



Specialist information

**from the Committee for Anaesthesia (GV-SOLAS)
in collaboration with Working Group 4 of the TVT**

The use of urethane in experiments with rodents and rabbits

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Urethane

Other names:

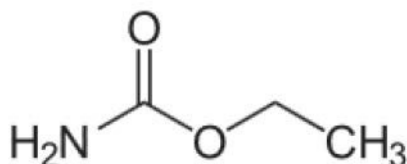
- 0-Ethyl carbamate
- 0-Ethylurethane
- A 11032
- Carbamic acid ethyl ester
- Ethyl carbamate
- Ethyl urethane
- Leucethane
- Pracarbamine
- U-compound
- Urethane
- Urethanum
- X 41

Hazardous substance, labelling: hazard, toxic.

Carcinogenic, mutagenic >>> Occupational health and safety!

Chemical formula: $C_3H_7NO_2$

General information based on internet sources, mainly from <http://www.chemie.de/lexikon/Urethan.html>



Structural formula from wikipedia.org/wiki/Urethan

Historical background and use in both human and veterinary medicine

Not used in clinical anaesthesia.

Not approved as either human or veterinary medicinal product.

Since urethane has not been used in clinical anaesthesia or in clinical veterinary medicine, information on its effects and the use of urethane in the scientific literature is extremely limited. The details on “Prior use in laboratory animals” and “Practical applications” were compiled on the basis of information from the literature and personal reports and experiences listed below.

Prior use in laboratory animals

Prior use in laboratory animals under non-recovery conditions (death under anaesthesia without recovery of consciousness, acute experiment, terminal experiment, final study).

Used alone or in combination with other substances (frequently α -chloralose) for general anaesthesia.

Long-term anaesthesia over several hours possible.

Minimal effect on respiration and cardiovascular system; therefore, suitable for physiological/pharmacological models under certain conditions

Practical application: Preparation, storage, properties of injection solution, route of administration

- Produced by heating urea with alcohol under pressure, heating of urea nitrate with alcohol and sodium nitrite.
- Obtainable as colourless, odourless crystalline or white powder.
- Good solubility both in alcohol and in water (Branson 1995). Dissolved urethane is pH neutral, molecular weight 89, boiling point 182°C.
- Metabolizes to ammonia, CO₂, and ethyl alcohol.
- The injection solution is produced by dissolving in H₂O (1 mg/0.5 mL); a 10-20% solution is usually administered
- In principle, administration should be i.v., but i.p. is possible.
- Frequently in combination with α -chloralose because it increases the solubility of α -chloralose. In addition, urethane reduces the undesirable CNS stimulation and muscle activity induced by α -chloralose.

Characterization of the anaesthetic: properties and side effects of anaesthesia

Urethane induces a hypnotic state lasting 6-8 hours. Anaesthesia stage III1 with cardiovascular and respiratory stability (Erhardt et al. 2012).

Several authors also describe sufficient analgesic potential to urethane for surgical and other painful procedures (Fish et al. 2008).

Urethane has toxic effects on organ systems. After a few hours of anaesthesia, for example, haemolysis has been reported (Erhardt et al. 2012), as have renal dysfunction and many other pathological effects as a result of urethane injection (Fish et al. 2008).

Highly carcinogenic in mice, rats, and rabbits. Also, potentially carcinogenic for laboratory staff as a result of absorption through the skin.

No serious citable reports were found on the chronic use of urethane. Recovery from this state could be expected to last a long time and to be accompanied by short and long-term side effects relevant to animal welfare – probably not as a result of the toxicity of the substance

Summary and opinion

Mutagenic, carcinogenic! Occupational health and safety regulations!!!

Urethane is only used for long-term anaesthesia for very specific purposes in non-recovery experiments (death under anaesthesia without recovery of consciousness, acute experiment, terminal experiment, final study).

Urethane is injected i.p. or i.v., possibly also in combination with other substances (e.g., α -chloralose).

Urethane is not approved as a medicinal product and is not in clinical use. A lack of any ready-to-use formulations means that injection solutions have to be prepared in the laboratory, posing an increased risk in its use. Aside from the potential risk to staff, considerable uncertainties for the anaesthesia and risks to the laboratory animal may arise as a result of errors or inattention in the preparation of the injection solution (e.g., with regard to concentration, solvent, solubility, contaminations, etc.).

Urethane is carcinogenic and mutagenic. Occupational health and safety regulations borne in mind be considered when planning an experiment and strictly observed when working with urethane!

Urethane is explicitly no longer recommended for use and may only be used if no alternatives have been found after a thorough review of the situation. Furthermore, urethane may only be used in non-recovery experiments (death under anaesthesia without recovery of consciousness, acute experiment, terminal experiment, final study).

References

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