be born in mind that although some types of PPE provide very high levels of protection, breakthrough will eventually occur so none provide 100% protection. Also, skin exposure may occur when removing used PPE. Suitable disposable gloves offer an easy management system to eliminate hand exposure from gloves that become contaminated inside. Advice and information for operators is necessary to ensure that the PPE provides the protection needed.

Maintenance

Disinfectant application equipment should be regularly maintained. Exposure control equipment should be kept in efficient working order and good repair. PPE/RPE should be examined and, where appropriate, tested at suitable intervals. Gloves should be inspected visually every time they are used. Disposable gloves should only be used once if chemicals are handled.

**Air monitoring**

Initially, air sampling may be required to check re-entry is safe into areas where fogging has been undertaken, particularly when high-hazard disinfectants are used, eg aldehydes. Air sampling may be used to identify settling times or the required number of ventilation air changes to reduce airborne concentrations to safe levels prior to re-entry. However, the majority of disinfectants do not have occupational exposure limits. In these cases, reference can be made to published guidance<sup>7</sup> which describes settling times.

**Health surveillance**

Employers are required to carry out health surveillance if exposure of any employee to any disinfectant is such that:

- an identifiable disease or adverse health effect may be related to the exposure;
- there is a reasonable likelihood that the disease or effect may occur under the particular conditions of work; and
- there are valid techniques for detecting indications of the disease or the effect.

Use of aldehydes as disinfectants will require health surveillance. Health surveillance is also likely to be required where there is a risk of contact dermatitis, which is associated with some disinfectants.

**Information and training**

Operators should be informed about the hazards of the disinfectants they work with and the risks created by exposure to these chemicals. They should be instructed in the precautions to take and how to use the control measures provided, and also informed of the results of any air monitoring and health surveillance.

**Washing facilities**

In many cases, skin is the principal organ that may be exposed to disinfectants, so ready access to washing facilities is essential. Employers should ensure that suitable facilities are provided to allow operatives to clean themselves after using disinfectants and before eating and drinking. PPE should be cleaned after use and stored separately from everyday work wear. Where showers or eye-sprays are provided (see following paragraph), they should be frequently flushed through and account taken of a potential risk from legionella bacteria, for which appropriate precautions should be taken.<sup>8</sup>

**Emergency procedures**

Emergency procedures should be in place, particularly when handling larger quantities of concentrated disinfectant. Emergency washing facilities (eg showers, eye-wash stations) should be available including measures to irrigate eyes in the event of splashes. The material safety data sheet should be consulted to obtain the appropriate method for handling spillages; this may include, for example, spill trays or absorbent granules. Environmental issues should be considered in the event of a spillage, particularly to prevent spillages running into storm or surface drains.

## References

- 1 General COSHH ACOP (Control of substances hazardous to health) and Carcinogens ACOP (Control of carcinogenic substances) and Biological agents ACOP (Control of biological agents). Control of Substances Hazardous to Health Regulations 1999. Approved Codes of Practice L5 (Second edition) HSE Books 1999 ISBN 0 7176 1670 3
- 2 Approved guide to the classification and labelling of substances and preparations dangerous for supply. Chemicals (Hazard Information and Packaging for Supply) (Amendment) Regulations 1997. Guidance on Regulations L100 (Fourth edition) HSE Books 1999 ISBN 0 7176 1726 2
- 3 A guide to the Biocidal Products Regulations for users of biocidal products HSG209 HSE Books 2001 ISBN 0 7176 1821 8
- 4 'Disinfection of food production areas' JT Holah Rev Sci Tech Off Int Epiz 1995 **14(2)** 343-363 available from Campden and Chorleywood Food Research Association, Chipping Campden, Gloucestershire GL55 6LD Tel: 01386 842000
- 5 Personal protective equipment at work. Personal Protective Equipment at Work Regulations 1992. Guidance on Regulations 1992 L25 HSE Books 1992 ISBN 0 7176 0415 2
- 6 The selection, use and maintenance of respiratory protective equipment. A practical guide (Second edition) HSG53 HSE Books 1998 ISBN 0 7176 1537 5
- 7 A practical guide to the disinfection of food processing factories and equipment using fogging Silsoe Research Institute, Wrest Park, Silsoe, Bedford MK45 4HS Tel: 01525 860000
- 8 Legionnaires' disease. The control of legionella bacteria in water systems. Approved Code of Practice and guidance L8 (Second edition) HSE Books 2000 ISBN 0 7176 1772 6

While every effort has been made to ensure the accuracy of the references listed in this publication, their future availability cannot be guaranteed.

## Further information

HSE priced and free publications are available by mail order from HSE Books, PO Box 1999, Sudbury, Suffolk CO10 2WA Tel: 01787 881165 Fax: 01787 313995 Website: [www.hsebooks.co.uk](http://www.hsebooks.co.uk) (HSE priced publications are also available from bookshops.)

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