

AS Level Physics A
H156/01 Breadth in Physics

Question Set 10

1

A researcher is investigating the work function of metals using the photoelectric effect.

The table below shows the threshold frequency f_0 and the work function ϕ for various metals.

metal	A	B	C	D	E
$f_0 / 10^{14} \text{ Hz}$	4.5	5.6	6.5	8.0	9.7
ϕ / eV	1.9	2.3	2.7	3.4	4.1

(a) Explain what is meant by *threshold frequency*. [1]

(b) Fig. 27 shows the data points for the metals **A**, **B**, **D** and **E** plotted on a ϕ against f_0 grid.

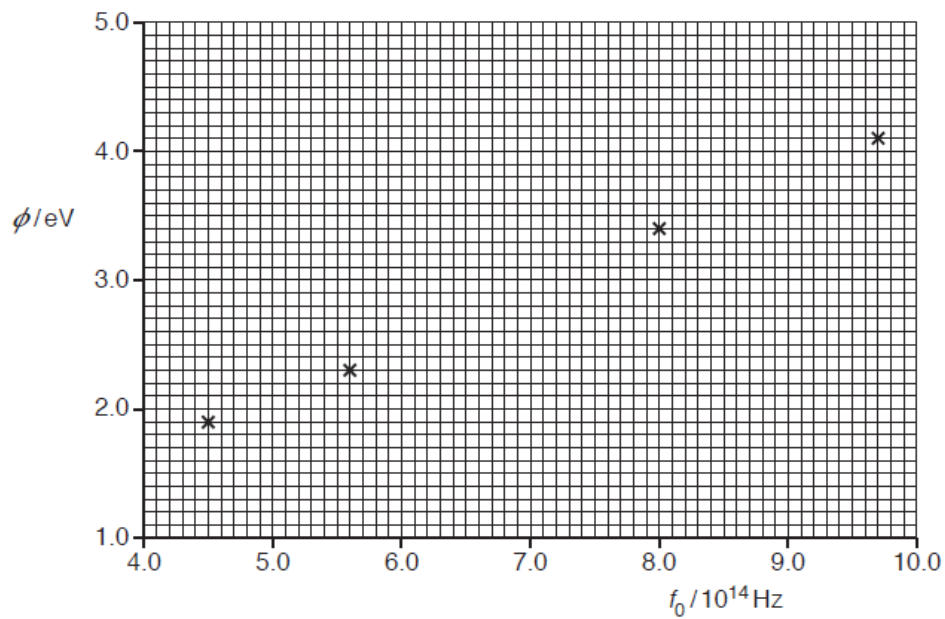


Fig. 27

(i) Use Einstein's photoelectric equation to show

$$\phi = hf_0$$

where h is the Planck constant.

[1]

(ii) Plot the data point for **C** on Fig. 27 and draw the straight line of best fit.

[1]

(iii) Use Fig. 27 to determine the experimental value for h .

$$h = \quad \quad \quad \text{Js}$$

(iv) Explain, without doing any calculations, how you could use Fig. 27 to determine the percentage uncertainty in h .

[2]

[2]

Total Marks for Question Set 10: 7

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