
Description of a porous media

Exercises

1 Knudsen number

1. Estimate the mean free path for N_2 under atmospheric pressure and ambient temperature.
2. What is the maximal pore dimension to neglect Klinkenberg effects? In what pore class is it included?

2 Porosities and specific surfaces

1. Estimate the porosity and the specific surface of this 3D porous media assuming that spheres are at contact. We denote as d the sphere diameter.



Figure 1: Side view

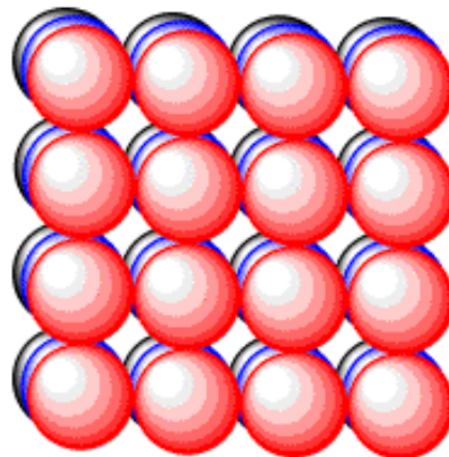


Figure 2: Top view

We now consider an assembly of spheres of radius a which compose a porous media.

2. Remind the definitions of the porosity and the specific surface.
3. We denote N as the total number of spheres in the assembly. What is the relation between the porosity and the specific surface in this case ?

We now consider that the porous media is made of an assembly of capillaries of length L and radius R .

4. Compute the relation between the porosity and the specific surface for an assembly of capillaries.
5. We want to make a porous media made of capillaries with the same porosity ε and the same specific surface as another porous media made of spheres of radius a . Compute the equivalent capillary radius R_{eq} as a function of a and ε .