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Acid-neutralising Capacity of Aluminium Hydroxide Gel

Experiment 11 - Practical Notes

Name: _____ Roll no.: _____ Date: _____

Aim

To calculate acid-neutralising capacity from added acid and a prescribed back-titration.

Principle

A known amount of acid reacts with the gel under defined conditions. Remaining acid is determined by back-titration to a specified endpoint. Acid consumed = acid added - acid remaining. For a monovalent hydrogen-ion basis, mmol of H^+ corresponds numerically to mEq; express capacity per stated mass or dose volume.

Requirements

- Aluminium hydroxide gel, standard hydrochloric acid and standard sodium hydroxide.
- Calibrated pH measurement or specified endpoint system, burette, pipette, balance and timer.

Procedure

1. Record the basis

Homogenise as prescribed and measure the stated gel mass or volume. Record both titrant concentrations and the endpoint criterion.

2. Add known acid

Add the measured standard-acid quantity and mix under the method's temperature and reaction-time conditions.

3. Back-titrate

Titrate the remaining acid with standard base to the prescribed endpoint, not an arbitrary colour change.

4. Check controls

Run the prescribed blank or control and replicate preparation. Record any endpoint or dispersion difficulty.

5. Calculate

Use acid and base concentrations with consistent volumes. Apply the prescribed blank correction and express capacity on the stated gel basis.

Pharmaceutical Inorganic and Analytical Chemistry

Observations and Record

Quantity	Unit	Record
Gel portion	g or mL	___
Acid added	Concentration × volume	___
Base titre / endpoint	Concentration × volume; pH or indicator	___

Worked Example

The numbers below are illustrative; enter your own observations in the record.

- Illustrative 1.00 g gel: add 30.0 mL of 1.00 mol/L HCl; back-titrate with 15.0 mL of 0.500 mol/L NaOH.
- Acid added = 30.0 mmol; remaining acid = 7.50 mmol; consumed = 22.5 mmol H⁺ = 22.5 mEq. Capacity = 22.5 mEq/g.
- Using C in mol/L and V in mL gives mmol numerically: capacity = (CaVa - CbVb) ÷ mass. The method's blank and endpoint still govern the actual calculation.

Result

Acid-neutralising capacity = ___ mEq per ___ of gel, using endpoint ___ and reaction conditions ___.

Precautions

- Use the prescribed reaction time and endpoint; slow neutralisation can alter the result.
- Do not confuse measured wet-gel mass with dry Al(OH)₃ mass.
- Do not infer a clinical dose from a classroom capacity calculation.

Viva Questions and Answers**1. Why use back-titration?**

It measures the excess acid after the gel has reacted.

2. What is mEq on this basis?

For H⁺, one mmol has one mEq of charge.

3. Why define the endpoint?

Different endpoints can give different estimates of residual acid.

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