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## Assessment of Smoky Fog Liquid

Danish Technological Institute, Division of environment has been asked to do an assessment of the effect on the environment when the smoky fog liquid has been released when used in burglar alarms.

The smoky fog liquid consists of a mixture of a propylene glycol and water. The effect of the smoky fog equipment is that the liquid is evaporated by heating. The liquid has a high boiling point. Therefore the vapours will condense rapidly as they are cooled down in the air when exhausted from the equipment. An aerosol is formed consisting of tiny liquid drops of a glycol-water mixture.

### *Corrosive effect*

The propylene glycol used has no corrosive effect to metals. The water in the smoky fog liquid may cause surface corrosion on unprotected surfaces of iron as any other water in contact with iron. The effect is very short, as the water will evaporate rapidly from the tiny liquid drops.

The propylene glycol is soluble in water. Therefore, wet cleaning after release of the smoky fog liquid may rinse the exposed surfaces very efficient.

If the surface is not cleaned, the propylene glycol will evaporate in a few hours or days depending on the amount of liquid released. It will not leave any residue on the surfaces. No damage on metals or electronics may arise, not even if no cleaning of the surfaces is done after exposure to the liquid.

### *Condensation of the Liquid*

The idea of the smoky fog equipment and the liquid is to evaporate a mixture of a propylene glycol and water of which the propylene glycol has a boiling point about 230C° and water 100C°. In the equipment the liquid mixture will be heated and evaporated but when the vapour is blown into the surrounding air, the liquid will very rapidly condense to tiny liquid droplets forming a smoky fog with a very high opacity. The droplets will slowly sink and eventually settle on horizontal surfaces.

Although the glycol has a high boiling point, it will completely evaporate again after a few hours or days.

*Conductivity and Capacitance*

The smoky fog liquid is an aqueous solution. The conductivity of the solution is 0.18 mS/m at 20C°. It is less than the conductivity of tap water. The dielectric constant for the glycol is about 40 and for water about 80. The water will evaporate faster than the glycol so the droplets when settling on surfaces will have a dielectric constant in the range between 40 and 80.

*Impact on Foodstuff and Pharmaceutical Products etc.*

The propylene glycol used has a low toxicity and is used without restrictions as raw material for the production of film wrapping and other polymer materials to be used in contact with foodstuff. The glycol, however, is not on the list of approved additives for foodstuff published by the Danish Ministry of Food.

The assessment is therefore that unpacked foodstuff, contaminated by the atomised liquid, should be condemned. Foodstuff packed in metal, glass, plastic, paper or cardboard, or fruit and vegetables, which are peeled before use, can be used without risk. The assessment is the same for pharmaceutical products.

Kind regards  
Environmental division



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