

# Atomic Absorption Method Guide

## V in lubricating oils

### Key Words

- Lubricating Oils
- Mineral Oils
- Vanadium
- Flame
- Atomic Absorption

### Principle

The sample is dissolved in white spirit, and vanadium is determined by flame atomic absorption spectrometry using a nitrous oxide-acetylene flame. Sodium or potassium is added to standard and sample solutions to act as an ionisation suppressant.

### Reagents

**White spirit (BS:245)** (Spectrosol grade or equivalent)

**Ionisation suppressant** (2500mg/L, e.g. sodium or potassium as naphthenate or sulphonate prepared in white spirit)

**Vanadium master standard** (500mg/L, oil-soluble organometallic standard solution or equivalent)

### Working standards

Weigh 0, 2.0, 4.0 and 6.0g of the vanadium master standard into a series of 100mL volumetric flasks. Add 40mL of the stock ionisation suppressant to the flasks and dilute to volume with white spirit. The working standards will contain 0, 10, 20 and 30mg/L of vanadium.

### Sample Preparation

Weigh up to 10.000g of oil into a 100mL volumetric flask, add 40.0mL of stock ionisation suppressant and dilute to volume with white spirit. Ensure the sample is fully dissolved. For higher concentrations, dissolve a smaller quantity of oil prepared in the same way.

### Instrument Parameters

The screenshot shows the instrument parameter software interface for Vanadium (V) analysis. The interface is divided into two main sections: the top section for general measurement settings and the bottom section for flame and burner parameters. The top section includes fields for Measurement Mode (Absorption), Number of Resamples (3), Measurement Time (4.0s), Wavelength (318.5nm), Lamp Current (75%), and Bandpass (0.5nm). It also has checkboxes for Fast Resamples, High Resolution, and Optimise Spectrometer Parameters. The bottom section includes Flame Type (Nitrous Oxide-Acetylene), Fuel Flow (4.5 L/min), Burner Stabilisation Time (0 min), Nebuliser Uptake Time (4 s), Burner Height (11.0 mm), and checkboxes for Optimise Fuel Flow, Auxiliary Oxidant, and Optimise Burner Height. A 'Cook Book' button is visible in the top right of the first section.

Figure 1 Instrument parameters

### Results

Sample	Used gear oil
Vanadium found (%m/m)	0.025
Independent analysis (%m/m)	0.028

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*The method of sample treatment described in this publication should be performed only by a competent chemist or technician trained in the use of safe techniques in analytical chemistry. Users should acquaint themselves with particular hazards which may be incurred when toxic materials are being analysed and handled in the instruments, and the instrument must be used in accordance with the operating and safety instructions given in the Operators manual.*

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