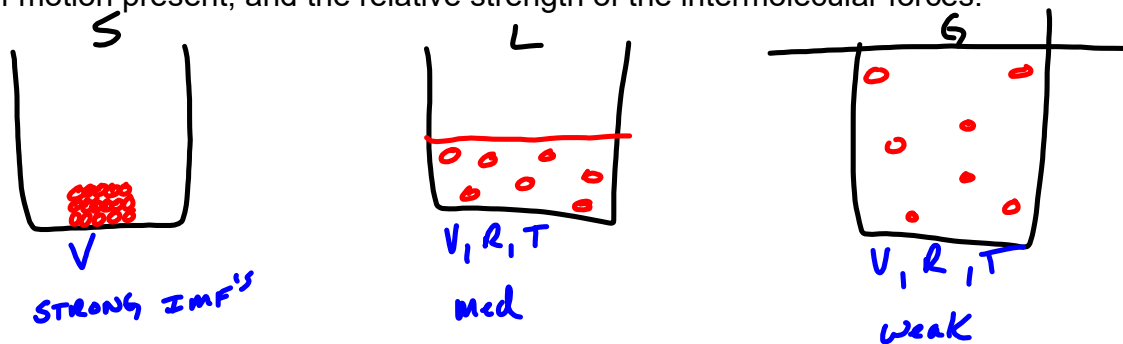


1. States of Matter Vibration, Rotational, Translation

Draw a diagram of each of the three states of matter at the particle level. Indicate the type of motion present, and the relative strength of the intermolecular forces.



2. States of Matter

1. How does a hot air balloon work?

Warm air is less dense than cold air - molecules move faster
at spread out (overcome IMF'S)

2. What state(s) would water be in if it is at the following temperatures:

- a) -10 C Solid
- b) -0.01 C Solid
- c) 0 C Solid/Liquid
- d) +0.01 C Liquid
- e) 50 C Liquid
- f) 99 C Liquid
- g) 100 C Liquid/gas
- H) 101 C gas

3. Applications

1. How does a thermometer work? Explain using the KMT

Add energy \rightarrow molecules move faster, overcome IMF's
& spread out

2. A sealed bag of chips will expand when heated. Explain using the KMT.

molecules move faster, overcome IMFs, spread out
& collide w Bag more often

4. Changes of State

1. Identify the following changes of state as either ^{heat out} EXOTHERMIC or ENDOTHERMIC

heat in
a) Freezing **exo**

b) melting **endo**

c) boiling **endo**

d) condensing **exo**

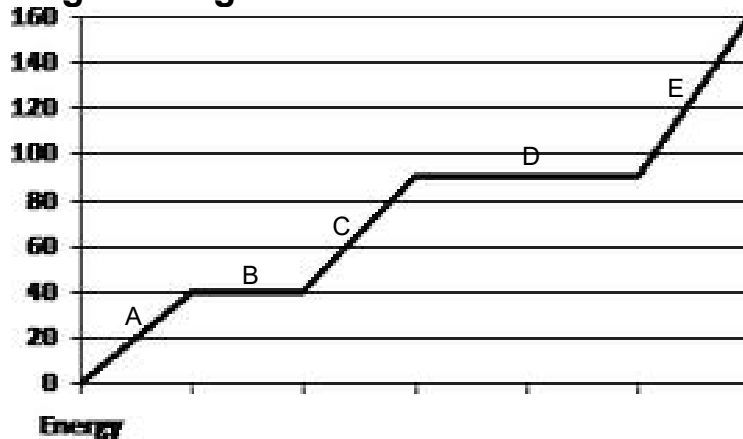
2. Define the following:

a) Sublimation **S \rightarrow G (endo)**

b) Deposition **G \rightarrow S (exo)**



5. Heating/Cooling Curves



Answer the following for the heating curve above:

a) Freezing point = 40°C

b) Boiling point = 90°C

c) Identify the state(s) present at each of the labelled regions on the curve:

A = S B = S/L C = L D = L/G E = G

6. Changes of State

1. EXPLAIN WHY a pot of boiling water stays at 100 degrees Celsius, even if the stove is still heating it.

* $\pi r q$ is being used to overcome IMFs

* Change of state \rightarrow high energy molecules escape

2. What does the term NORMAL boiling point mean?

Temp at which a substance boils
at std. pressure

7. Changes of State

1. What must be true for a liquid to boil? (note: nothing to do with temperature)

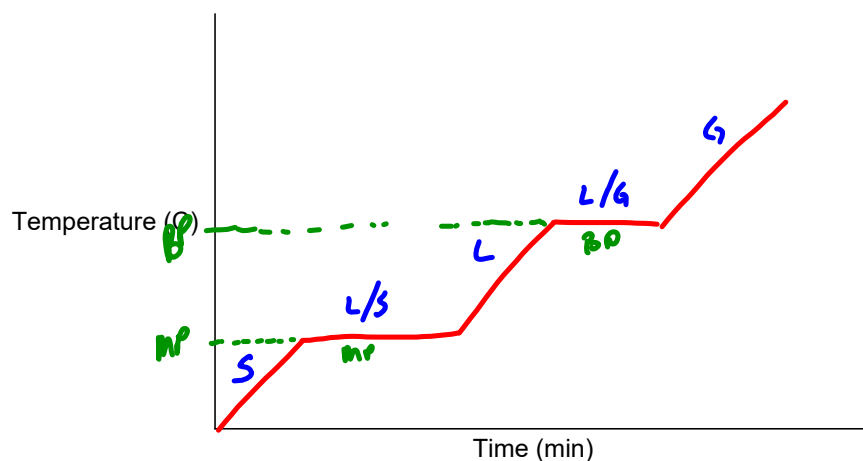
$$P_{\text{VAP}} \geq P_{\text{ATM}}$$

2. Some liquids evaporate faster than others, even at the same temperature. Why?

↳ weaker IMFS (need less nrg to escape)

8. Heating Curve

Sketch a heating curve for some solid as it changes to a gas. Label all the state(s) along the curve, and identify the melting and boiling points



9. Cooling Curve

Sketch a **Cooling curve** for some gas as it changes to a solid. Label all the state(s) along the curve, and identify the melting and boiling **points**

