


Pyrolyzer		
Curie Point Pyrolysis (CP-Py)		Furnace Pyrolysis (F-Py)
Heating Method	Curie Point heating	Furnace oven heating (Tubular ceramic heater)
Sample setting	by dropping Pyrofoil in the oven	by dropping pyrofoil or Sample cup in the oven or lower the holder by hand
Pyrolysis temp.	by choosing a Pyrofoil Temp. range from 160°C to 1040°C	40 to 800°C by 1°C unit Temp. elevation rate : Max 600°C/min
Needle	0.64mm OD×70mm	
Sample tube material	Quartz glass	
Dimentions, Weight	W120×D121×H328mm, 2Kg	

Controller	
Display / Control	5.7 inch touch panel allows to program temperature parameters, control analysis mode, Pyrolysis mode, Hybrid mode and EGA mode, optional PGS, CIC and Reanalysis Adsorption set (except JCI-77).
PYROLYSIS mode	Pyrolysis time : 1 to 99 sec Oven temp. : CP-Py : 40°C to 400°C F-Py: 40°C to 800°C
HYBRID mode	First analysis (Thermal extraction): 2 phases with different temperature elevation rates available Oven temp.: Max. 800°C, Duration: Max. 99.9min. each phase Second analysis (Pyrolysis): Oven temp.: Max. 400°C, Duration: Max. 99sec
EGA mode	3 Phases with different temperature elevation rates available Oven temp.: Max. 800°C, Duration: Max. 99.9min. each phase
Needle heater	40°C to 400°C by 1°C unit
RF generator	Radio frequency output : 48W Fall detect sensor is installed
Carrier gas	GC/JHI switching valve is installed
Dimensions,Weight, Power	W180×D500×H390mm, 16 Kg, 100-220V, 500VA (Max)

Curie Point Injector JCI-77 (Optional)	
Use	Collected desired peaks into mini-PAT during analysis can be reanalyzed by JCI-77
Heating Method / Pyrolysis time	Curie Point heating, 48W / 5 sec, 10 sec, 15 sec, 30 sec
Sample tube	Quartz glass / 5.5 mm OD×42 mm length
Injection gas	He gas (0.5 MPa or higher)
Dimensions,Weight, Power	Pyrolyzer 38 mm OD×160 mm / 110 g Controller W140×D347×H246 mm / 7 Kg / 85 - 240V, 500VA (Max)

Pyrofoil	
Pyrofoils of 21 different pyrolysis temperatures are available. When using the Pyrofoils, unlike F-Py, it heats up samples instantly to the target temperatures shown in the table.	Pyrolysis Temp.
	1040°C   500°C   315°C
	920°C   485°C   280°C
	764°C   445°C   255°C
	740°C   423°C   235°C
	670°C   386°C   220°C
	650°C   358°C   170°C
	590°C   333°C   160°C
	
Low noised Pyrofoils	

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Most Versatile  
Hybrid Pyrolyzer for GC/MS  
JHI-08

Hybrid

Curie Point Pyrolysis × Furnace Pyrolysis  
Evolved Gas Analysis



**JAI** Japan Analytical Industry Co., Ltd.

Point 1

Varied modes of analysis for different types of samples

JHI-08 performs Curie point pyrolysis with instantaneous heating by Pyrofoils. In addition, it can do furnace pyrolysis using sample cup with programmable oven temperature control.

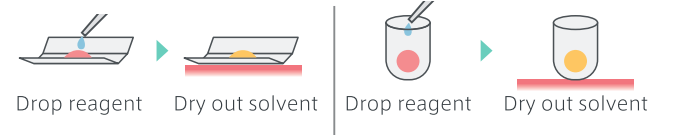
Curie Point Pyrolysis



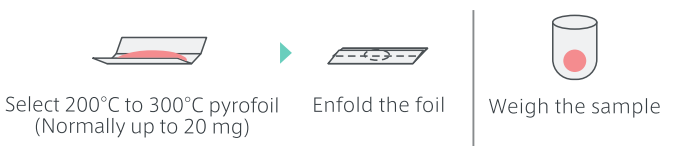
Furnace Pyrolysis



Derivatization Pyrolysis



Thermal Extraction



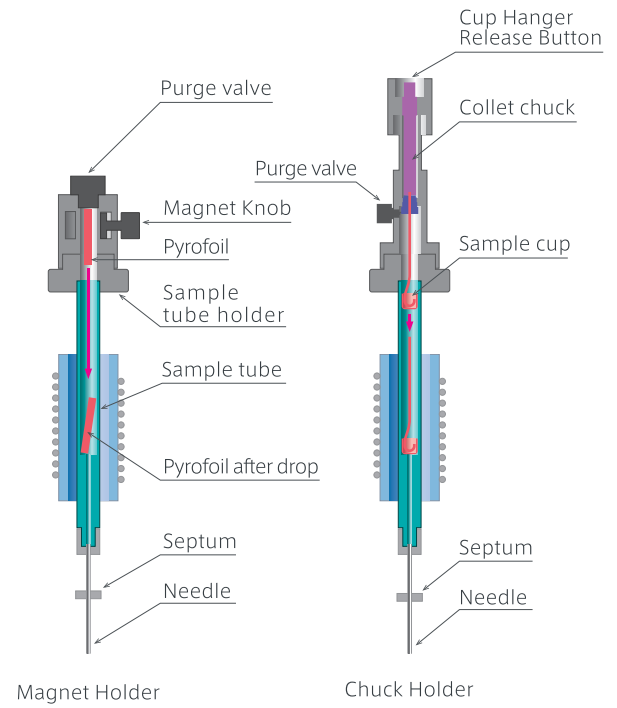
EGA



Point 2

Easily removable module prevents cross contamination in the flow channel.

During pyrolysis, approximately 60% of tar-like high-boiling materials remain in the sample tube. This is especially a problem for samples of molded resins and rubbers that contain inorganic filler, carbon powder and other additives. JHI-08 has easily replaceable sample tube and needle assy for cleaning. This minimizes cross contamination and results in better and reproducible chromatograms.



Sample tube holder is an assembly of sample tube and needle. All the flow channel is replaceable at once for successive analysis.

Point 3

Single button operation to select versatile mode

PYROLYSIS Mode

Two ways of pyrolysis are available. You can choose Curie Point pyrolysis using Pyrofoils or Furnace pyrolysis with ceramic heater.



EGA Mode

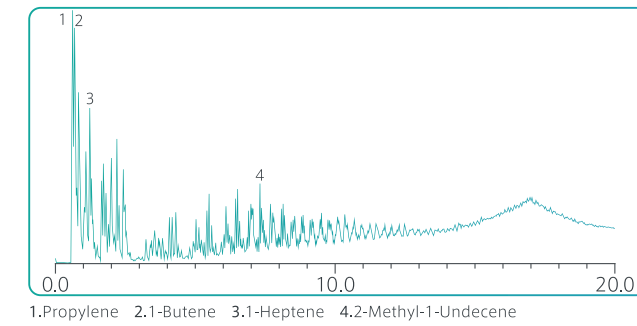
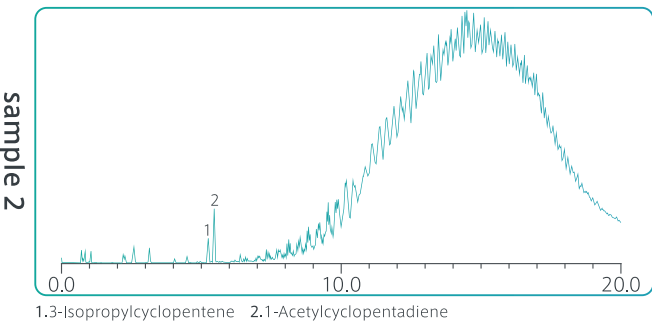
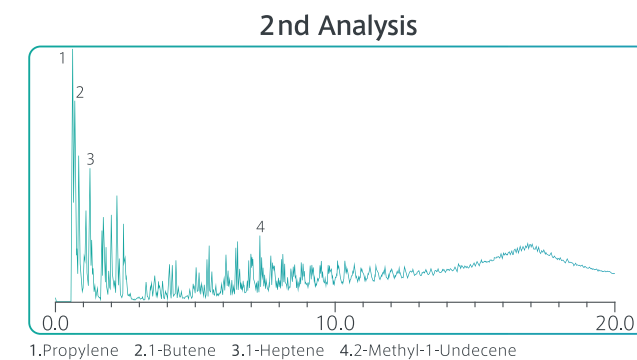
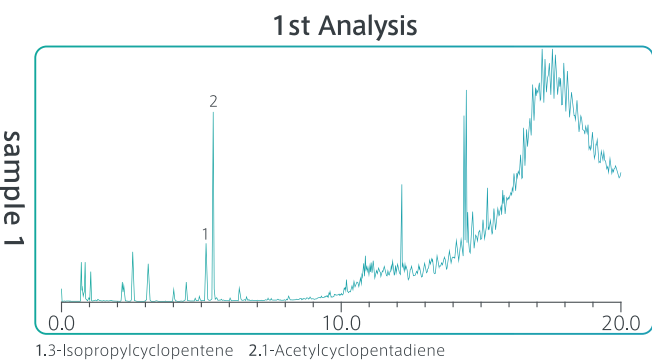
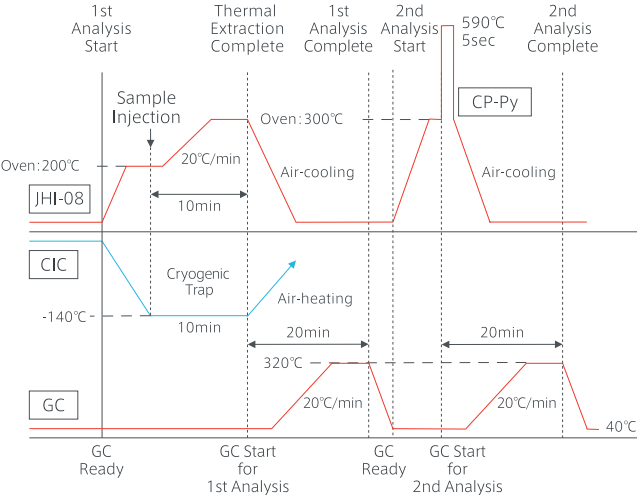
EGA mode can program multiple steps in heating temperature using resistance heating. Evolved gas analysis is often used as a simulation of TGA (Thermal Gravimetric Analysis).

HYBRID Mode

Conducting two kinds of analysis with one sample is possible, firstly thermal extraction using ceramic heater and then pyrolysis using Curie point heating, to obtain more information out of limited amount of samples. Further, ceramic heater can have two phases of temperature elevation with different duration and rate.

Example of Hybrid Mode Analysis

Purpose : Composition Analysis of EPDM (Two different kinds)  
Instruments : JHI-08, CIC (Column Inlet Cooler)  
Samples : 1. EPDM (EP-57F), 2. EPDM (Esprene 505)  
Experiment : The first analysis is thermal extraction analysis during which residual solvents, unreacted monomers and additives are analyzed. The second analysis, which starts automatically after the first one, is pyrolysis at 590°C for polymer composition analysis.  
Discussions : Big differences were observed between the two EPDMs in the thermal extraction analysis reflecting differences in additives. On the other hand, pyrolysis of the two gave almost identical pyrograms.



Point 4

Micro syringe injection without removal of the pyrolyzer

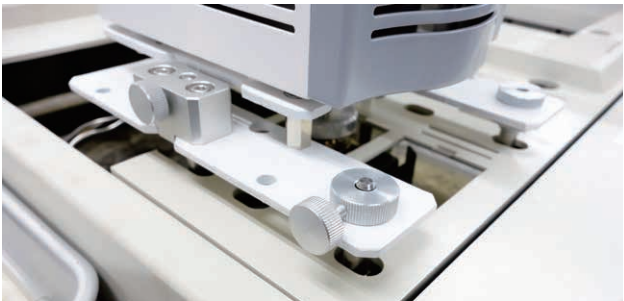
JHI-08 can be slid away easily to allow for micro syringe injection.



The pyrolyzer can slide backward.

Mounting posts of auto liquid sample injector can be used to fix the pyrolyzer. (Optional)

JHI-08 mounts on the GC with only one hand tightening screw. Mounting and removal only takes a second.



The pyrolyzer is attached on the GC.

Option 1

Auto sampler

APC-50 Auto sampler automates the sample feeding/collection process for both Pyrofoils and sample cups. Magnetic sample retriever does not consume Helium gas. It is quite easy to attach to and remove from pyrolyzer. APS-50 Auto sampler for Pyrofoils only is also available.



Turntable with Pyrofoils. Turntable for sample cups also comes as a standard accessory.

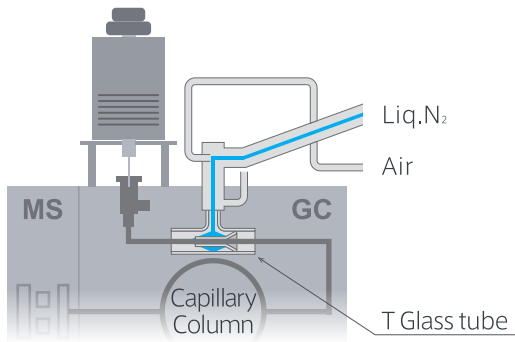
Pyrofoil & Cup sampler APC-50	
Maximum Number of Samples	50 samples at a time
Sample Introduction	By turntable
Sample Retrieval	By magnetic retriever stick
Air Purge	Auto purge by solenoid valve
Dimensions, Weight	W175×D265×H662 mm including JHI-08 Pyrolyzer, 8Kg

For APS-50, refer to the separate brochure.

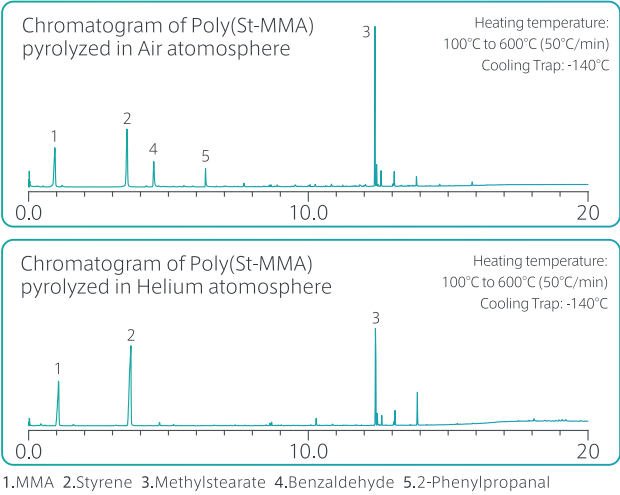
Option 2

Pyrolysis in air atmosphere + Column inlet cooler

Purge Gas Selector (PGS) allows to switch carrier gas to air easily. By combining with Column Inlet Cooler (CIC), you can perform pyrolysis under ambient air.



Comparison of chromatograms between Air atmosphere and Helium atmosphere. There are more peaks detected in air atmosphere.



1.MMA 2.Styrene 3.Methylstearate 4.Benzaldehyde 5.2-Phenylpropanal

Purge Gas Selector PGS (Optional)	
Compatible gases	He, N <sub>2</sub> , Air, O <sub>2</sub>
Gas selecting method	by solenoid valve
Gas flow control	Manually by flow controller
Power	100V-220V, 300VA (Max)

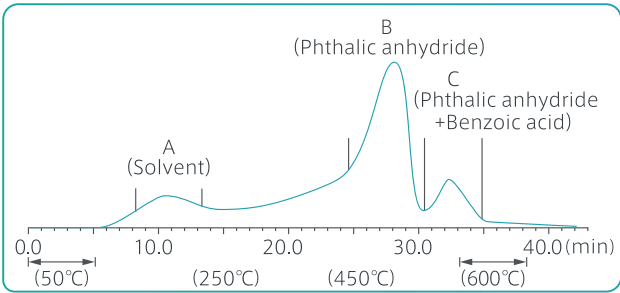
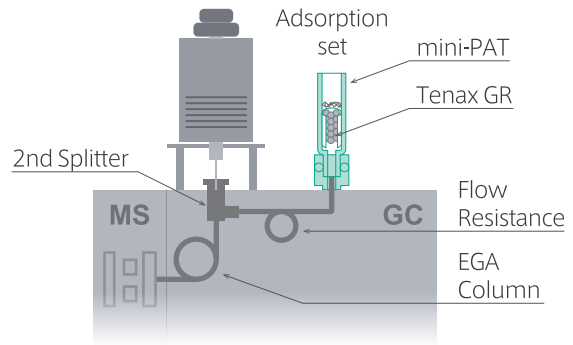
Column Inlet Cooler CIC (Optional)	
Cooling temperature	Cool down to approx. -196°C (When the GC oven is 40°C)
Defrost Mechanism	by compressed air
Usable Column	0.5 mm OD or smaller capillary column
Power	100-220V, 300VA (Max)
Compatible GC Model	Any major GCs on the market
Components	10 L dewar vessel, LN <sub>2</sub> Siphon and cooling unit

Option 3

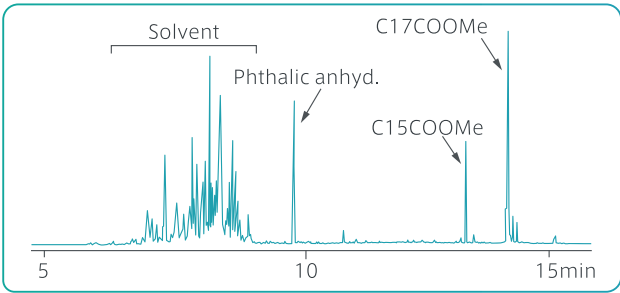
Reanalysis Adsorption Set

The generated gas is split again (2nd splitter) after GC injection port. One goes to GCMS for standard analysis, the other is vent out and collected to mini-PAT (Absorbent cartridge). The trapped gas in mini-PAT can be reanalyzed using JCI-77.

- Beneficial in following situation
1. Limited amount of sample.
  2. EGA and characterization of unknown EGA peaks from the same sample by changing to another column.



EGA analysis of Phthalic resin coating. Peaks A, B and C can be easily collected by mini-PAT individually.

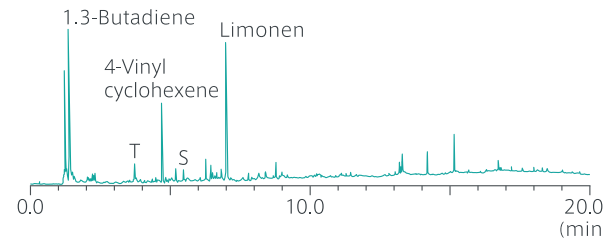


Peak A components were identified using JCI-77.

Reanalysis Adsorption Set	
Components	Secondary Splitter at GC Injection Port, Flow Resistance (4 mL/min at 100kPa), and mini-PAT Adaptor
Adsorption Tube	mini-PAT for JCI-77
Required Equipment	Curie Point Injector JCI-77

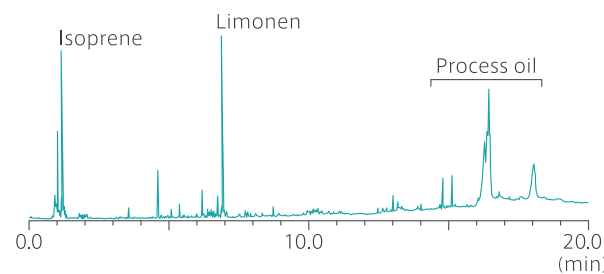


CP-Py  
Passenger Car Tire



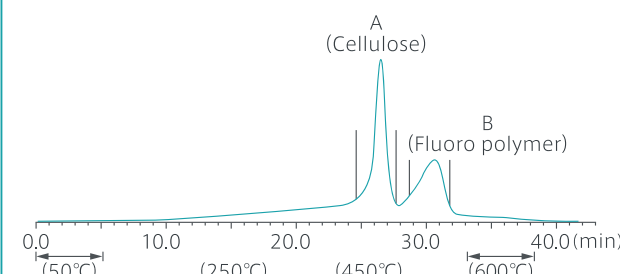
Pyrogram of vulcanized rubber,  
CP-Py at 590°C x 5sec.

CP-Py  
Truck Tire



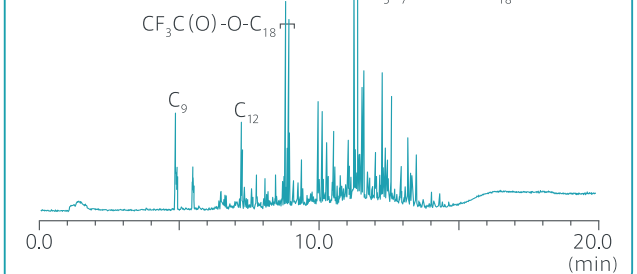
As JHI-08 is designed to be hardly contaminated, it keeps giving high reproducibility for longtime even when samples containing process oil is pyrolyzed.

EGA Coated paper



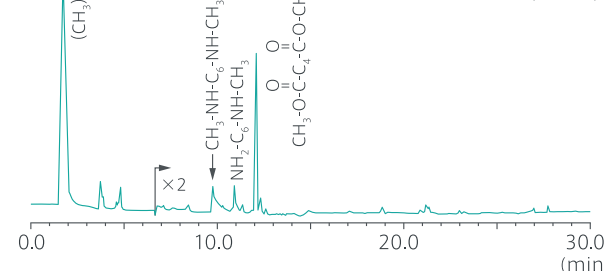
Cellulose and coating material started decomposing at 180. Peak A is for Levoglucosan, which is a decompose of cellulose.

Reanalysis of Peak B  
EGA Coated paper



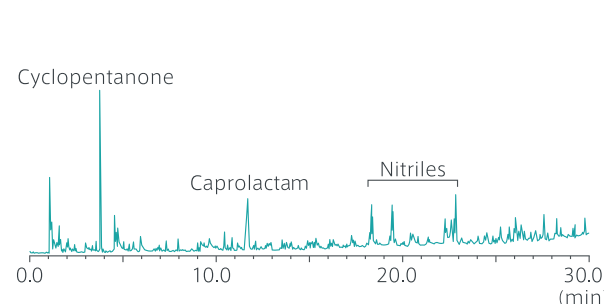
Components of Peak B of the EGA of Coated paper was trapped by mini-PAT and analysed by JCI-77. Long chain alkyl esters of organofluoride were detected.

Hydrothermal Decomposition & Methylation Nylon6.6  
HRC 16 597 (1993)



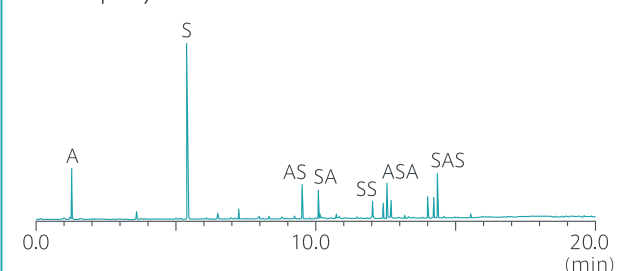
By pyrolyzing Nylon 6.6 with the solution of KOH/TMAH/H2O added, hexamethylenediamine and adipic acid were clearly detected in methylated forms.

Nylon 6.6 Copolymer



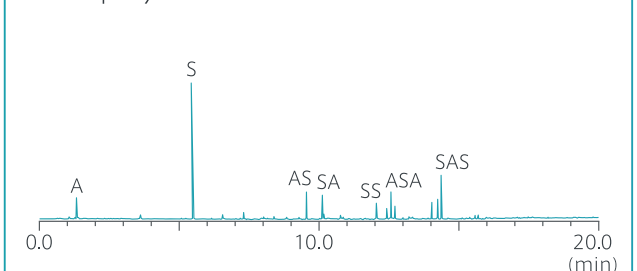
Cyclopentanone and Caprolactam, the typical pyrolyses of Nylon 6 and Nylon 6.6 respectively, were detected.

CP-Py  
AS Copolymer



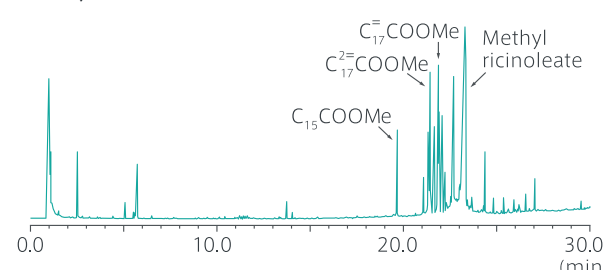
AS Copolymer was pyrolyzed by CP-Py 590°C x 5 sec.

F-Py  
AS Copolymer



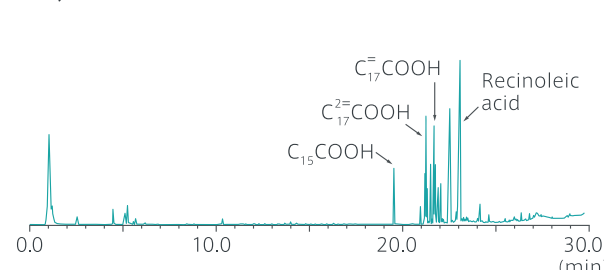
AS Copolymer was pyrolyzed by F-Py 600°C. The same chromatogram as CP-Py but with a bit smaller peaks.

Simultaneous Pyrolysis and Methylation (SPM)  
CP-Py, Castor Oil



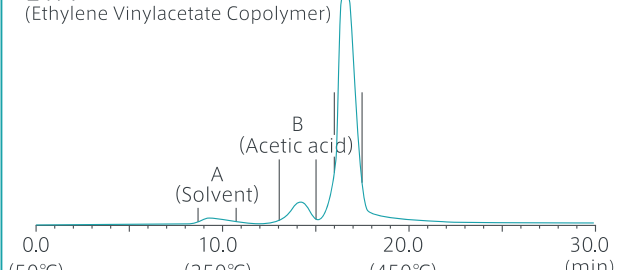
Castor oil was pyrolyzed with TMAH solution added. CP-Py at 590°C after solvent elimination gave the clear peaks of major components of Castor oil.

Simultaneous Pyrolysis and Methylation (SPM)  
F-Py, Castor Oil



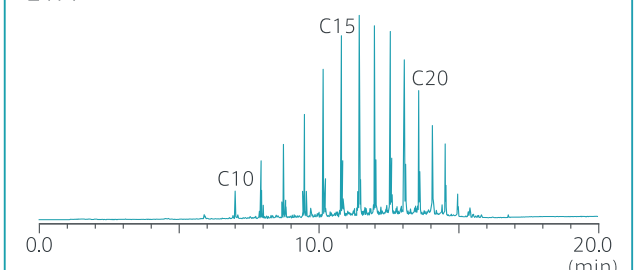
Castor oil was pyrolyzed with TMAH solution added. F-Py at 600°C after solvent elimination gave almost identical pyrogram as CP-Py.

EGA  
EVA  
(Ethylene Vinylacetate Copolymer)



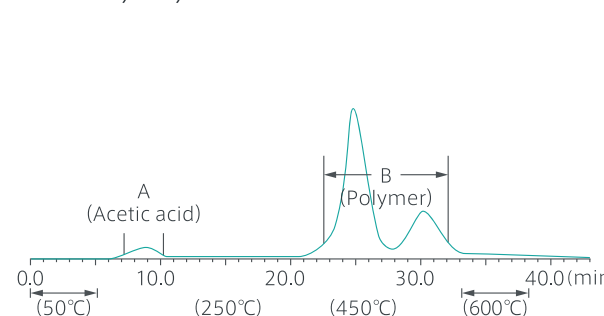
Parafins (Peak A), Acetic acid (Peak B) and some polymer (Peak C) were detected.

Reanalysis of Peak C  
EVA



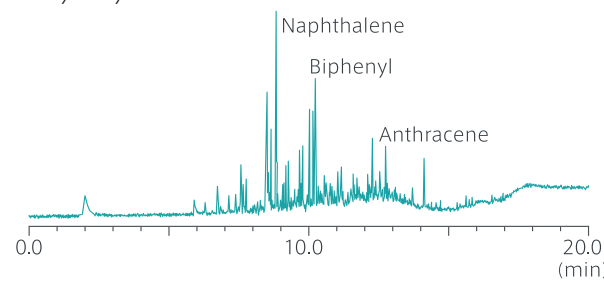
Components of Peak C of EGA of EVA was trapped by mini-PAT and analysed by JCI-77. The pyrogram was identical to that of PE as the acetic acid were detached during EGA.

EGA Polyvinyl chloride-acetate adhesive



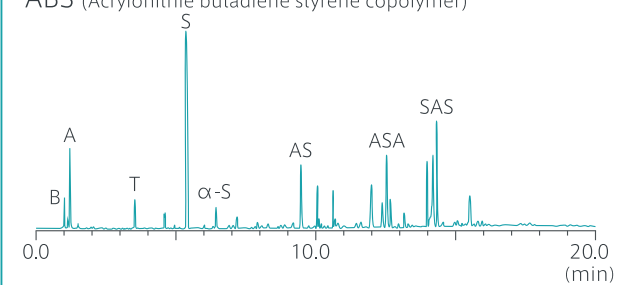
Peak A was acetic acid and the other two peaks were decomposates of the polymer.

Reanalysis of Peak B of EGA,  
Polyvinyl chloride-acetate adhesive



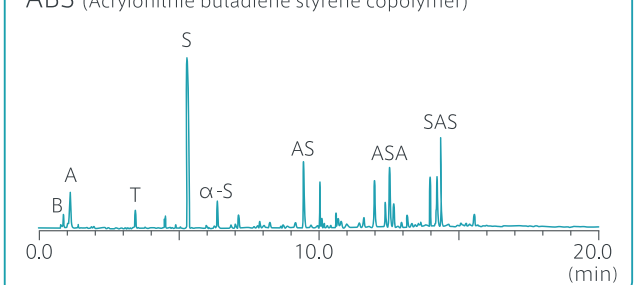
Components of Peak B of the EGA of Polyvinyl chloride-acetate adhesive was trapped by mini-PAT and analysed by JCI-77. Polycyclic aromatics that were generated through pyrolysis were detected.

CP-Py  
ABS (Acrylonitrile butadiene styrene copolymer)



ABS was pyrolyzed by CP-Py 590°C x 4 sec. The peaks are higher than those of F-Py because CP-Py heats up far more rapidly than F-Py.

F-Py  
ABS (Acrylonitrile butadiene styrene copolymer)



ABS was pyrolyzed by F-Py 600°C.