

Chemistry Module 5 Homework

Assignment #1

1. Classify the following reactions as decomposition, formation, complete combustion or neither:

- a. $2\text{NaHPO}_4 \rightarrow 2\text{Na} + \text{H}_2 + 2\text{P} + 4\text{O}_2$ **Decomposition**
- b. $\text{NaCl} + \text{AgNO}_3 \rightarrow \text{AgCl} + \text{NaNO}_3$ **Neither**
- c. $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O}$ **Combustion**
- d. $2\text{HBr} + \text{Ca}(\text{OH})_2 \rightarrow 2\text{H}_2\text{O} + \text{CaBr}_2$ **Neither**
- e. $\text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{CO}_3$ **Formation**
- f. $\text{CH}_4 + \text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$ **Combustion**

2. What is the difference between complete combustion and incomplete combustion?

For complete combustion, the products are carbon dioxide and water. For incomplete combustion, the products are carbon monoxide and water or just carbon and water because there is not enough oxygen for the complete combustion of the fuel.

3. Write the balanced chemical equation for the decomposition of NaHCO_3 .



4. Write the balanced chemical equation for the formation of K_2CrO_4 .



5. Write the balanced chemical equation for the complete combustion of decane, $\text{C}_{10}\text{H}_{22}$.



6. Explain how a catalytic converter in a car works.

A catalytic converter attracts carbon monoxide molecules and oxygen molecules to the side of a metal tube. When the molecules rush to get to the sides of the tube, they crash into each other and form carbon dioxide which is then released in the exhaust of the car.

7. Find the mass in amu of:

- a. 50 lithium atoms $50 \text{ atoms} \times 6.94 \text{ amu per atom} = 347 \text{ amu}$
- b. 3 silver atoms $3 \text{ atoms} \times 107.9 \text{ amu per atom} = 323.7 \text{ amu}$
- c. one uranium atom $1 \text{ atom} \times 238 \text{ amu per atom} = 238 \text{ amu}$

8. What is the mass of an iron atom:

- a. in amu **55.8 amu**
- b. in grams $55.8 \text{ amu} \times 1.66 \times 10^{-24} \text{ amu per gram} = 9.26 \times 10^{-23} \text{ grams}$

9. What is the mass of a NaHSO_4 molecule in

- a. amu $23 \text{ amu} + 1.01 \text{ amu} + 32.1 \text{ amu} + 4 \times 16 \text{ amu} = 120.11 \text{ amu}$
- b. grams $120.11 \text{ amu} \times 1.66 \times 10^{-24} \text{ amu per gram} = 1.99 \times 10^{-22} \text{ grams}$

10. AP- Indicate the type of each reaction – formation, decomposition, single replacement, double replacement, or combustion.

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|---|---------------------|
| a. $\text{Mg} + \text{H}_2\text{SO}_4 \rightarrow \text{MgSO}_4 + \text{H}_2$ | Single replacement |
| b. $\text{Fe} + \text{O}_2 \rightarrow \text{Fe}_3\text{O}_4$ | Formation |
| c. $\text{Pb}(\text{NO}_3)_2 \rightarrow \text{PbO} + \text{NO}_2 + \text{O}_2$ | Decomposition |
| d. $\text{C}_2\text{H}_6 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$ | Combustion |
| e. $\text{Pb}(\text{NO}_3)_2 + \text{NaI} \rightarrow \text{PbI}_2 + \text{NaNO}_3$ | Double displacement |