

Exercises

Master's degree in environmental science and engineering

Occupational and environmental health

2.3 Chemical pollutants - Assessment and control

1) Measurements in companies

A measurement campaign was carried out in two similar companies. These were personal exposure measurements in a group of operators (15 people) performing the same tasks under comparable conditions. The samples were taken during 8 hours for a solvent A (Suva VME: 100 ppm). The results are as follows:

Company A:

Measure 1: 85 ppm
Measure 2 : 86 ppm
Measure 3 : 83 ppm
Measure 4: 88 ppm
Measure 5: 83 ppm
Measure 6: 78 ppm

Company B:

Measure 1: 25 ppm
Measure 2: 2 ppm
Measure 3: 3 ppm
Measure 4: 35 ppm
Measure 5: 45 ppm
Measure 6: 12 ppm

Comment on these two statements:

- (a) The exposures in Companies A and B are below the TWA.
- b) Company B's employees are less exposed than Company A's.

2) Art restoration

In an art restoration workshop, a restorer uses toluene to clean the paint layer of his paintings. This work is long and difficult and can keep him busy for several days.

From the one-compartment model*, evaluate the art conservator's occupational exposure to toluene by inhalation.

It is assumed that the workshop is not equipped with ventilation and that the air exchange rate of the room is low (0.5 h^{-1}). The emission rate G [mg/h] of the solvent can be estimated by assuming that over the 8 working hours, the conservator uses a total volume of 250 ml of toluene ($d_{\text{toluene}} = 0.8669$). The volume of the workshop is 50 m^3 .

* Initial concentrations and other sources of contamination are neglected.

Is the toluene TWA of 50 ppm (190 mg/m^3) exceeded?