Chemical Reactions Part #1 Review

Average Atomic Mass

1. Rubidium is a soft, silvery-white metal that has two common isotopes, ^{85}Rb and ^{87}Rb. If the abundance of ^{85}Rb is 72.2% and the abundance of ^{87}Rb is 27.8%, what is the average atomic mass of rubidium?

2. Uranium is used in nuclear reactors and is a rare element on earth. Uranium has three common isotopes. If the abundance of ^{234}U is 0.01%, the abundance of ^{235}U is 0.71%, and the abundance of ^{238}U is 99.28%, what is the average atomic mass of uranium?

3. Titanium has five common isotopes: ^{46}Ti (8.0%), ^{47}Ti (7.8%), ^{48}Ti (73.4%), ^{49}Ti (5.5%), ^{50}Ti (5.3%). What is the average atomic mass of titanium?

4. Copper used in electric wires comes in two flavors (isotopes): ^{63}Cu and ^{65}Cu. ^{63}Cu has an atomic mass of 62.9298 amu and an abundance of 69.09%. The other isotope, ^{65}Cu, has an abundance of 30.91%. The average atomic mass between these two isotopes is 63.546 amu. Calculate the actual atomic mass of ^{65}Cu.

5. Magnesium consists of three naturally occurring isotopes. The percent abundance of these isotopes is as follows: ^{24}Mg (78.70%), ^{25}Mg (10.13%), and ^{26}Mg (11.7%). The average atomic mass of the three isotopes is 24.3050 amu. If the atomic mass of ^{25}Mg is 24.98584 amu, and ^{26}Mg is 25.98259 amu, calculate the actual atomic mass of ^{24}Mg.

Naming Compounds & Molar Masses

6. Name each of the following chemical compounds and list their molar masses to the nearest g/mol:

   (a) $AgNO_3$ _____ Mass = _____

   (b) $PbSO_4$ _____ Mass = _____

   (c) $CoCl_2$ _____ Mass = _____

   (d) $Sn(CO_3)_2$ _____ Mass = _____

7. Write the formulas of each of the following chemical compounds and list their molar masses to the nearest g/mol:

   (a) copper (I) oxide _____ Mass = _____

   (b) ammonium phosphate _____ Mass = _____

(c) vanadium (V) cyanide _____ Mass = _____

(d) platinum (IV) hydroxide _____ Mass = _____

Balancing Equations and Type of Reaction

8. Balance the following equations and indicate the type of reaction taking place:

(a) ____ NaBr + ____ H_3PO_4 → ____ Na_3PO_4 + ____ HBr

Type of reaction: _____

(b) ____ $Ca(OH)_2$ + ____ $Al_2(SO_4)_3$ → ____ $CaSO_4$ + ____ $Al(OH)_3$

Type of reaction: _____

(c) ____ Mg + ____ Fe_2O_3 → ____ Fe + ____ MgO

Type of reaction: _____

(d) ____ C_2H_4 + ____ O_2 → ____ CO_2 + ____ H_2O

Type of reaction: _____

(e) ____ $PbSO_4$ → ____ $PbSO_3$ + ____ O_2

Type of reaction: _____

(f) ____ NH_3 + ____ I_2 → ____ N_2I_6 + ____ H_2

Type of reaction: _____

(g) ____ H_2O + ____ SO_3 → ____ H_2SO_4

Type of reaction: _____

Molar Conversions

9. How many grams does 0.500 moles of CuBr weigh?

10. How many molecules are there in 0.655 moles of C_6H_{14}?

11. How many moles are there in 2.35×10^{24} molecules of water?

12. How many grams does 5.60×10^{22} molecules of SiO_2 weigh?

13. How many molecules are there in 21.6 grams of CH_4?

Calculations Involving Moles and Gases

14. How many moles of gas does it take to occupy 120 L at a pressure of 2.3 atm and a temperature of 340 K?

15. If I have a 50 L container that holds 45 moles of gas at a temperature of 200 °C, what is the pressure inside the container?

16. It is not safe to put aerosol canisters in a campfire, because the pressure inside the canisters gets very high and they can explode. If I have a 1.0 L canister that holds 2 moles of gas, and the campfire temperature is 1400 °C, what is the pressure inside the canister?

17. How many moles of gas are in a 30 L scuba canister if the temperature of the canister is 300 K and the pressure is 200 atm?

18. I have a balloon that can hold 100 L of air. If I blow up this balloon with 3 moles of oxygen gas at a pressure of 1 atm, what is the temperature of the balloon?