

Defect analysis of electronic devices - clouded optical components -

[Background] There was a case where the optical components of electronic devices became cloudy during use. Since the cloudiness did not occur when changing the solder flux used for the circuit board, it was suspected that the gases generated from organic residues in the flux after soldering was the cause of the cloudiness. Flux is composed of resin, activator, solvent, etc. In this report, gaseous components generated from flux by heating were analyzed using thermal desorption (TD)-GC/MS.

[Experimental] A GC/MS system with a Multi-Shot Pyrolyzer (EGA/PY-3030D) directly interfaced to the GC injector was used for analysis. Two flux samples collected after melting the solder (Sample 1: cloudiness occurred, Sample 2: no cloudiness) were used. Thermal desorption was performed at the temperature at which the electronic device was used (60 °C, 10 min hold), and the volatile compounds were cryo-trapped using a MicroJet Cryo-Trap (MJT-1035E) prior to the measurements of TD chromatograms by GC/MS.

[Results] The TD chromatograms of Samples 1 and 2 are shown in Fig. 1. Many peaks assigned to diethylene glycol mono-hexylether, etc. were observed. On the other hand, Sample 2 shows almost nothing other than 2-ethyl-1-hexanol. The total peak area per mass of Sample 1 was about 9 times larger than that of Sample 2. This suggests that compounds such as diethylene glycol mono-hexylether volatilize at the temperature at which electronic devices are used and condense on optical components, resulting in cloudiness.

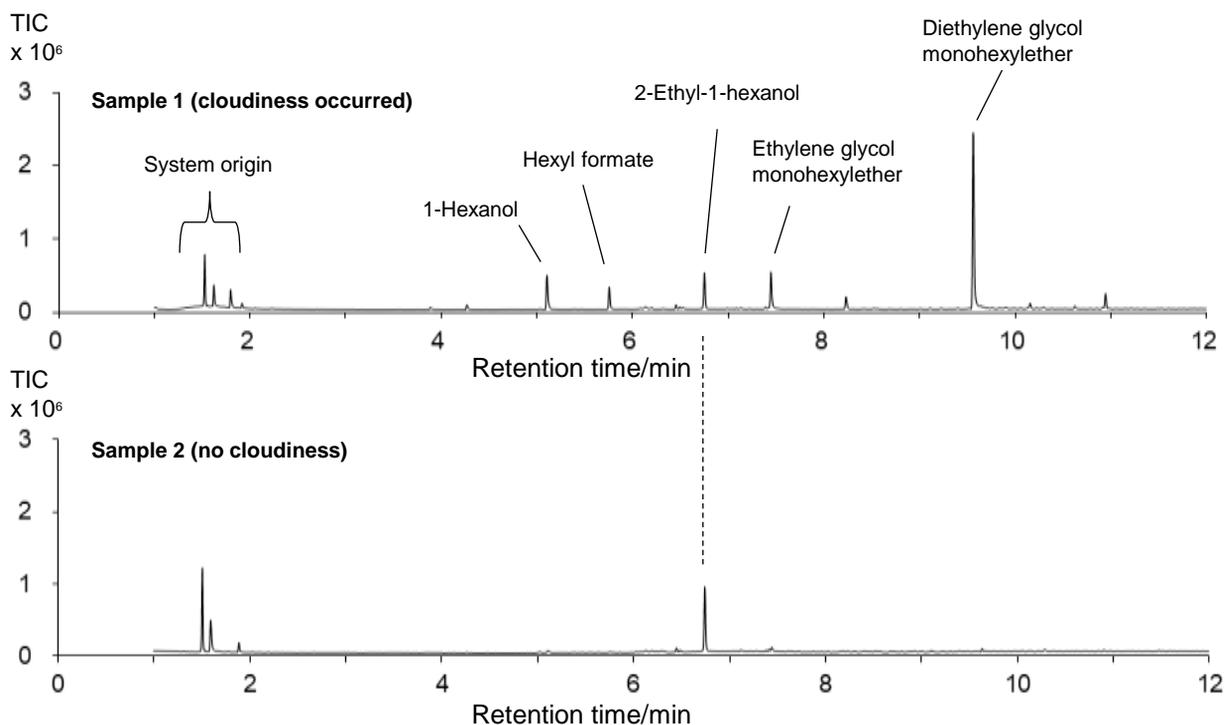


Fig.1 TD chromatograms of flux samples

Furnace temp.: 60 °C (10 min hold), GC oven temp.: 40 °C (2 min hold) - 320 °C (20 °C/min), Split ratio: 1/10, Column flow rate: 1 mL/min
 Separation column: UA⁺-5 (5 % diphenyl 95 % dimethylpolysiloxane, L=30 m, i.d.=0.25 mm, df=0.25 μm)
 MS scan range: m/z 29 - 400, Sample amount: ca. 5 mg

Keywords : Solder, Flux, Defect analysis, Thermal desorption-GC/MS

Product used : Multi-Shot Pyrolyzer, UA⁺-5, Vent-free GC/MS adapter, F-Search, MicroJet Cryo-Trap

Applications : Electronics, Quality assurance

Related technical notes : PYA1-006E, PYA1-025E

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