

BACKGROUND

Porosity and permeability are two properties of rock necessary for a productive oil or gas well. Porosity is a measure of the tiny spaces in rock that can hold a fluid, or oil and gas. Permeability is the characteristic of oil or gas to flow through the rock. Petroleum geologists focus on both of these when determining a productive reservoir.

This activity aims to measure the porosity of different sizes of rocks.

QUESTION

Which size gravel will have the greatest porosity?

MATERIALS

- 350 cm³ Large gravel
- 350 cm³ Medium gravel
- 350 cm³ Small gravel
- Water (can be dyed with food coloring)
- 3 600 mL Beakers
- 100 mL Graduated cylinder

INSTRUCTIONS

1. Fill one beaker to the 350 cm³ mark with the large gravel. Fill the second beaker with 350 cm³ of medium gravel. Lastly, fill the third beaker with 350 cm³ of small gravel (Remember, one cm³ is equal to one mL).
2. Fill the graduated cylinder with 100 mL of water.
3. Slowly pour water into the first beaker until the water reaches the top of the rocks. Record exactly how much water you poured into the beaker. If you need more than 100 mL of water, fill the graduated cylinder again.
4. Follow Step 3 again for the other two beakers filled with gravel.
5. Calculate the porosity of the three materials using this formula:

$$\text{Porosity} = \frac{\text{Volume of Water} \times 100}{\text{Volume of Material}}$$

Type of Material	Volume (mL) of water poured	Volume (cm ³) of Material	Percentage of Pore Space in Material
Large gravel			
Medium gravel			
Small gravel			

CONCLUSIONS

1. Which size of gravel has the greatest porosity? Explain why. _____

2. Explain rock porosity's importance in the drilling process of an oil well. _____
