Technical Data Sheet

TBPB
Tert. Butylperoxybenzoate
CAS# 614-45-9
Liquid, technical pure

Structural Formula

\[
\begin{align*}
H_3C &- C &- O &- O &- C \\
& & & & \text{CH}_3
\end{align*}
\]

Description
Colourless, mobile liquid, consisting of technically pure tert. butylperoxy benzoate. This aromatic perester is used as an initiator (radical source) in the curing of unsaturated polyester resins. Main application: hot press moulding of SMC or BMC at 130-160°C.

Technical Data

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Yellowish liquid</td>
</tr>
<tr>
<td>Peroxide content</td>
<td>Ca. 99 % w/w</td>
</tr>
<tr>
<td>Active oxygen</td>
<td>Ca. 8.16 % w/w</td>
</tr>
<tr>
<td>De-sensitising agent</td>
<td>None</td>
</tr>
<tr>
<td>Density at 20°C</td>
<td>Ca. 1.04 g/cm³</td>
</tr>
<tr>
<td>Viscosity at 20°C</td>
<td>Ca. 8 mPa.s</td>
</tr>
<tr>
<td>Refractive index at 20°C</td>
<td>Ca. 1.499</td>
</tr>
<tr>
<td>Miscibility</td>
<td>Immiscible with water, soluble in alcohols, phthalates</td>
</tr>
<tr>
<td>Critical temperature (SADT)</td>
<td>Ca. 60°C</td>
</tr>
<tr>
<td>Cold storage stability</td>
<td>Freezing point below 10°C</td>
</tr>
<tr>
<td>Kick-off temperature</td>
<td>Ca. 90°C</td>
</tr>
<tr>
<td>Recommended storage temperature</td>
<td>10 to 40°C (104°F)</td>
</tr>
<tr>
<td>Storage stability as from date of delivery</td>
<td>6 months</td>
</tr>
</tbody>
</table>

This product is in compliance with the ElektroG (EU-Directives: RoHS 2002/95/EG, WEEE 2002/96/EG)

Half-life Data
10h/1h/1min (0.1 m / benzene): 104°C / 124°C / 165°C

Application

**POLYESTER CURING:**
Curing agent for UP resins. Suitable for all resin types. Temperature range: 130-160°C. Usage level: 1-2% as supplied. "Shelf life" (gel time of resin + peroxide) several months at ambient temperature, depending on resin type.
Sensitive to some fillers and pigments as well as to cobalt salts or tertiary aromatic amines. Shelf life can be prolonged considerably by adding 0.1-0.3% Inhibitor BC 500.

CURING CHARACTERISTICS:
In the range of 85-95°C ("kick-off" temperature) the curing rate is not very high, unless there is a reaction exotherm (e.g. within a heat-retaining mould). Really short cure times of 1-3 minutes can be achieved only above 120°C. The optimum temperature range for hot press moulding therefore is 130-160°C.

PROCESSING METHODS:
Mainly hot press moulding of sheet moulding compounds (SMC) or bulk moulding compounds (BMC), as well as impregnation, dipping of wire windings.

Measurements

**Activity**
Influence of temperature and peroxide dosage on curing performance and degree of cure. Hot press moulding of 16 mm thick SMC pellets and 3 mm thick SMC sheets.

<table>
<thead>
<tr>
<th>Temperature of mould</th>
<th>130°C</th>
<th>130°C</th>
<th>140°C</th>
<th>140°C</th>
<th>150°C</th>
<th>150°C</th>
<th>160°C</th>
<th>160°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formulation (parts of weight)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard SMC (resin proportion)</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>TBPB</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Curing performance (SMC pellets)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flow time (min)</td>
<td>1.50</td>
<td>1.35</td>
<td>1.15</td>
<td>1.00</td>
<td>0.95</td>
<td>0.80</td>
<td>0.75</td>
<td>0.70</td>
</tr>
<tr>
<td>Time to peak tmax (min)</td>
<td>2.70</td>
<td>2.40</td>
<td>1.90</td>
<td>1.60</td>
<td>1.40</td>
<td>1.30</td>
<td>1.20</td>
<td>-</td>
</tr>
<tr>
<td>Peak exotherm Tmax (°C)</td>
<td>171</td>
<td>170</td>
<td>174</td>
<td>174</td>
<td>178</td>
<td>178</td>
<td>185</td>
<td>183</td>
</tr>
<tr>
<td>Degree of cure (SMC sheets)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barcol (934) hardness</td>
<td>20</td>
<td>20</td>
<td>25</td>
<td>25</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Residual styrene content (%)</td>
<td>2.6</td>
<td>1.7</td>
<td>0.8</td>
<td>0.6</td>
<td>0.5</td>
<td>0.2</td>
<td>&lt;0.1</td>
<td>&lt;0.1</td>
</tr>
</tbody>
</table>
1) The amounts added are equivalent to 1% or 2% w/w techn. pure t-buty
perbenzoate
2) The press cycles for the SMC sheets are equal to the tmax. of the
    corresponding SMC pellets.
Further information on suitable curing agents for unsaturated polyester resins
is given in our application brochures on this subject.

Packaging

The standard packaging of Norox TBPB is 25 kg.

Disclaimer

This information and all further technical advice are reflecting our present knowledge and experience based on internal tests with local raw materials with the purpose to inform about
our products and applications. The information should not be construed as guaranteeing specific properties of products described or their suitability for a particular application, nor as
providing complete instructions for use. The information implies no guarantee for product and shelf life properties, nor any liability or other legal responsibility on our part, including
with regard to existing third party intellectual property rights, especially patent rights. We reserve the right to make any changes according to technological progress or further
developments.
Application and usage of our products based on our technical advice is out of our control and sole responsibility of the user. The user is not released from the obligation to conduct
careful inspection and testing of incoming goods in order to verify the suitability for the intended application.

United Initiators
EU
T: +49 89 74422 237
F: +49 89 74422 6237
cs-initiators.eu@united-in.com

United Initiators
Nafta
T: +1 800 231 2702
F: +1 440 323 0898
cs-initiators.nafta@united-in.com

United Initiators
China
T: +86 20 6131 1370
F: +86 139 2503 8952
cs-initiators.cn@united-in.com

United Initiators
Australia
T: +61 2 9316 0046
F: +61 2 9316 0034
cs-initiators.au@united-in.com

www.united-initiators.com

Revision number: 1.1. Date: 24.02.17. Device M: TDS.