Electronic Supporting Information (SI)

Pore modification of deca-dodecasil-rhombohedral zeolite membrane by carbon loading from in situ decomposition of 1-adamantanamine for improved gas separation

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Gas permeation measurement:

The single gas permeance of the membrane was measured by a soap film flow meter under a feed pressure of 200–500 kPa at room temperature. The permselectivity of two gases G_1/G_2 was defined as the permeance ratio of gas G_1 and G_2. The gas permeation measurements of each single gas were repeated until the permeance data for the successive 10 tests were obtained. The single gas permeance was the average of 10 successive tests. For gas mixtures, separation selectivity was measured by gas chromatography (Model-Trace GC ultra, serial no 20092814, Thermo SCIENTIFIC, Germany) equipped with a thermal conductivity detector and a HAYESEP N packed column. The oven temperature was kept at 50 °C. The separation factor $\alpha_{A/B}$ of binary mixture was calculated from eqn. (1).

$$\alpha_{A/B} = \frac{y_A / y_B}{x_A / x_B} \qquad \ldots\ldots(1)$$

Where x and y are the mole fractions of each component in the feed and permeate sides, respectively. Subscripts A and B refer to components A and B, respectively. At each pressure point, at least four to six GC injections were done to obtain an average of the permeate composition. Permeance, (mol/m^2.s.Pa) of component gas *i* was calculated by using eq. (2)

 ……(2)

where J_i is the flux of component i and ΔP_i is the pressure difference of component i across the membrane (Pa).

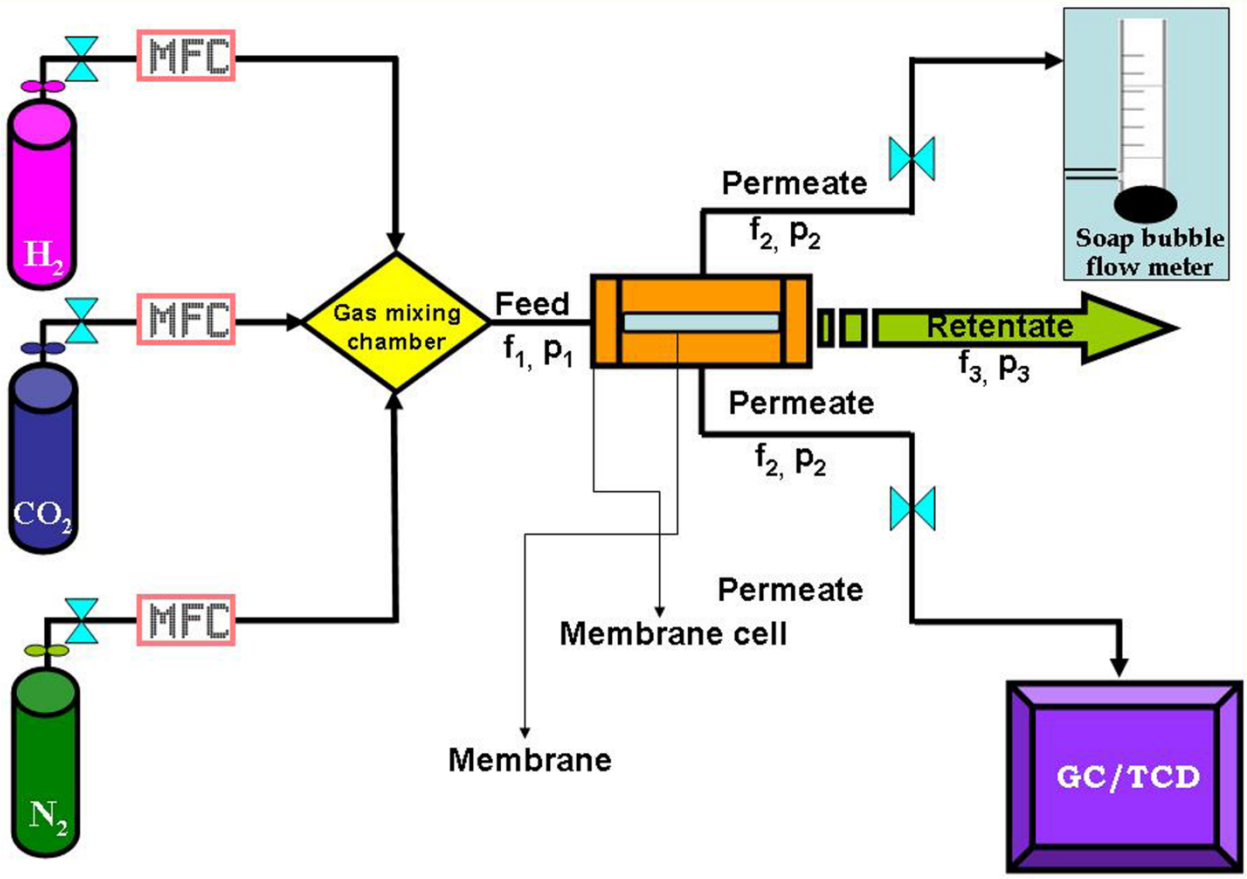

Fig S1 Schematic representation of permeation apparatus for the measurement of both single gas and mixed gas permeation.

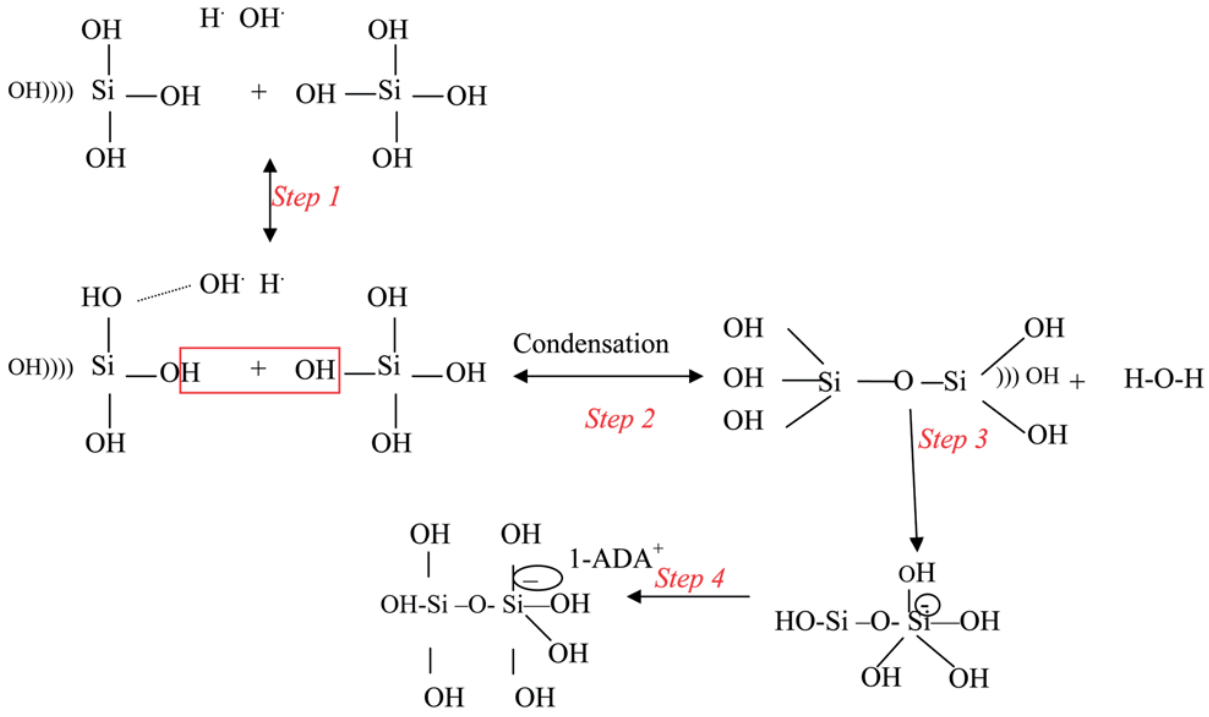

Fig S2. Schematic presentation of gradual formation of DDR zeolite from Silica and 1-adamantanamine

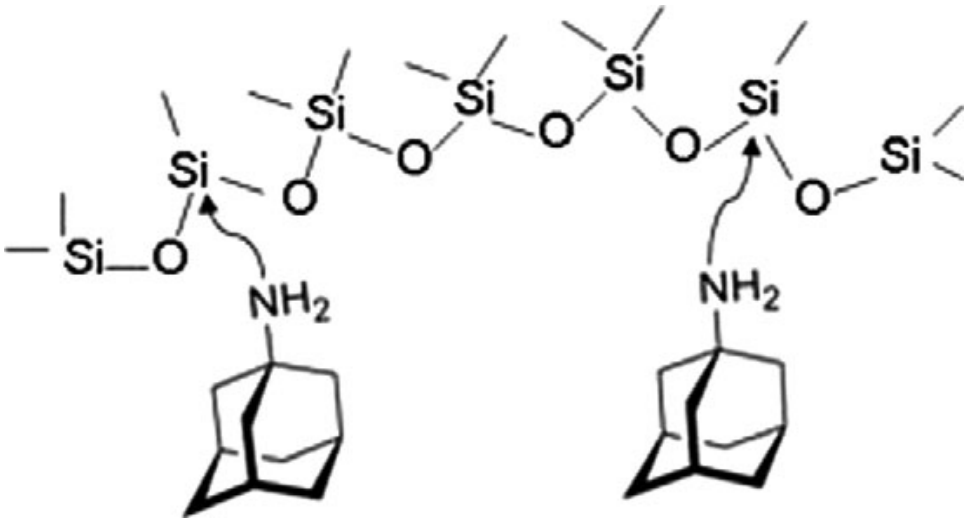

Fig. S3. Schematic presentation of arrangement of structure directing agent 1-adamantanamine in Silica backbone in zeolitic pores