

Petroleum Engineering 311
Test 1

January 17, 2003

1. Define porosity.

- the ratio of pore volume in a rock to its bulk volume

$$\phi = \frac{V_p}{V_b} = \frac{V_b - V_m}{V_b} \quad \begin{cases} V_p = \text{pore volume} \\ V_b = \text{bulk volume} \\ V_m = \text{matrix volume} \end{cases}$$

- an intensive rock property which is a measure of the rock's fluid storage capacity

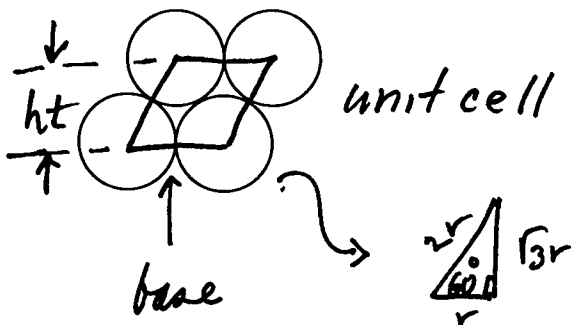
2. List the geological and engineering classifications of the porosity.

- primary - total
- secondary - effective

3. List two factors affecting intergranular porosity.

- angularity
- sphericity
- packing
- sorting

4. Calculate the bulk volume of a unit cell of uniform spheres of radius, r , when arranged in orthorhombic packing, i.e., when the top layer of the unit cell in cubic packing is moved a distance of one radius in line with connecting radii between the spheres of the lower layer. See the end view shown below.



$$\begin{aligned} V_b &= \text{area of base} \times \text{height} \\ &= (2r)^2 \times \sqrt{3}r \\ &= 4\sqrt{3}r^3 \end{aligned}$$