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Answer to question NO:1 (a)

An ideal gas is one that follows the gas laws at all conditions of temperature & pressure.

On the other hand, a real gas is a gas that does not behave according to the assumptions of the kinetic molecular theory. But, fortunately in laboratory, real gas tend to behave very much like ideal gases.

Answer to question NO: 1(b).

Given,

Mass of NH_3, w. = 7.40g.

Molar mass of NH_3, M = 17g/mol.

∴ Number of moles, $n = \frac{w}{M} = \frac{7.4}{17}$ mol.

$= 37/85$ mol.

Molar volume of gas, $V_m = 22.4$ lit.

∴ Volume occupied by 7.4g of NH_3, $V = n \times V_m$

$\Rightarrow \left(\frac{37}{85} \times 22.4\right)$ litres

$= 9.75$ lit.

Answer to question NO:1 (c).

The equation for the density of a gas is:

$$\rho = \frac{MP}{RT}$$

Here,

M = molar mass of gas (for CO_2, this is 44.01 g/mol).

P = pressure exerted (0.990 atm)

R = universal gas constant ($0.082057 \frac{L \cdot atm}{mol \cdot K}$)

T = absolute temperature. (55+273 = 328 K).

So,

$$\rho = \frac{44.01 \times 0.990}{0.082057 \times 328} \text{ g/L}$$

$$= 1.6198 \text{ g/L}.$$

Ans

Answer. to question NO: 2(a).

The limiting reactan (or limiting reagent) is the reactent that is entirely consumed when a reaction goes to completion.

Answer to question NO: 2(b).

$ZnCl_4 \rightarrow Zn$.

1 : 1.

$Mg \rightarrow Zn$

2 : 1.

Therefore, Mg is the limiting reagent

$2 \times 10^7 \times \frac{1}{24} \times \frac{1}{2} = 4.167 \times 10^5$ mol of Zn.

mol → grams of Zn.

$4.167 \times 10^5 \times 91$

$= 3.792 \times 10^7 g$.

% yield $= \frac{\text{actual yield}}{\text{theoretical yield}} \times 100$

$= \frac{7.9 \times 10^6}{3.8 \times 10^7} \times 100$

$= 20.789\%$.