

## 16 Regulatory Status

Included in the FDA Inactive Ingredients Database (topical and transdermal gels). Approved in the US as an indirect food additive. Included in nonparenteral formulations available in the UK and France. Included in the Canadian Natural Health Products Ingredients Database.

## 17 Related Substances

## 18 Comments

A number of studies have shown that the inclusion of diethylene glycol monoethyl ether can improve localized drug delivery by increasing drug retention in the skin. This is associated with the swelling of lipid bilayer structures which subsequently act as a depot for drug-solvent complexes, which enables the slow and localized diffusion of the drug over time.<sup>(3-5,14)</sup>

The EINECS number for diethylene glycol monoethyl ether is 203-919-7. The PubChem Compound ID (CID) for diethylene glycol monoethyl ether is 8146.

## 19 Specific References

- 1 Strickley RG. Solubilizing excipients in oral and injectable formulations. *Pharm Res* 2004; 21(2): 201-230.
- 2 Puglia C, Bonina F. Effect of polyunsaturated fatty acids and some conventional penetration enhancers on transdermal delivery of atenolol. *Drug Deliv* 2008; 15(2): 107-112.
- 3 Ritschel WA, et al. Influence of selected solvents on penetration of griseofulvin in rat skin, *in vitro*. *Pharm Ind* 1988; 50(4): 483-486.
- 4 Ritschel WA, et al. Development of an intracutaneous depot for drugs binding, drug accumulation and retention studies, and mechanism of depot. *Skin Pharmacol* 1991; 4: 235-245.
- 5 Yazdanian M, Chen E. The effect of diethylene glycol monoethyl ether as a vehicle for topical delivery of ivermectin. *Vet Res Commun* 1995; 19(4): 309-319.
- 6 Dixit N, et al. Nanoemulsion system for the transdermal delivery of a poorly soluble cardiovascular drug. *PDA J Pharm Sci Technol* 2008; 62(1): 46-55.
- 7 Gungor S, et al. Effect of penetration enhancers on *in vitro* percutaneous penetration of nimesulide through rat skin. *Pharmazie* 2004; 59(1): 39-41.
- 8 Papakostantinou E, et al. Efficacy of 2 weeks' application of theophylline ointment in psoriasis vulgaris. *J Dermatolog Treat* 2007; 16(3): 169-170.

- 9 Touitou E, et al. Modulation of caffeine skin delivery by carrier design: liposomes versus permeation enhancers. *Int J Pharm* 1994; 103(2): 131-136.
- 10 Touitou E, et al. Enhanced permeation of theophylline through the skin and its effect on fibroblast proliferation. *Int J Pharm* 1991; 70(12): 159-166.
- 11 Harrison JE, et al. The relative effect of azone and transcutool on permeant diffusivity and solubility in human stratum corneum. *Pharm Res* 1996; 13(4): 542-546.
- 12 Watkinson C, et al. Aspects of the transdermal delivery of prostaglandins. *Int J Pharm* 1991; 74(23): 229-236.
- 13 Minghetti P, et al. Development of patches for the controlled release of dehydroepiandrosterone. *Drug Dev Ind Pharm* 2001; 27(7): 711-717.
- 14 Mura P, et al. Evaluation of transcutool as a clonazepam transdermal permeation enhancer from hydrophilic gel formulations. *Eur J Pharm Sci* 2000; 9(4): 365-372.
- 15 Dow Chemical Company. Product information: *Carbitol*, March 2004.
- 16 Gattefossé. Technical literature: Lipid excipients for oral dosage forms and dermal drug delivery, 2010.
- 17 Anonymous. Final report on the safety assessment of butylene glycol, hexylene glycol, ethoxydiglycol, and dipropylene glycol. *J Am Coll Toxicol* 1985; 4: 223-232.
- 18 Palmer AK. Sporadic malformations in laboratory animals and their influence on drug testing. *Adv Exp Med Biol* 1972; 27: 45-60.
- 19 Gattefossé. *Transcutol HP*: Evaluation of the acute toxicity in mouse after intravenous administration. Report Phycher TAI-PH-08/0477, 2009.
- 20 Gattefossé. *Transcutol*: Acute toxicity following a single oral administration (limit test) in the rat. Report No. WPAT94-177/OT2225; Gattefossé No. GAT-94205. New City, NY, USA: GAT, AMA Laboratories, 13 April 1994.

## 20 General References

European Commission. Scientific Committee on Consumer Products (SCCP): Opinion on diethylene glycol monoethyl ether (DEGEE), 2007. [http://ec.europa.eu/health/ph\\_risk/committees/04\\_sccp/docs/sccp\\_o\\_082.pdf](http://ec.europa.eu/health/ph_risk/committees/04_sccp/docs/sccp_o_082.pdf) (accessed 29 February 2012).

## 21 Author

C Subra.

## 22 Date of Revision

4 May 2017.

# Difluoroethane (HFC)

## 1 Nonproprietary Names

None adopted.

## 2 Synonyms

*Dymel 152a*; ethylene fluoride; *Freon 152a* *Genetron 152a*; halocarbon 152a; HFC 152a; propellant 152a; R-152a; refrigerant 152a; *Solkane 152a*.

## 3 Chemical Name and CAS Registry Number

1,1-Difluoroethane [75-37-6]

## 4 Empirical Formula and Molecular Weight

C<sub>2</sub>H<sub>4</sub>F<sub>2</sub> 66.05

## 5 Structural Formula

