

## Science 1206 Worksheet 1

1. Indicate whether the following changes are physical changes or chemical changes by writing **physical** or **chemical** in the table.

Tearing paper	
Roasting marshmallows	
Using bleach to whiten clothes	
Melting ice	
Tap water freezing	

2. Classify the following substances as mixtures or pure substances by writing **mixture** or **pure** in the table.

Rust ( $\text{Fe}_2\text{O}_3$ )	
Aluminum foil	
Kool Aid	
Air	
Garden salad	

3. Classify the following substances as heterogeneous or homogeneous by writing **mechanical** or **solution** in the table (4 marks).

Vegetable soup	
Chocolate chip cookie	
Kool Aid	
Air	
Tap water	

4. Name two Elements in the following families

- A. Halogens \_\_\_\_\_
- B. Alkaline Earths \_\_\_\_\_
- C. Alkali Metals \_\_\_\_\_
- D. Nobel Gases \_\_\_\_\_
- E. Transition \_\_\_\_\_

## Science 1206 Worksheet 2

### 1. Fill-in the Blanks

Atom Name	Symbol	Metal or Nonmetal	Group Number	Atomic Number	# of electrons	# of protons	# of neutrons
scandium							
	Ga						
				16			
				20			
				45			
	Au						
						18	
	Pb						
				101			
				47			

### 2. Draw energy level diagrams for each of the following.

Sodium Atom	Nitrogen Atom	Al
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3. Name the element found in each of the following.

Period five and group IIIA	
Period four with seven electrons in the outer orbital	
Period five and an alkali metal	

4. Draw Bohr diagrams for each of the following.

Oxygen atom	Neon	Phosphorous Atom
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## Science 1206 Worksheet 3

1. Draw energy level diagrams for each of the following.

Sodium Ion	Nitride	$\text{Al}^{3+}$
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2. Draw Bohr diagrams for each of the following.

$\text{O}^{2-}$	chloride	phosphoride
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3. Fill-in the Blanks

Ion Name	Ion Symbol	Group number	# of protons	# of electrons	Same # e <sup>-</sup> as which noble gas?
sodium					
	$\text{S}^{2-}$				
			35		
Fluoride					

			53		
			30		
aluminum					
			17		
			34		
	H <sup>+</sup>				

### 3. Fill-in the Blank

How many electrons can fit in the lowest level of an Atom?	
How many electrons does sodium try to get rid of to become stable?	
In the halogen group, which one is the most reactive?	
What group number has ion with 1 <sup>+</sup> ?	
What group number has ion with 3 <sup>+</sup> ?	
How many valence electrons does bromine have?	
How many electrons do bromide?	
If the Atomic mass of tungsten with 74 protons in its nucleus is 184, how many neutrons does it have in its nucleus ?	
What group number has 3 valence electrons?	
What group number has ion with 2 <sup>-</sup> ?	

## Science 1206 Worksheet 4

### **Naming Binary Ionic Compounds**

Please fill in the table by naming or writing formulas for Binary Ionic Compounds

	<b>Name of Compound</b>	<b>Cations &amp; Anions</b>	<b>Chemical Formula</b>
ex	Calcium chloride	$\text{Ca}^{2+}$ $\text{Cl}^-$	$\text{CaCl}_2$
1	Potassium iodide		
2			$\text{MgO}$
3	Aluminum chloride		
4			$\text{NaBr}$
5			$\text{Al}_2\text{O}_3$
6	Lithium nitride		
7			$\text{CaO}$
8	Barium chloride		

Please fill in the table by naming or writing formulas for Polyatomic Ionic Compounds

1			$\text{NH}_4\text{ClO}_3$
2.			$\text{Mg}(\text{NO}_3)_2$
3			$\text{AlBO}_3$
4			$\text{Cs}_2\text{SO}_3$
5	Sodium chromate		
6.	Ammonium sulphide		
7.	Potassium hydrogen phosphate		

### WORKSHEET #5: NOMENCLATURE INVOLVING MULTIVALENT IONS

#	Chemical Formula	Cations	Anions	Name of Compound
Eg.	$\text{Cu}_2\text{S}$	$\text{Cu}^+$	$\text{S}^{2-}$	Copper(I)sulfide
1.	$\text{AuCl}_3$			
2.				Mercury(II)oxide
3.	$\text{Sb}_2\text{S}_3$			
4.	$\text{V}_2\text{O}_5$			
5.				Iron(III)iodide
6.				Copper(II)sulfide
7.	$\text{FeS}$			

### NOMENCLATURE OF HYDRATED IONIC COMPOUNDS

Use Latin prefixes to indicate # of water molecules present

1 = mono    2 = di    3 = tri    4 = tetra    5 = penta  
6 = hexa    7 = hepta    8 = octa    9 = nona    10 = deca

#	Name of Hydrate	Chemical Formula
Eg.	Copper(II)sulphate pentahydrate	$\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$
1		$\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$
2	Sodium carbonate decahydrate	
3		$\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$
4	Barium chloride dihydrate	
5		$\text{Cd}(\text{NO}_3)_2 \cdot 4\text{H}_2\text{O}$
6		$\text{ZnCl}_2 \cdot 6\text{H}_2\text{O}$
7	Zinc sulphate heptahydrate	

**Worksheet #6 Dissociation****Type: Ionic, Molecular, Acid and Base**

<b>High or Low</b>	<b>Type I, M, A, B</b>	<b>Compound Name / Formula</b>	<b>Write the dissociation equation.</b>
		aluminum hydroxide	
		iron (III) sulfite	
		HCl(aq)	
		magnesium chloride	
		cobalt (III) tripolyphosphate	
		calcium phosphide	
		potassium arsenide	
		CaCl <sub>2</sub>	
		Ni <sub>3</sub> As <sub>2</sub>	
		HNO <sub>2</sub> (aq)	
		aluminum cyanide	
		Ca(OH) <sub>2</sub>	
		copper (I) sulfide	
		H <sub>2</sub> SiO <sub>3</sub> (aq)	

**Fill-in the blanks**

1. The simplest part of matter is the \_\_\_\_\_.
2. The nucleus of an atom contains \_\_\_\_\_ and \_\_\_\_\_.
3. If a substance has an atomic number of 32 then it will have \_\_\_\_\_ electrons outside the nucleus.
4. The number of energy levels found in a Chlorine atom would be \_\_\_\_\_.
5. A bond between two nonmetals is called a(n) \_\_\_\_\_ bond.
6. Anything that has mass and occupies space is called \_\_\_\_\_.
7. Bonds between a metal and nonmetal are called \_\_\_\_\_ bonds.
8. The charge on a Magnesium ion would be \_\_\_\_\_.



**WORKSHEET #7 NOMENCLATURE OF MOLECULAR SUBSTANCES**

#	Molecular Formula	Name
Eg.	$\text{CCl}_4$	Carbon tetrachloride
1		Nitrogen
2	$\text{O}_2$	
3		Argon
4	$\text{CO}_2$	
5		helium
6	$\text{NO}$	
7	$\text{NO}_2$	
8		Sulphur dioxide
9	$\text{SO}_3$	
10		Carbon monoxide
11		Ozone
12		Ethanol
13		Sucrose
14		Sulphur (sulfur)
15	$\text{P}_4\text{O}_{10}$	
16	$\text{P}_4\text{O}_6$	
17		Chlorine dioxide
18		Methanol
19	$\text{P}_4$	
20		Ammonia
21	$\text{CH}_4$	
22	$\text{H}_2\text{O}$	
23		Dinitrogen monoxide
24		chlorine
25	$\text{N}_2\text{O}_5$	

## WORKSHEET #8 NOMENCLATURE OF ACIDS

hydrogen \_\_\_\_\_ ide becomes hydro \_\_\_\_\_ ic acid

hydrogen \_\_\_\_\_ ite becomes \_\_\_\_\_ ous acid

hydrogen \_\_\_\_\_ ate becomes \_\_\_\_\_ ic acid

#	Acid Formula	Workings	Acid Name
Eg.	$\text{HCl}_{(\text{aq})}$	$\text{H}^+ \text{Cl}^-$ hydrogen chloride	Hydrochloric acid
1	$\text{HBr}_{(\text{aq})}$		
2	$\text{H}_2\text{CO}_{3(\text{aq})}$		
3			Hydrofluoric acid
4	$\text{H}_2\text{CrO}_{4(\text{aq})}$		
5			Benzoic acid
6	$\text{H}_2\text{S}_{(\text{aq})}$		
7			Sulfurous acid
8	$\text{HI}_{(\text{aq})}$		
9			Oxalic acid
10	$\text{HClO}_{4(\text{aq})}$		

## NOMENCLATURE OF BASES

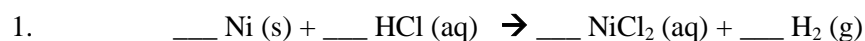
#	Acid Formula	Workings	Base Name
1	$\text{NaOH}_{(\text{aq})}$		
2	$\text{Mg}(\text{OH})_{2(\text{aq})}$		
3			Lithium hydroxide
4			Potassium hydroxide
5			Barium hydroxide
6	$\text{Sr}(\text{OH})_2$		
7			Aluminum hydroxide
8	$\text{Fe}(\text{OH})_{2(\text{aq})}$		

## **WORKSHEET #9: Fill-in the blanks**

1. What compounds turn blue litmus paper red \_\_\_\_\_?
2. Is melting water a physical or chemical change \_\_\_\_\_?
3. A(n) \_\_\_\_\_ compound is created when there is a transfer of electrons from a metal to a nonmetal atom.
4. If cobalt (II) chloride paper changes from blue to pink, then what is present? \_\_\_\_\_
5. A vertical column of elements in the periodic table are called a(n) \_\_\_\_\_.
6. A(n) \_\_\_\_\_ compound is created when two nonmetal atoms share electrons.
7. Elements on the right side of the periodic table are called \_\_\_\_\_.
8. A(n) \_\_\_\_\_ is a molecule that has water (H<sub>2</sub>O) attached to the end of it.
9. During a chemical reaction energy is released, what is it? \_\_\_\_\_
10. Salt will dissolve into water. It is said to be \_\_\_\_\_ in water.
11. In any chemical or physical change, \_\_\_\_\_ (matter) is neither created nor destroyed.
12. Is burning propane a physical or chemical change \_\_\_\_\_?
13. Is the compound CuSO<sub>4</sub> ionic or molecular \_\_\_\_\_?
14. A positive charged particle is referred to as a(n) \_\_\_\_\_.
15. The starting materials in a chemical change are called \_\_\_\_\_.
16. The electrons that are located in the outermost shell of an atom are called \_\_\_\_\_ electrons.
17. The materials created in a chemical change are called \_\_\_\_\_.
18. A negatively charged ion is called a(n) \_\_\_\_\_.
19. A(n) \_\_\_\_\_ compound is one created when a metal and nonmetal element bond.
20. The simplest part of matter is the \_\_\_\_\_.
21. A(n) \_\_\_\_\_ element will create an ion that has a positive charge on it because it will \_\_\_\_\_ electrons.
22. Is splitting an atom a chemical change or nuclear change \_\_\_\_\_?
23. A(n) \_\_\_\_\_ is a substance that does not conduct electricity in any state.
24. A(n) \_\_\_\_\_ is a substance that reacts with metals to produce hydrogen gas.

**Worksheet # 10      Balancing Chemical Equations**

Balance each of the equations listed below. Then, classify each reaction as combustion, formation, decomposition, single replacement or double replacement.



Reactant Count	Product Count

Reaction Type: \_\_\_\_\_



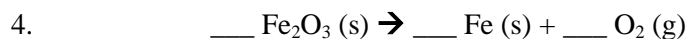
Reactant Count	Product Count

Reaction Type: \_\_\_\_\_



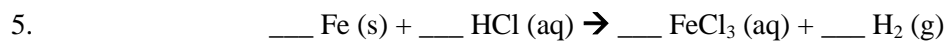
Reactant Count	Product Count

Reaction Type: \_\_\_\_\_



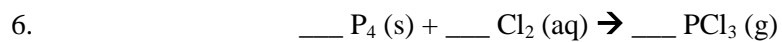
Reactant Count	Product Count

Reaction Type: \_\_\_\_\_



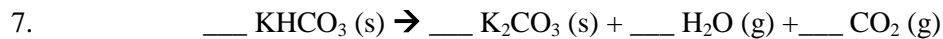
Reactant Count	Product Count

Reaction Type: \_\_\_\_\_



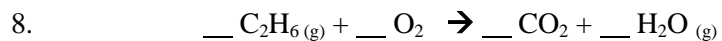
Reactant Count	Product Count

Reaction Type: \_\_\_\_\_



Reactant Count	Product Count

Reaction Type: \_\_\_\_\_



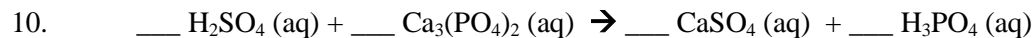
Reactant Count	Product Count

Reaction Type: \_\_\_\_\_



Reactant Count	Product Count

Reaction Type: \_\_\_\_\_



Reactant Count	Product Count

Reaction Type: \_\_\_\_\_

### Worksheet # 11 Balance Equations

Translate each of the following statements into word equations, then balanced chemical equations. Remember that ***The "HONorable Halogens" are all diatomic.***

1. Hydrogen and bromine react to produce hydrobromic.

Word Equation:

Chemical Equation:

2. Solid calcium and aqueous potassium chloride react to produce potassium and aqueous calcium chloride.

Word Equation:

Chemical Equation:

3. Solid Iron combines with oxygen gas to produce solid Iron oxide.

Word Equation:

Chemical Equation:

4. Carbon dioxide decomposes (breaks down) into carbon and oxygen gas.

Word Equation:

Chemical Equation:

5. Copper reacts with hydrochloric acid to produce copper (II) chloride solution and hydrogen gas.

Word. Equation:

Chemical Equation:

6. The combustion (burning) of ethyne gas,  $C_2H_{2(g)}$  in the presence of oxygen gas produces carbon dioxide gas and water vapor.

Word Equation:

Chemical Equation:

**Worksheet 12 FORMATION AND DECOMPOSITION REACTIONS**

Predict the products and /or balance the following. Indicate the type of reaction as either formation (form.) or decomposition (decomp.) in the space on the right.

Balanced Equation	Reaction Type
1. $\text{___S}_{8(s)} + \text{___O}_{2(g)} \rightarrow \text{___SO}_{2(g)}$	
2. $\text{___HgO}_{(s)} \rightarrow \text{___Hg}_{(l)} + \text{___O}_{2(g)}$	
3. $\text{___N}_2\text{O}_{5(g)} \rightarrow \text{_____} + \text{_____}$	
4. $\text{___Al}_{(s)} + \text{___O}_{2(g)} \rightarrow \text{_____}$	
5. $\text{___Na}_2\text{O}_{(s)} \rightarrow \text{_____} + \text{_____}$	
6. $\text{___Ag}_2\text{O}_{(s)} \rightarrow \text{_____} + \text{_____}$	

B. For each of the following, write balanced chemical equations, and indicate the type of reaction.

Balanced Equation	Reaction Type
1. Lithium reacts with nitrogen from the air. $\text{_____} + \text{_____} \rightarrow \text{_____}$	
2. Ammonia is broken down into its elements. $\text{_____} \rightarrow \text{_____} + \text{_____}$	
3. Ammonium nitrate decomposes into dinitrogen monoxide and water. $\text{_____} \rightarrow \text{_____} + \text{_____}$	
4. Silver tarnishes when exposed to sulfur. $\text{_____} + \text{_____} \rightarrow \text{_____}$	

## Worksheet 13 SINGLE DISPLACEMENT REACTIONS

Predict the products and write balanced chemical equations for each pair of reactants.

Balanced Equation	
1. $\_\_ \text{Al}_{(s)} + \_\_ \text{H}_2\text{SO}_{4(aq)} \rightarrow \_\_\_\_\_\_ + \_\_\_\_\_\_$	
2. $\_\_ \text{Cl}_{2(g)} + \_\_ \text{KI}_{(aq)} \rightarrow \_\_\_\_\_\_ + \_\_\_\_\_\_$	
3. $\_\_ \text{Cu}_{(s)} + \_\_ \text{FeSO}_{4(aq)} \rightarrow \_\_\_\_\_\_ + \_\_\_\_\_\_$	
4. $\_\_ \text{Li}_{(s)} + \_\_ \text{HOH}_{(l)} \rightarrow \_\_\_\_\_\_ + \_\_\_\_\_\_$	
5. $\_\_ \text{Zn}_{(s)} + \_\_ \text{Pb}(\text{NO}_3)_{2(aq)} \rightarrow \_\_\_\_\_\_ + \_\_\_\_\_\_$	
6. hydrogen sulfide and silver $\_\_\_\_\_\_ + \_\_\_\_\_\_ \rightarrow \_\_\_\_\_\_ + \_\_\_\_\_\_$	
1. copper and silver sulfate $\_\_\_\_\_\_ + \_\_\_\_\_\_ \rightarrow \_\_\_\_\_\_ + \_\_\_\_\_\_$	
2. fluorine and magnesium bromide $\_\_\_\_\_\_ + \_\_\_\_\_\_ \rightarrow \_\_\_\_\_\_ + \_\_\_\_\_\_$	
3. aluminum and iron(III)oxide $\_\_\_\_\_\_ + \_\_\_\_\_\_ \rightarrow \_\_\_\_\_\_ + \_\_\_\_\_\_$	
4. magnesium and water $\_\_\_\_\_\_ + \_\_\_\_\_\_ \rightarrow \_\_\_\_\_\_ + \_\_\_\_\_\_$	



## Worksheet 14 DOUBLE DISPLACEMENT REACTIONS

Predict the products and write balanced chemical equations for each pair of reactants.

Balanced Equation	
1.	$\text{___AgCl}_{(s)} + \text{___Mg(OH)}_{2(aq)} \rightarrow \text{_____} + \text{_____}$
2.	$\text{___Ca(OH)}_{2(aq)} + \text{___Mg(HCO}_3\text{)}_{2(aq)} \rightarrow \text{_____} + \text{_____}$
3.	$\text{___KOH}_{(aq)} + \text{___H}_3\text{PO}_{4(aq)} \rightarrow \text{_____} + \text{_____}$
4.	sulfuric acid and aluminum hydroxide $\text{_____} + \text{_____} \rightarrow \text{_____} + \text{_____}$
5.	strontium bromide and ammonium carbonate $\text{_____} + \text{_____} \rightarrow \text{_____} + \text{_____}$
6.	hydrogen sulfide gas and solid lead(II)chromate $\text{_____} + \text{_____} \rightarrow \text{_____} + \text{_____}$

## COMPLETE HYDROCARBON COMBUSTION

Write a balanced chemical equation for the complete combustion of the following:

Balanced Equation	
1.	$\text{___C}_3\text{H}_8(g) + \text{_____} \rightarrow \text{_____} + \text{_____}$
2.	$\text{___C}_8\text{H}_{18}(l) + \text{_____} \rightarrow \text{_____} + \text{_____}$
3.	$\text{___C}_6\text{H}_{14}(l) + \text{_____} \rightarrow \text{_____} + \text{_____}$