pKa by pH-metric Titration

Experiment 15 - Practical Notes

Name: _____ Roll no.: _____ Date: _____

Aim

To estimate the pKa of an assigned weak acid from its titration curve.

Principle

For the applicable monoprotic weak-acid model, pH at half-neutralisation approximates pKa when the stated assumptions are suitable.

Requirements

- Assigned weak acid, standardised base, calibrated pH meter and titration equipment.

Procedure

1. Record conditions

Enter acid identity, test aliquot, titrant and temperature.

2. Collect data

Record stabilised pH at the assigned cumulative titrant volumes.

3. Find equivalence

Use the prescribed titration-curve analysis to locate the relevant equivalence volume.

4. Find half-equivalence

Read/interpolate pH at half that volume and assess the model assumptions.

Observations and Record

Reading	Value
Equivalence volume	_____
Half-equivalence volume	_____
pH at half-equivalence	_____
pKa estimate and limitation	_____

Worked Example

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

- For the stated weak-acid model, pKa ≈ pH at Veq/2.
- Example: Veq = 20 mL, so read pH at 10 mL; a pH of 4.8 gives an approximate pKa of 4.8.

Result

Record the completed observations, calculations and conclusion with units. State any limitation of the observation.

Precautions

- Do not use one half-equivalence rule for overlapping polyprotic stages without the assigned model.
- Use measured pH, not a nominal buffer value.

Viva Questions and Answers

1. Why is half-equivalence useful?

The acid and conjugate-base amounts are equal in the ideal model.

2. What limits the estimate?

Activity effects, concentration, temperature and unsuitable or unresolved titration stages.

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