

3.10 Analysis of Vinyl Acetate Adhesive - GCMS

■Explanation

Vinyl acetate polymers and several organic solvents are contained in vinyl acetate adhesive. If an adhesive like this is thermally decomposed at high temperature, the peaks of the vinyl acetate related matter generated from heat decomposition and organic solvents will be mixed, making identification impossible. (See Fig. 3.10.3.)

To eliminate this problem, the sample is heated at 200 °C to vaporize the organic solvents without decomposing the vinyl acetate components. With the sample in this status, the organic solvents can be measured and analyzed. Next, the sample is heated to 550 °C to thermally decompose the vinyl acetate and produce a vinyl acetate pyrogram. The use of two heating stages means that the organic solvents and polymers used in the adhesive can be separately distinguished. (See Figs. 3.10.1 and 3.10.2.)

■Analytical Conditions

Instrument	: GCMS-QP5000 PYR-4A
Column	: DB-1 0.25mm × 30m df 0.25 μm
Col.Temp.	: 50 °C (1min)-300 °C (10 °C/min)
Inj.Temp.	: 300 °C
I/F Temp.	: 320 °C
Carrier Gas	: 100kPa(1min)-150kPa(2kPa/min)- 250kPa(5kPa/min)
Split Ratio	: 1 : 10

References

Application News No. M174, M196

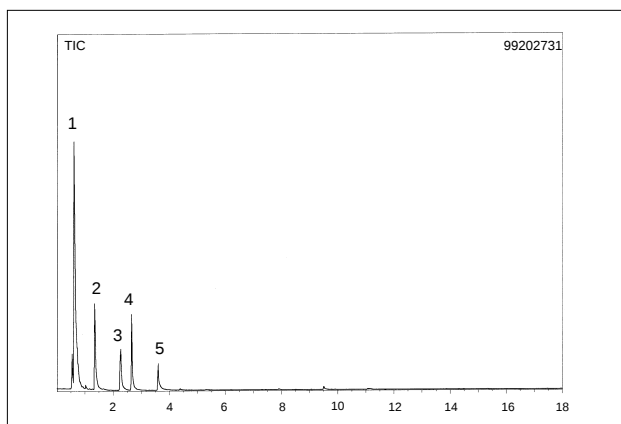


Fig. 3.10.1 Adhesive TIC (heating temperature: 200 °C)

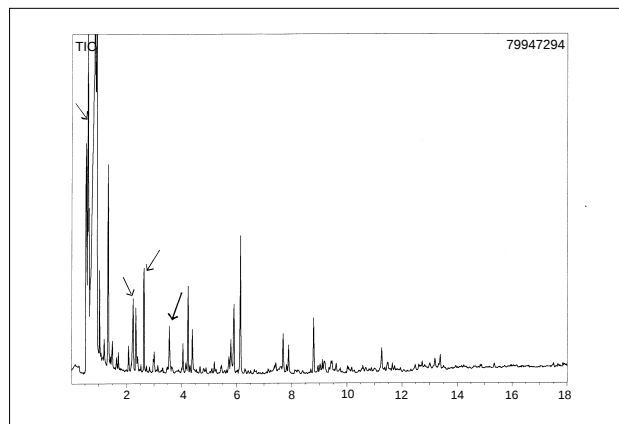


Fig. 3.10.3 Adhesive TIC (thermal decomposition temperature: room temperature to 550 °C) Arrows denote organic solvents

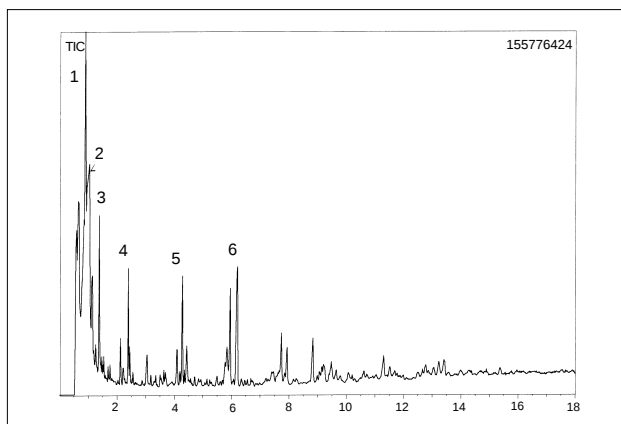


Fig. 3.10.2 Adhesive TIC (thermal decomposition temperature: 200 °C to 550 °C)

Identified Solvents (Fig. 3.10.1)

1. Methyl acetate 2. Isobutyl acetate
3. 2-Methyl-1-butyl acetate 4. n-Pentyl acetate
5. Azobis isobutyronitrile

Table 3.10.1

Identified Pyrolysis Fragments (Fig. 3.10.2)

1. Benzene 2. Acetic acid 3. Toluene
4. Styrene 5. Indene 6. Naphthalene

Table 3.10.2