Concepts

Everything (all matter) is made of chemicals, which can be found in different forms.

Words to Know

Chemical—anything that uses space and has mass.

Atom—a very, very small particle that makes up all matter.

Molecule—a small particle made of two or more atoms that are chemically bonded together.

Element—a substance made of all the same type of atoms.

Compound—a substance made of two or more elements chemically bonded together.

Mixture—two or more elements and/or compounds that are mixed together but are not chemically bonded.

Solution—a completely uniform mixture.

Physical state of matter—the form a substance takes, based on the behavior of its molecules or atoms: solid, liquid, or gas.

Solid—a state of matter in which the molecules or atoms are close together and form a rigid structure.

Crystal—a solid that has a regular pattern of atoms or molecules.

Liquid—a state of matter in which the molecules or atoms are close together but also move around each other.

Gas—a state of matter in which the molecules or atoms are very far apart and move very fast.

Density—a description of the amount of matter in a substance in relation to its volume.

Miscibility—the relative ability of a substance to mix with another substance.

Soluble/solubility—the ability of a substance to dissolve in another substance.

Periodic table—a chart that groups the elements by similar properties and structures.

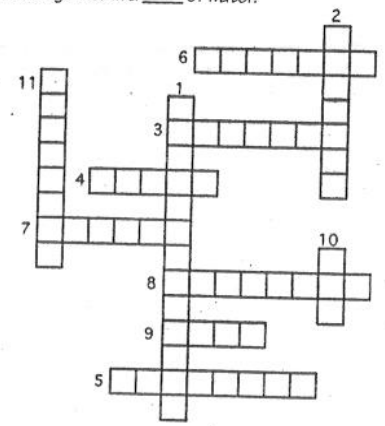
Fill in the crossword puzzle below with the "Words to Know."

ACROSS

3. Carbon is an ___, a substance made of the same type of atoms.
4. Three states of matter are ____, liquid, and gas.
5. When salt is dissolved in water, it forms a ____, a uniform mixture.
6. A carbon dioxide bubble in a soft drink is a ____, the combination of two or more substances that are NOT chemically bonded together.
7. Water is a ____; its molecules are close together but also move around each other.
8. A ____ is anything that uses space and has mass.
9. An ____ is a very, very small particle.

DOWN

1. A chart that groups chemical elements by similar properties is called a ____ ____.
2. A diamond is a ____, a solid that has a regular pattern of atoms.
10. Helium is a ____ because the molecules are very far apart and move very fast.
11. H_2O is the symbol that shows the atoms that are chemically bonded together in a ____ of water.



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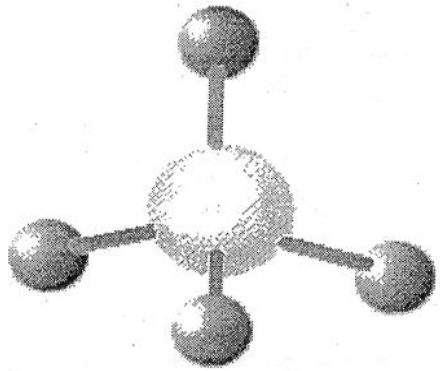
Chem lab

Take-Home Activities



The Nature of Matter

This project funded by the National Science Foundation

Density

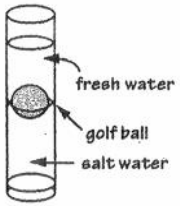
Make a golf ball float!

Materials:

Golf ball
Water
Salt
A tall, thin, transparent container slightly larger than the golf ball, for example, a vase
Food coloring
Mixing container
Stirring spoon
Masking tape
Pen

To do and notice:

1. Fill the tall container half full with water and pour it into the mixing container.
2. Place the golf ball into the mixing container. Notice that it sinks. Stir salt into the water until the ball floats.
3. Take the golf ball out and put it into the tall container. Pour the salt solution into the tall container.
4. Add fresh water to the mixing container. (Add enough to fill the top half of the tall container.) Add 4 drops of food coloring.
5. Slowly add the colored fresh water to the tall container until it is full.
6. With a piece of masking tape and a pen, mark the height of the ball in the container. **Is the golf ball in the same place after several days?**



A closer look:

The golf ball is not as dense as the saltwater. Therefore, the ball floats on top of the saltwater. The colored fresh water is not as dense as the golf ball, so the ball sinks in the colored water. Eventually, the saltwater and the colored fresh water mix. As the waters mix, the ball will sink.

Crystals

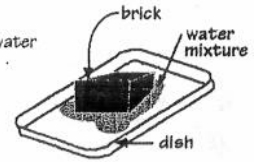
Grow your own garden!

Materials:

Small piece of porous brick or charcoal briquet
1 tablespoon liquid bluing (in the laundry section of a grocery store)
1 tablespoon ammonia
1 tablespoon salt
2 tablespoons water
Small bowl or other mixing container
Shallow dish
Magnifying glass (optional)

To do and notice:

1. Place the brick in the shallow dish.
2. Mix the ingredients in the bowl until they are thoroughly combined.
3. Pour the bluing, ammonia, salt, and water mixture over the brick.



4. Let the dish stand undisturbed for three or four days. Make daily observations. **What do you see? When did crystals appear?** Observe the crystals with a magnifying glass. **What do the crystals look like?**

A closer look:

The brick acts as a wick, soaking up the liquid in the dish. Crystals form as water evaporates from the surface of the brick, leaving the chemicals behind.

Now try this with a different batch:

Add food coloring to the liquid mixture.
Are the crystals colored?

Density and Miscibility

Chemistry you can drink?

Materials:

A tall, clear glass
Ice
Regular 7-Up
Chocolate syrup
Grenadine (optional)
Whipped cream
Maraschino cherry
A straw
Paper, pencil, colore

To do and notice:

1. Carefully add all the edible ingredients, except the maraschino cherry, to the glass and let the glass stand a few moments.

   Which ingredients are miscible (mix together)? Which layers rise to the top? Which settle to the bottom?

2. **On which layer do you think the cherry will float?** Drop it in and see. Draw a picture of the layers in the glass.
3. Stir the glass with the straw and let it stand for a few moments. **Which liquids are miscible? Do they separate?** Now you may drink the contents of the glass!

A closer look:

The miscibility of liquids depends upon the shape and charge of their molecules. Molecules with similar characteristics mix well with each other, while molecules that are very different do not mix.

Density, the relationship between the amount of space between the molecules of a substance and their mass, can be influenced by molecular shape and size. The molecules of a denser liquid, like chocolate syrup, are arranged more compactly than are the molecules of a liquid with less density, like 7-Up. This is why the chocolate syrup sinks to the bottom and the 7-Up rises to the top.