

Stofdocument deel A

CAS-nr: 7664-41-7

Ammoniak

NH₃

VN-nr: 1005

GEVI: 268

Synoniemen: ammoniak watervrij (Engels: ammonia)

Interventiewaarden		10 min.	30 min.	1 uur	2 uur	4 uur	8 uur
Voorlichtingsrichtwaarden	VRW	21	21	21	21	21	21
Alarmeringsgrenswaarden	AGW	200	200	140	99	99	99
Levensbedreigende	LBW	1900	1100	780	550	390	280

Datum vaststelling: 13-05-2009

1 mg/m³ = 1,41 ppm; 1 ppm = 0,707 mg/m³

Explosiegrens: LEL = 15 vol% ≈ 110.000 mg/m³

Geur: stekend, intens irriterend

LOA: 1,7 mg/m³

Fysisch-chemische eigenschappen

Uiterlijk: kleurloos gas

Molecuulmassa: 17,0 g/mol

Brand: kan brandbaar damp/lucht mengsel vormen

Zuurgraad: 11,6

LogKow: 0,23

Wateroplosbaarheid: 52 g/100 ml
(goed)

Relatieve dichtheid van verzadigd damp-lucht mengsel: geen data

Verzadigde dampdruk: 8600 mbar
(20 °C)

Overige informatie

Publieke grenswaarde:
14 mg/m³ (8 uur)
MAK: 14 mg/m³
TLV-TWA: 18 mg/m³

Toxicologische eigenschappen

Effecten bij inhalatoire blootstelling

Onder VRW: mogelijk lichte irritatie

VRW → AGW: irritatie ogen, keel en neus, hoesten, hyperventilatie

AGW → LBW: glottisoedeem, benauwdheid, longoedeem

Boven LBW: sterfte

Toxiciteit bij eenmalige, inhalatoire blootstelling

- Ammoniak kan een type I inhalatoire intoxicatie veroorzaken.
- Contact met vocht leidt tot vorming van ammonium hydroxide (corrosief) en warmteproductie.
- Na inademing van hoge concentraties kan glottisoedeem en longoedeem ontstaan, waarbij de verschijnselen pas na enkele uren kunnen optreden en worden versterkt door lichamelijk inspanning.
- Blootstelling aan hoge concentraties kan overlijden veroorzaken.

Effecten bij blootstelling aan vloeistof

Huidcontact: roodheid, pijn, blaren, wonden (vanwege bevroering)

Oogcontact: irritatie, tranenvloed, cornea-beschadiging, verlies gezichtsvermogen, ernstige brandwonden

Carcinogeniteit

IARC classificatie: niet geclassificeerd

CRP: niet afgeleid

Beknopte medische informatie

Ontsmetting gas

algemeen: frisse lucht, rust, halfzittende houding en direct spoedeisende medische hulp inzetten.

Ontsmetting vloeistof

huid: aan de huid vastgevroren kleding NIET lostrekken, eerst spoelen met veel water, dan pas kleding uittrekken, daarna weer spoelen, arts raadplegen en direct spoedeisende medische hulp inzetten.

ogen: minimaal 15 min. spoelen met water (evt. contactlenzen verwijderen), dan naar oogarts brengen, blijven spoelen tijdens vervoer.

inslikken: n.v.t. (gas)

Specifieke behandeling en materialen:.

Neem contact op met het NVIC (tel: +31 (0)30 -274 8888) voor informatie met betrekking tot medisch handelen.

Stofdocument deel B

CAS-nr: 7664-41-7

Ammonia

NH₃

UN-nr: 1005

Basis for the Dutch Intervention Values

VRW: AEGL Values are adopted, 2h value added

AGW: Different point of departure as for AEGL, 2h value added

LBW: AEGL Values are adopted, 2h value added

Date: 13-05-2009

AEGL document: Final, 2006

Dutch Intervention Values (mg/m³)

	10 min	30 min	1 h	2 h	4 h	8 h	End point
VRW	21	21	21	21	21	21	Faint or no irritation in humans
AGW	200	200	140	99	99	99	Irritation eyes, nose, throat
LBW	1900	1100	780	550	390	280	Lethality

Derivation of the Dutch Intervention Values

VRW: Humans experience either faint or no irritation after exposure to ammonia at 30 ppm (21 mg/m³) for 10 minutes. Therefore, 30 ppm (21 mg/m³) was used to derive VRW values. An interspecies uncertainty factor was not applied to these data because the VRW is based on human data. An intraspecies uncertainty factor of 1 was selected because ammonia is efficiently scrubbed in the upper respiratory tract, and if irritation occurs, it would be confined to the nasal cavity (and possibly the eyes). Nonatopic and atopic subjects, including asthmatics, responded similarly in a nasal airway resistance test when volunteers were exposed head-only to 100 ppm (71 mg/m³) of ammonia for up to 30 seconds; therefore, asthmatic individuals are not expected to respond differently from non-asthmatic individuals. No time-scaling was applied, because any effects that occur are not expected to become more severe with duration of exposure because adaptation occurs during prolonged exposure. This is supported by observations that humans reported similar intensity of response after exposure to 50 ppm (35 mg/m³) for 10 minutes to 2 hours.

AGW: The AGW values were based on a human volunteer study with 8 non-expert individuals (unfamiliar with effects of ammonia or laboratory studies) and 8 expert individuals (familiar with the effects of ammonia) exposed to 50, 80, 110 and 140 ppm (35, 57, 78, 99 mg/m³) ammonia for up to 2 hours. Exposure to 140 ppm (99 mg/m³) for 2 hours was used as point of departure for deriving the AGW values. The expert individuals perceived no general discomfort after the highest exposure for 2 hours. Four out of 8 non-expert individuals exposed to 140 ppm (99 mg/m³) perceived their general discomfort to range from "distinctly perceptible" to "unbearable" after 1 h.

An interspecies uncertainty factor is not applied to these data because the intervention values are based on human data. An intraspecies uncertainty factor of 1 was selected because ammonia is a contact irritant, it is efficiently scrubbed in the upper respiratory tract, and any perceived irritation is not expected to be greater than that of the most sensitive non-expert subject. The range of responses for this group is considered comparable to the range of responses that would be encountered in the population including asthmatics. The value of 140 ppm (99 mg/m³) was adopted as the 4- and 8-hour values, because the maximum severity rating for irritation in one study in humans changed very little between 30 minutes and 2 hours and is not expected to change for exposures up to 8 hours. Time scaling to 30 minutes and 1 hour was performed using the equation $C^n \times t = k$, using an n-value of 2 (based on rat lethality data for ammonia). The 30-minute value was also adopted as the 10-min AGW value because time scaling would yield a 10-minute value that might impair escape. The intervention values are supported by other studies showing that exposures up to 100 ppm (71 mg/m³) were tolerated by human subjects for 2 to 6 hours without causing serious effects. The data of two additional human studies showed no serious irreversible effects after exposure to 336 or 500 ppm (248 or 350 mg/m³), respectively.

LBW: The LC₀₁ values for lethality after 1 hour exposure of 3317 and 3374 ppm (2346 and 2386 mg/m³) derived from two different studies in mice were used as point of departure for the LBW values. The mouse is unusually sensitive to exposure to respiratory irritants, including ammonia; therefore, an

interspecies uncertainty factor of 1 was applied. The default uncertainty factor of 3 was applied to account for intraspecies variability. Applying a total uncertainty factor of 3 to the 1 hour LC₀₁ values of 3317 or 3374 ppm (2346 or 2386 mg/m³) results in a 1 hour LBW value of 1100 ppm (778 mg/m³). This value was scaled across time using the equation $C^n \times t = k$, using an n-value of 2 (based on rat lethality data for ammonia).

The LBW value for 8 hours is supported by studies in rats, rabbits, guinea pigs, dogs, and monkeys showing that daily 8-hour exposures to 1101 ppm (779 mg/m³) for 6 weeks caused no deaths. The only effects observed were nonspecific inflammation (rats and guinea pigs), lacrimation (dogs and rabbits), and dyspnea (dogs and rabbits).

Additional toxicological information (including relevant results of a general literature search, if any)

Tracheobronchial and pulmonary effects may occur at a lower concentration in elderly people.

Death in humans exposed to ammonia is associated with damage to the lower respiratory tract. Scientific data show that effects caused by ammonia on the lower respiratory tract would be lethal without prompt medical attention. Therefore, concentrations of ammonia that exceed the scrubbing capacity of the upper respiratory tract and cause coughing, which indicate lower respiratory effects, have potentially serious effects. (AHLs, 2006)

Ammonia produces effects immediately upon contact with moist mucous membranes of the eyes, mouth, and respiratory tract via the formation of ammonium hydroxide (a corrosive alkali) or the production of heat. Because of its irritant properties, individuals coming into contact with ammonia vapor (or gas) will try to escape as quickly as possible.

No reproductive or developmental data are available.

H331: Toxic if inhaled; H314: Causes severe skin burns and eye damage.

Carcinogenicity and derivation of the CRP value

IARC classification: not classified
No carcinogenic risk potency (CRP) was derived.

Odour and derivation of the LOA value

Odour: Sharp and intensely irritating.

Odour threshold: 0.106 mg/m³
[RIVM report 609200001]

$$LOA = 11.8 * OT_{50} * 1.33 = 1.7 \text{ mg/m}^3$$

(The concentration Level leading to distinct Odour Awareness (I=3) is calculated using the formula: $I = 2.33 * \log(C/OT_{50}) + 0.5$. A correction factor of 1.33 is applied to this value)

The LOA is lower than the VRW values. The odour threshold for ammonia is lower than its irritancy effect and serves as a warning of its presence.

Other standards and guidelines (1h values in mg/m³, unless otherwise indicated)

VRW level 21	AEGL-1 21	ERPG-1 18	IDLH: 210 (30 minutes)
AGW level 140	AEGL-2 110	ERPG-2 110	
LBW level 780	AEGL-3 780	ERPG-3 530	