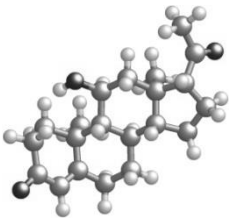


Chem!stry

Name: …… **( )**

Class: ……

Date: …… **/** …… **/** ……

States of Matter and Kinetic Particle Theory

The **Kinetic Theory of Matter** states that all matter is composed of very small particles (atoms, molecules or ions) which are in a constant state of motion. The motion of the particles increases as temperature increases.

Question One:

Complete the table below to give examples of *elements* and *compounds* which are either *solids*, *liquids* or *gases* at room temperature and pressure:

	Element	**Compound**
Solid		
Liquid		
Gas		

Question Two:

In the boxes below, draw clear diagrams that accurately describe how the particles are arranged in a *solid*, a *liquid* and a *gas*:

Solid:	Liquid:	Gas:

Question Three:

Now explain how the particles are arranged in a *solid*, a *liquid* and *gas* using words.

In your answer, you should describe the arrangement, separation, force of attraction, motion and kinetic energy of the particles. In addition, you should also describe the shape, volume, density, compressibility and thermal expansion of the three different states of matter:

• **Solid:** ……
……
……
……
……

• **Liquid:** ……...
……
……
……
……

• **Gas:** ……...
……
……
……
……

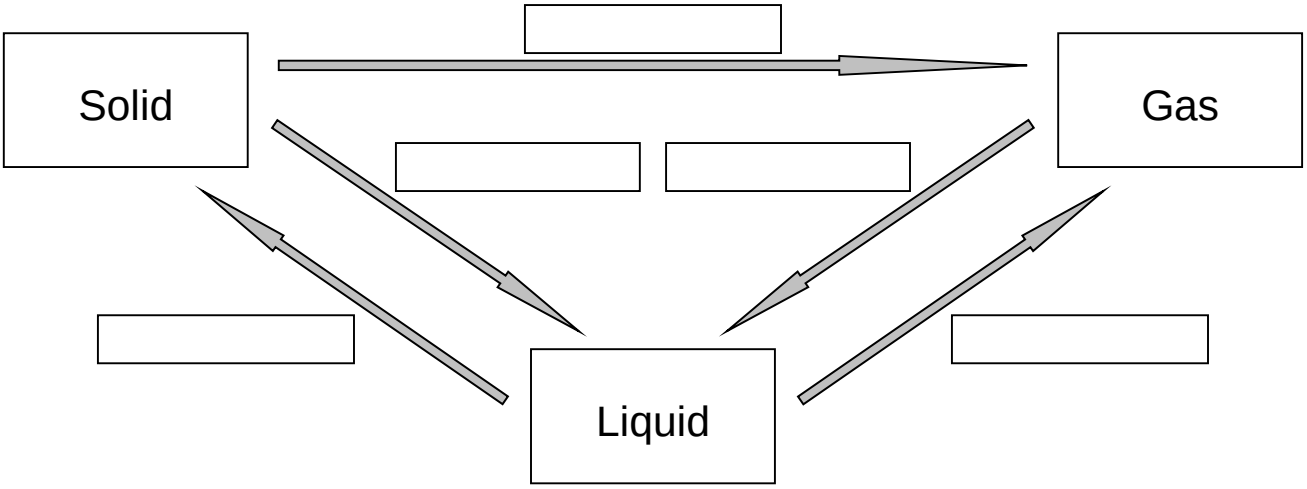
Question Four:

Use clear, labelled diagrams to explain why a gas can be *compressed*:

Question Five:

Use the following list of words to fill in the spaces in the diagram below:

Boil / Evaporate Melt Condense Sublime Freeze / Solidify

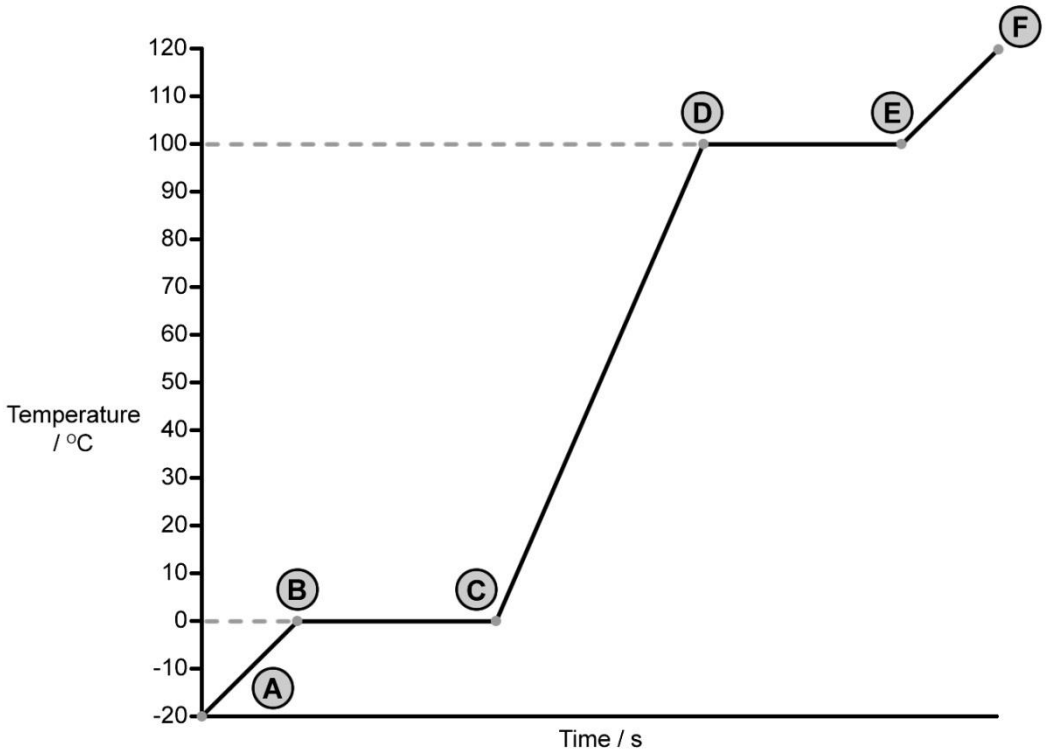


• Which of the above processes are ***Endothermic*** (this means that energy is absorbed or taken in by the system). Indicate these processes using a "+Δ" sign.

• Which of the above processes are ***Exothermic*** (this means that energy is released by the system). Indicate these processes using a "–Δ" sign.

Question Six:

A beaker of pure ice is removed from a freezer and heated at a constant rate over a Bunsen burner. The graph below shows how temperature changes with time while the ice is heated from −20°C to +120°C:



Using the terms “kinetic energy”, “potential energy”, “latent heat of fusion”, “latent heat of vaporisation” and “intermolecular force of attraction” explain the shape of the previous graph by completing the following sections:

- Describe what is happening to the H_2O molecules between points **A** and **B**:

……

……

- Describe what is happening to the H_2O molecules between points **B** and **C**:

……

……

- Describe what is happening to the H_2O molecules between points **C** and **D**:

……

……

- Describe what is happening to the H_2O molecules between points **D** and **E**:

……

……

- Describe what is happening to the H_2O molecules between points **E** and **F**:

……

……

Question Seven:

Complete the sentences below:

a) When a solid melts, it changes into a ……..

b) When a liquid ……, it changes into a gas.

c) When a …… condenses, it changes into a liquid.

Question Eight:

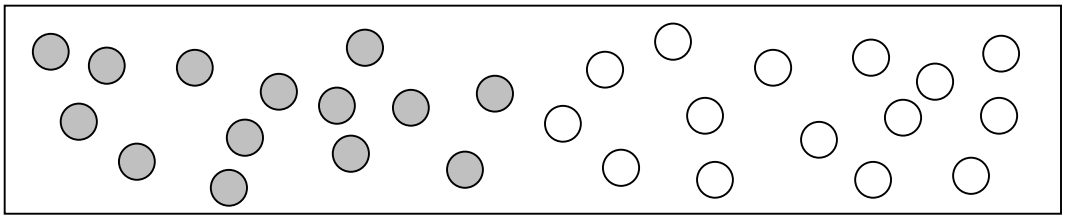
Complete the table below to say whether the element will be a *solid*, a *liquid* or a *gas* at 20°C:

Iodine (I)	Melting point: 114°C	Boiling Point: 184°C	State at room 20°C?
Sodium (Na)	Melting point: 98°C	Boiling Point: 890°C	State at room 20°C?
Neon (Ne)	Melting point: -249°C	Boiling Point: -246°C	State at room 20°C?
Silicon (Si)	Melting point: 1410°C	Boiling Point: 2360°C	State at room 20°C?
Bromine (Br)	Melting point: -7°C	Boiling Point: 59°C	State at room 20°C?

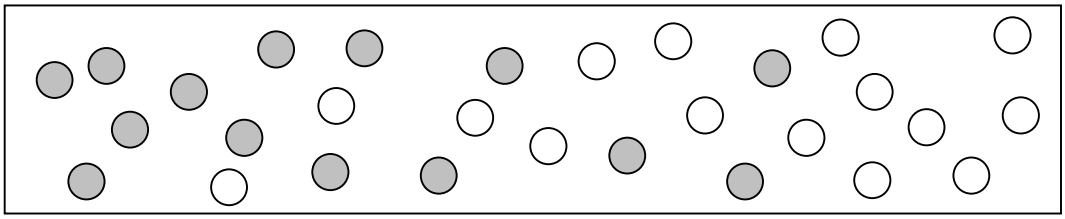
Question Nine:

The diagrams below show the sequence of events as one gas (represented by the grey circles ◯) diffuses into another gas (represented by the white circles ◯):

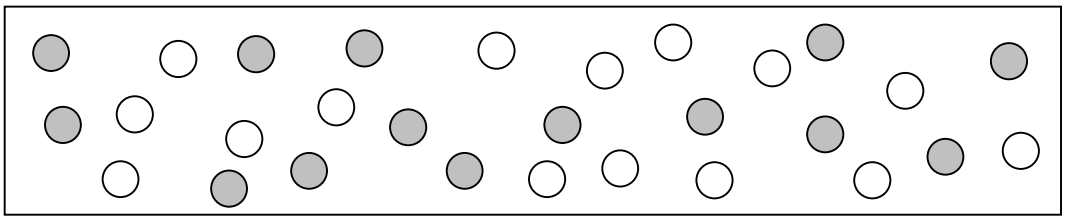
a)



b)



c)



Briefly describe what you see happening in each of the three diagrams:

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……

What is meant by the term “diffusion”?

……

……

……

……

Question Ten:

In addition to diffusion, what other empirical evidence suggests that matter is composed of tiny particles in a constant state of motion?

……

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