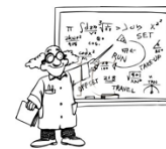


Chemistry

Name _____

Period _____



Semester 2 Chemistry Final Short Answer

Directions: ALL work needs to be completed here in Showbie. Annotate directly and post. If you type with the text feature at all, make sure ALL of the text fits in the text box otherwise it cannot be read.

CHAPTER 9 – Chemical Reactions

1. Explain *why* we must balance chemical reactions.

2. **Balance** the following chemical equation.

Also put a S, D, SR, DR, X on the blank in front of the number to indicate the type of reaction.

KEY: S = synthesis D = decomposition SR = single replacement
 DR = double replacement X = combustion



3. Write a **BALANCED** chemical equation for each of the following reactions described. *Be sure to show the states of matter.*

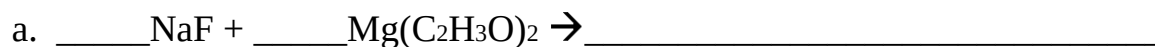
a. Aqueous barium iodide reacts with aqueous potassium sulfate to produce aqueous potassium iodide and solid barium sulfate.

b. Hydrogen gas and oxygen gas combine to produce liquid water.

4. Complete the following skeleton equation. These are single replacement reactions where the METAL gets replaced. THEN **BALANCE** it!



5. Write the proper formulas of the products assuming a double replacement (cations and anions switch partners). THEN **BALANCE** it!



CHAPTER 2 – Sig. Figs., Sci. Not., Metric System

6. Fill in the following information:

	Number of significant figures	Rounded to 2 significant figures	Rounded answer in scientific notation
344,750			
0.0080750			

7. Round the final answer with proper significant figures and units.

a. $37.0 \text{ cm} \times 63.662 \text{ cm} = \mathbf{2,355.5 \text{ cm}^2}$ The answer should be _____

b. $90.00 \text{ g} / 0.2 \text{ mL} = \mathbf{450 \text{ g/mL}}$ The answer should be _____

c. $22.740 \text{ m} + 1.2 \text{ m} = \mathbf{23.94 \text{ m}}$ The answer should be _____

d. $0.257 \text{ g} - 0.02 \text{ g} = \mathbf{0.237 \text{ g}}$ The answer should be _____

8. Solve the problems and express the answers in **scientific notation** with **units** and the **proper sig figs**.

a. $4.00 \times 10^2 \text{ m} \times 30 \text{ m}$ _____

b. $8.00 \times 10^4 \text{ g} / 5.5 \times 10^5 \text{ mL}$ _____

9. Complete the following conversions showing all work with the correct significant figures and units.

a. The distance between Los Angeles and San Francisco taking the I-5 freeway is 614.5 km. What is this distance in meters?

b. According to healthline.org, the average American male aged 20 years and above is 89.95 kg. What is this mass in milligrams?

10. Read and record the length of the following orange line properly.



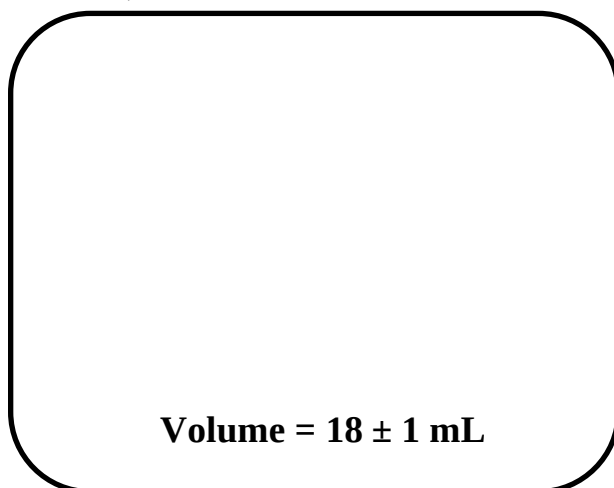
Length = _____

11. Read and record the volume on the graduated cylinder properly.



Volume = _____

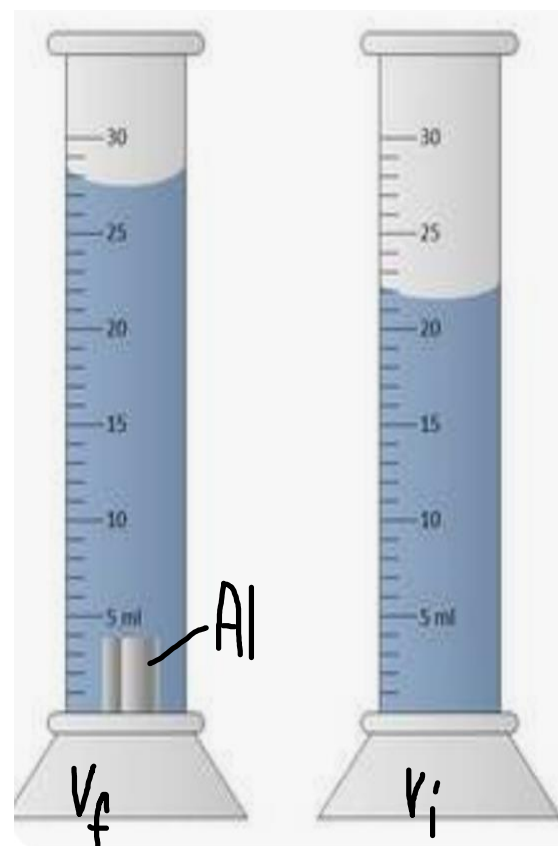
12. Given the measurement, draw the instrument. It's like #11 in reverse.



13. Using the data in Data Table 1-1 and images of the graduated cylinders, determine the density of the aluminum cube by answering a-d.

Table 1-1.				
Mass of the Aluminum Cube	(V _i) Initial Volume of Water	(V _f) Final Volume of Water	Volume of the Aluminum cube	Density of the Aluminum Cube
19.20 ± 0.01g				

- Record the initial volume of water in Table 1-1 with proper ± and units.
- Record the final volume of water in Table 1-1 with proper ± and units.
- Calculate the volume** of aluminum cube and record in Table 1-1.
- Calculate the density** of the aluminum cube and record in Table 1-1. Show ALL work below. ACE it!



CHAPTER 10 - Moles

14. Complete the following conversions showing all work with the correct significant figures and units.

- a. If you have 18.0 grams of Ca, how atoms of Ca is this?

- b. How many moles of $\text{Ba}(\text{MnO}_4)_2$ are in 355 grams of $\text{Ba}(\text{MnO}_4)_2$?

- c. 1.40×10^{25} molecules of NF_3 would contain what volume of NF_3 ?

15. a. Determine the percent composition of each element in $\text{Na}_2\text{C}_2\text{O}_4$.

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b. How many grams of sodium are in a 150 gram sample of $\text{Na}_2\text{C}_2\text{O}_4$?

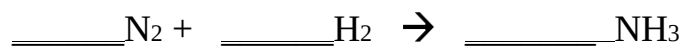
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16. Use the $<$, $>$, or $=$ sign in the chart to compare the values in each row of the table for C_2H_2 and NH_3 . (Hint: Use your intuition first, then if you are stuck, try to solve each side individually and compare them)

HF	$<, >, =$	PF₃
% Fluorine		% Fluorine
Molar Mass		Molar Mass
# Molecules in one mole		#Molecules in one mole
Mass of 2 moles		Mass of Avagadro's # of molecules
# Molecules in 50 g		# Molecules in 50 g
# Moles in 3.02×10^{23} molecules		1/2 Mole of molecules
Mass of 2 mole		Mass of 1 moles

CHAPTER 11 – Stoichiometry

17. Ammonia is useful in many applications like detergents and fertilizers. The following reaction is how ammonia is commercially produced:



a) Balance the reaction above.

b) Determine the reaction type.

c) If 45,000 g of H_2 are reacted, how many moles of N_2 would have to be reacted with it?

d) If 45,000 g of H_2 , what mass (in grams) of NH_3 can theoretically be formed?

e) Using the information from part (d), **what is the percent yield** of NH_3 if 240,000 grams of NH_3 are actually produced during the reaction? ACE it!

CHAPTER 13 – Gas Laws

18. Hot-Air Balloons. A sample of air occupies 2.50 L at a temperature of 22.0°C. What volume will this sample occupy inside a hot-air balloon at a temperature of 43.0°C? Assume that the pressure inside the balloon remains constant. ACE it! (Hint: temperature scale...nuff said)

19. A certain chemistry teacher carefully placed 3.40 gram chunk of dry ice (solid CO₂) into an empty half liter (.500L) water bottle that he found in the recycling bin. The dry ice converted entirely into a gaseous CO₂.

- a) How many moles of CO₂ filled the bottle from the 3.40 gram chunk CO₂?
- b) Plastic bottles will burst if there is too much pressure in the container resulting in a very explosive and dangerous situation. Assuming all of the CO₂ reached room temperature at 25°C, determine the pressure (atm) of the CO₂ filling the bottle. ACE it!

What temperature scale must be used? _____

- c) Knowing that most plastic water bottles can only withstand about 3 atm of pressure, was it actually safe for the teacher to put in that much dry ice into the container or was it a bonehead move? Use your answer from “b” to justify your answer.
- d) Why does pressure get created as the solid CO₂ converts to gas. You must use the words *particles*, *collisions*, and *frequency* in your explanation.

1A	2A	3A	4A	5A	6A	7A	8A
1 H 1.00794 Hydrogen	4 Be 9.012182 Beryllium	5 B 10.811 Boron	6 C 12.0107 Carbon	7 N 14.0067 Nitrogen	8 O 15.9994 Oxygen	9 F 18.9984032 Fluorine	2 He 4.002602 Helium
11 Na 22.989769 Sodium	12 Mg 24.3050 Magnesium	13 Al 26.9815386 Aluminum	14 Si 28.0855 Silicon	15 P 30.973762 Phosphorus	16 S 32.065 Sulfur	17 Cl 35.453 Chlorine	10 Ne 20.1797 Neon
19 K 39.0983 Potassium	20 Ca 40.078 Calcium	31 Ga 69.723 Gallium	32 Ge 72.64 Germanium	33 As 74.92160 Arsenic	34 Se 78.96 Selenium	35 Br 79.904 Bromine	36 Kr 83.798 Krypton
37 Rb 85.4678 Rubidium	38 Sr 87.62 Strontium	49 In 114.818 Indium	50 Sn 118.710 Tin	51 Sb 121.760 Antimony	52 Te 127.60 Tellurium	53 I 126.90447 Iodine	54 Xe 131.293 Xenon
55 Cs 132.9054519 Cesium	56 Ba 137.327 Barium	81 Tl 204.3833 Thallium	82 Pb 207.2 Lead	83 Bi 208.98040 Bismuth	84 Po [209] Polonium	85 At [210] Astatine	86 Rn [222] Radon
87 Fr [223] Francium	88 Ra [226] Radium	113 Uut [284] Ununtrium	114 Uuq [289] Ununquadium	115 Uup [288] Ununpentium	116 Uuh [293] Ununhexium	117 Uus [294] Ununseptium	118 Uuo [294] Ununoctium
Lanthanides							
57 La 138.90547 Lanthanum	58 Ce 140.116 Cerium	59 Pr 140.90765 Praseodymium	60 Nd 144.242 Neodymium	61 Pm [145] Promethium	62 Sm 150.36 Samarium	63 Eu 151.964 Europium	71 Lu 174.9668 Lutetium
89 Ac [227] Actinium	90 Th 232.03806 Thorium	91 Pa 231.03588 Protactinium	92 U 238.02891 Uranium	93 Np [237] Neptunium	94 Pu [244] Plutonium	95 Am [243] Americium	103 Lr [262] Lawrencium
Actinides							

Table 0.4

Common Polyatomic Ions					
1- charge		2- charge		3- charge	
Formula	Name	Formula	Name	Formula	Name
H ₂ PO ₄ ⁻	Dihydrogen phosphate	HPO ₄ ²⁻	Hydrogen phosphate	PO ₃ ³⁻	Phosphite
C ₂ H ₃ O ₂ ⁻	Acetate	C ₂ O ₄ ²⁻	Oxalate	PO ₄ ³⁻	Phosphate
HSO ₃ ⁻	Hydrogen sulfite	SO ₃ ²⁻	Sulfite		
HSO ₄ ⁻	Hydrogen sulfate	SO ₄ ²⁻	Sulfate		
HCO ₃ ⁻	Hydrogen carbonate	CO ₃ ²⁻	Carbonate		
NO ₂ ⁻	Nitrite	CrO ₄ ²⁻	Chromate		
NO ₃ ⁻	Nitrate	Cr ₂ O ₇ ²⁻	Dichromate		
CN ⁻	Cyanide	SiO ₃ ²⁻	Silicate		
OH ⁻	Hydroxide				
MnO ₄ ⁻	Permanganate				
ClO ⁻	Hypochlorite				
ClO ₂ ⁻	Chlorite				
ClO ₃ ⁻	Chlorate				
ClO ₄ ⁻	Perchlorate				

Chemical Names and Formulas 147

Covalent Compounds

The number
of each atom
is given by
prefixes

Mono-	1
Di-	2
Tri-	3
Tetra-	4
Penta-	5
Hexa-	6
Hepta-	7
Octa-	8
Nona-	9
Deca-	10

Writing Compound FORMULAS

Type 1 – Ionic

M/Non
M/Poly
M/Trans

CHARGES = 0

Type 2 – Covalent/Molecular

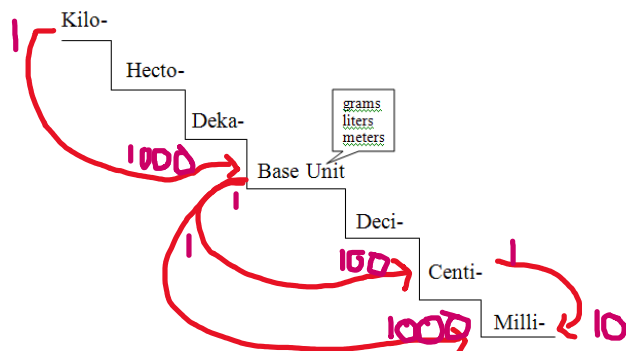
N/N - use #prefixes to write formula

Type 3 - Diatomics

Br₂ I₂ N₂ Cl₂ H₂ O₂ F₂

Type 4 – Just an element!

Ex: Fe, Ar, C, B, Ag



(Gas constant = 0.0821 L atm/mol K)

(Kelvin = Celsius + 273)

Gas Law	Formula
Boyle's Law	$P_1V_1 = P_2V_2$
Gas Law Formulas	
Charles' Law	$\frac{V_1}{T_1} = \frac{V_2}{T_2}$
Gay-Lussac's Law	$\frac{P_1}{T_1} = \frac{P_2}{T_2}$
Combined Law	$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$
Ideal Gas Law	$PV = nRT$

