

Question 7

Iron reacts with steam according to the equation:



In an experiment, 24.5 g of iron were reacted with 12.6 g of steam. Calculate:

a) the mass of Fe_3O_4 produced.

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 reactant to
determine the LR

First, calculate mole of reactants available

$$\begin{aligned} \text{Mole Fe available} &= \frac{\text{mass Fe}}{\text{Molar mass Fe}} \\ &= \underline{\hspace{2cm}} \end{aligned}$$

$$= \text{mol Fe available}$$

Ar of Fe = 55.9

Ar of H = 1

Ar of O = 16

$$\begin{aligned} \text{Mole Steam available} &= \frac{\text{mass H}_2\text{O}}{\text{Molar mass H}_2\text{O}} \\ &= \underline{\hspace{2cm}} \end{aligned}$$

= mol H₂O @ steam available

Compare the mole ratio of the reactants

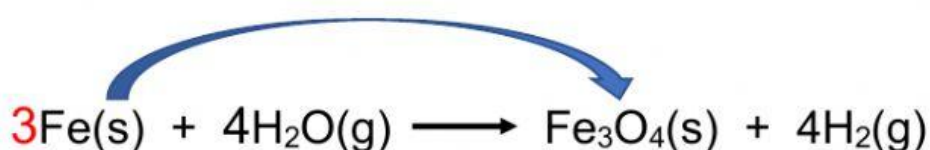


Mole ratio of Fe = $\frac{\text{mol of Fe}}{\text{S. Coefficient Fe}}$ = _____ =

Mole ratio of H₂O = $\frac{\text{mol of H}_2\text{O}}{\text{S. Coefficient H}_2\text{O}}$ = _____ =

Mole ratio of Fe _____ mole ratio of H₂O

Limiting reactant is _____



From the balanced equation

_____ mol Fe = _____ mol Fe₃O₄

_____ mol Fe = _____ x _____ mol Fe₃O₄

= _____ mole Fe₃O₄

Mole Fe₃O₄ = $\frac{\text{mass Fe}_3\text{O}_4}{\text{Molar mass Fe}_3\text{O}_4}$

Ar of Fe = 55.8

Ar of O = 16

Mass of Fe₃O₄ = Mole x Molar mass Fe₃O₄

= _____ g

Mole of H_2 produced
depends on LR

b) calculate the volume of H_2 formed at STP.

From the balanced equation

_____ mol Fe = _____ mol H_2

_____ mol Fe = _____ x _____ mol H_2

= _____ mol H_2

What is molar volume at
 0°C and 1atm@ STP?

At STP, 1 mol $H_{2\text{ gaseous}}$ will occupies _____ L

Vol of H_2 at STP = mole H_2 x Molar volume at STP

= _____ mole x _____ L/mole

= _____ L