

DIORAMA – How Fast Can I Flow?

How does oil move underground?
Is there space for it to move? Aren't rocks supposed to be solid?

DO YOU KNOW?

- An oil well is **NOT** a big underground lake.
- Oil exists underground as tiny droplets trapped inside open spaces (pores) inside rocks.
- Tremendous pressures underground cause oil droplets to squeeze through pores. This is how it moves.
- Hydrocarbons (oil & gas) move from a **source rock** (rock material where they are formed) to the **reservoir rock** (rock material where they are trapped).
- The slow, constant movement away from the source rock is called **migration** & is dependent on pressure, and the porosity & permeability of rocks.
- **Porosity:**
 - Percentage of rock that has no material & hence can be filled with fluid.
 - The larger the pore space or the greater their number, the higher the porosity.
- **Permeability** (centimeters per second):
 - Ability of a material to transmit fluid.
 - The rate a material will transmit a fluid depends on total porosity, number of interconnections between pores, & size of interconnections between pores.

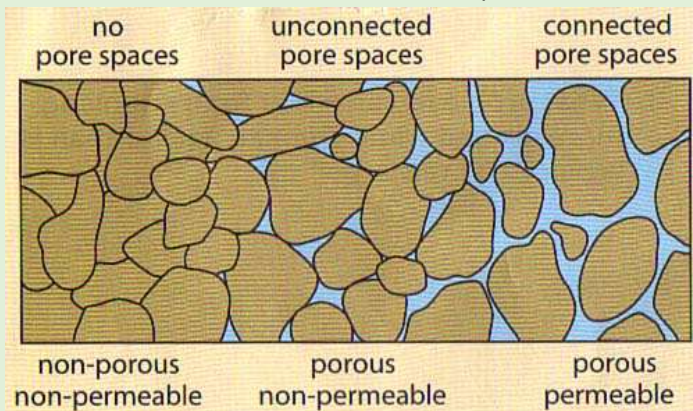


Image: <http://power-petroleum.com>

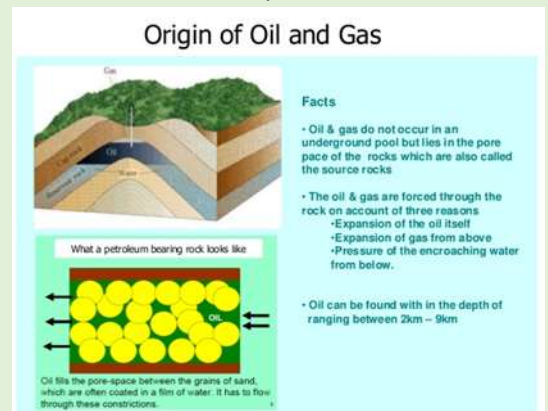


Image: www.slideshare.net



Checkout the **Porosity and Permeability** exhibit.

[Teachers/parents guidance may be required]

- There are 3 columns, each with different sized marbles that are partially filled with oil (left).
- Turn over all 3 columns. Observe the oil flow.

Questions

- Why did the oil at each column flow at different speeds?
- Does the size of the marbles and/or the space between each marble affect the speed of flow?



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TO EXPLORE

Experiment: Pressure (Force per unit area)

What you need

1. Clear 1.5 litre plastic soda bottle (label removed)
2. Thumb tacks (3)
3. Water

What to do

1. Puncture 3 verticle holes with a thumb tack on the clear plastic bottle & cover each hole with thumb tacks.

[Holes should be 8 cm apart, first hole about 4 cm from the bottom.]

2. Fill bottle with water & screw it tight.
3. Now remove the thumb tacks, unscrew the cap & observe.
4. Is the water shooting out at the same distance from each hole?

What is going on

- When the thumb tacks were removed & the cap unscrewed, water from the holes began shooting out.
- The farthest was the lowest stream when compared to the other two.
- This shows that pressure increases with greater depths.



Watch these!

- Oil and Natural Gas - How do they form and accumulate?
<https://www.youtube.com/watch?v=7loF0edwiHU>
- Formation Of Reservoir Rock | Oil & Gas Animations
https://www.youtube.com/watch?v=_PDOD_FEnNk
- Porosity and Permeability <https://www.youtube.com/watch?v=8mfBomrw0rs>

Keywords: Hydrocarbons, source rock, reservoir rock, migration, porosity, permeability

