

9/20/2019

Balancing equations!

- need same # + type of atoms on each side.
- change COEFFICIENTS not subscripts!



C: 2

H: 6

O: ~~7~~

C: ~~x~~ 2

H: ~~x~~ 6

O: ~~3~~ ~~5~~ 7

x 2



* lowest set of whole # coefficients *



C: 3

H: 8

O: ~~x~~ 10

C: ~~x~~ 3

H: ~~x~~ 8

O: ~~x~~ ~~7~~ 10

CO₂ H₂O
CO₂ H₂O
CO₂ H₂O
H₂O



K: ~~x~~ 2

Cl: ~~x~~ 2

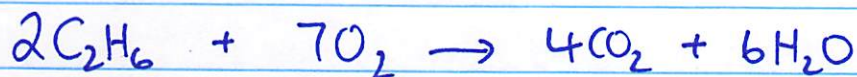
O: ~~x~~ 6

K: ~~x~~ 2

Cl: ~~x~~ 2

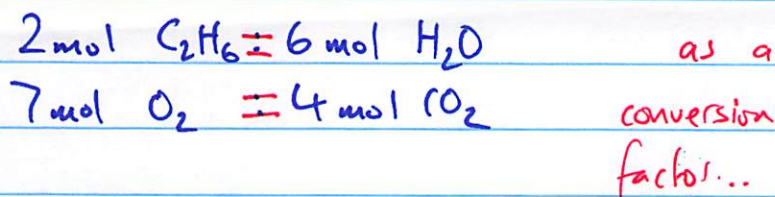
O: ~~x~~ 6

earlier:



coefficients are the ratios! (molar ratios)

$$\begin{array}{l} \times 3 \left(\begin{array}{l} 2 \text{ molecules } \text{C}_2\text{H}_6 : 7 \text{ molecules } \text{O}_2 \\ 6 \text{ " " " " : 21 " " " " } \end{array} \right) 6.022 \times 10^{23} \\ 2 \times 6.022 \times 10^{23} \text{ C}_2\text{H}_6 : 7 \times 6.022 \times 10^{23} \text{ O}_2 \\ 2 \text{ mol } \text{C}_2\text{H}_6 : 7 \text{ mol } \text{O}_2 \text{ (molar ratios!)} \end{array}$$

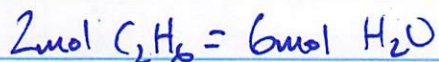


Q: How many mol CO_2 will we make from 7.2 mol O_2 ?

$$7.2 \text{ mol } \cancel{\text{O}_2} \times \frac{4 \text{ mol } \text{CO}_2}{7 \cancel{\text{ mol } \text{O}_2}} = 4.1 \text{ mol } \text{CO}_2 \text{ (2 s.f.)}$$

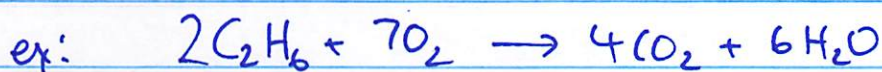
20 sf.
(exact)

Q: How many mol H_2O are made from 1.8 mol C_2H_6 ?



$$1.8 \text{ mol } \cancel{\text{C}_2\text{H}_6} \times \frac{6 \text{ mol } \text{H}_2\text{O}}{2 \cancel{\text{ mol } \text{C}_2\text{H}_6}} = 5.4 \text{ mol } \text{H}_2\text{O}$$

More useful to calculate masses!



Q: How many mol H_2O do we make from 454g C_2H_6 ?



? mol C_2H_6 $\xrightarrow{\text{②. coefficient.}}$? mol H_2O

① molar mass C_2H_6

454g C_2H_6

① C_2H_6

$$2 \times \text{C} = 2 \times 12.01$$

$$6 \times \text{H} = 6 \times 1.008$$

$$\underline{30.07 \text{ g/mol}}$$

$$454 \text{ g } \text{C}_2\text{H}_6 \times \frac{1 \text{ mol } \text{C}_2\text{H}_6}{30.07 \text{ g } \text{C}_2\text{H}_6} = 15.098 \text{ mol } \text{C}_2\text{H}_6$$

3sf exact guard digit

$$\textcircled{2} \quad 15.098 \text{ mol } \text{C}_2\text{H}_6 \times \frac{6 \text{ mol } \text{H}_2\text{O}}{2 \text{ mol } \text{C}_2\text{H}_6} = \boxed{45.3 \text{ mol } \text{H}_2\text{O}}$$

(3sf.) (3sf.)

$$454 \text{ g } \text{C}_2\text{H}_6 \times \frac{1 \text{ mol } \text{C}_2\text{H}_6}{30.07 \text{ g } \text{C}_2\text{H}_6} \times \frac{6 \text{ mol } \text{H}_2\text{O}}{2 \text{ mol } \text{C}_2\text{H}_6} = 45.3 \text{ mol } \text{H}_2\text{O}$$