

Chloride and Sulphate by Nephelo-Turbidimetry

Practical 08 | Instrumental Methods of Analysis and Novel Drug Delivery Systems

Aim

To study Chloride and Sulphate by Nephelo-Turbidimetry, and interpret the recorded observations.

Principle

- The assigned chloride and sulphate reactions form dispersed particles whose optical response is compared with standards. Nephelometry measures scattered light, while turbidimetry measures loss of transmitted light.
- An optical response is related to analyte concentration over the validated working range.
- A blank, suitable standards and consistent optical conditions are necessary for interpreting the response.
- Use the precipitation system and calibration specified separately for chloride and sulphate.
- Keep mixing, timing and optical geometry comparable, since particle size and settling can alter the reading.

Materials and Apparatus

- Assigned chloride/sulphate standards and precipitation systems, suitable optical instrument and volumetric equipment.
- Assigned analyte, suitable reference standard, solvent/reagents and volumetric glassware.
- Specified optical instrument and compatible cells or sample-introduction system.

Method

1. Select the optical method and settings appropriate to the assigned analyte.
2. Prepare a method blank and a series of independently documented calibration concentrations.
3. Check the instrument response and measure the blank and standards using consistent settings.
4. Prepare the test solution and apply documented dilution where necessary.
5. Read the test response within the established calibration range.
6. Calculate concentration, correct for dilution and report the original-material basis.

Observation Record

Complete this record using actual laboratory findings or the provided teaching data.

Observation / parameter	Record / finding
Analyte	_____
Standard concentration	_____
Reaction/timing conditions	_____
Optical response	_____
Calculated content	_____

Calculations and Interpretation

- For calibration response $y = mC + b$: $C = (y - b) / m$.
- Original concentration = concentration read from calibration $\times$ total dilution factor.

Worked Illustration

Illustration: $y = 0.050C + 0.010$ and $y = 0.260$ give $C = 5.00$ in the concentration units used for calibration.

The values in this illustration are for calculation practice.

Result

Record the actual finding, calculated value with units where relevant, and a conclusion supported by the observations.

Finding: _____

Conclusion: _____

Precautions

- Use clean compatible cells and consistent orientation where cells are used.
- Keep readings within the calibration range and examine the calibration fit.
- Avoid assuming that another analyte or solvent has the same response factor.

Viva Questions

1. How do nephelometry and turbidimetry differ?

They observe scattered light and attenuation of transmitted light respectively.

2. What is the role of a blank?

It corrects the contribution of the solvent, reagents and measurement background.

3. Why use several calibration levels?

They establish the usable response-concentration relationship and help reveal nonlinearity.

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