

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  $3.32 \times 10^7$  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  $160 \text{ nm}$  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)  $m_\ell = -3, -2, -1, 0, +1, +2, +3$