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MIXED MOLE CONVERSIONS

SHOW ALL WORK!!! (conversion factors, units, sig figs, molar mass work, etc)

Remember:

1 mol = 6.02×10^{23} particles (atoms, molecules, or formula units)

1 mol = molar mass in grams

1 mol = 22.4 L

1) How many moles are in 297 g of NH_3 ?

$$\frac{297 \text{ g NH}_3}{17.03 \text{ g NH}_3} \times \frac{1 \text{ mol NH}_3}{17.03 \text{ g NH}_3} = 17.4 \text{ mol NH}_3$$

2) How many moles are in 95 g of MgCO_3 ?

$$\frac{95 \text{ g MgCO}_3}{84.31 \text{ g MgCO}_3} \times \frac{1 \text{ mol MgCO}_3}{84.31 \text{ g MgCO}_3} = 1.1 \text{ mol MgCO}_3$$

3) What is the mass of 1.9×10^{26} formula units K_2CO_3 ?

$$\frac{1.9 \times 10^{26} \text{ FU K}_2\text{CO}_3}{6.02 \times 10^{23} \text{ FU}} \times \frac{1 \text{ mol K}_2\text{CO}_3}{6.02 \times 10^{23} \text{ FU}} \times \frac{138.21 \text{ g K}_2\text{CO}_3}{1 \text{ mol K}_2\text{CO}_3} = 4.4 \times 10^4 \text{ g K}_2\text{CO}_3$$

4) How many grams are in 21.7 mol H_2O ?

$$\frac{21.7 \text{ mol H}_2\text{O}}{1 \text{ mol H}_2\text{O}} \times \frac{18.016 \text{ g H}_2\text{O}}{1 \text{ mol H}_2\text{O}} = 391 \text{ g H}_2\text{O}$$

5) A hot air balloon contains 6.78×10^9 L of gas. How many moles does it contain?

$$\frac{6.78 \times 10^9 \text{ L}}{22.4 \text{ L}} \times \frac{1 \text{ mol}}{22.4 \text{ L}} = 3.03 \times 10^8 \text{ mol}$$

6) How many moles are equal to 8.9×10^{24} formula units of CO_2 ?

$$\frac{8.9 \times 10^{24} \text{ FU CO}_2}{6.02 \times 10^{23} \text{ FU CO}_2} \times \frac{1 \text{ mol CO}_2}{6.02 \times 10^{23} \text{ FU CO}_2} = 15 \text{ mol CO}_2$$

7) How many moles are in 2.03×10^{26} atoms of Zn?

$$\frac{2.03 \times 10^{26} \text{ atoms Zn}}{6.02 \times 10^{23} \text{ atoms Zn}} \times \frac{1 \text{ mol Zn}}{1} = 337 \text{ mol Zn}$$

8) How many molecules are in 3.569 mol of H_2O_2 ?

$$3.569 \text{ mol H}_2\text{O}_2 \times \frac{6.02 \times 10^{23} \text{ FU H}_2\text{O}_2}{1 \text{ mol H}_2\text{O}_2} = 2.149 \times 10^{24} \text{ FU H}_2\text{O}_2$$

9) How many atoms are in 5.2 mol of Ag?

$$5.2 \text{ mol Ag} \times \frac{6.02 \times 10^{23} \text{ atoms Ag}}{1 \text{ mol Ag}} = 3.1 \times 10^{24} \text{ atoms Ag}$$

10) How many particles are in 36 g of Li_2SO_4 ?

$$\frac{36 \text{ g Li}_2\text{SO}_4}{109.94 \text{ g Li}_2\text{SO}_4} \times \frac{1 \text{ mol Li}_2\text{SO}_4}{1} \times \frac{6.02 \times 10^{23} \text{ FU}}{1 \text{ mol Li}_2\text{SO}_4} = 2.0 \times 10^{23} \text{ FU Li}_2\text{SO}_4$$

11) What size container do you need to hold 21.4 mol Cl_2 gas at STP?

$$21.4 \text{ mol Cl}_2 \times \frac{22.4 \text{ L Cl}_2}{1 \text{ mol Cl}_2} = 479 \text{ L Cl}_2$$

12) What is the mass of 3.51×10^{24} formula units of CaF_2 ?

$$\frac{3.51 \times 10^{24} \text{ FU CaF}_2}{6.02 \times 10^{23} \text{ FU}} \times \frac{1 \text{ mol CaF}_2}{1} \times \frac{78.07 \text{ g CaF}_2}{1 \text{ mol CaF}_2} = 455 \text{ g CaF}_2$$