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Aldehyde Content of Volatile Oils

Practical 7 - Analytical practical

Aim

To determine method-defined aldehyde content in a selected volatile oil.

Principle

A suitable hydroxylamine-based method relates carbonyl reaction to a measured acid/base equivalent, but other carbonyls and matrix components may affect selectivity. The method and equivalent basis must be defined.

The test preparation, blank, calibration or titrant standardisation and independent controls are part of the measurement. State the actual concentration units, test conditions and adopted method before interpreting the result.

Materials and Requirements

- Selected oil and adopted validated carbonyl method
- Standardised titrant, reagent blank and suitable reference
- Controlled reaction and endpoint equipment
- Qualified balance and volumetric equipment
- Controlled method and raw-data worksheet

Procedure

1. Identify the material, intended attribute, method version and acceptance criteria. Record preparation and instrument or reagent identities.
2. Prepare the prescribed blank and reference or standardised reagent. Verify the measurement with an independent check where applicable.
3. Record the aldehyde identity or equivalent basis and method stoichiometry.
4. Run oil, blank and reference under matching reaction conditions.
5. Apply the prescribed blank direction and endpoint procedure and calculate the stated equivalent content.
6. Record individual readings for independently prepared test portions. Keep all raw observations, including unsuccessful measurements and their investigation.
7. Calculate the result on the stated mass, volume or area basis, including dilution, blank and recovery corrections as justified.
8. Compare the evidence with the applicable criteria and write a conclusion limited to the tested preparation and conditions.

Observations and Record

Enter actual measurements or the supplied teaching data. Record the method, material identity, conditions and units.

Preparation / attribute	Method condition	Raw measurement	Calculated result
Blank	Record	Record	Calculate
Reference	Record	Record	Calculate
Test 1	Record	Record	Calculate
Test 2	Record	Record	Calculate

Calculations

• For a justified 1:1 equivalent method: aldehyde-equivalent amount (mol) = corrected titrant volume (L) x concentration (mol/L)

Worked Example

Illustrative corrected equivalent consumption 2.00 mL of 0.100 mol/L corresponds to 0.200 mmol carbonyl equivalents.

Multiplying by a named aldehyde molar mass is valid only for the specified reporting convention.

Result and Interpretation

• Report method-defined aldehyde equivalents and interference limitations.

• Report replicate variability and the evidence that the method can measure the intended attribute in this matrix.

Precautions

• Use approved reactive-reagent and solvent controls.

• Do not assume all oil carbonyls are the same aldehyde.

• Retain reagent and native-acidity corrections.

• Use the adopted laboratory procedure, suitable controls and the designated waste arrangements.

Viva Questions and Answers

Why use a reagent blank?

The reagents can contribute to titrant consumption.

Does the assay identify the aldehyde?

Identity requires separate selective evidence.

Why state equivalent basis?

Mixed carbonyl compounds can have different masses and responses.

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