

Evaluation Report for Category B, Subcategory 1.2 Application

Application Number: 2013-6882
Application: New technical grade active ingredient product chemistry – New source (site) for a new registrant
Product: Arkema M-70 Hydrogen Peroxide Technical
Registration Number: 31708
Active ingredients (a.i.): Hydrogen peroxide
PMRA Document Number : 2465221

Purpose of Application

The purpose of this application was to register a new source of hydrogen peroxide, Arkema M-70 Hydrogen Peroxide Technical (guarantee 70% hydrogen peroxide), by a new registrant.

Chemistry Assessment

Accepted Name: Hydrogen peroxide
IUPAC Chemical Name: Hydrogen peroxide
CAS Chemical Name: Hydrogen peroxide

Arkema M-70 Hydrogen Peroxide Technical has the following properties:

Property	Result
Colour and physical state	Colourless liquid
Nominal concentration	70%
Odour	Slightly pungent
Density	1.28 g/mL
Vapour pressure	1 kPa (20°C)
pH	< 2
Solubility in water	Miscible
n-Octanol/water partition coefficient (K_{ow})	$\log K_{ow} = -1.36$

The chemistry requirements for Arkema M-70 Hydrogen Peroxide Technical have been fulfilled.

Health Assessments

A detailed review of the toxicological database for the active ingredient, hydrogen peroxide,

consisting of waiver rationales and published data was conducted. The available data are of sufficient completeness and scientific quality to define the majority of potential toxic effects associated with the technical grade active ingredient (TGAI), Arkema M-70 Hydrogen Peroxide Technical.

Hydrogen peroxide occurs naturally in the cells of humans and other species. The compound is readily absorbed across biological membranes and once it is absorbed, hydrogen peroxide undergoes spontaneous or enzyme-catalyzed decomposition (e.g., catalase, glutathione peroxidase) into oxygen and water in tissues. As a result of spontaneous or enzyme catalyzed decomposition, the overall absorption, distribution, metabolism, and excretion of intact hydrogen peroxide in humans and mammals is negligible.

The acute toxicity of hydrogen peroxide solutions of various concentrations have been well-characterized in the published scientific literature with toxicity mainly related to the strong oxidizing and corrosive properties of hydrogen peroxide.

Arkema M-70 Hydrogen Peroxide Technical containing 70% hydrogen peroxide is considered to be highly acutely toxic via the oral route, of low acute toxicity via the dermal route, and of moderate acute toxicity via inhalation. The TGAI is considered to be corrosive to the skin and severely irritating or corrosive to the eyes, but it is not expected to be a skin sensitizer.

The label statements for Arkema M-70 Hydrogen Peroxide Technical are considered adequate to address the potential hazards described above.

Although, hydrogen peroxide's reactivity and strong tendency to decompose in tissues via spontaneous or enzyme catalyzed processes mean that acute toxicity endpoints are likely to be the ones most relevant to the evaluation of human health hazards, some limited information for other toxicity endpoints has been identified from the published literature and in some cases was reviewed in previous assessments by the PMRA.

Hydrogen peroxide has been administered by gavage and via drinking water to rats and mice, including catalase deficient mice, in a number of repeated dose studies. Decreased body weight gain and adverse effects on hematological parameters were observed in rats and mice, and incidences of reversible duodenal hyperplasia were reported in the catalase deficient mice consuming hydrogen peroxide in drinking water. Available published studies of repeated inhalation exposures are older and have limitations with respect to methodology and reporting, but respiratory tract irritation and histopathology, and changes to lung enzyme levels were observed in rats and dogs which is consistent with reports of respiratory tract irritation and inflammation, increased susceptibility to infections and other symptoms in workers exposed to elevated airborne levels of hydrogen peroxide in industrial settings.

There is a lack of adequate data to evaluate the developmental and reproductive toxicity of hydrogen peroxide. However, based on the limited available data, the long world-wide history of use of the compound as a commodity chemical and a pesticide, and the inability of the compound to accumulate in tissues due to its rapid decomposition, it is unlikely that hydrogen peroxide will induce developmental toxicity following maternal exposure or reproductive toxicity.

Hydrogen peroxide is mutagenic *in vitro*, but is not genotoxic *in vivo* due to its rapid decomposition to water and oxygen. This may be linked to the potential DNA damaging role of hydroxyl radicals formed from hydrogen peroxide and the access of these radicals to DNA in *in vitro* cell lines versus tissues *in vivo*.

There is limited evidence from experimental animals for the carcinogenicity of hydrogen peroxide based on studies in which duodenal tumours were reported following administration of the compound in drinking water to mice. However, the International Agency for Research on Cancer (IARC) considers hydrogen peroxide to be not classifiable as to its carcinogenicity in humans because the evidence in animals is limited and inadequate in humans. Also, the US FDA has concluded that there is no evidence that hydrogen peroxide is carcinogenic in foods treated with the compound during processing.

Incident Reports

Since April 26, 2007, registrants have been required by law to report incidents to the PMRA, including adverse effects to Canadian health or the environment. The database was searched for incident reports involving hydrogen peroxide. As of October 3rd, 2014, the PMRA received two domestic animal incident reports.

Both domestic animal incidents were associated with farmed Atlantic salmon mortality that occurred during a bath treatment for sea lice with hydrogen peroxide. One of these incidents was found to be related to the reported pesticide exposure. A delayed flushing of hydrogen peroxide from the well tank in conjunction with extended exposure duration to the pesticide resulted in fish mortality.

The above incident information was incorporated into the evaluation of hydrogen peroxide.

Environmental and Value Assessment

Environmental and value assessments were not required for this application.

Conclusion

The PMRA completed a review of the information provided in support of Arkema M-70 Hydrogen Peroxide Technical and found it sufficient to grant a full registration.

References

A. List of Studies/Information Submitted by Registrant

PMRA Document Number	Reference
2397022	1996, Special Report No. 10 Hydrogen Peroxide OEl Criteria Document, DACO: 3.2.2, 4.1, 4.6.1, 4.6.2, 4.6.3, 4.6.4, 4.6.5, 4.6.6 CBI

2369818	2013, Chemistry-2.1-2.2, 2.3.1-10dec2013-M70-arkema, DACO: 2.1, 2.12.1, 2.2, 2.3.1 CBI
2369819	2013, Chemistry-2.11.2-10dec2013-M70-arkema, DACO: 2.11.2 CBI
2369821	2013, Chemistry-2.3-9-Arkema M 70-10december2013, DACO: 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9
2369822	2013, Albone 70% MS: Preliminary analysis and Enforcement Analytical Method, DACO: 2.13.1, 2.13.2, 2.13.3 CBI
2369823	2001, Albone 70% MS: Product Chemical Identity, Manufacturing Process and Impurities Data, DACO: 2.11.1, 2.11.2, 2.11.3, 2.11.4, 2.13.1 CBI
2440478	2001, Albone 70 MS (Hydrogen Peroxide): Product Chemical Identity, Formulating Process and Impurities Data , DACO: 2.11.1, 2.11.3, 2.11.4 CBI
2440479	2014, Chemistry-2.11.2-14july-M70 new source, DACO: 2.11.2 CBI
2440481	2008, COA-2-[CBI Removed], DACO: 2.11.2 CBI
2440482	2013, COA-2-[CBI Removed], DACO: 2.11.2 CBI
2440485	2011, COA-[CBI Removed] analysis result in Nov2012, DACO: 2.11.2 CBI
2440486	2008, COA-[CBI Removed], DACO: 2.11.2 CBI
2440487	2013, COA-[CBI Removed] , DACO: 2.11.2 CBI
2440488	2014, The Manufacture of Hydrogen Peroxide, DACO: 2.11.3 CBI
2440491	2013, [CBI Removed] analysis Albone M-70-2013-FI-FI20130912145600-A-00126142-05176[1], DACO: 2.13.4 CBI
2440492	2012, [CBI Removed] analysis Albone M-70-2013-FI-FI20130912145600-A-00126142-05176[1], DACO: 2.13.4 CBI
2440493	2011, [CBI Removed] analysis Albone M-70-2013-FI-FI20130912145600-A-00126142-05176[1], DACO: 2.13.4 CBI

B. Additional Information Considered

PMRA Document Number	Reference
2468362	International Agency for Research on Cancer World Health Organization, 1999, Hydrogen Peroxide, IARC Monographs on the Evaluation of Carcinogenic Risks to Humans Volume 71 Re-evaluation of some organic chemicals, hydrazine, and hydrogen peroxide, DACO: 12.5.4
2468363	US Food and Drug Administration, 2014, Hydrogen Peroxide, US FDA Database of Select Committee on GRAS Substances (SCOGS) Reviews, DACO: 12.5.4
2469168	ECETOC, 1993, Hydrogen Peroxide CAS No. 7722-84-1, Joint Assessment of Commodity Chemicals No. 22 January 1993, DACO: 12.5.4
2469174	European Chemicals Bureau (ECB), 2003, Hydrogen Peroxide, European Union Risk Assessment Report CAS No. 7722-84-1 EINECS No. 231-765-0 European Commission Joint Research Centre, DACO: 12.5.4
2469175	US EPA, 1993, Peroxy Compounds Reregistration Eligibility Decision List D Case 4072, December 1993, DACO: 12.5.4

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