Jeopardy

Chemistry Review for Quiz 2

Kinetic Theory	States of Matter	Phase Change	Distillation & Pressure	H_2O & D=M/V
100	100	100	100	100
200	200	200	200	200
300	300	300	300	300
400	400	400	400	400
500	500	500	500	500

Question 1 - 100

- When heated an increase in the kinetic energy of a substance causes the particles to

a. move _____,
b. collide more _____ with one another which then
c. causes volume to _____.

Answer 1 – 100

a. move faster

b. collide more frequently

c. volume increases

Question 1 - 200

- In the **solid state** of matter, the **<u>kinetic energy</u>** of the particles composing the substance is _____.
- The forces of attraction hold the particles in _____.
- Therefore, a solid has a _____ shape _____ volume.

1min

Answer 1 – 200

- In the **solid state** of matter, the **kinetic energy** of the particles composing the substance is **low**.
- The forces of attraction hold the particles in **fixed positions**.
- Therefore, a solid has a **definite** shape **definite** volume.

Question 1 - 300

- According to the Kinetic Molecular Theory of Matter, the state or phase of a substance is determined by the interaction of two opposing influences. What are they?

Answer 1 – 300

- Kinetic Energy and Forces of Attraction

Question 1 - 400

In the liquid state of a substance, the kinetic energy of the particles is _____.

Collisions between particles prevent _____ of _____ from holding them in fixed positions. Particles are free to move about relative to one another. Liquids have a _____ volume, and _____ shape.

1min

Answer 1 – 400

In the liquid state of a substance, the kinetic energy of the particles is **moderate**.

Collisions between particles prevent **forces** of **attraction** from holding them in fixed positions. Particles are free to move about relative to one another. Liquids have a **definite** volume, and **indefinite** shape.

Question 1 - 500

- In the gas state of a substance, the kinetic energy of the particles is _____. The collisions between the particles are high energy causing them to fly apart. Forces of attraction are _____ or _____ overcome all together. Therefore a gas has _____volume and _____ shape.

Answer 1 – 500

- In the gas state of a substance, the kinetic energy of the particles is **high**. The collisions between the particles are high energy causing them to fly apart. Forces of attraction are **weak** or **completely** overcome all together. Therefore a gas has **indefinite** volume and **indefinite** shape.

Question 2 - 100

- _____ A measure of the average kinetic energy of the particles making up a sample of matter.

Answer 2 – 100

- Temperature A measure of the average kinetic energy of the particles making up a sample of matter.

Question 2 - 200

- _____ Particles in a gas move at different speeds and in many different directions. The forces of attraction are weak and kinetic energy is strong as particles collide and rebound off one another constantly. However, if the temperature is decreased and the substance can cool, while having a surface to settle on, this phase change can occur.

Answer 2 – 200

- Condensation

Question 2 - 300

- _____ Molecules in a liquid have several forces influencing them. In addition to atomic forces of attraction, atmospheric pressure and gravity often pin them in place and resist this phase change from occurring. Despite these forces, some particles at the surface may gain just enough kinetic energy to overcome the forces of attraction that keep them together in the liquid state.

Answer 2 – 300

- Evaporate Molecules in a liquid have several forces influencing them. In addition to atomic forces of attraction, atmospheric pressure and gravity often pin them in place and resist this phase change from occurring. Despite these forces, some particles at the surface may gain just enough kinetic energy to overcome the forces of attraction that keep them together in the liquid state.

Question 2 - 400

- As the average energy (temperature) of particles decreases, the space between the particles does this _____.

This can occur to any of the states of matter; solids liquids or gases. Increasing pressure has this effect on gases in particular as well.

This is called _____.

Give a class example of a solid doing this _____

Give a class example of a liquid doing this _____

Answer 2 – 400

- As the average energy (temperature) of particles decreases, the space between the particles does this decreases.

This can occur to any of the states of matter; solids liquids or gases. Increasing pressure has this effect on gases in particular as well.

This is called contraction.

Give a class example of a solid doing this ring and ball

Give an example of a liquid doing this thermometer

Question 2 - 500

Regardless of the state of matter; solid, liquid or gas, the forces of attraction between the particles that make it up are a _____.

What factor is it that ultimately determines the state of matter?

_____.

Answer 2 – 500

Regardless of the state of matter; solid, liquid or gas, the forces of attraction between the particles that make it up are a **constant**.

What factor is it that ultimately determines the state of matter?

Kinetic Energy

Question 3 - 100

- _____ As a solid is heated, the kinetic energy of its particles increases. The particles vibrate faster and faster until the forces of attraction can no longer hold on. Forces of attraction are weakened and molecules start to move freely around one another.

Answer 3 – 100

- **Melting** As a solid is heated, the kinetic energy of its particles increases. The particles vibrate faster and faster until the forces of attraction can no longer hold on. Forces of attraction are weakened and molecules start to move freely around one another.

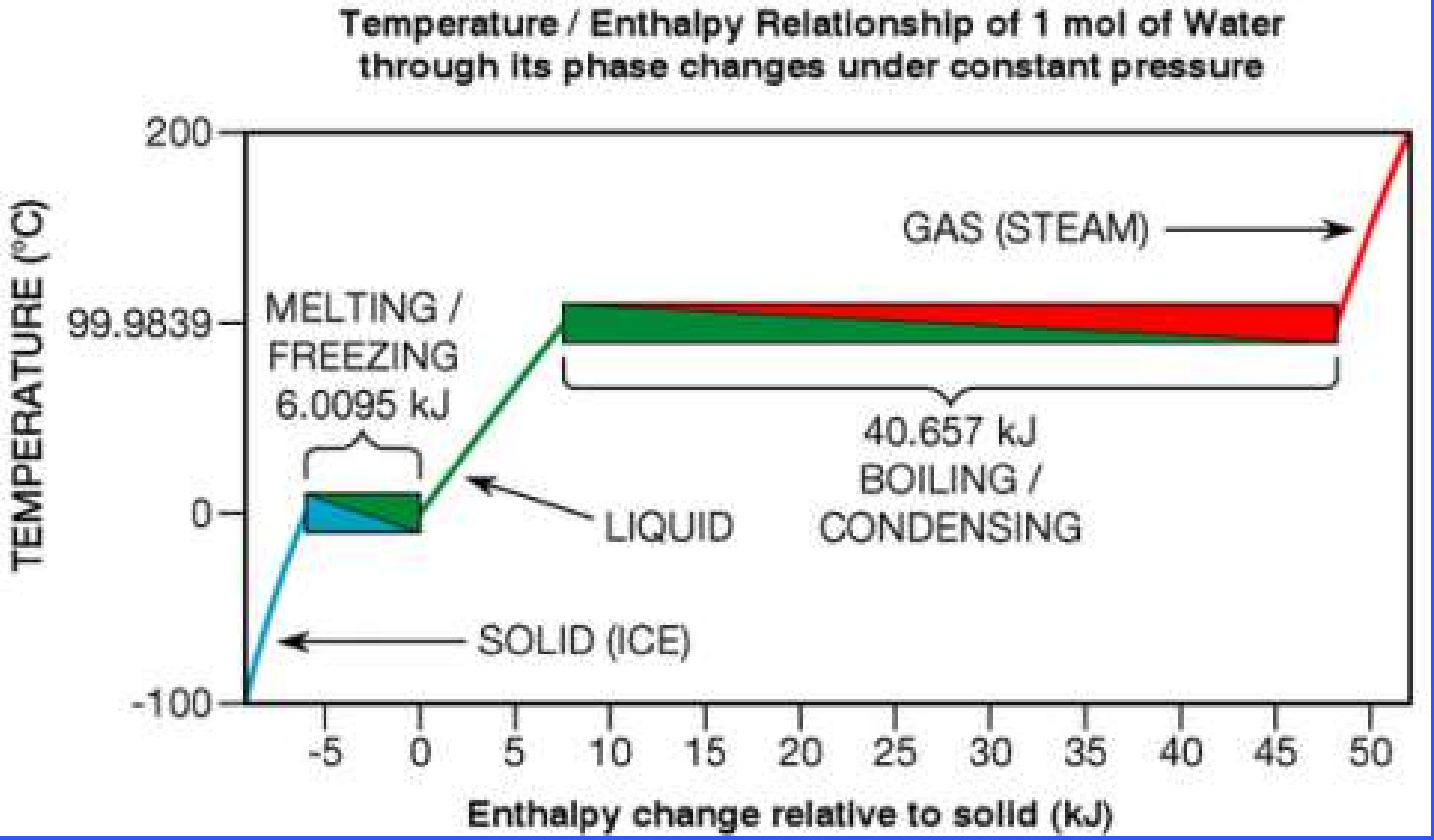
Question 3 - 200

- _____ As the temperature of a liquid decreases, the kinetic energy of its particles decreases. The slower moving particles collide off each over with less and less frequency. Forces of attraction start to overcome motion and particles, become fixed in their relative positions.

Answer 3 – 200

- **Freezing** As the temperature of a liquid decreases, the kinetic energy of its particles decreases. The slower moving particles collide off each over with less and less frequency. Forces of attraction start to overcome motion and particles, become fixed in their relative positions.

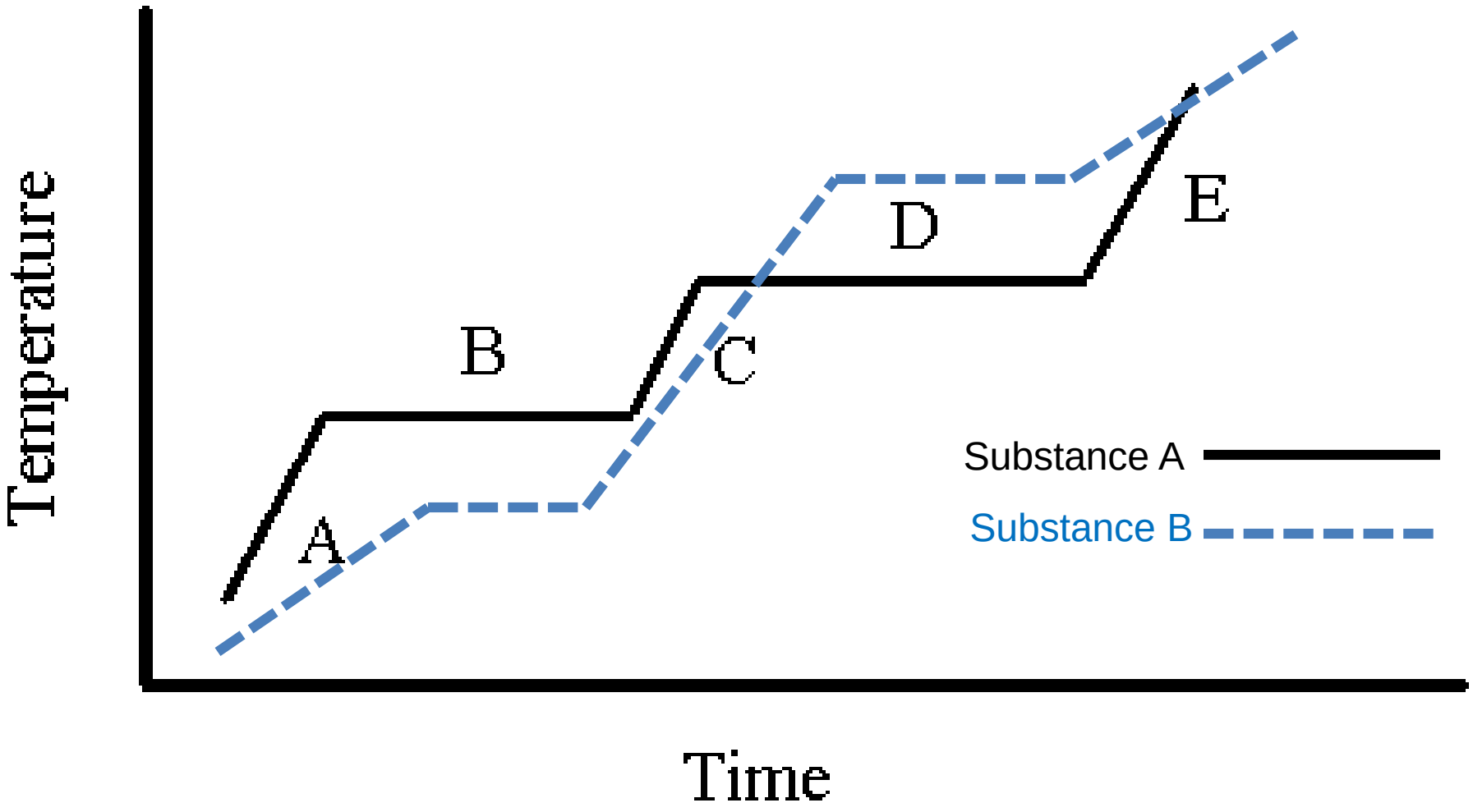
Question 3 – 300 see next slide



Answer 3 – 300

- Describe the energy requirements to change H_2O from a solid to a liquid, verses changing the same quantity from a liquid to a gas.

Question 3 – 400 Describe the phase change properties of substance B in respect to substance A.



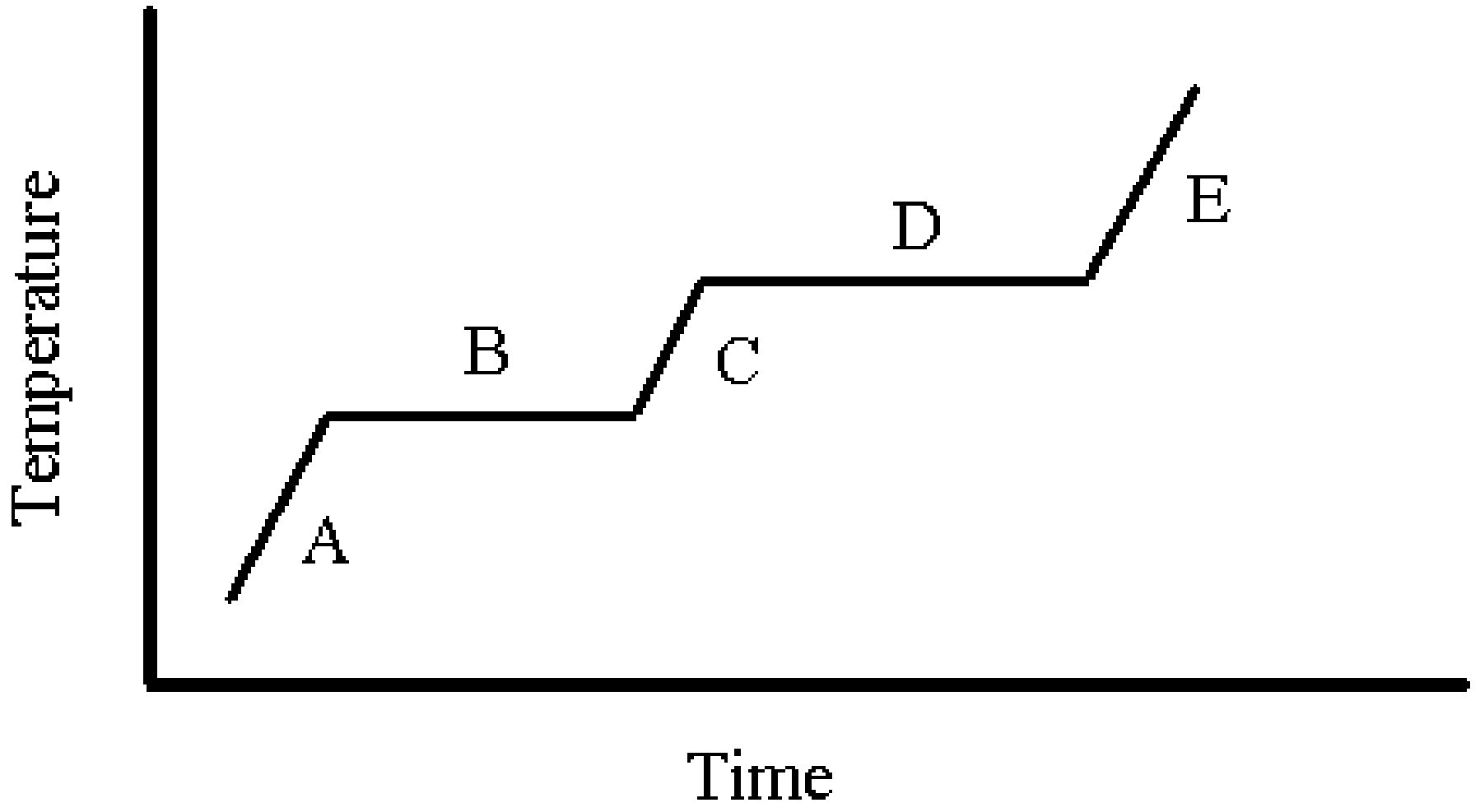
Answer 3 – 400

Substance B has a lower melting/freezing pt and higher boiling/ condensation pt.

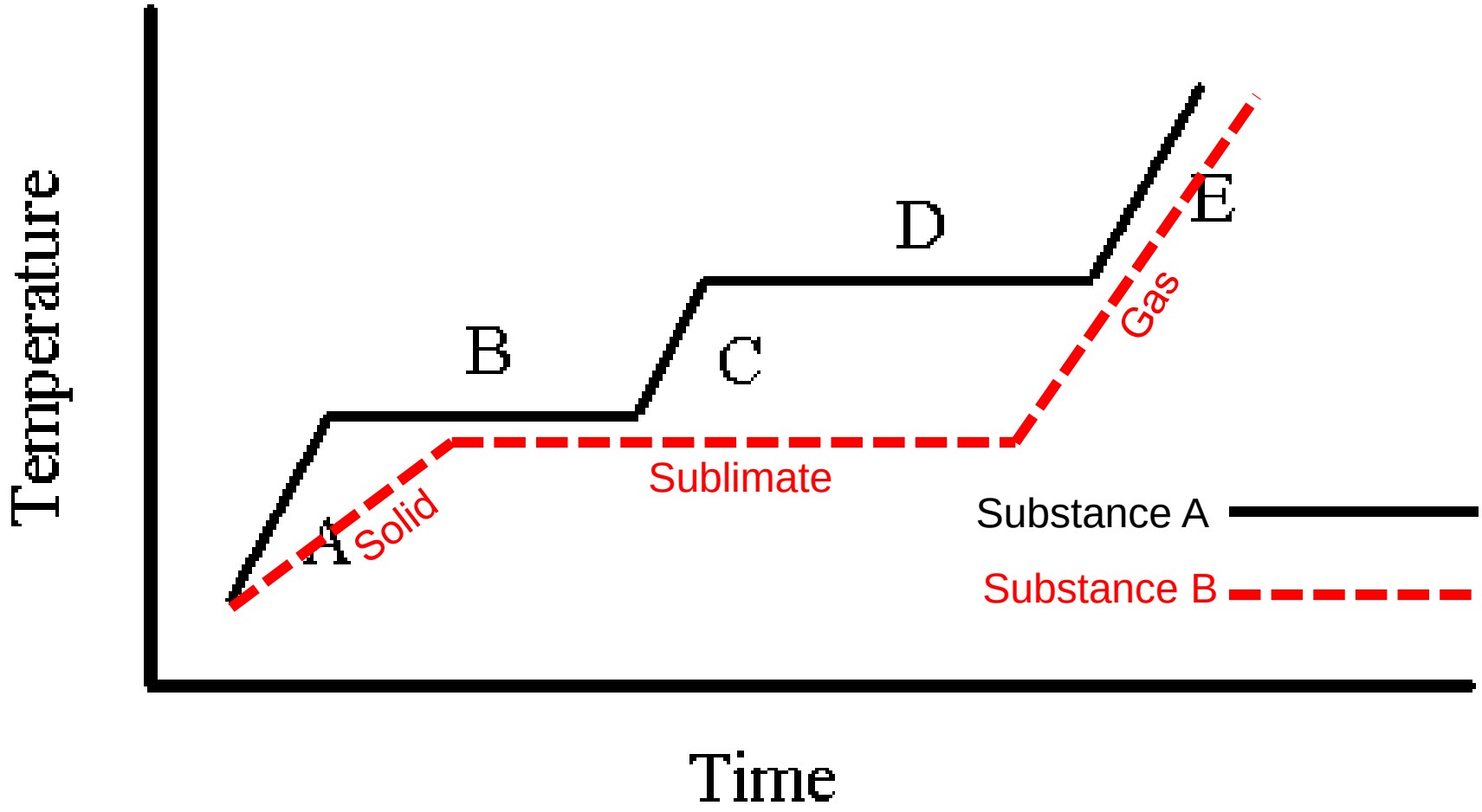
Question 3 – 500

Sketch the graph of sublimation on top.

Label states and phase change

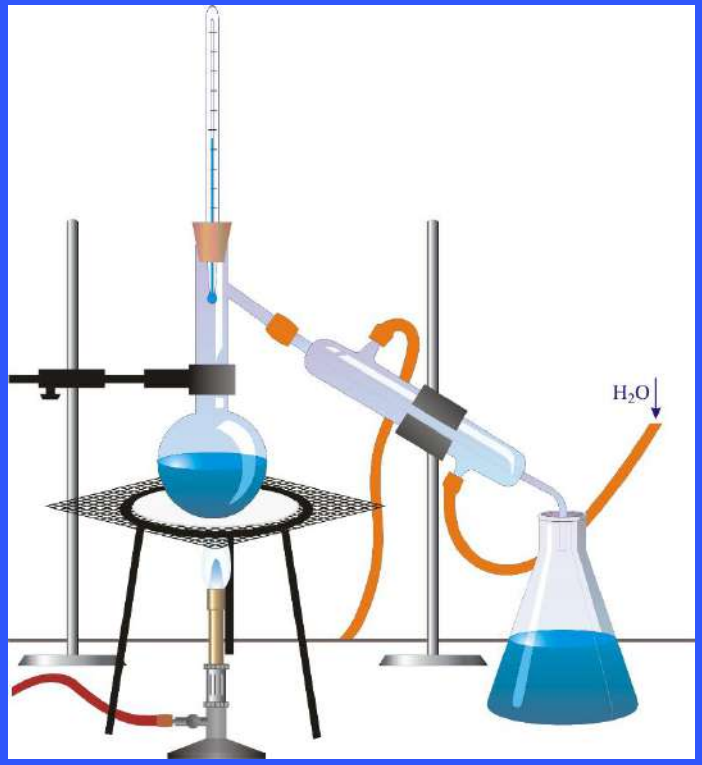


Answer 3 – 500


Temperature
A
Solid
B
C
D
E
Sublimate
Gas
Substance A
Substance B
Time

Question 4 - 100

- What is the *name* given to the vapor compression distiller, the device designed by Dean Kamen and his team we learned about in class?



Answer 4 – 100

- The Sling Shot

Question 4 - 200

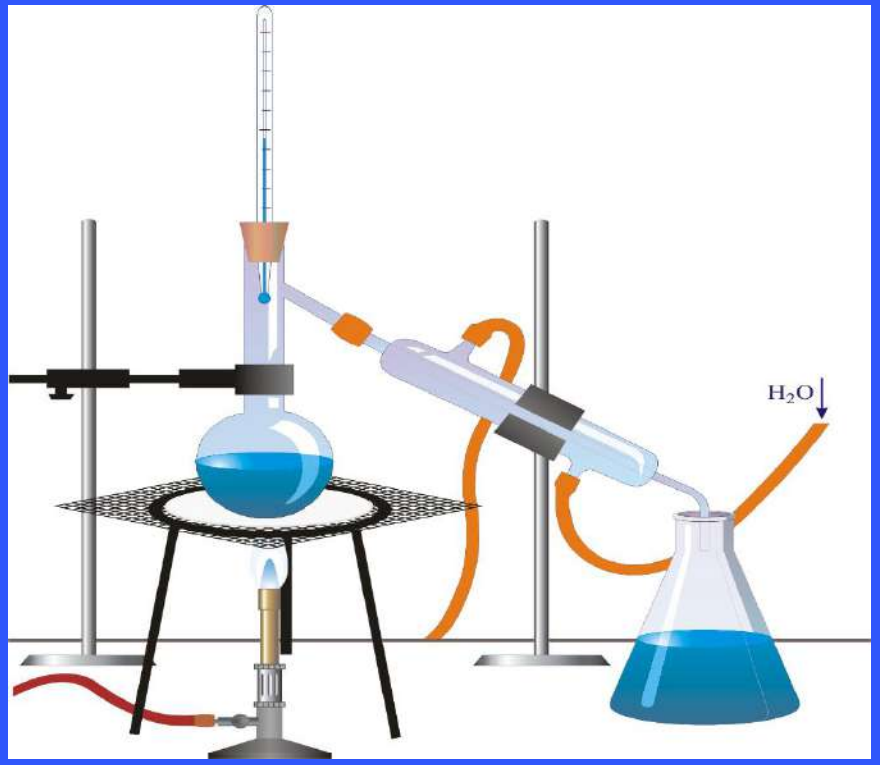
- What two phase changes of matter does a distillation apparatus take advantage of?

Answer 4 – 200

- Boiling and Condensing

Question 4 - 300

- What two variables can we manipulate and how in the distilling flask to improve efficiency of distillation?



Answer 4 – 300

- Increase temperature
- Decrease pressure

Question 4 - 400

- What can be done in the condenser to improve productivity and thus increasing distillate produced?

Answer 4 – 400

- Decrease temperature
- Increase pressure

Question 4 - 500

- The process of distillation is beneficial for producing many products by taking advantage of their physical properties of phase change at various temperature.
- What are three products produced in this manner?

Answer 4 – 500

- Potable water,
- alcohol,
- methane, gasoline, propane,
- purified solvents….

Question 5 - 100

- What is a force of attraction unique to water?

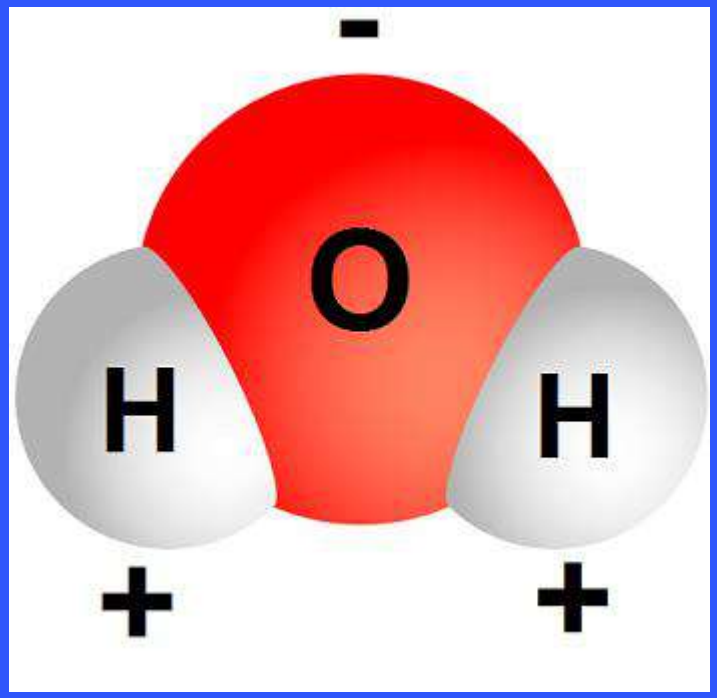
Answer 5 – 100

- Cohesion

Question 5 - 200

- Which end of a water molecule isc negative and which end is positive?

Answer 5 – 200

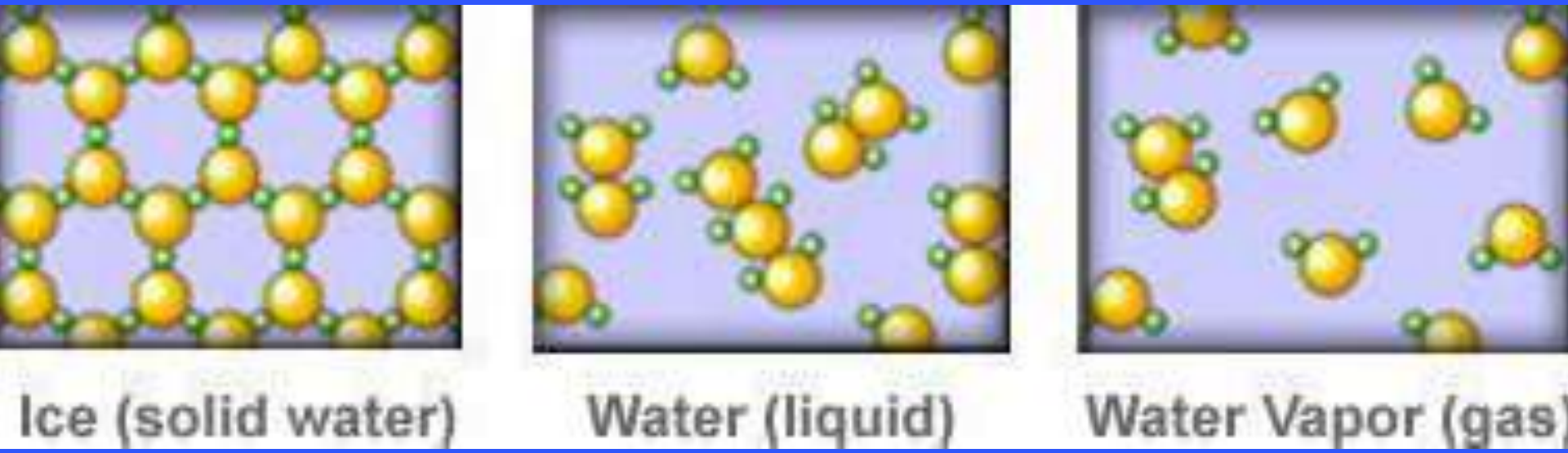


Question 5 - 300

This happens to water as it changes states from liquid to solid. Describe volume and density.

Answer 5 – 300

- Density decreases and volume increases

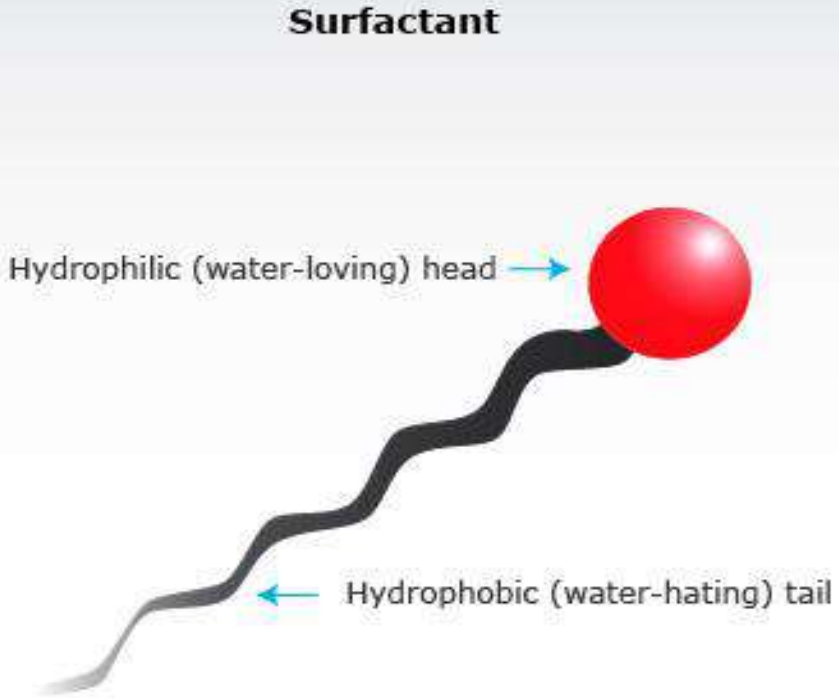


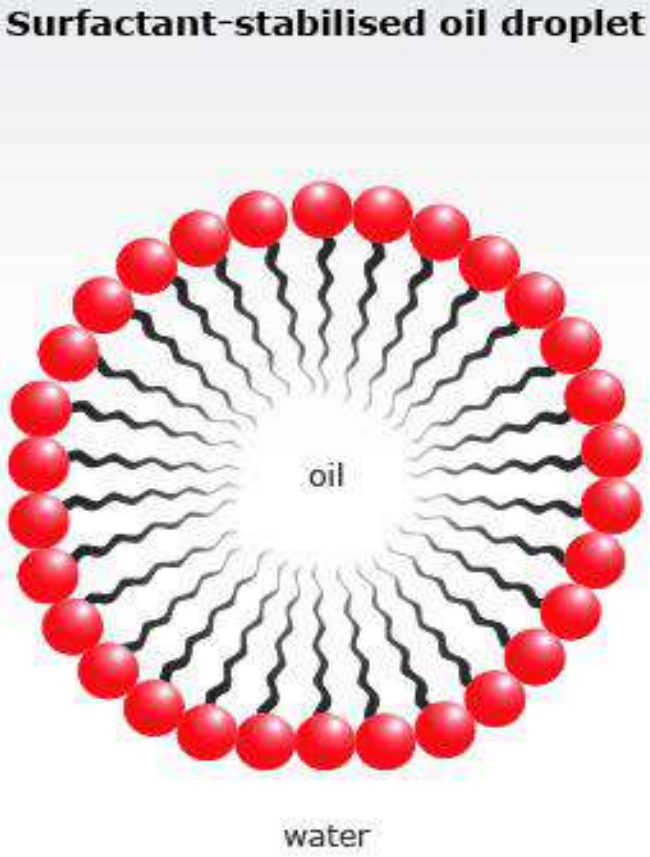
Question 5 - 400

- Surfactants have the effect of making water “wetter” and washing away dirt and debris, because of possessing both these paradoxical properties at once.

Answer 5 – 400

- Hydrophobic tail and hydrophilic tail





Question 5 - 500

- Engineers need to known what a new polymer they are designing will do in water?

  Sink, float, or remain neutrally buoyant

The substance has a mass of 100 grams and a volume of 120 cm3.

Answer 5 – 500

- D > 1 sink ex: 1.5 g/cm^3
- D < 1 float ex: 0.8333 g/cm^3
- D = 1 neutrally buoyant ex: 1 g/cm^3