

Solutions

2.1 Answer: B. Divide -13.6 by 9 .

Compare the rejected options: -13.6 eV; $+1.51$ eV. Use the stated model and conditions.

2.2 Answer: B. The orbital rule is $\Delta l = \pm 1$.

Compare the rejected options: 0 ; 2 . Use the stated model and conditions.

2.3 10.2. Subtract -13.6 from -3.4 .

2.4 False. Other mechanisms, such as two-photon emission, can occur.

3.1 A $3d$ state has $l = 2$. Electric-dipole emission requires $\Delta l = \pm 1$, and a lower n for positive photon energy. At $n = 2$ only $l = 0, 1$ exist, so $2p$ is allowed (with magnetic sublevels obeying $\Delta m = 0, \pm 1$). At $n = 1$ only $1s$ exists; $\Delta l = -2$ forbids that direct electric-dipole transition. Award initial l , rule, $2p$ and exclusion of $1s$. Higher-order transitions are outside this approximation.