

Volume strength of H_2O_2

20V
m

1 volume of solⁿ will give 20 volume $O_2(g)$ at STP



$$Sol^n = 1000 ml = 1 lit$$

$$H_2O_2 = M \text{ mole}$$

$$\frac{M \text{ mole}}{2}$$



$$V = \frac{M}{2} \times 22.7$$

$$= M \times 11.35 \text{ lit}$$

$$V.S. \text{ of } H_2O_2 = M \times 11.35$$

$$STP \Rightarrow P = 1 bar \\ T = 273 K \Rightarrow V = 22.7 \text{ lit}$$

$$NTP \Rightarrow P = 1 atm \\ T = 273 K \Rightarrow V = 22.4 \text{ lit}$$

Oleum : Fuming H_2SO_4 ($\text{or } H_2SO_4 + SO_3$)

109% oleum \Rightarrow 100 gm oleum will give max^m

109 gm H_2SO_4

100 gm oleum require 9 gm of water.



$$SO_3 = 0.5 \text{ mole} = 40 \text{ gm}$$

9 gm

0.5 mole

$$\% SO_3 = \frac{40}{100} \times 100 = 40\%$$

e.g. 114% oleum \Rightarrow 100 gm oleum req 14 gm H_2O req



$$\% SO_3 = \frac{14}{18} \times 80$$

$\left(\frac{14}{18}\right) \text{ mol}$

$$\frac{14}{18} \times 100 = 62.22$$

35 mL sample of hydrogen peroxide gives off 494 mL of O₂ at 27° C and 1 atm pressure. Volume strength of H₂O₂ sample will be:

- (a) 10 V (b) 13 V (c) 11 V (d) 12 V

b

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2} \Rightarrow \frac{1 \times 494}{300} = \frac{1 \times V_2}{273} \Rightarrow V_2 = 449.54 \text{ ml}$$

$$1 \text{ mL H}_2\text{O}_2 \text{ soln} \equiv \frac{449.54}{35} \approx 12.844 \text{ ml} \approx 13 \text{ ml}$$

A fresh H₂O₂ solution is labelled 11.2 V. This solution has the same concentration as a solution which is: (Assume 1 mole of an ideal gas occupies 22.4 L at STP)

- (a) 3.4% (w/w) (b) 3.4% (v/v) (c) 3.4% (w/v) (d) none of these

c $11.2 = M \times 11.2 \Rightarrow \text{Molarity} = 1 \text{ M}$

$$\text{Soln} = 1000 \text{ ml}$$

$$\therefore \text{wt/v} = \frac{34}{1000} \times 100 = \underline{\underline{3.4}}$$

$$\begin{aligned} \text{H}_2\text{O}_2 &= 1 \text{ mol} \\ &= 34 \text{ gm} \end{aligned}$$

The molality of a H₂O₂ solution of density 1.068 gm/ml is 2 m. The only incorrect concentration of the same solution is:

- | | |
|--------------------|---------------------------------------|
| (a) molarity = 2 M | (b) volume strength = 22.7 vol at STP |
| (c) 6.8 % (w/v) | (d) 6.8 % (w/w) |

An oleum sample is labelled as 113.5%. Identify the incorrect statement.

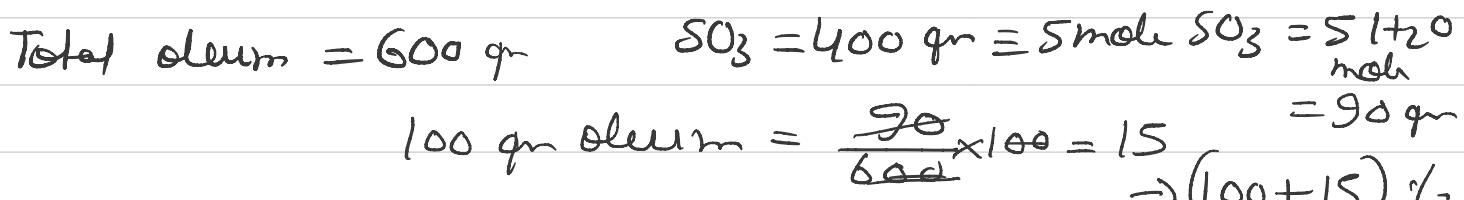
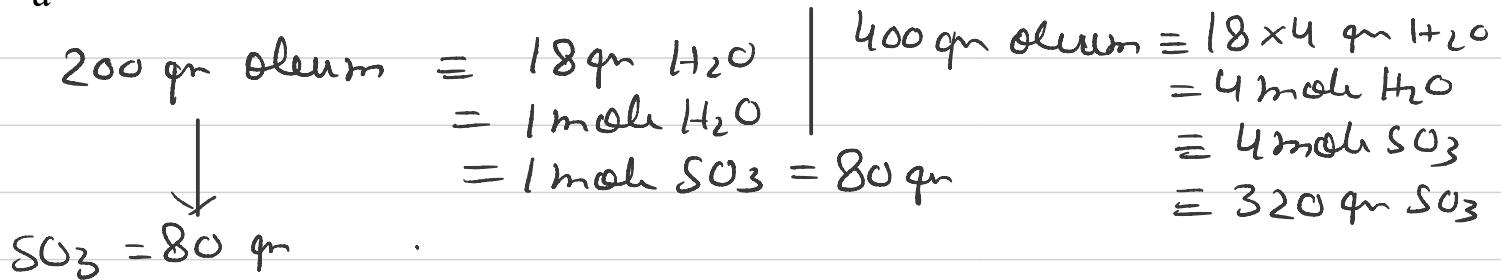
- (a) The amount of free SO_3 in 50 g oleum sample is 30 g.
(b) The amount of H_2SO_4 in 50 g oleum sample is 30 g.
(c) The new labelling of oleum sample when 8 g water is added in 100 g original oleum sample is $\left(100 + \frac{137.5}{27}\right)\%$
(d) In the original 50g oleum sample when 6.75 g water is added then 56.75 g H_2SO_4 is produced.

b

200 gm of an oleum sample (labelled as 109%) is mixed with 400 gm of another oleum sample (labelled as 118%). The labelling of the new sample formed will be:

- (a) 115 % (b) 112 % (c) 122 % (d) 116 %

a



Label an oleum sample which has mass fraction of SO_3 equal to 0.6:

- (a) 115% (b) 109% (c) 104.5% (d) 113.5%

d

