

## Experiments for Families

### ACIDS EATING MY NOSE!

#### Background

Acid rain is more acidic than normal rain and forms through a complex process of chemical reactions involving air pollution. The two most important pollutants that contribute to acid rain are sulfur dioxide and nitrogen oxides, which react with moisture in the atmosphere, forming acid rain. The sulfur and nitrogen compounds primarily come from human sources, such as automobiles, factories and utilities. Acid rain can fall as snow, hail, sleet, fog, or even dry particles.

Acid rain can harm forests and crops by washing away nutrients and poisoning the plants. Bodies of water can have their pH altered so much that the aquatic life dies, or different, more acid-tolerant species take over. The corners of buildings can be slowly eaten away. Statues can be smoothed, as ears, noses, and any other parts that stick out are slowly dissolved. Acid rain is not a strong enough acid to do you harm as it lands on your skin.

**Purpose:** Demonstrate the effect of acid rain on statues and buildings

#### Materials

- Vinegar
- Water
- 2 pieces of chalk
- 1 metal nail
- 2 clear cups

#### Procedure

1. Explain that acids react chemically with limestone
2. Pick up the chalk and make a drawing on it with the end of a nail
3. Fill one of the plastic cups with water, approximately 1 – 1½ inches full
4. Fill the other cup with vinegar, approximately 1 – 1½ inches full
5. Place the end of each chalk piece with the drawing into the water and vinegar solution
6. Wait a few minutes, and watch the reaction occur – then take each piece of chalk out and compare the two
7. Notice the chalk in the vinegar solution has been eaten away
8. Ask the child if they should be concerned about acid rain? Why? How can we try to prevent it? (Remember the sources -- factories, automobiles, and utilities.)



On *YouTube* search **FAMILY SCIENCE QUEST** for a demonstration of this experiment

**Note: Adult supervision required.**



## Experiments for Families

### DANCING RAISINS

#### Background

A base (baking soda) and an acid (vinegar) react to form a gas (carbon dioxide). As the gas forms in this experiment, it adheres to the raisins in the bottle. Once enough gas adheres to a raisin, it will begin to rise to the surface. When it reaches the surface, the gas escapes into the air and the raisin sinks. The raisin repeats this process for several hours or until the raisin gets soggy and too heavy to rise to the surface.

**Purpose:** Demonstrate the effect of a base and an acid reacting to form a gas

#### Materials

- Baking soda
- Vinegar
- Raisins
- Measuring cup
- Teaspoon
- Two-liter plastic bottle (*cut the top part off with scissors*)
- Large kitchen spoon

#### Procedure

1. Pour 1 cup of water into the empty two-liter plastic bottle with the top cut off
2. Add 1 heaping teaspoon of baking soda and stir until it has dissolved in the water
3. Add 4 - 6 raisins to the water/baking soda mix in the plastic bottle
4. Slowly add 1 cup of vinegar into the plastic bottle
5. After a couple of minutes, what happens to the raisins?



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## Experiments for Families

### MAKING SIDEWALK CHALK

#### Background

In this experiment, as the water evaporates from Plaster of Paris, what was once a powder and a liquid is now a solid, depending on the mold used. Sometimes during the evaporation process, you can detect heat also.

When you place the filled coin wrapper on a newspaper or paper towel, you will see that the water absorbed by the newspaper or paper towel is clear, not the color of the chalk. The Plaster of Paris acts as a filter: the water molecules are small enough to filter through the mixture, but the molecules containing the color are not.

**Purpose:** Demonstrate the effects of evaporation and filtering

#### Materials

- 1/8 cup of water
- 1/4 cup of Plaster of Paris
- Plastic spoon
- Plastic cup
- Tempera/poster paint
- Coin wrappers
- Paper towels
- Cookie sheet

#### Procedure

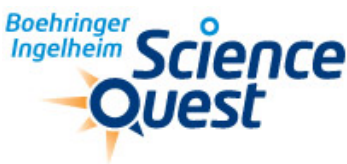
1. Add 1/4 cup of plaster of paris into a plastic cup
2. Add 1/8 cup of water into the plastic cup and stir until you have the consistency of ketchup – if too thin, add a little more plaster of paris
3. Mix enough tempera paint to make the mixture the desired color
4. Stand up coin wrapper on the cookie sheet and pour in the mixture
5. Gently tap tray on countertop to remove any air bubbles
6. Let dry for 1 – 1½ hours, then remove the wrapper (will peel away more easily if chalk is still a little moist)
7. Let chalk dry for a full 24 hours before using

**NOTE:** Do not put Plaster of Paris in the sink. It clogs pipes. Throw used materials in the trash.



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## Experiments for Families

### EXTRACTING IRON FROM CEREAL

#### Background

It turns out that when the folks who make your breakfast cereal add iron to it – which is good for your health – they actually add iron! Little bits of iron – iron filings – can be found in the cereal. This is OK, as the filing will be rapidly broken down in your stomach. But you can use a strong magnet to pull out the filings. This is a nice example of a mixture: the cereal is mixed with the iron filings, but they are not chemically combined at all.

**Purpose:** Use a mixture to demonstrate how cereals contain iron

#### Materials

- Blender
- Strong magnet
- Clear container
- Iron-fortified cereal (look on the label for a cereal that lists “iron” or “reduced iron” in the ingredients; one that provides 100% of your daily requirement is best)

#### Procedure

1. Pour some cereal into the blender and add water
2. Place the lid on the blender and blend for 2 minutes
3. Once blended, pour mixture into a clear container and let sit for 5 minutes
4. After 5 minutes, take a strong magnet and swirl it around mixture for approximately 2 minutes
5. You will find that some iron filings sticking to the magnet – this is the iron from the cereal!

(Note: you need a really strong magnet to do this. Normal refrigerator magnets won't work)

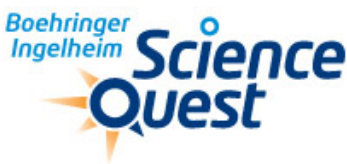
#### Other Things to Try

You can find iron filings other places, too. Take the magnet to the playground, and swoosh it around in the sand – you are certain to pick up iron along the way!



On *YouTube* search FAMILY SCIENCE QUEST for a demonstration of this experiment

**Note: Adult supervision required.**



## Experiments for Families

### CLOUD COOKERY

#### Background

Clouds form from the condensation or freezing of water vapor. The warm liquid water forms water vapor. This process of changing liquid water to gas is called evaporation. As the water vapor rises and nears the ice-filled tray, the vapor cools. The smoke particles provide a surface for the water to condense. In this experiment, if you remove the metal tray, the cloud will disappear as it mixes with the warmer surrounding air. The same events occur in our environment. Evaporated water condenses to form clouds which may later produce rain. The production of rain is referred to as precipitation. Together, evaporation, condensation and precipitation play an important role in the water cycle.

Condensation occurs when a gas (water vapor in this activity) changes into a liquid (the cloud). Water vapor condenses onto a surface when cooled. For instance, take a cold bottle outside on a warm day, and notice that water droplets form on the surface. This is condensation. Clouds form the same way.

**Purpose:** Demonstrate how water vapor forms

#### Materials

- Clear glass jar filled with 2 inches of warm water
- Spoon
- Set of matches
- Tray filled with ice

#### Procedure

1. Fill a jar with 2 inches of warm water and stir
2. Have the parent light a match, blow it out and drop it into the jar
3. When the smoke clears, place ice-filled metal tray on top
4. Watch carefully: a cloud will form near the top of the jar



**On YouTube search FAMILY SCIENCE QUEST for a demonstration of this experiment**  
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## Experiments for Families

### WOWIE ZOWIE

#### Background

A physical change happens when detergent breaks down fats into smaller pieces. This is a good model for motion of molecules. Whole milk has a lot of fat in it and dish soap helps disperse and break apart the fat. In this experiment, when you put in the dish soap, you disperse the fat in the whole milk and you are able to see this normally invisible process because of the food coloring. This is called a physical change.

**Purpose:** Demonstrate motion of molecules

#### Materials

- Dish soap
- Whole milk
- Food coloring
- Clear bowl

#### Procedure

1. Pour a thin layer of whole milk on the bottom of the bowl
2. Add drops of food coloring around the center, making sure the colors don't touch
3. Add a few drops of dish soap into the center of the bowl
4. Watch what happens to the food coloring. Wowie Zowie!



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