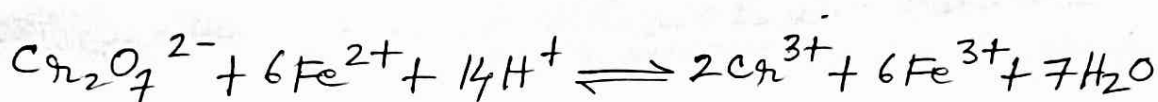


# # Estimation of Ferrous Iron in Mohr's salt

## Theory

Potassium dichromate quantitatively oxidises ferrous iron ( $\text{Fe}^{2+}$ ) of Mohr's salt to ferric iron ( $\text{Fe}^{3+}$ ) in acid medium.



The solution of Mohr's salt can be titrated with standard  $\text{K}_2\text{Cr}_2\text{O}_7$  solution in the presence of  $\text{H}_3\text{PO}_4$  and 2(N)  $\text{H}_2\text{SO}_4$  using Barium diphenylamine sulfonate as indicator.

## Procedure

### 1) Preparation of standard ( $\frac{N}{10}$ ) $\text{K}_2\text{Cr}_2\text{O}_7$ solution

Weigh out accurately 1.225 gm  $\text{K}_2\text{Cr}_2\text{O}_7$  in a 250ml volumetric flask. Dissolve it and make the volume up to the mark with distilled water.

Equivalent weight of  $\text{K}_2\text{Cr}_2\text{O}_7$  solution = 49.03

1000ml 1(N)  $\text{K}_2\text{Cr}_2\text{O}_7$  solution  $\equiv$  49.03 gm of  $\text{K}_2\text{Cr}_2\text{O}_7$

250ml ( $\frac{N}{10}$ )  $\text{K}_2\text{Cr}_2\text{O}_7$  solution  $\equiv$  1.225 gm of  $\text{K}_2\text{Cr}_2\text{O}_7$

Table 1: Preparation of standard (N/10)  $K_2Cr_2O_7$  solution

Weight of the bottle with $K_2Cr_2O_7$ ( $W_1$ gm)	Weight of the bottle after transfer ( $W_2$ gm)	Weight taken ( $W_1 - W_2 = W$ gm)

$$\text{Strength of } K_2Cr_2O_7 = \frac{\text{Weight taken}}{\text{Weight required}} \left( \frac{N}{10} \right)$$

$$= \frac{W_1 - W_2}{1.225} \left( \frac{N}{10} \right)$$

$$= \frac{W}{1.225} \left( \frac{N}{10} \right)$$

$$= f \left( \frac{N}{10} \right), \quad f = \text{factor}$$

## 2) Titration of Mohr's salt ( $\text{Fe}^{2+}$ solution) with standard $\text{K}_2\text{Cr}_2\text{O}_7$ solution

Rinse the burette with (N/10)  $\text{K}_2\text{Cr}_2\text{O}_7$  solution and then fill it. 25 ml of the Mohr's salt solution is pipetted out in a 250 ml conical flask, diluted to 150 ml with distilled water, 5 ml of conc.  $\text{H}_2\text{SO}_4$ , 5 ml of 10% molybdic phosphoric acid are added followed by 4-5 drops of BaDS indicator. The mixture is titrated with standard  $\text{K}_2\text{Cr}_2\text{O}_7$  solution with constant shaking until the colour of the solution just changes from green to reddish-violet.

Table-2: Titration of  $\text{Fe}^{2+}$  solution vs standard  $\text{K}_2\text{Cr}_2\text{O}_7$  solution

Sl. No.	Volume of $\text{Fe}^{2+}$ solution taken (ml)	Volume of $\text{K}_2\text{Cr}_2\text{O}_7$ solution required (ml)	Mean volume of $\text{K}_2\text{Cr}_2\text{O}_7$ (ml)
			V ml

## Calculation

$$\begin{aligned} 25 \text{ ml of } \text{Fe}^{2+} \text{ solution} &\equiv V \text{ ml of } f \left(\frac{N}{10}\right) \text{K}_2\text{Cr}_2\text{O}_7 \text{ solution} \\ &\equiv V \times f \text{ ml of } \left(\frac{N}{10}\right) \text{K}_2\text{Cr}_2\text{O}_7 \end{aligned}$$

$$\begin{aligned} 1000 \text{ ml of } \left(\frac{N}{10}\right) \text{K}_2\text{Cr}_2\text{O}_7 \text{ solution} &\equiv 1000 \text{ ml of } \left(\frac{N}{10}\right) \text{Fe}^{2+} \text{ solution} \\ &\equiv 5.585 \text{ gm of } \text{Fe}^{2+} \end{aligned}$$

$$\therefore 1 \text{ ml of } \left(\frac{N}{10}\right) \text{K}_2\text{Cr}_2\text{O}_7 \equiv 0.005585 \text{ gm of } \text{Fe}^{2+}$$

$$V \times f \text{ ml of } \left(\frac{N}{10}\right) \text{K}_2\text{Cr}_2\text{O}_7 \equiv V \times f \times 0.005585 \text{ gm of } \text{Fe}^{2+}$$

Now,

$$25 \text{ ml of } \text{Fe}^{2+} \text{ solution contains } V \times f \times 0.005585 \text{ gm } \text{Fe}^{2+}$$

$$250 \text{ ml of } \text{''} \text{''} \text{''} \text{''} \text{''} V \times f \times 0.005585 \times 10 \text{ gm } \text{Fe}^{2+}$$