



Standard Test Method for Determination of Boiling Range Distribution of Crude Petroleum by Gas Chromatography¹

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1. Scope

1.1 This test method covers the determination of the boiling range distribution of water-free crude petroleum through 538°C (1000°F). Material boiling above 538°C is reported as residue. This test method is applicable to whole crude samples, that can be solubilized in a solvent to permit sampling by means of a microsyringe.

1.2 The values stated in SI units are to be regarded as the standard. The values stated in inch-pound units are for information only.

1.3 *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 and health practices and determine the applicability of regulatory limitations prior to use.* Specific precautionary statements are given in 7.2, 7.5, 7.6, 7.7, and 7.9.

2. Referenced Documents

2.1 ASTM Standards:²

D2892 Test Method for Distillation of Crude Petroleum (15-Theoretical Plate Column)

D4057 Practice for Manual Sampling of Petroleum and Petroleum Products

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *area slice, n*—the area, resulting from the integration of the chromatographic detector signal, within a specified retention time interval.

3.1.1.1 *Discussion*—In area slice mode (see 6.2.2), peak detection parameters are bypassed and the detector signal integral is recorded as area slices of consecutive, fixed duration time intervals.

3.1.2 *corrected area slice, n*—an area slice corrected for baseline drift, by subtraction of the exactly corresponding area slice in a previously recorded blank (nonsample) analysis; correction for signal offset may also be required.

3.1.3 *cumulative corrected area, n*—the accumulated sum of corrected area slices from the beginning of the analysis through a given retention time, ignoring any nonsample area (for example, solvent).

3.1.4 *initial boiling point (IBP), n*—the temperature (corresponding to the retention time) at which a cumulative corrected area count equal to 0.5 % of the theoretical total area is obtained.

3.1.5 *residue, RES n*—the amount of sample boiling above 538°C (1000°F).

3.1.6 *theoretical total area, T n*—the area that would have been obtained if the entire sample had been eluted from the column.

3.1.6.1 *Discussion*—This is determined in 12.3.

3.2 Abbreviations:Abbreviations:

3.2.1 A common abbreviation of hydrocarbon compounds is to designate the number of carbon atoms in the compound. A prefix is used to indicate the carbon chain form, while a subscripted suffix denotes the number of carbon atoms (for example, normal decane = $n\text{-C}_{10}$; isotetradecane = $i\text{-C}_{14}$).

4. Summary of Test Method

4.1 The crude oil sample is diluted with carbon disulfide, and the resulting solution is injected into a gas chromatographic column that separates hydrocarbons in boiling point order. The column temperature is raised at a reproducible, linear rate, and the area under the chromatogram is recorded throughout the run. Boiling points are assigned to the time axis by comparison to a calibration curve obtained under the same chromatographic conditions by running a mixture of n -paraffins of known boiling point through a temperature of 538°C (1000°F). The amount of sample boiling above 538°C is estimated by means of a second analysis of the crude oil to which an internal standard has been added. From these data, the boiling range distribution of the water-free sample is calculated.

¹ This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.04.0H on Chromatographic Distribution Methods.

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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.