

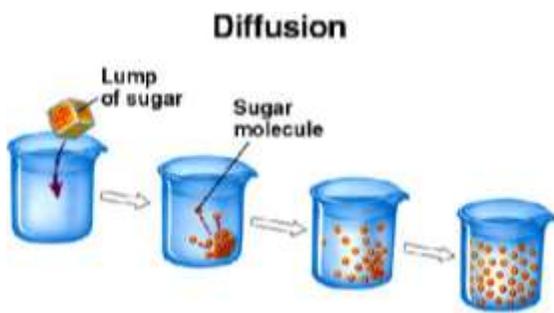
Diffusion, is the mixing of the atoms or molecules of one substance with those of another. It is caused by the natural movements of atoms and molecules because atoms and molecules are ALWAYS in motion. It differs from the mixing caused by stirring or shaking or the blowing of wind.

Diffusion occurs easily in gases and liquids because of the constant and random motion of their atoms and molecules. The process takes place more rapidly in gases than in liquids. Molecules of gases are farther apart and collide less frequently than those of liquids—and collisions among molecules hinder diffusion. In solids, the molecules are arranged in rigid patterns and move very little. Therefore, diffusion does not occur.

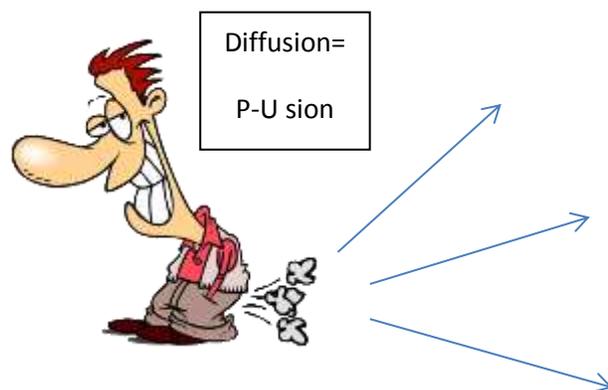
Diffusion can be demonstrated by adding ink to a glass of water. Each molecule of ink has its own constant and random motion. The motion of the ink molecules causes them to spread through the water. The water molecules also move about and become mixed with the ink molecules. After being mixed completely, the molecules of ink and water each continue to move individually. But as a result of diffusion, the color of the mixture becomes the color of the ink.

Many common occurrences involve diffusion. For example, water boiling in an uncovered pot produces steam that disappears. The disappearance results from the diffusion of steam molecules with air molecules. Odors from flowers, food, perfume, and other sources are produced by the diffusion of special gaseous odor molecules with molecules of air.

Molecules and atoms ALWAYS move from areas of high concentration to areas of low concentration. That means they will move out from where there is a lot of atoms, to where is fewer atoms.



Diffusion



Matter can be a solid, a liquid, or a gas

Matter is the substance, or material, from which all things are made. Everything in the world is made of matter. Matter is anything that has weight (mass) and takes up space (volume).

Many kinds of matter are easy to recognize. For example, people recognize gold by its color and sugar by its taste. Matter also has other properties. For example, copper carries electricity, and salt dissolves in water—it seems to disappear.

Matter can be a solid, a liquid, or a gas. A solid, such as a rock, has form. It has its own shape. A liquid, such as water, has no shape of its own, but it can flow. A liquid can take the shape of any container into which it is poured. A gas, such as air, has no shape, either, but it can expand. When a gas is put into a closed container, it spreads out and fills the container.

All matter is made up of atoms. In an element, all the atoms are the same kind. But the atoms of each element are different from the atoms of any other element. When the atoms of two or more elements combine, they form molecules.

My Child Studying for 15 minutes: _____

Gas

Gas is one of the three basic forms of matter. Air itself is a mixture of gases, mainly nitrogen and oxygen. The gases in air have no color or odor. But some gases have a color or an odor, or both. For example, when eggs rot, they give off a gas that smells bad.

A gas, such as oxygen, is made up of tiny bits of matter called *molecules*. The molecules are always moving around and crashing into one another. If the gas is in a container, the moving molecules push against the container's sides. This push is called the pressure of the gas. If gas in a container is heated, the molecules move faster, and the pressure increases.

Liquid

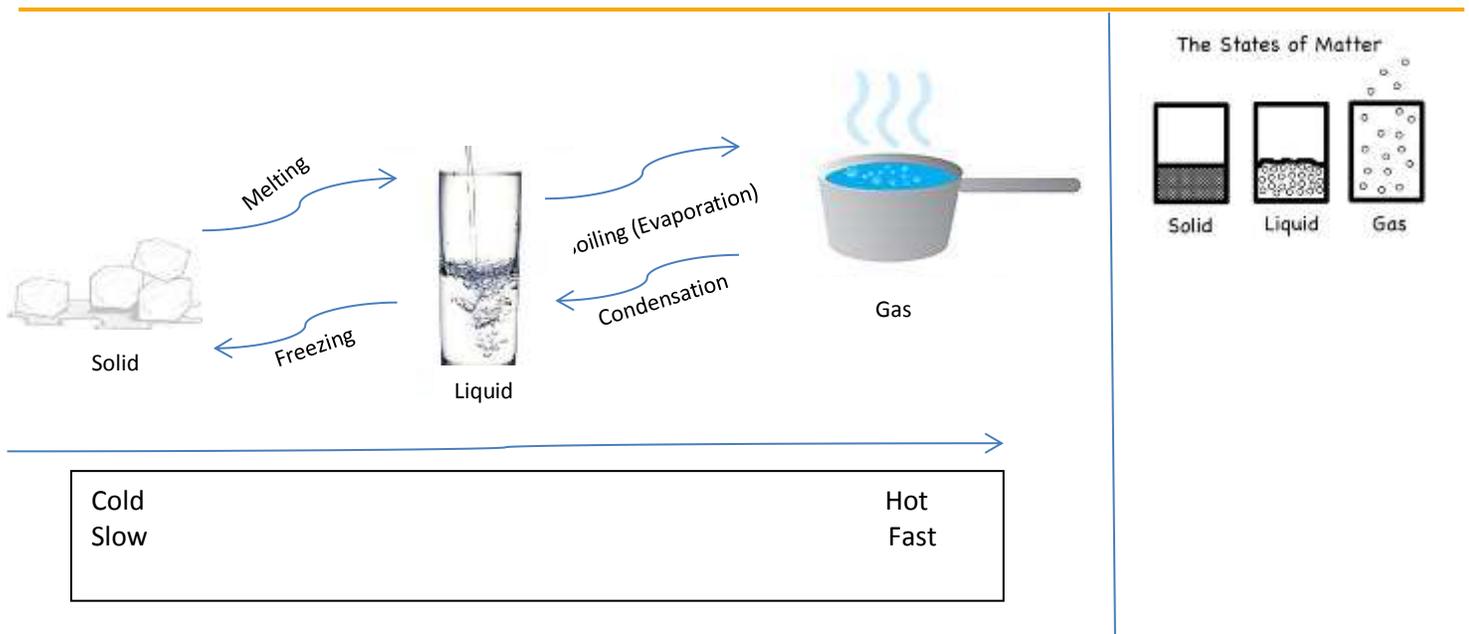
Liquids are one of the three forms that things can take. The molecules in liquids can flow. They are not locked in place like the molecules in solids. So when liquids are poured into a container, they take the shape of the container.

When liquids are heated or cooled, they can change into gases or solids. For example, when water is heated, it changes into steam. The water molecules mix with the air—a gas. When water is frozen, it turns into ice—a solid.

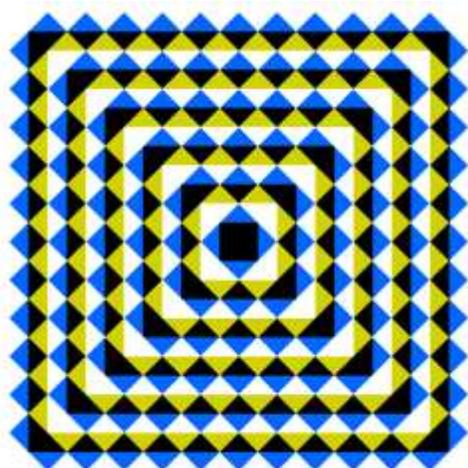
Solid

Solids are one kind of matter—the material that makes up everything in the world. For example, a rock is a solid. It has size and shape, and it can be broken apart.

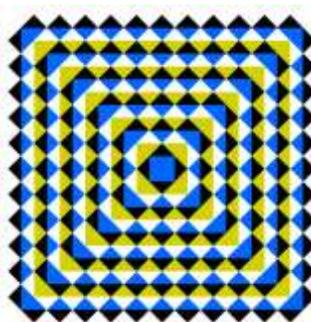
The state of a material changes with its temperature. For example, water changes into a solid when it freezes into ice, and water changes into a gas when it boils into steam.



Expansion



Contraction



Look at these illusions. Expansion happens with molecules become heated. They start to move faster and spread further apart. Remember that expansion=increased volume (the object takes up more space).

Contraction happens when molecules are cooled, (temperature decreased). The molecules slow down and move closer together. Contraction=decrease in volume.

Railroad tracks are built with space inbetween the rails so that in the summer, there is room for expansion of the metal and in the winter, the rails can contract.

Metal doors often get stuck in the doorframe during the summer because the metal expands.

Sidewalks are made with cracks(lines) every few feet to allow for expansion and contraction. If there were no lines, the sidewalks would get lots of cracks and break apart.

Bridges are made so that they can expand in the summer without breaking.

REMEMBER: Molecules themselves to not get bigger or smaller, only the space inbetween them.

Question #27 on the test is:

Pretend you are a particle of water that is being heated. Describe yourself as an ice cube, as water droplet and as water vapor. Be specific regarding molecule motion and the space inbetween molecules.

#28. Describe 2 experiments you could do to show diffusion of particles.