

Solutions

2.1 D More photons can emit more electrons; $h\nu - \phi$ remains the same.

Compare the rejected options: The surface work function; Maximum electron kinetic energy; The photon frequency; Planck's constant. Use the stated model and conditions.

2.2 C Three p orbitals fill singly first, then one pair; two unpaired parallel electrons give $S=1$.

Compare the rejected options: 0; $1/2$; $3/2$; 2. Use the stated model and conditions.

2.3 0.5. $m_e^2/(2m_e) = m_e/2$.

2.4 False. Successive collisions can lose the same excitation energy repeatedly.

3.1 $\mu = m_e M / (m_e + M)$ gives $\mu_1 = 10m_e/11$ and $\mu_2 = 20m_e/21$. $\nu_2/\nu_1 = \mu_2/\mu_1 = 22/21$ and $\lambda_2/\lambda_1 = 21/22$. For $M \rightarrow \infty$, $\mu \rightarrow m_e$ from below. Award reduced masses, frequency ratio, inverse wavelength ratio and limit. Values describe a model, not real isotopes.