

Activity #16

DANCING SPAGHETTI

KEY CONCEPT

When objects more dense than water are joined to objects less dense than water, the entire unit will float if the overall density of the combination is less than that of water.

SKILLS	Observing, explaining
TIME	15 minutes
AUDIENCE	Teachers and students

SAFETY

This activity needs no special precautions.

CONTENT FOCUS

Raw spaghetti, which is more dense than a solution of water, baking soda, and vinegar, should sink when placed in this mixture. But since the baking soda reacts with vinegar and produces carbon dioxide gas, a piece of spaghetti can be made to float—even if it is temporary. This can happen because some of the carbon dioxide gas produced adheres to the bumpy places on the surface of the spaghetti causing the volume of the spaghetti-gas bubble object to increase. As the volume of the object increases, its density decreases—so much that the density of the object becomes less than the density of the water. The spaghetti, with the gas bubbles on it, then floats to the surface where the attached gas goes off into the air. The spaghetti, without the gas, is once again more dense than water so it sinks.

In floating the spaghetti, the gas functions like a life preserver. A person is slightly more dense than water. Life preservers are made of low-density materials. The average density of a person plus a life preserver is less than the density of water so together both will float.

TIPS

- Raisins, grains of uncooked rice, or dry noodles, can be used in place of the spaghetti.
- If a larger container is used, increase the amounts of baking soda and vinegar.
- Occasionally the spaghetti in one cup will not “dance.” Have an extra set-

up or two available to replace any, which do not work.

- You could use a clear carbonated beverage (such as ginger ale) in place of the vinegar/baking soda solution.

MATERIALS (for each group of 2)

- clear cup or beaker
- water
- baking soda
- vinegar
- spaghetti
- 1 teaspoon
- 1 tablespoon

PROCEDURE

1. Fill a clear cup about $\frac{3}{4}$ full of water.
2. Add about one teaspoon of baking soda and stir to dissolve.
3. Break a piece of spaghetti into 2-3 centimeter (1 inch) pieces and add to the cup.
4. Add about one tablespoon of vinegar. Observe closely.
5. If the spaghetti is not “dancing” after several minutes, add more baking soda and/or vinegar.

DISPOSAL

Materials may be stored for later use or discarded in the trash. Liquids may be rinsed down the drain.

EXTENSION

A similar activity can be done using peeled and unpeeled grapes. The gas bubbles will adhere to an unpeeled grape but not to a peeled grape. Thus only the unpeeled grapes will float.

SUGGESTED QUESTIONS

1. Why does the spaghetti sink when first added to the container?
The spaghetti is more dense than the water and baking soda solution so it sinks.
2. Why does the spaghetti rise to the surface of the liquid?

When the vinegar is added, a chemical reaction occurs which produces a gas. Some of the gas bubbles adhere to the spaghetti. The density of the spaghetti plus gas is less than the density of the water solution so the spaghetti and gas bubbles float up in the solution.

3. Why does the spaghetti sink again after rising to the surface?

When the spaghetti with attached gas bubbles reaches the surface of the liquid, the gas bubbles burst. The spaghetti alone is more dense than the solution so it sinks. The process is repeated as the spaghetti picks up and loses gas bubbles.