

1. Draw the Lewis Dot structures for each of the following: (5 pts)

a. Cs

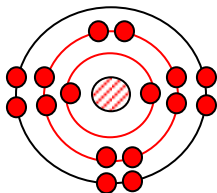


b. P

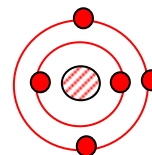


2. Using the Bohr model of an atom, draw the Electron Dot Structure for the following: (5 pts)

a. S

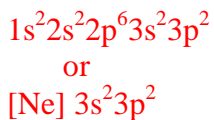


b. B

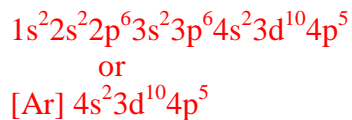


3. Write the electron configurations for the following: (5 pts)

a. Si



b. Br



4. Name the following compounds: (5 pts)

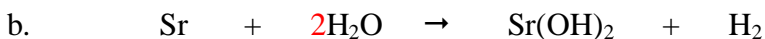
a. BrF_3

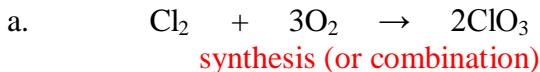
Bromine trifluoride

b. NH_4HCO_3

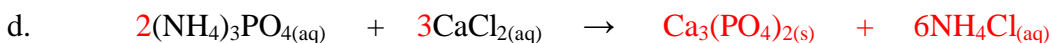
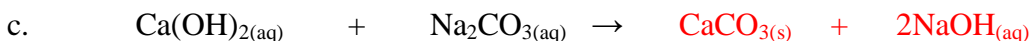
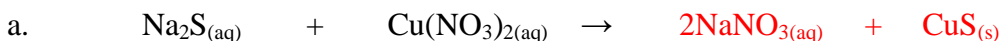
ammonium bicarbonate
(ammonium hydrogen carbonate)

5. Balance the following reactions: (10 pts)



6. Classify the following reactions: (10 pts)7. Complete and balance the following double displacement precipitation reactions and include phase labels, (s), (l), (g), or (aq): (20 pts)

Soluble	Except	Insoluble	Except
$\text{Na}^+, \text{K}^+, \text{Li}^+, \text{NH}_4^+$	None	CO_3^{2-}	Group 1A, NH_4^+
NO_3^-	None	PO_4^{3-}	Group 1A, NH_4^+
$\text{Cl}^-, \text{Br}^-, \text{I}^-$	$\text{Ag}^+, \text{Pb}^{2+}, \text{Hg}^{2+}$	S^{2-}	Group 1A, NH_4^+
SO_4^{2-}	$\text{Ca}^{2+}, \text{Ag}^+, \text{Pb}^{2+}, \text{Ba}^{2+}$	OH^-	Group 1A, $\text{Ca}^{2+}, \text{Ba}^{2+}$

8. Dioxane is a common solvent used to make plastics. If the molar mass is 88 g/mol and the % composition is 54.5% C, 9.15% H, 36.3% O, determine both the empirical formula and the molecular formula. (10 pts) *Assume a 100 g sample:*

$$54.5\text{g C} \times \frac{\text{mol}}{12\text{g}} = 4.54\text{ mol} \div 2.27\text{ mol} = 2$$

$$9.15\text{g H} \times \frac{\text{mol}}{1\text{g}} = 9.15\text{ mol} \div 2.27\text{ mol} = 4$$

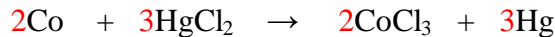
$$36.3\text{g O} \times \frac{\text{mol}}{16\text{g}} = 2.27\text{ mol} \div 2.27\text{ mol} = 1$$

Empirical Formula = $\text{C}_2\text{H}_4\text{O}$

$$\frac{\text{Molecular mass}}{\text{Empirical mass}} = \frac{88}{44} = 2$$

Molecular Formula = $\text{C}_4\text{H}_8\text{O}_2$

9. How many grams of mercuric chloride must react to give 5.11 g of Hg? (10 pts)



$$5.11\text{g Hg} \times \frac{1\text{ mol}}{201\text{g}} \times \frac{3\text{ mol HgCl}_2}{3\text{ mol Hg}} \times \frac{271\text{g}}{\text{mol}} = 6.89\text{g HgCl}_2$$

10. Calculate the following: (10 pts) (Avogadro's Number = 6.02×10^{23} atoms/mol)

a. moles in 20.3 grams of N

b. grams in 1.83×10^{-2} moles BF_3

$$20.3\text{g} \times \frac{\text{mol}}{14\text{g}} = 1.45\text{ mol}$$

$$1.83 \times 10^{-2}\text{mol} \times \frac{67.8\text{g}}{\text{mol}} = 1.24\text{ g}$$

c. molar mass of $\text{Al}(\text{OH})_3$

d. molecules in 7.82 moles O_2

$$\frac{21\text{g}}{\text{mol}} + 3\left(\frac{17\text{g}}{\text{mol}}\right) = 78\frac{\text{g}}{\text{mol}}$$

$$7.82\text{mol} \times \frac{6.02 \times 10^{23}\text{molecules}}{\text{mol}} = 4.71 \times 10^{24}$$

11. Calculate the water of crystallization for a hydrate of zinc sulfate, $\text{ZnSO}_4 \cdot X\text{H}_2\text{O}$, that is 43.9% H_2O and write the formula for the hydrate. (10 pts)

Assume a 100 g sample:

$$43.9\text{g H}_2\text{O} \times \frac{\text{mol}}{18\text{g}} = 2.44\text{ mol} \div 0.348 = 7 = X$$

$$100\text{g} - 43.9\text{g} = 56.1\text{g ZnSO}_4 \times \frac{\text{mol}}{161\text{g}} = 0.348\text{ mol} \div 0.348\text{ mol} = 1$$

Formula:



12. (Extra Credit) Use the given activity series to predict if the following single displacement reaction would occur. (5 pts)

Activity Series

$\text{Li} > \text{Ca} > \text{Al} > \text{Zn} > \text{Fe} > \text{Cu}$ No, because Cu is less reactive than Zn.

