

Announcements – Lecture IX – Tuesday, June 4th

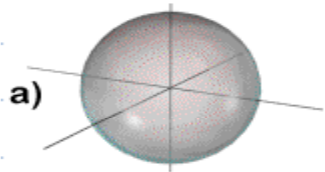
3^{RO} LAB: TODAY, 1:30-4:30, ISB 155 (B-D)



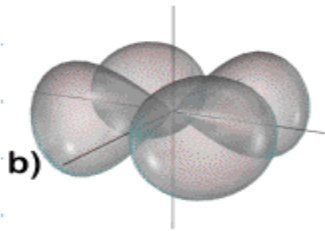
Quiz 6

Last Name: _____

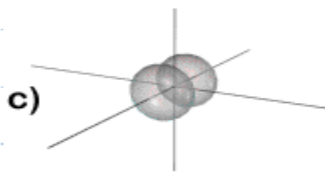
1. Label the orbitals depicted on the left as either s, p, d, f, or g.



s

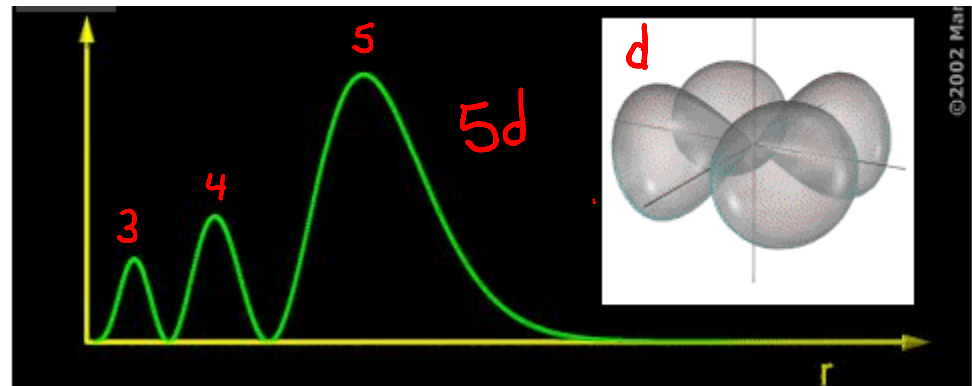


d



p

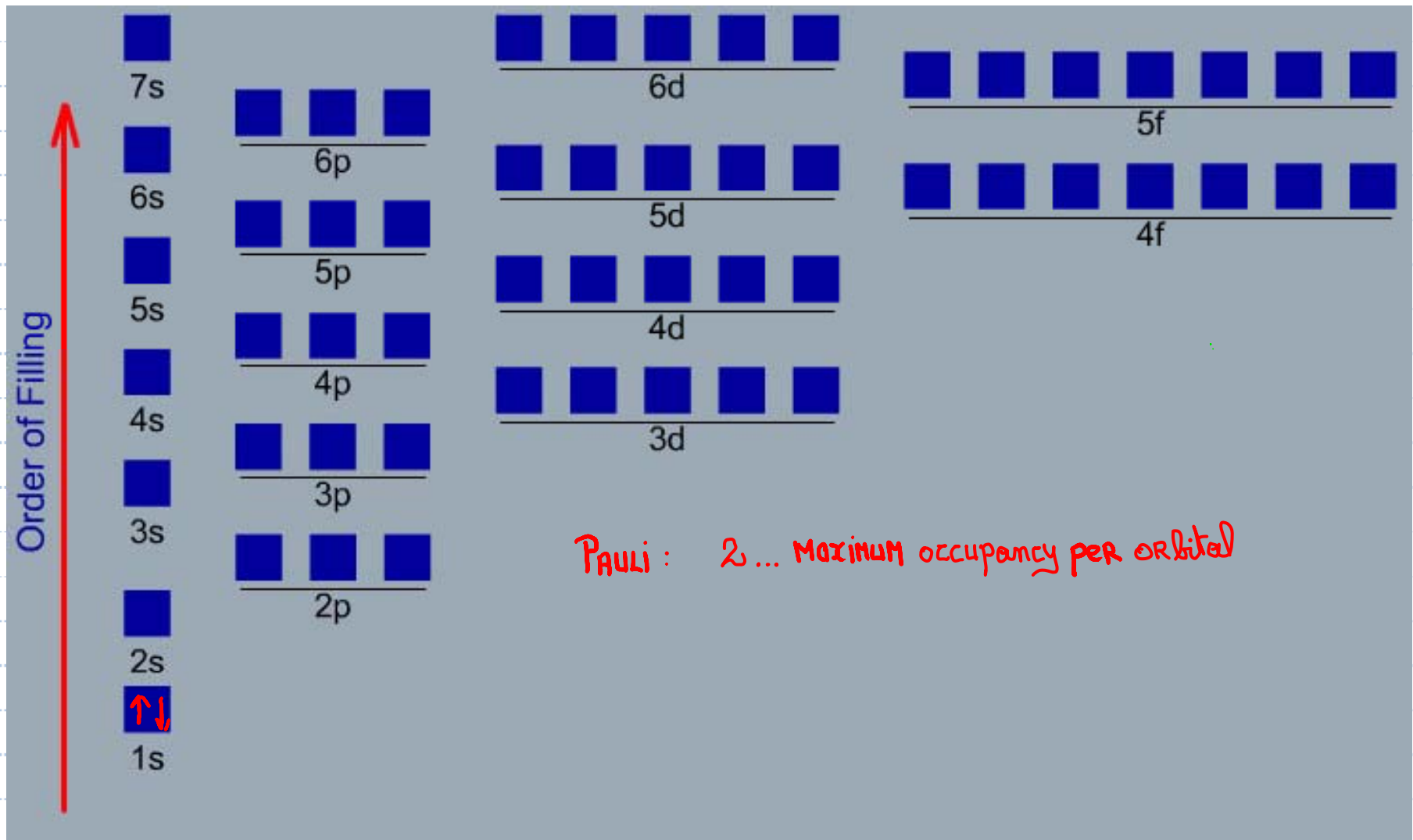
2. Label the orbital depicted below as either s, p, d, f, g – and give its correct n designation (ie 1, 2, 3, 4, 5, 6, 7, or 8)



Schematic plot of the radial distribution function

7.3 Electron Configuration of the Elements

A: The Pauli Exclusion Principle



7.3 Electron Configurations

B: spdf Notation

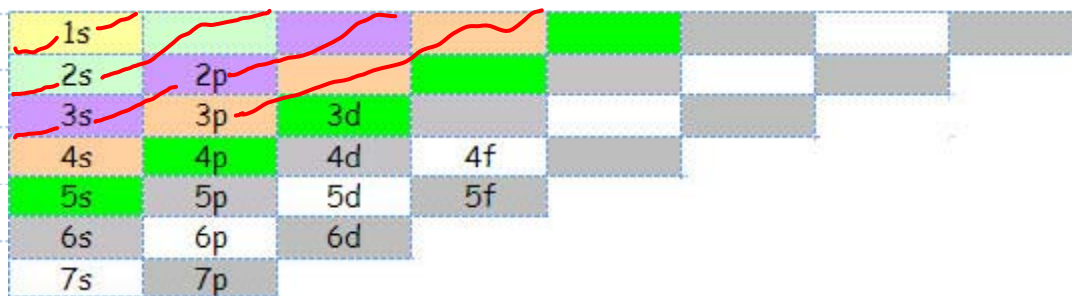
1s						
2s	2p					
3s	3p	3d				
4s	4p	4d	4f			
5s	5p	5d	5f			
6s	6p	6d				
7s	7p					

Element	#e-	Electronic Configuration	Valence Configuration	#Valence e-
H	1	$1s^1$		
He	2	$1s^2$		
Li	3	$1s^2 2s^1$		
Be	4	$1s^2 2s^2$		
B	5	$1s^2 2s^2 2p^1$		
C	6	$1s^2 2s^2 2p^2$		
N	7	$1s^2 2s^2 2p^3$		
O	8	$1s^2 2s^2 2p^4$		
F	9	$1s^2 2s^2 2p^5$		
Ne	10	$1s^2 2s^2 2p^6$		



7.3 Electron Configurations

B: spdf Notation



Element	#e-	Electronic Configuration	Valence Configuration	#Valence e-
Na	11	$1s^2 2s^2 2p^6 3s^1$		
Mg	12	$1s^2 2s^2 2p^6 3s^2$		
Al	13	$1s^2 2s^2 2p^6 3s^2 3p^1$		
Si	14	$1s^2 2s^2 2p^6 3s^2 3p^2$		
P	15	$1s^2 2s^2 2p^6 3s^2 3p^3$		
S	16	$1s^2 2s^2 2p^6 3s^2 3p^4$		
Cl	17	$1s^2 2s^2 2p^6 3s^2 3p^5$		
Ar	18	$1s^2 2s^2 2p^6 3s^2 3p^6$		

7.3 Electron Configurations

B: Valence Notation

1s						
2s	2p					
3s	3p	3d				
4s	4p	4d	4f			
5s	5p	5d	5f			
6s	6p	6d				
7s	7p					

Element	#e-	Electronic Configuration	Valence Configuration	#Valence e-
H	1	$1s^1$	$1s^1$	
He	2	$1s^2$	$1s^2$	
Li	3	$1s^2 2s^1$	$[He] 2s^1$	
Be	4	$1s^2 2s^2$	$[He] 2s^2$	
B	5	$1s^2 2s^2 2p^1$	$[He] 2s^2 2p^1$	
C	6	$1s^2 2s^2 2p^2$	$[He] 2s^2 2p^2$	
N	7	$1s^2 2s^2 2p^3$	$[He] 2s^2 2p^3$	
O	8	$1s^2 2s^2 2p^4$	$[He] 2s^2 2p^4$	
F	9	$1s^2 2s^2 2p^5$	$[He] 2s^2 2p^5$	
Ne	10	$1s^2 2s^2 2p^6$	$[He] 2s^2 2p^6$	



7.3 Electron Configurations B: Valence Notation

1s						
2s	2p					
3s	3p	3d				
4s	4p	4d	4f			
5s	5p	5d	5f			
6s	6p	6d				
7s	7p					

Element	#e-	Electronic Configuration	Valence Configuration	#Valence e-
Na	11	$1s^2 2s^2 2p^6 3s^1$	$[\text{Ne}] 3s^1$	1
Mg	12	$1s^2 2s^2 2p^6 3s^2$	$[\text{Ne}] 3s^2$	2
Al	13	$1s^2 2s^2 2p^6 3s^2 3p^1$	$[\text{Ne}] 3s^2 3p^1$	3
Si	14	$1s^2 2s^2 2p^6 3s^2 3p^2$	$[\text{Ne}] 3s^2 3p^2$	4
P	15	$1s^2 2s^2 2p^6 3s^2 3p^3$	$[\text{Ne}] 3s^2 3p^3$	5
S	16	$1s^2 2s^2 2p^6 3s^2 3p^4$	$[\text{Ne}] 3s^2 3p^4$	6
Cl	17	$1s^2 2s^2 2p^6 3s^2 3p^5$	$[\text{Ne}] 3s^2 3p^5$	7
Ar	18	$1s^2 2s^2 2p^6 3s^2 3p^6$	$[\text{Ne}] 3s^2 3p^6$	8

7.3 Electron Configurations

B: # Valence e-

MAIN GROUP:

electrons in the highest n orbitals

1s						
2s	2p					
3s	3p	3d				
4s	4p	4d	4f			
5s	5p	5d	5f			
6s	6p	6d				
7s	7p					

Element	#e-	Electronic Configuration	Valence Configuration	#Valence e-
H	1	$1s^1$	$1s^1$	<u>1</u>
He	2	$1s^2$	$1s^2$	<u>2</u>
Li	3	$1s^2 2s^1$	$[He]2s^1$	<u>1</u>
Be	4	$1s^2 2s^2$	$[He]2s^2$	<u>2</u>
B	5	$1s^2 2s^2 2p^1$	$[He]2s^2 2p^1$	<u>3</u>
C	6	$1s^2 2s^2 2p^2$	$[He]2s^2 2p^2$	<u>4</u>
N	7	$1s^2 2s^2 2p^3$	$[He]2s^2 2p^3$	<u>5</u>
O	8	$1s^2 2s^2 2p^4$	$[He]2s^2 2p^4$	<u>6</u>
F	9	$1s^2 2s^2 2p^5$	$[He]2s^2 2p^5$	<u>7</u>
Ne	10	$1s^2 2s^2 2p^6$	$[He]2s^2 2p^6$	<u>8</u>



7.3 Electron Configurations

B: # Valence e-

1s						
2s	2p					
3s	3p	3d				
4s	4p	4d	4f			
5s	5p	5d	5f			
6s	6p	6d				
7s	7p					

Element	#e-	Electronic Configuration	Valence Configuration	#Valence e-
Na	11	$1s^2 2s^2 2p^6 3s^1$	$[\text{Ne}]3s^1$	<u>1</u>
Mg	12	$1s^2 2s^2 2p^6 3s^2$	$[\text{Ne}]3s^2$	<u>2</u>
Al	13	$1s^2 2s^2 2p^6 3s^2 3p^1$	$[\text{Ne}]3s^2 3p^1$	<u>3</u>
Si	14	$1s^2 2s^2 2p^6 3s^2 3p^2$	$[\text{Ne}]3s^2 3p^2$	<u>4</u>
P	15	$1s^2 2s^2 2p^6 3s^2 3p^3$	$[\text{Ne}]3s^2 3p^3$	<u>5</u>
S	16	$1s^2 2s^2 2p^6 3s^2 3p^4$	$[\text{Ne}]3s^2 3p^4$	<u>6</u>
Cl	17	$1s^2 2s^2 2p^6 3s^2 3p^5$	$[\text{Ne}]3s^2 3p^5$	<u>7</u>
Ar	18	$1s^2 2s^2 2p^6 3s^2 3p^6$	$[\text{Ne}]3s^2 3p^6$	<u>8</u>

7.3 Electron Configurations of the Elements

D: Electron Configurations and the Periodic Table

GROUP 2A ... preferred charge, +2

1s						
2s	2p					
3s	3p	3d				
4s	4p	4d	4f			
5s	5p	5d	5f			
6s	6p	6d				
7s	7p					

Element	#e-	Electronic Configuration	Valence Configuration	#Valence e-
Be	4		[He]2s ²	<u>2</u>
Mg	12		[Ne]3s ²	<u>2</u>
Ca	20		[Ar]4s ²	<u>2</u>
Sr	38		[Kr]5s ²	<u>2</u>

7.3 Electron Configurations of the Elements

D: Electron Configurations and the Periodic Table

Group 6A ... preferred charge, -2

1s						
2s	2p					
3s	3p	3d				
4s	4p	4d	4f			
5s	5p	5d	5f			
6s	6p	6d				
7s	7p					

Element	#e-	Electronic Configuration	Valence Configuration	#Valence e-
O	8		$[\text{He}]2s^2 2p^4$	<u>6</u>
S	16		$[\text{Ne}] 3s^2 3p^4$	<u>6</u>
Se	34		$[\text{Ar}]4s^2 3d^{10}4p^4$	<u>6</u>
Te	52		$[\text{Kr}]5s^2 4d^{10}5p^4$	<u>6</u>

7.3 Electron Configurations of the Elements

D: Electron Configurations and the Periodic Table – Group 8A

1s						
2s	2p					
3s	3p	3d				
4s	4p	4d	4f			
5s	5p	5d	5f			
6s	6p	6d				
7s	7p					

Element	#e-	Electronic Configuration	Valence Configuration	#Valence e-
He	2		$1s^2$	<u>2</u>
Ne	10		$[\text{He}]2s^2 2p^6$	<u>8</u>
Ar	18		$[\text{Ne}]3s^2 3p^6$	<u>8</u>
Kr	36		$[\text{Ar}]4s^2 3d^{10} 4p^6$	<u>8</u>
Xe	54		$[\text{Kr}]5s^2 4d^{10} 5p^6$	<u>8</u>
Rn	86		$[\text{Xe}]6s^2 5d^{10} 4f^{14} 6p^6$	<u>8</u>