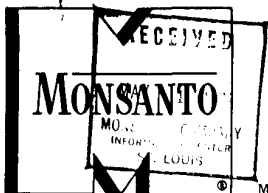


*Organic Chemicals*



## MONSANTO TERPHENYLS

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Organic Chemicals Division  
Monsanto Chemical Company - St. Louis, Missouri

### MONSANTO TERPHENYLS

The Monsanto TERPEHNYLS are a series of hydrocarbon solids ranging in melting point from a little above room temperature to as high as 210° C. (410°F.).

Monsanto TERPHENYLS have found use as plasticizers, softening agents, wax additives and extenders, and in paper coatings. Various properties of the TERPHENYLS are presented in this bulletin to facilitate the selection of the proper one for specific applications.

The information contained in this bulletin is, to our best knowledge, true and accurate, but all recommendations or suggestions are made without guarantee, since the conditions of use are beyond our control. The Monsanto Chemical Company disclaims any liability incurred in connection with the use of these data or suggestions. Furthermore, nothing contained herein shall be construed as a recommendation to use any product in conflict with existing patents covering any material or its use.

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### PHYSICAL PROPERTIES

|                                              | <u>Ortho</u>                   | <u>Meta</u>                | <u>Para</u>                |
|----------------------------------------------|--------------------------------|----------------------------|----------------------------|
| <u>Formula:</u>                              |                                |                            |                            |
| <u>Color - NPA:</u>                          | <1.5                           | <3.5                       | <2.0                       |
| <u>Density - g./cc.:</u>                     | 1.14                           | 1.164                      | 1.236                      |
| <u>Melting Point:</u>                        |                                |                            |                            |
| Completely liquid                            | 55°C.<br>(131°F.)              | 90°C.<br>(194°F.)          | 213°C.<br>(415°F.)         |
| <u>Solidification Temp.:</u>                 |                                |                            |                            |
| First crystals                               | --                             | <90°C.<br>(<194°F.)        | 209-213°C.<br>(408-415°F.) |
| Hold point                                   | 53-55°C.<br>(127-131°F.)       | 83-85°C.<br>(181-185°F.)   | --                         |
| <u>Distillation Range:</u><br>D-20 corrected | 330-350°C.<br>(626-662°F.)     | 368-378°C.<br>(694-712°F.) | 381-388°C.<br>(718-730°F.) |
| <u>Flash Point:</u>                          | 171°C.<br>(340°F.)             | 207°C.<br>(405°F.)         | 207°C.<br>(405°F.)         |
| <u>Flame Point:</u>                          | 193°C.<br>(390°F.)             | 229°C.<br>(445°F.)         | 238°C.<br>(460°F.)         |
| <u>Viscosity S.U.S.</u><br>at 210°F.:        | 40.6<br>(See Graph<br>No. I)   | 39.3                       | 28.8 (at 225°C.)           |
| <u>Solubility:</u>                           | See Graphs Nos. II, III and IV |                            |                            |

Vapor Pressure (mm. of Mercury):

| <u>T°C.</u> | <u>Ortho</u> | <u>Meta</u> | <u>Para</u> |       |
|-------------|--------------|-------------|-------------|-------|
| 90          | 0.17         | -           | -           |       |
| 100         | 0.3          | -           | -           |       |
| 110         | 0.5          | 0.15        | -           |       |
| 120         | 0.9          | 0.3         | -           |       |
| 130         | 1.5          | 0.5         | -           |       |
| 140         | 2.4          | 0.8         | 0.15        | Solid |
| 150         | 3.7          | 1.3         | 0.3         |       |
| 160         | 5.7          | 2.0         | 0.6         |       |
| 170         | 8.2          | 3.0         | 1.0         |       |
| 180         | 12.0         | 4.6         | 1.9         |       |
| 190         | 18.0         | 6.8         | 3.2         |       |
| 200         | 25.0         | 9.8         | 5.5         |       |
| 210         | 35.0         | 14.0        | 9.1         |       |
| 220         | 46.0         | 19.0        | 14.0        |       |
| 230         | 62.0         | 26.0        | 19.0        |       |
| 240         | 82.0         | 36.0        | 26.0        |       |
| 250         | 110.0        | 48.0        | 35.0        |       |
| 260         | 140.0        | 63.0        | 46.0        |       |
| 270         | 180.0        | 83.0        | 61.0        |       |
| 280         | 230.0        | 110.0       | 80.0        |       |
| 290         | 290.0        | 140.0       | 101.0       |       |
| 300         | 360.0        | 180.0       | 130.0       |       |
| 310         | 450.0        | 220.0       | 165.0       |       |
| 320         | 550.0        | 270.0       | 210.0       |       |
| 330         | 670.0        | 340.0       | 260.0       |       |
| 340         | 810.0        | 410.0       | 320.0       |       |
| 350         | 990.0        | 500.0       | 390.0       |       |
| 360         | 1160.0       | 610.0       | 470.0       |       |
| 370         | 1390.0       | 730.0       | 570.0       |       |
| 380         | 1600.0       | 870.0       | 680.0       |       |

ELECTRICAL PROPERTIES

| <u>Terphenyl</u> | <u>Dielectric Constant</u> | <u>Resistivity - ohm-cm.</u> |                  |
|------------------|----------------------------|------------------------------|------------------|
|                  |                            | <u>100°C.</u>                | <u>250°C.</u>    |
| Ortho            | 2.54                       | $8200 \times 10^9$           | -                |
| Meta             | 2.62                       | $2600 \times 10^9$           | -                |
| Para             | -                          | -                            | $30 \times 10^9$ |

STABILITY

No detectible effect on boiling Terphenyls in 10% Sulfuric Acid or Caustic Soda.

# COMPATIBILITY

| <u>Ortho Terphenyl</u><br><u>Other Component</u> | <u>% Ortho Terphenyl in Mixture</u> |           |           |           |           |
|--------------------------------------------------|-------------------------------------|-----------|-----------|-----------|-----------|
|                                                  | <u>10</u>                           | <u>25</u> | <u>50</u> | <u>75</u> | <u>90</u> |
| Paraffin (120°/125°F.)                           | C                                   |           | C         |           | C         |
| Barnsdall (160°/165°F.)                          | C                                   |           | C         |           | C         |
| Beeswax                                          | C                                   | C         | C         |           | I         |
| Opal Wax                                         | C                                   |           | I         |           | I         |
| Stearic Acid                                     | I                                   | I         | I         |           | I         |
| "N" Wood Rosin                                   | C                                   | C         | I         | I         |           |

| <u>Meta Terphenyl</u><br><u>Other Component</u> | <u>% Meta Terphenyl in Mixture</u>          |           |           |           |           |
|-------------------------------------------------|---------------------------------------------|-----------|-----------|-----------|-----------|
|                                                 | <u>10</u>                                   | <u>25</u> | <u>50</u> | <u>75</u> | <u>90</u> |
| Paraffin (120°/125°F.)                          | Incompatible with 2% or more Meta Terphenyl |           |           |           |           |
| Barnsdall Wax (160°/165°F.)                     |                                             | C         | B         | I         | I         |
| Ceresin                                         | I                                           |           | I         |           | I         |
| Carnauba Wax                                    | C                                           |           | C         | C         | I         |
| Candelilla Wax                                  | C                                           | C         | I         |           | I         |
| Montan Wax                                      | I                                           |           | I         |           | I         |
| Beeswax                                         | I                                           |           | I         |           | I         |
| Japan Wax                                       | C                                           | I         | I         |           |           |
| Opal Wax                                        | C                                           | C         | I         |           | I         |
| I. G. Wax O                                     | I                                           |           | I         |           | I         |
| Stroba Wax                                      | I                                           |           | I         |           | I         |
| Acra Wax                                        | C                                           |           | C         |           | B         |
| Stearic Acid                                    | I                                           |           | I         |           | I         |
| Shellac                                         | C                                           |           | I         |           | I         |
| Manila Resin (Loba B)                           | C                                           |           | I         |           | I         |
| Ester Gum                                       | C                                           |           | I         |           | I         |
| "N" Wood Rosin (Hercules)                       | C                                           | C         | I         |           | I         |
| Piccolite Resin (85°)                           | C                                           |           | I         |           | I         |
| Staybellite Resin                               | B                                           |           | I         |           | I         |

| <u>Para Terphenyl</u><br><u>Other Component</u> | <u>% Para Terphenyl in Mixture</u> |            |          |          |              |
|-------------------------------------------------|------------------------------------|------------|----------|----------|--------------|
|                                                 | <u>0.5</u>                         | <u>1-2</u> | <u>3</u> | <u>5</u> | <u>10-75</u> |
| Paraffin (120°/125°F.)                          | I                                  |            |          |          |              |
| Paradene No. 1                                  |                                    |            |          | C        | I            |
| Paradene No. 2                                  |                                    | C          | I        |          |              |
| "N" Wood Rosin                                  |                                    |            |          |          | I            |

Note: C = Compatible  
I = Incompatible  
B = Almost Compatible

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### COMPARATIVE HARDNESS

(Smaller values denote greater hardness)

| <u>Material</u>                   | <u>Average Penetration in cm. x 10<sup>-2</sup><br/>in 60 seconds at 25°C. under load<br/>indicated (ASTM D-5-25)</u> |                  |                  |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------|------------------|------------------|
|                                   | <u>50 Grams</u>                                                                                                       | <u>150 Grams</u> | <u>250 Grams</u> |
| Meta Terphenyl                    | 0                                                                                                                     | 0                | 2.3              |
| Para Terphenyl                    | 0                                                                                                                     | 0                | 3.3              |
| Carnauba Wax                      | 0                                                                                                                     | 2.3              | 4.7              |
| Candelilla Wax                    | 0                                                                                                                     | 3.3              | 4.7              |
| Ortho Terphenyl                   | 1.3                                                                                                                   | 4.0              | 10.7             |
| 50% Paraffin & 50% Meta Terphenyl | 3.7                                                                                                                   | 12.3             | 18.0             |
| 75% Paraffin & 25% Meta Terphenyl | 7.3                                                                                                                   | 18.0             | 25.3             |
| Ceresin Wax                       | 9.3                                                                                                                   | 15.7             | 26.0             |
| 95% Paraffin & 5% Meta Terphenyl  | 10.7                                                                                                                  | 21.0             | 29.7             |
| 98% Paraffin & 2% Meta Terphenyl  | 11.7                                                                                                                  | 26.0             | 32.7             |
| Paraffin Wax                      | 14.3                                                                                                                  | 23.3             | 31.3             |
| Montan Wax                        | 15.0                                                                                                                  | 28.7             | 37.3             |
| Mixed Isomeric Terphenyl          |                                                                                                                       |                  |                  |
| No aging                          | 60.0                                                                                                                  | -                | -                |
| Aged 24 hours                     | 28.7                                                                                                                  | -                | -                |

### AVAILABILITY

The Terphenyls are available in limited quantities.

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TEMPERATURE, DEGREES FAHRENHEIT

CHART B: SAYBOLT UNIVERSAL VISCOSITY, ABRIDGED  
OF THE  
A.S.T.M. TENTATIVE VISCOSITY-TEMPERATURE CHARTS  
FOR LIQUID PETROLEUM PRODUCTS (D 341-37 T)

Graph I

VISCOSITY OF ORTHO TERPHENYL  
(Lot 0-12)

VISCOSITY, SAYBOLT UNIVERSAL SECONDS

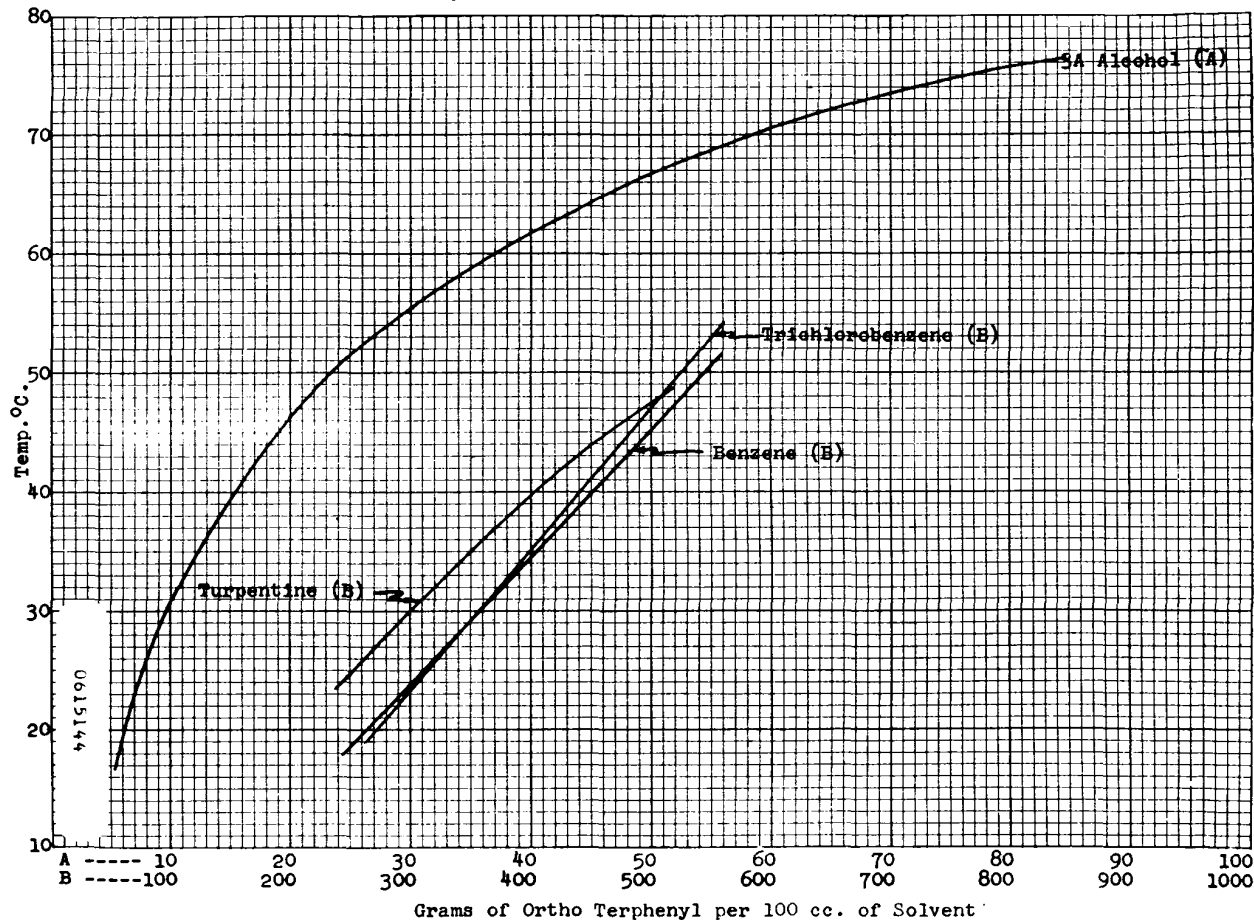
VISCOSITY, SAYBOLT UNIVERSAL SECONDS

TEMPERATURE, DEGREES FAHRENHEIT

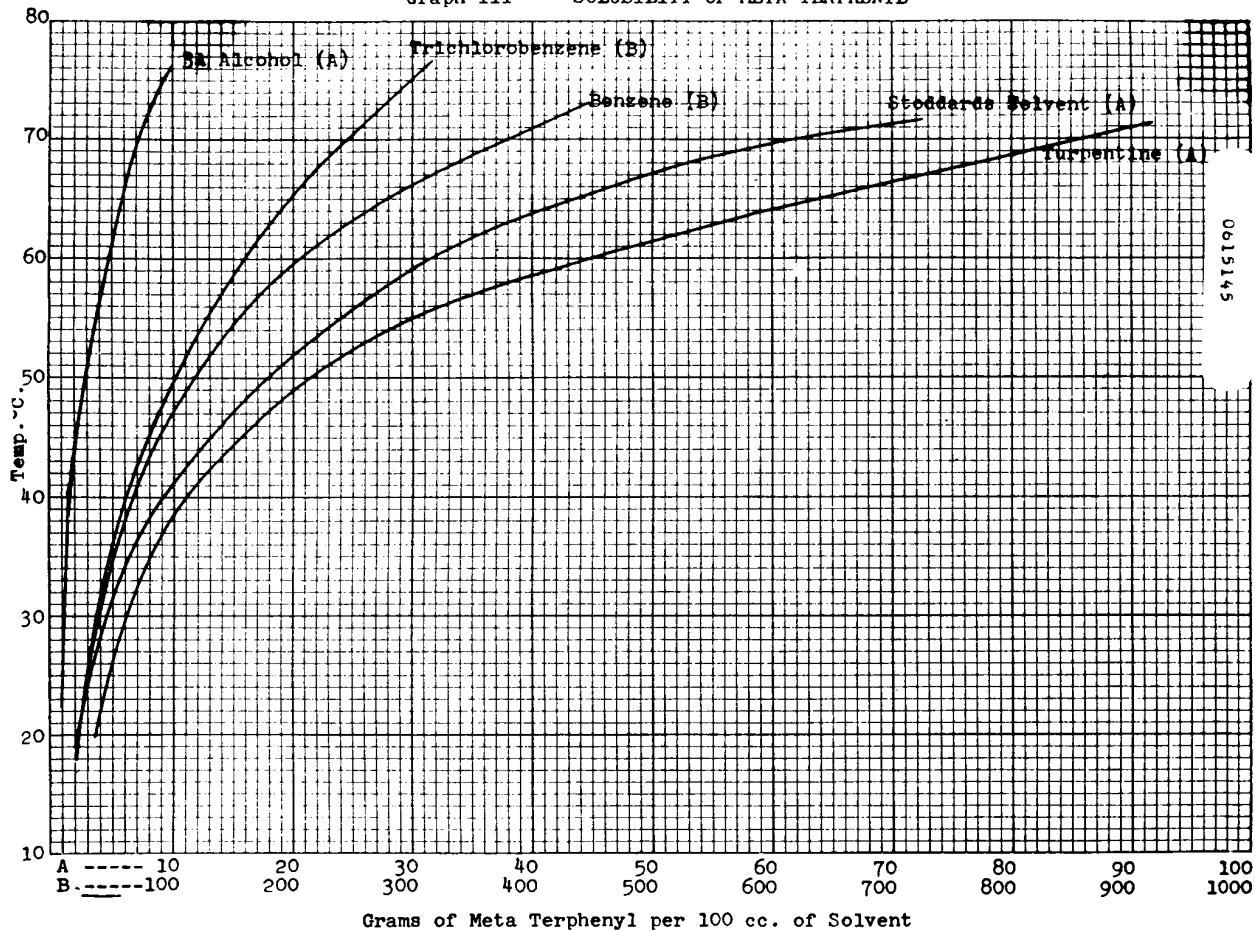
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Graph II - SOLUBILITY OF ORTHO TERPHENYL

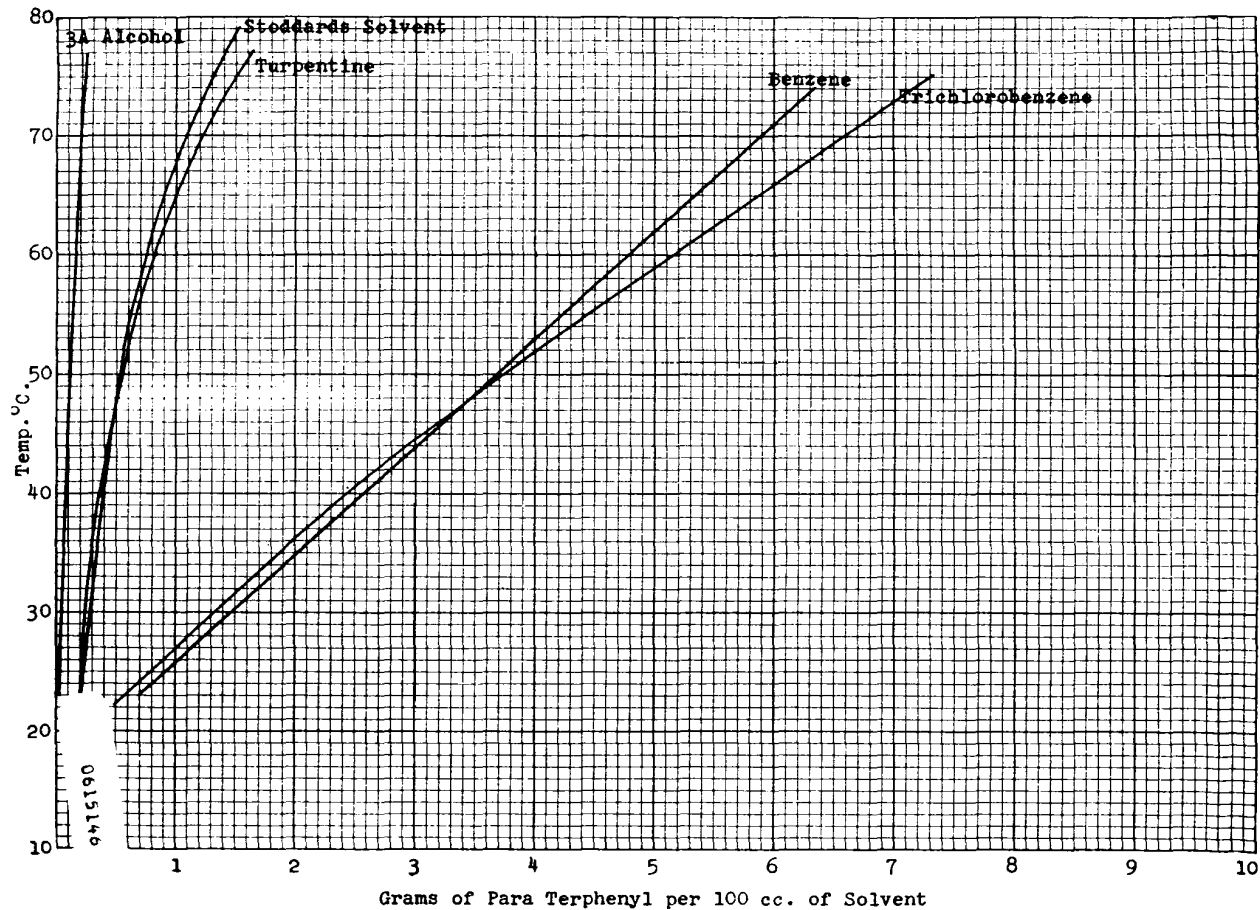


Graph III - SOLUBILITY OF META TERPHENYL



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Graph IV - SOLUBILITY OF PARA TERPHENYL





For further information about Monsanto TERPHENYLS  
contact the nearest Monsanto office.

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