Scientific Experiments for Homeschoolers

By Steve Davala

oung children receive less and less exposure to science in school, leaving it up to us parents to help them develop scientific minds. The following article describes an easy

experiment for parents who want to engage their kids in science. I use this experiment for my 8th grade science students but have adapted it for use by younger children. I even tested it out on my own 5- and 3-year-olds, who survived and enjoyed it.

# SIMPLE SCIENCE EXPERIMENTS ENCOURAGE SCIENTIFIC THINKING

Children today have little exposure to science in public elementary schools. And by science, I mean the questioning, testing, analyzing, and retesting of scientific method principles. Thus, it's up to us parents to provide opportunities if we want our young children to develop scientific minds. Since children rarely learn by just being told, simple hands-on experiments provide perfect opportunities for introducing and reinforcing scientific thinking.

How we present experiments greatly impacts their effectiveness. Experiments that begin with questions like "What do you think will happen?" or end with "Can you make it happen differently?" get children's minds in



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the right place. Even just letting children "play" with the materials before beginning an experiment gets them thinking about how the materials work together and allows for self-directed experimentation.

Not every parent just thinks up exciting experiments, however. There are a lot of great resources out there, but sometimes we need a quick something to get us going. Check out the simple experiment below to get you started. Allow your "students" to measure, pour, and mix independently to maximize their learning and feelings of competence. You'll be happy to hear that very little cleanup is involved.

### **CHEMICAL REACTION IN A BAG**

### **Purpose**

To see what happens when you mix vinegar and baking soda in a sealed bag

#### Materials

Film canister (or similar container) Ziplock bag that seals shut (quart-size) ½ cup vinegar 1 teaspoon baking soda Thermometer

#### **Steps**

- 1. Put one teaspoon of baking soda in the film canister.
- 2. Pour 1/4 cup of vinegar into the ziplock bag.
- 3. Find and record the temperature of the vinegar (leave thermometer in for at least a minute).
- 4. Stand the baking soda cup in the bag, but DON'T mix it yet.
- 5. Zip the bag almost shut and squeeze the air out; then seal the bag completely.
- 6. Predict what will happen to the bag and the temperature when you mix the baking soda into the vinegar.
- 7. Mix ALL the baking soda into the vinegar by turning the bag over.
- 8. Make and record observations!
- 9. Open the bag and measure the temperature of the liquid.

- 10. Ask what can be done differently and repeat the experiment.
- 11. Prompt further thinking with questions like "How does more or less baking soda or vinegar affect the temperature or how quickly the bag fills up?" and "How does the temperature of the vinegar affect things?"

### Conclusion

Science is about making discoveries about the world around us. It's about asking good questions and knowing how to get them answered. By providing opportunities like the one above and knowing how to ask questions that will get your children to think, you're helping them develop scientific minds, ready to solve any problem put before them.

### THE SCIENCE BEHIND THE **EXPERIMENT**

The chemical reaction between vinegar and baking soda creates carbon dioxide, a gas. Since gases take up more space than the liquid and solid combined, the bag inflates. The weight of the bag does not change throughout the experiment since nothing new is created: the original material just changes form. The temperature drops because the reaction is endothermic, meaning it keeps pulling in heat to react.

Now for an experiment that generates heat (exothermic) instead of removing it:

## STEEL WOOL **GENERATING HEAT**

By Dr. Jonathan Sarfati

### Materials

Steel wool Vinegar Polystyrene drink cup with lid with a hole for a straw Thermometer (which can be poked through the hole



### **Steps**

in the lid)

- 1. Put the thermometer in the jar and close the lid.
- 2. Wait about 5 minutes and write down the temperature.
- 3. Remove the thermometer from the jar.
- 4. Weigh a piece of steel wool.
- 5. Soak it in vinegar for 1 minute.
- 6. Squeeze the vinegar out of the steel wool pad. Wrap the steel wool around the bulb of the thermometer.
- 7. Place the thermometer and steel wool back into the jar and close the lid.
- 8. Wait 5 minutes.
- 9. Predict what will happen to the temperature.
- 10. Now take a look at the temperature.
- 11. (Optional) Predict what will happen to the weight.

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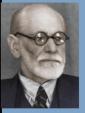


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You bet! Psychology is required at most colleges and it WILL challenge their beliefs. Many are not prepared. Some walk away from their faith.

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HomeschoolPsych.blogspot.com Dr. Tim Rice, LPC Homeschooling father of a



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12. Gently rinse (so no rust falls off) and dry the steel wool, then weigh it.

The vinegar removes any protective coating from the steel wool, allowing the iron in the steel to rust. Rusting is also speeded up by the acid in the vinegar. The steel wool should be noticeably rusty. Rusting is a slow combination of iron with oxygen in the presence of water. When this happens, heat energy is released. The heat released by the rusting of the iron causes the mercury in the thermometer to expand and rise, i.e., this is an exothermic reaction.

Since rust is a compound of iron and oxygen (as well as some water molecules), the wool pad should weigh more after rusting. (Rust is Fe<sub>2</sub>O<sub>3</sub>.nH<sub>2</sub>O).

### Why Did the Reactions Occur in the First Place?

All chemical reactions use energy to break chemical bonds and release energy when new bonds are formed. Reactions tend toward greater overall disorder-this is described by a scientific principle called the Second Law of Thermodynamics.

When an exothermic (heat-releasing) reaction occurs, the heat released by the reaction makes the surroundings more disordered. This overcomes any greater ordering produced by the reaction.

The opposite is true in an endothermic (heat-removing) reaction. Removing heat makes the surroundings more ordered, which must be overbalanced by disorder in the system itself.

For example, gases are very disordered, which explains the first reaction.

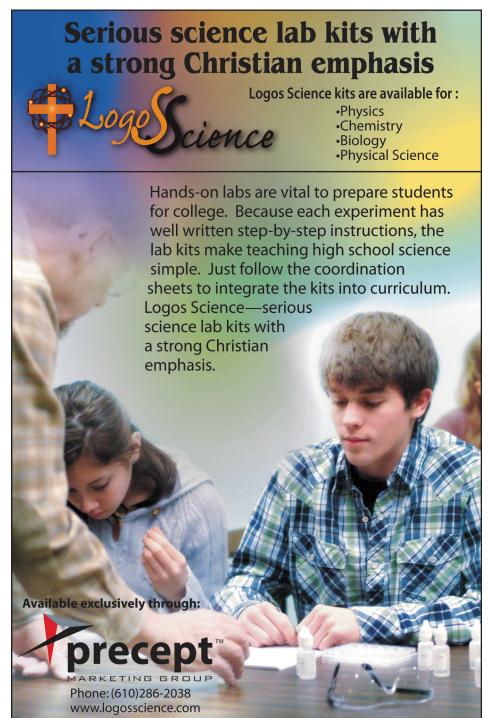
Note that these chemistry experiments are real science in the present, which has nothing to do with evolution, a belief system about the past. And like most branches of modern science, they were founded by believers in Biblical creation! They were inspired by God's command to take dominion over creation (Genesis 1:28) and by their faith in creation by a God of Order (1 Corinthians 14:33, NIV).

Find out more about some of the pioneers on creation.com/scientists-ofthe-past-who-believed-in-a-creator by searching for the following names:

- Robert Boyle and Andrew Ure (chemistry)
- · Jame Joule, James Clerk Maxwell, and Lord Kelvin (thermodynamics)

Steve Davala lives in Oregon with his wife, Laurie, and his two kids, Kyra and Jace. He is an 8th grade science teacher and likes to write parenting articles, children's books, and other fiction. More information can be found at www .stevedavala.com.

Dr. Sarfati's Ph.D. in physical chemistry is from Victoria University, Wellington, New Zealand. He is the author of some of the world's most well-known creation books, including By Design, Refuting Evolution (1 & 2), Refuting Compromise, and his latest, The Greatest Hoax on Earth? Refuting Dawkins on Evolution. A former chess champion of New Zealand, he works for Creation Ministries International (in Australia from 1996-2010, thereafter in Atlanta, Georgia).



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