

## 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  $\text{Fe}_3\text{O}_4$  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

$$\text{Mole Fe available} = \frac{\text{mass Fe}}{\text{Molar mass Fe}}$$

$$= \underline{\hspace{2cm}}$$

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

Ar of Fe = 55.9

Ar of H = 1

Ar of O = 16

$$\text{Mole Steam available} = \frac{\text{mass H}_2\text{O}}{\text{Molar mass H}_2\text{O}}$$

$$= \underline{\hspace{2cm}}$$

= mol H<sub>2</sub>O @ steam available

Compare the mole ratio of the reactants

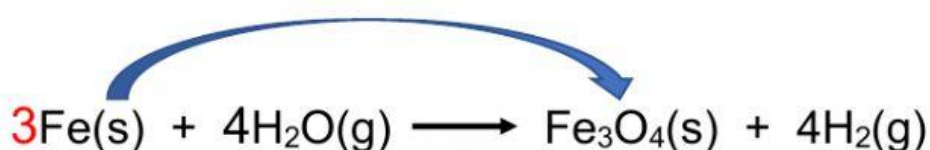


Mole ratio of Fe =  $\frac{\text{mol of Fe}}{\text{S. Coefficient Fe}}$  = \_\_\_\_\_ =

Mole ratio of H<sub>2</sub>O =  $\frac{\text{mol of H}_2\text{O}}{\text{S. Coefficient H}_2\text{O}}$  = \_\_\_\_\_ =

Mole ratio of Fe \_\_\_\_\_ mole ratio of H<sub>2</sub>O

Limiting reactant is \_\_\_\_\_



From the balanced equation

\_\_\_\_\_ mol Fe = \_\_\_\_\_ mol Fe<sub>3</sub>O<sub>4</sub>

\_\_\_\_\_ mol Fe = \_\_\_\_\_ x \_\_\_\_\_ mol Fe<sub>3</sub>O<sub>4</sub>

= \_\_\_\_\_ mole Fe<sub>3</sub>O<sub>4</sub>

Mole Fe<sub>3</sub>O<sub>4</sub> =  $\frac{\text{mass Fe}_3\text{O}_4}{\text{Molar mass Fe}_3\text{O}_4}$

Ar of Fe = 55.8

Ar of O = 16

Mass of Fe<sub>3</sub>O<sub>4</sub> = Mole x Molar mass Fe<sub>3</sub>O<sub>4</sub>

= \_\_\_\_\_ 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  
 $0^\circ\text{C}$  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