CHEMISTRY | LEE

NAME _____

DATE _____ BLOCK _____

UNIT THREE

PROBLEM SET

Score:

Do not cheat by copying the work of another person, or by allowing another person to copy your answers. Cheating results in a 0% grade for both parties involved.

Signature_____ Date_____

In the event any or all of this Problem Set is assessed for a grade, it <u>must be signed and dated</u> in order to receive a grade. The work shall be your own.

Problem Sets are generally not accepted late. Late assignments are 50% off.

Chapter 6 Worksheet 6 Writing Ternary Ionic Formulas from Names

Use the criss-cross method to fill in the table with the correct compound

	OH^-	HCO_3^-	SO_4^{2-}	PO_4^{3-}	NO_3^-
Na^+					
Ca^{2+}				$Ca_3(PO_4)_2$	
Cr^{+6}					
Ni^{+3}					
NH_4^+					
Pb^{4+}					

Polyatomic Formulas: OH^-, SO_4^{2-}, NO_3^-, PO_4^{3-}, CO_3^{2-}, HCO_3^-, $CH_3CO_2^-$ and NH_4^+

Write the formula for the following compounds (not all use polyatomic ions)

1. Sodium hydroxide
2. Calcium hydrogen carbonate
3. Copper(II) nitrate
4. Ammonium sulfide
5. Nickel(II) hydroxide
6. Lithium phosphate
7. Lead(IV) carbonate
8. Potassium sulfate
9. Cobalt(II) acetate
10. Ammonium sulfate
11. Aluminum carbonate
12. Sodium phosphate
13. Magnesium carbonate
14. Iron(III) nitrate
15. Silver acetate
16. Potassium hydrogen carbonate
17. Chromium(VI) sulfate
18. Zinc hydroxide

Chapter 6 Worksheet 7 Naming Ternary Ionic Compounds

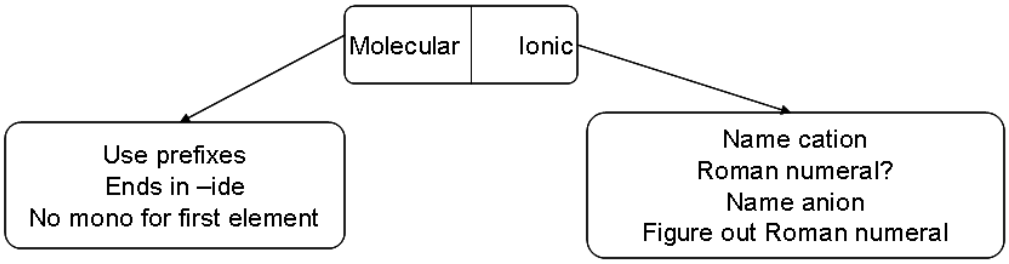
Polyatomic Formulas: OH^-, SO_4^{2-}, NO_3^-, PO_4^{3-}, CO_3^{2-}, HCO_3^-, $CH_3CO_2^-$ and NH_4^+

Write the Name

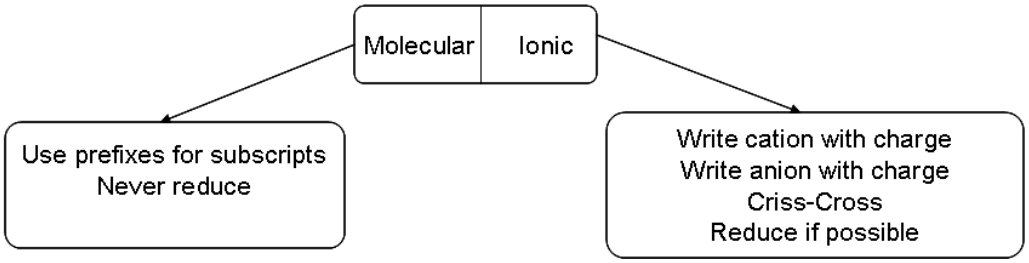
1. _____ $AlPO_4$
2. _____ K_2SO_4
3. _____ $Be(NO_3)_2$
4. _____ $(NH_4)_2O$
5. _____ $NaHCO_3$
6. _____ $Ni(OH)_2$
7. _____ $Ti(SO_4)_2$
8. _____ $Mn(CH_3CO_2)_2$
9. _____ Li_2CO_3
10. _____ $Fe(OH)_3$
11. _____ $SnCO_3$
12. _____ $Cr(PO_4)_2$
13. _____ $AgNO_3$
14. _____ $Sn_3(PO_4)_4$
15. _____ $Mg(HCO_3)_2$
16. _____ $(NH_4)_2SO_4$
17. _____ $ZnSO_4$
18. _____ NH_4OH
19. _____ $Pb(C_2H_3O_2)_2$
20. _____ $AgHCO_3$
21. _____ $Cu_2(CO_3)_3$

Ch 6 Worksheet 8: Mixed Formula ⇆ Name Practice

Formula to Name



Name to Formula



Decide if the compound is ionic or molecular and then answer accordingly.

Write the Formula	**Write the Name**
1. Lithium sulfate	10. $(NH_4)_2S$
2. Dinitrogen tetroxide	11. $Al(NO_3)_3$
3. Iron(II) sulfide	12. $NiBr_2$
4. Sodium hydrogen carbonate	13. SiO_2
5. Sulfur trioxide	14. $Pb(OH)_2$
6. Calcium phosphate	15. NF_3
7. Magnesium nitride	16. $Co(CH_3CO_2)_2$
8. Potassium acetate	17. $CrPO_4$
9. Copper(II) hydroxide	18. K_2CO_3

Chapter 7 Worksheet 7: Percent Compostion

Determine the percentage composition of each of the compounds below:

Example: What is the percent silver in $AgNO_3$?

Step 1: Determine the molar mass

Ag = 107.9 x 1 = 107.87
N = 14.01 x 1 = 14.01
O = 16.00 x 3 = 48.00
169.88 g

Step 2: Divide the mass of silver by the molar mass and convert to percent

107.86/169.88 = 63.5%

1. NaCl

   Na = _____%

   Cl = _____%

2. $CaCO_3$

   Ca = _____%

   C = _____%

   O = _____%

3. $Zn(ClO_3)_2$

   Zn = _____%

   Cl = _____%

   O = _____%

4. $(NH_4)_2SO_4$

   N = _____%

   H = _____%

   S = _____%

   O = _____%

5. $Fe_2(SO_3)_3$

   Fe = _____%

   S = _____%

   O = _____%

Answers to front: 1: 39.3% Na & 60.7% Cl 2:40.0% Ca & 12.0% C & 48% O, 3: 28.2% Zn and 30.5% Cl & 41.3% O, 4: 21.2%N & 6.1% H & 24.3%S & 48.8% O, 5: 31.7% Fe & 27.3% S & 41% O

Chapter 7 Worksheet 8: More Percent Composition.

Determine the formula of the compound from the name. Then determine the percent composition

1. What is the percent chromium in Chromium(III) hydroxide?(Ans = 50.5%)

2. What is the percent oxygen in potassium sulfate?(Ans = 36.7%)

3. Find the percent nitrogen in ammonium oxide?(Ans = 53.8%)

4. What is the percent oxygen in calcium carbonate?(Ans = 48.0%)

5. Determine the percent sodium in sodium phosphate?(Ans = 42.1%)

6. What is the percent iron in iron(III) nitrate?(Ans = 23.1%)

Ch 8 WS 7: Balancing Reactions with Polyatomics

If polyatomics are the same on both sides of the equation, they may be counted as a unit. Your instructor will demonstrate with the first few problems.
Balance the equations below:

1. ____ $AgNO_3$ + ____ K_3PO_4 → ____ Ag_3PO_4 + ____ KNO_3

2. ____ $Pb(OH)_2$ + ____ HCl → ____ H_2O + ____ $PbCl_2$

3. ____ $AlBr_3$ + ____ K_2SO_4 → ____ KBr + ____ $Al_2(SO_4)_3$

4. ____ $FeCl_3$ + ____ NaOH → ____ $Fe(OH)_3$ + ____NaCl

5. ____ Na + ____ H_2O → ____ NaOH + ____H_2

6. ____ H_2SO_4 + ____ $Ba(NO_3)_2$ → ____ HNO_3 + ____ $BaSO_4$

7. _____ $Ni(CH_3CO_2)_2$ + _____ K_2S → ____ NiS + _____ KCH_3CO_2

8. _____ Na_2CO_3 + _____ $FeCl_3$ → _____ $Fe_2(CO_3)_3$ + _____ NaCl

9. _____ $AgNO_3$ + _____ Cu → _____ Ag + _____ $Cu(NO_3)_2$

Chapter 8 WS 8: Identifying Reaction Types

For the following reactions, indicate whether the following are examples of synthesis, decomposition, combustion, single displacement, or double displacement reactions:

1) $Na_3PO_4 + 3\ KOH \rightarrow 3\ NaOH + K_3PO_4$ _____

2) $MgCl_2 + Li_2CO_3 \rightarrow MgCO_3 + 2\ LiCl$ _____

3) $C_6H_{12} + 9\ O_2 \rightarrow 6\ CO_2 + 6\ H_2O$ _____

4) $Pb + FeSO_4 \rightarrow PbSO_4 + Fe$ _____

5) $CaCO_3 \rightarrow CaO + CO_2$ _____

6) $P_4 + 3\ O_2 \rightarrow 2\ P_2O_3$ _____

7) $2\ RbNO_3 + BeF_2 \rightarrow Be(NO_3)_2 + 2\ RbF$ _____

8) $2\ AgNO_3 + Cu \rightarrow Cu(NO_3)_2 + 2\ Ag$ _____

9) $C_3H_6O + 4\ O_2 \rightarrow 3\ CO_2 + 3\ H_2O$ _____

10) $2\ C_5H_5 + Fe \rightarrow Fe(C_5H_5)_2$ _____

11) $SeCl_6 + O_2 \rightarrow SeO_2 + 3Cl_2$ _____

12) $2\ MgI_2 + Mn(SO_3)_2 \rightarrow 2\ MgSO_3 + MnI_4$ _____

13) $O_3 \rightarrow O^{\cdot} + O_2$ _____

14) $2\ NO_2 \rightarrow 2\ O_2 + N_2$ _____

Chapter 8 WS 9: Identify reaction types

Predict the products of the following reactions. Do not worry about balancing.

1. $Al + CuSO_4 \rightarrow Al_2(SO_4)_3 + Cu$ Type:_____

2. $NaI + CaCl_2 \rightarrow NaCl + CaI_2$ Type:_____

3. $F_2 + NaBr \rightarrow NaF + Br_2$ Type: _____

4. $2BF_3 \rightarrow B_2F_6$ Type_____

5. $HNO_3 + Mn(OH)_2 \rightarrow H_2O + Mn(NO_3)_2$ Type:_____

6. $AgNO_3 + BaSO_4 \rightarrow Ba(NO_3)_2 + Ag_2SO_4$ Type:_____

7. $C_3H_8 + O_2 \rightarrow CO_2 + H_2O$ Type:_____

8. $HF + CaSO_4 \rightarrow H_2SO_4 + CaF_2$ Type:_____

9. $N_2O_4 \rightarrow 2NO_2$ Type:_____

10. $H_2O + AgI \rightarrow HI + AgOH$ Type:_____

11. $HNO_3 + Fe(OH)_3 \rightarrow H_2O + Fe(NO_3)_3$ Type:_____

12. $CaCO_3 \rightarrow CaO + CO_2$ Type: _____

13. $LiBr + Co(SO_3)_2 \rightarrow Li_2SO_4 + CoBr_4$ Type:_____

14. $LiNO_3 + Ag \rightarrow AgNO_3 + Li$ Type:_____

15. $H_2O_2 \rightarrow H_2O + O_2$ Type:_____

Chapter 8 WS 10 More identifying reaction types

Type	
	___$AlCl_3$ + ___Cs → ___CsCl + ___Al
	___H_2SO_4 + ___NH_4OH → ___H_2O + ___$(NH_4)_2SO_4$
	___CH_3COOH + ___O_2 → ___CO_2 + ___H_2O
	___C_4H_8 + ___O_2 → ___CO_2 + ___H_2O
	___KCl + ___$Mg(OH)_2$ → ___KOH + ___$MgCl_2$
	___Zn +___ $Al(NO_3)_3$ → ___$Zn(NO_3)_2$ + ___Al
	___S_8 + ___O_2 → ___SO_3
	___KOH + ___H_2SO_4 → ___K_2SO_4 + ___H_2O
	___BaS + ___$PtCl_2$ → ___$BaCl_2$ +___ PtS

Chapter 9 Worksheet 1: Stoichiometry--Mole to Mole Problems

Hint: Use the mole ratio = $\frac{mole\ find}{mole\ given}$

1. How many moles of sodium hydroxide will react with 11 moles of magnesium sulfate?

$$MgSO_4 + 2NaOH \rightarrow Na_2SO_4 + Mg(OH)_2$$

2. How many moles of magnesium hydroxide are required to react completely with 0.044 moles of hydrochloric acid, HCl. (magnesium hydroxide is the active agent in Milk of Magnesia)

$$Mg(OH)_2 + 2HCl \rightarrow MgCl_2 + 2H_2O$$

3. How many moles of water will be produced from burning 23.4 moles of ethane, C_2H_6, with an excess of oxygen?

$$2C_2H_6 + 7O_2 \rightarrow 4CO_2 + 6H_2O$$

4. How many moles of oxygen are required to react completely with 44 moles of ammonia?

$$4NH_3 + 3O_2 \rightarrow 2N_2 + 6H_2O$$

5. 16 moles of phosphoric acid, H_3PO_4, reacts with an excess of calcium hydroxide. How many mole of water are produced?

$$2H_3PO_4 + 3Ca(OH)_2 \rightarrow Ca_3(PO_4)_2 + 6H_2O$$

Answers:1:22 mol NaOH, 2: 0.022 mol $Mg(OH)_2$, 3:70.2 mol H_2O, 4:33 mol O_2, 5: 48 mol H_2O

Ch 9 WS 2: Stoichiometry--Mole to grams, representative particles or gas volume

Hint: Use the mole ratio = $\frac{mole\ find}{mole\ given}$

1. How many liters of hydrogen gas will be produced from 5.0 moles of lithium reacting with an excess of water at STP?

$$2Li(s) + 2H_2O(l) \rightarrow 2LiOH(aq) + H_2(g)$$

2. How many grams of sodium metal will be required to produce 0.34 moles of sodium oxide in the presence of excess oxygen?

$$4Na(s) + O_2(g) \rightarrow 2Na_2O(s)$$

3. How many formula units of cesium nitride will be produced from 2.02 mole of cesium reacting with excess nitrogen?

$$6Cs(s) + N_2(g) \rightarrow 2Cs_3N(s)$$

4. How many grams of carbon dioxide will be produced from 6.2 moles of benzene, C_6H_6, burning in the presence of excess oxygen?

$$2C_6H_6(l) + 15O_2(g) \rightarrow 12CO_2(g) + 6H_2O(l)$$

5. How many atoms of sodium will be required to react completely with 0.041 moles of sodium nitrate to produce sodium oxide?

$$10Na + 2NaNO_3 \rightarrow 6Na_2O + N_2$$

6. How many liters of nitrogen will be produced from 21 moles of ammonia reacting with excess oxygen?

$$4NH_3 + 3O_2 \rightarrow 2N_2 + 6H_2O$$

Answers:1:56 L H_2, 2: 16 g Na, 3: 4.05×10^{23} f.u.n.Cs_3N, 4: 1600 g CO_2, 5: 1.2×10^{23} at. Na, 6: 240 L N_2

Ch 9 WS 3 Mixed Stoichiomety Problems Name_____

1. How many moles of glucose can be "burned" biologically when 10.0 mole of oxygen is available?(Ans = 1.67 mol)

$$C_6H_{12}O_6(s) + 6O_2(g) \rightarrow 6CO_2(g) + 6H_2O(l)$$

2. How many grams of carbon dioxide would be produced if 45 grams of $C_6H_{12}O_6$ (glucose) completely reacted with excess oxygen.(Ans = 66 g)

$$C_6H_{12}O_6(s) + 6O_2(g) \rightarrow 6CO_2(g) + 6H_2O(l)$$

3. How many liters of ammonia gas, at STP, will react with 5.3 g O_2 to form nitrogen dioxide and water?(Ans = 2.1 L)

$$4NH_3(g) + 7O_2(g) \rightarrow\rightarrow 4NO_2 + 6H_2O(l)$$

4. How many molecules of carbon dioxide are produced from burning 2.3 x 10^{-8} grams of pentanol, $C_5H_{11}OH$?(Ans = 7.9 x 10^{14})

$$2C_5H_{11}OH(l) + 15O_2(g) \rightarrow 10CO_2(g) + 12H_2O(g)$$

5. How many liters of oxygen are needed to produce 231 liters of CO_2 at STP?(Ans = 347 L)

$$2C_5H_{11}OH(l) + 15O_2(g) \rightarrow 10CO_2(g) + 12H_2O(g)$$

6. How many grams of TNT are required to make 32,100 liters of carbon monoxide?(Ans = 9.3 x 10^4 g)

$$2C_7H_5N_3O_6\ (s) \longrightarrow 3N_2(g) + 7CO(g) + 5H_2O(g) + 7C(s)$$

TNT soot

An Explosive Material

2,4,6-trinitrotoluene is better known by its initials, TNT. It is an important explosive, since it can very quickly change from a solid into hot expanding gases. Two moles of solid TNT almost instantly changes to 15 moles of hot gases plus some powdered carbon, which gives a dark sooty appearance to the explosion.

TNT is explosive for two reasons. First, it contains the elements carbon, oxygen and nitrogen, which means that when the material burns it produces highly stable substances (CO, CO_2 and N_2) with strong bonds, so releasing a great deal of energy. This is a common feature of most explosives; they invariably consist of many nitrogen or oxygen containing groups (usually in the form of 2, 3 or more nitro-groups), attached to a small, constricted organic backbone.

$$\underset{\text{TNT}}{2C_7H_5N_3O_6\ (s)} \longrightarrow 3N_2(g) + 7CO(g) + 5H_2O(g) + \underset{\text{soot}}{7C(s)}$$

However, explosives like TNT, actually have less potential energy than gasoline, but it is the high velocity at which this energy is released that produces the blast pressure. This very high speed reaction is called a *detonation*. TNT has a detonation velocity of 6,940 m/s compared to 1,680 m/s for the detonation of pentane in air, and the 0.34 m/s stoichiometric flame speed of gasoline combustion in air.

The second fact that makes TNT explosive is that it is chemically unstable - the nitro groups are so closely packed that they experience a great deal of strain and hindrance to movement from their neighbouring groups. Thus it doesn't take much of an initiating force to break some of the strained bonds, and the molecule then flies apart. Typically 1 gram of TNT produces about 1 litre of gas, which is a 1000 fold increase in volume. This expanding hot gas can be used to propel a projectile, such as a bullet from a gun, or for demolition purposes.

TNT as a Weapon

There are a number of advantages that TNT has for ammunition manufacturers. First, it melts at a reasonably low temperature (81°C), which means it can be readily melted and poured into shells and bombs. Secondly, it is not *too* unstable - allowing it to be handled reasonably safely during manufacture and operation. TNT will not spontaneously explode, and in fact can be treated quite roughly. In order to initiate the explosion, TNT must first be detonated using a pressure wave from another, more easily induced explosion from another explosive called a *detonator*. One such detonator is lead azide, $Pb(N_3)_2$, which explodes when struck or if an electric discharge is passed through it.

7. Use your answer from #6 on the reverse side to calculate the ratio of liters TNT to liters of product. Assume all solid products have a density of 1 gram/1mL

Ch 9 WS 4 More Mixed Stoichiometry Problems

1. How many grams of potassium chloride are produced if 25 grams of potassium chlorate decompose?

$$2KClO_3 \rightarrow 2KCl + 3O_2$$

2. What volume of NH_3 at STP is produced if 25 grams of nitrogen gas is reacted with excess hydrogen gas?

$$N_2 + 3H_2 \rightarrow 2NH_3$$

3. How many grams of silver chloride are produced from 5.0 grams of silver nitrate reacting with an excess of barium chloride?

$$2AgNO_3 + BaCl_2 \rightarrow 2AgCl + Ba(NO_3)_2$$

4. What volume of hydrogen at STP is produced when 2.5 grams of zinc react with an excess of hydrochloric acid?

$$Zn + 2HCl \rightarrow ZnCl_2 + H_2$$

5. If 10.0 gram of aluminum chloride are decomposed, how many molecules of Cl_2 are produced?

$$2AlCl_3 \rightarrow 2Al + 3Cl_2$$

6. How many moles of potassium nitrate are produced when two moles of potassium phosphate react with excess aluminum nitrate?

$$K_3PO_4 + Al(NO3)_3 \rightarrow 3KNO_3 + AlPO_4$$

Answers: 1:15 g, 2:40 L, 3:4.2 g, 4:0.86 L, 5:6.77×10^{22} molec. 6:6 moles

Ch 6 Worksheet 9: Mixed Formula ⇆ Name Practice

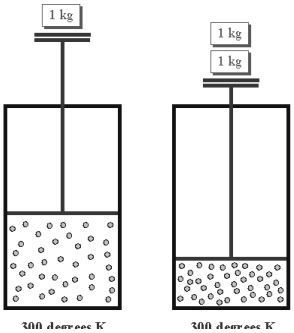
Decide if the compound is ionic or molecular and then answer accordingly.

Write the Formula	**Write the Name**
1. Iron(III) hydroxide	14. CBr_4
2. Magnesium sulfide	15. Li_2SO_4
3. Ammonium nitrate	16. $Ni(HCO_3)_2$
4. Sulfur hexafluoride	17. AlF_3
5. Lithium phosphate	18. NCl_3
6. Sodium hydrogen carbonate	19. $Mn(CH_3CO_2)_4$
7. Aluminum nitride	20. Na_3P
8. Chromium(III) carbonate	21. $Zn_3(PO_4)_2$
9. Zinc sulfate	22. $V_2(CO_3)_5$
10. Silver acetate	23. P_2O_3
11. Copper(I) oxide	24. $Pb(NO_3)_2$
12. Oxygen difluoride	25. $CoSO_4$
13. Ammonium sulfide	26. TiO_2

Chapter 12 WS 1 Boyle's Law Problems (Two Sides)

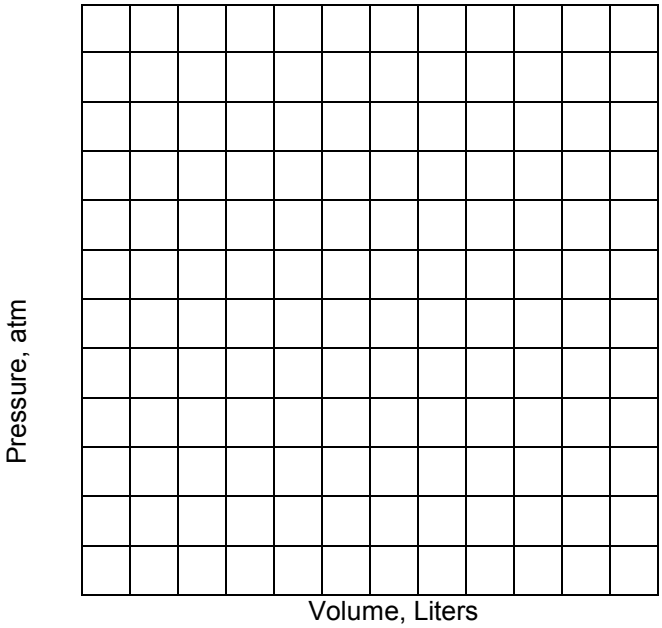
1. What is the equation for Boyle's Law?

2. A gas cylinder contains 2.50 L of argon gas at 100. kPa. What is the new volume of the gas if the piston is depressed until the pressure reaches 200 kPa. The temperature is held constant at 300 K. (Ans= 1.25 L)



3. According to Boyle's Law, gas volume and pressure are inversely proportional. Fill in the table with the new volumes and pressures if P_1 = 0.50 atmospheres and V_1 = 24 Liters. Create a line graph of the data.

New pressure	**New volume**
	12 Liters
2.0 atmospheres	
	4.0 Liters
	3.0 Liters
6.0 atmospheres	
12 atmospheres	



4. The pressure on 4.50 L of nitrogen gas changes from 105 kPa to 35 kPa. What will be the new volume of the nitrogen gas? (Ans = 14 L)

5. A sample of nitrogen occupies a volume of 400. mL at 130 kPa. What volume will it occupy at 150kPa?(Ans = 350 mL)

Ch 12 WS 1 Continued

6. Oxygen gas is at a pressure of 4.0 atm when it occupies a volume of 5.5 liters. What will be the pressure when the gas expands to a volume of 9.0 liters?(Ans = 2.4 atm)

7. A sample of nitrogen occupies a volume of 125 L at 250 torr. What volume will it occupy at 500 torr?(Ans = 62.5L)

8. Oxygen gas is at a pressure of 15 atm when it occupies a volume of 2.5 L. To what pressure should it be changed to in order to occupy a volume of 9.9 L?(Ans = 3.8 atm)

9. Freon-12 was once widely used in refrigeration systems, but has now been replaced by other compounds that do not lead to the breakdown of the protective ozone (O_3) in the upper atmosphere. Consider a 1.5 Liter sample of gaseous Freon-12 at 56 mmHg. If the pressure is changed to 150 mm of mmHg at a constant temperature, what will be the new volume of the gas?(Ans = 0.56 L)

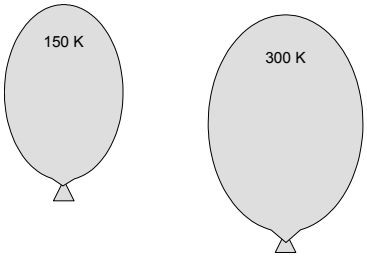
10. Calculate the pressure in mmHg in a motorcycle engine at the end of the compression stroke. Assume that at the start of the stroke, the pressure of the mixture of gasoline and air in the cylinder is 745.8 mm Hg and the volume of each cylinder is 246.8 mL. Assume that the volume of the cylinder is 24.2 mL at the end of the compression stroke.(Ans = 7610 mmHg)

11. If the pressure exerted on a confined gas is halved, then the volume of the gas will _____.

Chapter 12 WS 2 Charles Law Problems (Two Sides)

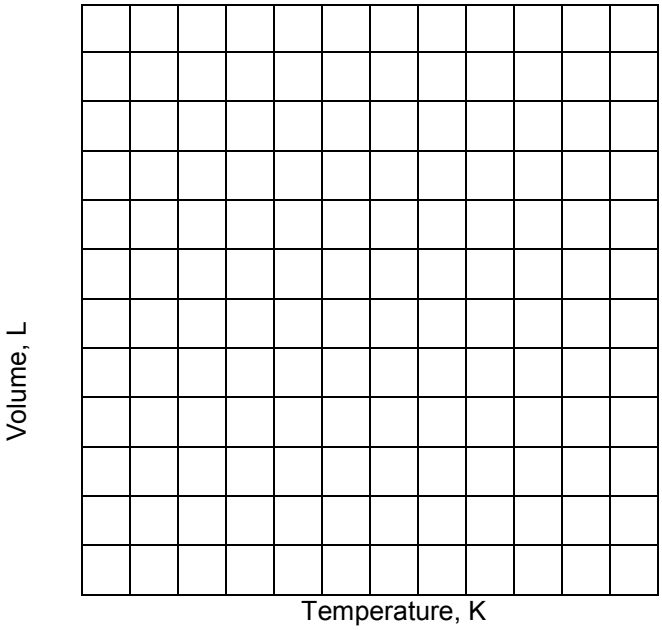
1. What is the equation for Charles' Law?

2. A balloon has a volume of 10. Liters at 150 K. What is the balloon's new volume if the temperature is increased to 300 K? Explain in terms of the gas molecules hitting the balloon walls why the volume changed. (Ans = 20. L)



3. According to Charles' Law, gas volume and temperaratures if T_1 = 50. K and V_1 = 20 Liters. Create a line graph of the data.

New temperature	**New volume**
	40 L
150 K	
200 K	
	100 L
	120 L



4. A 2.0 L sample of air is collected at 27°C and then cooled to -3°C. The pressure is held constant at 1.0 atmosphere. What is the volume of the air at -3°C? (Ans = 1.8 L)

5. A balloon filled with helium has a volume of 100. Liters at 277C°. If the balloon's volume changes to 20. Liters at constant pressure, what is the temperature of the gas in Kelvin? (Ans = 110 K)

Chapter 12 WS 2 Continued

6. Chlorine gas occupies a volume of 25 mL at 350 K. What volume in mL will it occupy at 690 K?(Ans = 49 mL)

7. A sample of neon gas at $45^{o}C$ and a volume of 3.5 L is cooled to $15^{0}C$. What is the new volume?(Ans = 3.2 L)

8. Fluorine gas at 699 K occupies a volume of 455 mL. To what temperature should it be lowered to bring the volume to 255 mL?(Ans = 392K)

9. Helium occupies a volume of 3.8 liters at $-45^{0}C$. What volume will it occupy at $140^{0}C$?(Ans = 6.9 L)

10. If the temperature around a perfectly elastic balloon filled with helium rises from 100 K to 300 K then the balloons volume will decrease/increase by a factor of _____. Assume pressure stays constant.

Chapter 12 WS 3 Gay Lussac's Law Problems

1. What is the equation for Gay-Lussac's Law?

2. A cylinder of nitrogen gas at 99 kPa and 280K is cooled to 90K. What is the new pressure inside the cylinder?(Ans = 32 kPa)

3. An aerosol can contains freon gas at a pressure of 15 atmospheres at 298 Kelvin. The aerosol can will burst if the pressure exceeds 30 atmospheres. At what temperature will the aerosol can burst?(Ans = 596 K)

4. A gas cylinder in a dentist's office contains dinitrogen oxide gas at 5.0 atmospheres at 20.°C. If the dentist office catches fire and the gas cylinder is surrounded by 1400°C flames, what will be the pressure inside the cylinder? (Ans = 29 atm)

5. A playground ball is filled to 760 mmHg with nitrogen at 17°C. What temperature in Kelvin is required to increase the pressure inside the ball to 1000 mmHg? (Ans = 382 K)

6. A rigid gas tire is pressurized to 1210 torr at 25°C. What will be the pressure in the tire if the temperature increases to 41°C?(Ans = 1270 torr)

7. If the temperature of a gas in a rigid cylinder is doubled, then the pressure _____ (be specific)

Chapter 12 WS 4 Mixed Gas Law Problems.

1) If the atmospheric pressure is measured as 78.0 kPa, what should the pressure be in mmHg on a barometer?(Ans = 585 mmHg)

2) A sample of nitrogen occupies a volume of 2.5 L at 10^0C. What volume will it occupy at 50^0C?(Ans = 2.9 L)

3) A sample of gas occupies 2.50 L at 1.15 atm of pressure. What is the volume at standard atmospheric pressure?(Ans = 2.88 L)

4) A gas at 40°C and 1.5 atmospheres is pressurized to 6.0 atmospheres. What is the new temperature of the gas in °C?(Ans = 1252K = 979°C)

5) A 500. ml sample of oxygen gas at 760 mmHg is compressed to 100. ml. What is the new pressure?(Ans = 3800 mm Hg)

6) Oxygen gas is at STP when it occupies a volume of 5.50 liters. To what temperature in Kelvins should it be raised to occupy a volume of 9.00 liters?(Ans = 447 K)

7) Hydrogen gas was cooled from 150^0C to 80^0C. Its new volume is 120 mL. What was the original volume?(Ans = 140 mL)

Chapter 12 WS 4 Continued

8) A space capsule pressurized with gas to 700 mmHg at 298K is cooled to 4.0 K in outer space. What is the new gas pressure inside the space capsule?(Ans = 9.4 mmHg)

9) Neon gas at 350°C occupies a volume of 200L. To what temperature in celsius should it be lowered to bring the volume to 85 L?(Ans = -8°C)

10) A sample of gas occupies 125 ml at STP. What is its pressure in kPa when its volume is compressed to 75.0 ml?(Ans = 169 kPa)

11) A propane gas tank pressurized to 2.0 atmospheres at 10°C is increased in temperature to 140°C. What is the new pressure in the tank.(Ans = 2.9 atm)

12) A sample of gas occupies 45.2 ml at 720. mmHg. What is its volume at standard atmospheric pressure?(Ans = 42.8 mL)

Chapter 5 Worksheet 3: Isotope/Scientist Review

Elements come in a variety of isotopes, meaning they are made up of atoms with the same atomic number (number of protons) but different atomic mass numbers. These atoms differ in the number of neutrons.

The average atomic mass is the weighted average of all the isotopes of an element.

Example: A sample of cesium is 75% Cs-133, 20% Cs-132, and 5% Cs-134. What is its average atomic mass?

Answer	0.75 x 133 =	99.75
	0.20 x 132 =	26.4
	0.05 x 134 =	6.7
	Total	132.85 amu

Fe-55 has _____ protons, _____ electrons and _____ neutrons.

Silver-109 has _____ protons _____ electrons and _____ neutrons.

^{40}K has _____ protons, _____ electrons and _____ neutrons.

Write the isotope symbol for the element that has 31 protons and 38 neutrons._____

Lead-210 has _____ neutrons.

Which scientist determined the atom was mostly empty space?_____

Which scientist discovered electrons using a cathode ray tube?_____

Which scientist said that all atoms of an element are identical?_____

Determine the average atomic mass of the following mixtures of isotopes

1. 85% Iodine-127 15% Iodine-126 (Ans = 126.85 amu)

2. 25% ^{37}Cl, 75% ^{35}Cl (Ans = 35.5 amu)

3. 15% Nickel-56, 80% Nickel-58, 5% Nickel-60 (Ans = 57.8 amu)