

201-15105B

Boiling Point (Range)

CAS No.: 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1; 68527-24-2; 68527-26-4; 68603-02-1

Robust Summary No.: OP E760

**RESIN OILS and CYCLODIENE DIMER CONCENTRATES
ROBUST SUMMARY**

Boiling Point

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Test Substance*:	Other TS [CAS # 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1; 68527-24-2; 68527-26-4; 68603-02-1]
Method/Guideline:	Calculated values using MPBPWIN version 1.40, a subroutine of the computer program EPIWIN version 3.04
Year (guideline):	1999
Type (test type):	Not applicable
GLP:	Not applicable
Year (study performed):	Not applicable
Estimation Pressure:	760 mm Hg
Test Conditions:	Boiling Point is calculated by the MPBPWIN subroutine, which is based on the calculation method of S. Stein and R. Brown in "Estimation of Normal Boiling Points from Group Contributions". 1994. J. Chem. Inf. Comput. Sci. 34: 581-587.
Results: Units/Value: <ul style="list-style-type: none"> Note: Concentration prep., vessel type, replication, test conditions. Note: Deviations from protocol or guideline, analytical method. 	<p>Calculated and measured boiling point data for representative constituents of the Resin Oils and Cyclo diene Dimer Concentrates Category are listed below. The data identify a potential boiling point range for substances represented by the 10 CAS numbers under <u>Test Substance</u>. Substances in this category do not have a specific boiling point value. Actual boiling point ranges for substances in this category will vary dependent on their constituent composition.</p> <p>Commercial substances in this category consist of complex hydrocarbon products with a carbon number distribution that is predominantly C8-C12 with some lower molecular weight constituents present. The predominant components are cycloalkenes and aromatic hydrocarbons. The five chemicals selected to represent the boiling point range of this category are C8-C12 hydrocarbons that can be found in substances identified by the 10 CAS numbers. Constituents representing category members were selected on the basis of carbon number as identified by the category name, chemistry/structure, measured boiling point ranges for category substances, and olefinic process (distillation) knowledge.</p>

Boiling Point (Range)

CAS No.: 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1; 68527-24-2; 68527-26-4; 68603-02-1

Robust Summary No.: OP E760

<p>Results: (continued)</p> <p>Units/Value:</p> <p>Note: Deviations from protocol or guideline, analytical method.</p>	<table border="1"> <thead> <tr> <th>Substance Constituent</th> <th>Calculated BP (°C)</th> <th>Measured* BP (°C)</th> </tr> </thead> <tbody> <tr> <td>vinyl toluene</td> <td>120.42</td> <td>na</td> </tr> <tr> <td>indene</td> <td>212.89</td> <td>na</td> </tr> <tr> <td>dicyclopentadiene</td> <td>176.78</td> <td>170.0</td> </tr> <tr> <td>methylindene</td> <td>231.75</td> <td>na</td> </tr> <tr> <td>methylcyclopentadiene dimer</td> <td>225.19</td> <td>191.0†</td> </tr> </tbody> </table> <p>* Experimental values from EPIWIN database. na = not available</p> <p>The data represent a potential boiling point range for substances represented by the 10 CAS numbers under <u>Test Substance</u>.</p> <p>† Huntingdon Life Sciences, Ltd. 2003. Physicochemical Properties Study. EXN040/032421</p>	Substance Constituent	Calculated BP (°C)	Measured* BP (°C)	vinyl toluene	120.42	na	indene	212.89	na	dicyclopentadiene	176.78	170.0	methylindene	231.75	na	methylcyclopentadiene dimer	225.19	191.0†
Substance Constituent	Calculated BP (°C)	Measured* BP (°C)																	
vinyl toluene	120.42	na																	
indene	212.89	na																	
dicyclopentadiene	176.78	170.0																	
methylindene	231.75	na																	
methylcyclopentadiene dimer	225.19	191.0†																	
<p>Test Substance:</p>	<p>The Resin Oils and Cyclodiene Dimer Concentrates Category includes the following CAS numbers:</p> <p>26742-00-4 4,7-Methano-1H-indene, 3a,4,7,7a-tetrahydrodimethyl-</p> <p>68477-40-7 Distillates, petroleum, cracked stripped steam-cracked petroleum distillates, C10-12 fraction</p> <p>68477-54-3 Distillates, petroleum, steam-cracked, C8-12 fraction</p> <p>68477-53-2 Distillates, petroleum, steam-cracked, C5-12 fraction</p> <p>68478-08-0 Naphtha, petroleum, light steam-cracked, C5-fraction, oligomer concentrate</p> <p>68478-10-4 Naphtha, petroleum, light steam-cracked, debenzenized, C8-16-cycloalkadiene concentrate</p> <p>68516-20-1 Naphtha, petroleum, steam-cracked middle aromatic</p> <p>68527-24-2 Naphtha, petroleum, light steam-cracked aromatic, C5-12 cycloalkadiene fraction, polymers</p> <p>68527-26-4 Naphtha, petroleum, light steam-cracked, debenzenized</p> <p>68603-02-1 Distillates, petroleum, thermal cracked naphtha and gas oil, dimerized</p> <p>The Resin Oils and Cyclodiene Dimer Concentrates Category was developed by grouping two Resin Oil streams, one relatively low in Dicyclopentadiene (DCPD), and a second that contains higher levels of the dimer. These Resin Oils have been further grouped with six other process streams that are concentrates of DCPD, Methylcyclopentadiene Dimer (MCDP Dimer), and co-dimers of these two cyclodienes with other hydrocarbons of similar molecular weight present, primarily cycloalkenes and aromatic hydrocarbons. The 10 CAS numbers are used to describe the nine process streams associated with the ethylene industry and associated manufacturing processes.</p>																		

Boiling Point (Range)

CAS No.: 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1; 68527-24-2; 68527-26-4; 68603-02-1

Robust Summary No.: OP E760

	<p>More information on the Resin Oils and Cyclodiene Dimer Concentrates Category can be found in the American Chemistry Council, Olefins Panel test plan for this category (1).</p> <ol style="list-style-type: none">1. Olefins Panel, HPV Implementation Task Group. 2001. High Production Volume (HPV) Chemical Challenge Program Test Plan For The Resin Oils and Cyclodiene Dimer Concentrates Category. American Chemistry Council, Olefins Panel, HPV Implementation Task Group. VA, USA.
Conclusion:	<p>The calculated boiling points for some representative constituents that are present in the category streams vary from 120.42 to 231.75°C @ 760 mm Hg. Measured boiling points for two of these same constituents vary from 170.0 to 191.0°C @ 760 mm Hg. Although this does not define the actual boiling points of the category streams, it offers an indication of a range that might be expected to encompass the boiling points of these complex streams with variable compositions. Boiling points outside of these ranges may be possible for some category streams.</p>
Reliability:	<p>(2) Reliable with restrictions</p> <p>The results include calculated data based on chemical structure as modeled by EPIWIN and measured data for specific chemicals as cited in the EPIWIN database or from studies performed for the ACC Olefins Panel. The data represent a potential boiling point range for substances represented by the 10 CAS numbers listed under <u>Test Substance</u>. This robust summary has a reliability rating of 2 because the data are not for specific substances in the Resin Oils and Cyclodiene Dimer Concentrates Category, but rather for selected constituents. These selected constituents represent all substances defined by this category and as such, this robust summary represents a "key study" for boiling point range based on constituent data.</p>
Reference:	<p>EPIWIN. 1999. Estimation Program Interface for Windows, version 3.04. Syracuse Research Corporation, Syracuse, NY, USA. (Boiling point values were calculated by the MPBPWIN subroutine and measured data came from the database in the computer program or from testing performed in conjunction with the test plan for this category)</p>
Other (source):	<p>American Chemistry Council, Olefins Panel (Prepared 8/03)</p>

* Other TS is a selection option under the Test Substance pick list that is in the IUCLID entry field for Boiling Point. Selecting this option refers the reader to information in the test substance "freetext" field to which the CAS numbers can be added.

Photodegradation (Direct)

CAS No.: 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1;
68527-24-2; 68527-26-4; 68603-02-1

Robust Summary No.: OP E768

**RESIN OILS and CYCLODIENE DIMER CONCENTRATES
ROBUST SUMMARY**

Photodegradation (Direct)

Test Substance*:	Other TS [CAS # 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1; 68527-24-2; 68527-26-4; 68603-02-1]
Method/Guideline:	Other: Technical discussion
Year (guideline):	Not applicable
GLP (Y/N):	Not applicable
Year (study performed):	Not applicable
Type (air, soil, water, other):	Water
Light Source:	Not applicable
Light Spectrum: <ul style="list-style-type: none">• Wave length value (upper/lower)	Not applicable
Relative Intensity:	Not applicable
Test Substance Spectrum:	Not applicable
Test Conditions: <ul style="list-style-type: none">• Note: Concentration, temperature, test system type, replication, deviations from guideline or protocol	Not applicable
Direct Photolysis**: <ul style="list-style-type: none">• Results: half-life, % degradation, quantum yield	<p><u>Summary</u></p> <p>In the environment, direct photolysis will not significantly contribute to the degradation of constituent chemicals in the Resin Oils and Cyclodiene Dimer Concentrates Category. The Resin Oils and Cyclodiene Dimer Concentrates Category includes nine process streams:</p> <ul style="list-style-type: none">• High DCPD Resin Oils• Low DCPD Resin Oils• Resin Former• Dicyclopentadiene (DCPD) Concentrate• DCPD, High Purity• DCPD Purge Stream

Photodegradation (Direct)

CAS No.: 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1;
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	<ul style="list-style-type: none">• Methylcyclopentadiene (MCPD) Dimer• DCPD Stream• DCPD/Codimer Concentrate <p>As discussed below, the reaction process involved in direct photolysis occurs when sufficient light energy excites a molecule to the degree that a structural transformation occurs. In general, substances in this category do not contain component chemicals that will undergo direct photolysis.</p> <p><u>The Resin Oils and Cyclo diene Dimer Concentrates Category</u></p> <p>A process stream is a mixture of chemicals that arises from a chemical reaction or separation activity. The category includes hydrocarbon process streams consisting predominantly of the same higher-boiling hydrocarbons, mostly cycloalkenes and aromatics, but at varying concentrations. Ten CAS numbers (see <u>Test Substance</u>) identify products derived from these process streams. This grouping of CAS numbers represents hydrocarbon streams with a carbon number distribution that is predominantly C8-C12 with some lower molecular weight constituents present. The predominant components are cycloalkenes and aromatic hydrocarbons. That is why this group is considered a category for purposes of the High Production Volume (HPV) Chemical Program, and designated <u>Resin Oils and Cyclo diene Dimer Concentrates</u>.</p> <p>The definitions found in the TSCA Chemical Substance Inventory for the CAS numbers included in this group are vague with respect to composition. Therefore, it is possible to find that the same CAS number is correctly used to describe different streams (compositions) or that two or more different CAS numbers are used to describe the same stream (composition or process).</p> <p>More information on the Resin Oils and Cyclo diene Dimer Concentrates Category can be found in the American Chemistry Council, Olefins Panel test plan for this category (1). The plan is available on the U.S. Environmental Protection Agency website under the HPV Chemical Program. A brief description of the production and composition of the nine process streams in this category are:</p> <ul style="list-style-type: none">• High DCPD Resin Oils: This stream typically contains about 55% DCPD, and significant levels of vinyl aromatics and codimers of cyclopentadiene with other monomers such as isoprene, pentadiene and methylcyclopentadiene. The highest boiling component in the stream is normally naphthalene and it is present usually at less than about 0.5%.• Low DCPD Resin Oils: This stream consists of components that are similar to those found in the High DCPD stream (vinyl aromatics) with the exception that DCPD and the codimers are present only at very low levels (typically <1% DCPD).• Resin Former: A participant in the Panel's HPV program who
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	<p>processes resin oil from various ethylene units produces this stream. It is most similar to the Low DCPD stream, with typical DCPD content reported as about 6.7%.</p> <ul style="list-style-type: none">• DCPD Concentrate: is produced from the Pyrolysis C5 Fraction by a combination of distillation and heat soak (dimerization) unit operations. DCPD content of the stream is typically 75% with the balance predominantly codimers of cyclopentadiene with other C5 monomers. The stream typically contains relatively low levels of low boiling hydrocarbons (C5 to C8).• DCPD, High Purity: Dicyclopentadiene can be purified to about 95% by a combination of thermal and distillation unit operations. The main impurities remaining in the stream are codimers and trimers of cyclopentadiene.• DCPD Purge Stream: The DCPD Purge Stream results from the distillation process that separates the DCPD/Codimer Concentrate stream and the MCPD Dimer stream from the C8+ fraction of a thermally-processed pyrolysis gasoline. The DCPD Purge Stream typically contains 18% DCPD, with the balance largely codimers and C8 aliphatics and aromatics.• MCPD Dimer: this stream is isolated by distillation from the C8+ fraction of a thermally processed pyrolysis gasoline. Typical purity is 90% as the dimer and the main impurities in the stream are codimers and trimers of DCPD and MCPD.• DCPD Stream: this stream is produced as the bottoms from a distillation tower that is charged with a DCPD-containing stream together with the heavy ends and raffinate from an isoprene extractive distillation unit. This stream is reported to contain about 50% DCPD, with the balance being largely C5s, both saturates and unsaturates.• DCPD/Codimer Concentrate: this stream is isolated by distillation from the C8+ fraction of a thermally processed pyrolysis gasoline. This stream typically contains about 40% DCPD with the balance primarily codimers of cyclopentadiene with piperylene, butadiene and methylcyclopentadiene. <p><u>Photolysis of Hydrocarbons</u></p> <p>The direct photolysis of an organic molecule occurs when it absorbs sufficient light energy to result in a structural transformation (2). The reaction process is initiated when light energy in a specific wavelength range elevates a molecule to an electronically excited state. However, the excited state is competitive with various deactivation processes that can result in the return of the molecule to a non excited state.</p> <p>The absorption of light in the ultra violet (UV)-visible range, 110-750 nm, can result in the electronic excitation of an organic molecule. Light in this range contains energy of the same order of magnitude as</p>
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Photodegradation (Direct)

CAS No.: 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1;
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	<p>covalent bond dissociation energies (2). Higher wavelengths (e.g. infrared) result only in vibrational and rotational transitions, which do not tend to produce structural changes to a molecule.</p> <p>The stratospheric ozone layer prevents UV light of less than 290 nm from reaching the earth's surface. Therefore, only light at wavelengths between 290 and 750 nm can result in photochemical transformations in the environment (2). Although the absorption of UV light in the 290-750 nm range is necessary, it is not always sufficient for a chemical to undergo photochemical degradation. Energy may be re-emitted from an excited molecule by mechanisms other than chemical transformation, resulting in no change to the parent molecule.</p> <p>A conservative approach to estimating a photochemical degradation rate is to assume that degradation will occur in proportion to the amount of light wavelengths >290 nm absorbed by the molecule (3). Saturated hydrocarbons do not absorb light above 200 nm. Some characteristic absorbance maxima (λ_{\max}) and associated molar absorptivities (ϵ) for selected unsaturated hydrocarbons are shown below (2):</p> <table border="1"><thead><tr><th rowspan="2">Hydrocarbon</th><th colspan="2">l below 290 nm</th><th colspan="2">l above 290 nm</th></tr><tr><th>λ_{\max}</th><th>ϵ</th><th>λ_{\max}</th><th>ϵ</th></tr></thead><tbody><tr><td>Ethylene</td><td>193</td><td>10,000</td><td>-</td><td>-</td></tr><tr><td>Benzene</td><td>255</td><td>215</td><td>-</td><td>-</td></tr><tr><td>Naphthalene</td><td>221</td><td>100,000</td><td>311</td><td>250</td></tr><tr><td></td><td>270</td><td>5,000</td><td></td><td></td></tr><tr><td>Styrene</td><td>244</td><td>12,000</td><td></td><td></td></tr><tr><td></td><td>282</td><td>450</td><td></td><td></td></tr></tbody></table> <p>Olefins with one double bond, or two conjugated double bonds, which constitute the majority of the chemicals in the Resin Oils and Cyclodiene Dimer Concentrates Category, do not absorb appreciable light energy above 290 nm. The absorption of UV light to cause cis-trans isomerization about the double bond of an olefin occurs only if it is in conjugation with an aromatic ring (2).</p> <p>Products in the Resin Oils and Cyclodiene Dimer Concentrates Category do not contain component molecules that will undergo direct photolysis. Therefore, this fate process will not contribute to a measurable degradative removal of chemical components in this category from the environment.</p>	Hydrocarbon	l below 290 nm		l above 290 nm		λ_{\max}	ϵ	λ_{\max}	ϵ	Ethylene	193	10,000	-	-	Benzene	255	215	-	-	Naphthalene	221	100,000	311	250		270	5,000			Styrene	244	12,000				282	450		
Hydrocarbon	l below 290 nm		l above 290 nm																																					
	λ_{\max}	ϵ	λ_{\max}	ϵ																																				
Ethylene	193	10,000	-	-																																				
Benzene	255	215	-	-																																				
Naphthalene	221	100,000	311	250																																				
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Photodegradation (Direct)

CAS No.: 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1;
68527-24-2; 68527-26-4; 68603-02-1

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	<p>References</p> <ol style="list-style-type: none"> Olefins Panel, HPV Implementation Task Group. 2001. High Production Volume (HPV) Chemical Challenge Program Test Plan For Resin Oils and Cyclo diene Dimer Concentrates Category. American Chemistry Council, Olefins Panel, HPV Implementation Task Group. VA, USA. Harris, J. C. 1982. "Rate of Aqueous Photolysis," Chapter 8 in: W. J. Lyman, W. F. Reehl, and D. H. Rosenblatt, eds., Handbook of Chemical Property Estimation Methods, McGraw-Hill Book Company, New York, USA. Zepp, R. G. and D. M. Cline. 1977. Rates of Direct Photolysis in the Aqueous Environment, Environ. Sci. Technol., 11:359-366.
<p>Indirect Photolysis**:</p> <ul style="list-style-type: none"> Results: type of sensitizer, concentration of sensitizer, rate constant, % degradation, half-life 	<p>Not applicable</p>
<p>Degradation Products**:</p> <ul style="list-style-type: none"> Note: Identification, concentration 	<p>Unknown</p>
<p>Test Substance:</p>	<p>The Resin Oils and Cyclo diene Dimer Concentrates Category includes the following CAS numbers:</p> <p>26742-00-4 4,7-Methano-1H-indene, 3a,4,7,7a-tetrahydrodimethyl- 68477-40-7 Distillates, petroleum, cracked stripped steam-cracked petroleum distillates, C10-12 fraction</p> <p>68477-54-3 Distillates, petroleum, steam-cracked, C8-12 fraction 68477-53-2 Distillates, petroleum, steam-cracked, C5-12 fraction 68478-08-0 Naphtha, petroleum, light steam-cracked, C5-fraction, oligomer concentrate 68478-10-4 Naphtha, petroleum, light steam-cracked, debenzenized, C8-16-cycloalkadiene concentrate 68516-20-1 Naphtha, petroleum, steam-cracked middle aromatic 68527-24-2 Naphtha, petroleum, light steam-cracked aromatic, C5-12 cycloalkadiene fraction, polymers 68527-26-4 Naphtha, petroleum, light steam-cracked, debenzenized 68603-02-1 Distillates, petroleum, thermal cracked naphtha and gas oil, dimerized</p>
<p>Conclusion:</p>	<p>Not applicable</p>

Photodegradation (Direct)

CAS No.: 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1;
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Reliability:	These data represent a key study for characterizing the potential of substances in the Resin Oils and Cyclo diene Dimer Concentrates Category to undergo direct photodegradation.
Reference:	American Chemistry Council, Olefins Panel. 2003. Photodegradation (Direct): Resin Oils and Cyclo diene Dimer Concentrates Category. Rosslyn, VA, USA.
Other (source):	American Chemistry Council, Olefins Panel (Prepared 8/03)

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Hydrolysis (Stability in Water)

CAS No.: 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1; 68527-24-2; 68527-26-4; 68603-02-1

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Hydrolysis (Stability in Water)

Test Substance*:	Other TS [CAS # 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1; 68527-24-2; 68527-26-4; 68603-02-1]
Method/Guideline:	Other: Technical discussion
Year (guideline):	Not applicable
Type (test type):	Not applicable
GLP (Y/N):	Not applicable
Year (study performed):	Not applicable
Analytical Monitoring:	Not applicable
Test Conditions:	Not applicable
<ul style="list-style-type: none"> Note: Concentration preparation, vessel type, volume, replication, deviations from guideline or protocol 	
Results:	Not applicable
Units/Value:	
<ul style="list-style-type: none"> Note: Analytical method, observations, half-lives by pH, degradation products 	
Test Substance:	<p>The Resin Oils and Cyclo diene Dimer Concentrates Category includes the following CAS numbers:</p> <p>26742-00-4 4,7-Methano-1H-indene, 3a,4,7,7a-tetrahydrodimethyl- 68477-40-7 Distillates, petroleum, cracked stripped steam-cracked petroleum distillates, C10-12 fraction 68477-54-3 Distillates, petroleum, steam-cracked, C8-12 fraction 68477-53-2 Distillates, petroleum, steam-cracked, C5-12 fraction 68478-08-0 Naphtha, petroleum, light steam-cracked, C5-fraction, oligomer concentrate 68478-10-4 Naphtha, petroleum, light steam-cracked, debenzenized, C8-16-cycloalkadiene concentrate 68516-20-1 Naphtha, petroleum, steam-cracked middle aromatic 68527-24-2 Naphtha, petroleum, light steam-cracked aromatic, C5-12 cycloalkadiene fraction, polymers</p>

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CAS No.: 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1;
68527-24-2; 68527-26-4; 68603-02-1

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	<p>68527-26-4 Naphtha, petroleum, light steam-cracked, debenzenized 68603-02-1 Distillates, petroleum, thermal cracked naphtha and gas oil, dimerized</p> <p>The Resin Oils and Cyclodiene Dimer Concentrates Category was developed by grouping two Resin Oil streams, one relatively low in Dicyclopentadiene (DCPD), and a second that contains higher levels of the dimer. These Resin Oils have been further grouped with six other process streams that are concentrates of DCPD, Methylcyclopentadiene Dimer (MCDP Dimer), and co-dimers of these two cyclodienes with other hydrocarbons of similar molecular weight present, primarily cycloalkenes and aromatic hydrocarbons. The 10 CAS numbers are used to describe the nine process streams associated with the ethylene industry and associated manufacturing processes.</p> <p>More information on the Resin Oils and Cyclodiene Dimer Concentrates Category can be found in the American Chemistry Council, Olefins Panel test plan for this category (1).</p> <ol style="list-style-type: none">1. Olefins Panel, HPV Implementation Task Group. 2001. High Production Volume (HPV) Chemical Challenge Program Test Plan For The Resin Oils and Cyclodiene Dimer Concentrates Category. American Chemistry Council, Olefins Panel, HPV Implementation Task Group. VA, USA.
<p>Conclusion:</p>	<p>Summary</p> <p>In the environment, hydrolysis will not contribute to the degradation of constituent chemicals in the Resin Oils and Cyclodiene Dimer Concentrates Category. Resin Oils and Cyclodiene Dimer Concentrates Category includes nine process streams:</p> <ul style="list-style-type: none">• High DCPD Resin Oils• Low DCPD Resin Oils• Resin Former• Dicyclopentadiene (DCPD) Concentrate• DCPD, High Purity• DCPD Purge Stream• Methylcyclopentadiene (MCPD) Dimer• DCPD Stream• DCPD/Codimer Concentrate <p>As discussed below, the chemicals in these streams are composed of carbon and hydrogen and are not amenable to hydrolysis because of their molecular structure and the chemical reaction required for this type of transformation to occur.</p> <p><u>The Resin Oils and Cyclodiene Dimer Concentrates Category</u></p> <p>A process stream is a mixture of chemicals that arises from a chemical reaction or separation activity. The category includes hydrocarbon process streams consisting predominantly of the same higher-boiling hydrocarbons, mostly cycloalkenes and aromatics, but at varying concentrations. Ten CAS numbers (see <u>Test Substance</u>) identify products derived from these process streams. This grouping of CAS</p>

Hydrolysis (Stability in Water)

CAS No.: 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1;
68527-24-2; 68527-26-4; 68603-02-1

Robust Summary No.: OP E767

	<p>numbers represents hydrocarbon streams with a carbon number distribution that is predominantly C8-C12 with some lower molecular weight constituents present. The predominant components are cycloalkenes and aromatic hydrocarbons. That is why this group is considered a category for purposes of the High Production Volume (HPV) Chemical Program, and designated <u>Resin Oils and Cyclo diene Dimer Concentrates</u>.</p> <p>The definitions found in the TSCA Chemical Substance Inventory for the CAS numbers included in this group are vague with respect to composition. Therefore, it is possible to find that the same CAS number is correctly used to describe different streams (compositions) or that two or more different CAS numbers are used to describe the same stream (composition or process).</p> <p>More information on the Resin Oils and Cyclo diene Dimer Concentrates Category can be found in the American Chemistry Council, Olefins Panel test plan for this category (1). The plan is available on the U.S. Environmental Protection Agency website under the HPV Chemical Program. A brief description of the production and composition of the nine process streams in this category are:</p> <ul style="list-style-type: none">• High DCPD Resin Oils: This stream typically contains about 55% DCPD, and significant levels of vinyl aromatics and codimers of cyclopentadiene with other monomers such as isoprene, pentadiene and methylcyclopentadiene. The highest boiling component in the stream is normally naphthalene and it is present usually at less than about 0.5%.• Low DCPD Resin Oils: This stream consists of components that are similar to those found in the High DCPD stream (vinyl aromatics) with the exception that DCPD and the codimers are present only at very low levels (typically <1% DCPD).• Resin Former: A participant in the Panel's HPV program who processes resin oil from various ethylene units produces this stream. It is most similar to the Low DCPD stream, with typical DCPD content reported as about 6.7%.• DCPD Concentrate: is produced from the Pyrolysis C5 Fraction by a combination of distillation and heat soak (dimerization) unit operations. DCPD content of the stream is typically 75% with the balance predominantly codimers of cyclopentadiene with other C5 monomers. The stream typically contains relatively low levels of low boiling hydrocarbons (C5 to C8).• DCPD, High Purity: Dicyclopentadiene can be purified to about 95% by a combination of thermal and distillation unit operations. The main impurities remaining in the stream are codimers and trimers of cyclopentadiene.• DCPD Purge Stream: The DCPD Purge Stream results from the distillation process that separates the DCPD/Codimer Concentrate stream and the MCPD Dimer stream from the C8+
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Hydrolysis (Stability in Water)

CAS No.: 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1;
68527-24-2; 68527-26-4; 68603-02-1

Robust Summary No.: OP E767

	<p>fraction of a thermally-processed pyrolysis gasoline. The DCPD Purge Stream typically contains 18% DCPD, with the balance largely codimers and C8 aliphatics and aromatics.</p> <ul style="list-style-type: none">• MCPD Dimer: this stream is isolated by distillation from the C8+ fraction of a thermally processed pyrolysis gasoline. Typical purity is 90% as the dimer and the main impurities in the stream are codimers and trimers of DCPD and MCPD.• DCPD Stream: this stream is produced as the bottoms from a distillation tower that is charged with a DCPD-containing stream together with the heavy ends and raffinate from an isoprene extractive distillation unit. This stream is reported to contain about 50% DCPD, with the balance being largely C5s, both saturates and unsaturates.• DCPD/Codimer Concentrate: this stream is isolated by distillation from the C8+ fraction of a thermally processed pyrolysis gasoline. This stream typically contains about 40% DCPD with the balance primarily codimers of cyclopentadiene with piperylene, butadiene and methylcyclopentadiene.
	<p><u>Hydrolysis of Hydrocarbons as a Function of Molecular Structure</u></p> <p>Hydrolysis of an organic molecule occurs when a molecule (R-X) reacts with water (H₂O) to form a new carbon-oxygen bond after the carbon-X bond is cleaved (2,3). Mechanistically, this reaction is referred to as a nucleophilic substitution reaction, where X is the leaving group being replaced by the incoming nucleophilic oxygen from the water molecule. The leaving group, X, must be a molecule other than carbon because for hydrolysis to occur, the R-X bond cannot be a carbon-carbon bond.</p> <p>The carbon atom lacks sufficient electronegativity to be a good leaving group and carbon-carbon bonds are too stable (high bond energy) to be cleaved by nucleophilic substitution. Thus, hydrocarbons, including alkenes, are not subject to hydrolysis (3) and this fate process will not contribute to the degradative loss of chemical components in this category from the environment.</p> <p>Under strongly acidic conditions the carbon-carbon double bond found in alkenes, such as those in the Resin Oils and CycloDiene Dimer Concentrates Category, will react with water by an addition reaction mechanism (2). The reaction product is an alcohol. This reaction is not considered to be hydrolysis because the carbon-carbon linkage is not cleaved and because the reaction is freely reversible (3). Substances that have a potential to hydrolyze include alkyl halides, amides, carbamates, carboxylic acid esters and lactones, epoxides, phosphate esters, and sulfonic acid esters (4).</p> <p>The substances in the Resin Oils and CycloDiene Dimer Concentrates Category are primarily olefins that contain at least one double bond (alkenes). The remaining chemicals are saturated hydrocarbons (alkanes). These two groups of chemicals contain only carbon and</p>

Hydrolysis (Stability in Water)

CAS No.: 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1;
68527-24-2; 68527-26-4; 68603-02-1

Robust Summary No.: OP E767

	<p>hydrogen. As such, their molecular structure is not subject to the hydrolytic mechanism discussed above. Therefore, chemicals in the Resin Oils and Cyclodiene Dimer Concentrates Category have a very low potential to hydrolyze, and this degradative process will not contribute to their removal in the environment.</p> <p>References</p> <ol style="list-style-type: none">1. Olefins Panel, HPV Implementation Task Group. 2001. High Production Volume (HPV) Chemical Challenge Program Test Plan For The Resin Oils and Cyclodiene Dimer Concentrates Category. American Chemistry Council, Olefins Panel, HPV Implementation Task Group. VA, USA.2. Gould, E.S. (1959), Mechanism and Structure in Organic Chemistry, Holt, Reinhart and Winston, New York, NY, USA.3. Harris, J.C. (1982), "Rate of Hydrolysis," Chapter 7 in: W.J. Lyman, W.F. Reehl, and D.H. Rosenblatt, eds., Handbook of Chemical Property Estimation Methods, McGraw-Hill Book Company, New York, NY, USA.4. Neely, W. B. 1985. Hydrolysis. In: W. B. Neely and G. E. Blau, eds. Environmental Exposure from Chemicals. Vol I., pp. 157-173. CRC Press, Boca Raton, FL, USA.
Reliability:	These data represent a key study for characterizing the potential of substances in the Resin Oils and Cyclodiene Dimer Concentrates Category to undergo hydrolysis.
Reference:	American Chemistry Council, Olefins Panel. 2003. Hydrolysis Resin Oils and Cyclodiene Dimer Concentrates Category. Rosslyn, VA, USA.
Other (source):	American Chemistry Council, Olefins Panel (Prepared 8/03)

* Other TS is a selection option under the Test Substance pick list that is in the IUCLID entry field for Hydrolysis. Selecting this option refers the reader to information in the test substance "freetext" field to which the CAS numbers can be added.

Photodegradation (Indirect)

CAS No.: 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1; 68527-24-2; 68527-26-4; 68603-02-1

Robust Summary No.: OP E770

**RESIN OILS and CYCLODIENE DIMER CONCENTRATES
ROBUST SUMMARY**

Photodegradation (Indirect)

Test Substance*:	Other TS [CAS # 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1; 68527-24-2; 68527-26-4; 68603-02-1]
Method/Guideline:	Calculated values using AOPWIN version 1.89, a subroutine of the computer program EPIWIN version 3.04
Year (guideline):	1999
GLP (Y/N):	Not applicable
Year (study performed):	Not applicable
Type (air, soil, water, other):	Not applicable
Light Source:	Sunlight
Light Spectrum: <ul style="list-style-type: none">• Wave length value (upper/lower)	Natural sunlight
Relative Intensity:	1
Test Substance Spectrum:	Not applicable
Test Conditions: <ul style="list-style-type: none">• Note: Concentration, temperature, test system type, replication, deviations from guideline or protocol	Indirect photodegradation, or atmospheric oxidation potential, is based on the structure-activity relationship methods developed by R. Atkinson. Temperature: 25°C Sensitizer: OH radical Concentration of Sensitizer: 1.5 E ⁶ OH radicals/cm ³
Direct Photolysis**: Results: half-life, % degradation, quantum yield	Not applicable

Photodegradation (Indirect)

CAS No.: 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1; 68527-24-2; 68527-26-4; 68603-02-1

Robust Summary No.: OP E770

<p>Indirect Photolysis**:</p> <ul style="list-style-type: none">Results: type of sensitizer, concentration of sensitizer, rate constant, % degradation, half-life	<p><u>The Resin Oils and Cyclodiene Dimer Concentrates Category</u></p> <p>The Resin Oils and Cyclodiene Dimer Concentrates Category was developed by grouping two Resin Oil streams, one relatively low in Dicyclopentadiene (DCPD), and a second that contains higher levels of the dimer. These Resin Oils have been further grouped with six other process streams that are concentrates of DCPD, Methylcyclopentadiene Dimer (MCDP Dimer), and co-dimers of these two cyclodienes with other hydrocarbons of similar molecular weight present.</p> <p>Commercial substances in this category consist of complex hydrocarbon products with a carbon number distribution that is predominantly C8-C12 with some lower molecular weight constituents present. The predominant components are cycloalkenes and aromatic hydrocarbons. That is why this group is considered a category for purposes of the High Production Volume (HPV) Chemical Program, and designated <u>Resin Oils and Cyclodiene Dimer Concentrates</u>.</p> <p>The five chemicals selected to represent the atmospheric oxidation potential of this category are C8-C12 hydrocarbons that can be found in substances identified by the 10 CAS numbers. Constituents representing category members were selected on the basis of carbon number as identified by the category name, chemistry/structure, measured boiling point ranges for category substances, and olefinic process (distillation) knowledge.</p> <p><u>Atmospheric Oxidation of Hydrocarbons</u></p> <p>In the environment, organic chemicals emitted into the troposphere are degraded by several important transformation processes. The dominant transformation process for most compounds is the daylight reaction with hydroxyl (OH-) radicals (Atkinson, 1988, 1989). The rate at which an organic compound reacts with OH-radicals is a direct measure of its atmospheric persistence (Meylan and Howard, 1993).</p> <p>AOPWIN estimates the rate constant for the atmospheric, gas-phase reaction between photochemically produced hydroxyl radicals and organic chemicals. The rate constants estimated by the program are then used to calculate atmospheric half-lives for organic compounds based upon average atmospheric concentrations of hydroxyl radicals.</p> <p>Since the reactions only take place in the presence of sunlight, the atmospheric half-lives are normalized for a 12-hour day.</p>
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Photodegradation (Indirect)

CAS No.: 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1; 68527-24-2; 68527-26-4; 68603-02-1

Robust Summary No.: OP E770

<p>Indirect Photolysis**: (cont'd)</p> <p>Results: type of sensitizer, concentration of sensitizer, rate constant, % degradation, half-life</p>	<table border="1"> <thead> <tr> <th><u>Chemical</u></th> <th><u>Calculated* half-life (hrs)</u></th> <th><u>OH- Rate Constant (cm³/molecule-sec)</u></th> </tr> </thead> <tbody> <tr> <td>vinyl toluene</td> <td>44.5</td> <td>2.9 E⁻¹²</td> </tr> <tr> <td>indene</td> <td>53.0</td> <td>2.4 E⁻¹²</td> </tr> <tr> <td>dicyclopentadiene</td> <td>1.1</td> <td>119.2 E⁻¹²</td> </tr> <tr> <td>methylindene</td> <td>50.2</td> <td>2.6 E⁻¹²</td> </tr> <tr> <td>methylcyclopentadiene dimer</td> <td>0.7</td> <td>173.1 E⁻¹²</td> </tr> </tbody> </table> <p>* Atmospheric half-life values are based on a 12-hr day.</p> <p>More information on the Resin Oils and Cycloidiene Dimer Concentrates Category can be found in the American Chemistry Council, Olefins Panel test plan for this category (Olefins Panel, 2001).</p> <p><u>References:</u></p> <ol style="list-style-type: none"> 1. Atkinson, R. 1988. Estimation of gas-phase hydroxyl radical rate constants for organic chemicals. <i>Environ. Toxicol. Chem.</i> 7:435-442. 2. Atkinson, R. 1989. Kinetics and mechanisms of the gas-phase reactions of the hydroxyl radical with organic compounds. J. Phys. Chem. Ref. Data Monograph No. 1, Amer. Inst. Physics & Amer. Chem. Soc., NY. 3. Meylan, W.M. and P.H. Howard. 1993. Computer estimation of the atmospheric gas-phase reaction rate of organic compounds with hydroxyl radicals and ozone. <i>Chemosphere</i> 12:2293-2299. 4. Olefins Panel, HPV Implementation Task Group. 2001. High Production Volume (HPV) Chemical Challenge Program Test Plan For The Resin Oils and Cycloidiene Dimer Concentrates Category. American Chemistry Council, Olefins Panel, HPV Implementation Task Group. VA, USA. 	<u>Chemical</u>	<u>Calculated* half-life (hrs)</u>	<u>OH- Rate Constant (cm³/molecule-sec)</u>	vinyl toluene	44.5	2.9 E ⁻¹²	indene	53.0	2.4 E ⁻¹²	dicyclopentadiene	1.1	119.2 E ⁻¹²	methylindene	50.2	2.6 E ⁻¹²	methylcyclopentadiene dimer	0.7	173.1 E ⁻¹²
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methylcyclopentadiene dimer	0.7	173.1 E ⁻¹²																	
<p>Degradation Products**:</p> <ul style="list-style-type: none"> • Note: Identification, concentration 	<p>Unknown</p>																		

Photodegradation (Indirect)

CAS No.: 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1; 68527-24-2; 68527-26-4; 68603-02-1

Robust Summary No.: OP E770

Test Substance:	<p>The Resin Oils and Cycloadiene Dimer Concentrates Category includes the following CAS numbers:</p> <p>26742-00-4 4,7-Methano-1H-indene, 3a,4,7,7a-tetrahydrodimethyl-</p> <p>68477-40-7 Distillates, petroleum, cracked stripped steam-cracked petroleum distillates, C10-12 fraction</p> <p>68477-54-3 Distillates, petroleum, steam-cracked, C8-12 fraction</p> <p>68477-53-2 Distillates, petroleum, steam-cracked, C5-12 fraction</p> <p>68478-08-0 Naphtha, petroleum, light steam-cracked, C5-fraction, oligomer concentrate</p> <p>68478-10-4 Naphtha, petroleum, light steam-cracked, debenzenized, C8-16-cycloalkadiene concentrate</p> <p>68516-20-1 Naphtha, petroleum, steam-cracked middle aromatic</p> <p>68527-24-2 Naphtha, petroleum, light steam-cracked aromatic, C5-12 cycloalkadiene fraction, polymers</p> <p>68527-26-4 Naphtha, petroleum, light steam-cracked, debenzenized</p> <p>68603-02-1 Distillates, petroleum, thermal cracked naphtha and gas oil, dimerized</p>
Conclusion:	<p>Atmospheric oxidation via hydroxyl radicals can be a significant route of degradation for products in this category. Based on calculated values, products in this category can have an atmospheric half-life range of 0.7 to 53 hours as a result of indirect photolysis by hydroxyl radical attack.</p>
Reliability:	<p>(2) Reliable with restrictions</p> <p>The results include calculated data based on chemical structure as modeled by AOPWIN. The data represent a potential atmospheric half-life range for substances represented by the 10 CAS numbers under <u>Test Substance</u>. This robust summary has a reliability rating of 2 because the data are not for specific substances in the Resin Oils and Cycloadiene Dimer Concentrates Category, but rather for selected constituents. These selected constituents represent all substances defined by this category and as such, this robust summary represents a "key study" for atmospheric half-life range based on constituent data.</p>
Reference:	<p>Meylan, M., SRC 1994-1999. AOPWIN is contained in the computer program EPIWIN. 1999. Estimation Program Interface for Windows, version 3.04. Syracuse Research Corporation, Syracuse, NY, USA.</p>
Other (source):	<p>American Chemistry Council, Olefins Panel (Prepared 10/03)</p>

* Other TS is a selection option under the Test Substance pick list that is in the IUCLID entry field for Photodegradation (Indirect). Selecting this option refers the reader to information in the test substance "freetext" field to which the CAS numbers can be added.

** In IUCLID, provide additional discussion if needed in the results freetext

Partition Coefficient (Range)

CAS No.: 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1; 68527-24-2; 68527-26-4; 68603-02-1

Robust Summary No.: OP E763

**RESIN OILS and CYCLODIENE DIMER CONCENTRATES
ROBUST SUMMARY**

Partition Coefficient

Test Substance*:	Other TS [CAS # 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1; 68527-24-2; 68527-26-4; 68603-02-1]
Method/Guideline:	Calculated values using KOWWIN version 1.65, a subroutine of the computer program EPIWIN version 3.04
Year (guideline):	1999
Type (test type):	Not applicable
GLP:	Not applicable
Year (study performed):	Not applicable
Estimation Temperature:	25°C
Test Conditions: <ul style="list-style-type: none">Note: Concentration prep., vessel type, replication, test conditions.	Octanol / Water Partition Coefficient is calculated by the KOWWIN subroutine, which is based on an atom/fragment contribution method of W. Meylan and P. Howard in "Atom/fragment contribution method for estimating octanol-water partition coefficients". 1995. <i>J. Pharm. Sci.</i> 84:83-92.
Results: Units/Value: <ul style="list-style-type: none">Note: Deviations from protocol or guideline, analytical method.	<p>Calculated and measured log K_{ow} data for representative constituents of the Resin Oils and Cyclodiene Dimer Concentrates Category are listed below. The data identify a potential log K_{ow} range for substances represented by the 10 CAS numbers under <u>Test Substance</u>. Substances in this category do not have a specific log K_{ow} value. Actual log K_{ow} ranges for substances in this category will vary dependent on their constituent composition.</p> <p>Commercial substances in this category consist of complex hydrocarbon products with a carbon number distribution that is predominantly C8-C12 with some lower molecular weight constituents present. The predominant components are cycloalkenes and aromatic hydrocarbons. The five chemicals selected to represent the log K_{ow} range of this category are C8-C12 hydrocarbons that can be found in substances identified by the 10 CAS numbers. Constituents representing category members were selected on the basis of carbon number as identified by the category name, chemistry/structure, measured boiling point ranges for category substances, and olefinic process (distillation) knowledge.</p>

Partition Coefficient (Range)

CAS No.: 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1; 68527-24-2; 68527-26-4; 68603-02-1

Robust Summary No.: OP E763

<p>Results: (continued)</p> <p>Units/Value:</p> <p>Note: Deviations from protocol or guideline, analytical method.</p>	<table border="1"> <thead> <tr> <th>Substance Constituent</th> <th>Calculated log K_{ow} @ 25°C</th> <th>Measured* log K_{ow} @ 25°C</th> </tr> </thead> <tbody> <tr> <td>vinyl toluene</td> <td>2.48</td> <td>na</td> </tr> <tr> <td>indene</td> <td>2.88</td> <td>na</td> </tr> <tr> <td>dicyclopentadiene</td> <td>3.16</td> <td>na</td> </tr> <tr> <td>methylindene</td> <td>3.42</td> <td>na</td> </tr> <tr> <td>methylcyclopentadiene dimer</td> <td>5.27</td> <td>5.5 to 5.7†</td> </tr> </tbody> </table> <p>* Experimental values from EPIWIN database. na = not available The data represent a potential log K_{ow} range for substances represented by the 10 CAS numbers under <u>Test Substance</u>.</p> <p>† Huntingdon Life Sciences, Ltd. 2003. Physicochemical Properties Study. EXN040/032421</p>	Substance Constituent	Calculated log K _{ow} @ 25°C	Measured* log K _{ow} @ 25°C	vinyl toluene	2.48	na	indene	2.88	na	dicyclopentadiene	3.16	na	methylindene	3.42	na	methylcyclopentadiene dimer	5.27	5.5 to 5.7†
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Partition Coefficient (Range)

CAS No.: 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1; 68527-24-2; 68527-26-4; 68603-02-1

Robust Summary No.: OP E763

	<p>More information on the Resin Oils and Cyclodiene Dimer Concentrates Category can be found in the American Chemistry Council, Olefins Panel test plan for this category (1).</p> <ol style="list-style-type: none">1. Olefins Panel, HPV Implementation Task Group. 2001. High Production Volume (HPV) Chemical Challenge Program Test Plan For The Resin Oils and Cyclodiene Dimer Concentrates Category. American Chemistry Council, Olefins Panel, HPV Implementation Task Group. VA, USA.
Conclusion:	<p>The calculated log K_{ow} for some representative constituents that are present in the category streams vary from 2.48 to 5.27 @ 25°C. The measured log K_{ow} of MCPD Dimer has been reported to range from 5.5 to 5.7 @ 25°C. Although this does not define the actual log K_{ow} of the category streams, it offers an indication of a range that might be expected to encompass the log K_{ow} of these complex streams with variable compositions. Log K_{ow} values outside of these ranges may be possible for some category streams.</p>
Reliability:	<p>(2) Reliable with restrictions</p> <p>The results include calculated data based on chemical structure as modeled by EPIWIN and measured data for specific chemicals as cited in the EPIWIN database. The data represent a potential log K_{ow} range for substances represented by the 10 CAS numbers under <u>Test Substance</u>. This robust summary has a reliability rating of 2 because the data are not for specific substances in the Resin Oils and Cyclodiene Dimer Concentrates Category, but rather for selected constituents. These selected constituents represent all substances defined by this category and as such, this robust summary represents a "key study" for log K_{ow} range based on constituent data.</p>
Reference:	<p>EPIWIN. 1999. Estimation Program Interface for Windows, version 3.04. Syracuse Research Corporation, Syracuse, NY, USA. (Log K_{ow} values were calculated by the KOWWIN subroutine and measured data came from the database in the computer program.)</p>
Other (source):	<p>American Chemistry Council, Olefins Panel (Prepared 8/03)</p>

* Other TS is a selection option under the Test Substance pick list that is in the IUCLID entry field for Partition Coefficient. Selecting this option refers the reader to information in the test substance "freetext" field to which the CAS numbers can be added.

Melting Point (Range)

CAS No.: 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1; 68527-24-2; 68527-26-4; 68603-02-1

Robust Summary No.: OP E761

**RESIN OILS and CYCLODIENE DIMER CONCENTRATES
ROBUST SUMMARY**

Melting Point

Test Substance*:	Other TS [CAS # 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1; 68527-24-2; 68527-26-4; 68603-02-1]
Method/Guideline:	Calculated values using MPBPWIN version 1.40, a subroutine of the computer program EPIWIN version 3.04
Year (guideline):	1999
Type (test type):	Not applicable
GLP:	Not applicable
Year (study performed):	Not applicable
Test Conditions: <ul style="list-style-type: none">Note: Concentration prep., vessel type, replication, test conditions.	<p>Melting Point is calculated by the MPBPWIN subroutine, which is based on the average result of the methods of K. Joback and Gold and Ogle.</p> <p>Joback's Method is described in Joback, K.G. 1982. A Unified Approach to Physical Property Estimation Using Multivariate Statistical Techniques. In <u>The Properties of Gases and Liquids</u>, Fourth Edition. 1987. R.C. Reid, J.M. Prausnitz and B.E. Poling, Eds.</p> <p>The Gold and Ogle Method simply uses the formula $T_m = 0.5839T_b$, where T_m is the melting point in Kelvin and T_b is the boiling point in Kelvin. The Gold and Ogle Method is described by Lyman, W.J., 1985, In: <u>Environmental Exposure from Chemicals</u>. Volume 1. Neely, W.B. and Blau, G.E. (eds), Boca Raton, FL, CRC Press, Inc., Chapter 2.</p>
Results: Units/Value: <ul style="list-style-type: none">Note: Deviations from protocol or guideline, analytical method.	<p>Calculated and measured melting point data for representative constituents of the Resin Oils and Cyclo diene Dimer Concentrates Category are listed below. The data identify a potential melting point range for substances represented by the 10 CAS numbers under <u>Test Substance</u>. Substances in this category do not have a specific melting point value. Actual melting point ranges for substances in this category will vary dependent on their constituent composition.</p> <p>Commercial substances in this category consist of complex hydrocarbon products with a carbon number distribution that is predominantly C8-C12 with some lower molecular weight constituents present. The predominant components are cycloalkenes and aromatic hydrocarbons. The five chemicals selected to represent the melting point range of this category are C8-C12 hydrocarbons that can be found in substances identified by the 10 CAS numbers. Constituents representing category</p>

Melting Point (Range)

CAS No.: 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1; 68527-24-2; 68527-26-4; 68603-02-1

Robust Summary No.: OP E761

	<p>members were selected on the basis of carbon number as identified by the category name, chemistry/structure, measured boiling point ranges for category substances, and olefinic process (distillation) knowledge.</p>																		
<p>Results: (continued)</p> <p>Units/Value:</p> <p>Note: Deviations from protocol or guideline, analytical method.</p>	<table border="1"> <thead> <tr> <th data-bbox="690 415 1052 474">Substance Constituent</th> <th data-bbox="1057 415 1247 474">Calculated MP (°C)</th> <th data-bbox="1252 415 1481 474">Measured* MP (°C)</th> </tr> </thead> <tbody> <tr> <td data-bbox="690 506 1052 533">vinyl toluene</td> <td data-bbox="1057 506 1247 533">-60.33</td> <td data-bbox="1252 506 1481 533">na</td> </tr> <tr> <td data-bbox="690 539 1052 567">indene</td> <td data-bbox="1057 539 1247 567">24.36</td> <td data-bbox="1252 539 1481 567">na</td> </tr> <tr> <td data-bbox="690 573 1052 600">dicyclopentadiene</td> <td data-bbox="1057 573 1247 600">-16.78</td> <td data-bbox="1252 573 1481 600">32.0</td> </tr> <tr> <td data-bbox="690 606 1052 634">methylindene</td> <td data-bbox="1057 606 1247 634">35.06</td> <td data-bbox="1252 606 1481 634">na</td> </tr> <tr> <td data-bbox="690 640 1052 667">methylcyclopentadiene dimer</td> <td data-bbox="1057 640 1247 667">3.13</td> <td data-bbox="1252 640 1481 667">na</td> </tr> </tbody> </table> <p>* Experimental values from EPIWIN database. na = not available</p> <p>The data represent a potential melting point range for substances represented by the 10 CAS numbers under <u>Test Substance</u>.</p>	Substance Constituent	Calculated MP (°C)	Measured* MP (°C)	vinyl toluene	-60.33	na	indene	24.36	na	dicyclopentadiene	-16.78	32.0	methylindene	35.06	na	methylcyclopentadiene dimer	3.13	na
Substance Constituent	Calculated MP (°C)	Measured* MP (°C)																	
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methylindene	35.06	na																	
methylcyclopentadiene dimer	3.13	na																	
<p>Test Substance:</p>	<p>The Resin Oils and Cycloidiene Dimer Concentrates Category includes the following CAS numbers:</p> <p>26742-00-4 4,7-Methano-1H-indene, 3a,4,7,7a-tetrahydrodimethyl-</p> <p>68477-40-7 Distillates, petroleum, cracked stripped steam-cracked petroleum distillates, C10-12 fraction</p> <p>68477-54-3 Distillates, petroleum, steam-cracked, C8-12 fraction</p> <p>68477-53-2 Distillates, petroleum, steam-cracked, C5-12 fraction</p> <p>68478-08-0 Naphtha, petroleum, light steam-cracked, C5-fraction, oligomer concentrate</p> <p>68478-10-4 Naphtha, petroleum, light steam-cracked, debenzenized, C8-16-cycloalkadiene concentrate</p> <p>68516-20-1 Naphtha, petroleum, steam-cracked middle aromatic</p> <p>68527-24-2 Naphtha, petroleum, light steam-cracked aromatic, C5-12 cycloalkadiene fraction, polymers</p> <p>68527-26-4 Naphtha, petroleum, light steam-cracked, debenzenized</p> <p>68603-02-1 Distillates, petroleum, thermal cracked naphtha and gas oil, dimerized</p> <p>The Resin Oils and Cycloidiene Dimer Concentrates Category was developed by grouping two Resin Oil streams, one relatively low in Dicyclopentadiene (DCPD), and a second that contains higher levels of the dimer. These Resin Oils have been further grouped with six other process streams that are concentrates of DCPD, Methylcyclopentadiene Dimer (MCDP Dimer), and co-dimers of these two cycloidiene with other hydrocarbons of similar molecular weight present, primarily cycloalkenes and aromatic hydrocarbons. The 10 CAS numbers are used to describe the nine process streams associated with the ethylene industry and associated manufacturing processes.</p>																		

Melting Point (Range)

CAS No.: 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1; 68527-24-2; 68527-26-4; 68603-02-1

Robust Summary No.: OP E761

	<p>More information on the Resin Oils and Cyclo diene Dimer Concentrates Category can be found in the American Chemistry Council, Olefins Panel test plan for this category (1).</p> <ol style="list-style-type: none">1. Olefins Panel, HPV Implementation Task Group. 2001. High Production Volume (HPV) Chemical Challenge Program Test Plan For The Resin Oils and Cyclo diene Dimer Concentrates Category. American Chemistry Council, Olefins Panel, HPV Implementation Task Group. VA, USA.
Conclusion:	<p>The calculated melting points for some representative constituents that are present in the category streams vary from -60.33 to 35.06°C. The measured melting point for one of these same constituents (DCPD) was 32.0°C. Although this does not define the actual melting points of the category streams, it offers an indication of a range that might be expected to encompass the melting points of these complex streams with variable compositions. Melting points outside of these ranges may be possible for some category streams.</p>
Reliability:	<p>(2) Reliable with restrictions</p> <p>The results include calculated data based on chemical structure as modeled by EPIWIN and measured data for specific chemicals as cited in the EPIWIN database. The data represent a potential melting point range for substances represented by the 10 CAS numbers listed under <u>Test Substance</u>. This robust summary has a reliability rating of 2 because the data are not for specific substances in the Resin Oils and Cyclo diene Dimer Concentrates Category, but rather for selected constituents. These selected constituents represent all substances defined by this category and as such, this robust summary represents a "key study" for melting point range based on constituent data.</p>
Reference:	<p>EPIWIN. 1999. Estimation Program Interface for Windows, version 3.04. Syracuse Research Corporation, Syracuse, NY, USA. (Melting point values were calculated by the MPBPWIN subroutine and measured data came from the database in the computer program.)</p>
Other (source):	<p>American Chemistry Council, Olefins Panel (Prepared 8/03)</p>

* Other TS is a selection option under the Test Substance pick list that is in the IUCLID entry field for Melting Point. Selecting this option refers the reader to information in the test substance "freetext" field to which the CAS numbers can be added.

Transport / Distribution (Fugacity)

CAS No.: 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1; 68527-24-2; 68527-26-4; 68603-02-1

Robust Summary No.: OP E769

**RESIN OILS and CYCLODIENE DIMER CONCENTRATES
ROBUST SUMMARY**

Transport / Distribution (Fugacity)

Test Substance*:	Other TS [CAS # 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1; 68527-24-2; 68527-26-4; 68603-02-1]
Method/Guideline:	Calculated according to Mackay Level I, EQC Model version 1.01
Year (guideline):	1997
Type (test type):	Not applicable
GLP:	Not applicable
Year (study performed):	Not applicable
Estimation Temperature:	25°C
Test Conditions: <ul style="list-style-type: none">Note: Concentration prep., vessel type, replication, test conditions.	<p>The EQC Level I is a steady state, equilibrium model that utilizes the input of basic chemical properties including molecular weight, vapor pressure, and water solubility to calculate distribution within a standardized regional environment.</p> <p>Physicochemical input values for the model were calculated using the EPIWIN Estimation v 3.04 program (1). Measured input values were also used where available and obtained from the EPIWIN database (1). Distribution data from the equilibrium model provide basic information on the potential partitioning behavior of chemicals between selected environmental compartments (i.e., air, water, soil, sediment, suspended sediment, biota).</p> <p>1. EPIWIN. 1999. Estimation Program Interface for Windows, version 3.04. Syracuse Research Corporation, Syracuse, NY, USA.</p>

Transport / Distribution (Fugacity)

CAS No.: 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1; 68527-24-2; 68527-26-4; 68603-02-1

Robust Summary No.: OP E769

<p>Results:</p> <p>Units/Value:</p> <ul style="list-style-type: none"> Note: Deviations from protocol or guideline, analytical method. 	<p>Calculated partitioning data for representative constituents of the Resin Oils and Cyclodiene Dimer Concentrates Category are listed below. The data identify a potential distribution for substances represented by the 10 CAS numbers under <u>Test Substance</u>. Actual distribution of substances in this category will vary dependent on their constituent composition.</p> <p>Commercial substances in this category consist of complex hydrocarbon products with a carbon number distribution that is predominantly C8-C12 with some lower molecular weight constituents present. The predominant components are cycloalkenes and aromatic hydrocarbons. The five chemicals selected to represent the environmental distribution range of this category are C8-C12 hydrocarbons that can be found in substances identified by the 10 CAS numbers. Constituents representing category members were selected on the basis of carbon number as identified by the category name, chemistry/structure, measured boiling point ranges for category substances, and olefinic process (distillation) knowledge.</p> <p>The range of distribution data for constituent chemicals in each of the compartments can be used as an estimate of the partitioning behavior for category substances.</p> <p>The following Mackay Level I model distribution values for representative constituents of substances in this category were determined using physicochemical input data calculated using the EPIWIN program:</p> <table border="1"> <thead> <tr> <th rowspan="2"><u>Chemical</u></th> <th colspan="4"><u>Calculated*</u> <u>Percent Distribution</u></th> </tr> <tr> <th><u>Air</u></th> <th><u>Water</u></th> <th><u>Soil</u></th> <th><u>Sediment</u></th> </tr> </thead> <tbody> <tr> <td>vinyl toluene</td> <td>96.94</td> <td>2.40</td> <td>0.64</td> <td>0.02</td> </tr> <tr> <td>indene</td> <td>47.61</td> <td>31.05</td> <td>20.86</td> <td>0.46</td> </tr> <tr> <td>dicyclopentadiene</td> <td>98.00</td> <td>0.87</td> <td>1.11</td> <td>0.02</td> </tr> <tr> <td>methylindene</td> <td>32.02</td> <td>20.10</td> <td>46.81</td> <td>1.04</td> </tr> <tr> <td>methylcyclopentadiene dimer</td> <td>85.98</td> <td>0.09</td> <td>13.62</td> <td>0.03</td> </tr> </tbody> </table> <p>* Distribution values determined using calculated input data from EPIWIN program</p>	<u>Chemical</u>	<u>Calculated*</u> <u>Percent Distribution</u>				<u>Air</u>	<u>Water</u>	<u>Soil</u>	<u>Sediment</u>	vinyl toluene	96.94	2.40	0.64	0.02	indene	47.61	31.05	20.86	0.46	dicyclopentadiene	98.00	0.87	1.11	0.02	methylindene	32.02	20.10	46.81	1.04	methylcyclopentadiene dimer	85.98	0.09	13.62	0.03
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Transport / Distribution (Fugacity)

CAS No.: 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1; 68527-24-2; 68527-26-4; 68603-02-1

Robust Summary No.: OP E769

<p>Results: (cont'd)</p> <p>Units/Value:</p> <ul style="list-style-type: none"> Note: Deviations from protocol or guideline, analytical method. 	<table border="1"> <thead> <tr> <th rowspan="2"><u>Chemical</u></th> <th colspan="4"><u>Measured**</u> <u>Percent Distribution</u></th> </tr> <tr> <th><u>Air</u></th> <th><u>Water</u></th> <th><u>Soil</u></th> <th><u>Sediment</u></th> </tr> </thead> <tbody> <tr> <td>vinyl toluene</td> <td>na</td> <td>na</td> <td>na</td> <td>na</td> </tr> <tr> <td>indene</td> <td>na</td> <td>na</td> <td>na</td> <td>na</td> </tr> <tr> <td>dicyclopentadiene</td> <td>98.00</td> <td>0.87</td> <td>1.11</td> <td>0.02</td> </tr> <tr> <td>methylindene</td> <td>na</td> <td>na</td> <td>na</td> <td>na</td> </tr> <tr> <td>methylcyclopentadiene dimer</td> <td>na</td> <td>na</td> <td>na</td> <td>na</td> </tr> </tbody> </table> <p>** Distribution values determined using measured input data from the EPIWIN program experimental database. na = not available</p>	<u>Chemical</u>	<u>Measured**</u> <u>Percent Distribution</u>				<u>Air</u>	<u>Water</u>	<u>Soil</u>	<u>Sediment</u>	vinyl toluene	na	na	na	na	indene	na	na	na	na	dicyclopentadiene	98.00	0.87	1.11	0.02	methylindene	na	na	na	na	methylcyclopentadiene dimer	na	na	na	na
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Transport / Distribution (Fugacity)

CAS No.: 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1; 68527-24-2; 68527-26-4; 68603-02-1

Robust Summary No.: OP E769

	<p>2. Olefins Panel, HPV Implementation Task Group. 2001. High Production Volume (HPV) Chemical Challenge Program Test Plan For The Resin Oils and Cyclo diene Dimer Concentrates Category. American Chemistry Council, Olefins Panel, HPV Implementation Task Group. VA, USA.</p>
Conclusion:	<p>The partitioning data represent a potential distribution range for substances in the 10 CAS numbers listed under <u>Test Substance</u>. Substances in the Resin Oils and Cyclo diene Dimer Concentrates Category are complex hydrocarbon reaction products, and as a result, the potential environmental distribution of these substances is also expected to be complex. Constituent chemicals are calculated to partition either primarily to air or to air, water, and soil with a small percentage to sediment.</p> <p>The input data used to run the EQC Level I model included estimated values calculated by the EPIWIN program based on chemical structure and measured data from the EPIWIN database. A comparison of the distribution data developed using either all calculated input values or measured values where data were available indicate a similar partitioning behavior and support the use of the dataset for chemicals without any measured data.</p>
Reliability:	<p>(2) Reliable with restrictions</p> <p>The input data used to run the EQC Level I model include calculated and experimental values available through the EPIWIN program. The data represent a potential environmental distribution range for substances with the 10 CAS numbers listed under <u>Test Substance</u>. This robust summary has a reliability rating of 2 because the data are not for specific substances in the Resin Oils and Cyclo diene Dimer Concentrates Category, but rather for selected constituents. These selected constituents represent all substances defined by this category and as such, this robust summary represents a "key study" for distribution range based on constituent data.</p>
Reference:	<p>Mackay, D.A. DiGuardo, S. Paterson, and C. Cowan. EQC Model Version 1.01. 1997. Available from the Environmental Modeling Centre, Trent University, Canada.</p>
Other (source):	<p>American Chemistry Council, Olefins Panel (Prepared 8/03)</p>

* Other TS is a selection option under the Test Substance pick list that is in the IUCLID entry field for Transport-Distribution. Selecting this option refers the reader to information in the test substance "freetext" field to which the CAS numbers can be added.

Vapor Pressure (Range)

CAS No.: 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1; 68527-24-2; 68527-26-4; 68603-02-1

Robust Summary No.: OP E762

**RESIN OILS and CYCLODIENE DIMER CONCENTRATES
ROBUST SUMMARY**

Vapor Pressure

Test Substance*:	Other TS [CAS # 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1; 68527-24-2; 68527-26-4; 68603-02-1]
Method/Guideline:	Calculated values using MPBPWIN version 1.40, a subroutine of the computer program EPIWIN version 3.04
Year (guideline):	1999
Type (test type):	Not applicable
GLP:	Not applicable
Year (study performed):	Not applicable
Estimation Temperature:	25°C
Test Conditions: <ul style="list-style-type: none">Note: Concentration prep., vessel type, replication, test conditions.	<p>Vapor Pressure is calculated by the MPBPWIN subroutine, which is based on the average result of the methods of Antoine and Grain. Both methods use boiling point for the calculation.</p> <p>The Antoine Method is described in the <u>Handbook of Chemical Property Estimation</u>. Chapter 14. W.J. Lyman, W.F. Reehl and D.H. Rosenblatt, Eds. Washington, D.C.: American Chemical Society. 1990.</p> <p>A modified Grain Method is described on page 31 of Neely and Blau's <u>Environmental Exposure from Chemicals</u>, Volume 1, CRC Press. 1985.</p>
Results: Units/Value: <ul style="list-style-type: none">Note: Deviations from protocol or guideline, analytical method.	<p>Calculated and measured vapor pressure data for representative constituents of the Resin Oils and Cyclo diene Dimer Concentrates Category are listed below. The data identify a potential vapor pressure range for substances represented by the 10 CAS numbers under <u>Test Substance</u>. Substances in this category do not have a specific vapor pressure value. Actual vapor pressure ranges for substances in this category will vary dependent on their constituent composition.</p> <p>Commercial substances in this category consist of complex hydrocarbon products with a carbon number distribution that is predominantly C8-C12 with some lower molecular weight constituents present. The predominant components are cycloalkenes and aromatic hydrocarbons. The five chemicals selected to represent the vapor pressure range of this category are C8-C12 hydrocarbons that can be found in substances identified by the 10 CAS numbers. Constituents representing category members were selected on the basis of carbon number as</p>

Vapor Pressure (Range)

CAS No.: 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1; 68527-24-2; 68527-26-4; 68603-02-1

Robust Summary No.: OP E762

	<p>identified by the category name, chemistry/structure, measured boiling point ranges for category substances, and olefinic process (distillation) knowledge.</p>																		
<p>Results: (cont'd)</p> <p>Units/Value:</p> <ul style="list-style-type: none"> Note: Deviations from protocol or guideline, analytical method. 	<table border="1"> <thead> <tr> <th data-bbox="695 386 1013 443">Substance Constituent</th> <th data-bbox="1023 386 1192 443">Calculated VP (hPa @ 25°C)</th> <th data-bbox="1263 386 1432 443">Measured* VP (hPa @ 25°C)</th> </tr> </thead> <tbody> <tr> <td data-bbox="695 478 834 506">vinyl toluene</td> <td data-bbox="1081 478 1140 506">20.53</td> <td data-bbox="1321 478 1349 506">na</td> </tr> <tr> <td data-bbox="695 512 769 539">indene</td> <td data-bbox="1094 512 1140 539">0.25</td> <td data-bbox="1321 512 1349 539">na</td> </tr> <tr> <td data-bbox="695 546 899 573">dicyclopentadiene</td> <td data-bbox="1094 546 1122 573">2.2</td> <td data-bbox="1321 546 1365 573">3.05</td> </tr> <tr> <td data-bbox="695 579 834 606">methyindene</td> <td data-bbox="1094 579 1140 606">0.07</td> <td data-bbox="1321 579 1349 606">na</td> </tr> <tr> <td data-bbox="695 613 1029 640">methylcyclopentadiene dimer</td> <td data-bbox="1094 613 1140 640">0.20</td> <td data-bbox="1308 613 1365 640">19.0†</td> </tr> </tbody> </table> <p data-bbox="695 663 1224 720">* Experimental values from EPIWIN database. na = not available</p> <p data-bbox="695 726 1398 810">The data represent a potential vapor pressure range for substances represented by the 10 CAS numbers under <u>Test Substance</u>.</p> <p data-bbox="695 863 1349 919">† Huntingdon Life Sciences, Ltd. 2003. Physicochemical Properties Study. EXN040/032421</p>	Substance Constituent	Calculated VP (hPa @ 25°C)	Measured* VP (hPa @ 25°C)	vinyl toluene	20.53	na	indene	0.25	na	dicyclopentadiene	2.2	3.05	methyindene	0.07	na	methylcyclopentadiene dimer	0.20	19.0†
Substance Constituent	Calculated VP (hPa @ 25°C)	Measured* VP (hPa @ 25°C)																	
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methyindene	0.07	na																	
methylcyclopentadiene dimer	0.20	19.0†																	
<p>Test Substance:</p>	<p>The Resin Oils and Cycloidiene Dimer Concentrates Category includes the following CAS numbers:</p> <p>26742-00-4 4,7-Methano-1H-indene, 3a,4,7,7a-tetrahydrodimethyl-</p> <p>68477-40-7 Distillates, petroleum, cracked stripped steam-cracked petroleum distillates, C10-12 fraction</p> <p>68477-54-3 Distillates, petroleum, steam-cracked, C8-12 fraction</p> <p>68477-53-2 Distillates, petroleum, steam-cracked, C5-12 fraction</p> <p>68478-08-0 Naphtha, petroleum, light steam-cracked, C5-fraction, oligomer concentrate</p> <p>68478-10-4 Naphtha, petroleum, light steam-cracked, debenzenized, C8-16-cycloalkadiene concentrate</p> <p>68516-20-1 Naphtha, petroleum, steam-cracked middle aromatic</p> <p>68527-24-2 Naphtha, petroleum, light steam-cracked aromatic, C5-12 cycloalkadiene fraction, polymers</p> <p>68527-26-4 Naphtha, petroleum, light steam-cracked, debenzenized</p> <p>68603-02-1 Distillates, petroleum, thermal cracked naphtha and gas oil, dimerized</p> <p>The Resin Oils and Cycloidiene Dimer Concentrates Category was developed by grouping two Resin Oil streams, one relatively low in Dicyclopentadiene (DCPD), and a second that contains higher levels of the dimer. These Resin Oils have been further grouped with six other process streams that are concentrates of DCPD, Methylcyclopentadiene Dimer (MCDP Dimer), and co-dimers of these two cycloidiene with other hydrocarbons of similar molecular weight present, primarily cycloalkenes and aromatic hydrocarbons. The 10 CAS numbers are used to describe the nine process streams associated with the ethylene industry and associated manufacturing processes.</p>																		

Vapor Pressure (Range)**CAS No.:** 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1; 68527-24-2; 68527-26-4; 68603-02-1**Robust Summary No.:** OP E762

	<p>More information on the Resin Oils and Cyclo diene Dimer Concentrates Category can be found in the American Chemistry Council, Olefins Panel test plan for this category (1).</p> <ol style="list-style-type: none">1. Olefins Panel, HPV Implementation Task Group. 2001. High Production Volume (HPV) Chemical Challenge Program Test Plan For The Resin Oils and Cyclo diene Dimer Concentrates Category. American Chemistry Council, Olefins Panel, HPV Implementation Task Group. VA, USA.
Conclusion:	<p>The calculated vapor pressures for some representative constituents that are present in the category streams vary from 0.07 to 20.53 hPa @ 25°C. Measured vapor pressures for two of these same constituents vary from 3.05 to 19.0 hPa @ 25°C. Although this does not define the actual vapor pressures of the category streams, it offers an indication of a range that might be expected to encompass the vapor pressures of these complex streams with variable compositions. Vapor pressure outside of these ranges may be possible for some category streams.</p>
Reliability:	<p>(2) Reliable with restrictions</p> <p>The results include calculated data based on chemical structure as modeled by EPIWIN and measured data for specific chemicals as cited in the EPIWIN database. The data represent a potential vapor pressure range for substances represented by the 10 CAS numbers under <u>Test Substance</u>. This robust summary has a reliability rating of 2 because the data are not for specific substances in the Resin Oils and Cyclo diene Dimer Concentrates Category, but rather for selected constituents. These selected constituents represent all substances defined by this category and as such, this robust summary represents a "key study" for vapor pressure range based on constituent data.</p>
Reference:	<p>EPIWIN. 1999. Estimation Program Interface for Windows, version 3.04. Syracuse Research Corporation, Syracuse, NY, USA. (Vapor pressure values were calculated by the MPBPWIN subroutine and measured data came from the database in the computer program or from testing performed in conjunction with the test plan for this category.)</p>
Other (source):	<p>American Chemistry Council, Olefins Panel (Prepared 8/03)</p>

* Other TS is a selection option under the Test Substance pick list that is in the IUCLID entry field for Vapor Pressure. Selecting this option refers the reader to information in the test substance "freetext" field to which the CAS numbers can be added.

Water Solubility (Range)

CAS No.: 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1; 68527-24-2; 68527-26-4; 68603-02-1

Robust Summary No.: OP E764

**RESIN OILS and CYCLODIENE DIMER CONCENTRATES
ROBUST SUMMARY**

Water Solubility

Test Substance*:	Other TS [CAS # 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1; 68527-24-2; 68527-26-4; 68603-02-1]
Method/Guideline:	Calculated values using WSKOWWIN version 1.36, a subroutine of the computer program EPIWIN version 3.04
Year (guideline):	1999
Type (test type):	Not applicable
GLP:	Not applicable
Year (study performed):	Not applicable
Estimation Temperature:	25°C
Test Conditions: <ul style="list-style-type: none">Note: Concentration prep., vessel type, replication, test conditions.	Water Solubility is calculated by the WSKOWWIN subroutine, which is based on a Kow correlation method described by W. Meylan, P. Howard and R. Boethling in "Improved method for estimating water solubility from octanol/water partition coefficient". <i>Environ. Toxicol. Chem.</i> 15:100-106. 1995.
Results: Units/Value: <ul style="list-style-type: none">Note: Deviations from protocol or guideline, analytical method.	<p>Calculated water solubility data for representative constituents of the Resin Oils and Cyclo diene Dimer Concentrates Category are listed below. The data identify a potential water solubility range for substances represented by the 10 CAS numbers under <u>Test Substance</u>. Substances in this category do not have a specific water solubility value. Actual water solubility ranges for substances in this category will vary dependent on their loading rate (i.e., weight of test material added to a volume of water).</p> <p>Commercial substances in this category consist of complex hydrocarbon products with a carbon number distribution that is predominantly C8-C12 with some lower molecular weight constituents present. The predominant components are cycloalkenes and aromatic hydrocarbons. The five chemicals selected to represent the water solubility range of this category are C8-C12 hydrocarbons that can be found in substances identified by the 10 CAS numbers. Constituents representing category members were selected on the basis of carbon number as identified by the category name, chemistry/structure, measured boiling point ranges for category substances, and olefinic process (distillation) knowledge.</p>

Water Solubility (Range)

CAS No.: 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1; 68527-24-2; 68527-26-4; 68603-02-1

Robust Summary No.: OP E764

<p>Results: (continued)</p> <p>Units/Value:</p> <p>Note: Deviations from protocol or guideline, analytical method.</p>	<table border="1"> <thead> <tr> <th>Substance <u>Constituent</u></th> <th>Calculated WS (mg/L @ 25°C)</th> <th>Measured WS* (mg/L @ 25°C)</th> </tr> </thead> <tbody> <tr> <td>vinyl toluene</td> <td>935.0</td> <td>na</td> </tr> <tr> <td>indene</td> <td>372.1</td> <td>na</td> </tr> <tr> <td>dicyclopentadiene</td> <td>51.9</td> <td>na</td> </tr> <tr> <td>methylindine</td> <td>112.7</td> <td>na</td> </tr> <tr> <td>methylcyclopentadiene dimer</td> <td>0.62</td> <td>na</td> </tr> </tbody> </table> <p>* Experimental values from EPIWIN database. na = not available The data represent a potential water solubility range for substances represented by the 10 CAS numbers under <u>Test Substance</u>.</p>	Substance <u>Constituent</u>	Calculated WS (mg/L @ 25°C)	Measured WS* (mg/L @ 25°C)	vinyl toluene	935.0	na	indene	372.1	na	dicyclopentadiene	51.9	na	methylindine	112.7	na	methylcyclopentadiene dimer	0.62	na
Substance <u>Constituent</u>	Calculated WS (mg/L @ 25°C)	Measured WS* (mg/L @ 25°C)																	
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<p>Test Substance:</p>	<p>The Resin Oils and Cyclodiene Dimer Concentrates Category includes the following CAS numbers:</p> <p>26742-00-4 4,7-Methano-1H-indene, 3a,4,7,7a-tetrahydrodimethyl-</p> <p>68477-40-7 Distillates, petroleum, cracked stripped steam-cracked petroleum distillates, C10-12 fraction</p> <p>68477-54-3 Distillates, petroleum, steam-cracked, C8-12 fraction</p> <p>68477-53-2 Distillates, petroleum, steam-cracked, C5-12 fraction</p> <p>68478-08-0 Naphtha, petroleum, light steam-cracked, C5-fraction, oligomer concentrate</p> <p>68478-10-4 Naphtha, petroleum, light steam-cracked, debenzenized, C8-16-cycloalkadiene concentrate</p> <p>68516-20-1 Naphtha, petroleum, steam-cracked middle aromatic</p> <p>68527-24-2 Naphtha, petroleum, light steam-cracked aromatic, C5-12 cycloalkadiene fraction, polymers</p> <p>68527-26-4 Naphtha, petroleum, light steam-cracked, debenzenized</p> <p>68603-02-1 Distillates, petroleum, thermal cracked naphtha and gas oil, dimerized</p> <p>The Resin Oils and Cyclodiene Dimer Concentrates Category was developed by grouping two Resin Oil streams, one relatively low in Dicyclopentadiene (DCPD), and a second that contains higher levels of the dimer. These Resin Oils have been further grouped with six other process streams that are concentrates of DCPD, Methylcyclopentadiene Dimer (MCDP Dimer), and co-dimers of these two cyclodienes with other hydrocarbons of similar molecular weight present, primarily cycloalkenes and aromatic hydrocarbons. The 10 CAS numbers are used to describe the nine process streams associated with the ethylene industry and associated manufacturing processes.</p> <p>More information on the Resin Oils and Cyclodiene Dimer Concentrates Category can be found in the American Chemistry Council, Olefins Panel test plan for this category (1).</p>																		

Water Solubility (Range)

CAS No.: 26742-00-4; 68477-40-7; 68477-54-3; 68477-53-2; 68478-08-0; 68478-10-4; 68516-20-1; 68527-24-2; 68527-26-4; 68603-02-1

Robust Summary No.: OP E764

	1. Olefins Panel, HPV Implementation Task Group. 2001. High Production Volume (HPV) Chemical Challenge Program Test Plan For The Resin Oils and Cyclo diene Dimer Concentrates Category. American Chemistry Council, Olefins Panel, HPV Implementation Task Group. VA, USA.
Conclusion:	The calculated water solubility for some representative constituents that are present in the category streams vary from 0.62 to 935.0 mg/L @ 25°C. Measured water solubility data for these same constituents were not available. Although this does not define the actual water solubility of the category streams, it offers an indication of a range that might be expected to encompass the water solubility of these complex streams with variable compositions. Water solubilities outside of these ranges may be possible for some category streams.
Reliability:	(2) Reliable with restrictions The results include calculated data based on chemical structure as modeled by EPIWIN. The data represent a potential water solubility range for substances represented by the 10 CAS numbers under <u>Test Substance</u> . This robust summary has a reliability rating of 2 because the data are not for specific substances in the Resin Oils and Cyclo diene Dimer Concentrates Category, but rather for selected constituents. These selected constituents represent all substances defined by this category and as such, this robust summary represents a "key study" for water solubility range based on constituent data.
Reference:	EPIWIN. 1999. Estimation Program Interface for Windows, version 3.04. Syracuse Research Corporation, Syracuse, NY, USA. (Water solubility values were calculated by the WSKOWWIN subroutine.)
Other (source):	American Chemistry Council, Olefins Panel (Prepared 8/03)

* Other TS is a selection option under the Test Substance pick list that is in the IUCLID entry field for Water Solubility. Selecting this option refers the reader to information in the test substance "freetext" field to which the CAS numbers can be added.