

Exercises solution

Master's degree in environmental science and engineering

Occupational and environmental health

1. Introduction

1. Our exposure to pollutants can come from a variety of living spaces, in which case we speak of aggregate exposure. For the following pollutants, can you identify the relevant living space(s), as well as a typical example of an exposure situation?

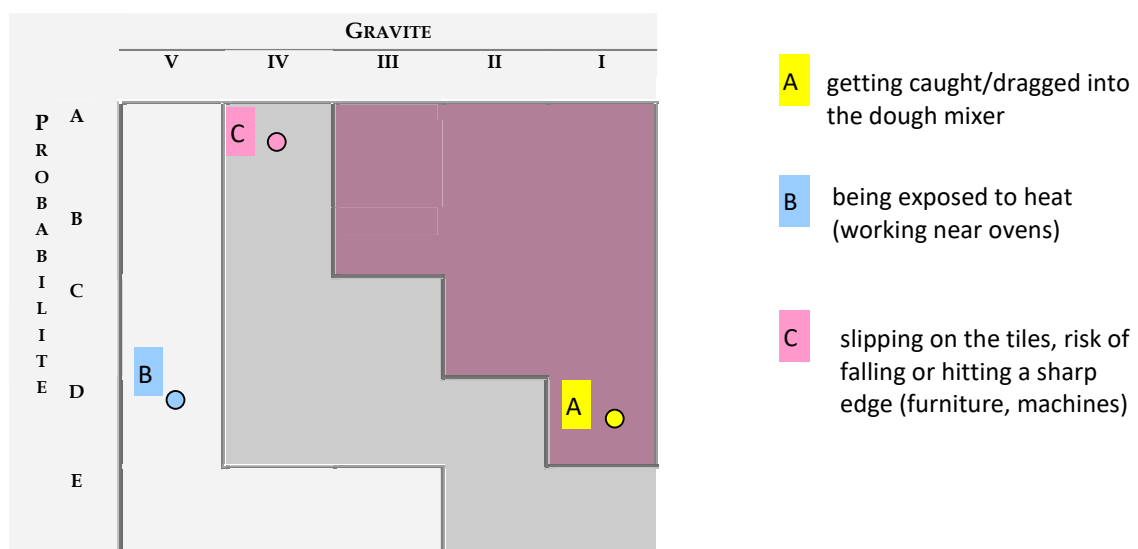
Pollutant	General environment	Indoor environment	Occupational environment
Ozone (Example)	Airborne UV-induced O ₃ generation in polluted areas	n.a.	O ₃ -based water disinfection processes, arc welding
Formaldehyde	n.a.	Emission from building materials and furniture	Manufacture of building material, biology and medicine (tissues fixation)
TiO ₂ nanoparticles	Residues in food, cosmetics, re-emission from building material or tires	Residues in food, cosmetics	Manufacture of paint, cement, tires...
Lead	Residues from traffic pollution	Lead-based paint on wall and furniture	Metal industry, metal recycling, battery manufacture

1. 30% of European workers declare that work affects their health. In Switzerland, only 2700 occupational diseases are recognized annually (against >270'000 accidents).
 - a. Name factors that explain this underreporting.
 - b. Can you imagine situations leading to under-reporting of occupational injuries?
- a) The possible link between the disease and the occupational exposure may not be identified (occupational history not taken, few occupational physicians, link not known or poorly documented). In the case of diseases occurring after a long delay, it is difficult to identify the associated occupational exposure. Diseases resulting from nuisances indirectly linked to the professional activity are generally not identified as

occupational diseases (e.g. environmental nuisance suffered at work). Even if the link is suspected, the disease may not be recognized as occupational because of its lack of specificity (e.g. lung cancer), or the presence of other exposure factors.

- b) Occupational accidents are easily identifiable and should therefore be reported in full. When the absence of an accident can lead to substantial benefits (e.g. employer's bonus) it is however possible that "light" accidents are not always reported.

2. A risk assessment carried out in an industrial bakery has enabled us to locate 3 dangerous phenomena in the following matrix (SUVA risk matrix). Propose examples of preventive measures that seem adequate for these situations (justify the type of measure proposed).



The proposed measures must have the following characteristics:

- Risk A: Priority measure (of a strategic or technical nature) which can significantly reduce the severity or frequency of events (purchase of a new machine meeting stricter safety standards, installation of a protective cover, a contact bar with safety switch, etc.).
- Risk B: No measures required. Investments should be primarily reserved for higher risk hazards (A and C). Organizational or individual measures of lower cost can be considered (protective apron against infrared, rotation of activities to reduce the time spent working in hot environments).
- Risk C: Economically and technically reasonable measures. Given the acceptance matrix, measures to reduce the severity of damage should be preferred (e.g., protection or removal of sharp edges). Measures to reduce the probability of occurrence will reduce the risk, but probably not get out of the ALARP zone (e.g. anti-slip soles, reorganization of flows to limit travel,...)

