

Practice Question Set For A-Level  
**Subject : Physics**  
**Paper-1 Topic: Particle And Radiation**

Name of the Student: \_\_\_\_\_

Max. Marks : 22 Marks

Time : 22 Minutes

Mark Schemes

**Q1.**

(a) 95 protons ✓ 1

241 – 95 = 146 neutrons ✓ 1

(b) Beta minus decay. ✓  
*Marks can be given for a correct equation* 1

There is no change in the number of nucleons.

The number of protons increases by 1. ✓  
*Ignore omitted antineutrino.* 1

(c) 
$${}_{95}^{241}\text{Am} \rightarrow {}_Z^A\text{X} + {}_2^4\alpha$$
 ✓ 1

Nucleon number = A = 241 – 4 = 237 ✓ 1

Proton number = Z = 95 – 2 = 93 ✓ 1

(d) Ionisation is the removal (or addition) of electrons from (to) an atom or molecule ✓ 1

(e) Only a small quantity of material is needed ✓ 1

The particles it emits do not travel more than a few centimetres ✓  
*Alternative for 2nd mark: Would be stopped before reaching the outside of the detector* 1

[10]

**Q2.**

(a) energy of photon ✓ 1  
is greater than the work function ✓

so electrons are emitted ✓

1

*if correct reference to threshold frequency and no mention of work function then only score one of first two marks and can be awarded third mark*

1

- (b) increased intensity means more photons incident per second ✓  
only need to see per second once

1

current greater OR more electrons emitted per second ✓  
rate of photons incident OK (or rate of electrons emitted)

1

- (c) (use of  $hf = \phi + E_k$ )  
 $\phi = 2.1 \times 1.6 \times 10^{-19} = 3.36 \times 10^{-19}$  ✓ (J)  
*if incorrect or no conversion to J then CE for next two marks*

1

$$E_k = 6.63 \times 10^{-34} \times 7.23 \times 10^{14} - 3.36 \times 10^{-19}$$

1

$$E_k = 1.4(3) \times 10^{-19} \text{ ✓ (J)}$$

1

- (d) (use of  $eV = E_k$ )  
 $V_s = 1.43 \times 10^{-19} / 1.6 \times 10^{-19} = 0.89$  (V) ✓  
CE from 05.3  
RANGE 0.70 – 0.90

1

- (e) stopping potential would be greater ✓

1

because the energy of the photons (of the electromagnetic radiation) would be greater ✓

1

(hence) maximum kinetic energy of (photo)electrons would be greater ✓

1

[12]