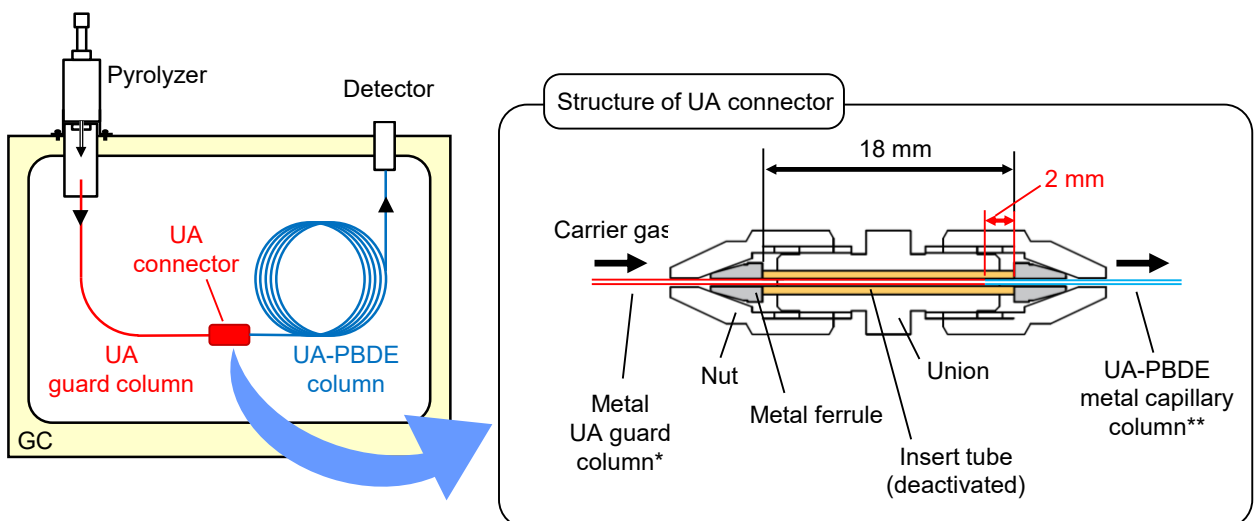


## Development of UA guard column for UA PBDE column for analysis of phthalates Part 1: Structure of UA connector

**[Background]** Phthalates are widely used as plasticizers in resins such as poly(vinyl chloride) (PVC). Seven phthalates\*<sup>1</sup> are known to have adverse effects on human health; IEC 62321-8\*<sup>2</sup> regulates that their content in electrical and electronic equipments be 1000 ppm or less. The IEC method regulates that the analytical protocol be based on thermal desorption-GC/MS and it is recommended to use a UA-PBDE metal capillary column (Frontier Labs) as the separation column. These samples are often complex and column deterioration is observed as the column use increases. This loss of performance is attributed to the hydrogen chloride formed by the pyrolysis of PVC. Perhaps the most efficient and simplest way to extend the lifetime of the column is to insert a “guard” between the injection port and the separation column. Non-volatile contaminants will condense on the surface of the guard column; they do not flow to the separation column. This technical note describes the use of a UA guard column with a UA connector, applicable to the analysis of phthalates according to IEC 62321-8, and it is of great importance that the connector be inert and easily implemented.

**[Structure]** The UA connector consists of two nuts, metal ferrules, a deactivated insert tube and a union. The deactivated metal insert tube is inserted into the union. The UA guard column is connected to the union and the UA-PBDE column is connected to the other side of the union, both sides are sealed with metal ferrules. Using metal ferrules eliminates leaks as the temperature of the GC oven is repeatedly cycled. The outer diameter of the UA guard column and UA-PBDE column are 0.47 mm and the inner diameter of the insert tube is 0.5 mm. Furthermore, the position at which the guard column and UA-PBDE column meet in the union is 2 mm from the UA-PBDE column end of the insert tube in order to minimize the dead space (Fig. 1).



\* L= 1.5 m, i.d.= 0.25, df= 0.1 μm  
 \*\* L= 15 m, i.d.= 0.25, df= 0.05 μm

Fig. 1 Connection of a UA guard column to a UA-PBDE column with a UA connector (left), and the structure of the UA connector (right).

\*1 Di-isobutyl phthalate(DIBP), Di-n-butyl phthalate(DBP), Benzyl butyl phthalate(BBP), Di(2-ethylhexyl)phthalate(DEHP), Di-n-octyl phthalate(DnOP), Di-isononyl phthalate(DINP), Di-isodecyl phthalate(DIDP)

\*2 IEC62321-8, Determination of certain substance in electrotechnical products-Part8: Phthalates in polymers by gas chromatography-mass spectrometry (GC-MS), gas chromatography-mass spectrometry using a pyrolyzer/thermal desorption accessory (Py/TD-GC-MS)

**Keywords :** Phthalates, Guard column, UA connector structure, PBDE column

**Product used :** Multi-Shot Pyrolyzer, UA-PBDE, UA connector, UA guard column

**Applications :** Polymer analysis, Quality control

**Related technical notes :** UAT-009 (Part 2), UAT-010 (Part 3)

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Phone: (81)24-935-5100 Fax: (81)24-935-5102  
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