8. Limiting / Excess reactants

The limiting reactant is the one that is all used up at the end of the reaction. The reactant in excess is still there at the end of the reaction (although in a smaller amount than at the start)

Example: [M/J/09-V32-Q9C]

(c) 0.08 moles of silicon reacts with 7.2g of fluorine.

$$Si + 2F_2 \longrightarrow SiF_4$$

(i) Which one is the limiting reagent? Explain your choice.

.....

.....

.....

.....

..... [3]

(ii) How many moles of SiF_4 are formed?

..... [1]

Solution:

Ideal mole ratio: Si : F_2 : SiF_4

1 : 2 : 1

- We do not know which reagent is in excess. Suppose we consider that 0.08 moles of Si are correctly taken. So according to the ideal stoichiometric equation, 0.08 Si react with 0.16 ,moles of F_2.

7.2g of F_2 = 7.2/38=0.189. This shows that reaction will get over when 0.08 moles of Si are completely used up with 0.16 moles of F_2 leaving behind (0.189-0.16=0.029) moles of F_2.Thus F_2 is in excess and **Si is the limiting reagent** as reaction stops because all of Si is used up.

- **Hint:** To find how many moles of SiF_4 were formed, we need to take the moles of the limiting reactant and not the excess reactant.

Hence Si : F_2 : SiF_4

0.08 : 0.16 : 0.08

Hence 0.08 moles of SiF_2 will be formed