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Hydrogenated Polydecene

$C_{30\leq n \leq 70}H_{2n+2}$
1-Decene, homopolymer, hydrogenated
CAS RN[®]: 68037-01-4.

DEFINITION
Hydrogenated Polydecene is a mixture of saturated, synthetic hydrocarbons in the range $C_{30}H_{62}$ through $C_{70}H_{142}$ made from direct oligomerization of 1-decene (C_{10} alpha olefin). The oligomer mixture may be distilled to fractions of a suitable calculated viscosity and hydrogenated to reach saturation, or it may be hydrogenated to reach saturation and then distilled to the desired viscosity. The requirements for specific gravity, viscosity, and content of decene oligomer differ for the various types of Hydrogenated Polydecene, as set forth in the two tables below. Hydrogenated Polydecene may contain a suitable stabilizer.

Specific Gravity and Viscosity

Type	Specific Gravity	Kinematic Viscosity Range, Centistokes (mm ² /s)
I	0.814-0.819	16.0-20.0
II	0.823-0.827	28.0-34.0
III	0.828-0.832	40.0-52.0

Content of Decene Oligomers

Type	$C_{30}H_{62}$	$C_{40}H_{82}$	$C_{50}H_{102}$	$C_{60}H_{122}$	$C_{70}H_{142}$
I	70-93	5-25	0-5	0-1	0-1
II	13-40	35-70	9-25	0-7	0-2
III	3-15	25-55	25-40	13-28	0-10

IDENTIFICATION
• **A.** The chromatogram of the *Sample solution* from the test for *Content of Decene Oligomer* exhibits major peaks for trimers, tetramers, pentamers, hexamers, and possibly heptamers. The decene oligomer content is within the range given in the table *Content of Decene Oligomers* in the *Definition* for the labeled type of Hydrogenated Polydecene.

ASSAY
• **CONTENT OF DECENE OLIGOMER**
System suitability solution: 10 mg/mL of hexadecane, 10 mg/mL of squalane, and 1 mg/mL of tetradecane in pentane
Sample solution: Dissolve 0.1 mL of Hydrogenated Polydecene in 10 mL of pentane.
Chromatographic system

(See [Chromatography \(621\), System Suitability](#).)

Mode: GC

Detector: Flame ionization

Column: 0.52-mm × 16-m fused-silica capillary; coated with 0.1-mm stationary phase G2

Carrier gas: Helium

Flow rate: 10 mL/min

Injection volume: 2 µL

Temperatures

Injection port: 310°

Detector: 320°

Column: See [Table 1](#).

Table 1

Initial Temperature (°)	Ramp (°/min)	Final Temperature (°)	Hold Time at Final Temperature (min)
35	5	50	—
50	12	170	—
170	10	310	18

System suitability

Sample: *System suitability solution*

[NOTE—The retention time for squalane is about 18 min; the relative retention times for tetradecane, hexadecane, and squalane are about 0.5, 0.6, and 1.0, respectively.]

Suitability requirements

Resolution: NLT 2.0 between tetradecane and hexadecane

Relative standard deviation: NMT 2.0% for each peak

Analysis

Sample: *Sample solution*

Record the chromatogram, and measure the areas for the major peaks.

[NOTE—The tetramer oligomer has a retention time of about 23 min. The trimer, pentamer, hexamer, and heptamer oligomers, if present, have relative retention times of about 0.8, 1.1, 1.3, and 1.4, respectively, relative to the tetramer.]

Calculate the percentage of each oligomer present:

$$\text{Result} = (r_U/r_T) \times 100$$

r_U = response of each oligomer

r_T = sum of the responses of all the peaks, excluding the solvent peak

Acceptance criteria: The decene oligomer content is within the limits specified in the table *Content of Decene Oligomers* in the *Definition*.

IMPURITIES

• **LIMIT OF NICKEL**

Nickel stock solution: Immediately before use, dilute an appropriate quantity of organometallic standard¹ with kerosene to prepare a solution containing the equivalent of 1.0 µg/mL of nickel.

Standard solutions: Transfer 0.5, 1.0, 2.0, and 4.0 mL of *Nickel stock solution*, respectively, to four identical 10-mL volumetric flasks, dilute the contents of each flask with kerosene to volume, and mix. These *Standard solutions* contain, respectively, 0.05, 0.1, 0.2, and 0.40 µg/mL of nickel. [NOTE—The calibration range, especially the upper limit, can be adjusted for certain instruments, provided that instrument validation and calibration linearity are achieved.]

Sample solution: 0.3 g/mL of Hydrogenated Polydecene in kerosene. [NOTE—If necessary, dilute with an appropriate quantity of kerosene to obtain a reading within the calibrated absorbance range.]

Instrumental conditions