PETROL (GASOLINE)

CAS number: —

Synonyms: —

Chemical formula: —

Structural formula: —

Workplace exposure standard (amended)

TWA: **300 ppm (900 mg/m^3)**

STEL: **—**

Peak limitation: **500 ppm (1,480 mg/m^3)**

Notations: **—**

IDLH: **1,100 ppm (10% LEL)**

Sampling and analysis: The recommended value is quantifiable through available sampling and analysis techniques.

Recommendation and basis for workplace exposure standard

A TWA of 300 ppm (900 mg/m^3) is recommended to protect for eye, mucous membrane and upper respiratory tract irritation in exposed workers.

A peak limitation of 500 ppm (1,480 mg/m^3) is recommended to protect for acute and severe central nervous system (CNS) effects and irritation in exposed workers.

Discussion and conclusions

Petrol is used primarily as a fuel in spark-ignited internal combustion engines.

Critical effects of exposure are acute depression of the CNS and eye, mucous membrane and upper respiratory tract irritation. Limited detailed toxicological data are available.

Responses in humans following acute exposure to petrol vapours are noted in a single report. Humans exposed at 160 to 270 ppm for eight hours are reported to experience irritation of the eyes. Eye, nose and throat irritation and dizziness occurs after one-hour exposure at 500 to 900 ppm. Mild anaesthesia is reported after one hour at 2,000 ppm. Higher concentrations are intoxicating within five to 10 minutes. A threshold of 1,000 ppm is reported for immediate, mild toxic effect. The concentration of aromatics in the petrol vapour is reported as being much lower than in liquid which, on average, contains 14% aromatic hydrocarbons. Carcinogenic effects observed in male rats in chronic inhalation studies; but this is not considered relevant to humans (ACGIH, 2018).

Based on the data regarding human responses and the recommendation by the ACGIH (2018), a TWA of 300 ppm (900 mg/m^3) is recommended. Based on potential severe effects on the CNS (anaesthesia) demonstrated at short-term exposures, a peak limitation of 500 ppm (1,480 mg/m^3) is also recommended as derived by the ACGIH (2018).

Recommendation for notations

Not classified as a carcinogen according to the Globally Harmonized System of Classification and Labelling of Chemicals (GHS).

Not classified as a skin sensitiser or respiratory sensitiser according to the GHS.

A skin notation is not recommended based on evidence in animals.

APPENDIX

Primary sources with reports

Source	Year set	Standard
SWA	***1991***	***TWA: 900 mg/m^3***
ACGIH	***2001***	***TLV-TWA: 300 ppm (890 mg/m^3); TLV-STEL: 500 ppm (1480 mg/m^3)***

TLV-TWA recommended to minimise the potential for eye, mucous membrane and upper respiratory tract irritation.

TLV–STEL is intended to minimise the potential for acute depression of the CNS.

Recommended for occupational exposure during bulk handling of gasoline.

Summary of data:

- A typical composition of 80% paraffins, 14% aromatics and 6% olefins
- Benzene component likely <1% and other components such as *n*-hexane, aromatics and certain olefins OEL reviewed separately
- Concentration of aromatics in the vapour was generally lower than in the liquid which, on the average contains 14% aromatic hydrocarbons:
  - one report of 24%–27% total aromatics in various grades of one brand
- Basis for TLV-TWA is calculations on hydrocarbon content of vapours; no specific derivation provided
- Due to wide variation in molecular weights of its components, the conversion of ppm to mg/m^3 is approximate.

Human data:

- Hazard to human health related to high volatility and rapid rate at which concentrations develop
- Most common symptoms from acute exposure include intoxication, headaches, blurred vision, dizziness and nausea
- Reported responses to petrol vapour exposures are:
  - eye irritation in 8 h at 160–270 ppm
  - eye, nose and throat irritation and dizziness in 1 h at 500–900 ppm
  - mild anaesthesia in 1 h at 2,000 ppm
  - higher concentrations are intoxicating in 5–10 min
  - 1,000 ppm threshold for immediate, mild toxic effect
  - the concentration of aromatics in the petrol vapour was much lower than in the liquid which, on average, contains 14% aromatic hydrocarbons
  - no further information
- Inadequate evidence for human cancer attributable to occupational petrol exposure
- Reports of toxic neuritis after exposures to petrol; role of *n*-hexane in outcome unclear.

Animal data:

- Animals dosed daily *via* gavage for up to 9 d (studied for hyaline droplet decay at day 3, 6 and 9); no further information on exposure or doses reported:
  - significant renal accumulation of a2u-globulin and hyaline droplets accumulation that was reversible and dependent on maintenance of normal constitutive levels of circulating a2u-globulin

Source	Year set	Standard
		• Rats exposed at 0, 67, 292 or 2,056 ppm for lifetime; incidence of renal adenoma and carcinoma (combined) per group was 0/49, 1/59, 5/56 and 7/45, respectively; 0%, 5%, 63% and 91% of the rats (respective to doses) had mineralisation of the renal papilla • Rats exposed at 300 ppm for 48 wk; H-labelled thymidine indices in the renal proximal tubule were 4- to 6-fold higher in treated rats than in control rats; no further information • Unscheduled DNA synthesis occurred upon addition of unleaded gasoline to rat, mouse and human hepatocytes • No significant responses in *S. typhimurium*, in L5178Y cells and the mouse dominant lethal and bone marrow cytogenicity assays • Inhalation or gavage in male rats failed to elicit unscheduled DNA synthesis in kidney or liver; elevated in mouse liver after gasoline gavage. Insufficient data to recommend a skin or sensitiser notation.
DFG	***NA***	***NA***
No report.		
SCOEL	***NA***	***NA***
No report.		
OARS/AIHA	***NA***	***NA***
No report.		
HCOTN	***NA***	***NA***
No report.		

Secondary source reports relied upon

Source		Year	Additional information
NICNAS	✓	2016	• LD_{50}: >5,000 (petroleum) (rats, dermal).
IARC	✓	1989	• Inadequate evidence for the carcinogenicity in humans of gasoline • Limited evidence for the carcinogenicity in experimental animals.

Carcinogenicity — non-threshold based genotoxic carcinogens

Is the chemical mutagenic?	Insufficient data
Is the chemical carcinogenic with a mutagenic mechanism of action?	No

The chemical is not a non-threshold based genotoxic carcinogen.

Notations

Source	Notations
SWA	—
HCIS	NA

Source	Notations
NICNAS	NA
EU Annex	NA
ECHA	NA
ACGIH	Carcinogenicity – A3
DFG	NA
SCOEL	NA
HCOTN	NA
IARC	NA
US NIOSH	NA

NA = not applicable (a recommendation has not been made by this Agency); — = the Agency has assessed available data for this chemical but has not recommended any notations

Skin notation assessment

Calculation	
Adverse effects in human case study:	
Dermal LD_{50} ≤1000 mg/kg:	no
Dermal repeat-dose NOAEL ≤200 mg/kg:	
Dermal LD_{50}/Inhalation LD_{50} <10:	
In vivo dermal absorption rate >10%:	
Estimated dermal exposure at WES >10%:	
	a skin notation is not warranted

IDLH

Is there a suitable IDLH value available? Yes, based on LEL

Additional information

Molecular weight:	N/A
Conversion factors at 25°C and 101.3 kPa:	1 ppm = Number mg/m^3; 1 mg/m^3 = Number ppm
This chemical is used as a pesticide:	☐
This chemical is a biological product:	☐
This chemical is a by-product of a process:	☐
A biological exposure index has been recommended by these agencies:	☐ ACGIH ☐ DFG ☐ SCOEL

Workplace exposure standard history

Year	Standard
Click here to enter year	

References

American Conference of Industrial Hygienists (ACGIH®) (2018) TLVs® and BEIs® with 7th Edition Documentation, CD-ROM, Single User Version. Copyright 2018. Reprinted with permission. See the *TLVs® and BEIs® Guidelines section* on the ACGIH website.

International Agency for Research on Cancer (IARC) Petroleum refining, crude oil and major petroleum fuels. IARC Monographs – 45.

US National Institute for Occupational Safety and Health (NIOSH) (1994) Immediately dangerous to life or health concentrations – Petroleum distillates (naphtha).