



**Science Unit:** *Matter*

**Lesson 7:** *Chemical Changes to Matter – Part 2*

School year: 2005/2006

Developed for: McBride Elementary School, Vancouver School District

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Grade level: Presented to grades 2 - 3; appropriate for grades 1 - 4 with age appropriate modifications.

Duration of Lesson 1 hour and 20 minutes

Notes: Please see the Matter unit, Lesson 6, *Chemical Changes to Matter – Part 1*, available from the Scientist in Residence Program website <http://www.scientistinresidence.ca>

## **Changes to Shining Penny Experiment**

Pennies can be easily shone with lemon juice (Realemon) and salt instead of with ketchup. After the pennies in the lemon solution are shiny, leave them in the cup, and then one can put in a clean nail or paper clip. Wait 10-15 minutes and the nail/paper clip will become coated with the copper that is in solution in the cup. This works best if there are 2-4 pennies in each cup.

## **Nail Rusting Experiment (this activity can be done as a demonstration)**

### **Objectives**

The students will observe the chemical reaction of rust on nails. They will observe that for rust to form, unprotected metal must be in the presence of moisture and air.

### **Materials**

- 4 Clean carpenter's nails (best if cleaned with fine sandpaper or abrasive scrubber)
- 4 Small jars, one with a lid
- Fingernail polish to paint one nail (paint nail ahead of time)
- Water
- kettle

### **Introductory Discussion**

What happens when we leave bikes, wagons or tin cans out in the rain? Does it make a difference if these metal objects are painted? Why?

### **Science Activity**

1. This experiment has 4 different treatments: Nail in air, Nail in water, Nail in boiled water with lid, Painted nail in water
2. Students can make predictions as to what they think may happen to the nails in the four different treatments (see above). Record predictions on a master sheet.



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3. Place the first nail in the empty jar with only air. Place the second nail in a jar with water. Place the third nail in freshly boiled water filled to the top of the jar and then capped with a lid. Place the fourth painted nail in a jar with only water.
4. Observe over the next 5-7 days and record observations on a master sheet.

### Closing Discussion

What has happened to the four different jars? Is it what you predicted would happen? Rust is a chemical reaction, which takes place when unprotected metal is exposed to moisture and air. When there is only air the nail does not rust. Boiling water takes out much of the air and then capping the jar with a lid further avoids more air being introduced. This jar should show less rust than the jar filled with regular water. The painted nail should show no rust.

### Tooth in Coca-Cola Experiment (this activity can be done as a demonstration)

#### Objectives

Students will see a chemical reaction take place with Coca-Cola and a tooth. Tooth decay is visible within 10-20 days.

#### Materials

- 2 child's teeth
- 2 small jars or cups
- Coca-Cola
- water
- kettle

#### Science Activity

1. Pass 2 teeth around so that students can have a look at them close up.
2. Put one tooth in a cup and cover with ample Coca-Cola. Place the second tooth in a cup filled with water.
3. Make predictions as to what will happen to the teeth over the next 10-20 days. Record on a master sheet.
4. Observe each few days and if need replenish cups with fresh water and fresh Coca-Cola. Record on the master sheet.

### Closing Discussion

What has happened to the two teeth? What does Coca-Cola contain that would cause the tooth to start to turn black and show signs of tooth decay? Why does the tooth in water look no different? Why do we have to brush our teeth? The tooth in Coca-Cola is showing a chemical reaction is taking place. The sugar in the Coca-Cola is breaking down the tooth enamel.



**References**

Churchill, E. Richard, L.V. Loeschig and M. Mandell. 1997. 365 Simple Science Experiments with Everyday Materials. Black Dog and Leventhal Publishing. P. 38, 294, 305.

Nicholson, Sue (Ed.). The Kingfisher Young Discoverers Encyclopedia of Facts and Experiments. Pp. 115.