

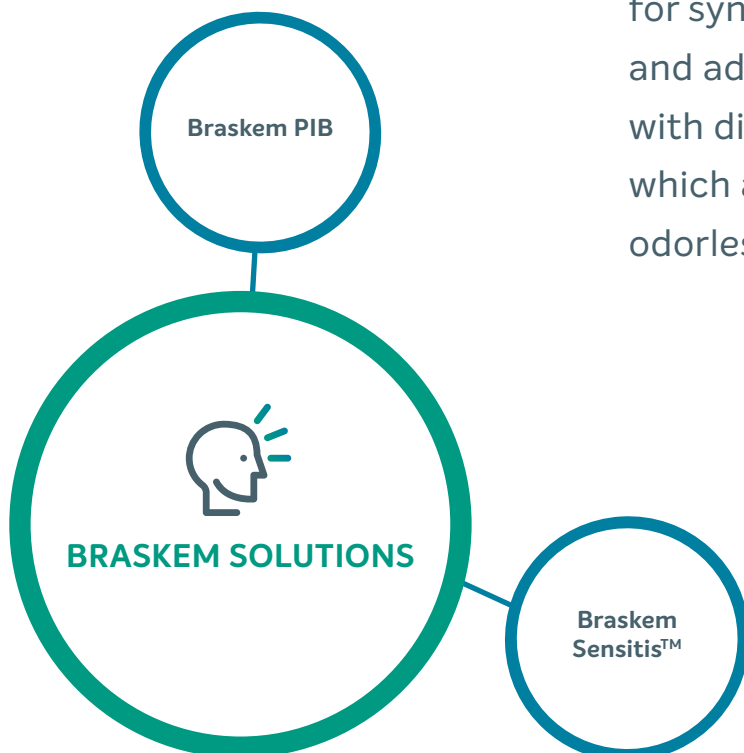


Chemical Solutions for the Lubricants Market

**For each
need, we
offer a
solution.**



We offer great solutions for producers of industrial lubricants: Braskem PIB, an ideal component for synthetic lubricating oils, grease and additives; and Isoparafins with different distillation ranges, which allow for the production of odorless and colorless solvents.





► Braskem PIB

Braskem PIB is nontoxic and has NSF certification, which makes it suitable for highly demanded applications such as the Food Industry

In order to fulfill the needs for these applications, Braskem PIB has a diversified portfolio with different molecular weights: light, medium, and heavy.



A bright, transparent and stable product even when exposed to light



Chemically stable

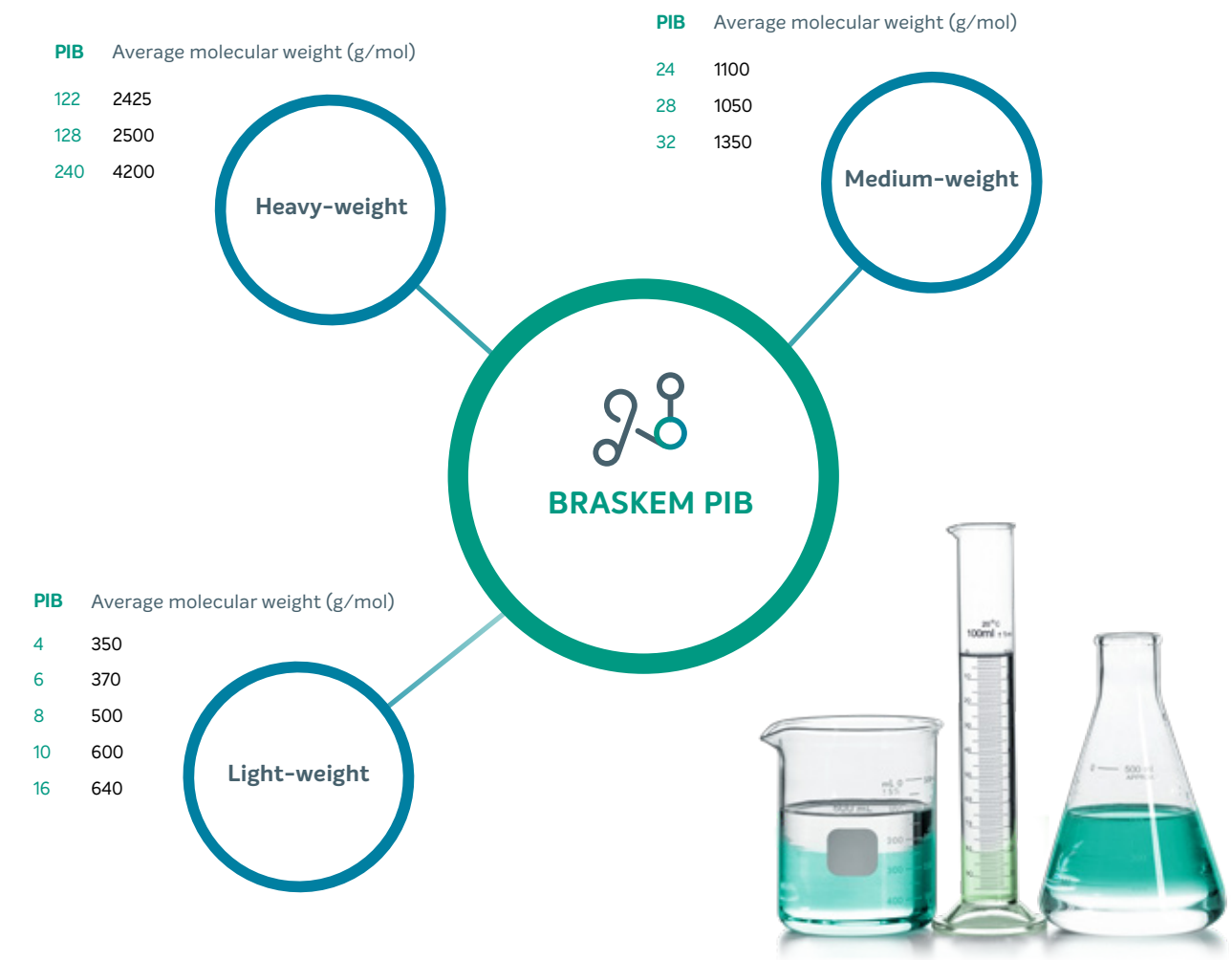


Resistant to oxidization, light, and temperature



Excellent dielectric properties

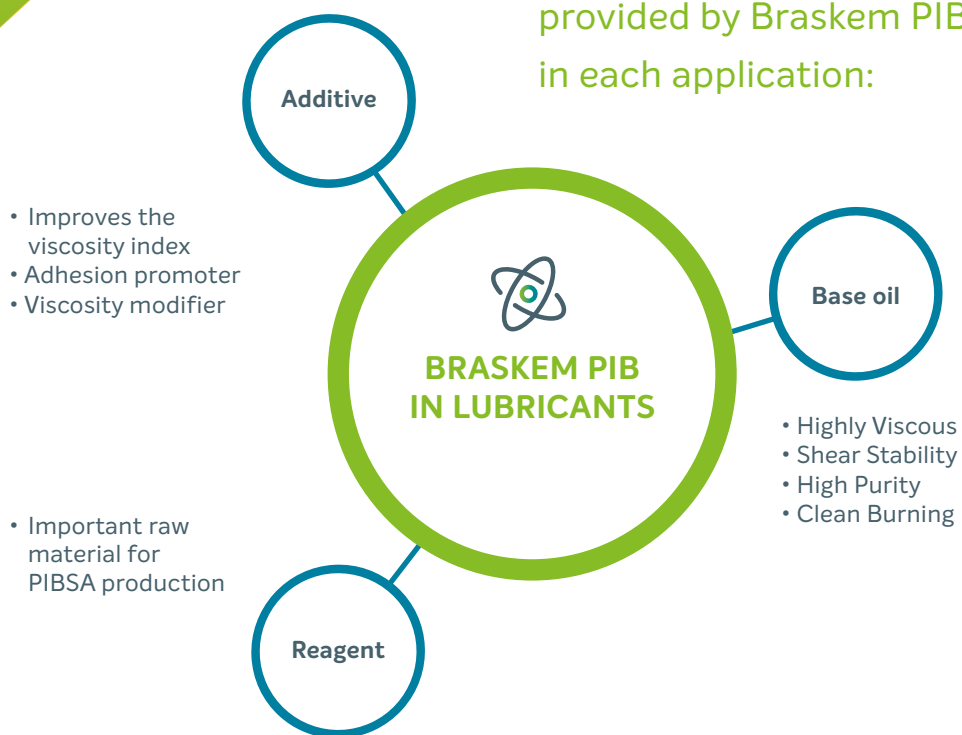
A diversified portfolio



Properties	Average molecular weight	Viscosity 37.8 °C	Viscosity 100 °C	Color (Pt-Co)	Density 20/4 °C	Flash point	Pour point
Unit	g/mol	cSt	cSt	-	-	°C	°C
Test method	Internal	ASTM D-445	ASTM D-445	ASTM D-1209	ASTM D-4052	ASTM D-92	ASTM D-97
Grades							
PIB 4	350	15	-	50	0,82	125	-55
PIB 6	370	32	6	50	0,84	130	-50
PIB 8	500	105	12	50	0,85	130	-35
PIB 10	600	500	25	50	0,87	135	-25
PIB 24	1100	8700	220	30	0,89	200	-1
PIB 32	1350	28000	680	30	0,90	210	5
PIB 122	2425	-	3200	30	0,91	240	15
PIB 128	2500	-	4400	30	0,91	250	20
PIB 240	4200	-	12500	30	0,92	260	25

Braskem PIB in Lubricants

In lubricants, PIB can be used either as an additive or as the base oil of formulations. See below the characteristics provided by Braskem PIB in each application:

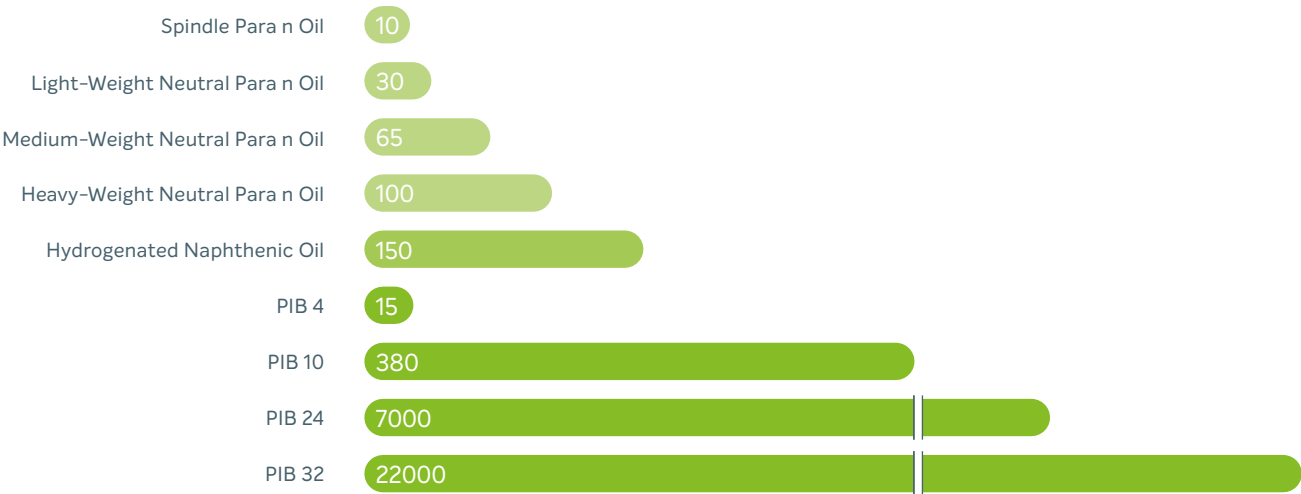


Braskem PIB as
a base oil

Comparing the viscosity
of Braskem PIB with
different base oils.



Viscosity at 40°C (cSt)



Viscosity at 40°C (cSt)





High Purity

- Applied in compressors and machines in refineries, plants, and chemical industries
- Prevention of catalyst poisoning
- Applied in lubricants for food conveyor belts

APPLICATION EXAMPLE

- Rolling bearings in sugar production plants
(Viscosity – 16,000 cSt @ 40°C)

Clean Burning

- No deposits and less smoke
- PIB evaporates completely without leaving residues
- No formation of stains or soot

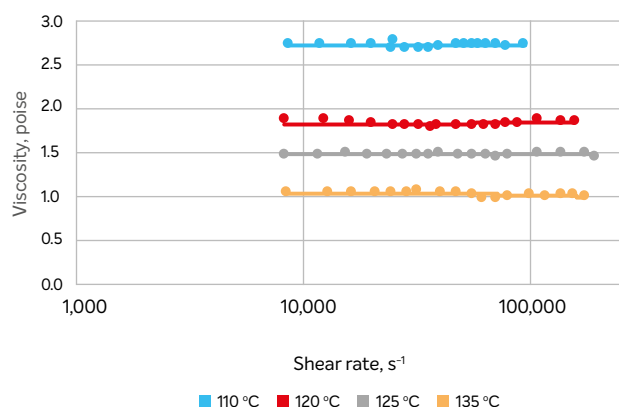
APPLICATION EXAMPLE

- Two-stroke engines
- Metalworking fluids: stamping, pressing, and foiling

Shear Stability

Sonic shear stability test			
Material	Initial viscosity at 38°C (cST)	Viscosity reduction	
		1 hour	2 hours
14% PIB 122 in oil 5W	62.9	6%	7%
100% PIB 6	23	1.5%	2%

PIB 32 – Shear Test



PIB as an Additive for Lubricants

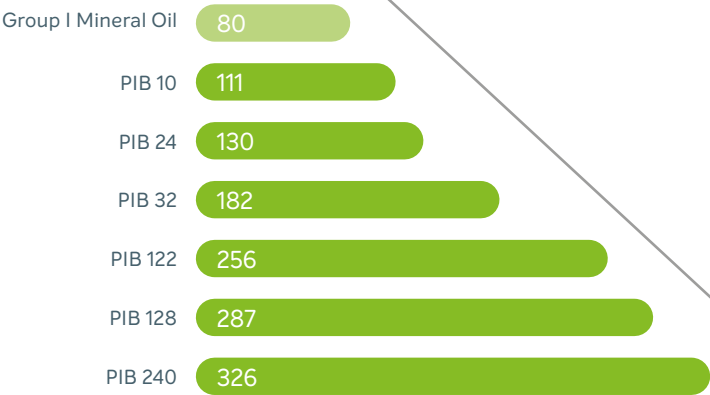
Braskem PIB is used as building block for the manufacture of detergents and dispersants, such as PIBSA and PIBA, which are widely used in the formulation of additive packages for lubricants and fuels.

GDP as a Viscosity Index Modifier

PIB as a viscosity modifier

Braskem PIB stands out when used as a viscosity index modifier (MVI) for mineral oils. Check in the plot on the right the viscosity index values for the various PIB grades.

Viscosity index



PIB in grease production

Used in the manufacture of greases with metal soaps: calcium, aluminum, and lithium stearates.





► Braskem Sensitis™

We have a special line of high-purity, high-performance hydrogenated solvents that feature a very low concentration of aromatic compounds, comprising four products of different distillation ranges, which enable the choice of the ideal solvent for application in lubricants.

Main properties

- High purity
- Colorless
- Odorless
- Liquid
- Chemically stable



Product	Density (20/4 °C)	IBP (°C)	FBP (°C)	Flash point (°C)	Aniline point (°C)	Mixed aniline point (°C)	Evaporation rate (Butyl Ac. = 100)	Benzene Concentration (%)	Color (Pt/Co)
3/16 Braskem Sensitis™	0.71	35	160	< 10	75	-	122	< 0.01	< 5
13/15 Braskem Sensitis™	0.72	130	150	20	76	-	94	< 0.01	< 5
17/21 Braskem Sensitis™	0.75	170	210	52	83	-	8	< 0.002	< 5
22/25 Braskem Sensitis™	0.78	218	255	90	89	-	0,5	< 0.002	< 5

We are available to discuss our Chemical Solutions for the Lubricants Market portfolio. Talk to your business contact at Braskem or send an email through **braskem.com.br/contato**