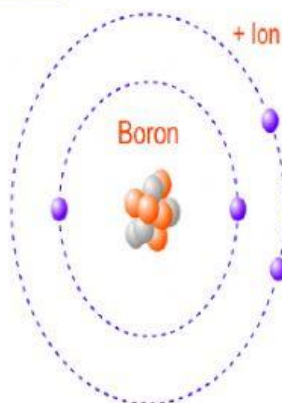


UNIT 1: ATOMIC STRUCTURE REVIEW

Protons: ●●●●●
Neutrons: ●●●●●
Electrons: ●●●●●



Element

B

Net Charge

+1

Mass Number

9

Based on the diagram shown to the left, fill out the numbers



Z=___ is _____

A=___ is _____

C=___ is _____

Atom	# of protons	# of neutrons	# of electron	Mass #
${}^{42}_{20}\text{Ca}^{+2}$				
S-34				

- Ions are atoms that are _____
- Isotopes of a given element differ by _____.
This is because different isotopes of a given element have different numbers of _____ (protons, neutrons, electrons).

Cations are atoms that have a _____ (Positive/negative) charge obtained by _____ (losing, gaining) electrons.

Anions are atoms that have a _____ (Positive/negative) charge obtained by _____ (losing, gaining) electrons.

HALF LIFE CALCULATIONS

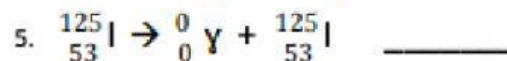
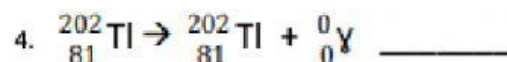
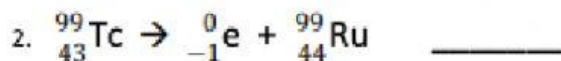
What is the half life of an element that degrades from 100g to 25g over 5000 years?

The half life of element X is 240 days. If I begin with a 23g sample how much would remain after 1200 days?

An element that has a half life of 10 days decays from 500 grams to 31.25 grams. How much time passed?

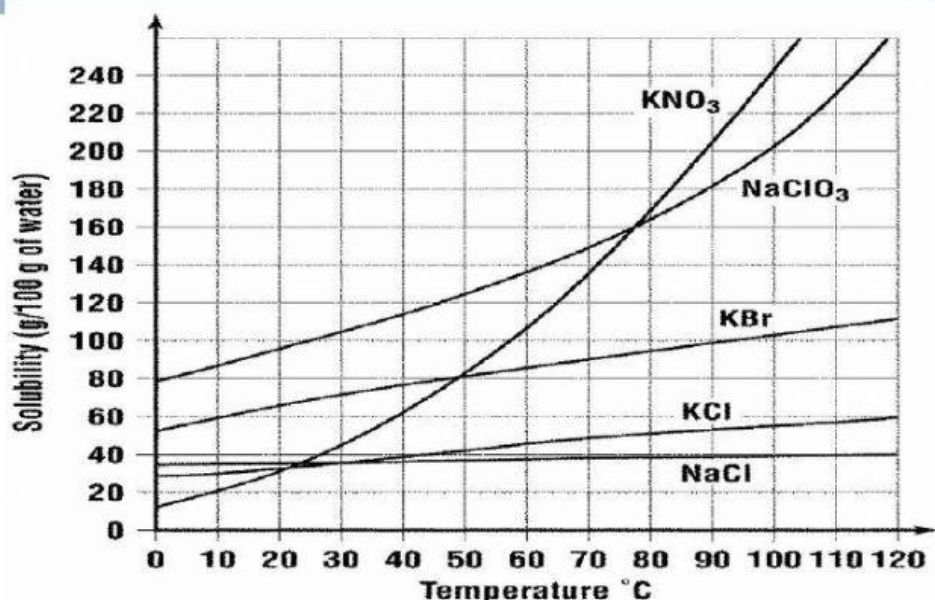
Radioactive Decay Problems

Identify the following examples as alpha, beta, or gamma decay.



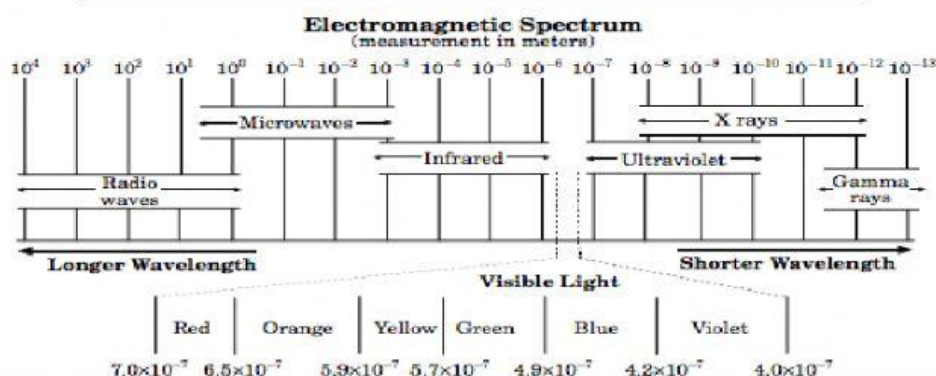
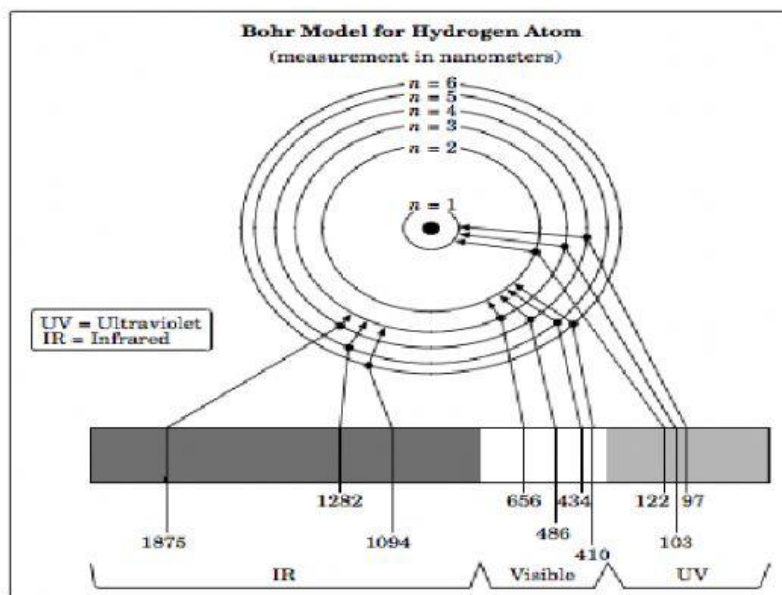
Solubility Curve Problems

Reading Solubility Graphs



- Which Salt is most soluble at 90 degrees Celsius?
- Which Salt undergoes the greatest change in solubility with an increase in temperature?
- How many grams of KBr at 90 degrees Celsius are needed to form a saturated solution in...
 - 100 grams of water _____ 200 grams of water _____
- 100 grams of NaClO₃ at 50 degrees Celsius forms what type of solution?
- If I add 140 grams of KBr at 90 degrees Celsius in 100 grams of water, _____ grams of KBr will dissolve and _____ grams of KBr will remain undissolved.
- If I add 100 grams of KCl at 110 degrees Celsius in 100 grams of water, _____ grams of KCl will dissolve and _____ grams of KCl will remain undissolved.

UNIT 2 EM SPECTRUM



Do microwaves or ultraviolet rays have a longer wavelength? _____

Does blue light or orange light have a higher energy? _____

Rank infrared, x-rays, and green light from lowest to highest frequency. _____

As an electron falls from $n=4$ energy level to $n=2$ energy level, it is in the _____ light spectrum and has a value of _____ nm. The colored light that is emitted is _____.

To emit a IR, an electron falls from $n=6$ energy level to $n=?$ _____

As wavelength increases, frequency _____. As frequency increases, energy _____.

UNIT 2 Periodic Table Properties

PERIODIC TABLE

1 IA H Hydrogen 1.008	2 IIA He Helium 4.003																
3 Li Lithium 6.941	4 Be Beryllium 9.012																
11 Na Sodium 22.99	12 Mg Magnesium 24.31	13 Al Aluminum 26.98	14 Si Silicon 28.09	15 P Phosphorus 30.97	16 S Sulfur 32.07	17 Cl Chlorine 35.45	18 Ar Argon 39.95										
19 K Potassium 39.10	20 Ca Calcium 40.08	21 Sc Scandium 44.96	22 Ti Titanium 47.88	23 V Vanadium 50.94	24 Cr Chromium 51.99	25 Mn Manganese 54.94	26 Fe Iron 55.85	27 Co Cobalt 58.93	28 Ni Nickel 58.69	29 Cu Copper 63.55	30 Zn Zinc 65.39	31 Ga Gallium 69.72	32 Ge Germanium 72.61	33 As Arsenic 74.92	34 Se Selenium 78.96	35 Br Bromine 79.90	36 Kr Krypton 83.80
37 Rb Rubidium 85.47	38 Sr Strontium 87.62	39 Y Yttrium 88.91	40 Zr Zirconium 91.22	41 Nb Niobium 92.91	42 Mo Molybdenum 95.94	43 Tc Technetium (98)	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.91	46 Pd Palladium 106.42	47 Ag Silver 107.87	48 Cd Cadmium 112.41	49 In Indium 114.82	50 Sn Tin 118.71	51 Sb Antimony 121.76	52 Te Tellurium 127.60	53 I Iodine 126.90	54 Xe Xenon 131.29
55 Cs Cesium 132.91	56 Ba Barium 137.33	57 La Lanthanum 138.91	58 Ce Cerium 140.12	59 Pr Praseodymium 140.91	60 Nd Neodymium 144.24	61 Pm Promethium (145)	62 Sm Samarium 150.36	63 Eu Europium 151.96	64 Gd Gadolinium 157.25	65 Tb Terbium 158.93	66 Dy Dysprosium 162.50	67 Ho Holmium 164.93	68 Er Erbium 167.26	69 Tm Thulium 168.93	70 Yb Ytterbium 173.04	71 Lu Lutetium 174.97	72 Hf Hafnium 178.49
87 Fr Francium (223)	88 Ra Radium (226)	89 Ac Actinium (227)	90 Th Thorium (232)	91 Pa Protactinium (231)	92 U Uranium (238)	93 Np Neptunium (237)	94 Pu Plutonium (244)	95 Am Americium (243)	96 Cm Curium (247)	97 Bk Berkelium (247)	98 Cf Californium (251)	99 Es Einsteinium (252)	100 Fm Fermium (257)	101 Md Mendelevium (258)	102 No Nobelium (259)	103 Lr Lawrencium (262)	104 Rf Rutherfordium (261)

OF THE ELEMENTS

10 VIIIB Ni Nickel 58.69	11 IB Cu Copper 63.55	12 IIB Zn Zinc 65.39	13 IIIA Al Aluminum 26.98	14 IVA Si Silicon 28.09	15 VA P Phosphorus 30.97	16 VIA S Sulfur 32.07	17 VIIA Cl Chlorine 35.45	18 VIIIA Ar Argon 39.95
28 Ni Nickel 58.69	29 Cu Copper 63.55	30 Zn Zinc 65.39	31 Ga Gallium 69.72	32 Ge Germanium 72.61	33 As Arsenic 74.92	34 Se Selenium 78.96	35 Br Bromine 79.90	36 Kr Krypton 83.80
46 Pd Palladium 106.42	47 Ag Silver 107.87	48 Cd Cadmium 112.41	49 In Indium 114.82	50 Sn Tin 118.71	51 Sb Antimony 121.76	52 Te Tellurium 127.60	53 I Iodine 126.90	54 Xe Xenon 131.29
78 Pt Platinum 195.08	79 Au Gold 196.97	80 Hg Mercury 200.59	81 Tl Thallium 204.38	82 Pb Lead 207.2	83 Bi Bismuth 208.98	84 Po Polonium (209)	85 At Astatine (210)	86 Rn Radon (222)
110 Ds Darmstadtium (271)	111 Rg Roentgenium (272)	112 Uub Ununbium (277)	113 Nh Nihonium (284)	114 Fl Flerovium (289)	115 Mc Moscovium (288)	116 Lv Livermorium (293)	117 Ts Tennessine (294)	118 Og Oganesson (294)

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Page 4

Group 1A represents your _____.

- These elements have ___ valence electron.
- These are your _____
- Elements in group 1A _____ electron to form a _____ (cation, anion).

Group 2A represents your _____.

- These elements have ___ valence electrons.
- These are your _____
- Elements in group 2A _____ electron to form a _____ (cation, anion).

Group 7A represents your _____.

- These elements have ___ valence electrons.
- These are your _____
- Elements in group 7A _____ electron to form a _____ (cation, anion).

Group 8A represents your _____.

- These elements have ___ valence electrons.
- These are your _____
- Elements in group 8A _____ electrons to form a _____

Metals are on the _____ side of the staircase. Nonmetals are on the _____ side.

Elements that are in the same _____ share similar characteristics because they have the same number of _____ (valence electrons, energy levels).

- _____ is the element symbol for the element that is located in group 5A and period 4.
- Which of the following is a metal? _____.
- What does the period # represent for an element? _____.

Ionization energy is the _____
 The element _____ has the highest ionization energy.

Electronegativity is the _____
 The element _____ has the highest electronegativity.

Atomic radius is the _____
 The element _____ has the highest atomic radius.

Which of the following elements from the following list would not be a metalloid? Provide the element symbol

- Al, B, Si, Ge, As, Sb, Te

1 H 1s																	2 He 1s																												
3 Li 2s	4 Be																	5 B 2p	6 C	7 N	8 O	9 F	10 Ne																						
11 Na 3s	12 Mg																	13 Al 3p	14 Si	15 P	16 S	17 Cl	18 Ar																						
19 K 4s	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr																												
37 Rb 5s	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe																												
55 Cs 6s	56 Ba	57 La	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn																												
87 Fr 7s	88 Ra	89 Ac	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110	111	112	113	114																																
		<table><tr><td>58 Ce</td><td>59 Pr</td><td>60 Nd</td><td>61 Pm</td><td>62 Sm</td><td>63 Eu</td><td>64 Gd</td><td>65 Tb</td><td>66 Dy</td><td>67 Ho</td><td>68 Er</td><td>69 Tm</td><td>70 Yb</td><td>71 Lu</td></tr><tr><td>90 Th</td><td>91 Pa</td><td>92 U</td><td>93 Np</td><td>94 Pu</td><td>95 Am</td><td>96 Cm</td><td>97 Bk</td><td>98 Cf</td><td>99 Es</td><td>100 Fm</td><td>101 Md</td><td>102 No</td><td>103 Lr</td></tr></table>																58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr
58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu																																
90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr																																

by: Sarah Fatah

What is the electron configuration for Arsenic?

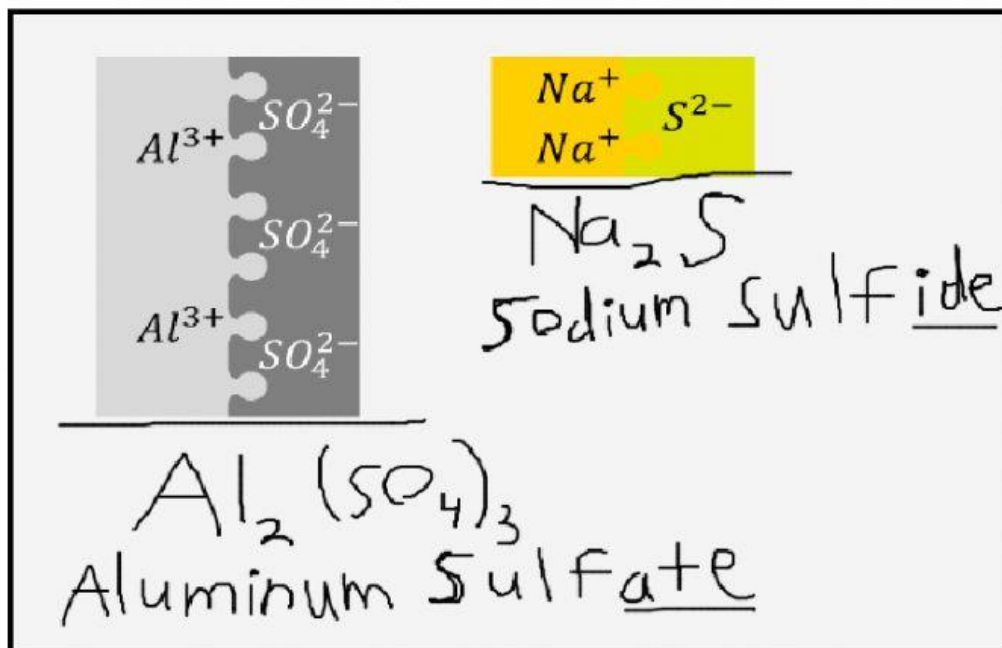
Draw the bohr model for Arsenic.

- How many electrons are in the 1st energy level?
- How many electrons are in the 2nd energy level?
- How many electrons are in the 3rd energy level?
- How many electrons are in the 4th energy level?
- How many valence electrons are there?
- What is the symbol of the element that reacts similar to Arsenic and is in period 5?
- What is the name of the element that would be used in the noble gas (shortcut) configuration?

UNIT 3 Bonding

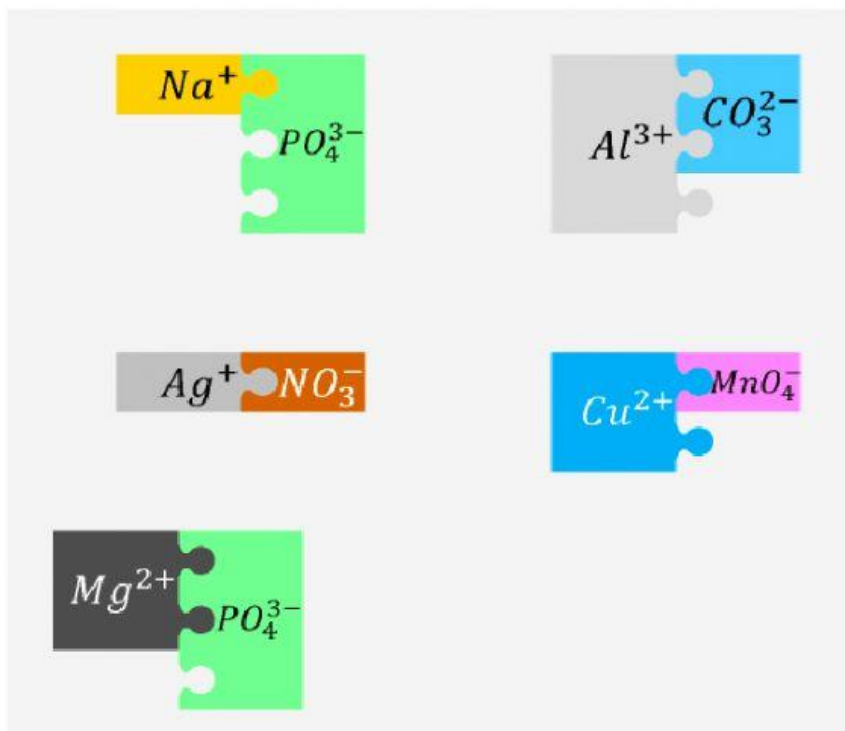
Ionic Bonding occurs when a _____ (metal, nonmetal) decides to _____ (transfers, shares) electrons with a _____ (metal, nonmetal). The metal would form a _____ (positive cation, negative anion) since the metal _____ (loses, gains) electrons. The nonmetal would form a _____ (positive cation, negative anion) since the nonmetal _____ (loses, gains) electrons.

Reference the two examples of the ionic bonds drawn below.



As can be seen from the **ionic bond between Aluminum and Sulfate**, Aluminum Sulfate is formed when two Aluminum atoms each _____ (lose three, gain 3) electrons and three SO_4 molecules each _____ (gain 2, lose 2) electrons. The sum of the charge of the ions add up to **zero** to form a _____ (stable, reactive) compound. Because SO_4 is a polyatomic ion, the name of SO_4 is given on your _____ (polyatomic ion chart, periodic table) in your reference packet. The ending of the name of this ion is _____ (changed to ide, not changed).

As can be seen from the **ionic bond between Sodium and Sulfur**, Sodium sulfide is formed when two Sodium atoms each _____ (lose 1, gain 1) electron and one sulfur atom _____ (gain 2, lose 2) electrons. The sum of the charge of the ions add up to **zero** to form a _____ (stable, reactive) compound. Because S is a nonmetal on the periodic table, the name of S is given on your _____ (reference packet, periodic table) and the ending is _____ (changed to ide, not changed).



Write the chemical names and chemical formulas for the following compounds based on the charge of the ions

Write either the correct chemical formula or the correct chemical name.

1A	2A		3A	4A	5A	6A	7A	8A
Ve: 1	2		3	4	5	6	7	8
Ox#: +1	+2		+3	+4	-3	-2	-1	0

Polyatomic Ions		PERIODIC TABLE OF THE ELEMENTS																	
NH ₄ ⁺	Ammonium																		
BrO ₃ ⁻	Bromate																		
CN ⁻	Cyanide																		
C ₂ H ₃ O ₂ ⁻	Acetate																		
ClO ₄ ⁻	Perchlorate																		
ClO ₃ ⁻	Chlorate																		
ClO ₂ ⁻	Chlorite																		
ClO ⁻	Hypochlorite																		
IO ₃ ⁻	Iodate																		
MnO ₄ ⁻	Permanganate																		
NO ₃ ⁻	Nitrate																		
NO ₂ ⁻	Nitrite																		
OH ⁻	Hydroxide																		
HCO ₃ ⁻	Hydrogen carbonate																		
HSO ₄ ⁻	Hydrogen sulfate																		
SCN ⁻	Thiocyanate																		
CO ₃ ²⁻	Carbonate																		
Cr ₂ O ₇ ²⁻	Dichromate																		
CrO ₄ ²⁻	Chromate																		
SO ₄ ²⁻	Sulfate																		
SO ₃ ²⁻	Sulfite																		
PO ₄ ³⁻	Phosphate																		

Na₂CO₃ _____

_____ Calcium phosphate

Rb₂S _____

_____ Lithium Sulfide

Al(ClO₃)₃ _____

_____ Aluminum Chloride

Polyatomic Ions	
NH_4^+	Ammonium
BrO_3^-	Bromate
CN^-	Cyanide
$\text{C}_2\text{H}_3\text{O}_2^-$ (CH_3COO^-)	Acetate
ClO_4^-	Perchlorate
ClO_3^-	Chlorate
ClO_2^-	Chlorite
ClO^-	Hypochlorite
IO_3^-	Iodate
MnO_4^-	Permanganate
NO_3^-	Nitrate
NO_2^-	Nitrite
OH^-	Hydroxide
HCO_3^-	Hydrogen carbonate
HSO_4^-	Hydrogen sulfate
SCN^-	Thiocyanate
CO_3^{2-}	Carbonate
$\text{Cr}_2\text{O}_7^{2-}$	Dichromate
CrO_4^{2-}	Chromate
SO_4^{2-}	Sulfate
SO_3^{2-}	Sulfite
PO_4^{3-}	Phosphate

- We use our rules for ionic bonding when the first element is _____.
 - This means sum of the charges of the ions add up to _____
 - The ending of the nonmetal changes to ide
- When the first element is green, we apply these same ionic bonding rules but make sure to put a _____ in the chemical _____ to denote the _____ of the metal.
- When the first element is blue, we use _____ to denote how many of each atom there are.

Covalent Bonding occurs when a _____ (metal, nonmetal) decides to _____ (transfers, shares) electrons with a _____ (metal, nonmetal). We draw Lewis Structures to show how electrons are **shared** between nonmetals. Because covalent bonds do not contain a metal, they have _____ and are very _____. When we write the chemical formulas of covalent compounds, we simply look at the _____ to see how many of each element the compound contains. When we write the chemical names of covalent bonds, we use the prefixes on both the first and second elements to denote how many of each atom there are. The only exception is that we don't use _____ on the first. The

[illegible]