

SOLUTIONS:

- 1) What is the molar mass of NaCl.

$$\begin{aligned} \text{Na: } & 1 \times 23 \text{ g/mole} = 23 \text{ g/mole} \\ \text{Cl: } & 1 \times 35.45 \text{ g/mole} = 35.45 \text{ g/mole} \\ & \underline{58.45 \text{ g/mole}} \end{aligned}$$

- 2) What is the molar mass of CCl
- ₄

$$\begin{aligned} \text{C: } & 1 \times 12 = 12 \text{ g/mole} \\ \text{Cl: } & 4 \times 35.45 = 141.8 \text{ g/mole} \\ & \underline{153.8 \text{ g/mole}} \end{aligned}$$

- 3) What is the molar mass of CaSO
- ₄

$$\begin{aligned} \text{Ca: } & 1 \times 40 \text{ g/mole} = 40 \\ \text{S: } & 1 \times 32 \text{ g/mole} = 32 \\ \text{O: } & 4 \times 16 \text{ g/mole} = 64 \\ & \underline{136 \text{ g/mole}} \end{aligned}$$

- 4) Find the mass of 4.5 moles of Carbon.

$$n = \frac{m}{M} \quad 4.5 \text{ moles} = \frac{m}{12 \text{ g/mole}} \quad 4.5(12) = m$$

$$\underline{54 \text{ g} = m}$$

- 5) Find the mass of 4 moles of Iron.

$$n = \frac{m}{M} \quad 4 \text{ moles} = \frac{m}{56 \text{ g/mole}} \quad 4(56) = m$$

$$\underline{226 \text{ g} = m}$$

- 6) Find the mass of 7.1 moles of Ca
- ₃
- (PO
- ₄
-)
- ₂

Step ①

$$\begin{aligned} \text{Ca: } & 3 \times 40 \text{ g/mole} = 120 \\ \text{P: } & 2 \times 31 \text{ g/mole} = 62 \\ \text{O: } & 8 \times 16 \text{ g/mole} = 128 \\ & \underline{310 \text{ g/mole}} \end{aligned}$$

Step ②

$$n = \frac{m}{M} \quad 7.1 = \frac{m}{310}$$

$$7.1(310) = m$$

$$\underline{2201 \text{ g} = m}$$

- 7) How many moles is equivalent to 8g of Carbon.

$$n = \frac{m}{M}$$

$$n = \frac{8 \text{ g}}{12 \text{ g/mole}} \quad n = \underline{0.67 \text{ moles}}$$

8) How many moles is equivalent to 138g of NO_2 .

Step ①
 $\text{N}: 1 \times 14 \text{ g/mole} = 14$
 $\text{O}: 2 \times 16 \text{ g/mole} = 32$
 46 g/mole

Step ②
 $n = \frac{m}{M} \quad n = \frac{138 \text{ g}}{46 \text{ g/mole}} = \underline{3 \text{ moles}}$

9) How many moles is equivalent to 1kg of $\text{Ca}_3(\text{PO}_4)_2$ (1000g)

Step ①
M of $\text{Ca}_3(\text{PO}_4)_2$
 $= 310 \text{ g/mole}$

Step ②
 $n = \frac{m}{M}$
 $n = \frac{1000 \text{ g}}{310 \text{ g/mole}} \quad n = \underline{3.22 \text{ moles}}$

10) How many molecules are there in 1.75 moles of any substance.

$(1.75) \times 6.02 \times 10^{23} \approx \underline{1.054 \times 10^{24} \text{ molecules}}$

11) How many molecules are there in 25g of H_2O .

Step ①
M of H_2O
 $= 18 \text{ g/mole}$

Step ②
 $n = \frac{m}{M} = \frac{25 \text{ g}}{18 \text{ g}} = 1.39 \text{ moles}$

Step ③
 $(1.39) \times 6.02 \times 10^{23}$
 $= \underline{8.368 \times 10^{23} \text{ molecules}}$

12) How many molecules are there in 500g of $\text{Ca}_3(\text{PO}_4)_2$

Step ①
M of $\text{Ca}_3(\text{PO}_4)_2$
 $= 310 \text{ g/mole}$

Step ②
 $n = \frac{m}{M} = \frac{500 \text{ g}}{310 \text{ g/mole}}$
 $n = 1.61 \text{ moles}$

Step ③
 $(1.61) \times 6.02 \times 10^{23}$
 $= \underline{9.692 \times 10^{23} \text{ molecules}}$