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物理作业20

13-7 $\lambda_0 = 0.62\,\mu m$

(1) 钾的逸出功

(2) 若波长 $\lambda = 330\,nm$，钾的遏止电势差

解 当 $E_{km} = 0$ 时，算逸出功

$$A = h\nu = \frac{hc}{\lambda_0} = \frac{6.63\times10^{-34}\times3\times10^{8}}{0.62\times10^{-6}}\,J = 3.21\times10^{-19}\,J = 2.0\,eV$$

(2) $E_{km} = eU_a$

$$U_a = \frac{E_{km}}{e} = \frac{h\nu - A}{e} = \frac{h(\nu-\nu_0)}{e} = \frac{hc}{e}\left(\frac{1}{\lambda}-\frac{1}{\lambda_0}\right)$$

$$= \frac{6.63\times10^{-34}\times3\times10^{8}}{1.602\times10^{-19}\times1\times10^{-9}}\left(\frac{1}{330}-\frac{1}{620}\right)V = 1.76\,V$$

13-7 钨的逸出功为4.2eV，$\lambda=200nm$

$$E_{km}=h\nu-A$$

$$eU_a=E_k-E_{ka}$$

光电子的最大初动能

$$E_{km}=h\nu-A=h\frac{c}{\lambda}-A=3.23\times10^{-19}J=2.0eV$$

遏止电势差 $U_a=\frac{E_{km}}{e}=2.0V$

由逸出功与红限 $A=h\nu_0=\frac{hc}{\lambda_0}$

钨的红限波长 $\lambda_0=\frac{hc}{A}=296nm$