

# A technical insight into our building blocks for Phase Change Materials (PCM)

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Sasol Chemicals



# About us

We at Sasol Chemicals innovate for a better world and deliver long-term value to our customers, communities and society.

Our broad portfolio of high-value products plays an integral role in the creation of numerous solutions that benefit the lives of millions of people.

Thousands of companies around the world leverage our technology, world-class facilities, expertise and collaborative approach to tackle their challenges.

Within our Technical Formulations we offer customers and formulators in industrial markets technical support via an extensive range of high-performance functional additives, components and unique solutions that enable technical processes and facilitate the production of industrial goods. Customers use our products as emulsifiers, foamers, defoamers, inhibitors, dispersants, solvents, carriers, cleaning agents, spacer fluids, wetting agents, viscosity modifiers and pour point depressants.

Our customer-centric approach promotes close collaboration with customers in the development of high-performing solutions, resulting in products tailored to specific applications. Given our global presence and our commitment to sustainability, these solutions include responsibly sourced, sustainable raw materials such as synthetic, palm-free, natural renewable and/or low carbon footprint.

# Content

Paraffins for Phase Change Materials (PCM) .....3

Why our Paraffins are the best choice.....4

Applications .....6

PARAFOL and LINPAR products .....8

Viscosity and density .....9

Analytical methods .....9

Packaging and delivery ..... 10

Handling and storage..... 10

Sasol Chemicals alcohol portfolio ..... 10

Registration ..... 10

Our global footprint ..... 11

## Paraffins for Phase Change Materials (PCM)

We produce the building blocks for **Phase Change Materials (PCMs)**.

Our products are globally accessible, mainly based on renewable raw materials, high purity, biodegradable, single-cut linear paraffins – which are used in a variety of applications. From cool wicking textiles to temperature-controlled packaging, we have the perfect solution for your PCM applications. We offer a broad range of paraffins with distinct melting points to meet the necessary temperature requirements from low temperatures to high temperatures.

## Why our Paraffins are the best choice

**PARAFOLs** are high purity, linear paraffins mainly available from renewable resources.

**PARAFOL** single cut paraffins are an excellent choice when looking for a phase change material for latent heat storage applications including cold chain logistics, functional textiles and construction.

**PARAFOL** single cut paraffins are an alternative option when searching for high-purity non-polar solvents, oils, or wax additives. PARAFOLs are available from natural-based feedstock.

The performance profile of **PARAFOL** single cut paraffins is characterised by:

- sharp melting profiles as shown in Figure 1
- adjustable melting points by chain length in the desired temperature range
- high latent heat of fusion as shown in Figure 2
- non-tendency to segregation
- chemical inertness
- non-corrosiveness to conventional storage and construction material
- non-degradation throughout melt/freeze cycles
- non-tendency to supercooling

Figure 1:  
DSC thermogram – melting profile

### Sharp melting profile

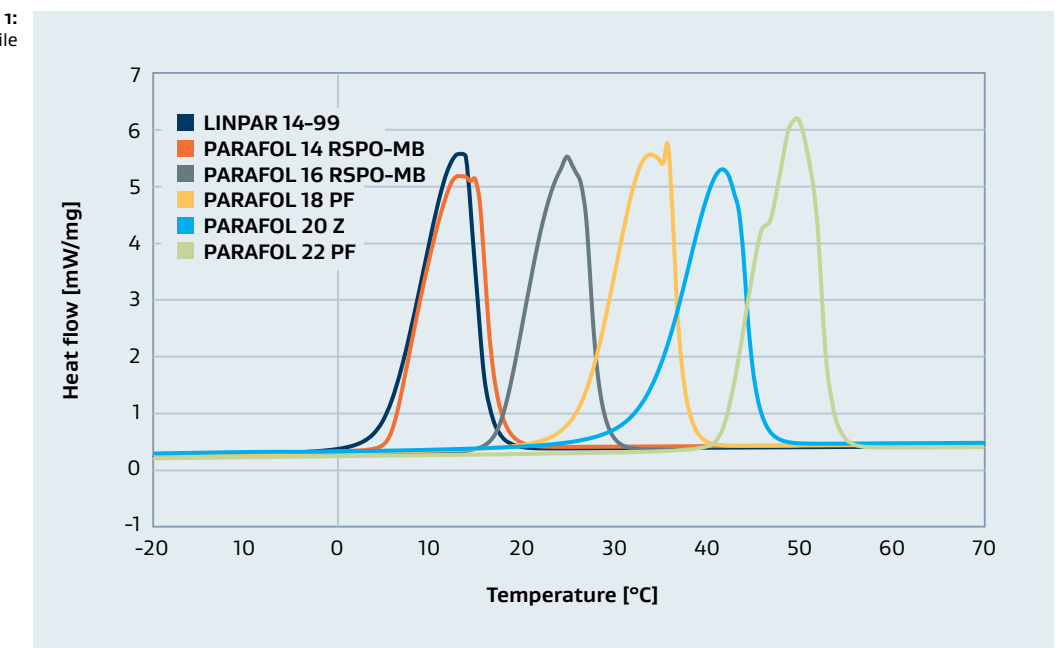
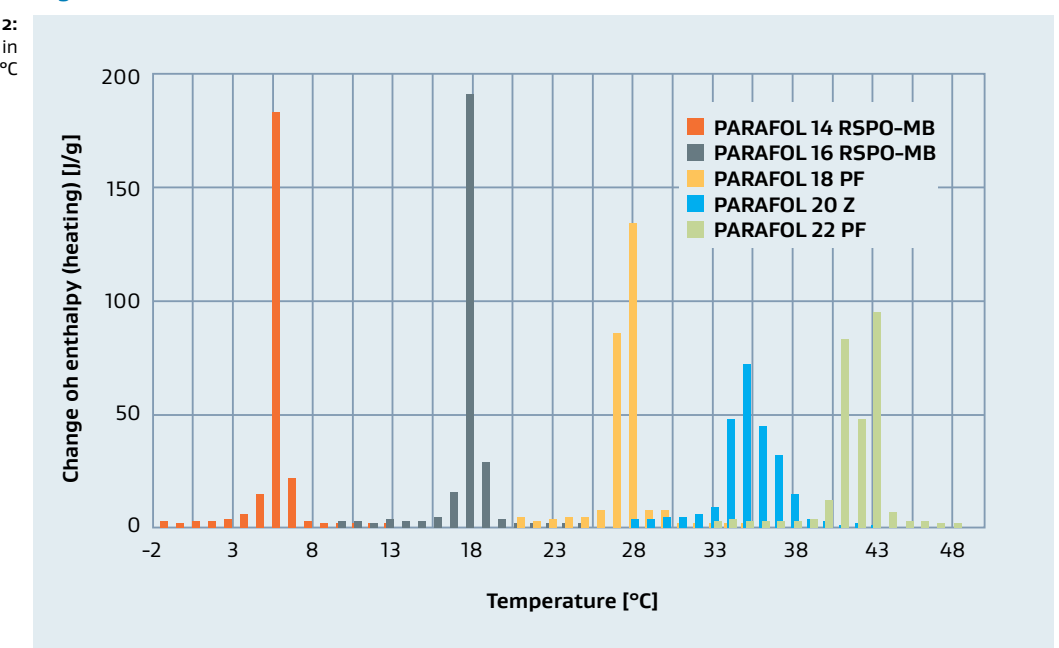


Figure 2:  
Detailed latent heat measurement in intervals of 1 °C

### High latent heat of fusion





# Applications

Discover the applications where our products deliver outstanding performance.

The wide landscape of PCM products is dynamic and we are proud to offer innovative solutions for the following applications:

- Latent heat storage
- Logistics and transportation
- Construction
- Automotive
- Functional textile
- Bedding
- Cooling



Our **PARAFOL** products are also utilized in various other applications such as cosmetics, inks, paints, coatings, and more.

Please reach out to us for our **PARAFOL** brochure.



# Applications



Our products are used in countless applications in our daily lives to add value, security and comfort.

## PARAFOL and LINPAR products

| Trade name                        |  | PARAFOL 14<br>RSPO-MB    | LINPAR 14         | PARAFOL 16<br>RSPO-MB    | PARAFOL 18 PF     | PARAFOL 20 Z      | PARAFOL 22 PF     |
|-----------------------------------|--|--------------------------|-------------------|--------------------------|-------------------|-------------------|-------------------|
| Chemical name                     |  | n-tetradecane            | n-tetradecane     | n-hexadecane             | n-octadecane      | n-eicosane        | n-docosane        |
| Feedstock                         |  | oleochemical             | synthetic         | oleochemical             | oleochemical      | synthetic         | oleochemical      |
| Appearance at ambient temperature |  | clear, colourless liquid | clear, colourless | clear, colourless liquid | colourless, solid | colourless, solid | colourless, solid |

### Sales specification

|                   |         |             |             |              |              |              |              |
|-------------------|---------|-------------|-------------|--------------|--------------|--------------|--------------|
| Purity            | [wt. %] | min. 97     | min. 99     | min. 97      | min. 97      | min. 90      | min. 95      |
| Onset temperature | [°C]    | approx. 4.5 | approx. 4.5 | approx. 16.5 | approx. 27.5 | approx. 32.5 | approx. 41.5 |
| Latent heat       | [J/g]   | min. 210    | min. 210    | min. 220     | min. 220     | min. 200     | min. 220     |

### Additional properties

|                     |         |             |             |             |             |             |             |
|---------------------|---------|-------------|-------------|-------------|-------------|-------------|-------------|
| Molecular weight    | [g/mol] | approx. 198 | approx. 198 | approx. 226 | approx. 254 | approx. 282 | approx. 310 |
| Colour              | [Hazen] | max. 20     | max. 30     | max. 20     | max. 20     | max. 20     | max. 20     |
| Boiling point       | [°C]    | approx. 253 | 235-246     | approx. 287 | —           | —           | —           |
| Flash point         | [°C]    | approx. 115 | 102         | approx. 135 | approx. 165 | approx. 176 | approx. 184 |
| Kauri butanol value |         | approx. 12  | —           | approx. 8   | —           | —           | —           |



## Viscosity and density

The kinematic viscosity is the resistance to flow of a fluid under gravity. It is determined by measuring the time for a volume of liquid to flow under gravity through a calibrated glass capillary viscometer.

The temperature dependant kinematic viscosity **PARAFOL** is shown in Figure 3.

Density is a measure of how much mass is contained in a given unit volume. The formal definition of density is mass per unit volume. Usually, the density is expressed in grams per mL. In general, density can be changed by changing either the pressure or the temperature. Increasing the pressure will always increase the density of a material. Increasing the temperature generally decreases the density, but there are notable exceptions to this generalisation.

The temperature dependent density of **PARAFOL** is shown in Figure 4.

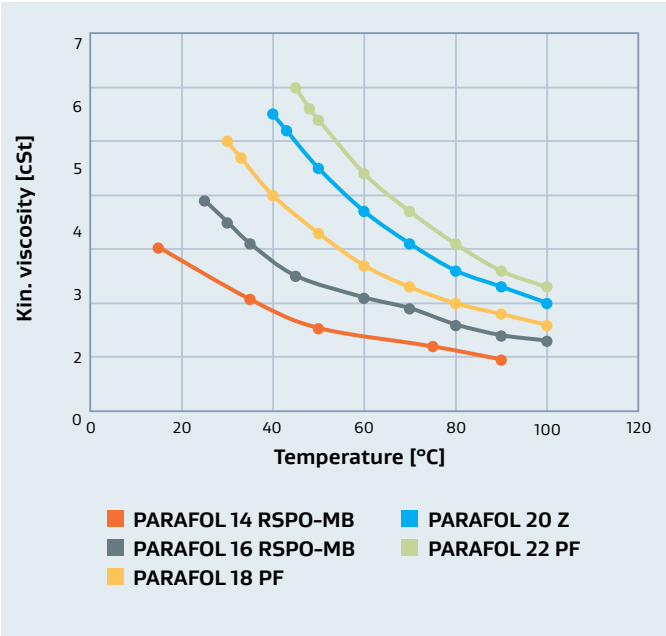


Figure 5: Kin. viscosity

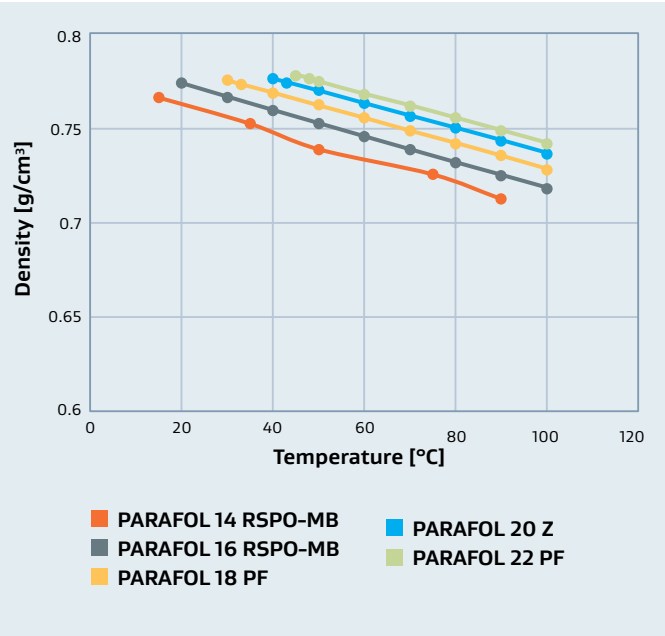


Figure 6: Density

## Analytical methods

|                     |                                                          | Sasol method with reference to |
|---------------------|----------------------------------------------------------|--------------------------------|
| Boiling point       |                                                          | DIN 51 751                     |
| Colour              |                                                          | EN ISO 6271 -2                 |
| Density             |                                                          | DIN EN ISO 12 185              |
| Flash point         | Pensky-Martens (65° C to 165° C)<br>Cleveland (> 165° C) | EN ISO 2719<br>ISO 2592        |
| Kauri butanol value |                                                          | ASTM D 1133                    |
| Latent heat         |                                                          | DIN 53 765                     |
| Molecular weight    |                                                          |                                |
| Onset temperature   |                                                          | DIN 53 765                     |
| Purity              |                                                          | Gas chromatographic method     |
| Viscosity           |                                                          | ASTM D 7042                    |



# Packaging and delivery

## Filled products

1. In steel drums

  - Filling quantity: 155 kg/drum
  - Pallet capacity: 4 drums (screw-cap) on a CP3 pallet covered by stretch hood
  - Inside coating using epoxyphenolic lacquer
2. In intermediate bulk containers (IBCs)

  - Capacity of approximately 1 kg or 1 m<sup>3</sup>
  - Pallet capacity: 1 container securely mounted onto a CP1 pallet
  - EVOH Barrier for guaranteed permeation protection

# Handling and storage

Storage temperature of all goods shipped in barrels or drums

5 < T < 30 °C  
41 < T < 86 °F

# Sasol Chemicals alcohol portfolio

Sasol Chemicals is one of the world’s largest suppliers of C6+ alcohols and offers one of the broadest portfolios of specialty and commodity alcohols based on different pro- duction technologies. Sasol Chemical’s C<sub>6</sub> to C<sub>20+</sub> alcohols

serve a huge number of different industries along the chemical value chain.

[Want to explore our comprehensive alcohol brochure?](#)  
[Don’t hesitate to get in touch with us for details!](#)

|          |                                                                                     |                                         |
|----------|-------------------------------------------------------------------------------------|-----------------------------------------|
| LIAL     | Mixture of linear and mono-branched alcohols from C <sub>9</sub> to C <sub>17</sub> | Sasol Italy S.p.A., Augusta             |
| ALCHEM   | Linear alcohol mono-cuts and blends from C <sub>9</sub> to C <sub>17</sub>          | Sasol Italy S.p.A., Augusta             |
| ISALCHEM | Mono-branched alcohol mono-cuts and blends from C <sub>9</sub> to C <sub>17</sub>   | Sasol Italy S.p.A., Augusta             |
| NACOL    | Pure cuts of linear alcohols C <sub>6</sub> to C <sub>22</sub>                      | Sasol Germany GmbH, Brunsbüttel         |
| NAFOL    | Blends of linear alcohols C <sub>8</sub> to C <sub>28</sub>                         | Sasol Germany GmbH, Brunsbüttel         |
| ISOFOL   | Defined branched Guerbet alcohols C <sub>12</sub> to C <sub>32</sub>                | Sasol Germany GmbH, Brunsbüttel         |
| SAFOL    | Mixture of linear and branched alcohols C <sub>12</sub> to C <sub>13</sub>          | Sasol Ltd, Secunda                      |
| ALFOL    | Pure cuts and blends of linear Ziegler alcohols C <sub>6</sub> to C <sub>22</sub>   | Sasol Chemicals (USA) LLC, Lake Charles |

# Registration

For registration status, please refer to the material safety data sheet or contact us at:  
Sasol Chemicals | <https://chemicals.sasol.com/contactus>

# Our global footprint

Sasol Chemicals’ business locations, e.g. offices, production sites, JVs, laboratories, etc.



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Technical Formulations – Phase Change Materials



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