Practice Question Set For GCSE
Subject : Physics
Paper-1 Topic: Particle Model Of Matter (Low Demand)

Merit Minds
www.merit-minds.com
Exam Preparation and Free Resources

Name of the Student:_____
Max. Marks : 23 Marks **Time : 23 Minutes**

Q1.

In an experiment, a beam of alpha particles was directed at a thin sheet of gold foil.

(a) Most of the alpha particles passed straight through the gold foil.

Alpha particles which passed close to the nucleus of a gold atom did **not** pass straight through.

What happened to the alpha particles which passed close to the nucleus of a gold atom?

_____

_____

(1)

(b) The results suggested that the diameter of the nucleus of a gold atom is $\frac{1}{6000}$ of the diameter of the atom.

The diameter of a gold atom is 0.18 nm

Calculate the diameter of a gold nucleus in nm

_____

_____

_____

_____

Diameter = _____ nm

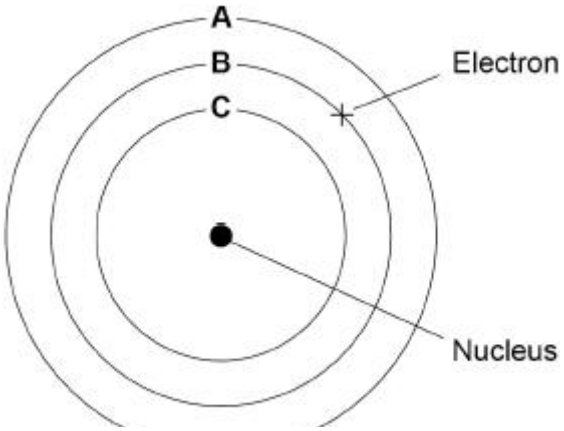
(2)

(c) Further experiments showed that gold nuclei are surrounded by electrons in different energy levels.

Figure 1 shows three of the energy levels around the nucleus of a gold atom.

Figure 1

Downloaded from www.merit-minds.com



The electron in energy level **B** absorbs electromagnetic radiation.

Which energy level will the electron be in after it has absorbed the electromagnetic radiation?

Tick (✓) **one** box.

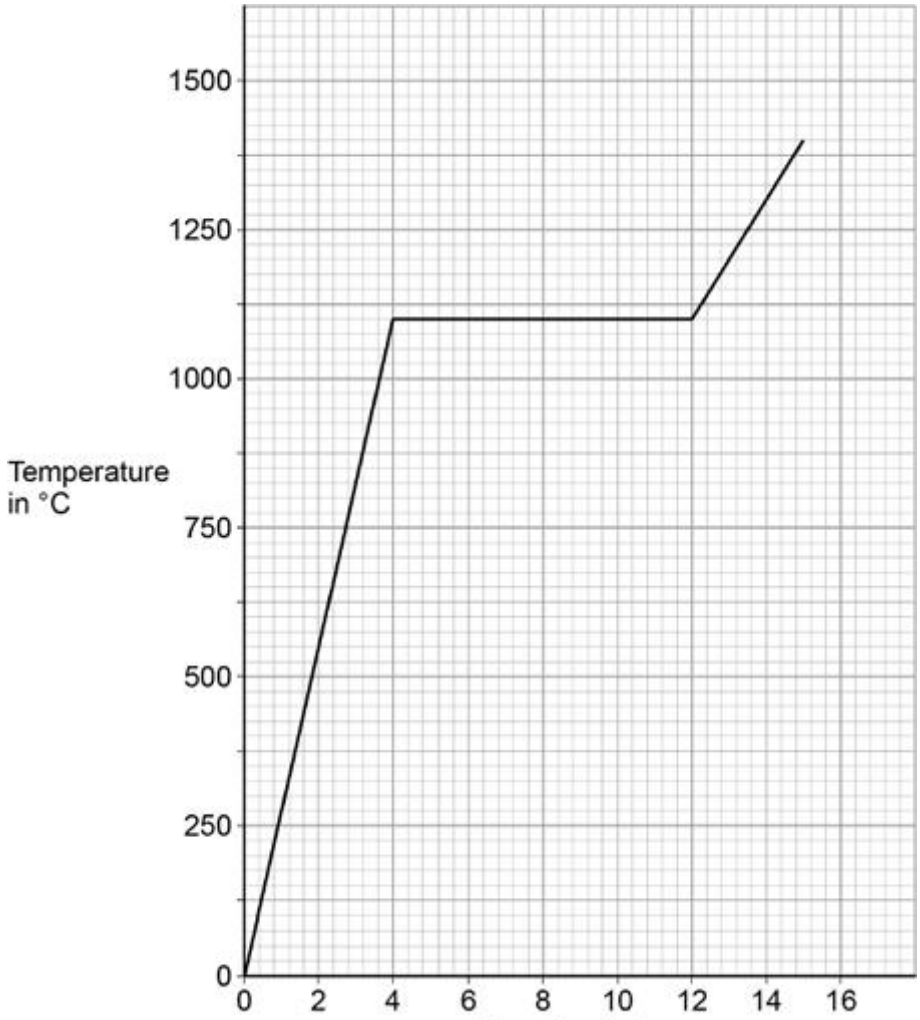
A ☐ **B** ☐ **C** ☐

(1)

Figure 2 shows how the temperature of a small sample of gold changes as it is heated from a solid to a liquid.

Figure 2

Downloaded from www.merit-minds.com



(d) What is the melting point of the gold?

Melting point = _____ °C

(1)

(e) How many minutes did it take for all of the gold in the sample to change from solid to liquid?

Time taken = _____ minutes

(1)

(f) What does the gradient of the graph in **Figure 2** represent?

Tick (✓) **one** box.

The internal energy of the gold ☐

The rate of change of temperature of the gold ☐

The specific heat capacity of the gold ☐

(1)

(Total 7 marks)

Downloaded from www.merit-minds.com

Q2.

Radioactive nuclei can emit alpha, beta or gamma radiation.

(a) Which type of radiation is the most penetrating?

Tick **one** box.

Alpha (α) ☐

Beta (β) ☐

Gamma (γ) ☐

(1)

(b) Which type of radiation is the most ionising?

Tick **one** box.

Alpha (α) ☐

Beta (β) ☐

Gamma (γ) ☐

(1)

(c) Which type of radiation has the longest range in air?

Tick **one** box.

Alpha (α) ☐

Beta (β) ☐

Gamma (γ) ☐

(1)

When radioactive isotopes in the Earth's crust decay they release energy.

The decay causes the heating of rocks in the crust.

(d) The diagram below shows the decay of uranium-238 (U-238) into thorium-234 (Th-234).

$$^{238}_{92}U \rightarrow {}^{234}_{90}Th + {}^{4}_{2}He$$

Complete the table below to show the number of neutrons and protons in the nuclei.

Downloaded from www.merit-minds.com

Isotope	Number of neutrons	Number of protons
uranium-238	146	
thorium-234		90

(2)

(e) Geothermal power stations pump water through heated rocks.

The temperature of the water increases from 20 °C to its boiling point of 100 °C

Calculate the change in thermal energy when the mass of water heated is 150 kg

Specific heat capacity = 4 200 J/kg °C

Use the Physics Equations Sheet.

_____

_____

_____

Change in thermal energy = _____ J

(3)

(Total 8 marks)

Q3.

Water exists as ice, water or steam.

(a) Complete the sentences.

Choose the answers from the box.

ice	steam	water

The particles are arranged in a regular pattern in _____ .

The particles are close together but not in a pattern in _____ .

The particles move quickly in all directions in _____ .

(2)

(b) Which will have the most internal energy?

Tick **one** box.

1 kg of ice ☐

1 kg of steam ☐

1 kg of water ☐

Downloaded from www.merit-minds.com

(1)

(c) Which will have the lowest density?

Tick **one** box.

Ice ☐

Steam ☐

Water ☐

(1)

The image shows an iceberg floating in the sea.

(d) The iceberg has a mass of 11 200 kg

The volume of the iceberg is 12.0 m^3

Calculate the density of the iceberg.

Use the equation:

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$

_____

_____

Density = _____ kg/m^3

(2)

(e) Explain why the iceberg will melt.

_____

_____

_____

_____

(2)

(Total 8 marks)

Downloaded from www.merit-minds.com