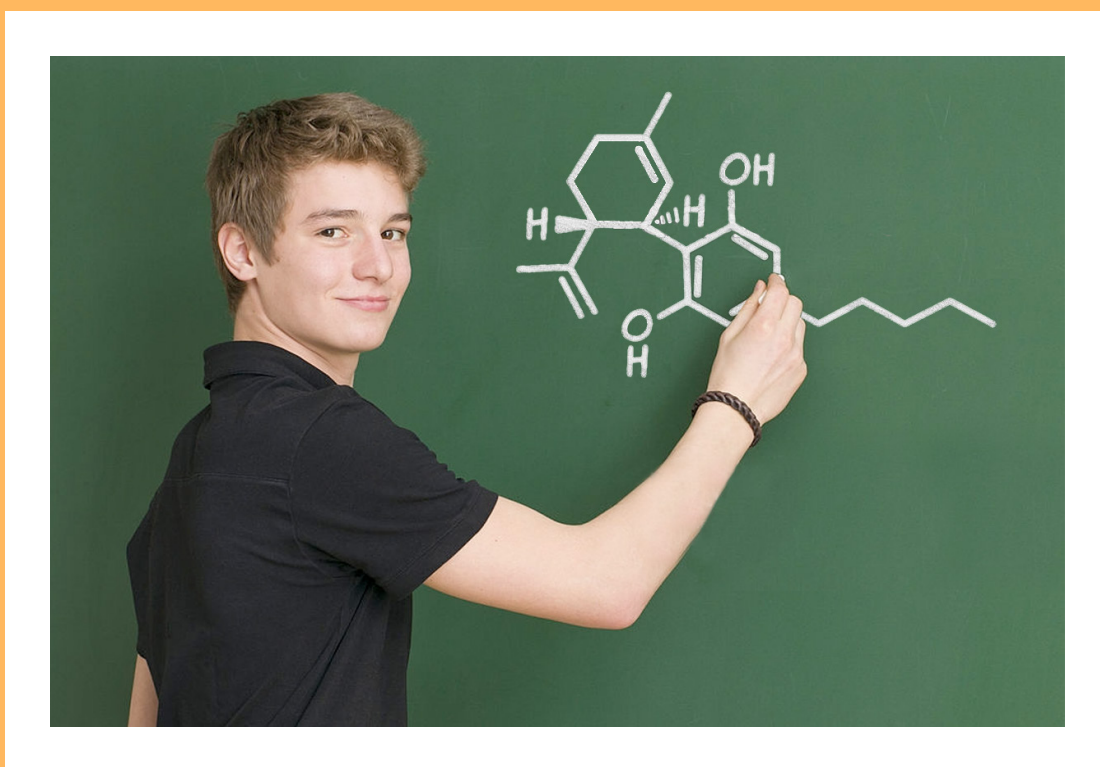


STEM *Sims*TM

Organic Models



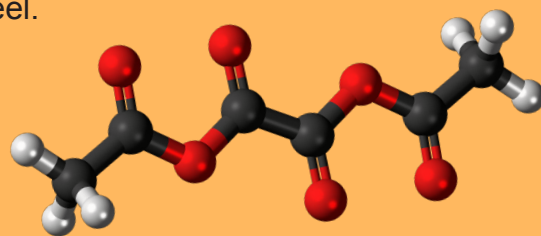
Organic Models

Do you need an idea for a scientific study?

Try out one of our ideas or make one of your own.

Start learning right now about organic chemistry. Take the following brief quiz to see how much you already know about the study of carbon-based molecules. See the bottom of page 4 to check your answers.

- Currently, about how many unique organic compounds have been identified?
 - 100,000
 - 1,000,000
 - 10,000,000
 - 10,000,000,000
- What is the most common organic compound on terrestrial Earth?
 - methane
 - carbon dioxide
 - water
 - cellulose
- The word “carbon” comes from the Latin word “*carbo*.” What was the meaning of the Latin word *carbo*?
 - air injected
 - charcoal
 - bridge builder
 - engine power
- Polyacrylonitrile (PAN) is used to make carbon fibers. These fibers are used in the manufacturing of fishing poles, car parts, construction materials, and a host of other materials. Compared to steel, PAN:
 - has the same mass and same strength as steel.
 - is much more massive, and is about 1/2 as strong as steel.
 - is about 50 times lighter and 100 times stronger than steel.
 - is about 5 times lighter and 2 times stronger than steel.
- The organic ester called ethyl butyrate has the aroma of:
 - fresh orange juice.
 - wintergreen.
 - cinnamon.
 - spearmint.



Glued to Organic Chemistry

The earliest form of the common white school glue was made from an organic molecule called casein. Casein, which can be made from curdled skim milk, is a molecule consisting of carbon, hydrogen, nitrogen, and oxygen. In this activity, you'll create your own glue. Caution: Eye protection, heat protection, and adult supervision are required to complete this activity.

Materials Required

- Safety glasses
- About 500 mL skim milk
- 100 mL graduated cylinder
- Tablespoon
- Baking soda
- 500 mL beaker
- Gloves for heat protection
- Heat source (stove or hot plate)
- Funnel and filter paper or food strainer
- Vinegar
- Small sauce pan or 1,000 mL beaker
- Heat-resistant pad



Procedure

1. Put on your safety glass and heat-resistant gloves.
2. Dispense 100 mL or smaller portions of the skim milk into the graduated cylinder, and then into the sauce pan or 1,000 mL beaker until you have a total of 470 mL of skim milk in the pan or beaker.
3. Dispense 90 mL of vinegar into the graduated cylinder, and then add the vinegar to the pan or beaker containing the skim milk.
4. Place the pan or beaker on the heat source.
5. Turn the heat source on "Low" and use the tablespoon to continuously stir the mixture.
6. When the milk begins to clump into blobs, remove the pan or beaker from the heat source and place the pan or beaker on the heat-resistant pad.
7. Continue stirring the mixture until the clumping stops.
8. Once the mixture has cooled, the liquid part of the milk (called the whey) will separate from the clumps (called the curds).
9. Position the funnel and filter paper or the strainer above the 500-mL beaker.
10. Slowly pour the mixture from the pan or 1,000 mL beaker through the funnel or strainer to separate the whey from the curds. The curds will remain in the filter paper or strainer.
11. Pour the whey (liquid) down the drain, but retain the curds. Clean the 500-mL beaker.
12. Allow the curds to completely dry. Place the curds into the clean 500-mL beaker.
13. Dispense 60 mL of water into the graduated cylinder and then add the water to the beaker containing the dry curds.
14. Add one tablespoon of baking soda to the water and curds. Use the tablespoon to stir the mixture.
15. Apply your newly-made glue to two sheets of paper to test your glue's holding power.
16. Make sure to clean all beakers and the spoon before the glue dries.

Organic Models

Don't Worry; It's Organic

To many people, the term organic with respect to food products has come to mean “good for you” or “natural.” But are there official guidelines for a food to be labeled as organic? The U.S. Department of Agriculture (USDA) has established guidelines for certifying and labeling food as being 100% Organic, Organic, Made with Organic, or Organic Ingredients. The food’s designation has to do with the manner in which the food was farmed. For a product to be labeled 100% Organic no synthetic fertilizers or pesticides may be used, no irradiation may be used to preserve the food, and no antibiotics used on livestock. The product must also not be genetically engineered. The Organic label requires at least 95% of the ingredients being certified as being organically farmed. Made with Organic must have 70% organics ingredients. The Organic Ingredients label indicates that less than 70% of the ingredients are not organically farmed and therefore *cannot* be certified as being an “organic” product.

All Natural, Free Range, and Hormone-Free labels on food products do *not* tell the consumer whether the product is organic or not. An “all natural” label only means that the product is free from artificial flavorings, artificial colorings and free from preservatives. Livestock raised free range or hormone free might still be given antibiotics or received other treatments that keep the final product from being labeled as being 100% Organic.

Most often, the cost of organic food products is higher than those produced using traditional farming methods. This begs the question, are there benefits to buying and consuming organic foods? The answer is – possibly. Organic foods have slightly higher concentrations of nutrients than typical foods. Consuming more nutrients in a person’s diet has been associated with better health. Products made using organic farming practices also have lower concentrations of some heavy metals and pesticides that may be detrimental to human health when consumed.



Please visit our site for more helpful information:
STEMsims.com

Answers: Page 2 Answers: 1) c, 2) d, 3) b, 4) d, 5) a.

The Science Fair Kits project was funded in part under the Department of Homeland Security Science and Technology Directorate grant contract #N10PC20003. Its contents are solely the responsibilities of the authors and do not necessarily represent the official views of the Department of Homeland Security.

© 2018 STEM Sims. All rights reserved. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable, and may be changed without notice. No liability will be accepted by the publisher for any consequence of its use. Publication thereof does not convey nor imply any license under patent or other industrial or intellectual property rights.