



## 2-Butoxyethanol

Updated: April 2016

2-Butoxyethanol (Ethylene glycol monobutyl ether, EGBE, Butyl Cellosolve®, C<sub>6</sub>H<sub>14</sub>O<sub>2</sub>, CAS no. 111-76-2) belongs to the group of glycol ethers. It is a colorless liquid that smells like ether and is miscible with water and most organic solvents. 2-Butoxyethanol is a man-made product produced by a reaction of ethylene oxide with an anhydrous alcohol in the presence of a suitable catalyst [IARC].

### Usage and Exposure

2-Butoxyethanol is a high volume production chemical. It exhibits properties of both alcohol and ethers and is therefore used extensively in the production of cleaning agents. 2-butoxyethanol is used most frequently as a solvent in surface coatings, water-based paints and varnishes, spray lacquers, quick-dry lacquers, enamels, and latex paint. It is also used in formulated industrial and household cleaners, spot removers, metal cleaners, silicone caulks, printing inks, and as a formulation solvent for insecticides and herbicides [IARC, ASTDR]. Liquid soaps and cosmetics such as hair dyes, nail polishes, nail polish removers and skin cleansers also contain 2-butoxyethanol [IARC].

Occupational exposure to 2-butoxyethanol occurs during its production, formulation or cleaning with products containing the substance, painting or surface coating, and printing.

Household exposure may occur during cleaning, painting or surface coating, and during use of cosmetics containing 2-butoxyethanol [ASTDR].

### Routes of Exposure

The most common route of occupational exposure to 2-butoxyethanol is inhalation.

2-Butoxyethanol is readily absorbed through the skin and has a relatively low vapor pressure. Consequently, the dermal route may be predominant or may contribute significantly to overall exposure [IARC].

Ingestion of the substance may be accidental or occur in cases of substance abuse.

## **Target Organs**

There are numerous well - documented studies that deal with exposure of animals to 2-butoxyethanol through inhalation, ingestion, or dermal contact, but few studies have dealt with the health effects resulting from human exposure.

The target organs for acute and chronic exposure are the hematological system, the hepatic, renal, and lymphoreticular (spleen) systems [ASTDR].

## **Metabolism**

2-Butoxyethanol is readily absorbed after inhalation, oral, and dermal exposure and is rapidly distributed in the tissues and metabolized. It is eliminated mainly in urine, but some is exhaled in the form of CO<sub>2</sub>. 2-Butoxyethanol is metabolized by alcohol dehydrogenase and aldehyde dehydrogenase to form 2-butoxyacetaldehyde and 2-butoxyacetic Acid [The MAK Collection]. Biological monitoring of the common urinary metabolite 2-butoxyacetic acid is recommended for a complete assessment of exposure [IARC].

## **Health Hazards**

### **Acute Effects**

Exposure to high levels of 2-butoxyethanol of 100-300 ml/m<sup>3</sup> results in irritation of the eyes, nose and throat and impairment of the sense of taste, headaches and nausea, shortness of breath and weakness [IARC].

A number of case reports described the main symptoms following ingestion of cleaning agents containing 2-butoxyethanol in concentrations of about 25 to 60 g. The symptoms included haemoglobinuria, erythropoemia, hypotension, metabolic acidosis, shock and haematuria, as well as CNS depression and coma [The MAK Collection].

Hematological effects of 2-butoxyethanol such as elevated osmotic fragility, increased fibrinogen, and reduced erythrocyte count and hemoglobin values were observed in animals after acute and intermediate inhalation exposure [ASTDR].

Effects on the liver, kidneys, lungs and spleen that may be secondary to haematotoxicity have been observed in animals exposed acutely to lower doses or concentrations [IARC].

### **Chronic Effects**

Chronic exposure to 2-butoxyethanol at concentrations of 31.2 ppm or higher resulted in hemolytic anemia – an effect similar to the critical end-points observed in shorter-term studies, [NTP].

A study was conducted in which application patches containing 2-butoxyethanol were applied to 201 subjects, but no adverse dermal effects or skin sensitization were observed [IARC].

There are no clinical findings of respiratory sensitization [The MAK Collection].

#### Reproductive Effects:

No data are available regarding the effects of 2-butoxyethanol on reproduction in humans [The MAK Collection]. Effects on reproductive ability and reproductive organs of animals were observed at doses or concentrations of 2-butoxyethanol that were much greater than those associated with hematological effects [IARC].

#### Genetic Effects:

Available data show that the compound exhibits no appreciable genotoxicity [IARC].

### **Carcinogenicity**

According to IARC evaluation, there is inadequate evidence in humans for the carcinogenicity of 2-butoxyethanol. There is limited evidence of its carcinogenicity in experimental animals

2-Butoxyethanol is not classifiable as to its carcinogenicity to humans (Group 3) [IARC].

### **References:**

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