Environment Canada Environnement Canada

Risk Evaluation Determining Whether Environmental Emergency Planning is Required Under the

Environmental Emergency Regulations set under the *Canadian Environmental Protection Act, 1999* (CEPA 1999)

Acetic Acid (CAS #: 64-19-7)

(Industry requested this substance to be assessed for possible addition to the *Environmental Emergency Regulations*)

Introduction

Acetic acid (CAS number 64-19-7) is found on the Domestic Substances List (DSL) (Environment Canada, 1996). According to the *Canadian Chemical Directory*, *acetic acid* is distributed by 38 companies and manufactured by one company (Camford, 2005). Environment Canada has not yet undertaken a Priority Substances List (PSL) Assessment Report on *acetic acid*.

Summary of Risk Evaluation Analysis

The Risk Evaluation Framework (REF), developed by Environment Canada, is applied to chemical substances in order to determine whether or not an environmental emergency (E2) plan should be required. For those substances that are evaluated as requiring an E2 plan, the next step is to determine a threshold quantity for the total quantity of the substance and the maximum storage container size on site. Within the REF, three categories are used to evaluate chemicals and assign threshold quantities. Shown below are the details within the three categories for *acetic acid*:

Canada

1. Environment Hazard

(Persistence, Bioaccumulation and Aquatic Toxicity Analysis)

- *Acetic acid* is classified as highly persistent (half-life greater than or equal to 2 days) in air (Mackay *et al*., 2000). It is also non-persistent (half-life less than 14 days) in soil (HSDB, 2004).
- *Acetic acid* is practically non-bioaccumulative (Log Kow less than 2) (HSBD, 2004).
- For aquatic toxicity, it was determined that *acetic acid* is slightly toxic (LC_{50} at 96 hrs between 10 and 100 mg/L) based on the most sensitive species, fathead minnow (Mattson *et al*., 1976).

2. Human Hazard

(Inhalation Toxicity and Carcinogenicity Analysis)

- Since *acetic acid* has a vapour pressure above 1.33 kPa at 20°C (NJDHS, 2007; NFPA, 2002), there is sufficient vapour from the substance to cause an inhalation problem.
- There is an Immediately Dangerous to Life and Health (IDLH) value of 50 ppm (NIOSH, 2005).
- *Acetic acid* has currently not been evaluated for carcinogenicity (Genium, 2005).

3. Physical Hazard

(Flammability and Combustibility Analysis)

- *Acetic acid* is stable under normal storage conditions, and hazardous polymerization will not occur (Genium, 2005).
- When heated to decomposition, it emits acrid smoke (Lewis, 2000). The National Fire Protection Association (NFPA) has rated this chemical as '0' for reactivity (NFPA, 2002).

Flammability and Combustibility Analysis Table

	Value	Vapour Cloud Explosion (Yes/No)	Combustible (Yes/No)	References
Boiling point (°C)	118	No	No	(Genium, 2005; Lewis Sr., 2001)
Flash point (°C)	39			(HSDB, 2004; Genium 2005)

Threshold

The data from the above mentioned categories were used to determine the various environmental/human thresholds. The threshold quantities relate to: carcinogenicity, aquatic toxicity, inhalation toxicity, vapour cloud explosion, combustibility, and reactivity.

The threshold quantity for carcinogenicity is defaulted to 0.22 tonnes, if it meets the following criteria:
1) have an IARC rating of 1, 2A or 2B, or have a US EPA rating of A, B1, or B2;
2) be persistent in any media for greater than 5 years.

Threshold quantities assigned as a result of aquatic toxicity are based on the following table:

Threshold Quantities Assigned as a Result of Aquatic Toxicity

Criteria	Extremely Toxic	Highly Toxic	Moderately Toxic	Slightly Toxic
Persistence (water)	≥ 6 months	≥ 2 months to < 6 months	N/A	N/A
Bioaccumulation	BCF ≥ 5000 or Log Kow ≥ 5	BCF ≥ 500 to < 5000 or Log Kow ≥ 4 to < 5 (unless BCF < 500)	N/A	N/A
Acute Aquatic Toxicity (96 hrs LC_{50} – mg/L)	≤ 0.1	> 0.1 to ≤ 1	> 1 to ≤ 10	> 10 to ≤ 100
Threshold Quantity Tonnes (lbs)	**0.22 (500 lbs)**	**1.13 (2 500 lbs)**	**4.50 (10 000 lbs)**	**9.10 (20 000 lbs)**

A substance is a candidate for a vapour cloud explosion if its flash point is < 23°C and its boiling point is < 35°C. A substance is considered combustible if its flash point is < 23°C or its boiling point is < 35°C. In accordance with the precautionary principle, the category with the lowest threshold will be used. For further explanation, please refer to the *Implementation Guidelines for Part 8 of the Canadian Environmental Protection Act, 1999 – Environmental Emergency Plans* (http://www.ec.gc.ca/ee-ue/).

Conclusion

For *acetic acid*, the E2 hazard threshold was triggered by:
1) Aquatic toxicity at 9.10 tonnes;
2) Inhalation toxicity at 6.80 tonnes.

Therefore, *acetic acid* is recommended for addition to Schedule 1 of the *Environmental Emergency Regulations* under Part 2 with a threshold quantity of 6.80 tonnes.

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