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Result for CAS#: 106-97-8

[Expand All \(+\)](#) [Collapse All \(-\)](#)

CAS# found in EINECS (European INventory of Existing Commercial chemical Substances).

General Information:

EC# : 203-448-7
 CAS# : 106-97-8
 Substance Name : Butane
 De : Butan
 Es : Butano
 Fr : Butane
 Molecular Formula : C4H10
 Description : Not available

Bu

[Enlarge Structure](#)

Classification and Labelling Information:

Annex I Index# (1) : 601-004-00-0
 Substance Name : + **Butane**
 in Annex 1 **And isobutane**
 Note :

	Alphabetic	Numeric
	C	-

 ATP :

	inserted	Updated
	19	21

 Classification : F+; R12
 Risk Phrases : + **R12 : Extremely flammable.**
 Safety Phrases : + **S2 : Keep out of the reach of children.**
 : + **S9 : Keep container in a well-ventilated place.**
 : + **S16 : Keep away from sources of ignition - No smoking.**

Symbol(s) and Indication(s) of Danger

+ **F+ : Extremely flammable**

Specific Concentration Limit(s) : Not available

Annex I Index# (2) : 601-004-01-8
 Substance Name : + **isobutane (containing ≥ 0.1 % butadiene (203-450-8))**
 in Annex 1 **Butane (containing ≥ 0.1 % butadiene (203-450-8))**
 Note :

	Alphabetic	Numeric
	CS	-

 ATP :

	inserted	Updated
	21	28

 Classification : F+; R12 - Carc. Cat. 1; R45 - Muta. Cat. 2; R46
 Risk Phrases : + **R45 : May cause cancer.**
 : + **R46 : May cause heritable genetic damage.**
 : + **R12 : Extremely flammable.**
 Safety Phrases : + **S53 : Avoid exposure - obtain special instructions before use.**
 : + **S45 : In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).**

Symbol(s) and Indication(s) of Danger

+ **F+ : Extremely flammable**+ **T : Toxic**

Specific Concentration Limit(s) : Not available

HPV-LPV (High and Low Production Volume) Information:

HPV Chemical : + [List of Producers/Importers](#)

IUCLID & OECD Chemical Data Sheets and Export Files Information:

IUCLID Chemical Data Sheet : [view & save it](#)IUCLID Export File : [view & save it](#)

n-Butane

NIOSH Pocket Guide

1.0 CHEMICAL NAME, STRUCTURE/FORMULA, GAS AND RTECS NOS., AND DOT ID AND GUIDE NOS.▲

Chemical Name: n-Butane

Formula: $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$

Structure/Formula: $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$

CAS Number: 106-97-8

RTECS Number: EJ4200000

DOT ID and NAERG Guide Numbers: 1011 115
1075 115

2.0 SYNONYMS, TRADENAMES AND CONVERSION FACTORS▲

Synonyms/Tradenames: normal-Butane; Butyl hydride; Diethyl; Methylethylmethane

Notes: [Also see specific listing for Isobutane.]

Conversion Factor at 68° F and 760 mmHg: 1ppm = 2.38mg/m³

3.0 EXPOSURE LIMITS (TWA UNLESS NOTED OTHERWISE)▲

NIOSH Recommended Exposure Limits (RELs): Time-weighted average (TWA) 800ppm
(1900mg/m³)

OSHA Permissible Exposure Limits (PELs): (Vacated OSHA PELs are listed in Appendix G)
none

4.0 IDLH▲

The IDLH has not been determined.

5.0 PHYSICAL DESCRIPTION▲

Colorless gas with a gasoline-like or natural gas odor.

Notes: [Shipped as a liquefied compressed gas. A liquid below 31° F.]

6.0 CHEMICAL AND PHYSICAL PROPERTIES▲

Molecular Weight: 58.1

Boiling Point: 31° F

Solubility in Water: Slight

Flash Point: NA (Gas)

Ionization Potential: 10.63 eV

Relative Gas Density: 2.11

Specific Gravity: 0.6 (Liquid at 31° F)

Flammability Class: Flammable Gas Class IA Flammable Liquid

Vapor Pressure: 2.05 atm

Freezing Point: -217° F

Upper Explosive Limit in air (% by volume): 8.4%

Lower Explosive Limit in air (% by volume): 1.6%

7.0 INCOMPATIBILITIES AND REACTIVITIES▲

Strong oxidizers (e.g., nitrates & perchlorates), chlorine, fluorine, (nickel carbonyl + oxygen)

8.0 MEASUREMENT METHOD (SEE TABLE 1)▲

None available

9.0 PERSONAL PROTECTION AND SANITATION (SEE TABLE 3)▲

Skin: Skin: Wear appropriate personal protective clothing to prevent the skin from becoming frozen from contact with the liquid or from contact with vessels containing the liquid.

Eyes: Wear appropriate eye protection to prevent eye contact with the liquid that could result in burns or tissue damage from frostbite.

Wash Skin: No recommendation is made specifying the need for washing the substance from the skin (either immediately or at the end of the work shift).

Remove: Work clothing that becomes wet should be immediately removed due to its flammability hazard (i.e., for liquids with a flash point <100° F).

Change: No recommendation is made specifying the need for the worker to change clothing after the workshift.

Provide: Quick drench facilities and/or eyewash fountains should be provided within the immediate work area for emergency use where there is any possibility of exposure to liquids that are extremely cold or rapidly evaporating.

10.0 RECOMMENDATIONS FOR RESPIRATOR SELECTION (SEE TABLE 4)▲

To be added later.

11.0 HEALTH HAZARDS▲

Exposure Routes: Inhalation, Skin and/or eye contact, (liquid)

Exposure Symptoms (See Table 5): Drowsiness, Narcosis, Asphyxia; liquid: frostbite

Eye (See Table 6): If eye tissue is frozen, seek medical attention immediately; if tissue is not frozen, immediately and thoroughly flush the eyes with large amounts of water for at least 15 minutes, occasionally lifting the lower and upper eyelids. If irritation, pain, swelling, lacrimation, or photophobia persist, get medical attention as soon as possible.

Skin (See Table 6): If frostbite has occurred, seek medical attention immediately; do NOT rub the affected areas or flush them with water. In order to prevent further tissue damage, do NOT attempt to remove frozen clothing from frostbitten areas. If frostbite has NOT occurred, immediately and thoroughly wash contaminated skin with soap and water.

Breath (See Table 6): If a person breathes large amounts of this chemical, move the exposed person to fresh air at once. If breathing has stopped, perform mouth-to-mouth resuscitation. Keep the affected person warm and at rest. Get medical attention as soon as possible.

Target Organs (See Table 5): Central nervous system



Butane

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1.1 Substance

1.2 Group

1.3 Synonyms

1.4 Identification numbers

1.4.1 CAS number

1.4.2 Other numbers

1.5 Main brand names, main trade names

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Butane

International Programme on Chemical Safety
Poisons Information Monograph 945
Chemical

This monograph contain the following sections
completed: 1, 2, 3, 4.1, 5, 7.1, 7.2, 9, 10, 11

1. NAME

1.1 Substance

Butane

1.2 Group

Aliphatic hydrocarbon

1.3 Synonyms

n-Butane; Butyl hydride;
Methylethylmethane

1.4 Identification numbers

1.4.1 CAS number

106-97-8

1.4.2 Other numbers

UN/NA NUMBER(S): 1011
RTECS NUMBER(S): EJ4200000
EU EINECS/ELINCS NUMBER: 203-448-7

1.5 Main brand names, main trade names

1.6 Main manufacturers, main importers

2. SUMMARY

2.1 Main risks and target organs

Butane is a simple asphyxiant (that is, depriving victim of oxygen) with explosive and flammable potential. It is also

widely used substance of abuse. The main target organs are in the central nervous and cardiovascular system.

2.2 Summary of clinical effects

Abuse:

Initial effects: Euphoria, excitation, blurred vision, slurred speech, nausea, vomiting, coughing, sneezing, increased salivation.

As dose increases: disinhibition, confusion, perceptual distortion, hallucinations (ecstatic or terrifying), delusions (which may lead to aggressive or risk taking behaviour), tinnitus, ataxia.

Large doses: nystagmus, dysarthria, tachycardia, central nervous system (CNS) depression, drowsiness, coma and sudden death which may result from anoxia, vagal inhibition of the heart, respiratory depression, cardiac arrhythmias or trauma.

Other exposures: (leakage from tanks)
Headaches, drowsiness and coma.

2.3 Diagnosis

As there is no typical clinical finding in butane inhalation poisoning except possible unconsciousness, the diagnosis is made upon the history of exposure to butane in poorly ventilated spaces.
In case of abuse the spraying of liquified gas directly into the throat, the presence of irritation followed by depression of CNS, together with cardiac dysrrhythmias and history of abuse make the diagnosis.

2.4 First aid measures and management principles

Abuse:

Supportive and symptomatic care. All patients should be given bed rest, monitored on an ECG, in a quiet environment for at least 4 hours. **DO NOT GIVE STIMULANTS** (e.g. adrenaline or noradrenaline, except for resuscitation). Recovery normally occurs quickly once exposure has ceased but support of the cardiovascular and respiratory systems may be needed.

Cardio-respiratory resuscitation, if necessary, with conventional treatment of arrhythmias and convulsions, with intensive support. Arrhythmias may respond well to beta blockers (e.g. atenolol). Respiratory arrest generally recovers with assisted ventilation. Vagal inhibition of the heart can lead to bradycardia or cardiac arrest. Treat accordingly.

Other exposures:

Remove from exposure to a place of fresh air. Treat hypoxia. Give symptomatic and supportive treatment. Assess neurological status.

3. PHYSICO-CHEMICAL PROPERTIES

3.1 Origin of the substance

3.2 Chemical structure

Molecular formula: C₄H₁₀
Molecular mass: 58.12
Structural Formula: CH₃-CH₂-CH₂-CH₃

3.3 Physical properties

3.3.1 Colour

Colourless

3.3.2 State/Form

Gas

3.3.3 Description

Butane is an aliphatic hydrocarbon of low-molecular weight. Colourless gas with a natural gas or gasoline-like odour.

Melting Point: -138.4°C (-217 Deg F)
Boiling Point: -0.5°C (31.1 Deg F)
Relative Density (Specific Gravity): 0.60 (Water=1)
Solubility in Water: Slight (3.15 Cm³ Gas/100 Cm³ Water At 0°C)
Solubility in other Liquids: Soluble In Ethanol, Ether, Chloroform.
Vapour Density: 2.11 (Air=1)
Vapour Pressure: 213.7 Kpa (2.1 Atm) At 21.1°C
356 Kpa (3.5 Atm) At 37.8°C
Critical Temperature: 152°C (305.6 Deg F)
Critical Pressure: 3,797 Kpa (37.47 Atm)

Conversion Factor:

1 Ppm = 2.38 Mg/M3; 1 Mg/M3 = 0.42 Ppm At 25°C

Odour Threshold:

6,160 Mg/M3 (2,582 Ppm) (Recognition). One source indicates that the odour threshold exceeds 5,000 Ppm.

3.4 Hazardous characteristics

Compounds sold as 'butane' often contain mixtures of methane, ethane, propane, iso-butane and n-butane (Ramsey et al., 1989).

4. USES

4.1 Uses

4.1.1 Uses

4.1.2 Description

Butane is found in aerosols, lighter fuel and refills, small blow torches and camping stoves. It is used in organic synthesis. Pure grades are used in calibrating instruments and as a food additive. It is widely available.

4.2 High risk circumstance of poisoning

4.3 Occupationally exposed populations

5. ROUTES OF EXPOSURE

5.1 Oral

5.2 Inhalation

Abuse:

Direct spraying directly into the throat is the most common way of taking butane. Other methods are bagging (inhaling from a plastic bag and huffing (inhaling from a cloth or handkerchief)).

Other exposures:

Accidental release in a confined area.

5.3 Dermal

5.4 Eye

5.5 Parenteral

5.6 Other

6. KINETICS

6.1 Absorption by route of exposure

6.2 Distribution by route of exposure

6.3 Biological half-life by route of exposure

6.4 Metabolism

6.5 Elimination and excretion

7. TOXICOLOGY

7.1 Mode of action

It is a simple asphyxiant and causes toxicity by displacing oxygen (Ellenhorn and Barceloux, 1988). There are no direct systemic effects.

7.2 Toxicity

7.2.1 Human data

7.2.1.1 Adults

In the United Kingdom between 1988 and 1990, 398 people (mainly teenagers) died due to abuse of fuel gas. Butane from lighter refill canisters has accounted for three times as many deaths as any other product after the victim sprayed it down their throats to attain euphoria (Russell, 1993). In studies, concentrations in air as low as 15% produce myocardial sensitisation and dysrhythmias (Aviado and Beley, 1974).

7.2.1.2 Children

7.2.2 Relevant animal data

- 7.2.3 Relevant in vitro data
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- Initial effects: Euphoria, excitation, blurred vision, slurred speech, nausea, vomiting, coughing, sneezing, increased salivation.
- As dose increases: disinhibition, confusion, perceptual distortion, hallucinations (ecstatic or terrifying), delusions (which may lead to aggressive or risk taking behaviour), tinnitus, ataxia.
- Large doses: nystagmus, dysarthria, tachycardia, CNS

depression, drowsiness, coma and sudden death which may result from anoxia, vagal inhibition of the heart, respiratory depression, cardiac arrhythmias or trauma (Ashton, 1990).

- 9.1.3 Skin exposure
- 9.1.4 Eye contact
- 9.1.5 Parenteral exposure
- 9.1.6 Other

9.2 Chronic poisoning

- 9.2.1 Ingestion
- 9.2.2 Inhalation
- 9.2.3 Skin exposure
- 9.2.4 Eye contact
- 9.2.5 Parenteral exposure
- 9.2.6 Other

9.3 Course, prognosis, cause of death

9.4 Systematic description of clinical effects

9.4.1 Cardiovascular

Vagal inhibition of the heart: is a reflex response associated with stimulation of the vagal nerve (ie. irritation of the larynx). By spraying the butane directly into the throat the jet of fluid can cool rapidly to -20°C by expansion (Ramsey et al., 1989). Sudden, or severe stimulation of the vagus may result in profound bradycardia or even cardiac arrest (Shepherd, 1989).

Cardiac arrhythmias: There is some experimental evidence that butane can 'sensitise' the myocardium to the action of adrenaline and other endogenous catecholamines (Aviado and Beley, 1974). This 'sensitisation' is thought to be more profound in the presence of hypoxia (Shepherd, 1989). 'Sensitisation' is erroneous as it is more likely that butane is a membrane stabilising agent that actually stabilizes the myocardial cell membrane to depolarisation. However, because of the variable response of

individual cells and the complex way in which the myocardial electrical impulses are propagated this 'stability' blocks their transmission and leads to an increased risk of arrhythmias. Butane is quickly absorbed into the fatty tissues that line the nerve fibres and then is slowly released back into the blood stream, this is the probable cause of the acute, direct 'postponed' deaths.

Adrenaline is released for a number of reasons and influences, stress and fear being the most common. The higher the level of adrenaline the greater the cardiovascular effect and the more likely is the

production of arrhythmias. There are several reasons for raised adrenaline concentrations, for example: hallucination which may be disturbing and frightening, a desire to run, abusers who are being chased by the authorities or increase during sexual activities (Shepherd, 1989).

9.4.2 Respiratory

Anoxia: either by occlusion of airways or decreased oxygen content of inspired air

9.4.3 Neurological

9.4.3.1 Central nervous system (CNS)

Respiratory depression: euphoria and other 'positive' effects are associated with other effects, e.g. CNS depression which may involve the respiratory centre of the brain and therefore, theoretically, high concentrations inhaled continuously could lead to respiratory arrest (Shepherd, 1989).

9.4.3.2 Peripheral nervous system

9.4.3.3 Autonomic nervous system

9.4.3.4 Skeletal and smooth muscle

9.4.4 Gastrointestinal

9.4.5 Hepatic

9.4.6 Urinary

9.4.6.1 Renal

9.4.6.2 Other

9.4.7 Endocrine and reproductive systems

9.4.8 Dermatological

9.4.9 Eye, ear, nose, throat: local effects

9.4.10 Haematological

9.4.11 Immunological

9.4.12 Metabolic

9.4.12.1 Acid-base disturbances

9.4.12.2 Fluid and electrolyte disturbances

9.4.12.3 Others

9.4.13 Allergic reactions

9.4.14 Other clinical effects

9.4.15 Special risks

9.5 Other

9.6 Summary

10. MANAGEMENT

10.1 General principles

Supportive and symptomatic care. All patients should be on bed rest, monitored on an ECG, in a quiet environment for at least 4 hours. **DO NOT GIVE STIMULANTS** (e.g. adrenaline or noradrenaline, except for resuscitation). Recovery normally occurs quickly once exposure has ceased but support of the cardiovascular and respiratory systems may be needed.

Cardio-respiratory resuscitation, if necessary, with conventional treatment of arrhythmias and convulsions, with intensive support. Arrhythmias may respond well to beta blockers (e.g. atenolol). Respiratory arrest generally recovers with assisted ventilation. Vagal inhibition of the heart can lead to bradycardia or cardiac arrest. Treat conventionally.

10.2 Life supportive procedures and symptomatic/specific treatment

See section 10.1

10.3 Decontamination

10.4 Enhanced elimination

10.5 Antidote treatment

10.5.1 Adults

10.5.2 Children

10.6 Management discussion

11. ILLUSTRATIVE CASES

11.1 Case reports from literature

Ventricular fibrillation

A 15 year old boy habitually inhaled butane by spraying it on to a towel and inhaling to gain a euphoric state. The effects normally took 20 minutes to wear off. A few moments after one such sniffing episode he suffered severe anterior chest pain, screamed, ran downstairs and collapsed. When the ambulance arrived he was pulseless and apnoeic. CPR was started and on arrival to hospital he was in VF and had DC cardioversion 3 times in 30 minutes. He was given intravenous (IV) lignocaine, atropine and calcium. ECG showed sinus tachycardia with left-bundle-branch block. Within 2 hours the QRS complex reverted to normal and there was widespread ST segment elevation. He was ventilated for 36 hours due to cerebral oedema and made a complete recovery in 4 weeks (Gunn et al., 1989).

Myocardial infarction

A 15 year old boy was found unresponsive and cyanosed after inhaling butane from a plastic bag. CPR was given, he was intubated and ventilated. He was in VT and VF which was treated with lignocaine, CPR and cardioversion. On arrival at hospital he was in asystole; sodium bicarbonate, adrenaline, atropine, naloxone and lignocaine were given, he