

## ANSWERS TO BENCHMARK #2 REVIEW QUESTIONS

- 1) The location and velocity of an electron cannot be known at the same time
- 2) Equal energy orbitals must be filled with an electron before they are paired up.
- 3) Electrons must be added to atoms filling the lowest energy orbital first
- 4) Only 2 electrons may occupy a single atomic orbital and must have opposite spin
- 5) The arrangement of electrons in an atom
- 6)  $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^5$
- 7)  $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^1$
- 8)  $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2$
- 9)  $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^4$
- 10)  $[\text{Xe}]6s^2 4f^{14} 5d^4$
- 11)  $[\text{Xe}]6s^2 4f^{14} 5d^9$
- 12)  $[\text{Kr}]5s^1$
- 13)

alkali metals	noble gases
alkaline earth metals	halogens
other metals	
semiconductors	

Group:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Period	1A	2A	3B	4B	5B	6B	7B	8B			1B	2B	3A	4A	5A	6A	7A	8A
1	1 <a href="#">H</a>																	2 <a href="#">He</a>
2	3 <a href="#">Li</a>	4 <a href="#">Be</a>											5 <a href="#">B</a>	6 <a href="#">C</a>	7 <a href="#">N</a>	8 <a href="#">O</a>	9 <a href="#">F</a>	10 <a href="#">Ne</a>
3	11 <a href="#">Na</a>	12 <a href="#">Mg</a>											13 <a href="#">Al</a>	14 <a href="#">Si</a>	15 <a href="#">P</a>	16 <a href="#">S</a>	17 <a href="#">Cl</a>	18 <a href="#">Ar</a>
4	19 <a href="#">K</a>	20 <a href="#">Ca</a>	21 <a href="#">Sc</a>	22 <a href="#">Ti</a>	23 <a href="#">V</a>	24 <a href="#">Cr</a>	25 <a href="#">Mn</a>	26 <a href="#">Fe</a>	27 <a href="#">Co</a>	28 <a href="#">Ni</a>	29 <a href="#">Cu</a>	30 <a href="#">Zn</a>	31 <a href="#">Ga</a>	32 <a href="#">Ge</a>	33 <a href="#">As</a>	34 <a href="#">Se</a>	35 <a href="#">Br</a>	36 <a href="#">Kr</a>
5	37 <a href="#">Rb</a>	38 <a href="#">Sr</a>	39 <a href="#">Y</a>	40 <a href="#">Zr</a>	41 <a href="#">Nb</a>	42 <a href="#">Mo</a>	[43] <a href="#">Tc</a>	44 <a href="#">Ru</a>	45 <a href="#">Rh</a>	46 <a href="#">Pd</a>	47 <a href="#">Ag</a>	48 <a href="#">Cd</a>	49 <a href="#">In</a>	50 <a href="#">Sn</a>	51 <a href="#">Sb</a>	52 <a href="#">Te</a>	53 <a href="#">I</a>	54 <a href="#">Xe</a>
6	55 <a href="#">Cs</a>	56 <a href="#">Ba</a>	*	72 <a href="#">Hf</a>	73 <a href="#">Ta</a>	74 <a href="#">W</a>	75 <a href="#">Re</a>	76 <a href="#">Os</a>	77 <a href="#">Ir</a>	78 <a href="#">Pt</a>	79 <a href="#">Au</a>	80 <a href="#">Hg</a>	81 <a href="#">Tl</a>	82 <a href="#">Pb</a>	83 <a href="#">Bi</a>	84 <a href="#">Po</a>	85 <a href="#">At</a>	86 <a href="#">Rn</a>
7	87 <a href="#">Fr</a>	88 <a href="#">Ra</a>	**	[104] <a href="#">Unq</a>	[105] <a href="#">Unp</a>	[106] <a href="#">Unh</a>	[107] <a href="#">Uns</a>	[108] <a href="#">Uno</a>	[109] <a href="#">Une</a>	[110] <a href="#">Uun</a>	[111] <a href="#">Uuu</a>	[112] <a href="#">Uub</a>	[113] <a href="#">Uut</a>	[114] <a href="#">Uuq</a>	[115] <a href="#">Uup</a>	[116] <a href="#">Uuh</a>	[117] <a href="#">Uus</a>	[118] <a href="#">Uuo</a>

- 14) 1A - alkali metals
- 15) 8A - noble gases
- 16) 2A - alkaline earth metals
- 17) 4A - Metalloids (semi conductors)
- 18)  $m_s, n, m, l$

19)

Name of Quantum #	Principal Energy Level	Angular Momentum Quantum #	Magnetic Quantum #	Spin Quantum #
Symbol	n	l	m	$m_s$
What it represents	Main Energy Level	Shape of the Orbital	Orientation (x, y, or z axis)	Which way $e^-$ is spinning

- 20) The increase in energy levels causes the element to get larger  
21) It decreases because of increased nuclear charge.  
22) If an element loses an electron the radius will get smaller  
23) If an element gains an electron the radius will get larger  
24) Decreases because Decreases top to bottom because: electrons are further away from the nucleus so there is not as much attraction between the nucleus and electrons. They can be pried loose more easily.  
25) Increases because you have an increased nuclear charge  
26) The distance between energy levels  
27)  $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^5$       $3s^2 + 3p^6 + 3d^5 = 2+6+5 = 13$  electrons in the 3rd energy level  
28) 2, 2, 2, 2  
29) 1, 3, 5, 7  
30) trick-trick question! Actually the same question as #28. 2,2,2,2  
31) 1,2 cation. Alkali = +1 Alkaline earth metal = +2  
32) Transition Metal - Cobalt  
33) Transition Metals  
34) F = most     Astatine = least  
35) 6A  
36)  $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6$