Jasmeen / Sara / Astar

Experiment # 4: States Of Matter

18.5
20

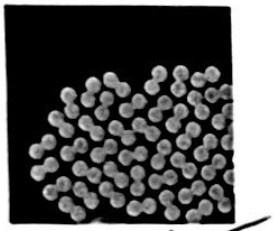
Introduction

The kinetic theory describes matter as a large number of small particles (atoms or molecules), all of which ar constant, random motion. The rapidly moving particles constantly collide with each other and/or with the walls of t container. Kinetic theory explains properties such as pressure, temperature, viscosity, thermal conductivity, and vol

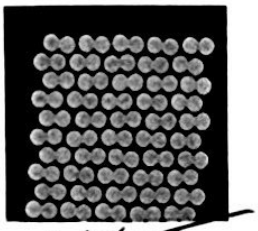
In this activity, you will demonstrate the properties of various types of matter. The demonstration will allow change forms of matter, amounts of matter, temperature, and pressure.

Procedure

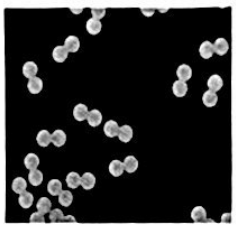
1. Identify the following as either a solid, liquid, or a gas?



liquid



solid



Gas

2. Go to the following website : https://phet.colorado.edu/en/simulation/states-of-matter
3. Click on "Run Now! Then Click on the tab that is labeled "Solid, Liquid, Gas.

Part one: (describe the states of matter)

1. Use the menu on the right side of the program to select **Water and Solid**. Draw and describe what you see in the space below.

Diagram	Description
	tightly packed, in a regular pattern vibrate, but do not move from place to place.

2. Now, use the slider on the bottom of the program to Add Heat. Notice the thermometer at the top of the program.

3. What happens to the water as you increase the temperature? It takes the shape of the pot that is placed in it. the energy increases and the spacing increases

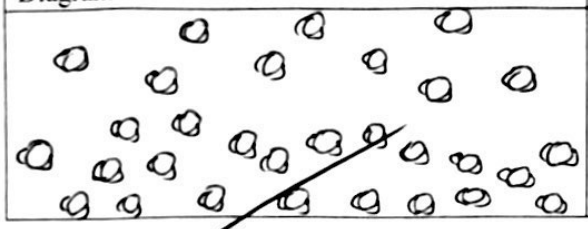
4. What is the melting/freezing point of water in Kelvin? 273 K

5. Draw and describe what water looks like as a liquid.

Diagram	Description
	close together with no regular arrangement. vibrate move about and slide past each other

6. What is the boiling/condensation point of water in Kelvin? 373 K

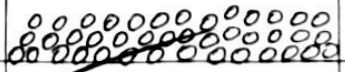
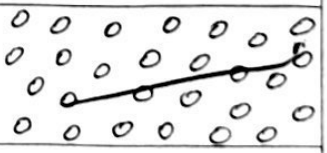
7. Draw and describe what water looks like as a gas.

Diagram	Description
	well separated with no regular arrangement. vibrate and move freely at high speeds

Now: Choose one of the other three substances listed in the menu on the right. Investigate what happens when you add and remove heat from this substance. Use the buttons on the right to see this substance as a solid, liquid, and gas. Draw and describe its properties in the table below.

-Substance Selected: Neon

- Its Melting Point: 24.56 K
-Its boiling point: 27.07 K

	Solid	Liquid	Gas
Diagram of molecules			
Sentence explaining how molecules are moving.			

X

Part two: (temperature and kinetic energy)

1. Using Neon, choose a solid state of matter, record the temperature.
   Temperature : 14 K

- increase the temperature, record the temperature.
  Temperature : 24 K

- decrease the temperature, record the temperature.
  Temperature : 30 K

- Describe what happens to kinetic energy of the molecules when temperature increases. What type of relationship exists between kinetic energy and temperature? (direct or inverse)

when the temperature increases, the ~~Kinetic energy~~ the neon molecules increases, ~~and~~ thus the divergence between the molecules increases, so they shift from the solid state to the liquid state, and from the liquid state to the gas.

Part three: (phase changes)

** **Now** Click on the tab that is labeled "**Phase Changes**".

1. Using **Oxygen**, record the initial pressure(0 atm) Then, push the finger down on the container until the oxygen becomes distorted. If you go too far with the finger, click on reset and try again.

- What is happened to the pressure and the temperature when the volume is decreased?

when we reduced the volume, the pressure increased and thus the kinetic energy of the molecules ~~increased~~ and the temperature increased.

- How does this affect the movement of the molecules?

The molecules became more distant.

Click on Reset.

2. Using **Oxygen**, **heat** up the container and record the temperature (100k) and pressure ( ) without changing the container size. Click on Reset.
Then , **cool** down the container and record the temperature (5k) and pressure (0atm without changing the container size.

-What will happen to the pressure if the temperature is increased?

increased

- What will happen to the pressure if the temperature is decreased?

decreased

- As the temperature increases, which state of matter are the molecules in?

gas → I became distant and increases the kinetic energy.

- As the temperature decreases, which state of matter are the molecules in?

solid → I became closer and ~~increased~~ decreased the kinetic energy.

X - How can you use the movement of molecules to determine when a phase change has occurred?

3. Label the following phase diagram as shown on the simulation.