



## Expert forecast on emerging chemical risks related to occupational safety and health

There are an estimated 167,000 work-related fatalities in the EU27 every year. About 159,000 are attributable to work-related diseases, of which 74,000 may be linked to workplace exposure to hazardous substances (1).

### What are emerging risks?

An 'emerging OSH risk' is any risk that is both **new** and **increasing**.

**New** means that:

- the risk was previously non-existent; or
- a long-standing issue is now considered to be a risk due to new scientific knowledge or public perceptions.

The risk is **increasing** if:

- the number of hazards leading to the risk is rising; or
- the likelihood of exposure is rising; or
- the effect of the hazard on workers' health is getting worse.

### Identifying emerging risks

The Community Strategy 2002-06 (2) called on the Agency to 'set up a risk observatory' to 'anticipate new and emerging risks'. The expert forecast was formulated within this context, from the results of three consecutive questionnaire-based surveys using the Delphi method (in which the results of the previous survey round are fed back to the experts for further evaluation until a consensus is achieved). A five-point Likert scale was used to rate the risks. Forty-nine experts from 21 European countries participated in the survey.

### Emerging chemical risks

#### Particles

**Nanoparticles** (NPs) are already used in many applications. NPs can have very different properties from the same materials at the macro scale. Little research attention has been paid to health and safety issues but it is certain that NPs can enter the human body. Although the degree of damage is still unknown, there are indications that they can cause toxicity, cardiopulmonary effects, modification of protein structures, autoimmune effects, oxidative stress and cancers. There is a need to determine the physico-chemical, toxicological and behavioural properties of each type of NP and to develop reliable methods for their detection and measurement in the environment as well as in the human body. Although quantitative data are lacking, sufficient information is available to begin preliminary assessment and to develop interim working practices to reduce workplace exposure.



By courtesy of INSHT, Spain

**Diesel exhaust** is classified as 'probably carcinogenic' (IARC classification). It is the fourth most common carcinogen found in the workplace, (3) and may cause lung cancer as well as non-cancer damage to the lung. More research is needed on the health effects of such particulates.

**Man-made mineral fibres** (MMMFs) are continuously evolving materials. Inhalation of fibrous structures increases inflammatory, cytotoxic and carcinogenic potential – the longer and thinner the fibres, the more dangerous they are. Specific dimensions of MMMFs are thought to have a biological activity but need to be evaluated in epidemiologic studies. Standard air sampling methods are also needed to allow precise measurement of fibre size. While some MMMFs could be classified in the EU classification (e.g. aluminium silicate wool/refractory ceramic fibres and type E special purpose glass fibres as carcinogenic category 2), there is a need to gather information on the toxicity of unclassified MMMFs.

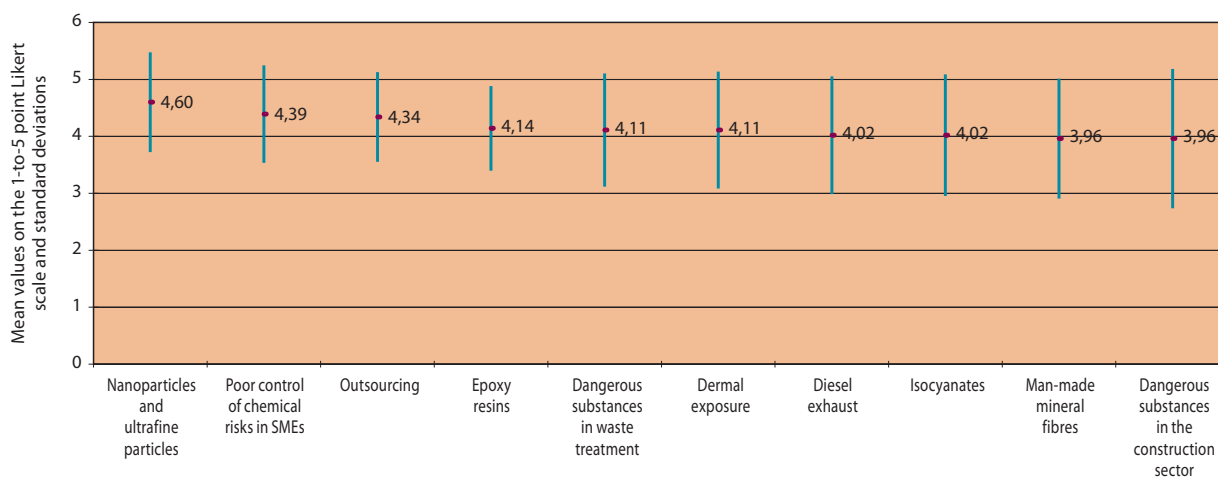
#### Allergenic and sensitising agents

The continuous demand for new epoxy resins with enhanced properties – e.g. for the manufacture of adhesives, paints, coatings and polymer composite structures – may introduce unknown adverse health effects. Epoxy resins are a major cause of occupational allergic contact dermatitis. Skin sensitisation, irritation of the eyes and respiratory tract, contact urticaria, rhinitis and asthma are also reported. Epoxy skin sensitisation is particularly problematic in construction, where a safe and healthy working environment (e.g. clean workspace) and the use of protective clothing (e.g. gloves) are impractical.

(1) ILO 2005: Figures are an estimate for EU27; <http://www.ilo.org/public/english/protection/safework/wdcongrs17/index.htm>

(2) 'Adapting to change in work and society: a new Community strategy on health and safety at work 2002-06', Com (2002) 118 final.

(3) Kauppinen, T. et al., 'CAREX – International Information System on Occupational Exposure to Carcinogens. Occupational exposures to carcinogens in the European Union in 1990-1993', FIOH, Helsinki 1998.



The 10 most important emerging chemical risks identified in the survey

**Isocyanates** are widely used in the manufacture of foams, fibres, elastomers, building insulation materials, paints and varnishes. Exposure to isocyanates occurs not only at the production stage but also when polyurethane products containing isocyanates are used in processes such as spraypainting, welding or abrading of car bodies. They are powerful asthmatic sensitising agents and irritants to the mucous membranes. Direct skin contact can cause serious inflammation and dermatitis.

**Dermal exposure** is a major route of occupational exposure to dangerous substances. Skin disorders are the second most common occupational diseases in the EU, and chemicals are responsible for 80-90% of these. However, there is no validated scientific method to assess dermal exposure to dangerous substances, and no 'dermal' occupational exposure limits (OELs). The thorough identification and control of risk factors for dermal exposure are therefore very important.

### Carcinogens, mutagens and reprotoxic substances (CMRs)

Asbestos, crystalline silica, wood dust, organic solvents, endocrine disruptors, persistent organic pollutants, aromatic amines, biocides, azo dyes and combined exposures to several carcinogens were identified as emerging risks. No fewer than 32 million people in the EU are exposed to such carcinogens at levels considered unsafe (\*). About 95,500 fatal cancers each year could be work-related, which would make cancer one of the main occupational causes of death in the EU.

### Sector-specific chemical risks

Dangerous substances in the **construction** sector and in **waste treatment** were highlighted as emerging risks. The illness rate is 50% higher in waste workers than in other sectors. High levels of dust and over 100 volatile organic compounds (VOCs) were found. Electrical and electronic equipment and end-of-life vehicles are

increasingly being recycled and contain lead, cadmium, mercury and polychlorinated biphenyls (PCBs). While it is not possible to completely eliminate the chemical risks inherent in waste management, the most efficient prevention measure is to reduce the generation of dust, aerosols and VOCs. Technical collective measures and hygiene plans also contribute greatly to reducing workers' exposure. Prevention should be adapted to the type of waste and treatment activities concerned.

### Combined risks

In addition to **mixed dangerous substances**, combined chemical and psychosocial risks were identified, such as the **poor control of chemical risks in small and medium-size enterprises (SMEs)** – which make up 99.8% of all businesses (EU25, 2003) – and increasing subcontracting practices, e.g. in maintenance and cleaning, whereby **subcontracted workers are less aware of chemical risks** and hence more vulnerable to dangerous substances. Considering each risk factor independently may lead to an underestimation of the real risks to workers.

### Further information

This expert forecast is the last of a series of four reports on physical, biological, psychosocial and chemical risks.

The full report 'Expert forecast on emerging chemical risks related to occupational safety and health' is available at:

<http://osha.europa.eu/en/publications/reports/TE3008390ENC/view>

All the information published by the European Risk Observatory is available at:

<http://osha.europa.eu/en/riskobservatory>

(\*) 'Commission consults workers and employers on reducing exposure to substances that cause cancer and reduce fertility', *European Commission press release*, Reference IP/04/391, Brussels, 26 March 2004.