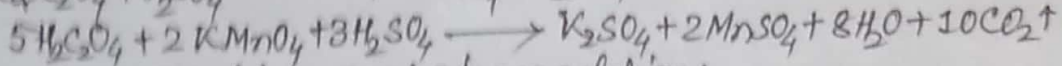
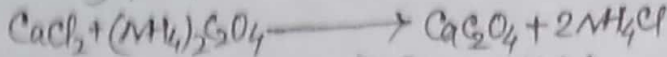
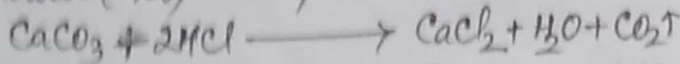


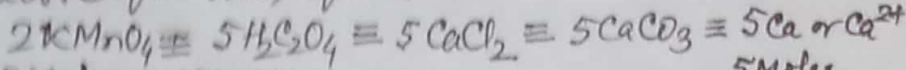


(2)

Calcium  
With hot ammonium oxalate solution, oxalate ( $\text{CaC}_2\text{O}_4$ ) is formed. The calcium oxalate is decomposed by dilute  $\text{H}_2\text{SO}_4$  to free oxalic acid ( $\text{H}_2\text{C}_2\text{O}_4$ ), which is then titrated with standard (N/10)  $\text{KMnO}_4$  solution.



From above equations, equivalence relation:



2 Moles or, 10 gmequ.

or, 1 gmequivalent

or, 1000 mL N solution

5 Moles

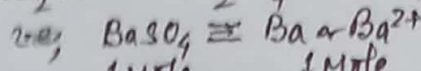
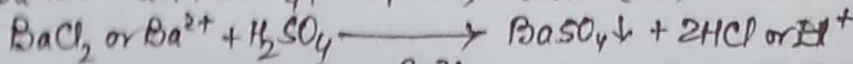
or, 0.5 mole

or, 20.04 gm

$\therefore 1 \text{ mL N KMnO}_4 \text{ solution} = 0.0204 \text{ gm Ca or Ca}^{2+}$ .

### ⇒ Gravimetric estimation of $\text{Ba}^{2+}$

When an excess of dilute  $\text{H}_2\text{SO}_4$  is slowly added to a solution of  $\text{Ba}^{2+}$  salt (e.g.  $\text{BaCl}_2$ ), barium is quantitatively precipitated as  $\text{BaSO}_4$  (Barium sulphate). Knowing the weight of  $\text{Ba}^{2+}$  salt and  $\text{BaSO}_4$  precipitate, barium ( $\text{Ba}^{2+}$ ) is estimated in barium salt.



1 Mole  
233.42 gm

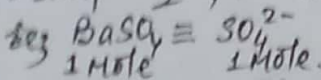
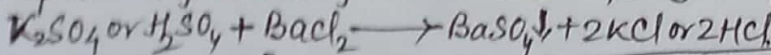
1 Mole  
137.36 gm

$$\% \text{ of } \text{Ba}^{2+} = \frac{137.36 \times W'}{233.42 \times W} \times 100$$

(where  $W, W'$  = weights of  $\text{Ba}^{2+}$  salt &  $\text{BaSO}_4$  respectively).

### ⇒ Gravimetric estimation of $\text{SO}_4^{2-}$ :

When an excess of a dilute solution of  $\text{BaCl}_2$  is slowly added to a hot solution of a soluble sulphate (e.g.  $\text{K}_2\text{SO}_4$  or  $\text{Fe}_2(\text{SO}_4)_3$ ) solution containing a little conc.  $\text{HCl}$  or  $\text{H}_2\text{SO}_4$ , the sulphate ( $\text{SO}_4^{2-}$ ) present in solution quantitatively precipitated as  $\text{BaSO}_4$ . Knowing the weights of  $\text{BaSO}_4$  & soluble sulphate salt,  $\text{SO}_4^{2-}$  in soluble sulphate can be estimated. The precipitation is done at boiling temp. and weakly acidic medium in order to prevent the possible formation of  $\text{Ba}^{2+}$  salts as  $\text{CrO}_4^{2-}$ ,  $\text{CO}_3^{2-}$  &  $\text{PO}_4^{3-}$ .



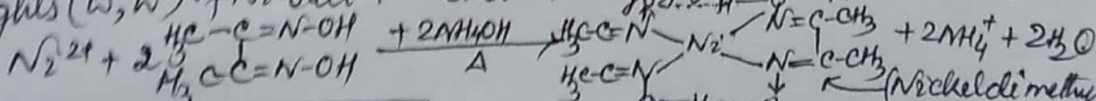
1 Mole  
or, 233.42 gm 96 gm.

$$\% \text{ of } \text{SO}_4^{2-} = \frac{96 \times W'}{233.42 \times W} \times 100$$

(where  $W, W'$  are weight of soluble sulphate &  $\text{BaSO}_4$  respectively)

### ⇒ Gravimetric estimation of $\text{Ni}^{2+}$ :

When an alcoholic solution of dimethylglyoxime ( $\text{H}_2\text{DMG}$ ) is added to neutral or faintly acidic hot solution of  $\text{Ni}^{2+}$  salt, nickel is quantitatively precipitated as zinc complex, nickel dimethylglyoximate (scarlet red). A slight excess of aqueous ammonia ( $\text{NH}_4\text{OH}$ ) free from  $\text{CO}_3^{2-}$  added during precipitation of  $\text{Ni}^{2+}$ , since precipitate is insoluble in its amm. salts. Only a slight of the reagent should be used, since  $\text{H}_2\text{DMG}$  is not very soluble in water or in very dilute ethanol and may precipitate, if a very large excess is added, some of the precipitate may dissolve. Knowing weights ( $W, W'$ ) of  $\text{Ni}^{2+}$  salt & nickel dimethylglyoximate ppt,  $\text{Ni}^{2+}$  is estimated.



$$\% \text{ of Ni} = \frac{58.71 \times W'}{288.71 \times W} \times 100$$

$\text{Ni}(\text{DMG})_2 \equiv \text{Ni} \equiv \text{Ni}^{2+}$  salt.  
1 Mole  
288.71 gm

(Nickel dimethylglyoximate)  
or,  $\text{Ni}(\text{DMG})_2$   
1 Mole  
58.71 gm