

M501: MEASUREMENT OF HAZARDOUS SUBSTANCES INCLUDING RISK ASSESSMENT

CASE STUDY 5 – SUPPLEMENTARY INFORMATION

- **Properties of Tetraethyl Lead (TEL)**

Lead alkyls are heavy (specific gravity 1.6), colourless, volatile liquids with a pleasant characteristic odour. Exposed to the atmosphere they can evaporate to create a toxic environment. They are usually made up in a 30% solution with toluene.

Alkyl leads are soluble in oils, fats and hydrocarbons, but virtually insoluble in water.

Alkyl lead, when exposed to the atmosphere, is converted from the organic to the inorganic form of lead by oxidation, however the net lead content remains largely unchanged.

- **Hazards of TEL**

TEL is metabolised by the liver to the more soluble tri-alkyl lead form which is the toxic agent. Exposure to organic lead can constitute a toxic hazard by absorption, either

- a) Through the skin from contact with the liquid
- b) Through the lungs by inhalation of the vapour
- c) Through the alimentary tract by ingestion of the liquid

If appropriate biological monitoring is conducted, over-exposure should be identified before the appearance of clinical signs and symptoms. Clinical effects may follow one brief severe exposure or repeated more mild exposures. Those of the central nervous system predominate.

- **Exposure Limits**

0.1 mg/m³ as Lead (Pb) (8 hour time-weighted-average – skin)

- **Health Surveillance**

Biological monitoring to estimate urinary lead is the most sensitive way of detecting over-exposure. Elevated levels will occur before clinical signs and symptoms are apparent. Samples should be taken 4 to 6 hours following exposure as the lead in urine is eliminated rapidly and almost completely after 24 hours.

The estimation of lead in whole blood is suitable for inorganic lead but of little value in identifying alkyl lead poisoning.

For tank cleaning urinary leads should be carried out:

- a) Before and soon after each tank cleaning activity
- b) After any incident with known or possible over-exposure to alkyl lead vapours
- c) After advice from an occupational hygiene assessment that chronic exposure could be occurring

Individuals with urinary lead levels below 50 µg/litre may be considered in the normal range. Between 50 and 120 µg/litre, the test should be repeated for confirmation and precautionary steps taken to reduce exposures. For levels above 120 µg/litre, urgent investigation of workplace exposure must be carried out, the urinary lead estimation repeated and the individual must be immediately removed from lead work.

- **Composition of Leaded Gasoline**

Depending on the individual refinery, gasoline may contain variable amounts of:

Alkanes

n-Hexane

Cycloalkanes

t-Butyl Methyl Ether

Alkenes

Pseudocumene (1,2,4 – Trimethylbenzene)

Aromatic Hydrocarbons

Cyclohexane

Oylenes (ortho, meta & para)

Ethylbenzene

Toluene

Naphthalene

Benzene

Lead