

How much? The amount of chemical change  $\cdot$  supported focus

Supported focus  $\cdot$  SL

## Supported scope

- Supported SL focus. First assessment 2025; current brief acquired; full Chemistry guide not acquired. Remaining guide, assessment and practical requirements retain their recorded holds.
- State model conditions and distinguish fictional data from measurements.

# Titration · 1.1

## Reasoning

A burette reading is not the delivered volume. The titre is the difference between final and initial readings, and both readings have uncertainty. Start with a prediction. State the quantities or features you would compare, then decide what evidence could distinguish two explanations.

## Titration · 2.1

### Reasoning

A titration measures the amount of one solution needed to react with a known amount of another. The equation gives the mole ratio. An indicator endpoint approximates the equivalence point when a suitable indicator is used. titre: The volume delivered between two burette readings; equivalence point: The point of stoichiometric reaction completion.

## Titration · 3.1

### Reasoning

Calculate the known amount first, apply the stoichiometric ratio, then divide by the unknown solution volume in cubic decimetres. Use concordant titres as required by the school method and report the accepted values. Rinse the burette with its solution and the pipette with the solution it transfers. Rinse the flask with distilled water. Add titrant slowly near the endpoint, swirl, and read the meniscus at eye level. Use a white tile and appropriate eye protection.

## Titration · 4.1

### Reasoning

State the known values and their units. Choose the relation because its assumptions fit this case, then rearrange before substitution. Known: 25.0 cubic centimetres of acid reacts 1:1 with 20.0 cubic centimetres of 0.100 mol per cubic decimetre alkali.  $n = cV = 0.100 \times 0.0200 = 0.00200$  mol. Acid amount is 0.00200 mol.  $c = n/V = 0.00200/0.0250 = 0.0800$  mol per cubic decimetre.

## Titration · 4.2

### Reasoning

Burette readings are 1.40 and 23.65 cubic centimetres. Calculate titre. Use the same sequence: known quantities  $\rightarrow$  model  $\rightarrow$  relation  $\rightarrow$  substitution  $\rightarrow$  unit and interpretation.

## Titration · 5.1

### Reasoning

Adding distilled water to the flask changes volume but not the transferred amount of analyte. Do not average a rough titre with carefully measured concordant values. Return to the original observation. Explain what the result supports, which conditions it assumes, and one way to test a competing explanation.

## Titration · 5.2

### Reasoning

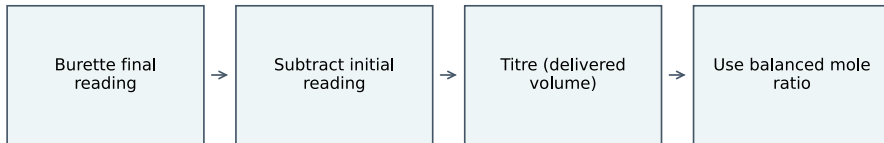
A flask must be rinsed with analyte to avoid dilution of its mole amount. This claim is false: Adding distilled water to the flask changes volume but not the transferred amount of analyte. Do not average a rough titre with carefully measured concordant values.

## Titration · 5.3

### Reasoning

Titration and a defensible concentration: Calculate the known amount first, apply the stoichiometric ratio, then divide by the unknown solution volume in cubic decimetres. Use concordant titres as required by the school method and report the accepted values.

## Titration · diagram



- Original teaching diagram: Titration and a defensible concentration
- Use the labels and the stated model together.

## Titration · original transfer

### Your turn

Fictional 1:1 titration:  $25.0 \text{ cm}^3$  acid needs  $18.0 \text{ cm}^3$   $0.100 \text{ mol/dm}^3$  alkali. Find acid concentration and explain how an overshoot endpoint biases it.

## Titration · transfer reasoning

### Method and interpretation

$n = 0.100 \times 0.0180 = 0.00180 \text{ mol}$ ;  $c = 0.00180 / 0.0250 = 0.0720 \text{ mol/dm}^3$ . Overshoot increases recorded volume and inferred concentration in this model. Use concordant runs.

## Check yourself

- Explain titre using the stated model.
- Explain equivalence point using the stated model.
- Change one value in the original transfer; explain which assumption still matters.