



Ice Orbs Activity

Learning objectives

This activity explores the following ideas:

- Ocean worlds may be the most likely places to discover life beyond Earth.
- Scientists think that ocean worlds have ice-cold frozen exteriors, and warmer, liquid interiors.
- Some astrobiologists are studying ocean worlds for evidence and signs of life.

Materials

- Ice orbs (**prepared in advance—see instructions below**)
- Plastic tray
- Sponge and towel
- Magnifying lens
- Flashlight
- Toothpicks
- Paper clips
- Optional: Small bowls to hold the balloons in the freezer, additional tools
- Activity and facilitator guides

Preparing the Ice Orbs (will need to freeze overnight)

Materials

- Freezer
- Balloons
- Liquid watercolor
- Small funnel + confetti, chia seeds, and tinsel
- Water faucet
- Metal bowl (optional)

Instructions

- Add 2 to 4 drops of liquid watercolor to the inside of each balloon.
- Use the small funnel to add a tiny pinch (about $\frac{1}{4}$ teaspoon) of confetti, chia seeds, and tinsel to the inside of each balloon. Less is more! Do not add too much.
- Place the neck of the balloon over a faucet and hold it tightly. Slowly turn on the tap and fill the balloon with water, until it is about 6 to 8 inches in diameter. Be sure you add enough water to get a round shape rather than an elongated (egg) shape. Pinch the neck of the balloon closed

and carefully remove it from the faucet.

- Release any remaining air from the neck of your balloon or the confetti won't be encased in ice. Tie off the balloon.

- Place all the balloons in a freezer, leaving them for two days or until frozen. Tip: You can rest the filled balloons in a small round-bottomed bowl to help them hold a more spherical shape while they freeze. To get the roundest shape, freeze the balloons knot-side down.

Try This!



Look closely at the ball of ice. What do you see on the outside and the inside? Compare what you see to the images of icy moons.



Choose an object hidden under the surface of the ice. What do you observe? Try using tools to get more information!



Can you tell what the hidden object is made of? Is it alive? How could you learn more about the object or the ice?

Background

Ocean worlds may be the most likely places to discover life beyond Earth. **Scientists think that ocean**

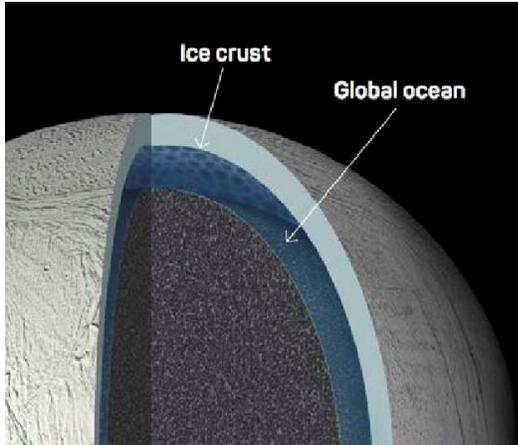


Figure 2 Enceladus may have a frozen outer shell and an ocean beneath its surface.

worlds have icy, frozen exteriors and warmer, liquid interiors. Examples of ocean worlds in our solar system include Jupiter's moons Europa, Ganymede, and Callisto, and Saturn's moons Enceladus and Titan. The ice orbs you investigated in this activity are different from these ocean worlds, because they're frozen all the way through. To study distant ocean worlds, scientists make observations using a variety of tools and then compare the data to geological processes on Earth. Sometimes scientists can use telescopes based on Earth to observe these far-off places, and sometimes they gather data using spacecraft with special instruments. **Astrobiologists are searching ocean worlds for evidence of life.** Because water is essential to life on Earth, some scientists think that ocean worlds are the most likely places to find living things in

other parts of the universe. NASA missions such as Juno and Cassini are contributing data to astrobiology research. In the future, NASA researchers hope to send scientific missions to these cold and alien worlds to gather more data. Future missions might take better images, analyze the chemical and mineral compositions of the oceans, and probe the surfaces and interiors of these planetary bodies.

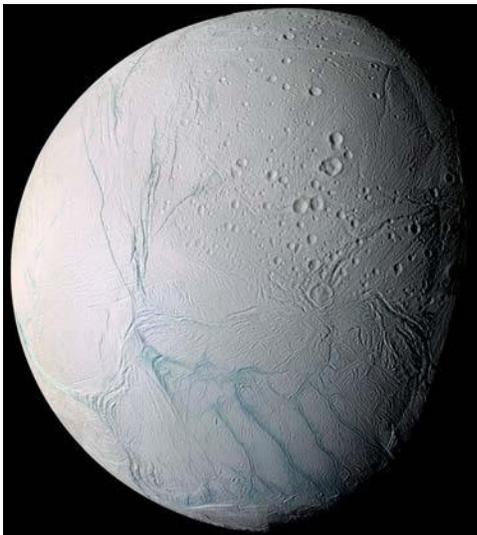


Figure 1 Ocean worlds such as Enceladus might host microbial life.

References

<http://nisenet.org/catalog/exploring-universe-ice-orbs>