

 **Activity 3.3.2 Extracting Air****Purpose**

Just like with any living organism, plant roots need oxygen to survive. How is this possible when plant roots are grown underground? It all depends upon pores, which are pockets filled with air or water in the soil structure. Soils that have more porosity are better suited for sustaining plant life.

You will assess the quality of a soil based on porosity in this activity. Since soil is filled with pores ranging in all sizes, it is hard to see with the naked eye. You will test the porosity of the soil, which will allow you to see the air trapped in the soil as it is being replaced by water. In addition, you will also compare two soils that have different levels of organic matter content to determine if pore space is affected by organic matter.

Materials**Per pair of students:**

- Clod of soil containing high amounts of visible organic matter
- Clod of soil containing low amounts of visible organic matter
- Polyurethane spray can
- 2 500 ml beakers
- Stopwatch
- Water
- Paper towels

Per student:

- *Agriscience Notebook*
- Pencil

Procedure

You and a partner will prepare two clods of soil by spraying them with a polyurethane sealant. The sealant will hold the clod together when submersed underwater. After you have made some predictions about which soil sample has the most pore space, or in other words air volume, you will submerge both and record the amount of time it takes for the air to be released from the soil samples.

Part One – Apply Sealant

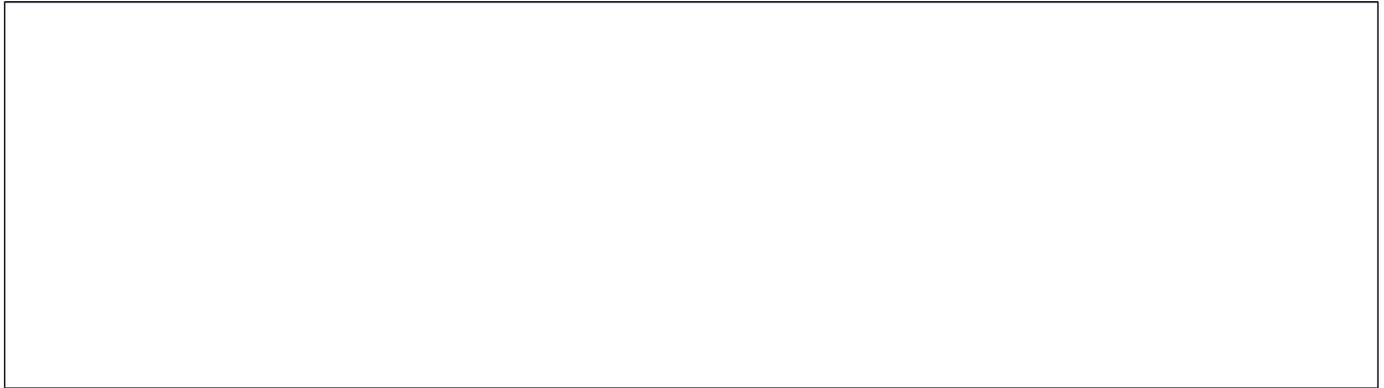
Take two clods of soil, one representing a high amount of organic matter and the other sample representing a low amount. Make sure both samples are approximately the same size. Be sure the clods fit easily in the beaker. If either one does not, carefully break a small portion away to allow it to fit in the beaker.

Coat both samples with an even coat of polyurethane and set aside to dry. Drying time will require 5-10 minutes. While the clods are drying, complete Part Two.

Part Two – Make your Prediction

You and your partner will need to agree upon a prediction for the porosity of the two samples. Formulate and write down a prediction as to which soil sample will have the most pore space. In the box provided, record your prediction written as a complete sentence.

Prediction: _____



Part Three – Conduct the Experiment

1. Pour 375 ml of water into each of the 500 ml breakers.
2. Once the polyurethane is dry, you and your partner will gently place each clod into the beakers at the same time. **NOTE:** Start the stopwatch at the moment the soil is placed into water.
3. Observe the bubbles that emerge from each clod. Record your observations in Table 1 for the time intervals listed. Important observations should be made including how fast and how many bubbles each clod is producing, and when a sample stops bubbling. Each partner will need to be responsible for one of the clods. But, each partner should observe the other clod when possible.

Observations	High Organic Matter Sample	Low Organic Matter Sample
:30 check		
1:00 check		
1:30 check		
2:00 check		
2:30 check		
3:00 check		
3:30 check		
4:00 check		
4:30 check		
5:00 check		

Part Four – Clean up

After your observations are recorded, dispose of the water and soil, clean and return the equipment, and clean up your workstation according to your teacher's directions.

Conclusion

1. What do you believe the bubbles represent in the soil?
2. Explain why you believe your prediction was or was not correct about pore space between the two soil samples.
3. Why do you think organic matter affects the amount of pore space in soil?
4. What are some recommendations you would make for increasing porosity in soils?