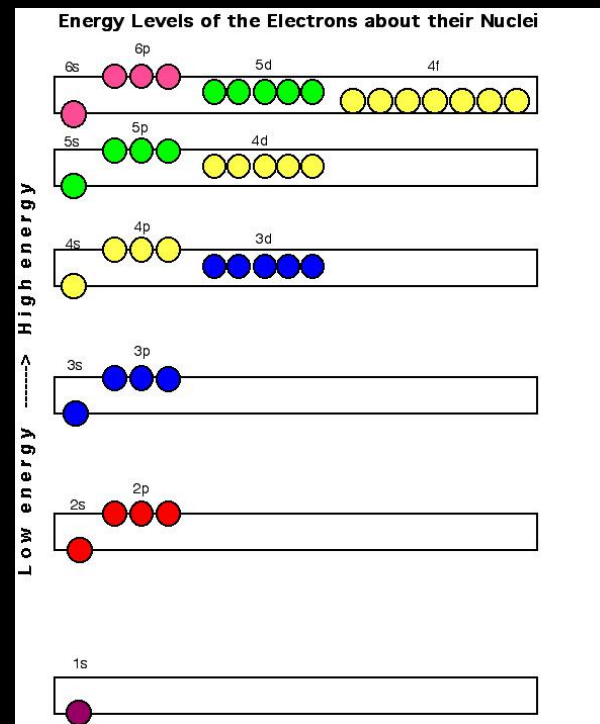
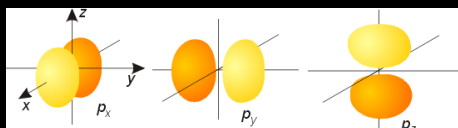
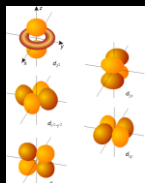
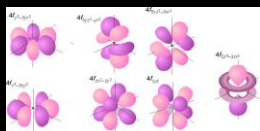


# Electron Configuration Problems



1		Metalloids																Metals		18																				
1		Alkali Earth Metals										Halogens		Noble Gases		2																								
3		Transition Metals										Lanthanides		Actinides		4																								
4		Non-Metals										Transactinides		10																										
5		Alkali Metals										Lanthanides		10																										
6		Actinides										10																												
1	H																	He	2																					
2	Li	Be											B	C	N	O	F	Ne	10																					
3	Na	Mg	Al	Si	P	S	Cl	Ar			K	Ca	Sc	Ti	V	Cr	Mn	Fe	Cu	Zn	Ga	Ge	As	Se	Br	Kr	36													
4	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Cu	Ni	Zn	Ga	Ge	As	Se	Br	Kr			Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe	54		
5	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe			Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn	86	
6	Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn			Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Uub	Uut	Uuq	Uup	Uuh	Uus	Uuo	118	
7	Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Uub	Uut	Uuq	Uup	Uuh	Uus	Uuo																						
Lanthanide Series		58	59	60	61	62	63	64	65	66	67	68	69	70	71																									
Actinide Series		90	91	92	93	94	95	96	97	98	99	100	101	102	103																									
		232	231	238	237	244	243	247	251	252	257	258	269	262																										

# Walking Through The Periodic Table

Electron Configuration = a walk through the table

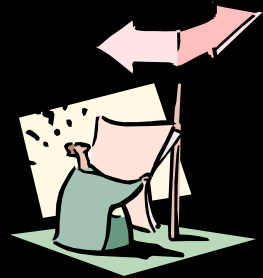
What element has the electron configuration  $1s^2 2s^2 2p^4$ ? **O**

What period is it in? **2**

What group is it in? **6**

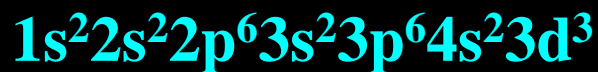
How many valence electrons? **6**

Without “Table”  
Coefficient = period  
“A” Group = s + p



		Metalloids										Metals																	
		Alkali Earth Metals			Transition Metals			Non Metals				Alkali Metals		Transactinides		Noble Gases		Lanthanides											
		Actinides																											
1	2	Element: <input type="text" value="O"/>																											
1	2	H																	He										
2	10	Li	Be	B	C	N	O	F	Ne																				
3	18	Na	Mg	Al	Si	P	S	Cl	Ar																				
4	36	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr										
5	54	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe										
6	86	Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn										
7	118	Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Uub	Uut	Uuq	Uup	Uuh	Uus	Uuo										
Lanthanide Series		58	59	60	61	62	63	64	65	66	67	68	69	70	71														
		Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu														
Actinide Series		90	91	92	93	94	95	96	97	98	99	100	101	102	103														
		Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr														

# Identify the elements with electron configurations



V

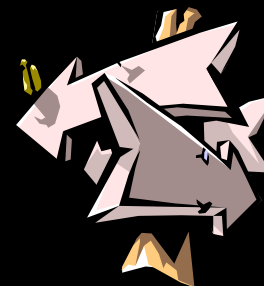
		Metalloids										Metals																							
		Alkali Earth Metals			Transition Metals				Non Metals			Halogens			Noble Gases																				
		Alkali Metals			Transition Metals				Non Metals			Halogens			Noble Gases																				
		Actinides			Lanthanides				Non Metals			Halogens			Noble Gases																				
1	1	H	2	He																															
2	3	Li	4	Be	5	6	7	8	9	10	11	12	13	14	15	16	17	18	He																
3	11	Na	12	Mg	13	14	15	16	17	18	Ar																								
4	19	K	20	Ca	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	Kr														
5	37	Rb	38	Sr	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	Xe														
6	55	Cs	56	Ba	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	Rn
7	87	Fr	88	Ra	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	Uuo
Lanthanide Series		58	59	60	61	62	63	64	65	66	67	68	69	70	71																				
Actinide Series		90	91	92	93	94	95	96	97	98	99	100	101	102	103																				



Ne



Si



# Write the ground state electron configuration of:

**Manganese**



**Cobalt**



**Nickel**



**Magnesium**



**Chlorine**  
 $1s^2 2s^2 2p^6 3s^2 3p^5$

		Element:																	
		atomic number																	
		symbol																	
		atomic weight																	
1	2																	18	
1	H																	He	1
2	3	4															10	2	
	Li	Be															Ne		
	6.9	9.01															20		
3	11	12	13	14	15	16	17	18									36	3	
	Na	Mg	Al	Si	P	S	Cl	Ar											
	23	24.3	27	28.1	31	32.1	35.5	39.9											
4	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	4
	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr	
	39.1	40.1	45	47.9	50.9	52	54.9	55.8	58.9	58.7	63.5	65.4	69.7	72.6	74.9	79	79.9	83.8	
5	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	5
	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe	
	85.5	87.6	88.9	91.2	92.9	95.9	98	101	103	106	108	112	115	119	122	128	127	131	
6	55	56	57	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	6
	Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn	
	133	137	139	178	181	184	186	190	192	195	197	201	204	207	209	209	210	222	
7	87	88	89	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	7
	Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Uub	Uut	Uuq	Uup	Uuh	Uus	Uuo	
	223	226	227	261	262	266	264	269	268	281	272	285	284	289	288	292			
Lanthanide Series	6	58	59	60	61	62	63	64	65	66	67	68	69	70	71				
		Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu				
		140	141	144	145	150	152	157	159	162	165	167	169	173	175				
Actinide Series	7	90	91	92	93	94	95	96	97	98	99	100	101	102	103				
		Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr				
		232	231	238	237	244	243	247	247	251	252	257	258	259	262				



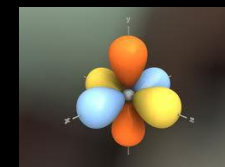


# What is the # of valence electrons in atoms of carbon & silicon?

Carbon and Silicon members of family 4A → 4 electrons



1												18														
1	H 1.01											2	He 4	1												
2	Li 6.94	Be 9.01											3	B 10.8	4	C 12	5	N 14	6	O 16	7	F 19	8	Ne 20.2	2	
3	Na 23	Mg 24.3											13	Al 27	14	Si 28.1	15	P 31	16	S 32.1	17	Cl 35.5	18	Ar 39.9	3	
4	K 39.1	Ca 40.1	Sc 45	Ti 47.9	V 50.9	Cr 52	Mn 54.9	Fe 55.8	Co 58.9	Ni 58.7	Cu 63.5	Zn 65.4	31	Ga 69.7	32	Ge 72.6	33	As 74.9	34	Se 79	35	Br 79.9	36	Kr 83.8	4	
5	Rb 85.5	Sr 87.6	Y 88.9	Zr 91.2	Nb 92.9	Mo 95.9	Tc 98	Ru 101	Rh 103	Pd 106	Ag 108	Cd 112	49	In 115	50	Sn 119	51	Sb 122	52	Te 128	53	I 127	54	Xe 131	5	
6	Cs 133	Ba 137	La 139	Hf 178	Ta 181	W 184	Re 186	Os 190	Ir 192	Pt 195	Au 197	Hg 201	81	Tl 204	82	Pb 207	83	Bi 209	84	Po 209	85	At 210	86	Rn 222	6	
7	Fr 223	Ra 226	Ac 227	Rf 261	Db 262	Sg 266	Bh 264	Hs 269	Mt 268	Ds 281	Rg 272	112	Uub 285	113	Uut 284	114	Uuq 289	115	Uup 288	116	Uuh 291	117	Uus 294	118	Uuo 294	7
Lanthanide Series			6	Ce 140	Pr 141	Nd 144	Pm 145	Sm 150	Eu 152	Gd 157	Tb 159	Dy 162	Ho 165	Er 167	Tm 169	Yb 173	Lu 175									
Actinide Series			7	Th 232	Pa 231	U 238	Np 237	Pu 244	Am 243	Cm 247	Bk 247	Cf 251	Es 252	Fm 257	Md 258	Nm 259	Lr 262									

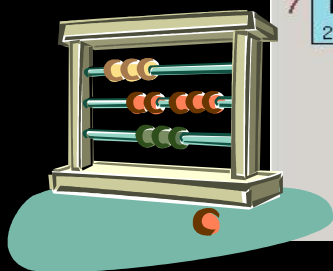
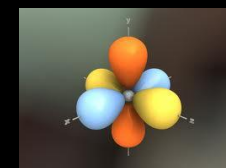


Which group of the Periodic Table does  $ns^2np^4$  represent?

Valence shell is  $s + p: 2 + 4 = 6 \rightarrow$  VIA (16)

# Comparing Entities: Looking for IsoElectronic Atoms

1																		18																	
1	<b>H</b> 1.01																	<b>He</b> 4	1																
2	<b>Li</b> 6.94	<b>Be</b> 9.01															<b>Ne</b> 20.2	2																	
3	<b>Na</b> 23	<b>Mg</b> 24.3													<b>Ar</b> 39.9	3																			
4	<b>K</b> 39.1	<b>Ca</b> 40.1	<b>Sc</b> 45	<b>Ti</b> 47.9	<b>V</b> 50.9	<b>Cr</b> 52	<b>Mn</b> 54.9	<b>Fe</b> 55.8	<b>Co</b> 58.9	<b>Ni</b> 58.7	<b>Cu</b> 63.5	<b>Zn</b> 65.4	<b>Ga</b> 69.7	<b>Ge</b> 72.6	<b>As</b> 74.9	<b>Se</b> 79	<b>Br</b> 79.9	<b>Kr</b> 83.8	4																
5	<b>Rb</b> 85.5	<b>Sr</b> 87.6	<b>Y</b> 88.9	<b>Zr</b> 91.2	<b>Nb</b> 92.9	<b>Mo</b> 95.9	<b>Tc</b> 98	<b>Ru</b> 101	<b>Rh</b> 103	<b>Pd</b> 106	<b>Ag</b> 108	<b>Cd</b> 112	<b>In</b> 115	<b>Sn</b> 119	<b>Sb</b> 122	<b>Te</b> 128	<b>I</b> 127	<b>Xe</b> 131	5																
6	<b>Cs</b> 133	<b>Ba</b> 137	<b>La</b> 139	<b>Hf</b> 178	<b>Ta</b> 181	<b>W</b> 184	<b>Re</b> 186	<b>Os</b> 190	<b>Ir</b> 192	<b>Pt</b> 195	<b>Au</b> 197	<b>Hg</b> 201	<b>Tl</b> 204	<b>Pb</b> 207	<b>Bi</b> 209	<b>Po</b> 209	<b>At</b> 210	<b>Rn</b> 222	6																
7	<b>Fr</b> 223	<b>Ra</b> 226	<b>Ac</b> 227	<b>Rf</b> 261	<b>Db</b> 262	<b>Sg</b> 266	<b>Bh</b> 264	<b>Hs</b> 269	<b>Mt</b> 268	<b>Ds</b> 281	<b>Rg</b> 272	<b>Uub</b> 285	<b>Uut</b> 284	<b>Uuq</b> 289	<b>Uup</b> 288	<b>Uuh</b> 292	<b>Uus</b> 292	<b>Uuo</b> 292	7																
Lanthanide Series			6	<b>Ce</b> 140	<b>Pr</b> 141	<b>Nd</b> 144	<b>Pm</b> 145	<b>Sm</b> 150	<b>Eu</b> 152	<b>Gd</b> 157	<b>Tb</b> 159	<b>Dy</b> 162	<b>Ho</b> 165	<b>Er</b> 167	<b>Tm</b> 169	<b>Yb</b> 173	<b>Lu</b> 175																		
Actinide Series			7	<b>Th</b> 232	<b>Pa</b> 231	<b>U</b> 238	<b>Np</b> 237	<b>Pu</b> 244	<b>Am</b> 243	<b>Cm</b> 247	<b>Bk</b> 247	<b>Cf</b> 251	<b>Es</b> 252	<b>Fm</b> 257	<b>Md</b> 258	<b>No</b> 259	<b>Lr</b> 262																		



**Loses Electrons (Becomes More Positive): Move to Left**  
**Gains Electrons (Becomes More Negative): Move to Right**  
**Number on Charge Determines How Many Spaces to Move**

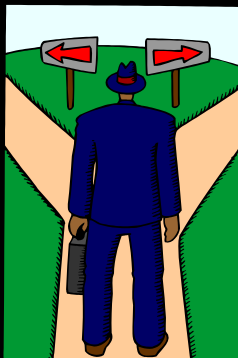
# Which Atoms Are Isoelectronic?

$\text{N}^{3-}$  [Ne] &  $\text{F}^-$  [Ne] Yes, both have same configuration (Ne)

$\text{K}^+$  [Ar] &  $\text{Br}^-$  [Kr] No, different outer shells

$\text{C}^{4-}$  [Ne] &  $\text{O}^{2-}$  [Ne] Yes, both have same configuration (Ne)

$\text{Mg}^{2+}$  [Ne] &  $\text{Ca}^{2+}$  [Ar] No, different outer shells

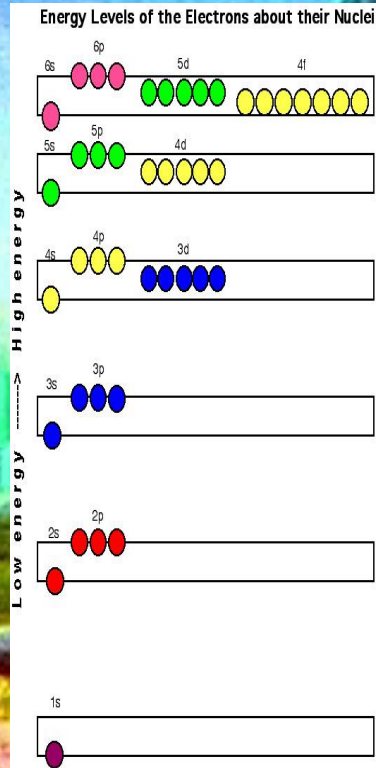


		Metalloids										Metals													
		Alkali Earth Metals			Transition Metals							Halogens			Noble Gases										
		Non Metals		Transactinides																					
		Alkali Metals		Lanthanides																					
		Actinides																							
1	1	H	2											18	2	He									
	1	1.01													4										
2	3	Li	4	Be											10	2	Ne								
	2	6.94	9.01												20.2										
3	11	Na	12	Mg	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18					
	3	23	24.3											27	28.1	31	32.1	35.5	39.9						
4	19	K	20	Ca	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36					
	4	39.1	40.1	45	47.9	50.9	52	54.9	55.8	58.7	58.7	63.5	65.4	69.7	72.6	74.9	79	79.9	83.8						
5	37	Rb	38	Sr	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54					
	5	85.5	87.6	88.9	91.2	92.9	95.9	98	101	103	106	108	112	115	119	122	128	127	131						
6	55	Cs	56	Ba	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72					
	6	133	137	139	178	181	184	186	190	192	195	197	201	204	207	209	210	210	222						
7	87	Fr	88	Ra	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103						
	7	223	226	227	261	262	266	264	269	268	281	272	285	284	289	288	292								
		Lanthanide Series										Actinide Series													
		58	59	60	61	62	63	64	65	66	67	68	69	70	71										
		Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu										
		140	141	144	145	150	152	157	159	162	165	167	169	173	175										
		90	91	92	93	94	95	96	97	98	99	100	101	102	103										
		Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr										
		232	231	238	237	244	243	247	247	251	252	257	258	259	262										



# Path To Success

		Metals		Nonmetals		Metalloids		Transition Metals		Alkali Earth Metals		Halogens		Noble Gases		Other		
		Alkali Metals		Alkaline Earth Metals		Transition Metals		Transition Metals		Transition Metals		Halogens		Noble Gases		Other		
		Alkali Metals		Alkaline Earth Metals		Transition Metals		Transition Metals		Transition Metals		Halogens		Noble Gases		Other		
		Alkali Metals		Alkaline Earth Metals		Transition Metals		Transition Metals		Transition Metals		Halogens		Noble Gases		Other		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
1	H																He	
2	Li	Be											B	C	N	O	F	Ne
3	Na	Mg											Al	Si	P	S	Cl	Ar
4	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Cu	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
5	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
6	Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
7	Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Uub	Uut	Uuq	Uup	Uuh	Uus	Uuo
Lanthanide Series		58	59	60	61	62	63	64	65	66	67	68	69	70	71			
Actinide Series		90	91	92	93	94	95	96	97	98	99	100	101	102	103			



Start at Hydrogen  
Walk Through Tables –one electron at a time  
until  
Element or Configuration is reached