RAFT IDEAS

Topics: Matter, Physical Properties, Mixtures

Materials List
- ✓ Mixture of the following materials: iron filings, salt, lentils (or similarly sized objects), sand
- ✓ Preforms with pop-up caps
- ✓ Cups
- ✓ Magnet wand
- ✓ Small zip-loc baggie
- ✓ Craft stick
- ✓ Warm water

This activity can be used to teach:
Next Generation Science Standards:
- Property of materials (Grade 2, Physical Science, 1-1; Grade 5, Physical Science, 1-3)
- Structure of matter (Grade 5, Physical Science, 1-1)
- Mixtures (Grade 5, Physical Science, 1-4)
- Chemical reactions (Middle School, Physical Science, 1-2)
- Science & Engineering Practices (grades 2-8)

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Sorting it out with Science
Separating Mixtures using Properties
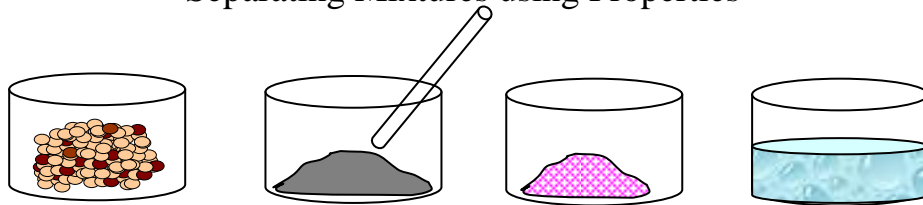
Separate a mixture of several substances using physical properties.

To Do and Notice
1. Examine the mixture and note the variety of substances. Discuss some of the visible properties of these substances (particle size, color, shape).
2. Note that all the largest objects (lentils) are the same. Begin by sorting out the lentils using the pop-up cap as a sieve. Open the pop-up cap and shake the smaller-sized particles into a cup. Set the separated "pure lentil" sample aside.
3. Sort the iron filings from the remaining mixture using the property of attraction to magnets. Place a magnet wand into a baggie. Stir the mixture with the baggie-covered magnet and notice the accumulation of iron filings to the outside of the baggie. Gently tap the magnet on the side of the cup to release any trapped sand or salt particles.
4. Transfer the iron filings to an empty cup by holding the baggie over the cup and removing the magnet wand from the baggie, releasing the iron filings.
5. Repeat steps 3 & 4 until all iron filings are removed. Set the separated "pure iron filings" sample aside.
6. Sort the sand and salt by using salt's property of high solubility in water. Pour warm water into the mixture and stir until all the salt has dissolved, and then pour the saltwater into a cup (note: the salt will not be a pure sample until the water has evaporated.)

The Science Behind the Activity
Scientists can identify any substance using its unique set of physical and chemical properties. All objects have 4 properties: Volume, Mass, Weight, and Density. Volume measures the amount of space taken up by an object, mass measures the amount of matter in an object, density measures how tightly packed the matter is in an object, and weight is determined by the object's position in space (accounting for gravity.) Substances also exhibit other properties that can be used for identification, such as attraction to magnets, crystalline structure, volatility, and solubility. These all represent physical properties of matter; after a physical change, the substance is still the same. Chemical properties include a substance's ability to burn or react with an acid; after a chemical change, a new substance is present. For example, if a craft stick is broken into 2 pieces, its volume has changed, but it is still wood (physical change); if the same craft stick is burned, a new substance is created and the stick is now charcoal (chemical change.)

Scientists classify matter into either pure substances or mixtures. Mixtures can be evenly mixed throughout (homogeneous) or unevenly mixed (heterogeneous). Scientists use properties of matter to sort mixtures, just as students did in this activity. Density, for example, is used in industry to separate recyclables and refine crude oil.

Web Resources (Visit www.raft.net/raft-idea?isid=395 for more resources!)