

Sulfer Dioxide environment and the chemical reactions that occur during a discharge of a Firepro Fire Suppression System.

Where SO₂, has been measured in the general area in concentrations that can peak as high as 100ppm, but usually averaging between 0.5 and 5 ppm.

In presence of sulfur dioxide, potassium carbonate produces potassium sulfite and carbon dioxide according to the following equation:



Potassium sulfite is a stable product under normal temperature and pressure conditions and in contrast to the highly toxic sulfur dioxide, it is classified as a non-hazardous substance or mixture according to Regulation (EC) No. 1272/2008.

The reaction of potassium carbonate with sulfur dioxide is not expected to inhibit the fire suppression mechanism. Not only because the detected concentration of sulfur dioxide is extremely low, but also because the mechanism is mainly driven by the potassium free radicals (K*) which are formed upon dissociation of the potassium salts. The potassium radicals bind to other flame free radicals, such as hydroxide, hydrogen and oxygen free radicals, which sustain flame’s combustion process by producing harmless stable products.

The FirePro Aerosol phase consists of a gas phase with micro sized solid particles in suspension. Analysis by a laser beam diffraction test on the particles, have shown composition of the gas and solid components:

| | |
|----------------------------------|--|
| 52 % solid micro sized particles | inorganic potassium salts, mainly potassium nitrate, which is primarily converted into potassium carbonate. All particles are less than 5microns in diameter. In comparison human hair is approx. 100 microns in diameter. |
| 48 % gaseous particles | mainly water vapor, nitrogen and minor % of carbon dioxide |

The **solid aerosol-forming compound FPC** is the originator of the condensed extinguishing aerosol. Upon activation the solid aerosol-forming compound FPC will undergo a combustion reaction generating the fire extinguishing condensed aerosol.

| | Compound | Chemical Formula | % by Weight |
|-----------|---------------------|--------------------------------|-------------|
| GAS | Carbon Dioxide | CO ₂ | 13%-14% |
| | Nitrogen | N ₂ | 21%-22% |
| | Water Vapor | H ₂ O | 10%-12% |
| | Carbon Monoxide | CO | |
| | Methane | CH ₄ | 1%-2% |
| | Hydrogen | H ₂ | |
| PARTICLES | Potassium Carbonate | K ₂ CO ₃ | 47%-49% |
| | Potassium Nitrate | KNO ₃ | 2%-3% |
| | Potassium Chloride | KCl | < 1% |
| | Other elements | | < 1 % |

Residue of Particulate matter after discharge of FirePro Aerosol Generators is approximately 10-15% of the aerosol weight of the generator. Example - 100g FirePro Generator will leave 10-15g of dust like residue distributed around the risk area. Where the risk area is ventilated during the aerosol phase the particles will be distributed by the prevailing wind conditions.

The residue is non-toxic and non-corrosive; it is hydroscopic in nature on discharge as a result of the aerosol process so will attract moisture. The chemical nature of the residues (potassium salts) is slightly alkaline PH is approx. 8.

FirePro® consists of inorganic potassium salts. Under normal circumstances these salts will not cause any damage to human beings or animals. The concentrations of heavy metals and other trace elements are negligible.

Upon activation our products pose no threat to the atmosphere when the extinguishing aerosol is produced. This is evident in the physical and chemical characteristics of our products which bear the Green Label, SNAP Listed (Significant New Alternative Policy) of EPA (USA) and Ozone-Friendly-NO-CFCs logos.

Effect on Water Supplies eco systems and potable drinking water unless large quantities of the particles have been deposited on water supplies there will be no discernible effect on water bodies. The PH of 8 would have an impact but this would not normally be measurable, and the particle sizes which are less than 5 microns are so small that any concentration outside of a contained area where the discharge occurred would be extremely unlikely. Without such concentration the quality of eco water and potable drinking water will be unaffected.



Known health impact associated with direct exposure to the discharged aerosol. FirePro® aerosol-forming compound is not based on halogen compounds that react with the fire. It does not produce any corrosive halogen acid by-products in its reaction with the fire. Potassium carbonate creates stability in neurons to help maintain equilibrium. There are no known Occupational Exposure Limits.

Hazards Identification

- ☺ Hazards for humans related to the SBK solid compound have not been found.
- ☺ Hazards for humans related to the aerosol released by the solid compound have not been established.
- ☺ Signs and symptoms related to the aerosol are only referred to acute exposure and/or chronic overexposures.

Signs and Symptoms

- | | |
|---|-----------------------------|
| ☺ Eye Contact | At normal contact no injury |
| ☺ Inhalation | Not a likely route of entry |
| ☺ Skin Contact | At normal contact no injury |
| ☺ Ingestion | At normal contact no injury |
| ☺ Chronic Overexposure | At normal contact no injury |
| ☺ Medical Conditions Generally Aggravated by Exposure | None known |
| ☺ Environment | None established |

Exposure Controls and Personal Protection

- | | |
|----------------------------|------------------------------|
| ☺ Respiratory Protection | At normal contact not needed |
| ☺ Hand Protection | At normal contact not needed |
| ☺ Eye Protection | At normal contact not needed |
| ☺ Skin and Body Protection | At normal contact not needed |

Recommended decontamination - areas exposed to the residue in any concentration, should be cleaned and the dust particles removed. Removal of the dust particles can be achieved by vacuum, broom or other equipment in sensitive areas. This level of concentration would only be inside the discharge area. The distribution of the particles would be over a large area as the discharge is carried by the prevailing wind unless contained.

