



## Chemical solutions for the paints market

Braskem





## Braskem's chemicals business

Braskem's Chemicals Business produces a diversified portfolio of basic and performance chemicals, such as solvents and specialties. With a global, forward-looking and sustainable vision, we are constantly innovating to add value and transform markets. This translates into true partner relationships with our clients, supported by close and personalized service and by versatile products that combine high performance with reliability.

## Our competitive advantages

- Broad and versatile portfolio
- High performance and reliability
- Excellent customer service
- Dedicated after-sales service
- Superior distribution process
- Focus on innovation and transforming markets
- Partnering on product development and applications



## The Paints Market

In the paints industry, Braskem offers a diversified and flexible portfolio to meet a wide range of industry needs.

Discover our solutions for paint and thinner formulations:

### Solvents

Braskem Ezolem®  
Braskem Pluract®  
Braskem Sensitis®  
Cyclohexane  
Braskem Toluene  
Braskem Xylene  
Braskem White Spirit  
Circular Hexane HE-70S  
Circular Sensitis 17/21

### Hydrocarbon Resins

Braskem Unilene®  
I'm Green™ PE Wax



# Solvents

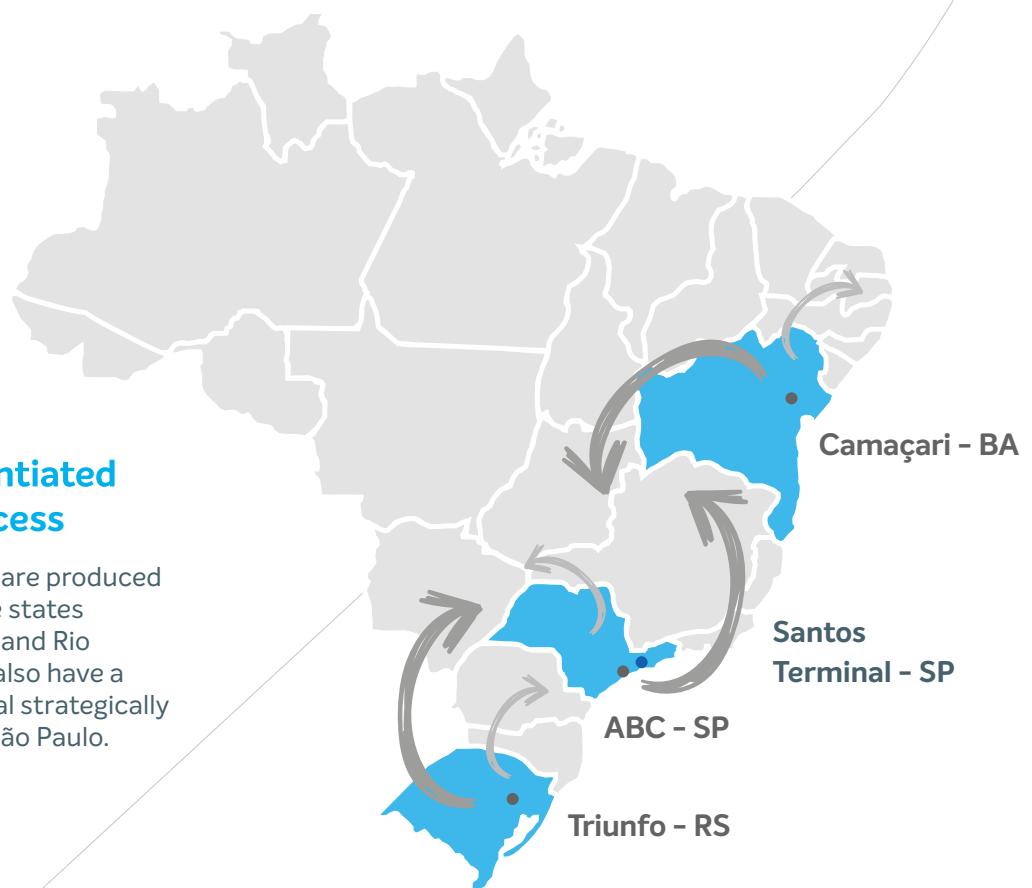
Solvents are indispensable for making paints, since they dissolve resins and keep pigments and additives in homogeneous suspension. Our solvents facilitate paint application by adjusting the viscosity and evaporation rate, which results in superior-quality films free of defects. Braskem's Chemicals Business has a series of solvents for this market that can enhance Clients' formulations.

## Key applications

- Automotive paints (OEM and Repaint)
- Decorative paints
- High-performance industrial protective paints
- Thinners for dilution and cleaning
- Synthetic enamel and varnishes for wood and metal

## Safe and differentiated distribution process

- Braskem's solvents are produced at three units in the states of Bahia, São Paulo and Rio Grande do Sul. We also have a distribution terminal strategically located in Santos, São Paulo.





# Solvents

## Products and characteristics

Braskem's solvents combine high performance and reliability to meet a wide array of paint manufacturers' applications and needs. Key advantages include excellent solvency power, compliance with the market's rigorous quality demands and an excellent cost-benefit tradeoff.

Discover our solvents and their main characteristics:

## HYDROCARBON SOLVENTS

### Light solvents

Braskem Ezolem® 6/7

Braskem Ezolem® 7/9

Braskem Ezolem® 6/13

Braskem Ezolem® 6/15

Braskem Ezolem® 6/17

Cyclohexane

### Characteristics

- Low-odor solvents
- Adjusts viscosity to prevent runs and ensure homogenous surface coverage free of defects
- Longer durability in final applications
- Formulation flexibility for different markets
- Optimal balance between cost and performance

### Medium solvents

Toluene

Mixed Xylene

Braskem White Spirit

### Characteristics

- High solvency power for applications in various resin families
- Average evaporation rate supports the formation of high quality films free of defects

### Heavy solvents

Braskem Pluract® 9

Braskem Pluract® 10+

Braskem Pluract® 12+

Braskem Sensitis® 13/15

Braskem Sensitis® 17/21

Braskem Sensitis® 22/25

### Characteristics

- Maximum solvency action
- Acts as an evaporation retardant
- High flash point, improving handling safety
- Low evaporation rate promotes film formation with good leveling, appearance and gloss, free of defects such as blushing, blistering and air bubbles
- Excellent cost-benefit tradeoff

## SUSTAINABLE SOLVENTS

### Renewable Solvents

HE-70S

### Characteristics

- Low Carbon footprint – renewable carbon content certified by ASTM D6866-18
- High evaporation rate
- High solvency power
- Solvents with 100% circular content
- Quality
- Performance

Circular Hexane

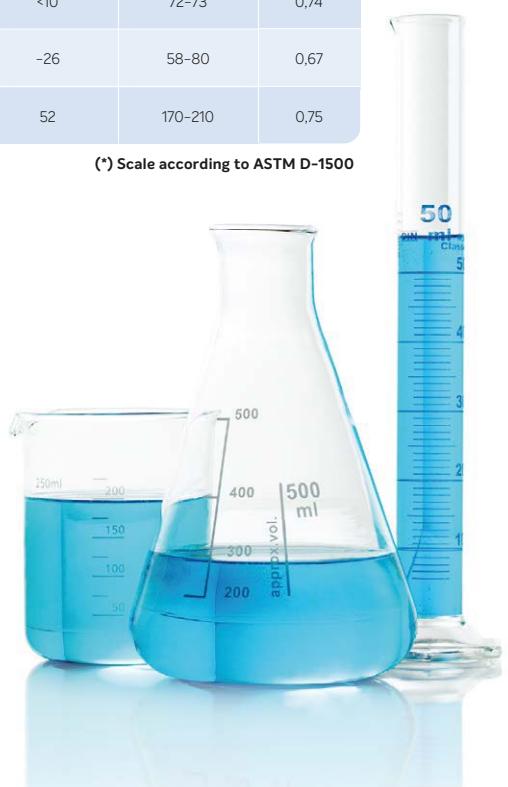
Circular Sensitis 17/21

## Table of Properties

Discover the properties of Braskem's complete solvent portfolio.

| Solvents                         | EVAPORATION RATE (BUTYL ACETATE = 100) | SOLUBILITY PARAMETERS (J/cm <sup>3</sup> ) <sup>1/2</sup> |     |     | FLASH POINT (°C)<br>CLOSED VESSEL | DISTILLATION RANGE (°C) | DENSITY (20/4°C) |
|----------------------------------|--|---|-----|-----|-----------------------------------|-------------------------|------------------|
|                                  |  | dD  | dP  | dH  |                                   |                         |                  |
| <b>AROMATICS</b>                 |  |   |     |     |                                   |                         |                  |
| <b>Toluene</b>                   | 209                                    | 18  | 1,4 | 2   | 4                                 | 110-112                 | 0,87             |
| <b>Mixed Xylene</b>              | 72                                     | 17,8  | 1,2 | 2,1 | 30                                | 136-143                 | 860              |
| <b>Braskem Pluract® 9</b>        | 23                                     | 17,6  | 1,9 | 2,2 | 40                                | 156-170                 | 0,88             |
| <b>Braskem Pluract® 10+</b>      | 30                                     | 17,1  | 1,4 | 1,1 | 61                                | 180-230                 | 0,86             |
| <b>Braskem Pluract® 12+</b>      | 0,2                                    | 16,1  | 0,7 | 0,4 | 80                                | 200-350                 | 0,89             |
| <b>ALIPHATICS</b>                |  |   |     |     |                                   |                         |                  |
| <b>Braskem Ezolem® 6/7</b>       | 790                                    | 15,4  | 0   | 0,6 | -22                               | 58-72                   | 0,7              |
| <b>Braskem Ezolem® 7/9</b>       | 655                                    | 15,7  | 0   | 0,5 | <10                               | 70-95                   | 0,72             |
| <b>Braskem Ezolem® 6/13</b>      | 447                                    | 15,1  | 0   | 0,1 | <20                               | 60-135                  | 0,69             |
| <b>Braskem Ezolem® 6/15</b>      | 442                                    | 15,6  | 0   | 0,3 | -38                               | 50-200                  | 0,72             |
| <b>Braskem Ezolem® 6/17</b>      | 473                                    | 15,6  | 0   | 0,5 | <20                               | 60-170                  | 0,72             |
| <b>Braskem White Spirit</b>      | 39                                     | 16,2  | 0   | 0,4 | 28                                | 125-235                 | 0,76             |
| <b>HYDROGENATED</b>              |  |   |     |     |                                   |                         |                  |
| <b>Cyclohexane</b>               | 425                                    | 16,8  | 0   | 0,2 | -20                               | 78-82                   | 0,78             |
| <b>Braskem Sensitis® Hiflash</b> | 7,5                                    | 15,4  | 0   | 0   | 64                                | 180-210                 | 0,75             |
| <b>Braskem Sensitis® 17/21</b>   | 8                                      | 15,4  | 0   | 0   | 52                                | 170-210                 | 0,75             |
| <b>Braskem Sensitis® 22/25</b>   | 0,5                                    | 15,6  | 0   | 0   | 90                                | 218-255                 | 0,78             |
| <b>SUSTAINABLE SOLVENTS</b>      |  |   |     |     |                                   |                         |                  |
| <b>HE-70S</b>                    | 700                                    | 14,4  | 3,7 | 3,3 | <10                               | 72-73                   | 0,74             |
| <b>Circular Hexane</b>           | 830                                    | 14,9  | 0   | 0   | -26                               | 58-80                   | 0,67             |
| <b>Circular Sensitis 17/21</b>   | 8                                      | 15,4  | 0   | 0   | 52                                | 170-210                 | 0,75             |

(\*) Scale according to ASTM D-1500





## Solubility software

*Close, personalized service and technical support are major competitive advantages of Braskem's solutions.*

*To help clients choose the product best suited to their needs, Braskem offers a tool based on Hansen solubility parameters to assess the solubility of solvents into various resins used in paint formulations.*



*We also have an application laboratory to support solubility assessments, optimize formulations and eNose technology.*



# Hydrocarbon Resins



Braskem Unilene<sup>®</sup>, Braskem's line of hydrocarbon resins, is ideal for paint and varnish formulations given its compatibility with most solvents and polymers. Key characteristic include improving gloss and drying properties and imparting technical and economic advantages due to its chemical stability and high purity. Braskem is Latin America's only producer of this type of resin and each year exports more than 5,000 tons of it to over 20 countries.

## Main advantages of using Braskem Unilene<sup>®</sup> in paints

- Increases film hardness
- Highlights and helps maintain gloss\*
- Reduces drying times\*
- Increases adherence to surface
- Enhances moisture resistance, as well as resistance to acid and base substances
- Compatible with various solvents and bases\*\*
- Acts as a flow aid, increasing the leveling of the film during application

### \*Gloss and drying

Aluminum paints made with Braskem Unilene<sup>®</sup> are used for tanks, silos, containers and cylinders. Their main function is to dissipate light and heat, resulting in shorter drying times, significantly higher gloss while maintaining reflection and stability properties.

### Key applications

- Inks for printing industry
- Road-marking paint
- Aluminum-based protective paints for tubing
- Automotive paints
- Protective varnishes
- Tanks and cylinders

### \*\*Compatibility

Unilene is highly compatible with other bases, such as epoxy, oil-based and alkyd resins and elastomers.

## Solubility of Hydrocarbon Resins in Solvents

The Braskem Unilene hydrocarbon resins are soluble in various solvents, such as esters, ketones, aromatics, chlorinated hydrocarbons, ethers and aliphatic hydrocarbons (white spirit). The resins also have good compatibility with epoxy, polyester polymers and elastomers.

The solubility of Unilene resins allows not only an increase in the solid content, but also a reduction in viscosity, contributing to a reduction in solvent emissions.



# Hydrocarbon Resins

## Table of Properties



Braskem UNILENE – Aromatic Resins (C9):

| Unilene - aromatic resins            | Softening Point (°C) |             | Gardner Color | Acid Number (mgKOH/g) |
|--------------------------------------|----------------------|-------------|---------------|-----------------------|
|                                      | ASTM D 6493          | ASTM D 6166 | ASTM D 974    |                       |
| A Series                             | A-80                 | 75 – 86     | max. 7        | ≤ 0.10                |
|                                      | A-90                 | 87 – 95     | max. 7        | ≤ 0.10                |
|                                      | A-100                | 96 – 105    | max. 6        | ≤ 0.10                |
| B Series                             | B-100                | 95 – 105    | max. 6        | ≤ 0.10                |
|                                      | B-110                | 106 – 115   | max. 6        | ≤ 0.10                |
|                                      | B-120                | 116 – 125   | max. 6        | ≤ 0.10                |
| BS Series                            | BS-130               | 126 – 135   | max. 5        | ≤ 0.10                |
|                                      | BS-140               | 136 – 145   | max. 5        | ≤ 0.10                |
| LN Series<br>naphthalene<br>≤ 100ppm | A-90 LN              | 87 – 95     | max. 4        | ≤ 0.10                |
|                                      | A-100 LN             | 96 – 105    | max. 4        | ≤ 0.10                |
|                                      | B-100 LN             | 95 – 105    | max. 4        | ≤ 0.10                |
|                                      | B-110 LN             | 106 – 115   | max. 4        | ≤ 0.10                |
|                                      | B-120 LN             | 116 – 125   | max. 4        | ≤ 0.10                |
|                                      | BS-130 LN            | 126 – 135   | max. 4        | ≤ 0.10                |
|                                      | BS-140 LN            | 136 – 145   | max. 4        | ≤ 0.10                |

The grades most recommended for paint formulations have softening points between 100 °C and 120 °C (Unilene B100 and Unilene B120).

| T101 – Aliphatic Resin* | Softening Point (°C) |             | Gardner Color | Acid Number (mgKOH/g) |
|-------------------------|----------------------|-------------|---------------|-----------------------|
|                         | ASTM D 6493          | ASTM D 6166 | ASTM D 974    |                       |
| T101                    | 94 – 102             | max. 3      |               | max. 0.10             |

| PMR – Pure Monomer Resin* | Softening Point (°C) |          | Gardner Color |
|---------------------------|----------------------|----------|---------------|
|                           | ASTM D 3461          | ISO 4630 |               |
| PMR85                     | 82 – 88              | max. 1   |               |
| PMR100                    | 95 – 105             | max. 1   |               |

| CNH – Hydrogenated Aromatic Modified Cycloaliphatic Resin* | Softening Point (°C) | Yellowness index, 50% in toluene (initial) | Yellowness index, 50% in toluene (175 °C/5h) |
|--|----------------------|--|--|
|  | ASTM D 3461          | ASTM D 5386                                | ASTM D 5386                                  |
| CNH100   | 95 – 105             | max. 2                                     | max. 10                                      |
| CNH120   | 115 – 125            | max. 2                                     | max. 10                                      |



| NH –<br>Hydrogenated<br>Aromatic Resin | Softening<br>Point (°C) | Yellowness<br>index, 50% in<br>toluene (initial) | Yellowness<br>index, 50% in<br>toluene (175 °C/5h) |
|--|-------------------------|--|--|
|  | ASTM D 3461             | ASTM D 5386                                      | ASTM D 5386  |
| NH100                                  | 95 – 105                | max. 1,5   | max. 10  |
| NH120                                  | 120 – 130               | max. 1,5   | max. 10  |

\*Products available only in South America.

### I'm green™ bio-based PE WAX

| FEATURE                    | METHOD                | UNIT      | GWAX<br>30E | GWAX<br>50E | GWAX<br>10A | GWAX<br>50A | GWAX<br>150A | GWAX<br>260A |
|----------------------------|-----------------------|-----------|-------------|-------------|-------------|-------------|--------------|--------------|
| Dropping Point             | DIN ISO 2176          | °C        | 101         | 108         | 115         | 119         | 120          | 125          |
| Solidification Point       | DIN ISO 2207          | °C        | 82          | 94          | 95          | 104         | 105          | 112          |
| Melting Point              | DIN ISO 51007         | °C        | 100         | 105         | 113         | 118         | 120          | 127          |
| Needle Penetration (25 °C) | DIN 51579, ASTM D1321 | 10-1mm    | 12          | 4           | 17          | 2           | 1            | 1            |
| Dyn. Viscosity (140 °C)    | DIN EN ISO 2555       | mPas      | 53          | 138         | 32          | 141         | 360          | 818          |
| Density (23 °C)            | DIN EN ISO 1183-1     | g/cm³     | 0.88        | 0.88        | 0.92        | 0.94        | 0.93         | 0.95         |
| Acid Value                 | DIN EN ISO 2114       | mg(KOH)/g | <1          | <1          | <1          | <1          | <1           | <1           |
| Acid Value                 | DIN EN ISO 3681       | mg(KOH)/g | <1          | <2          | <1          | <1          | <2           | <1           |
| Yellowness Index           | DIN EN ISO 11664      |           | 26          | 4           | 55          | 30          | <25          | 2            |
| Flashpoint - Pensky M.     | DIN EN ISO 2719       | °C        | >216        | >220        | >200        | >225        | >225         | >220         |
| Minimum Bio-Based Content  | ASTM D 6866           | %         | 95          | 95          | 96          | 96          | 96           | 96           |

Other grades with different characteristics can be developed in order to meet the demands of each market.

