EXPLORE SCIENCE Ice Orbs featured

EXPLORE SCIENCE Ice Orbs User Guide

Contents

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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: Insulated bag (or cooler)
- Optional: Small bowls to hold the balloons in the freezer, additional tools
- Crater on Europa Info sheet
- Surface of Enceladus Info sheet
- Oceans Below the Surface Info sheet

  The Explore Science toolkit comes complete with all necessary materials for this activity. Materials are also readily available to create or restock activity kits. Graphic files can be downloaded from **www.nisenet.org**. All other materials are available at discount stores.

Advance preparation

Two days ahead of time, prepare the ice orbs. You will need:

- Freezer
- About 10 party balloons (10 balloons is enough for approx. 100 visitors over 4 hours)
- 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 ¼ 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. Repeat filling instructions for the remainder of the balloons.
- 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.

- Just before you start the activity, cut the neck of the balloons and peel the balloons off the ice orbs. Discard the balloons and place the ice balls in the insulated bag (or cooler).
- When you start the activity, place a couple ice orbs on the tray for participants to observe. Keep the rest cool in the insulated bag or cooler.

Safety

The balloons used to prepare the ice orbs are latex so individuals with latex allergies should not do the advance preparation for this activity. The activity facilitator and participants won't come into contact with the balloons, but be sure to remove all balloon residue before taking the orbs onto the floor. Water melting from the ice can become messy and could pose a slip hazard. Use the towel underneath the tray to soak up excess water.

Notes to the presenter
This activity is designed to allow open-ended exploration of the materials. Encourage visitors to make close observations of the ice and compare its features to the images of ocean worlds and moons. You can include other tools and probes for your visitors as they're exploring, but you may not want them to actually remove the objects hidden in the ice, since real researchers can't do that yet either. If you're bringing multiple ice balls onto the floor, keep a cooler nearby for storage and/or to keep them cold between visitor groups. Ice orbs typically last a few hours indoors.

Conversational prompts
While participants are engaged with this activity you can explore additional content together. Share with visitors that in our quest for life beyond Earth, NASA scientists must think about our responsibility to life on other worlds and/or life here on Earth. There are even international agreements and treaties governing what tools can be used to explore these far-off worlds. Engage participants in conversation:

- On the recent Juno mission to Jupiter, scientists made the decision to deorbit—or crash—the spacecraft into Jupiter to avoid contaminating Jupiter's moons with microbes from Earth. Was this the right thing to do?
- What tools should we use to study life on other worlds if we find it? Should we bring samples back to Earth and risk endangering species native to our own planet?

Difficult concepts

With this activity, it may be important to remind participants that we haven't found life or signs of life anywhere else in the whole universe. Some people have had experiences, heard about events, or seen popular media that suggest extraterrestrial creatures exist and have even visited Earth. Scientists have not validated any of these accounts, so the current scientific opinion is that no "aliens" have been found or have been in contact with people or planet Earth.However, scientists do expect that life exists beyond Earth and that one day we may encounter it. There are many NASA research programs looking for evidence of life in other parts of the universe. If we find them, living organisms on other planets are likely to look very different from people, or the little green creatures of popular culture. If participants bring up things they've experienced or have heard of, you might say something like, "Yes, we hear lots of stories and see movies about aliens, and that makes them seem real to us. But right now scientists haven't been able to verify any alien encounters, so we're still looking for good evidence of life beyond Earth." Or, "Yes, sometimes we experience things we can't explain, and we wonder if extraterrestrials could be involved. But right now scientists haven't been able to verify any alien encounters, so we're still looking for good evidence of life beyond Earth."

Staff training resources
Refer to the Tips for Leading Hands-on Activities sheet in your activity materials.

- An activity training video is available at **vimeo.com/191168571**.
- A content training video is available at **vimeo.com/191171452**.

Credits and rights
This activity was adapted from Ice Balloons, developed by the Exploratorium. Retrieved from: http://www.exploratorium.edu/afterschool/activities/index.php?activity=171 .

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Documents / Resources

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References

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- Ocean Worlds
- The National Informal STEM Education Network
- Ice Orbs Activity Training Video on Vimeo
- Ice Orbs Content Training Video on Vimeo
- User Manual