

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

December 1, 2003

TO: Ethylenated benzene residues file (CAS # 68987-42-8)  
FROM: Gary Butterfield  
SUBJECT: Screening level for ethylenated benzene residues

Ethylenated benzene residues are also known as 1,1-diphenylethane with thermal degradation products, or the manufacturer's name of Dowtherm Q heat transfer fluid (degraded). This material is a light brown liquid, made up of a mixture containing mainly 1,1-diphenylethane, along with other degradation products. The vapor pressure of this liquid was reported to be 0.0015 mmHg at 25C.

The following references or databases were searched to identify data to determine the screening level: U.S. Environmental Protection Agency (EPA) Integrated Risk Information System (IRIS), National Institute for Occupational Safety and Health (NIOSH) Registry for Toxic Effects of Chemical Substances (RTECS), American Conference of Governmental and Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs), Michigan Department of Environmental Quality (DEQ) library, International Agency for Research on Cancer (IARC) Monographs, Chemical Abstract Service (CAS) Online (1968 - May 2003), National Library of Medicine (NLM) - Toxline, and National Toxicology Program (NTP) Status Report.

The CAS and NLM on-line literature searches were conducted on May 5, 2003. No toxicity studies were located under this CAS number during the literature searches. Dow Chemical was able to supply summaries of some unpublished toxicity studies from their files so that a screening level could be calculated.

In an acute oral toxicity study, Dow/Lacher (1990), a group of three male F344 rats were given a single gavage dose of 2000 mg/kg of undiluted thermally degraded 1,1-diphenylethane. All rats survived the two week observation period. The LD50 is greater than 2000 mg/kg.

In a two week inhalation study, Dow/Bradley et al (1993), groups of 5 male F344 rats, 6 weeks old, were exposed to concentrations of 0, 19.8 or 86.5 mg/m<sup>3</sup> for 6 hours a day, 5 days per week for a total of 9 exposures. There was no exposure related effects in any dose group for clinical observations, body weight changes, gross pathology, or histopathology. The NOEL from this report is 86.5 mg/m<sup>3</sup>.

For the purpose of establishing an ITSL, a longer term study and an inhalation study is generally preferred over an acute oral study. Therefore, the two week inhalation study provides the best basis for setting the ITSL. The ITSL can be calculated using the NOEL of 86.5 mg/m<sup>3</sup> and the equation from R232(1)(d) as follows. It should be noted that R232(1)(d) is to be used with a seven-day study. However, there is not a significant difference between nine and seven days of exposure, so the R232(1)(d) equation will be used un-modified.

$$\text{ITSL} = \frac{(86.5 \text{ mg/m}^3)}{35 \times 100} \times \frac{6}{24} = 6 \text{ ug/m}^3 \text{ annual average}$$

References:

Dow/Bradley et al. 1993. Dowtherm Q: a two week inhalation toxicity study with Fischer 344 rats. Lab report code K-000667-004. Summary supplied by Dow Chemical to DEQ Air Quality Division.

Dow/Lacher. 1990. 1,1-diphenylethane (thermally degraded): acute toxicologic properties. Lab report code K-000667-002. Summary supplied by Dow Chemical to DEQ Air Quality Division.