3M UK Corporate Analytical Services - Report No 7162

To : Mark Nursall

Subject : Analysis of FC-77 for residual HF/PFIB.

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Date : 7 November, 2007

Copies :

Background

A sample of FC-77 taken by Alcatel on the 19/09/07 was submitted for analysis. The solvent had been used in a 10kV DC converter, which presents the potential for the solvent to degrade, in which case hydrogen fluoride (HF) and perfluoroisobutene (PFIB) are products. Analysis was required to determine the presence of these compounds.

Analysis Results and Discussion

The sample was analysed by Gas Chromatography-Mass Spectrometry (GC-MS). A sample of laboratory standard FC-77 was also run and the chromatograms compared. The resulting chromatograms are shown in figure 1.

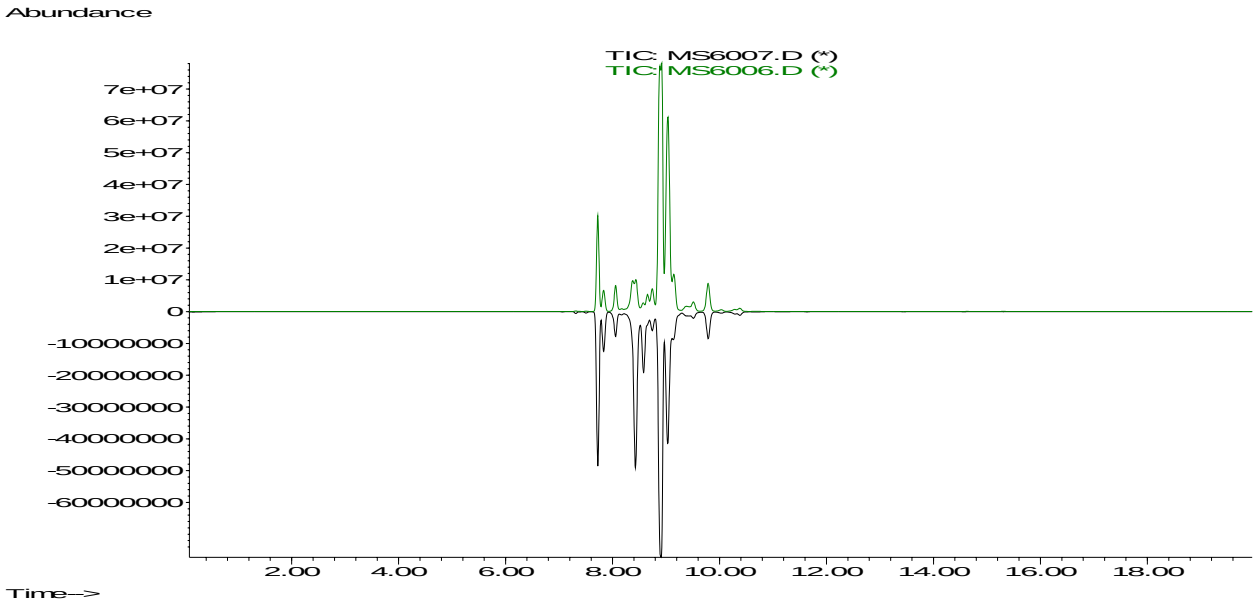

Figure 1. GC-MS chromatograms of FC-77 from Alcatel (green) and laboratory (black).

The comparison indicates a slight change in the ratio of some peaks, relating to the fluorocarbon compounds of FC-77, this could be due to variations from batch to batch or differential solvent loss during application. No extra peaks were observed in the sample form Alcatel, which suggests no HF or PFIB is present.

To confirm this, the sample (~50mL) was washed with water (~20mL) in order to liberate any HF from the FC-77 solution producing a mild hydrofluoric acid solution in the water. The pH was then checked, the presence of HF would then be detected in a change in pH from the standard water. This was checked by pH colour indicators, shown in figure 2.

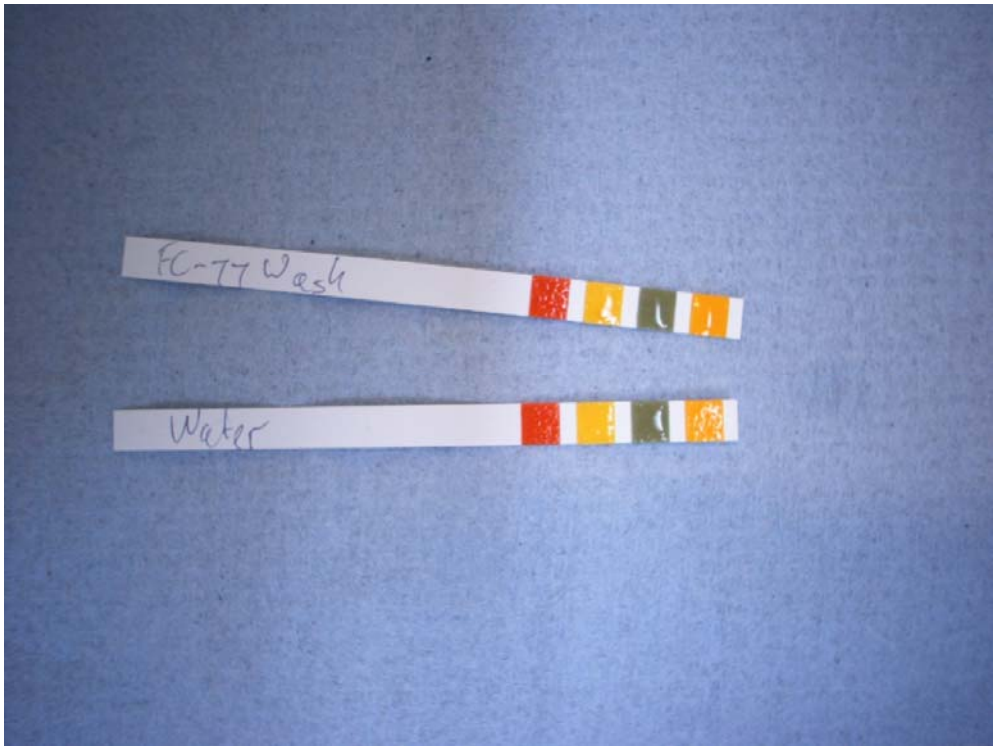

Figure 2. pH indicators from standard water (bottom) and water used as a wash for the FC-77 sample.

The indicator strips show no discernable difference in colour, indicating no change in acidity after the sample had been shaken with water. This suggests that no HF is present. It is known that the level of PFIB production during FC-77 degradation is 1000 time lower than HF. This link suggests that no PFIB is present.

Conclusions

- The sample of FC-77 taken by Alcatel on 19/09/07 was analysed by GC-MS and for potential acidity change in water. Both methods gave a negative result for HF and PFIB.

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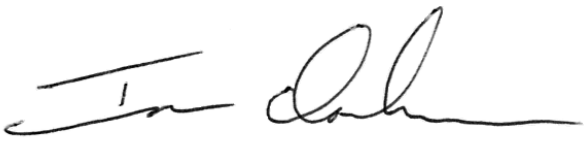

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