

## Observe Like Emanuel Swedenborg, a Scientist

Swedenborg practiced observing things he saw in the natural world. After his spiritual eyes were opened he was able to observe many wonderful things in the spiritual world as well. Practice observing like Mr. Swedenborg. Choose one experiment to see what happens!

### Eggshell Geodes

Watch crystals form in eggshells as water evaporates from salt solutions.

#### Materials

clean eggshells  
1-2 water (and a way to heat it to boiling)  
salt (table or rock) or Borax  
small heat proof container (such as a coffee cup)  
spoon  
food coloring  
egg cartons and wax paper or mini muffin tins

#### Directions

1. Crack eggs as close to the narrow end as possible. Clean the eggshells out using hot water. Remove *all* the membrane. (Membrane left in the shell may cause mold to grow, turning the crystals black.)
2. Put clean eggshells into an egg carton lined with wax paper or mini muffin tins to hold the eggs upright.
3. Heat the water to boiling in a saucepan.
4. Pour  $\frac{1}{2}$  cup of water into your heatproof container. Add  $\frac{1}{4}$  cup of salt or Borax to the hot water and stir until it dissolves. Once the salt is dissolved, *continue adding small amounts of salt until no more salt will dissolve and the water is super-saturated.*
5. Add food coloring.
6. Pour the solution into the eggshells, filling them as full as possible without causing them to overflow or tip.
7. Set the eggshells aside in a ventilated safe place while the water evaporates. Crystals will form inside the eggshells as the water evaporates over several days.
8. Observe what is happening as the crystals form. How long did it take for crystals to form?
9. Are all the crystals the same size, or are some larger than others?
10. Try putting one eggshell on a windowsill where there is more sun and evaporation is faster. Compare crystals that form faster with crystals that form more slowly. Are they the same or different?

## Observe Like a Scientist

### Balloon Inflator

Watch a balloon inflate with carbon dioxide gas when baking soda and vinegar are combined in a bottle. Experiment to see if changing the ratios of vinegar and baking soda change the results!

#### Materials

small plastic water or soda bottle, empty

balloon

4 tablespoons vinegar

1 teaspoon baking powder

teaspoon

*optional:* funnel with narrow spout for putting the baking soda into the balloon

} *increase quantities for a larger bottle*

#### Directions

1. Pour the vinegar into the empty bottle and set aside.
2. Put the baking soda into the balloon using a spoon or funnel.
3. Stretch the balloon over the mouth of the bottle being careful to keep the baking soda in the balloon clamped off with a finger and thumb.
4. When you are ready, release the baking soda from the balloon into the bottle.
5. Observe what happens when the baking soda and vinegar mix.
6. Since this experiment works quickly, try doing it again with different ratios of vinegar to baking soda. Does having more or less vinegar make a difference to the experiment? Does having more or less baking soda make a difference to the experiment?