Column Care and Use Instructions
YMC-GPC

1. Introduction

Thank you for purchasing a YMC high-performance liquid chromatography (HPLC) column. YMC HPLC columns, which are manufactured under highly controlled conditions, must pass a series of stringent tests before being accepted for shipment. (Please refer to the column inspection report). To ensure optimal performance and durability of the column, please read these instructions carefully before using this column.

2. Column connections

Connect the GPC column in the mobile phase flow direction indicated and tighten the 1/16 inch nut and ferrule using wrenches on the 1/16 inch nut and the actual end fitting.

It is recommended that several drops of mobile phase have been pumped before the column outlet is connected to another column or detector to clean out the end fitting of any particulate matter which may be present.

To avoid loosening the end fittings and causing leaks, wrenches must be used on the end fitting adjacent to the connecting nut and NOT on the column barrel or the opposite end fitting, See Figure 1.

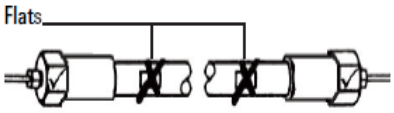

Figure.1. Don't use wrenches on the flats.

3. Recommended flow rate

The recommended flow rates are given in Table1, however, higher viscosity mobile phases should be used at reduced flow rates or elevated temperature. Flow rates should be changed progressively and pressure pulses limited. At no times should the maximum operating pressure of the column be exceeded (see Table 1).

Table 1. Recommended flow rate

Column type	Particle size (μm)	Flow rate (mL/min)	Recommended flow rate (mL/min)	Recommended pressure (MPa)	Pressure limit (MPa)
YMC-GPC 21.2 mm I.D.	10	3.0 – 15.0	10.0	3.5	14
YMC-GPC 40 mm I.D.	10	30.0 – 40.0	35.0	3.0	14

4. Sample preparation and injection

If maximum resolution and expected column lifetime are to be achieved care must be taken in sample preparation.

To avoid blockage of the column frits, sample filtration is recommended (0.5 – 2.0 μm depending on molecular weight [MW]). A guard column will further protect the columns with little detrimental effect on performance.

Optimum sample volumes and concentrations are best determined for each type of analysis and are dependent on sample MW. Broad distribution polymers can generally be injected at higher concentrations than lower polydispersity samples. Overloading will not damage the column, but distorted peaks and spurious results will be obtained.

Excessive injector loop volume will contribute to band broadening and reduce system performance. Injection volume recommendations are shown in Table 2.

Table 2. Concentrations and injection volumes

Column type	Recommended concentration (%)	Recommended injection volume (μL)
YMC-GPC 21.2 mm I.D.	0.5 – 5.0	500 – 2000
YMC-GPC 40 mm I.D.	0.5 – 5.0	1000 – 5000

5. Mobile phase

YMC-GPC columns are compatible with an extensive range of organic solvents. Mixed organic solvent systems can also be used, but water should not be used except at concentrations less than 10% by volume in a miscible organic mobile phase. All mobile phases should be of high purity and should be filtered and degassed prior to use. YMC-GPC columns are normally supplied in ethylbenzene unless otherwise stated, and can be flushed directly from ethylbenzene to THF at 3.5 mL/ min. Unstabilized THF (for example, HPLC grade) is not recommended as an mobile phase due to the attack of peroxide on the gels.

YMC-GPC columns can be transferred to other mobile phases with no deterioration in performance. When transferring to another mobile phase, miscibility and viscosity of the new mobile phase are of primary consideration. The transferring procedure is described in Figure 2. When transferring to another mobile phase without heating, use a lower flow rate though it depends on viscosity of the mobile phase. Note that loss of resolution or peak broadening might be seen if heating cannot be used when using high viscosity solvents.

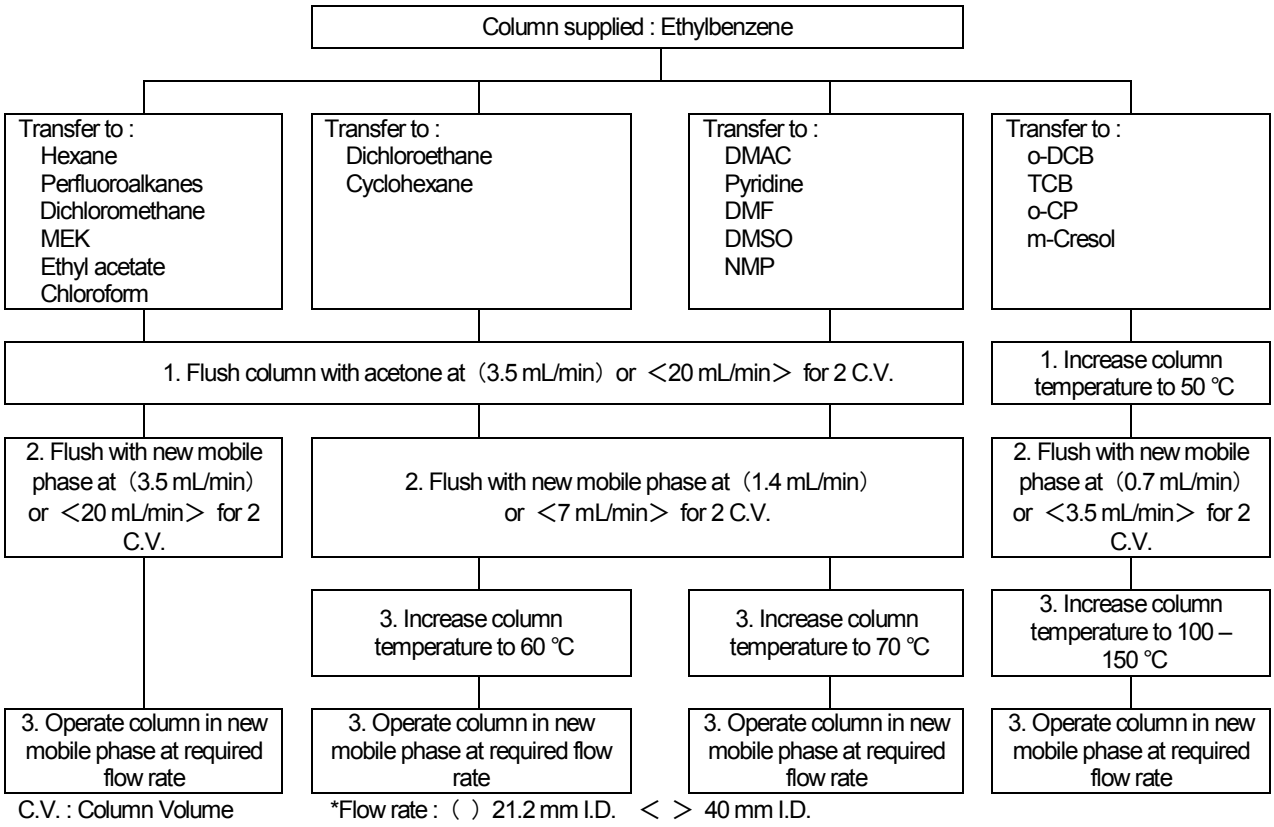

Figure 2. Mobile phase transfer guide

6. Column testing

Every YMC-GPC column is supplied with a test certificate indicating the test conditions and the column performance. Measurements of column performance are described below:

Efficiency (1/2 ht) (Plates/m) $N = 5.54 (t/W_{1/2})^2/L$
Efficiency (5σ) (Plates/m) $N = 25 (t/W_{5\sigma})^2/L$
Symmetry = a/b

t : Peak elution time
$W_{1/2}$: Peak width at half peak height
$W_{5\sigma}$: Peak with at 4.4 % of peak height
L : Column length in meters
a、b : Peak widths either side of the perpendicular measured at 10 % of peak height.

Column efficiency is dependent on many experimental factors (system dead volume, mobile phase, flow rate, test probe, temperature, and so forth) and test results may differ slightly from those quoted on the column certificate due to variability in these parameters.

7. Storage

On removing the column from the system, the end plugs must be replaced to prevent the column from drying out by evaporation, since subsequent shrinkage of the gel and disruption of the packing will occur. The end plugs need only be applied finger tight. All mobile phases mentioned previously are suitable for storage, but unstabilized THF should not be used.

8. Maintenance

Deterioration in column performance may occur as a result of damage to the packed bed or as a result of blockage in the column frits. In the case of frit blockage, the column can be reverse flushed at 1.0 mL/ min for 1 minute to remove loosely retained material.

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