

Revised August 2011



HONORS WORKSHEET 4s: Stoichiometry Summary



- **TYPE 1: Those involving Avogadro's number (the mole concept).**

Question 1

A sample of Ge is found to contain 9.7×10^{23} atoms of Ge. How many moles of Ge atoms are in the sample? (1)

Question 2

How many W atoms are found in 0.43 moles of pure W? (1)

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- **TYPE 2: Those involving the relationship between mass, moles and molar mass (RAM, RFM, RMM).**

Question 3

What is the mass in grams of 0.531 moles of Sn? (1)

Question 4

How many moles of Ca are in 2.03 g of Ca? (1)

Question 5

5.00 moles of a binary, group II oxide are found to have a mass of 521 g. Identify the group II metal. (2)

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- **TYPE 3: Those combining types #1 & #2.**

Question 6

How many Ta atoms are found in a 1.231 g sample of Ta? (2)

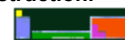
Question 7

What is the mass of 8.11×10^{23} atoms of Sulfur? (2)

Question 8

What mass of Cu atoms have the same number of atoms as there are in a 4.21g sample of Si?
(2)

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- **TYPE 4: % by Mass Composition.**

Question 9

Calculate the percent by mass composition of dimethylether, CH_3OCH_3 . (2)

Question 10

What is the percent by mass composition of aluminum sulfate? (2)

Question 11

A compound that contains a complex ion has the formula $\text{Al}_4[\text{Fe}(\text{CN})_6]_3$. What is the percent by mass composition of this compound? (2)

- **TYPE 5: Empirical formula.**

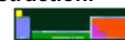
Question 12

A compound containing silver and chlorine contains 75.3% Ag. What is the empirical formula of the compound? (2)

Question 13

In a vigorous chemical reaction, 1.403 g of sodium metal is completely reacted with 1.159 g of fluorine gas. What is the empirical formula of the compound formed? (3)

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- **TYPE 6: Molecular formulae from empirical formulae.**

Question 14

What is the molecular formula of hydrocarbon that has an empirical formula of CH and a molecular mass of 78 g mol^{-1} ? (1)

Question 15

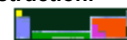
A compound contains 48.65% carbon, 8.108% hydrogen, and the remainder oxygen. The molecular mass of this compound is approximately 74.00 g/mol . What is the empirical formula? What is the molecular formula? (3)

- **TYPE 7: Combustion analysis.**

Question 16

The combustion of 4.000 g of a compound that contains only C, H, N and Br yields 3.826 g of CO_2 and 2.087 g of H_2O . Another sample of the compound with a mass of 3.111 g is found to contain 1.803 grams of Br. What is the empirical formula of the compound? (6)

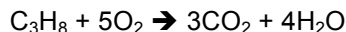
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- **TYPE 8: % Yield.**

Question 17

Propane will combust according to the reaction below. If 11.1 g of Propane produces 23.3 g of CO₂ when burned in excess oxygen, what is the % yield? (3)



- **TYPE 9: Limiting reactant.**

Question 18

Consider the reaction between Iron and anhydrous Copper (II) sulfate that produces Iron (II) sulfate and Copper metal.

- Write an equation for the reaction. (2)
- If 120. g of Fe are reacted with 200. g of Copper (II) sulfate, identify the limiting reagent. Which reagent is in excess? (2)
- Calculate the mass of Copper formed. (2)
- How much of the excess reagent is left over at the end of the reaction? (2)

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- **Type 10: Analysis of hydrated salts.**

Question 19

Barium Chloride is found as a hydrated salt, $\text{BaCl}_2 \cdot x\text{H}_2\text{O}$. A student carefully heats 2.50 g of the salt to a constant mass of 2.13 g. Find x . (4)

- **TYPE 11: Moles and reacting ratios (including solutions).**

Question 20

Calcium hydrogen carbonate, $\text{Ca}(\text{HCO}_3)_2$, reacts with HCl according to the equation below.



- (a) What volume of 0.235 M HCl solution must be present to totally react with 0.140 moles of the calcium compound? (2)
- (b) How many moles of water are produced when 0.491 g of the calcium compound combines with excess HCl? (2)

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- TYPE 12: Dilution.

Question 21

Calculate the volume of 0.120 M sulfuric acid that must be diluted with water to produce 3.00 L of 0.018 M sulfuric acid. (2)