Space Sand Fun Facts

Space Sand truly is the closest thing to soil from Mars that most of us will ever experience. Reddish in color and very dusty and dry, Space Sand is hydrophobic sand with the same properties as the sand on Mars. It is theorized that it exhibits hydrophobic properties because it has not been exposed to water in over 13 million years! Space Sand is currently being used in NASA Mars Exploration Classroom Experiments.

Space Sand Experiments

Individuals should divide into three groups. Each group gets a different color of Space Sand and can do each of the experiments once. Afterwards, the groups can try mixing colors.

1. Fill two cups three-quarters full with water. Add one tablespoon of Space Sand to the first cup. Next, add one tablespoon of natural sand to the second cup. What happened? Did the Space Sand get wet? Did the natural sand? Why?
2. Put another tablespoon of Space Sand into the cup of water. With a spoon, stir the sand under the water. Can Space Sand be sculpted under water? Now pour the water out of the cup. What happens? Is the Space Sand wet or dry?
3. Lay two pieces of construction paper on a flat surface. Add one teaspoon of Space Sand to the first piece of paper. Add one teaspoon of natural sand to the second piece of paper. Drizzle one teaspoon of vinegar over each type of sand. What happens? Does the Space Sand get wet? Does either sand bubble?
4. Add a small amount of oil to one cup of water. What happens? Pour some Space Sand over the oil. What happens? Does the oil mix with the Space Sand? Why?
5. Fill one cup with water. Add two tablespoons of Space Sand to it. Now add a little dish detergent to the cup. What happens? Does the Space Sand get wet? Why?
6. Fill two cups with water. Add two tablespoons of Space Sand to the first cup, and two tablespoons of natural sand to the second cup. Place both cups in a freezer overnight. Take them out the next morning. What happens? Did both cups of sand freeze?
7. Surface tension experiment: read all directions before adding sand.

Cup #1:	¾ cup water + (no salt)	+Space Sand sprinkled
Cup #2:	¾ cup water + 1 tsp salt	+Space Sand sprinkled
Cup #3:	¾ cup water + 2 tsp salt	+Space Sand sprinkled
Cup #4:	¾ cup water + 2 tsp salt	+beach sand sprinkled

Mark the level of the water on the side of the cup after adding the salt (if any). Gently sprinkle a little bit of sand at a time on top of the water. You may start to form a sand raft. Keep track of how much sand you add to the raft, watch how the raft sags below the water line, and mark the new level of the water when the sand raft sinks. Which cup can support the most sand floating on the surface? How far above the marked line is the water displaced by the time the sand sinks? Now recreate a thin sand raft. Poke your finger through the sand raft. Does it get wet? Put drops of water on the sand raft. What happens?

Discussion Questions

1. What causes a molecule to be polar or non-polar? What is an example of a polar molecule? A non-polar molecule?
2. What other uses could Space Sand have? Can it be helpful to our environment?

Super Snow Fun Facts

Meet the future of snow! Create snow at any time in any climate, just add a tablespoon of Super Snow to a quart of water and stir. The more it's stirred, the more it shines and sparkles. It's so realistic that it has been used at indoor snowboarding parks and on movie sets. Super Snow expands to more than 100 times its size and lasts for weeks without rewetting.

Super Snow & Instant Solid Powder

Super Snow is a cross-linked polymer that rapidly absorbs water to expand from a powder to fluffy snow. Polymers are molecules that are composed of repeating units of smaller molecules linked together like a chain. Cross-links are connections between multiple polymer chains. Super Snow is a polar polymer, so it mixes with water and expands to more than 100 times its size.

Instant Solid Powder is made from sodium salts cross-linked with polyacrylic acid to form sodium polyacrylate. Polymerization produces a linear molecule that has a very high molecular weight usually greater than one million molecular units. Instant Solid Powder is also a cross-linked polymer that rapidly absorbs water through the process of osmosis. When the sodium polyacrylate is immersed in water, there is a higher concentration of water outside the polymer. When water approaches a sodium polyacrylate molecule it is drawn to the center of the molecule by osmosis. Because it is polar, it mixes with water, and absorbs 200-300 times its weight in water forming a gooey gel!

Physical Matter Properties Classroom Kit

Student Guide

Super Snow & Instant Solid Powder Experiments

1. Put ¼ teaspoon of Super Snow in 4 cups. Stir ¼ cup, ½ cup, ¾ cup and 1 cup of water into the cups. Repeat with the Instant Solid Powder. How much water can Super Snow and Instant Solid Powder hold? In which cup do they stop absorbing the water and become immersed in it? To separate the polymers from excess water pour them through a heavy-duty paper towel with a cup underneath. The polymers will remain in the towel – most can be dumped back into a cup – and the water can be poured down the drain.
2. Put ¼ teaspoon of Super Snow in a cup. Add 2 ounces of water. Do not stir! Put ¼ teaspoon of Super Snow in 2 ounces of water. Stir for 20 to 30 seconds. Which cup makes snow faster? Try it with the Instant Solid Powder. Does stirring have an effect?
3. Mix a food-coloring tablet with 4 ounces of water in a separate cup and stir. Divide the colored water and heat one half in a microwave for about 10 seconds. Pour 1 teaspoon of the cold colored water in a cup of hydrated Super Snow or Instant Solid Powder. Pour 1 teaspoon of the hot colored water in a cup of hydrated Super Snow or Instant Solid Powder. Does the color spread faster with hot or cold water? What is osmosis?
4. Weigh an empty cup. Put ¼ teaspoon of Super Snow or Instant Solid Powder in the cup and weigh again. Subtract the weight of the empty cup from the weight of the cup with powder; this is the weight of the powder. Repeat the process for a cup that has 8 ounces of water. Mix the Super Snow or Instant Solid Powder with water and weigh. Does the mixed weight equal the sum of the initial mass of powder and water? What did you learn about the Conservation of Mass?
5. Take some hydrated Super Snow and Instant Solid Powder. (Put ¼ teaspoon of powder in a cup with 2 ounces of water.) Add 1 teaspoon of salt, and stir for 20 to 30 seconds. What happens?
6. Add ¼ teaspoon of Super Snow and Instant Solid Powder to two cups each. Add 2 ounces of pop (any kind will work) to one cup, and add 2 ounces of orange juice to the other cup. Do not stir! What happens? Now stir and see what happens.
7. Water absorbed in Super Snow and Instant Solid Powder evaporates like water anywhere else on the planet. Measure the rate of evaporation under various circumstances. Try it in an open cup, in a cup with a lid on top, and in a cup exposed to heat (under a hot light bulb, near a heat vent or by a radiator). Also try it with colored polymers. What happens in the different environments? What happens to the color as the water evaporates?

Discussion Questions

1. How do Super Snow and Instant Solid Powder work? What is a polymer?
2. What special uses could Super Snow have? How could it be helpful to humans and our environment?
3. What differences are there between real snow and Super Snow? How long does Super Snow last?

Notes

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