The Institute for Interconnecting and Packaging Electronic Circuits
2215 Sanders Road • Northbrook, IL 60062-6135

IPC-TM-650
TEST METHODS MANUAL

Number	
2.3.27.1	
Subject	
Rosin Flux Residue Analysis—HPLC Method	
Date	Revision
1/95	
Originating Task Group	
New Methods Task Group (5-32f)	

1.0 Scope

1.1 This High Performance Liquid Chromatography (HPLC) procedure outlines the analysis of rosin flux residues remaining on a printed wiring board (PWB) after defluxing. This test can be used for the evaluation of processes used to clean rosin based soldering fluxes.

Applicable Documents

IPC-TP-383 ''Organic Surface Contamination - Its identification Characterization, Record Effects on Surface Insulation Resistance and Conformal Coating Adhesion.''

1PC-TR-580 ''Cleaning and Cleanliness Test Program Phase 1 Results.''

3.0 Test Specimens

3.1 Printed wiring board (PWB) for extraction

4.0 Apparatus and Materials

4.1 HPLC systems with UV detection

4.2 Waters C18 Novapak column, or equivalent

4.3 Suitable extraction vessel, KAPAK® bag, or equivalent, to extract PWB

4.4 Volumetric Flasks

4.5 Acetonitrile, HPLC grade

4.6 Deionized water, HPLC grade

4.7 Rosin Standards: abietic acid, dehydroabietic acid, neoabietic acid (Helix BioTech, 604-270-7468, Aldrich Chemical, Alltech Associates)

4.8 2-Propanol (IPA), HPLC grade

4.9 Sodium phosphate monobasic, NaH2PO4oH20)

4.10 Hot water bath, 80° ± 5°C

5.0 Procedure

5.1 Extraction

5.1.1 Record area of PWB. General rule on surface area is (length x width x 2)+10% for a populated PWB.

5.1.2 Place processed PWB in extraction bag, or equivalent

5.1.3 Prepare 75/25 (by volume), IPA/H20 solutions for the extraction.

5.1.4 Add 75-200 mls of IPA/H20 solution to extraction bag, enough to cover PWB.

5.1.5 Heat seal bag and place in water bath at 80° ± 5°C for 1 hour (cut vent hole in bag).

5.1.6 Dilute (with IPA/$H_2$0 solution) or concentrate extract to get approximately 100 ml of extract per 35 sq inch of PWB area.

5.1.7 Extract unprocessed PWB blank, in same manner as sample.

5.2 Standard and sample analysis

5.2.1 Set HPLC instrument conditions as follows:

Wavelength ..... 220 & 240 nanometers
(The two wavelengths are needed to get optimum response from all constituients. See attached cromatograms.)
Column temp ..... 60°C
Mobile phase ..... Acetonitrile/water 60/40
..... 25 millimolar $Na_2PO_4H_2$0
Flow rate ..... 2 milliliters/minute
Sample size ..... 10 microliters
(Instrument conditions may be changed to optimize separation)

5.2.2 Prepare standards of known concentration

5.2.3 Establish retention times and areas of rosin standards

5.2.4 Prepare calibration curves for each of the identifiable peaks in the extract chromatogram.

5.2.5 Run extracts obtained in 5.1

5.3 Calculation of residue concentration

5.3.1 Concentration of material in solution (milligrams/liter) = (AxBxC)/(DxE)

A = Area of material peak
B = Concentration of standard (milligrams/liter)
C = Injection volume of standard (microliters)
D = Are of standard peak
E = Injection volume of sample (microliters)

Residual material {(micrograms/inch squared)(ug/in2)} = ((FxG)/H)x1000ug/mg

F = Concentration of material in solution (milligrams/liter)
G = Volume of extract solvent (liter)
H = PWB surface area (square inch)

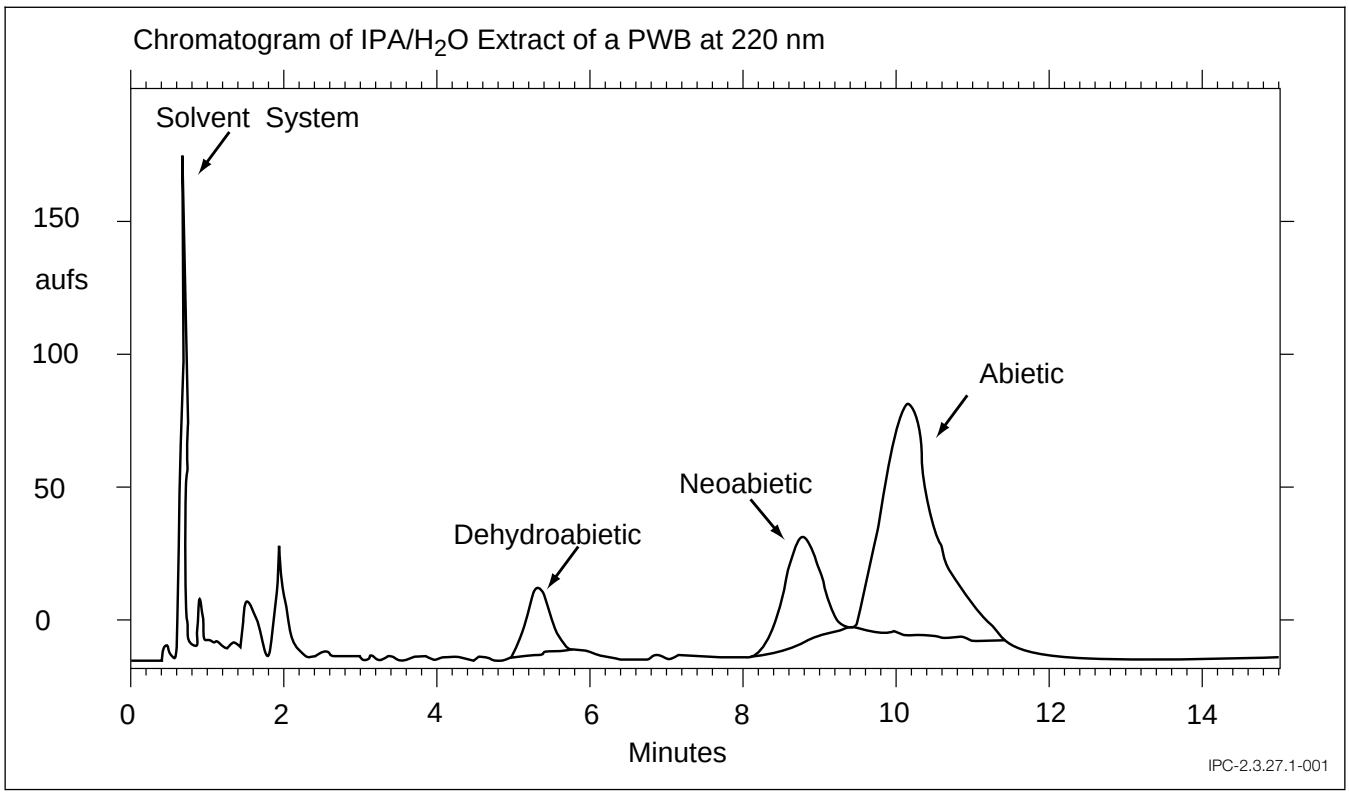

Figure 1

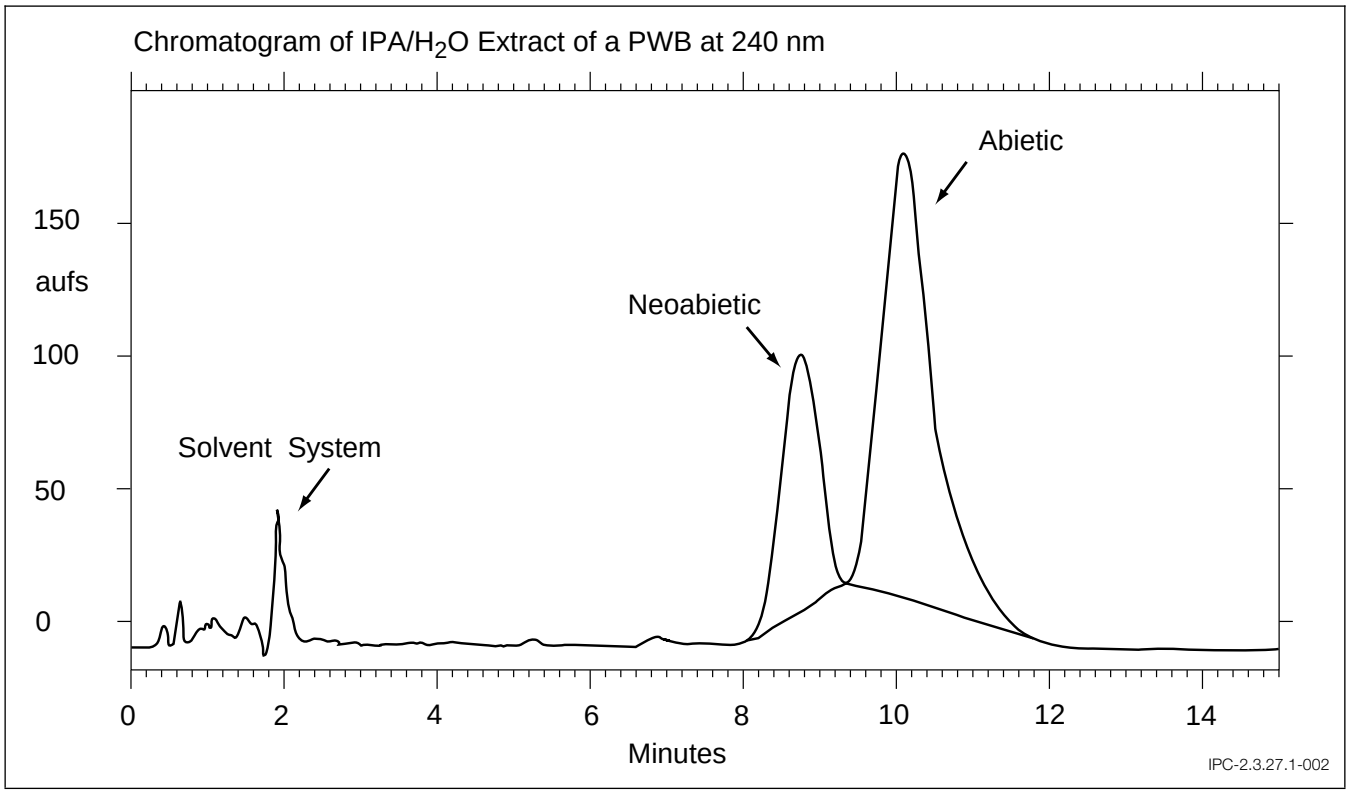
Chromatogram of IPA/H_2O Extract of a PWB at 240 nm
Abietic
Neoabietic
Solvent System
150
aufs
100
50
0
0
2
4
6
8
10
12
14
Minutes
IPC-2.3.27.1-002

Figure 2