

1

Photons of wavelength 290 nm are incident on a metal plate. The work function of the metal is 4.1 eV

What is the maximum kinetic energy of the emitted electrons?

- A 0.19 eV
- B 4.3 eV
- C 6.9 eV
- D 8.4 eV

(Total 1 mark)

2

When light of a certain frequency greater than the threshold frequency of a metal is directed at the metal, photoelectrons are emitted from the surface. The power of the light incident on the metal surface is doubled.

Which row shows the effect on the maximum kinetic energy and the number of photoelectrons emitted per second?

	Maximum kinetic energy	Number of photoelectrons emitted per second	
A	remains unchanged	remains unchanged	<input type="radio"/>
B	doubles	remains unchanged	<input type="radio"/>
C	remains unchanged	doubles	<input type="radio"/>
D	doubles	doubles	<input type="radio"/>

(Total 1 mark)

3

- (i) Calculate the longest wavelength of electromagnetic radiation that will cause photoelectric emission at a clean lithium surface.

work function for lithium $\phi = 4.6 \times 10^{-19} \text{ J}$

Longest wavelength = _____ m

(3)

- (ii) Calculate maximum kinetic energy of the electrons emitted when electromagnetic radiation of frequency $8.5 \times 10^{14} \text{ Hz}$ is incident on the surface.

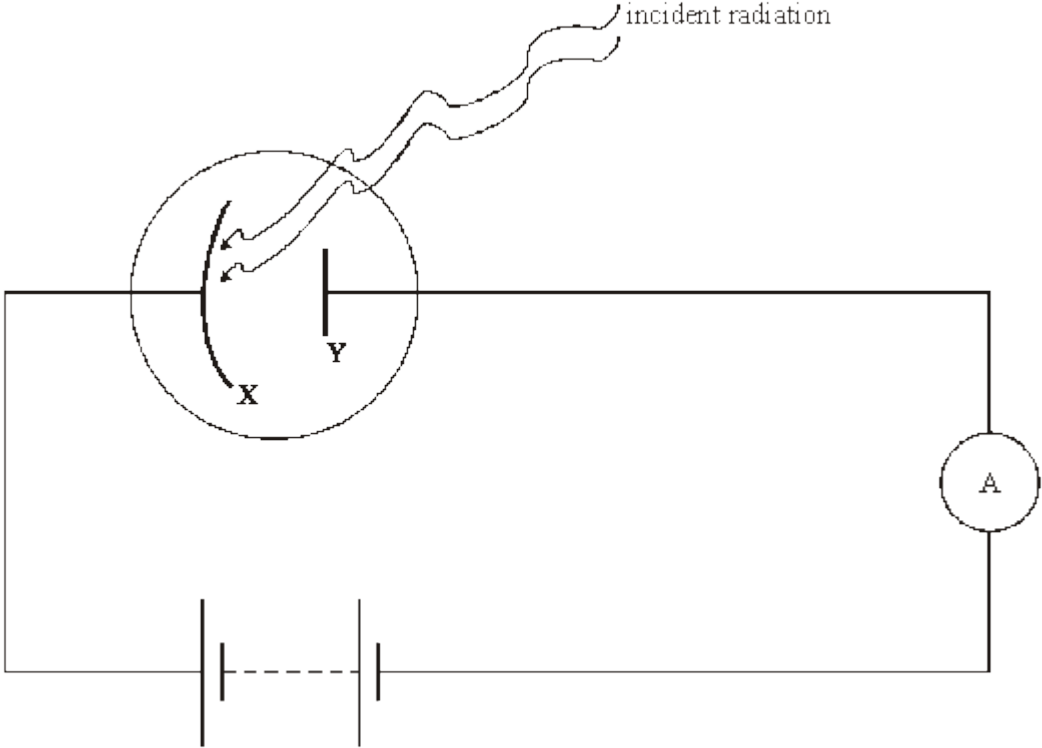
Maximum energy = _____ J

(3)

(Total 6 marks)

4

In the apparatus shown, monochromatic ultraviolet radiation is incident on the surface of metal **X**. Photoelectrons are emitted from **X** and are collected at electrode **Y**.



- (a) Calculate the work function of **X**, given that each photon in the incident radiation has 3.2×10^{-19} J of energy.
The maximum kinetic energy possessed by a single photoelectron is 2.1×10^{-19} J.

(3)

- (b) The source of the incident radiation is replaced with a new source. The wavelength of the radiation from the new source is half the wavelength of the original radiation.
Calculate the maximum kinetic energy of the emitted photoelectrons.

(3)

(Total 6 marks)