A Level Physics Taster Questions – Atomic Structure.

Q1.

A nucleus of the radioactive isotope $^{65}_{28}Ni$ decays by β^- emission.

How many protons and neutrons are there in the resulting daughter nucleus?

	Number of protons	Number of neutons	
A	28	65	⬭
B	29	65	⬭
C	29	36	⬭
D	30	35	⬭

(Total 1 mark)

Q2.

What is the best estimate for the order of magnitude for the diameter of an atom?

A 10^{-14} m ⬭

B 10^{-12} m ⬭

C 10^{-10} m ⬭

D 10^{-8} m ⬭

(Total 1 mark)

Q3.

In a nuclear reaction $^{14}_{7}N$ is bombarded by neutrons. This results in the capture of one neutron and the emission of one proton by one nucleus of $^{14}_{7}N$. The resulting nucleus is

A $^{13}_{7}N$

B $^{14}_{6}C$

C $^{12}_{6}C$

D $^{14}_{8}O$

(Total 1 mark)

Q4.

The nucleus of $^{9}_{4}Be$ captures a proton and emits an α particle. What is the product nucleus?

A $^{10}_{6}C$ ⬭

B $^{7}_{3}Li$ ⬭

C $^{6}_{3}Li$ ⬭

D $^{6}_{2}He$ ⬭

(Total 1 mark)

Q5.

The nuclide $^{25}_{12}Mg$ absorbs an α particle and emits a neutron and γ radiation.

What are the correct values for the nucleon number and proton number of the nuclide which is formed?

	Nucleon number	Proton number	
A	29	14	⬭
B	29	12	⬭
C	28	14	⬭
D	27	12	⬭

(Total 1 mark)

Q6.

$^{232}_{90}Th$ is an unstable nuclide in a radioactive decay series. It decays by emitting an α particle. The next two nuclides in the series emit β^- particles.

What nuclide is formed after these three decays have taken place?

A $^{230}_{90}Th$ ⬭

B $^{228}_{92}U$ ⬭

C $^{228}_{88}Ra$ ⬭

D $^{228}_{90}Th$ ⬭

(Total 1 mark)

Q7.

A radioactive nucleus emits a β^- particle then an α particle and finally another β^- particle. The final nuclide is

A an isotope of the original element ⬭

B the same element with a different proton number ⬭

C a new element of higher proton number ⬭

D a new element of lower nucleon number ⬭

(Total 1 mark)

Q8.

$^{236}_{92}U$ undergoes a series of decays to produce $^{204}_{82}Pb$.

How many alpha decays are involved in this decay series?

A 5 ⬭

B 6 ⬭

C 8 ⬭

D 10 ⬭

(Total 1 mark)

Mark schemes

Q1.

C

[1]

Q2.

C

[1]

Q3.

B

[1]

Q4.

C

[1]

Q5.

C

[1]

Q6.

D

[1]

Q7.

A

[1]

Q8.

C

[1]