**synthesis of the PIM-1/ (Cr)MOF monolithic composite materials**

Mix PIM-1 and (Cr)MOF in tetrachloroethane Solvent

Keep overnight in a magnetic stirrer to achieve a desired homogeneous mixture of PIM-1/(Cr)MOF)

Heat to 150°C to evaporate the solvent to get final product

Characterizations: XRD, TGA, PCT measurement, SEM,

**Synthesis of polymers of intrinsic micro porosity PIM-1**

3.00 g of tertrafluoroterephthalonitril

16.59 g of anhydrous K2CO3

5.11 g of 5,5’,6,6’ -tetrahydroxy-3,3,3’,3’ -tetramethyl-1,1’-spirobisindane

250-mL three-neck round-bottomed flask fitted with a reflux condenser

100 mL anhydrous DMF

Stirring precipitation for 72 h at 65°C under N2 and cool to room temperature

stirring for another 1 h

Filtrated product dry at 80°C under vacuum for 2 days

Precipitate three times in 800 ml of methanol.

Dry the product at 60°C

**Synthesis of (Cr) MOF**

Terephthalic acid (1.66 g) was dissolved in deionised water (45 mL) and ultrasonicate at

room temperature.

Product dry overnight at 90°C

Wash in hot ethanol at 60°C for 24 h

Wash in hot DMF at 80 °C for 3 h

Cool to room temperature

Add Formic acid (30.2 mL, 80 eq) at 210°C for duration of 8 h.

250 mL Teflon-lined high-pressure autoclave reactor

2.66 g Chromium chloride hexhydrate in 55 mL of deionized water.