

Electronic Structure of Atoms Worksheet Answer Key

1. a) $4.6 \times 10^{-19} \text{ J}$ b) $6.94 \times 10^{14} \text{ s}^{-1}$ c) $4.32 \times 10^{-7} \text{ m}$ d) $5.68 \times 10^{-19} \text{ J}$
2. $4.34 \times 10^{-7} \text{ m} = 434 \text{ nm}$
3. $E_{\text{XRay}} = 1.29 \times 10^{-15} \text{ J}$; $E_{\text{Microwave}} = 3.89 \times 10^{-23} \text{ J}$ (Xrays have 3.32×10^7 times more energy)

Electronic Structure Worksheet Answer Key

1. $4.58 \times 10^{-19} \text{ J}$
2. $2.42 \times 10^{-14} \text{ m/s}$
3. $7 \times 10^{-19} \text{ J}$
4. $n = 2$ $\ell = 1$ $m_\ell = 0$; $n = 2$ $\ell = 1$ $m_\ell = -1, 0, +1$
5. $3.98 \times 10^{11} \text{ Hz}$
6. $4.74 \times 10^{-19} \text{ J}$
7. $2s = 1, 3d = 5$
8. $-1, 0, +1$

Chapter 6 Homework Problems

1. Inversely proportional; 400-700 nm
2. $B < C < E < A < D$
3. a) 0.344 m; b) $4.62 \times 10^{-14} \text{ Hz}$; c) microwave/TV range, is visible (not detected)
4. 455 nm indigo
5. a) $2.48 \times 10^{-19} \text{ J}$; b) $5.2 \times 10^{-19} \text{ J}$; c) $2.84 \times 10^{15} \text{ s}^{-1}$
6. a) $2.3 \times 10^{-20} \text{ J}$ and $1.2 \times 10^{-18} \text{ J}$; b) $8.7 \mu\text{m}$ is IR and 160 nm is UV
7. 40 photons (must be a whole #)
8. $1.50 \times 10^{-6} \text{ m}$; yes, it is in the IR region
9. a) $4.60 \times 10^{-19} \text{ J}$; b) $6.94 \times 10^{14} \text{ s}^{-1}$; c) 432 nm; d) 65.2 kJ/mol
10. Bohr theory states that only certain energy changes are allowed within an atom. These allowed changes correspond to specific wavelengths in the line spectrum.
11. a) absorbed; b) emitted; c) absorbed
12. a) $-2.04 \times 10^{-18} \text{ J}$ and $9.74 \times 10^{-8} \text{ m}$ emitted
b) $-1.55 \times 10^{-19} \text{ J}$ and $1.28 \times 10^{-6} \text{ m}$; emitted
c) $-4.84 \times 10^{-19} \text{ J}$ and $4.11 \times 10^{-7} \text{ m}$ emitted
13. $1.22 \times 10^{-7} \text{ m}$ UV
14. a) 25 m/s, $2.0 \times 10^{-38} \text{ m}$; b) 0.14 kg, 40 m/s, $1.2 \times 10^{-34} \text{ m}$;
c) $6.64 \times 10^{-27} \text{ kg/He atom}$, $1.2 \times 10^{-13} \text{ m}$
15. a) $\ell = 3, 2, 1, 0$; b) $m_\ell = -3, -2, -1, 0, +1, +2, +3$