(2) $Zn + 2HCl \longrightarrow ZnCl_2 + H_2\uparrow$
65gm 73gm 136gm 2gm

(i) Qualitative significance
(a) zinc and hydrochloric acid are reactance to produce zinc chloride and hydrogen gas.
(b) zinc reacts with hydrochloric acid to give zinc chloride and hydrogen gas.

(ii) Quantitative significance
(a) 1 mole of Zn react with 2 mole of HCl to produce 1 mole of $ZnCl_2$ and 1 mole of H_2 gas.
(b) 65gm of Zn reacts with 73gm of HCl to give 136gm of $ZnCl_2$ and 2gm of H_2 gas.

(3) $N_2 + 3H_2 \longrightarrow 2NH_3 + 24$ kcal
28gm 6gm 34gm

(i) Qualitative significance
(a) Nitrogen and hydrogen are reactante to produce ammonia gas.
(b) Nitrogen reacts with hydrogen to give ammonia gas.

(ii) Quantitative significance
(a) 1 mole of N_2 reacts with 3 mole of H_2 to give 2 Mole of NH_3 gas.
(b) 28gm of N_2 reacts with 6gm of H_2 to produce 34gm of NH_3 gas.
(c) 24 kcal energy energy is released in each reaction.

limitations of a chemical Equations
⇒ limitation of a chemical equation are given below;-
(i) The physical state of the substance.
(ii) The concentration of the reactants at the start and the concentration of the products at the end.
(iii) The speed at which the reaction goes on and the time taken for the completion of that reaction.
(iv) The conditions under which the reaction takes place.
(v) The unidirectional or reversible nature of the reaction.
(vi) The formation of a precipitate or evolution of a gas.

(i) $CaCO_3$
$= 40 + 12 + 16 \times 3$
$= 40 + 12 + 48$
$= 100$ gm

(ii) $2HCl$
$= 2(1 + 35.5)$
$= 2(36.5)$
$= 2 \times 36.5$
$= 73$ gm

(iii) $CaCl_2$
$= 40 + 35.5 \times 2$
$= 40 + 71$
$= 111$ gm

(iv) H_2O
$= 1 \times 2 + 16$
$= 2 + 16$
$= 18$ gm

(v) CO_2
$= 12 + 16 \times 2$
$= 12 + 32$
$= 44$ gm

Strong electrolytes
⇒ The electrolytes which completely ionize in aqueous solutions are called strong electrolytes for eg :- H_2SO_4, HCl, etc.

Weak electrolytes
⇒ The electrolytes which ionize in very small extent are called weak electrolytes.
for eg :- NH_4OH, HCN, etc.

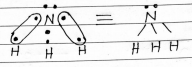
define variable valency? Explain with the reference of Fe.
⇒ Having more than one valency of a single element is known as variable valency
⇒ An atom of such elements combines with different number of atoms of other elements to form two or more different compounds.
⇒ Iron (Fe) combines with chlorine to form $FeCl_2$ and $FeCl_3$. In $FeCl_2$ valency of iron is 2 and in $FeCl_3$ valency of iron is 3. this shows that iron has variable valency.

Molar volume
⇒ The actual volume occupied by one mole of any gaseous substance is called molar volume which is equal to 22.4 litres at N.T.P.

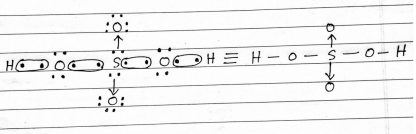
define symbol.
⇒ A symbol is defined as a shorthand sign for the full name of an element.
for eg :- oxygen is represented by the letter 'O'.

Lewis structure

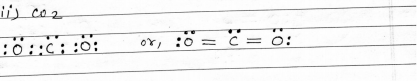
(i) NH_3



(ii) H_2SO_4

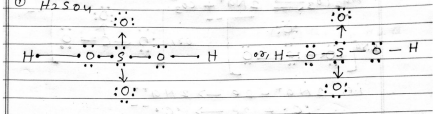


(iii) CO_2



Dot structure

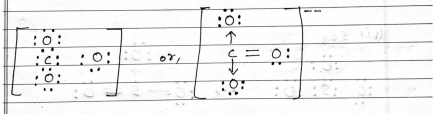
(i) H_2SO_4



(ii) $CaCO_3$

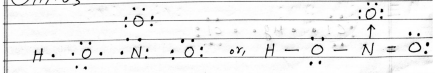
$Ca - 2e \longrightarrow Ca^{++}$

$:O: + 2e \longrightarrow :\underset{\cdot\cdot}{\overset{\cdot\cdot}{O}}:^{--}$



i.e, $Ca^{++}CO_3^{--}$

(iii) HNO_3



(6) $Na_2CO_3 + 2HCl \longrightarrow 2NaCl + H_2O + CO_2\uparrow$
106gm 73gm 117gm 18gm 44gm

(i) Qualitative information
(a) Sodium carbonate and hydrochloric acid are reactans to produce sodium chloride, water and carbondioxide gas.
(b) Sodium carbonate reacts with hydrochloric acid to give sodium chloride, water and carbon dioxide gas.

(ii) Quantitative information
(a) 1 mole of Na_2CO_3 reacts with 2 Mole of HCl to produce 2 mole of NaCl, 1 mole of H_2O and 1 mole of carbondioxide gas.
(b) 106gm of Na_2CO_3 reacts with 73gm of HCl to give 117gm of NaCl, 18gm of H_2O and 44gm of CO_2 gas.

(7) $NH_3 + O_2 \xrightarrow[800°C]{Rh/Pt} NO + H_2O$

NH_3 — Ammonia gas
O_2 — oxygen
NO — Nitric oxide, also called Nitrogen Monoxide
H_2O — water

(iii) 20gm of $CaCO_3$
we have,
100gm of $CaCO_3$ = 1 mole of $CaCO_3$
$\therefore$ 20gm of $CaCO_3 = \frac{20}{100} = 0.2$ mole

1) 10^{-3} mole of NaOH is dissolved in 10 litres of water. what will be the pH of the solution?
Solution given that
Volume (V) = 10 litre
Number of mole = 10^{-3}
Equivalent weight of NaOH (E) = 40
We know that,
1 mole NaOH = 40gm NaOH
$\therefore 10^{-3}$ mole = $40 \times 10^{-3} = \frac{1}{25}$ gm NaOH
we have,
$W = \frac{NEV}{1000}$; where v in ml
or, $\frac{1}{25} = \frac{N \times 40 \times 1000}{1000}$
or, $N = \frac{1}{25 \times 40 \times 1}$
$\therefore N = \frac{1}{1000} = 10^{-4}$ N
$\therefore [OH^-] = 10^{-4}$ N
Now,
pOH = 4
and, pH = 14 - pOH.
= 14 - 4
= 10