

Let us calculate $\frac{hc}{\lambda}$ and compare with ϕ for each metal.

$$\frac{hc}{\lambda} = \frac{12400 \text{ eV} \cdot \text{\AA}}{3000 \text{ \AA}} = 4.1 \text{ eV}$$

\Rightarrow For Li $\phi = 2.3 \text{ eV}$
 Be $\phi = 3.9 \text{ eV}$

$\left. \begin{array}{l} \text{Li } \phi = 2.3 \text{ eV} \\ \text{Be } \phi = 3.9 \text{ eV} \end{array} \right\}$ both have $\phi < \frac{hc}{\lambda}$
 \Rightarrow exhibit photoelectric effect.

Hg $\phi = 4.5 \text{ eV} > \frac{hc}{\lambda} \Rightarrow$ no photoelectric effect.

Li $K_{\max} = 4.2 - 2.3 = \boxed{1.9 \text{ eV}}$

Be $K_{\max} = 4.2 - 3.9 = \boxed{0.3 \text{ eV}}$

20.

$$V_s = \frac{h}{e} f - \frac{\phi}{e}$$

Choose two points from the graph
 $(3, 11.2 \times 10^{14})$ and $(0, 4.1 \times 10^{14})$

slope of V_s vs. f is $\frac{\Delta V_s}{\Delta f} = \frac{3 - 0}{(11.2 - 4.1) \times 10^{14}} = 4.23 \times 10^{-15} \frac{\text{V}}{\text{Hz}}$
 $= 4.23 \times 10^{-15} \text{ V} \cdot \text{s}$

$\Rightarrow \frac{h}{e} = \frac{\Delta V_s}{\Delta f} \Rightarrow h = 4.23 \times 10^{-15} \times 1.6 \times 10^{-19} = \boxed{6.77 \times 10^{-34} \text{ J} \cdot \text{s}}$

and $\frac{\phi}{e} = -V_s + \left(\frac{h}{e}\right) f = -3 + (4.23 \times 10^{-15})(11.2 \times 10^{14})$
 $= 4.73 - 3 = 1.73 \text{ V}$