NON-AQUEOUS TITRATION

Date

1. Arrhenius concept – not applicable
2. Brownsted - lowry concept
   Proton donor - Acid
   Proton acceptor - Base

$$HCl + NH_3 \longrightarrow NH_4^+ + Cl^-$$
Acid Base C·A C·B

Need for this titration cause bcoz water behave as both weak base and weak acid.

3. Lewis concept
   lone pair donor - Base
   " " acceptor - Acid

→ Why non-aq titration is used? • more accuracy.
• enhance solubility.

- Reactants which aren't soluble in water
- Some " are reactive in water
- If Reactants are v v weak base or weak acid in nature.
- Titration with H_2O doesn't give sharp end points

→ Selection of solvents

- Solubility of the analyte
- Nature " " "
- Reactivity " " ".

→ Types of solvents

- Protogenic • acidic in nature
  • used to dissolve basic analyte
  Eg Glacial acetic acid
- Protophilic • Basic in nature
  • used to dissolve acidic analyte
  Eg Pyridine, ethylenediamine, DMF
- Amphiprotic • act as W.A / W.B
  • accept or donate proton
  Eg alcohol, methanol, ethanol

- Aprotic - • Not accepting / donating proton
  • used to dissolve water insoluble drugs
  eg Benzene, CCl_4

* Selected solvents used in non aq titration
- Glacial Acetic Acid
- Acetonitrile (CH_3CN)
- Alcohol
- Dioxane

Types of non aqueous titration

Acidimetry
- used for quantative estimation of basic drug
- Titrant used in acidimetry is acidic in nature
  eg $HClO_4$ (Perchloric acid)
- Protogenic solvents are used eg glacial acetic acid.
- Sample which can be determined by this are
  → Ephedrine
  → Morphine
  → Adrenaline
  → Caffeine
  → Acyclovir
- Indicator - Crystal violet (0.5% in acetic acid)
  ↳ from violet → light green

Date

Alkalimetry

- used for quant estimat^n of weak acidic drugs
- Titrant used is basic / alkaline in nature eg CH_3ONa (Sodium Methoxide)
- Protophilic solvent are used eg Dimethylformamide (DMF)
- Samples which can be determined by this - Fluorouracil
  - Nalidixic acid
- Indicator - Thymol Blue (0.5% in methanol)
  - ↳ colour change from pink to blue

Assay of Drugs

Step 1 → Preperation of 0.1N Perchloric acid

1. Take 900ml of glacial acetic acid and add 8.4 ml of conc. $HClO_4$ dropwise with cont and vigorous stirring.

2. Add 30 ml of acetic anhydride and make the vol upto 1000 ml by glacial acetic anhydride

added bcoz its non aq titration and water mig... glacial acetic or $HClO_4$; so this react ... and becomes acetic acid.

Prep^n of 0.1N Pot Hydrogen Phtalate (1° std)

Mwt = 204 g

Ewt = Mwt / acidity = 204 / 1

W = (204 × 0.1 × 100) / 1000

= 2.04 in 100ml glacial acetic acid.

- 1st conc. $HClO_4$ is dil with 900ml of glacial bcoz $HClO_4$ & glacial acetic ā may give

- Acetic ā is used to remove H_2O content

$$CH_3CO\text{-}O\text{-}COCH_3 + H_2O \longrightarrow CH_3COOH + CH_3COOH$$

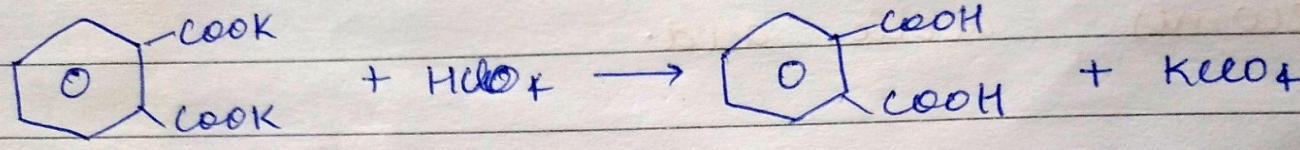
$HClO_4$ Density = 1.67 — In 1L of $HClO_4$ = 1670g present

molwt = 100.5 — $N = \frac{1670\ g}{100.5} = 16.62N$ for 100% purity

** % purity = 72%

For 72% = $16.62 \times \frac{72}{100} = 11.96N$

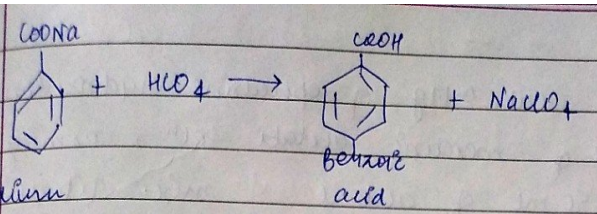
$N_1V_1 = N_2V_2 \Rightarrow 11.96 \times V_1 = 0.1 \times 1000 = 8.36ml = 8.4ml$



pot Hydro
phthalate

Assay of Sodium Benzoate

- Take 0.25g of Sodium Benzoate and dissolve in 20ml of glacial acetic acid
- warm the soln (if req)
- cool the soln and add few drops of crystal violet indicator
- titrate against standardized 0.1N $HClO_4$ soln till light green colour appear at end point.
- Blank titration is peformed to reduce errors.



Sodium Benzonate

Benzoic acid

Calculation

Mol wt Na Benzonate = 144.1g

1ml of 0.1N $HClO_4$ = 1ml of 0.1N sodium benzonate

1000ml of Sod Benzonate (0.1N) contain = 14.41g

$$1ml = \frac{14.41}{1000} = 0.01441g$$

$$\% \text{ purity of Sod benzonate} = \frac{\text{Vol of } HClO_4 \times N \text{ of } HClO_4 \times 0.1441 \times 100}{\text{wt of Na Benzoate} \times 0.1}$$

(calculated)

(wt of sample) (N given)

Estimation of Ephedrine Hydrochloride by NAT :-

Ephedrine hydrochloride = $C_6H_{15}NO, HCl$

mwt = 201.7

→ colourless crystals or a white, crystalline powder, odourless. Its affected by light.

* Prepⁿ same as Na Benzoate for both $HClO_4$ & Pot Hydrogen Phthalate

Indicator → Crystal violet

End pt. → blue to blue green

* Standardisation of 0.1N $HClO_4$

Same as previous

* Observation → same
* Calculn → same

* Assay Procedure

weigh accurately about 0.17g of ephedrine hydrochloride, dissolve in 10ml of mercuric acetate soln, warming gently, add 50 ml of acetone & mix. Titrate with 0.1M perchloric acid, using 1ml of a saturated soln of methyl orange in acetone as indicator, until a red colour is obtained. Carry out a blank titrations.

* IP factor 1ml of 0.1M $HClO_4$ is equivalent to 0.02017 g $C_{10}H_{15}NO, HCl$

* Observation

S.NO.	Vol of pot hyd phthalate	Burette Reading Intial	Burette Reading Final	Vol of $HClO_4$ used
1.	25	0	25.2	25.2
2.	25	25.2	50.4	25.2
3.	25	50.4	75.8	25.4

Mean value = $\frac{25.2 + 25.2 + 25.4}{3}$

$= \frac{25.26}{}$

% purity = $\frac{\text{Vol } HClO_4 \times N \text{ (calculated)} \times 0.02017 \times 100}{\text{wt of ephedrine} \times 0.1}$