Electrons – Unit 4

ANSWER SHEET

**ALL NUMERICAL ANSWERS MUST INCLUDE THE PROPER UNITS **

1. 1.3×10^{-21} J
2. 7.0×10^{-7} m
3. 3.3×10^{16} Hz
4. 9.9×10^{-14} J
5. 5.1×10^{8} Hz
6. photon
7. ground state
8. excited state
9. Louis de Broglie
10. Heisenberg Uncertainty Principle
11. Pauli Exclusion Principle
12. Aufbau Principle
13. Hund's Rule
14. valence electrons

15. ↑↓ ↑↓ ↑↓ ↑↓ ↑↓ ↑↓
    1s 2s 2p 3s

16. ↑↓ ↑↓ ↑↓ ↑↓ ↑↓ ↑↓ ↑ ↑ __
    1s 2s 2p 3s 3p

17. ↑↓ ↑↓ ↑↓ ↑↓ ↑↓ ↑↓ ↑↓ ↑↓ ↑↓
    1s 2s 2p 3s 3p

    ↑↓ ↑ ↑ __ __ __
    4s 3d

18. ↑↓ ↑↓ ↑↓ ↑↓ ↑↓
    1s 2s 2p

19. $1s^2 2s^2 2p^3$ N
20. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$ K
21. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 3d^5$ Cr
    (Remember: Cr makes an exception to gain stability.)
22. [Kr] $5s^2 4d^{10} 5p^3$ Sb
23. [Xe] $6s^2 4f^{14} 5d^{10} 6p^3$ Bi
24. [Kr] $5s^2 4d^5$ Tc
25. [Ar] $4s^2 3d^{10} 4p^2$ Ge
26. Te^{2-} [Kr] $5s^2 4d^{10} 5p^6$ Te^{2-}
27. B^{3+} $1s^2$ B^{3+}
28. Ba^{2+} [Kr] $5s^2 4d^{10} 5p^6$ Ba^{2+}
29. Br^- [Ar] $4s^2 3d^{10} 4p^6$ Br^-
30. K^+ [Ne] $3s^2 3p^6$ K^+

Review Unit H

1. $E = ?$ $\quad E = h \cdot \nu$

   $\nu = 2.0 \times 10^{12}\ Hz$ $\quad = (6.626 \times 10^{-34}\ J \cdot s)(2.0 \times 10^{12}\ 1/s) = 1.3 \times 10^{-21}\ J$

2. $\lambda = ?$ $\quad \lambda = \frac{c}{\nu} = \frac{3.00 \times 10^{8}\ m/s}{4.3 \times 10^{14}\ 1/s} = 7.0 \times 10^{-7}\ m$

   $\nu = 4.3 \times 10^{14}\ Hz$

3. $\nu = ?$ $\quad c = \lambda \cdot \nu$ so

   $\lambda = 9.2\ nm \left| \frac{1 \times 10^{-9}\ m}{1\ nm} \right. = 9.2 \times 10^{-9}\ m$ $\quad \nu = \frac{c}{\lambda} = \frac{3.00 \times 10^{8}\ m/s}{9.2 \times 10^{-9}\ m} = 3.3 \times 10^{16}\ Hz$

4. $E = ?$

   $\lambda = 2.0\ pm \left| \frac{1 \times 10^{-12}\ m}{1\ pm} \right. = 2.0 \times 10^{-12}\ m$ $\quad E = \frac{h \cdot c}{\lambda} = \frac{(6.626 \times 10^{-34}\ J \cdot s)(3.00 \times 10^{8}\ m/s)}{(2.0 \times 10^{-12}\ m)}$

   $E = 9.9 \times 10^{-14}\ J$

5. $\nu = ?$ $\quad E = h\nu$ so $\frac{E}{h} = \nu$ $\quad \frac{(3.4 \times 10^{-25}\ J)}{(6.626 \times 10^{-34}\ J \cdot s)} = 5.1 \times 10^{8}\ Hz$

   $E = 3.4 \times 10^{-25}\ J$