

name _____

4. [3 pts] Chlorine has two major isotopes, ^{35}Cl and ^{37}Cl . Using the average mass from the periodic table, which of the following values is **closest** to the percent ^{35}Cl ? (Circle the best answer.)

1% 10% 25% 50% **75%** 90% 99%

$$35x + 37(1-x) = 35.45$$

$$35x + 37 - 37x = 35.45$$

$$-2x = -1.55$$

$$x = 0.775 \approx 77\%$$

Or: a 50/50 mix would be ≈ 36 on average.
75/25 gives an average halfway between 35 & 36.

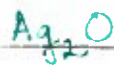
5. At high temperature, silver sulfate decomposes to form elemental silver, SO_3 , and O_2 . The reaction occurs in two steps:

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→ to get $2 \text{Ag}_2\text{O}$ to cancel, need to double the top rxn

(a) [2 pts] Identify the **intermediate** in the reaction.



(b) [3 pts] Give the balanced equation for the overall process, with the intermediate canceled out.



(c) [6 pts] (Calculate the following, and round your answers appropriately.) For a sample containing 0.032 mol of silver sulfate,

$$\text{Ag}_2\text{SO}_4 \quad \left. \begin{array}{l} \text{Ag } 107.9 \times 2 = 215.8 \\ \text{S } 32.00 \\ \text{O } 16.00 \times 4 = 64.00 \end{array} \right\} 311.6 \text{ g/mol}$$

what is the mass of the sample? (Include appropriate unit.)

$$0.032 \text{ mol} \times \frac{311.6 \text{ g}}{\text{mol}} = 9.97 \text{ g} \rightarrow \boxed{10. \text{ g}} \text{ (rounded to 2 s.f.)}$$

how many moles of oxygen are in the sample?

$$0.032 \text{ mol Ag}_2\text{SO}_4 \times \frac{4 \text{ mol O}}{1 \text{ mol Ag}_2\text{SO}_4} = \boxed{0.128 \text{ mol O}}$$

or 0.13
↑ 3 d.p. if we think of adding 4x
↑ 2 s.f. if we think of mult. rule

how many silver atoms are in the sample?

$$0.032 \text{ mol Ag}_2\text{SO}_4 \times \frac{2 \text{ mol Ag}}{1 \text{ mol Ag}_2\text{SO}_4} \times \frac{6.022 \times 10^{23} \text{ atoms Ag}}{\text{mol Ag}} = 3.9 \times 10^{22} \text{ atoms}$$

6. [10 pts] Fill in the blanks. In some cases there could be more than one acceptable answer; pick **one**.

$\text{C}, \text{Si}, \text{B}$

An element that forms covalent compounds, but does not form binary ionic compounds.

MgO

The product formed in the combustion of magnesium metal. $\text{Mg} + \text{O}_2 \rightarrow \text{MgO}$

Br

The Period 4 halogen.

312.10

The number 312.096, rounded to 2 decimal places.

Fe

An element that forms variable charge cations. • any transition metal besides Ag, Zn
• also Sn, Pb, Bi, Po

name _____

7. [18 pts] Clearly indicate whether each statement is TRUE or FALSE. If we can't tell which you mean, it's wrong.

False ^{Isotopes} Allotropes of an element have different numbers of neutrons but the same number of protons.False A balanced equation will have the same number of molecules on each side of the arrow.True Different isotopes of an element have the same number of electrons.
 *↳ # of molecules can change.*True The sum of 55.54 and 63.47 should have 5 significant figures.True The designation "transition elements" only includes metals.True Chlorine dioxide is a binary covalent compound. ClO_2 True Ionic compounds can contain covalent bonds. *polyatomic ions contain covalent bonds*False N_2O_3 is composed of N^3 and O^2 ions. *no - it's covalent*False Ru is an inner transition metal = lanthanides, actinides

$$\begin{array}{r} 55.54 \\ 63.47 \\ \hline 119.01 \end{array} \begin{array}{l} \text{2 d.p.} \\ \therefore 5 \text{ s.f.} \end{array}$$

8. [5 pts] In the list below, circle all substances that are covalent compounds.

alloy
NaKionic
 IrCl_3 P_2O_5 element
 N_2 ICl_3

9. [12 pts] Give a correct systematic name for each of the following. Spelling counts.

lithium nitride ** Li_3N silicon dioxide ** SiO_2 copper (I) sulfite ** Cu_2SO_3 potassium phosphate ** K_3PO_4 chlorine trifluoride ** ClF_3 sulfur trioxide SO_3

10. [14 pts] Give the correct chemical formula for each of the following.

 NH_4ClO_2 ammonium chlorite NaBrO_4 sodium perbromate NO nitrogen oxide C_4H_{10} butane $\text{Ag}_2\text{C}_2\text{O}_4$ silver oxalate Cl_2 elemental chlorine Fe_2S_3 iron(III) sulfide