Empty 1 mL Mini Column Starter Kit
Empty 5 mL Mini Column Starter Kit

Introduction

JNC's *Super Edge* Empty Mini Column Starter Kit* can be used to make your own single-use, pre-packed 1 or 5 mL volume columns. These low cost kits can be used to pre-pack columns for advanced chromatography methods development or resin screening experiments. The Kit provides a complete set of column parts needed to pre-pack column; a) a Screw press/Stand, b) a packing reservoir and c) a rod for inserting the frit into the column and preparing a pre-packed column without needing special equipment.

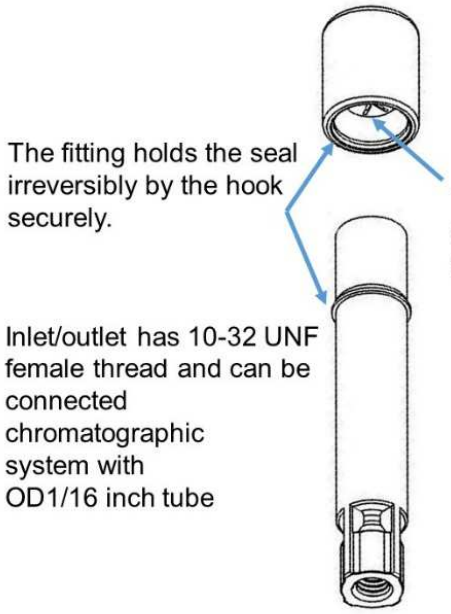
* Resin is not included in the kit.

Notes

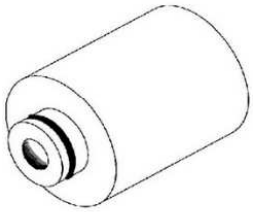
- Please use this empty column for liquid chromatography applications. Do not use for other applications.
- These single-use columns cannot be emptied and re-filled as the top cap cannot be removed without damaging the sealing mechanism.
- This Kit is "For Research Use Only".

1. Product features

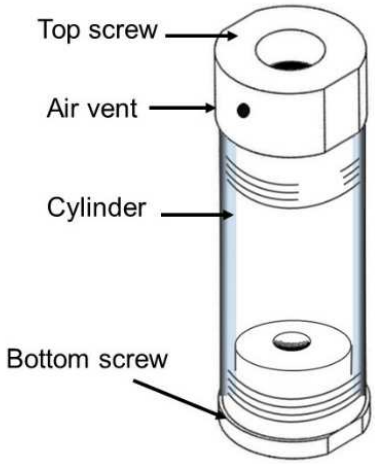
The empty mini column starter kit is suitable for compression packing of a wide range of chromatography resins, such as cross-linked agarose and Cellufine™ cellulose type resins widely used in biopharmaceutical manufacturing. This kit facilitates small scale experiments in this pre-packed column format for candidate resin screening and small scale process purification in the laboratory.



Column top cap and tube

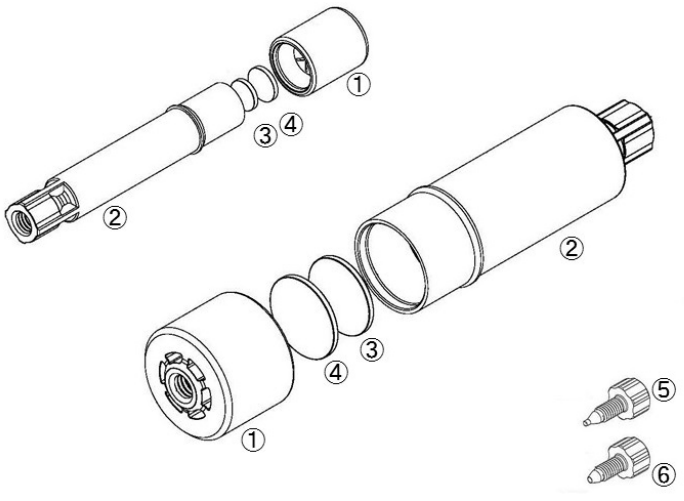


Packing reservoir is used for gravity settling of resin to a predetermined height.



Screw press/Stand is used for fitting the column top cap and tube, and it is also used to set the column upright by resin packing operation.

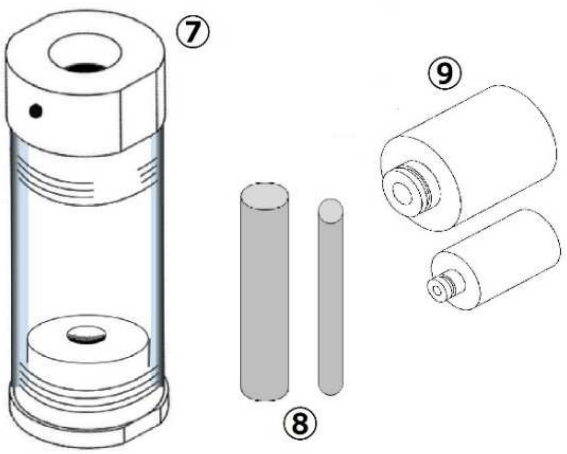
2. Description of material Column parts



Item	Material	Fluid Contact
1. Column top cap	Polypropylene	Yes
2. Column tube	Polypropylene	Yes
3. Frit (bottom)	UHMW-PE	Yes
4. Frit (top)	UHMW-PE	Yes
5. Stop plug	PEEK	Yes
6. Easy fitting (tubing connection)	PEEK	Yes

*Frit (bottom) is smaller than frit (top)

3. Packing tools



Item	Material
7. Screw press/ Stand	Acrylic resin Polyacetal
8. Frit insertion rod	Polyacetal
9. Packing reservoir	Acrylic resin O-ring (NBR)

No.1, column top cap is made blue colored polypropylene and when assembled on the column tube axially compresses the resin.
No.2, column tube is made of translucent polypropylene to easily visualize the packed bed.
No.3 & No.4, frit's are made of Ultra High Molecular Weight Polyethylene (UHMW-PE) having a pore size of 20 µM.
No.5, stop plug is made of Poly Ethyl Ether Ketone (PEEK) with a 10-32 UNF thread for easy sealing of the column when not in use.
No.6, easy fittings made of PEEK with 10-32 UNF thread for connection of 1/16 inch OD tubing between the column and an AKTA[1] chromatography or equivalent chromatography workstation.
No.7, screw press/stand for; a) holding columns upright during filling and b) for assembling of the top cap by tightening the fitting of the device with a suitable wrench.
No.8, a rod to insert the frit and push it to the bottom of the column tube.
No.9, a packing reservoir is made of acrylic which is inserted into a column tube for adding and allowing the resin slurry to settle under gravity.

[1] AKTA is trademarks of GE Healthcare companies

4. Product description

Characteristics	**1 mL**	**5 mL**
Column volume (mL)	1.06	5.02
dimensions (ID x L)	6.7mm ID x 30 mm L	14.6 mm ID x 30 mm L
Connectors	Standard HPLC (10-32 UNF, OD1/16 inch tube)	
Pressure limit (MPa)	0.4 (4 bar)	
Recommended flow rate	0.1-1.0 mL/min (17-170 cm/hr)	0.1-5.0mL/min (3.6-180cm/hr)
Tips for working pressure and flow rate	The relationship between pressure and flow rate depends on the type of resin, please refer to the manual of resin. **Note**: Do not use column at pressure higher than the pressure limit of packed resin.	
Chemical stability The chemical stability refers to the column hardware.	The column can be used in aqueous buffers and most organic solvents commonly used in chromatography of biological materials. **Note**: The column cannot be used in halogenated hydrocarbons and 100% concentration of ketones.	

5. Protocol

1) Pre-wet bottom frit in 100% ethanol to remove trapped air. Dilute ethanol to 20% (v/v) and repeat pre-wetting the frit.

2) Insert the bottom frit into the column tube using the insertion rod making sure the frit is flat in the bottom, and install stop plug on the outlet of the column tube (see Fig 1).
Note: Do not use the top frit at this stage as it is a different diameter than the bottom frit and will not form a good seal in the bottom of the column tube.

3) Place in the screw press/stand as shown in Fig 2. Fill the column tube with packing solution (20% ethanol).

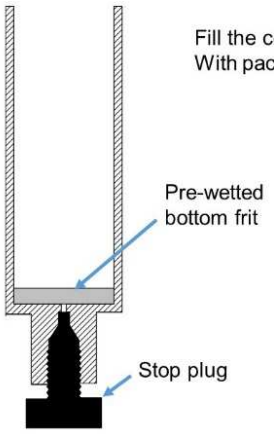


Fig 1. Assemble the pre-wetted bottom frit and stop plug in the column tube.

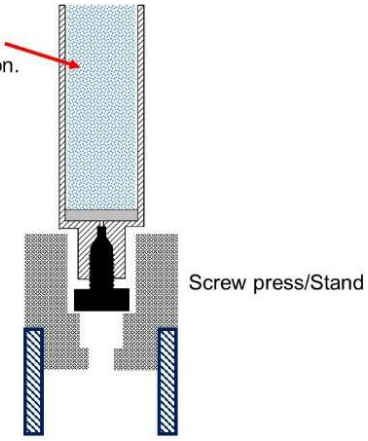


Fig 2. Diagram of column installation on the screw press/stand.

4) Insert the packing reservoir into the tube.
Note: Make sure that the packing reservoir is inserted all the way and avoid introducing bubbles into the column tube (see Fig 3 and Photograph P1).

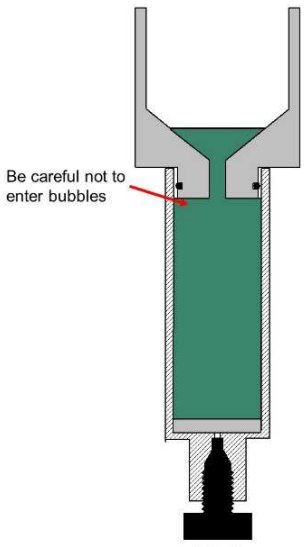


Fig 3.

Photograph P1; 5 mL packing reservoir assembled on top of the column tube and supported in a vertical orientation in the screw press/stand.

5) Prepare a 50-70% slurry of the resin in 20% Ethanol and measure % solids by allowing the slurry to settle in a slurry bottle for a minimum of 4 h.

6) Calculate the volume of slurry to add to the packing reservoir so that after allowing the resin to settle under gravity the packed bed will fill the column tube and up into the packing reservoir above the “O-ring” line in the neck of the reservoir.
For example; for a 5-mL volume cartridge you need 6.0 mL of packed bed volume after settling. This corresponds to 12 ml of a 50% (v/v) slurry.

7) Mix the slurry by inversion and then add to the packing reservoir as shown in Photograph P2 below.

Photograph P2; adding slurry to the packing reservoir-column tube assembly in the screw press/stand.

8) Remove the packing reservoir-column tube assembly from the screw press/stand to remove the stop plug from column tube bottom fitting. Replace in the screw press/stand again.
Note: Packing solution will be drop into screw press/stand cylinder and the resin will settle down.

Photograph P3; allowing slurry to settle under flow in the packing reservoir-column tube assembly in the screw press/stand

9) Add sufficient slurry so that final settled bed will not fall below the O-ring line on the packing reservoir.

10) Wait until the resin settled bed forms in the packing reservoir.
Note: 80-100 μM diameter beads will about 10 minutes to settle down, smaller diameter beads may need more time to settle down (over 20 min).

11) Install the stop plug at bottom of the tube and remove the excess slurry remaining in the packing reservoir above the O-ring line (see Fig 4) by pouring (Photograph P4) or using a pipette (Photograph P5). Discard the pooled packing solution elute from column tube in the collected in the bottom of the screw press/stand.

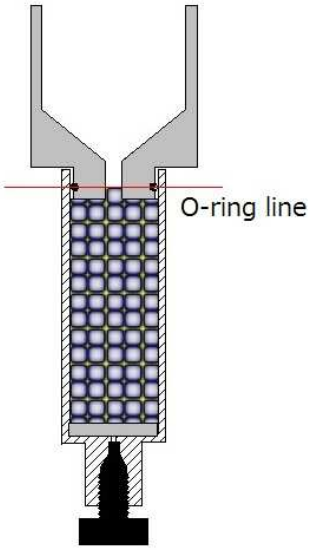
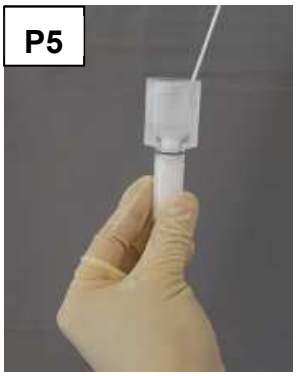


Fig. 4

Photograph P4; pouring excess slurry from packing reservoir-column tube assembly.



Photograph P5; using a pipette to remove excess slurry from the packing reservoir-column tube assembly.

12) Carefully remove the packing reservoir from the top of the column tube leaving behind a small plug of settled resin bed in the neck of the packing reservoir (see Photograph P6)

Photograph P6; Separation of the packing reservoir from the column tube.

Photograph P7; adding the frit to the top of the column tube.

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13) Add packing solution up to the top of the column tube.
Note: it is important not to add the solution over top end of the column tube. Space for the frit (top) is needed.

14) Place the frit (top) on the top of the column tube (see Photograph P7).13) Insert a column top cap slowly so that it pushes the frit (top) down into the column tube (see Photograph P8).
Note: it is very important not to introduce any air bubbles between the settled resin bed and the frit.

Photograph P8; assembly of the top blue cap on top of the frit and the settled bed in the column tube.

15) Transfer the assembly into the screw press/stand cylinder and screw in the top screw (see Photograph P9) to seat the frit into the column tube. Hand tighten the top screw.
Note: you may need an adjustable wrench or non-slip gloves to grip the cylinder and the top screw firmly. (See Photograph P10).

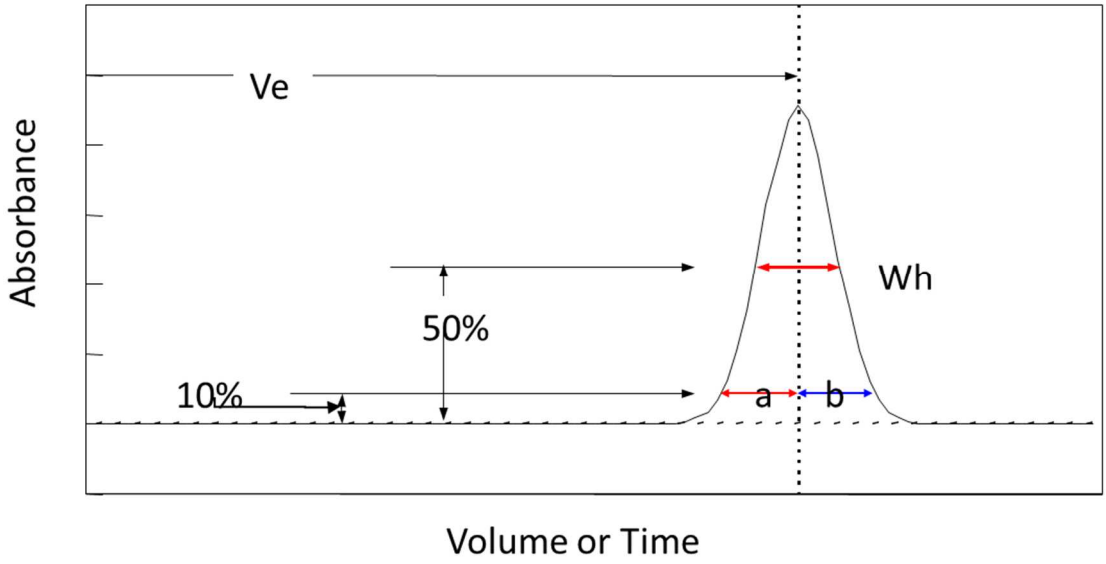
Photograph P9; Assembly of top screw and screw press/stand.

Photograph P10; Using an adjustable wrench to seal top screw

16) Install the stop plug at the top of the column cap (Photograph P11).
Note: Store according to the manual of the resin manufacture until use.

6. Evaluation of packed column

Methods for evaluate the packing column performance.
*The theoretical plates number and the asymmetry factor (As) are calculated according to the below equations.



Measurement conditions

- Injection volume: 1% to 2.5% of Column vol.
- Sample: 1% to 2% acetone or 1 M NaCl
- Flow rate: up to 30 cm/h

Calculation **HETP = L/N** **N = 5.54× (Ve/Wh)^2** **As=b/a**		
	L	column length （cm or m)
	Ve	elution time or volume
	Wh	half width of peak
	a,b	peak width of 10% of peak height , (a) front, (b) rear
	Note	Ve, Wh and a,b were should same dimension

7. Ordering information

Product name	Qty.	Code
Empty 1 mL Mini Column Starter Kit Including Screw press/Stand 1pc, 1 mL Frit insertion rod 1pc, 1 mL Packing reservoir 1pc, 1 mL Column top cap 10pcs, 1 mL Column tube 10pcs, 1 mL Frit(bottom) 10pcs, 1 mL Frit(top) 10pcs, Stop plug 20pcs, Easy fitting 4pcs.	1 set	EMC1SK
Empty 5 mL Mini Column Starter Kit Including Screw press/Stand 1pc, 5 mL Frit insertion rod 1pc, 5 mL Packing reservoir 1pc, 5 mL Column top cap 10pcs, 5 mL Column tube 10pcs, 5 mL Frit(bottom) 10pcs, 5 mL Frit(top) 10pcs, Stop plug 20pcs, Easy fitting 4pcs.	1 set	EMC5SK
Empty 1 mL Column 10 set Including 1 mL Column top cap 10pcs, 1 mL Column tube 10pcs, 1 mL Frit(bottom) 10pcs, 1 mL Frit(top) 10pcs, Stop plug 20pcs.	1 set	EMC1C10
Empty 5 mL Column 10 set Including 5 mL Column top cap 10pcs, 5 mL Column tube 10pcs, 5 mL Frit(bottom) 10pcs, 5 mL Frit(top) 10pcs, Stop plug 20pcs.	1 set	EMC5C10
Screw press/Stand	1 pc	EMC15V
1 mL Packing reservoir	1 pc	EMC1PK
5 mL Packing reservoir	1 pc	EMC5PK
1 mL Frit insertion rod	1 pc	EMC1RD
5 mL Frit insertion rod	1 pc	EMC5RD
Easy Fittings (tubing connection)	10 pcs	EMCEFT

Please access our website,
http://www.jnc-corp.co.jp/fine/se/english/index.html

We can also provide prepacked mini columns of Cellufine™, please access,
http://www.jnc-corp.co.jp/fine/en/cellufine/grade/grade-5.html

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