



1. The effect of toxic gases

The effects of toxic gases differ.

Chlorine, sulphur dioxide, hydrogen chloride or ammoniac form acids or bases together with the moisture in the air or in mucous membranes.

As a result of a rapid reaction of the released carbonyl group (=CO) with amino acids and enzymes, phosgene blocks vital processes. As little as 10 ppm can cause serious breathing irritation after just a few seconds.

Carbon monoxide interferes with oxygen transport in the blood even in small concentrations.

2. Identification of toxic gases

Gas cylinders filled with toxic gases and uncleaned empty gas cylinders which have contained toxic gases can be identified by the following:

- The dangerous goods label no. 2.3 conforming to ADR



or the skull and crossbones symbol conforming to the European Hazardous Materials Directives is applied to the cylinders.



Old EG symbol
RL 67/5548/EWG



New EG symbol
VO 1272/2008

If the cylinder carries the label no. 2.3 conforming to ADR, it is not necessary to identify the cylinder with the skull and crossbones symbol. Gases such as vinyl chloride or 1.3-butadiene must be identified as toxic in accordance with the European Hazardous Materials Ordinance, but not in accordance with ADR. The corresponding cylinders therefore carry only the sticker with the skull and crossbones symbol in accordance with the European Hazardous Materials Directives.

- In the delivery note, after the proper shipping name the label model number 2.3 follows (e.g. see attached deliver note).

3. Transporting toxic gases

In addition to the general ADR regulations (see Linde Safety Advice 11 "Transport of gas receptacles in vehicles"), it is also necessary to observe the following for transporting toxic gases in accordance with ADR:

- A transport document is required for transporting toxic gases.
- The EIGA tremcard No. 5 "Toxic gases in receptacles or articles" must be carried, irrespective of how many cylinders are being transported with toxic gases (Linde stipulation). The safety equipment stated in the tremcard must be carried.
- The vehicle crew must have suitable breathing apparatus (e.g. escape filter unit with gas filter type A/B/E/K/Hg/CO/NO P3, "Combitox Novo" from the Draeger company in Lübeck).
- Vehicles which transport toxic gases must be guarded when parked. If sufficient security is guaranteed, such vehicles may be parked separately and unguarded in a

secure depot or on the plant site.

- If gas cylinders containing toxic gases develop leaks during transport (e.g. due to a road accident), proceed as outlined in the EIGA tremcard No. 5 "Toxic gases in receptacles or articles". In particular, unauthorised persons must be kept away by using the necessary personal safety equipment (breathing apparatus, safety goggles, gloves ...). Do not remain in the danger area. The delivery point or Linde AG, Linde Gas Division (Phone: +49/89/7446-0) must be informed immediately.
- The security provisions of chapter 1.10 of the ADR / RID 2005 have to be taken in consideration.

4. Storing toxic gases

Toxic gases must be stored under lock and key so that only appropriately qualified persons have access to them.

5. Finally

These instructions have been compiled taking into account the ADR / RID 2005 at the time of publication and the relevant exceptions (status: 01.03.2005). They were compiled with the necessary care, but still cannot cover every special case. In particular, no claims may be made against Linde AG if these instructions no longer correspond with the currently valid regulations.

Binding information on the valid regulations can be obtained from the responsible authorities.

Linde AG

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