

Chemistry – Unit 5 Review

1. Definitions

- mole
- molar mass
- Avogadro's number
- empirical formula
- molecular formula

2. Find the molar mass of the following:

- KNO_3 _____
- $(\text{NH}_4)_2\text{CO}_3$ _____
- Ag_2CrO_4 _____
- oxygen gas _____
- $\text{Ca}(\text{NO}_3)_2$ _____
- PbSO_4 _____

3. Consider the masses of various hardware below.

Type	Mass (g)	Relative mass
Washer	1.74	
Hex nut	3.16	
Anchor		3.00
Bolt	7.64	

- Do the calculations necessary to complete the table.
- Explain the connection between these calculations and the atomic masses in the Periodic Table.

4. Convert from g \rightarrow moles or from moles \rightarrow g. Show units.

a. 12.0 g Fe x _____ = _____ moles

b. 25.0 g of Cl₂ gas x _____ = _____ moles

c. 0.476 g of (NH₄)₂SO₄ x _____ = _____ moles

d. 0.15 moles NaNO₃ x _____ = _____ g

e. 0.0280 moles NO₂ x _____ = _____ g

f. 0.64 moles AlCl₃ x _____ = _____ g

5. Use Avogadro's number to do the following. Show work, use labels.

a. How many atoms are there in 0.00150 moles Zn?

b. If you had 2.50 moles of oxygen gas, what mass of the gas would be in the sample?

c. A 4.07 g sample of NaI contains how many atoms of Na?

d. How many atoms of chlorine are there in 16.5 g of iron (III) chloride, FeCl₃?

*e. What is the mass of 100 million atoms of gold? Could you mass this on a balance?

6. Calculate the empirical formula of a compound that contains 4.20 g of nitrogen and 12.0 g of oxygen.
7. When 20.16 g of magnesium oxide reacts with carbon, carbon monoxide forms and 12.16 g of Mg metal remains. What is the empirical formula of magnesium oxide?
8. What is the molecular formula of each compound?

<u>Empirical Formula</u>	<u>Actual Molar Mass of Compound</u>	<u>Molecular Formula</u>
CH	78 g/mole	_____
NO ₂	92 g/mole	_____

9. A compound is composed of 7.20 g of carbon, 1.20 g of hydrogen and 9.60 g of oxygen. The molar mass of the compound is 180 g/mole. Determine the empirical and molecular formulas of this compound.

10. What is the % by mass of oxygen in water?

11. A compound of iron and oxygen is found to contain 28 g of Fe and 8.0 g of O. What is the % by mass of each element in the compound?