Question 14

A side reaction in the manufacture of rayon from wood pulp is

$$3CS_2 + 6NaOH \rightarrow 2Na_2CS_3 + Na_2CO_3 + 3H_2O$$

How many grams of Na_2CS_3 are produced in the reaction between 92.5 mL of liquid CS_2 and 2.78 mol NaOH?

(Given *density of CS_2 = 1.26 g/mL*)

Density = $\dfrac{\text{Mass solution ,g}}{\text{Volume solution, mL}}$

Mass of CS_2 = Density x Vol solution

= _____ g

Mol of CS_2 = $\dfrac{\text{_____ g}}{\text{g/mole}}$

= _____ mole

Ar of Na = 23

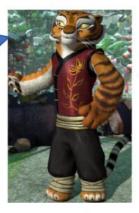Ar of O = 16

Ar of H = 1

Ar of C = 12

Ar of S = 32

Mol of NaOH = 2.78mole

Mole of product formed based on LR!!

There are **3 methods** to determine the LR:

1) Compare mole ratios of the reactants

2) **Compare the amount of products based on different reactants**

3) Compare the mole needed vs mole required

Lets say we use **mole ratio of the reactants** to determine the LR

Compare the mole ratio of the reactants

$$3\text{CS}_2 \ + \ 6\text{NaOH} \ \rightarrow \ 2\text{Na}_2\text{CS}_3 \ + \ \text{Na}_2\text{CO}_3 \ + \ 3\text{H}_2\text{O}$$

Mole ratio of $\text{CS}_2 = \dfrac{\text{mol of CS}_2}{\text{S. Coefficient CS}_2} = \underline{\hspace{1.5cm}} = $

Mole ratio of $\text{NaOH} = \dfrac{\text{mol of NaOH}}{\text{S. Coefficient NaOH}} = \underline{\hspace{1.5cm}} = $

Mole ratio of CS_2 _____ mole ratio of NaOH

Limiting reactant is _____

From balanced equation

      6 moles of NaOH produces 2 moles Na_2CS_3

      6 moles NaOH = 2 moles Na_2CS_3

      _____ mol NaOH = ___ x _____ mol Na_2CS_3

      = _____ moles Na_2CS_3

Mole $\text{Na}_2\text{CS}_3 = \dfrac{\text{mass Na}_2\text{CS}_3}{\text{molecular mass Na}_2\text{CS}_3}$

mass Na_2CS_3 = _____ g