Name of the Student:_____
Max. Marks : 19 Marks **Time : 19 Minutes**

Mark Schemes

Q1.

(a) *indication (in writing or on graph) of finding point where radiation is halved (e.g. to 24 [from an initial 48]) and relating to the time difference between the two points*

gains 1 mark

but
*4.2-4.8**
*(*i.e. in this range, including extremes)*

gains 2 marks

units billions of years

for 1 mark

3

(b) *¾* ***or*** *75%*
[allow ecf from (a)]

for 1 mark

1

(c) (i) *idea that the intermediate nuclides are relatively short-lived*

for 1 mark

1

(ii) *idea that ¼ has decayed* ***or*** *¾ remains*

gains 1 mark

but
read graph for radiation level of 36 (stated or shown on graph itself)

gains 2 marks

but
1.6-1.8 (billion years)*
(i.e. in this range, including extremes)*

gains 3 marks

3

[8]

Q2.

(i) *(fast moving) electrons (from the nucleus)*
(allow negatively charged particles)

for 1 mark

1

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(ii) protactinium has one neutron fewer
protactinium has one proton more
(credit has different numbers of neutrons / protons with one mark)
for 1 mark each

2

[3]

Q3.

(a) protons = 79

allow proton number is 79
ignore atomic number

1

electrons = 79

1

neutrons = 118

1

*protons **and** neutrons in nucleus and electrons in shells / energy levels / orbits around nucleus*

*allow for **1** mark, protons, neutrons and electrons if no other mark obtained*

1

(b) (i) supply of copper(-rich) ores is limited

allow can extract copper from low grade ores

or
to limit the environmental impact (of traditional mining)

ignore environmentally friendly unqualified

or
more economical than other methods

ignore it is cheaper unless qualified

1

(ii) plants (grown on land containing copper)

1

(plants) absorb copper compounds / ions

allow minerals
ignore copper / metal

1

(plants) burned to produce ash / metal compounds

1

[8]

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