

EXPERIMENT NO. 7Aim

To determine total alkalinity of the given water sample using methyl orange as indicator. Given standard $N/40$ Na_2CO_3 to standardise HCl solution.

Apparatus Required

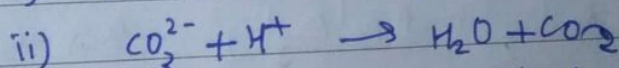
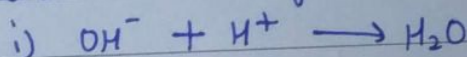
Burette, pipette, conical flask, measuring cylinders, funnel

Chemicals Required

Na_2CO_3 ($N/40$) soln., HCl soln., Methyl orange (M) and water sample.

Theory

The ionic equations involved for this reaction are:



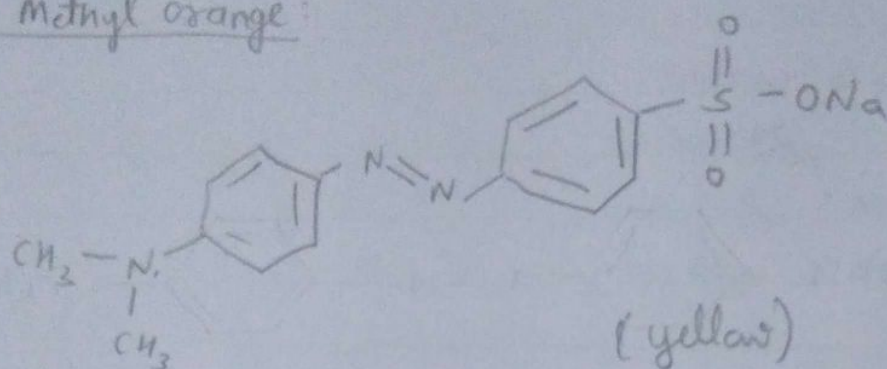
This is an example of neutralisation titration. The titration is based upon the specific pH range of the indicator. Methyl orange gives red colour in pH range 4.4-3.0.

Procedure

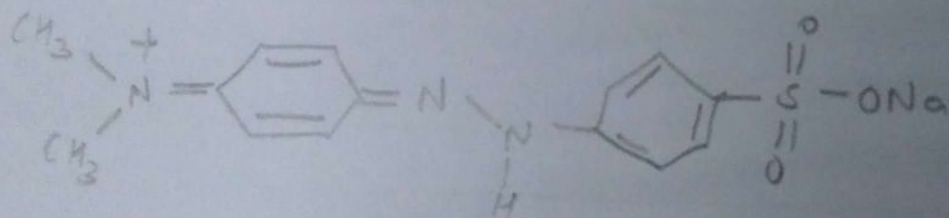
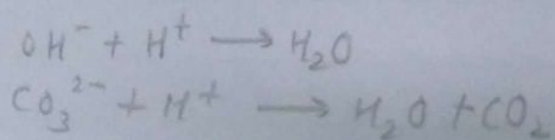
1. Standardisation of given HCl soln.
- i) Take 10mL of standard Na_2CO_3 with the help of pipette into a conical flask. Add 1-2 drops of methyl orange.
- ii) Run the acid solution from the burette into conical flask drop wise with constant shaking of solution.
- iii) Find the end point when light yellow colour solution turns red.

Teacher's Signature :

Methyl orange:



Reactions:



- In acid solution - (Red)
- Quinoid form of methyl orange

Note the volume of acid used. Repeat the steps till you get at least two concordant readings.

2. Titration of given water sample with HCl solution

- (i) Pipette out 10 mL of given water sample into a conical flask. Add 2-3 drops of methyl orange indicator.
- (ii) Add HCl soln. from burette into the conical flask with constant shaking.
- (iii) Titrate with acid till yellow coloured soln. turns red (end point).

Result

Total alkalinity of the given solution (in terms of CaCO_3) = 0.04015 N

Precautions

- 1) Shake the titration flask continuously during adding the solution from the pipette.
- 2) Keep your eye in level with the liquid surface while taking the burette reading or while reading the pipette.
- 3) Always read lower meniscus's reading.
- 4) Do not blow last drop of soln. from pipette. Just tap the tip of pipette to the walls of the flask.

Teacher's Signature:

Observations & Calculations :

1) Standardisation of HCl , Na_2CO_3 used = 10 mL

S.No.	Initial Reading	Final Reading	ΔV (mL)
1.	0	6.6	6.6
2.	6.6	13.2	6.6
3.	13.2	19.8	6.6

Concordant Reading = 6.6 mL

Now,

$$N_1 V_1 = N_2 V_2$$

(HCl) (Na_2CO_3)

$$N_{\text{HCl}} (6.6) = \frac{N}{40} (10)$$

$$\Rightarrow N_{\text{HCl}} = \frac{1}{26.4} N = \underline{0.0378 N}$$

2) With Water sample,

S.No.	Initial Reading	Final Reading	ΔV (mL)
1.	0	10.6	10.6
2.	10.6	21.2	10.6
3.	21.2	31.8	10.6

Concordant Reading = 10.6 mL

Now,

$$N_1 V_1 = N_2 V_2$$

(Water sample) (HCl)

$$N_{\text{Sample}} \times 10 = \frac{1}{26.4} \times 10.6$$

$$N_{\text{Sample}} = \underline{0.04015 N}$$