



Designation: D8252 – 23

Standard Test Method for Vanadium and Nickel in Crude and Residual Oil by X-ray Spectrometry¹

This standard is issued under the fixed designation D8252; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 This test method covers the quantitative determination of total vanadium and nickel in crude and residual oil in the concentration ranges shown in [Table 1](#) using X-ray fluorescence (XRF) spectrometry.

1.2 Sulfur is measured for analytical purposes only for the compensation of X-ray absorption matrix effects affecting the vanadium and nickel X-rays. For measurement of sulfur by standard test method use Test Methods [D4294](#), [D2622](#) or other suitable standard test method for sulfur in crude and residual oils.

1.3 This test method is limited to the use of X-ray fluorescence (XRF) spectrometers employing an X-ray tube for excitation in conjunction with wavelength dispersive detection system or energy dispersive high resolution semiconductor detector with the ability to separate signals of adjacent and near-adjacent elements.

1.4 This test method uses inter-element correction factors calculated from XRF theory, the fundamental parameters (FP) approach, or best fit regression.

1.5 Samples containing higher concentrations than shown in [Table 1](#) must be diluted to bring the elemental concentration of the diluted material within the scope of this test method.

1.6 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.6.1 The preferred concentrations units are mg/kg for vanadium and nickel.

1.7 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

¹ This test method is under the jurisdiction of ASTM Committee [D02](#) on Petroleum Products, Liquid Fuels, and Lubricants and is the direct responsibility of Subcommittee [D02.03](#) on Elemental Analysis.

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1.8 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

- [D2622](#) Test Method for Sulfur in Petroleum Products by Wavelength Dispersive X-ray Fluorescence Spectrometry
- [D4057](#) Practice for Manual Sampling of Petroleum and Petroleum Products
- [D4177](#) Practice for Automatic Sampling of Petroleum and Petroleum Products
- [D4294](#) Test Method for Sulfur in Petroleum and Petroleum Products by Energy Dispersive X-ray Fluorescence Spectrometry
- [D6259](#) Practice for Determination of a Pooled Limit of Quantitation for a Test Method
- [D6299](#) Practice for Applying Statistical Quality Assurance and Control Charting Techniques to Evaluate Analytical Measurement System Performance
- [D7343](#) Practice for Optimization, Sample Handling, Calibration, and Validation of X-ray Fluorescence Spectrometry Methods for Elemental Analysis of Petroleum Products and Lubricants
- [E1621](#) Guide for Elemental Analysis by Wavelength Dispersive X-Ray Fluorescence Spectrometry

3. Terminology

3.1 Definitions:

3.1.1 *alpha corrections, n*—influence correction factors that compensate for inter-element X-ray matrix effects; alpha corrections may be determined by best-fit regression, XRF Fundamental Parameters (FP), or XRF theory (called theoretical alphas).

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

*A Summary of Changes section appears at the end of this standard