CHLORIDE ANALYSIS

Chloride analysis is literally an analysis for chloride – which means ions of the element chloride. The reason why one wants to make the analysis is, that material which has a high content of chloride develops hydrochloric acid when it burns and this hydrochloric acid could course extensive secondary damage such as corrosion of metal parts.

Chloride Analysis is the sampling and testing for the presence of chloride ions in contamination. Analysis of this type is necessary as chlorinated plastics decompose at elevated temperatures releasing gaseous HCl. This gas then combines with water to form Hydrochloric Acid, which condenses on the surfaces. This acid can then cause corrosion to unprotected metal parts.

Hydrochloric acid

The most ordinary source of chloride from a fire is combustion of plastic material in PVC. Normal PVC contains approximately 40% chloride measured on a weight. When burning this chloride will be released as the gas hydrogen chloride., which forms hydrochloric acid when it receives water. Consequently smoke from a fire which contains large amounts of PVC also contains large amounts of hydrochloric acid. As a rule of thumb 1 kg PVC can form up till 1 litre of hydrochloric acid.

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Risk assessment and damage control

Chloride analysis is able to map out possible pollution of hydrochloric acid and it is an important tool as regards risk assessment of secondary damages after a fire. Knowing the risk of secondary damages - and not least knowing it fast - is an important factor in relation of damage control.

Chloride analysis can be used to map the levels of contamination throughout a premises and is an important tool for the process of risk assessment of secondary damage after a fire. Knowing the risk of secondary damages - and not least knowing it fast - is an important factor in relation of damage control.

The method

At AREPA chloride analysis measures chloride in a liquid sample such as potentiometric titration of silver nitrate.

On the actual surface an area of 25 cm^2 is washed away with 20 ml. distilled water. 1 ml. of nitric acid is added to counteract precipitation of silver salts. Afterwards the sample is titrated with silver nitrate under precipitation of silver chloride until equivalent point. In the equivalent point the the chloride concentration is calculated from the used amount of silver nitrate.

AREPA use Potentiometric Titration, which involves the addition of silver nitrate to a solution of the contaminant taken from a set surface area, this reacts with the chlorides in the solution to form silver chloride, which can then be measured and the chloride ion contamination calculated.

The danger line

The results of a chloride analysis are normally stated in microgram chloride per cm² (µg Cl^-/cm²). The danger lines in connection with chloride pollution varies depending the type of equipment, but generally they are around 6-14 µg Cl^-/cm².

Experience

To make a chloride analysis after a fire is as mentioned an important part of an estimation of the risk of secondary damages. The analysis can not stand alone as many chemical substances in smoke from a fire a side from hydrochloric acid is able to cause corrosion of metal parts. Consequently the results of the analysis must be seen as a contribution to the overall risk exposure of a fire damage. The most important contribution in estimating particular fire damage will always be the knowledge which experienced technicians receive by having worked with estimating and repairing fire damage.

Although knowing the levels of contamination is an important part of the risk assessment process, correct interpretation of the results is required. However, this is also dependent on the situation. For example, equipment on board a sea-going vessel would have a high background chloride level as a result of the maritime atmosphere, similarly, the substances used in any production processes in the area could result in artificially high readings. Examples of this are commercial laundries using bleach in the laundering process or the use of salt (NaCl) to soften water for a particular process. The most important factor of assessing the risk of damage to technical equipment following a fire is the knowledge and experience of the personnel involved.