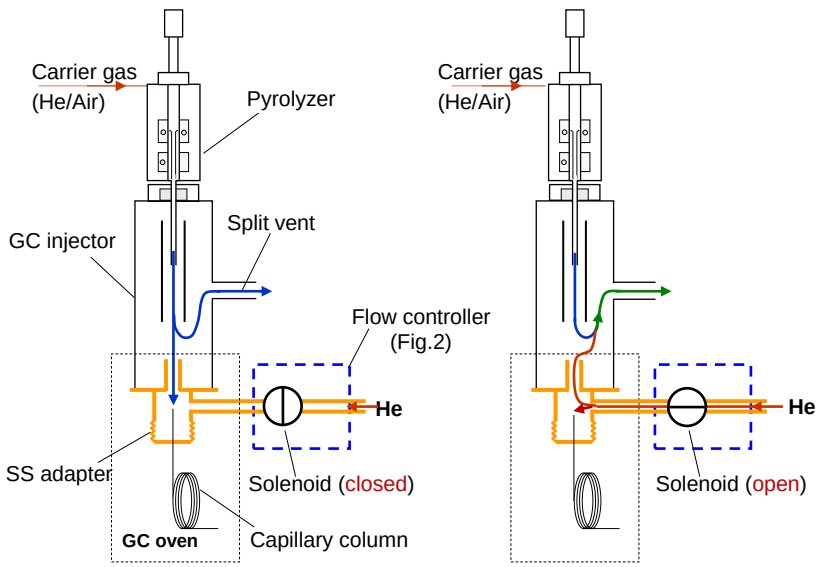
Operating principle of Selective Sampler

[Background] Evolved gas analysis (EGA) is used to characterize polymeric materials. When a temperature zone of an EGA thermogram is analyzed by GC (heart-cut analysis), conventionally a mechanical switching valve is required. However, this method poses problems such as flow path contamination and deposition on the metal sliding surface of the valve by high boiling compounds. On the other hand, the Selective Sampler (SS) enables the flow path switching without using a mechanical switching valve. This not only resolves the problems, but also shortens the analysis time and greatly reduces contaminations of column and detector. This note describes the operating principle of the SS which uses auxiliary helium (He) to switch the gas flow path.

[Operating principle] The SS was developed as an accessory for the Multi-functional Pyrolyzer and enables the heart-cut analysis of a specific temperature zone of an EGA thermogram with eliminating contributions from solvents or high boiling components.

The SS adapter is attached to the bottom of the split/splitless injector of a GC instrument. Auxiliary He gas line connected to the adapter is used to direct the gas flow from the pyrolyzer by pressure difference like “Deans switching”. Turning the auxiliary He “ON” or “OFF” directs the gases to the desired flow path. When the auxiliary He gas valve is closed as shown in Fig. 1A, the gases from the pyrolyzer are “injected” into the separation column. When there is no interest in a given sample fraction, the auxiliary gas valve is open, as shown in Fig.1B; all gases are vented through the split vent. The flow path switching can be manually or automatically done using the control software and totally eight temperature zones can be selected.

By combining a SS with a Multi-functional Pyrolyzer, heart-cut analysis of pre-selected EGA thermal zones can be easily performed either in a He or air carrier gas. Normally, heart-cut components are cryo-trapped at the head of a separation column using Micro-Jet Cryo-Trap (MJT-1035E) before starting GC analysis.



A. Valve “OFF” B. Valve “ON”

Fig.1 Flow path of gases when Selective Sampler is used.

Fig. 2 Selective Sampler (SS-1010E).
(Flow controller)

Keywords : Selective Sampler, Heart-cut analysis, Deans switching,

Products used : Multi-functional pyrolyzer, Selective Sampler, Micro-Jet Cryo-Trap

Applications : General chemical analysis

Related technical notes : PYA1-012E, PYA1-014E, PYA1-017E, PYA1-031E, PYA1-032E, PYA3-025E

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