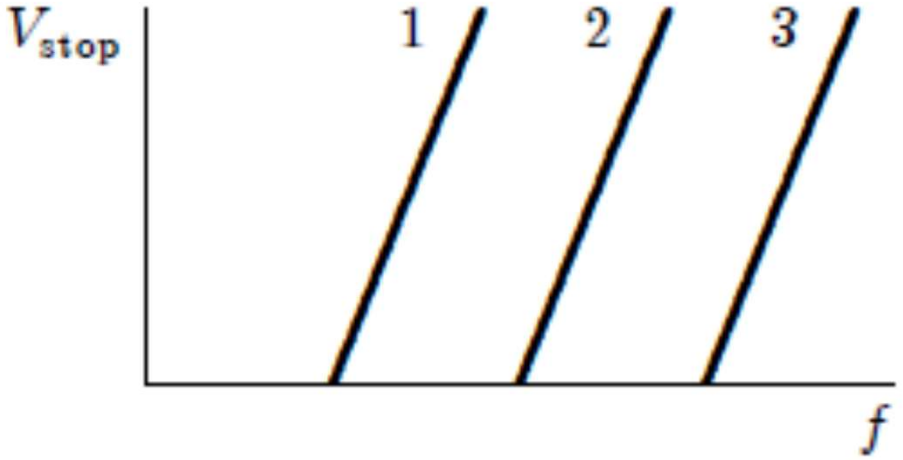
Test 3

31.05.2017

Choose the only one correct answer. In calculations assume that: the rest mass of the electron $m_e = 9.11 \cdot 10^{-31} kg$, the rest mass of the proton $m_p = 1.67 \cdot 10^{-27} kg$, Planck constant $h = 6.63 \cdot 10^{-34} J \cdot s$, electron charge $e = 1.6 \cdot 10^{-19} C$, Compton wavelength of the electron $\lambda_C = 2.4 \cdot 10^{-12} m$

1. The diagram shows the graphs of the stopping potential as a function of the frequency of the incident light for photoelectric experiments performed on three different materials. Rank the materials according to the values of their work functions, from least to greatest.

A. 1, 2, 3
B. 3, 2, 1
C. 2, 3, 1
D. 2, 1, 3
E. 1, 3, 2



2. The work function for a certain sample is 2.3 eV. The stopping potential for electrons ejected from the sample by 7.0×10^{14} Hz electromagnetic radiation is:

A. 0

B. 0.60V

C. 2.3V

D. 2.9V

E. 5.2V

3. The frequency and wavelength of the matter wave associated with a 10 eV free electron are:

A. 1.5×10^{34} Hz, 3.9×10^{-10} m

B. 1.5×10^{34} Hz, 1.3×10^{-34} m

C. 2.4×10^{15} Hz, 1.2×10^{-9} m

D. 2.4×10^{15} Hz, 3.9×10^{-10} m

E. 4.8×10^{15} Hz, 1.9×10^{-10} m

4. If a wave function φ for a particle moving along the x axis is normalized, then:

A. $\int |\varphi|^2 dt = 1$

B. $\int |\varphi|^2 dx = 1$

C. $\frac{\partial \varphi}{\partial x} = 1$

D. $\frac{\partial \varphi}{\partial t} = 1$

E. $|\varphi|^2 = 1$

5. An electron is in a one-dimensional trap with zero potential energy in the interior and infinite potential energy at the walls. The ratio E_3/E_1 of the energy for n = 3 to that for n = 1 is:

A. 1/3
B. 1/9
C. 3/1
D. 9/1
E. 1/1