

Eduqas Physics GCSE
Topic 9.1: Nuclear atom and
isotopes
Mark Schemes for Questions by
topic

1.

Question	Answers	Extra information	Mark	AO / Spec. Ref.
2	Level 3: A detailed and coherent explanation is provided. The student gives examples that argue a strong case and demonstrate deep knowledge. The student makes logical links between clearly identified, relevant points.	5–6	6	2xAO2/2
	Level 2: An attempt to link the description of the experiment and the results with differences between the two models. The student gives examples of where the plum pudding model does not explain observations. The logic used may not be clear.	3–4		1xAO1/1 1xAO2/2
	Level 1: Simple statements are made that the nuclear model is a better model. The response may fail to make logical links between the points raised.	1–2		2x AO1/1 4.4.1.3
	No relevant content	0		
	Indicative content <ul style="list-style-type: none"> • alpha particle scattering experiment • alpha particles directed at gold foil • most alpha particles pass straight through • (so) most of atom is empty space • a few alpha particles deflected through large angles • (so) mass is concentrated at centre of atom • (and) nucleus is (positively) charged • plum pudding model has mass spread throughout atom • plum pudding model has charge spread throughout atom 			

2.

(a) neutrons and protons

1

(b) 0

1

(+)1

1

(c) (i) total positive charge = total negative charge

accept protons and electrons have an equal opposite charge

1

(because) no of protons = no of electrons

1

(ii) ion

1

positive

1

3.

(a) (i) all correct

accept presented as a tally chart

Number of protons	3
Number of electrons	3
Number of neutrons	4

allow 1 mark for 1 correct

2

(ii) 7

reason may score even if 7 not chosen

1

number of protons and neutrons

accept number of particles in the nucleus

accept number of nucleons

*do **not** accept number of electrons and neutrons*

1

(b) an ion

1

4.

(a) electron(s)

1

(b) 3rd box ticked

The model cannot explain the results from a new experiment

1

(c) all three correct

Particle
Proton
Electron
Neutron

allow 1 mark for 1 correct

2

[4]

5.
(a) neutron discovered 1

6.
(a) Y and Z 1

they have the same number of protons **or** same atomic number
*accept they have the same number of electrons **or** same number of protons **and** electrons*
allow only different in number of neutrons N.B. independent marks

1

7.

(c) (i) (3) fewer neutrons
accept lower/ smaller mass number
*do **not** accept different numbers of neutrons*
any mention of fewer/more protons/electrons negates mark
accept answers in terms of U-238 providing U-238 is specifically stated i.e. U-238 has (3) more neutrons

1

8.

(a) has an equal amount of positive charge
accept pudding/it is positive

1

9.

any **two** pairs from:

to gain credit it must be clear which model is being described
*do **not** accept simple descriptions of the diagram without comparison*

- nuclear model mass is concentrated at the centre / nucleus (1)
accept the nuclear model has a nucleus / the plum pudding model does not have a nucleus for 1 mark

plum pudding model mass is evenly distributed (1)

- nuclear model positive charge occupies only a small part of the atom (1)

plum pudding model positive charge spread throughout the atom (1)

- nuclear model electrons orbit some distance from the centre (1)

accept electrons in shells / orbits provided a valid comparison is made with the plum pudding model

plum pudding electrons embedded in the (mass) of positive (charge) (1)
do not accept electrons at edge of plum pudding

- nuclear model the atom mainly empty space (1)

plum pudding model is a 'solid' mass (1)

[4]

10.

(a) 90

for one mark

1

(b) (i) neutron

for one mark

1

(ii) nucleus

for one mark

1

(iii) electron

for one mark

1

(c) (i) 100

for one mark

1

(ii) 157

for one mark

1

[6]