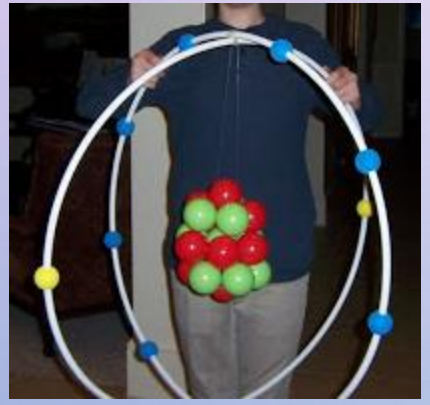
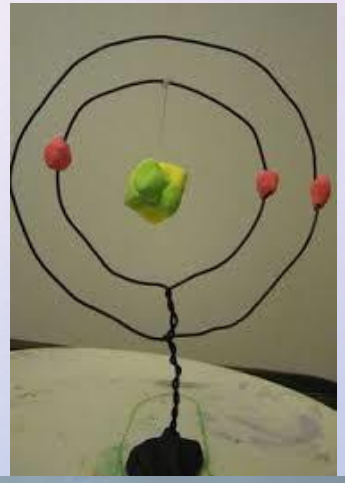
S8P1C. STATES OF MATTER

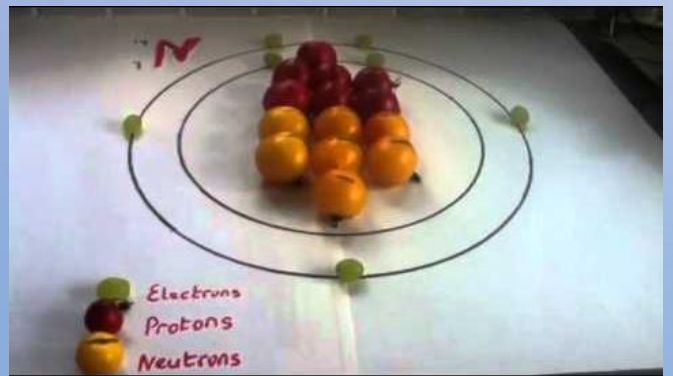
E.Q. WHAT ARE THE STATES OF MATTER? WHAT ARE THE CHARACTERISTICS OF EACH STATE OF MATTER?

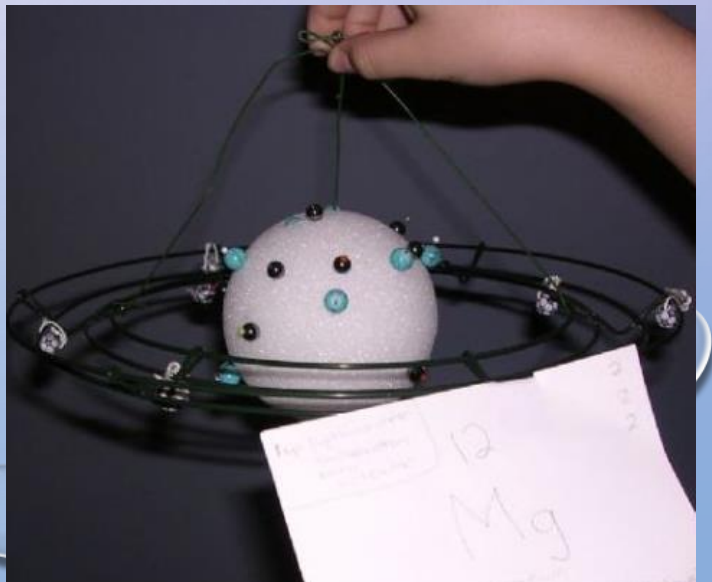
BE CREATIVE!!!

- ATOMIC MODEL PROJECT
- MIXTURES VS. SUBSTANCES TASK DUE BY FRIDAY, NOVEMBER 6TH
- THOSE WHO NEED TO COMPLETE LAB QUESTIONS NEED TO SEE ME ON TUESDAY DURING FIRST PERIOD. FINAL GRADES WILL BE GIVEN ON WEDNESDAY IN CLASS.
- PICTURES OF PROJECTS:







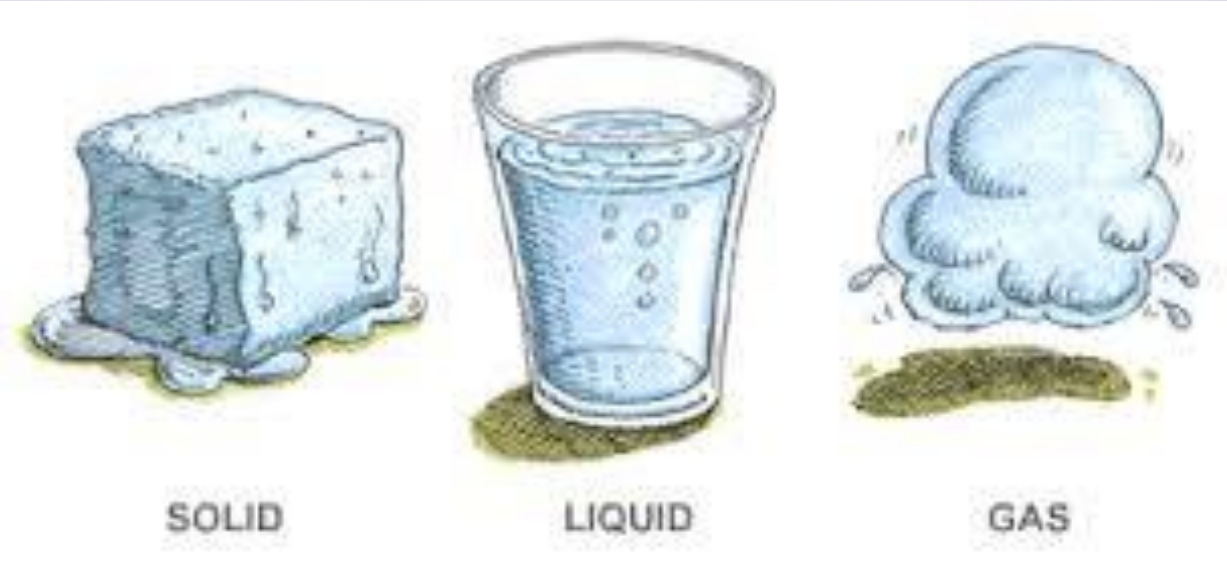


STATES OF MATTER NOTES

SUBSTANCES CAN EXIST AS ANY STATE OF MATTER.

WATER CAN BE FROZEN, WATER VAPOR, OR IN LIQUID FORM.

EVEN THOUGH THEY ARE THE SAME SUBSTANCE AND IN DIFFERENT FORMS, THEY EACH HAVE DIFFERENT PHYSICAL QUALITIES.



STATES OF MATTER

- **ALL MATTER IS MADE OF PARTICLES THAT ARE ALWAYS MOVING AND ARE ARRANGED DIFFERENTLY IN EACH STATE OF MATTER. <u>THERE ARE 3 GENERAL STATES OF MATTER THAT EXISTS ON EARTH:</u>**
- **<u>SOLID</u>**
- **<u>LIQUID</u>**
- **<u>GAS</u>**

NOTE: PARTICLE IS A WORD TO DESCRIBE SMALL THINGS OR THE SMALLEST BITS OF MATTER WHICH IN TURN ARE “ATOMS”.

SIMULATION

SIMULATION SHOWING PARTICLE ARRANGEMENT OF EACH STATE OF MATTER

HTTPS://PHET.COLORADO.EDU/EN/SIMULATION/STATES-OF-MATTER

QUESTIONS:

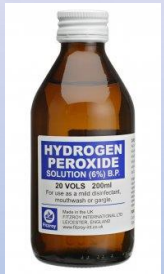
1. WHAT DO YOU NOTICE ABOUT SOLIDS?
2. WHAT DO YOU NOTICE ABOUT LIQUIDS?
3. WHAT DO YOU NOTICE ABOUT GASES?

LOOK AT EACH EXAMPLE BELOW. DESCRIBE HOW THE PARTICLES (ATOMS) ARE ARRANGED ON A MOLECULAR LEVEL.

A. (LIQUID- HYDROGEN PEROXIDE)

B. (SOLID- SILVER)

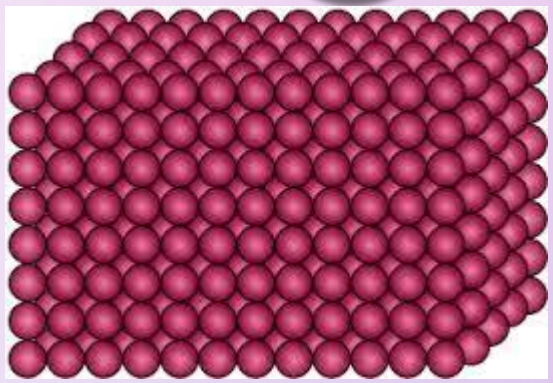
C. (GAS- NITROGEN OR SULFUR)



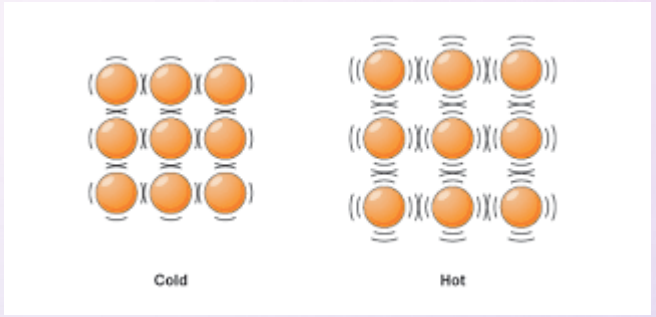
OUT OF ALL 4 STATES OF MATTER, WHICH ONE NATURAL HAS THE HIGHEST KINETIC ENERGY?

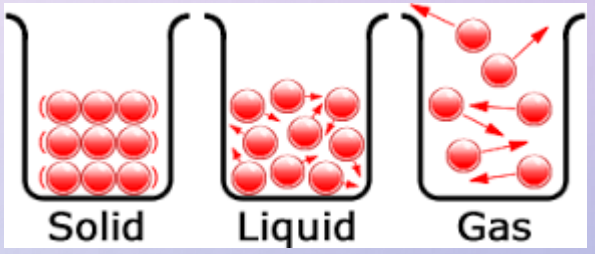
WHY DO YOU THINK IT HAS SUCH A HIGH AMOUNT OF KINETIC ENERGY?

SOLIDS

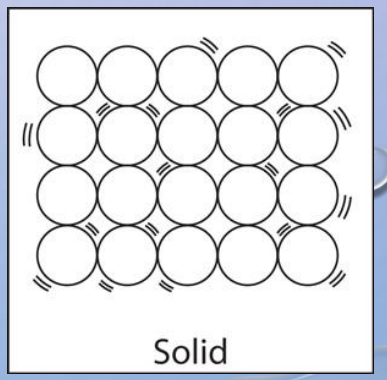


- **HAVE A DEFINITE SHAPE (MAINTAINS SHAPE) AND A DEFINITE VOLUME (AMOUNT OF SPACE MATTER TAKES UP/OCCUPIES)**
- **THE PARTICLES OF A SOLID ARE PACKED VERY CLOSELY TOGETHER (IN A PATTERN OR CRYSTAL FORMATION).**
- **PARTICLES VIBRATE, BUT DON'T SLIP PAST EACH OTHER.**
- **SO, WHY DO SOLIDS MAINTAIN A DEFINITE SHAPE AND VOLUME.**



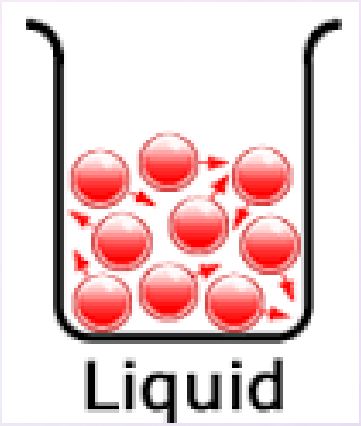


The particles don't move causing the solid to maintain It's shape and volume.



LIQUIDS

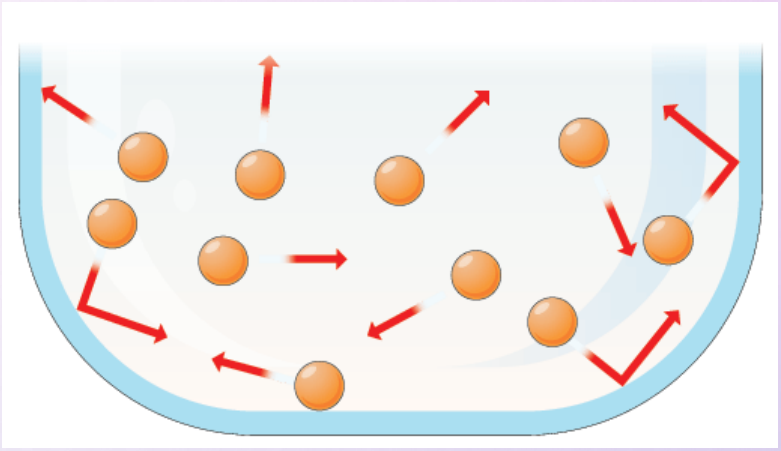
- **THE PARTICLES ARE IN CONTACT WITH EACH OTHER.**
- **THE PARTICLES CLOSE, BUT MOVE QUICKLY ENOUGH TO MOVE AROUND EACH OTHER**
- **LIQUIDS DOES NOT HAVE A DEFINITE SHAPE, BUT DOES HAVE A DEFINITE/FIXED VOLUME.**
- **SO, WHY DON'T LIQUIDS HAVE A DEFINITE SHAPE?**



The particles can move around each other causing the liquid to take the shape of any container.

GAS

- **PARTICLES ARE WIDELY SEPARATED AND MOVE AT GREAT SPEEDS.**
- **TAKE THE SHAPE OF THE CONTAINER AND THE VOLUME OF THE CONTAINER.**
- **WITHOUT A CONTAINER, PARTICLES DON'T HAVE A FIXED SHAPE NOR FIXED VOLUME.**

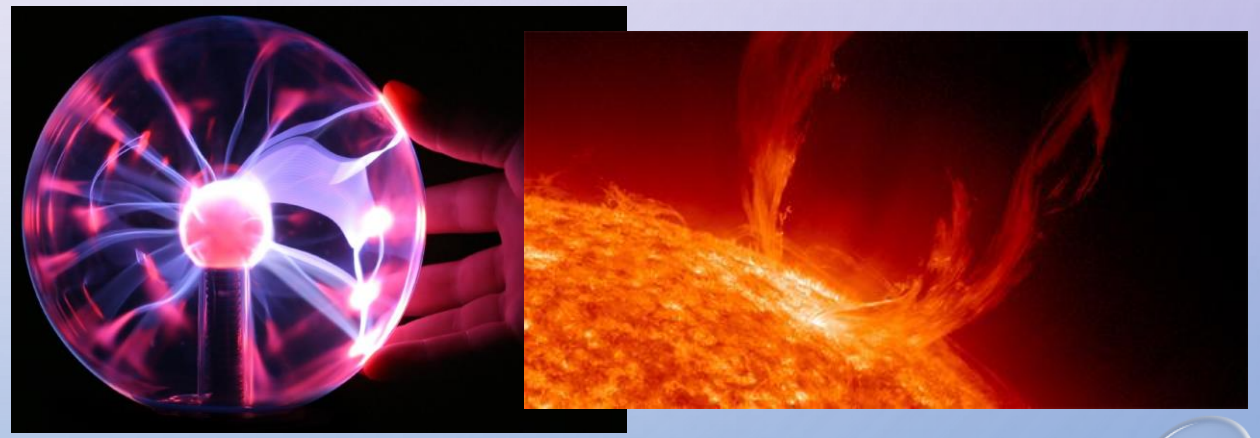


The volume changes depending on the volume of the container.

PLASMA

- IT IS ELECTRICALLY CHARGED GAS
- DOES NOT HAVE A DEFINITE VOLUME NOR SHAPE.
- FORMS AT VERY HIGH TEMPERATURES (TEMPERATURE IN STARS).
- AT HIGH TEMP, ATOMS COLLIDE WITH GREAT FORCE. THE FORCE ALLOWS THE ELECTRONS TO OVERCOME THE ATTRACTIVE FORCE BETWEEN THE PROTONS.
- THE RESULT, LOOSE ELECTRONS AND POSITIVELY CHARGED IONS THAT MAKES PLASMA ABLE TO CONDUCT ELECTRICITY!
- COMMON IN SPACE, BUT RARE ON EARTH (EXISTS IN LIGHTNING BOLTS AND IN SOME LIGHTBULBS)

The least amount of force is between the particles

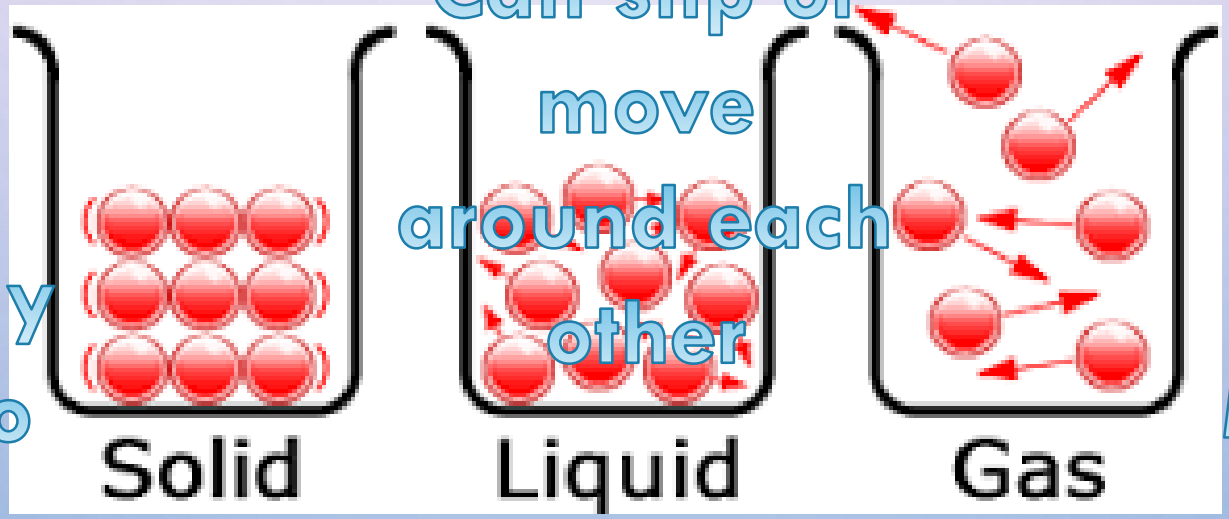


COOL VIDEO ABOUT PLASMA!

HTTPS://WWW.YOUTUBE.COM/WATCH?V=AVEGJZXGLIG

WHAT ARE THE MAIN DIFFERENCES BETWEEN THE FORMS OF MATTER?

- DISTANCE BETWEEN THE PARTICLES
- MOTION OF THE PARTICLES



Extremely close; no space vibrates

Little space Can slip or move around each other

Far apart Moves fast in various directions

INQUIRY LAB QUESTIONS

1. DESCRIBE THE NATURAL STATES OF EACH FORM OF MATTER (SOLID, LIQUID, GAS). BE SURE TO INCLUDE THE DISTANCE BETWEEN THE PARTICLES AND THE MOVEMENT OF PARTICLES.
2. IS THERE ANY RELATIONSHIP BETWEEN THERMAL ENERGY AND KINETIC ENERGY OF THE PARTICLES FOUND IN MATTER? IF SO, HOW DO THEY RELATE?
3. WHAT OCCURS ON A MOLECULAR LEVEL AS MATTER BEGINS TO BOIL?
4. WHAT OCCURS ON A MOLECULES LEVEL AS MATTER FREEZES?

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THE HIGHER THE TEMPERATURE >>>>>THE MORE ENERGY IS GAINED>>>> THE FASTER THE PARTICLES MOVE

THE LOWER THE TEMPERATURE>>>> THE LESS ENERGY AVAILABLE>>> THE SLOWER THE PARTICLES MOVE

WHAT CAUSES MATTER TO CHANGE FORM?

THERMAL ENERGY AFFECTS PARTICLE MOVEMENT

- PARTICLES OF A SUBSTANCE ARE ALWAYS MOVING AND MOVE EVEN MORE WHEN IT'S WARMER (KINETIC ENERGY= ENERGY IN MOTION).
- TEMPERATURE IS A MEASURE OF THE AVERAGE KINETIC ENERGY OF THE PARTICLES IN A SUBSTANCE.
- THE FASTER PARTICLES MOVE= HIGHER THE TEMPERATURE.
- THE SLOWER PARTICLES MOVE= LOWER THE TEMPERATURE.
- HTTPS://WWW.YOUTUBE.COM/WATCH?V=KCL8ZQJXBME

MATTER CAN CHANGE PHYSICALLY

- CHANGING STATES: OCCURS WHEN MATTER CHANGES FROM A SOLID, LIQUID OR GAS.
- THERMAL ENERGY (HEAT) MUST BE ABSORBED OR RELEASED BY MATTER.

- THINK PAIR SHARE

IS ENERGY GAINED OR LOST WHEN A SOLID CHANGES TO A LIQUID?

IS ENERGY GAINED OR LOST WHEN A LIQUID CHANGES TO A GAS?

IS ENERGY GAINED OR LOST WHEN A GAS CHANGES TO A LIQUID?

IS ENERGY GAINED OR LOST WHEN A LIQUID CHANGES TO A SOLID?

ENERGY LOST OR GAINED

- SOLIDS GAIN OR ABSORBS ENERGY FROM HIGH TEMPERATURES
- THE PARTICLES MOVE FASTER CAUSING THE BONDS TO BREAK BETWEEN THEM CHANGING IT INTO A LIQUID.
- LIQUIDS GAIN/ABSORB ENERGY FROM HEAT. THE PARTICLES MOVE EVEN FASTER CHANGING IT TO A GAS.
- ENERGY IS LOST/RELEASED FROM PARTICLES IN A GAS WHEN THERMAL ENERGY IS LOW (COOLER) AND IT CHANGES TO A LIQUID.
- ENERGY IS LOST/RELEASED FROM PARTICLES IN A LIQUID AS LESS THERMAL ENERGY IS PRESENT (COLD) AND IT CHANGES TO A SOLID.