Chapter 3: Lect 1 :States of Matter Name:_____Sci #____ Pd____

BrainPop State of Matter Quiz 1 pt ec printing

1. What is matter? Choose the best answer:
a. Anything that is solid b. Anything that takes up space
c. Anything that has a fixed volume d. Anything that can be seen

2. In what way are liquids different from solids?
a. Liquid molecules are lighter than solid molecules
b. Liquids are made of atoms; solids are made of molecules
c. Liquids don't have a fixed shape, solids do
d. Liquids are always denser than solids

3. What happens to the chemical structure of water when it changes state?
a. Water molecules break apart to form individual atoms
b. Water molecules harden into ice molecules
c. Water molecules melt into gas molecules
d. Nothing happens to the chemical structure

4. What will happen if you keep increasing both the pressure & temperature of a liquid?
a. It will boil b. It will transpire C. It will melt d. It will solidify

5. What do lightning & stars have in common?
a. Both have no electrical charge b. Both contain plasma
c. Both have a fixed volume d.Both contain all 3 states of matter

6. Water's chemical formula is "H2O". What does this mean?
a. Water is composed of hydrogen molecules & oxygen molecules
b. A gram of water contains 20 hydrogen atoms
c. Each water molecule contains 2 hydrogen atoms & 1 oxygen atom
d. Water molecules cannot be split into smaller pieces

7. What is the basic shape of a liquid?
a. A sphere b. the same shape as a gas, only rounder
c. a cube d. Whatever the shape of its container is

8. How can you remove energy from matter?
a. By increasing its volume b. By lowering its temperature
c. by increasing its pressure d. By boiling it

9. Gases have a tendency to expand. What's the best synonym for " expand"?
a. Collide b. Spread out c. Shrink d. Boil

10. Where would you find a Bose-Einstein condensate?
a. inside stars b. at the North Pole c. In a science lan
d. Bose-Einstein condensates exist only in theory

The 5 States of Matter

All matter exists in some sort of physical form or a state of matter. There are 5 states of matter:

1) _____, (2) _____, (3) _____, (4) _____,
(5) Bose-Einstein Condensate (_____)

The Particles are Moving: Matter is made up of little atoms. These are constantly moving and bumping into one another. The state of matter of a substance depends on 2 things: (1) _____ _____ and (2) _____

*** The atoms move very differently**

SOLID	LIQUID	GAS
_____ are solid. The atoms are locked in place and vibrate microscopically. DRAW BELOW	_____ move a little bit more. These atoms can slide past one another, but are still connected. DRAW	_____ are unconnected and shoot all over the place. DRAW BELOW

Solids : The atoms in a solid are tightly packed together. That's why they feel hard - the closer your molecules are, the harder you are. Solids also can hold their own shape. A rock will always look like a rock unless something happens to it. Solids like their shape and don't want to change. **Summary:** Solids have a _____ and hold _____.
There are two types of solids: 1. _____solids 2. _____solids

Crystalline Solids: A crystalline solid has a _____ _____ and 3D arrangement of molecules. Think seats in a movie theater they are all lined up, in rows and columns. **Examples of Crystalline Solids** Salt, Diamonds, Ice, A crystal is a solid that was slowly formed.	**Amorphous solids :** Amorphous solids are made of atoms that are in _____ _____order. Think of going to the beach - you sit wherever there's room. Same thing when you go see a concert in a park. Each person has a spot, but there is no order or _____ **Examples of Amorphous Solids:**Amorphous solids do not have a definite melting point and can exist in two different states: a "rubbery" state, a "glassy" state. Examples: Butter, Rubber, Glass, Wax

Weird Solids: Some substances act like a solid and a liquid. Jello, Peanut Butter, Whole Milk, SLIME! You can spread peanut butter on bread, but peanut butter does not flow, right? It is not a liquid at room temperature. When you make Jello, it is first a liquid. You have to put it in the refrigerator so that it becomes a solid. These yummy forms of matter with properties of a liquid and a solid are called _____.

Flowing Fluids: A _____ is a form of matter that flows when any force is applied, no matter how small. _____are one kind of fluid, _____are another. You have seen water flow from a faucet (or overflow a sink) and felt cool air flow through an open window (or carry the aroma of cooking food into your room).

Lovely Liquids	**How do liquid molecules move?**
A liquid is a substance that has _____ and _____ , but _____ shape. It takes the _____ of its container. Think of what would happen if you knocked this glass of Coke over - It would spread all over the table, onto the floor, all over until it was spread out as far as it could possibly go! But when you pour it into a cup, it fills it up as much as possible.	The molecules in liquid water have more _____ and move around much more than do the molecules in ice. In a liquid, molecules can slide over and around each other. This is how liquids flow and change shape. But the atoms do not have enough energy to completely break their bonds with one another. That is why liquids have _____ volume even though the shape may change. Think of the balls in a ball pit - they spread out as much as they can, to fill the shape of the pit

Liquids have a definite volume

In fact, liquids don't like to change their volume, even if they don't mind changing their shape. Example: it doesn't matter whether you pour a soda into a big glass or small glass, you'll still have the same amount and it'll take up the same amount of space (volume). But think of how hard it would be to force a liquid, or compress it, into a small space.

Two Properties of Liquids	
_____ --The resistance of a liquid to flow. Think of pouring honey (high viscosity) vs. water (low viscosity).	_____ -- The molecules on the surface of a liquid are sometimes so strongly attracted to one another that they form a sheet across the top. This is what lets bugs like water skaters.

Giddy Gases	**How do gas molecules move?**
Gas is everywhere. Our atmosphere is a big layer of gas that surrounds the Earth. Gases are random groups of atoms. In solids, atoms and molecules are compact and close together. Liquids have atoms a little more spread out. However, gases are really spread out and the atoms and molecules are full of energy. They are bouncing around constantly - that's why they're giddy!	Remember, gas atoms and molecules move very quickly. They move so quickly, that they can completely break away from one another. When they break away, they collide and bump into one another constantly. This causes them to spread out as much as they can.

Gases _____ have a definite volume

Gases can fill a container of any size or shape. Think about a balloon - No matter what shape you make the balloon it will be evenly filled with the gas atoms. The atoms and molecules are spread equally throughout the entire balloon. Liquids can only fill the bottom of the container while gases can fill it entirely.

Let's Talk Pressure

A force applied to a fluid creates _____. Pressure acts in _____, not just the direction of the applied force. When you inflate a basketball, you are increasing the pressure in the ball. A pressure of 30 pounds per square inch means every square inch of the inside of the ball feels a force of 30 pounds. This force acts up, down, and sideways in all directions inside the ball. This is also what makes the basketball feel solid, even though it is filled with air.

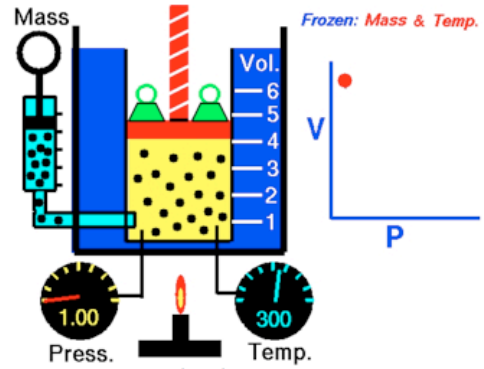
Compare the basketball to the beach ball though. Even though they have the same volume, the basketball has much more air particles compressed into it. This causes a higher pressure, which causes the basketball to feel more solid.

The basketball has a higher pressure than the beach ball because the greater number of particles of gas are closer together. Therefore, they collide with the inside of the ball at a faster rate.

The beach ball has a lower pressure than the basketball because the lesser number of particles of gas are farther apart. Therefore, they collide with the inside of the ball at a slower rate.

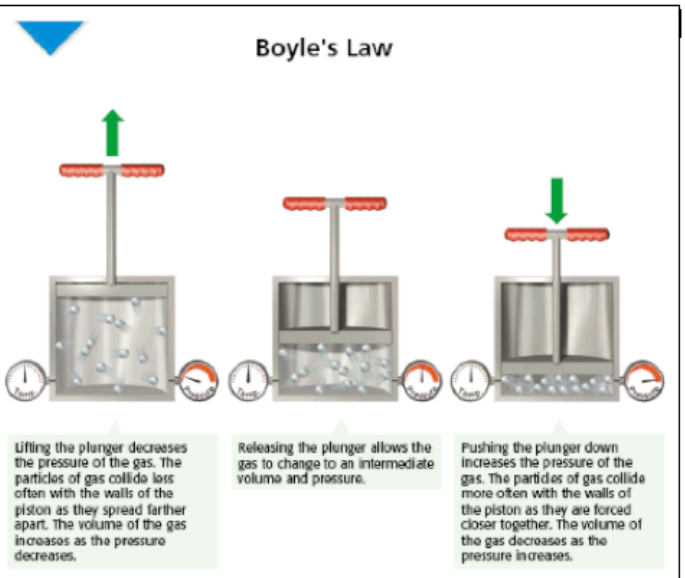
Boyle's Law

Robert Boyle wrote a law that states:
For a fixed amount of gas at a constant temperature, the volume of the gas increases as its pressure decreases.



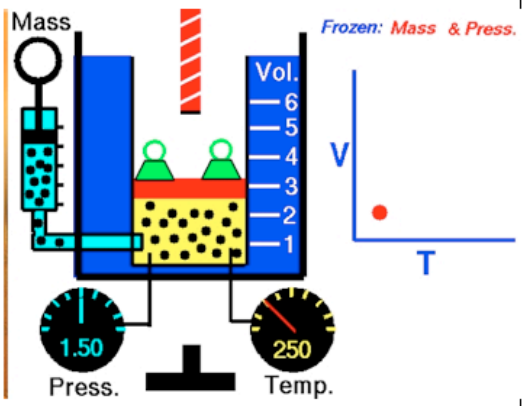
_____ = constant

↑Pressure then ↓Volume or
↓Pressure then ↑ Volume



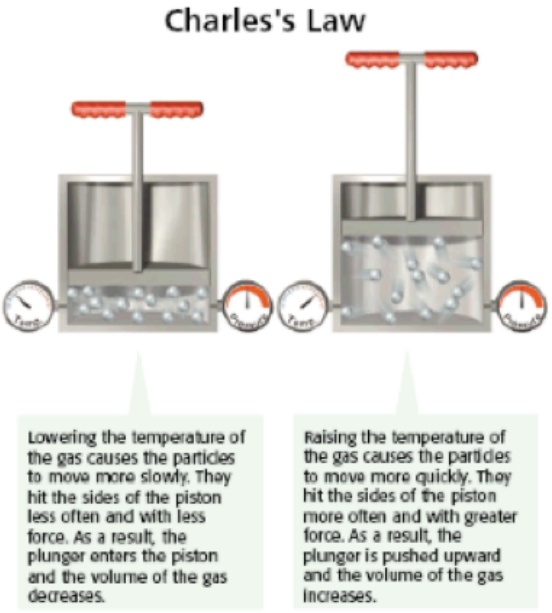
Charles's Law

Jacques Charles wrote a law that states:
For a fixed amount of gas at a constant pressure, the volume of the gas increase as its temperature increases.



_____ = constant

↑Volume then ↑ Temperature
↓Volume then ↓Temperature



Pulsating Plasmas

The 4th state of matter, plasma is matter that does not have a definite _____ or _____ and whose particles have broken apart. Plasma is an _____ _____, a gas into which sufficient energy is provided to free electrons from atoms or molecules and to allow both species, ions and electrons, to coexist. In other words, a plasma is a _____ that has _____ running through it.

Plasmas are the _____state of matter in the universe. Plasma occurs naturally and makes up the stuff of our sun, the core of stars and occurs in quasars, x-ray beam emitting pulsars, and supernovas. On Earth, plasma is naturally occurring in _____, _____, and the _____ (northern & southern lights). Artificial plasmas include fluorescent lights.

A fifth state of matter?

The _____ state of matter was the only one created while your parents were alive. In 1995, two scientists, Cornell and Weiman, finally created the condensate. When you hear the word condensate, think about _____ and the way gas molecules come together and condense and to a liquid. The molecules get denser or packed closer together. Two other scientists, Satyendra Bose and _____, had predicted it in the 1920s, but they didn't have the equipment and facilities to make it happen at that time. Now we do. If plasmas are super hot and super excited atoms, the atoms in a Bose-Einstein condensate (BEC) are total opposites. They are super unexcited and super cold _____

	Solid	Liquid	Gas
3D Model			
Shape			
Volume			

Review Drawing:

Video Notes Section:

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