

Chemical oxygen generator

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The "SFOG" in this article is a solid fuel oxygen generator, "SFOG" can also mean Six Flags Over Georgia.

A **chemical oxygen generator** is a device that releases oxygen created by a chemical reaction. The oxygen source is usually an inorganic superoxide, chlorate or perchlorate. A promising group of oxygen sources are ozonides.

The generators are usually ignited mechanically, by a firing pin.

The chemical reaction is usually exothermic, making the generator a potential fire hazard.

Potassium superoxide was used as an oxygen source on early manned USSR space missions, and for firefighters and mine rescue.

Contents

- 1 Chemical oxygen generator in commercial airliners
- 2 Oxygen candle
 - 2.1 Solid oxygen generator from Mir
- 3 Uses

Chemical oxygen generator in commercial airliners

Commercial aircraft provide emergency oxygen to passengers to protect them from drops on cabin pressure. For each row of seats there are overhead masks and oxygen generator. If a decompression occurs, the panels are opened either by an automatic pressure switch or by a manual switch, and the masks are released. When the passengers pull down on the mask they remove the retaining pins and trigger the production of oxygen.

The oxidizer core is sodium chlorate (NaClO₃), which is mixed with less than 5 percent barium peroxide (BaO₂) and less than 1 percent potassium perchlorate (KClO₄). The explosives in the percussion cap are a lead styphnate and tetracene mixture. The chemical reaction is exothermic and the exterior temperature of the canister will reach 260 °C. **It will produce oxygen for 15 to 20 minutes, about 20 liters for each passenger.** The two-mask generator is approximately 63 mm in diameter and 223 mm long. The three-mask generator is approximately 70 mm in diameter and 250 mm long.

Accidental activation of improperly shipped expired generators caused the ValuJet Flight 592 crash.

Oxygen candle

A **chlorate candle**, or an **oxygen candle**, is a cylindrical chemical oxygen generator containing a mix of **sodium chlorate** and **iron** powder. When ignited, the mixture **smolders** at about 600 °C, producing **sodium chloride**, **iron oxide**, and **about 6.5 man-hours of oxygen per kilogram** of the mixture. It releases oxygen at a fixed rate. The mixture has an indefinite shelf life if stored properly; candles stored for 20 years have shown no decrease in oxygen output. The oxygen is released by thermal decomposition, the heat is supplied by the burning iron. The candle has to be wrapped in thermal insulation to maintain the reaction temperature and to protect surrounding equipment.

Potassium and lithium chlorate, and sodium, potassium and lithium perchlorates can also be used in oxygen candles.

Solid oxygen generator from Mir

The TKG generator contains a replaceable cartridge, a thin walled steel tube with a three-part block of oxygen-releasing mixture based on lithium perchlorate. Two parts are tablets of the chemical mixture and the third one is the igniter tablet with a flash igniter. The igniter is struck by a firing pin when the device is activated. One cartridge releases 600 liters of oxygen and burns for 5-20 minutes at 450-500 °C. The oxygen is cooled and filtered from dust and odors, and released into the space station atmosphere. [1]

On 23 February 1997, during the exchange of an air filter, a failed chemical oxygen generator spewed torch-like jet of a molten metal and sparks across one of the Mir space station modules, burning for 14 minutes and blocking the escape route to one of the Soyuz spacecraft. [2] The accident was caused by a leak of the lithium perchlorate from one of the canisters.

Uses

Chemical oxygen generators are used in aircraft, breathing apparatus for firefighters and mine rescue crews, submarines, and everywhere where a compact emergency oxygen generator with long shelf life is needed. They usually contain a device for absorption of carbon dioxide, often a filter filled with lithium hydroxide; a kilogram of LiOH absorbs about half a kilogram of CO₂.

Self-contained self-rescue devices (SCSRs) are used to facilitate escape from mines.

On the International Space Station, chemical oxygen generators are located aboard the Elektron module. Each canister can produce enough oxygen for one crewmember for one day.

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Categories: Human spaceflight | Firefighting equipment | Submarines

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