1,5-NAPHTHALENE DIISOCYANATE

Data were last reviewed in IARC (1979) and the compound was classified in *IARC Monographs* Supplement 7 (1987).

1. Exposure Data

1.1 Chemical and physical data

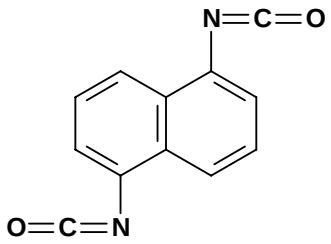
1.1.1 *Nomenclature*

Chem. Abstr. Serv. Reg. No.: 3173-72-6

Chem. Abstr. Name: 1,5-Diisocyanatonaphthalene

IUPAC Systematic Name: Isocyanic acid, 1,5-naphthylene ester

1.1.2 *Structural and molecular formulae and relative molecular mass*



$C_{12}H_6N_2O_2$ Relative molecular mass: 210.20

1.1.3 *Chemical and physical properties of the pure substance*

(*a*) *Description*: White to light yellow, crystalline solid (Lewis, 1993)

(*b*) *Boiling-point*: 183°C (Ulrich, 1989)

(*c*) *Melting-point*: 130–132°C (Ulrich, 1989)

(*d*) *Conversion factor*: $mg/m^3 = 8.60 \times ppm$

1.2 Production and use

1,5-Naphthalene diisocyanate is reported to be produced by two companies in Japan and one in Germany (Chemical Information Services, 1995).

1.3 Occurrence

No data were available to the Working Group.

1.4 Regulations and guidelines

The American Conference of Governmental Industrial Hygienists (ACGIH) (1997) has not proposed any occupational exposure limit for 1,5-naphthalene diisocyanate in workplace air. Values ranging from 0.02 to 0.095 mg/m^3 for a time-weighted average and from 0.01 to 0.07 mg/m^3 for short-term exposure limits have been used as standards or guidelines in several countries (International Labour Office, 1991; United States National Library of Medicine, 1997).

No international guideline for 1,5-naphthalene diisocyanate in drinking-water has been established (WHO, 1993).

2. Studies of Cancer in Humans

No data were available to the Working Group.

3. Studies of Cancer in Experimental Animals

No data were available to the Working Group.

4. Other Data Relevant to an Evaluation of Carcinogenicity and its Mechanisms

4.1 Absorption, distribution, metabolism and excretion

No data were available to the Working Group.

4.2 Toxic effects

4.2.1 *Humans*

Acute damage to the respiratory tract as well as conjunctivitis were observed in workers employed in the production of polyurethane rubber, in which 1,5-naphthalene diisocyanate was the basic chemical. An association has been reported between bronchitis and exposure to 1,5-naphthalene diisocyanate (IARC, 1979).

The irritative effects of 1,5-naphthalene diisocyanate were confirmed in a further study of rubber production workers, in which exposure over the range of 0.002–0.007 mg/m^3 was associated with increased frequency of eye irritation, cough and exertion dyspnoea. Also, an increase in the closing volume, especially among the older workers, was observed, suggesting airway irritation (Alexandersson *et al*., 1986)

4.2.2 *Experimental systems*

No data were available to the Working Group.

4.3 Reproductive and developmental effects

No data were available to the Working Group.

4.4 Genetic and related effects

No data were available to the Working Group.

5. Evaluation

No epidemiological data relevant to the carcinogenicity of 1,5-naphthalene diisocyanate were available.

No experimental data relevant to the carcinogenicity of 1,5-naphthalene diisocyanate were available.

Overall evaluation

1,5-Naphthalene diisocyanate is *not classifiable as to its carcinogenicity to humans (Group 3).*

6. References

Alexandersson, R., Gustafsson, P., Hedenstierna, G. & Rosen, G. (1986) Exposure to naphthalene-diisocyanate in a rubber plant: symptoms and lung function. *Arch. environ. Health*, **41**, 85–89

American Conference of Governmental Industrial Hygienists (1997) *1997 TLVs® and BEIs®*, Cincinnati, OH, pp. 1013–1014

Chemical Information Services (1995) *Directory of World Chemical Producers—1995–1996, Standard Edition*, Dallas, TX, p. 278

IARC (1979) *IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans*, Vol. 19, *Some Monomers, Plastics, Synthetic Elastomers, and Acrolein*, Lyon, pp. 303–340

IARC (1987) *IARC Monographs on the Evaluation of Carcinogenic Risks to Humans*, Supplement 7, *Overall Evaluations of Carcinogenicity: An Updating of* IARC Monographs *Volumes 1 to 42*, Lyon, p. 67

International Labour Office (1991) *Occupational Exposure Limits for Airborne Toxic Substances*, 3rd Ed. (Occupational Safety and Health Series No. 37), Geneva, pp. 286–287

Lewis, R.J., Jr (1993) *Hawley's Condensed Chemical Dictionary*, 12th Ed., New York, Van Nostrand Reinhold, pp. 805–806

Ulrich, H., (1989) Acrylic acid and derivatives. In: Gerhartz, W. & Yamamoto, Y.S., eds., *Ullmann's Encyclopedia of Industrial Chemistry*, 5th rev. Ed., Vol. A 14, VCH Publishers, pp. 611–625

United States National Library of Medicine (1997*) Registry of Toxic Effects of Chemical Substances (RTECS) Database*, Bethesda, MD [Record No. 95536]

WHO (1993) *Guidelines for Drinking Water Quality*, 2nd Ed., Vol. 1, *Recommendations*, Geneva