



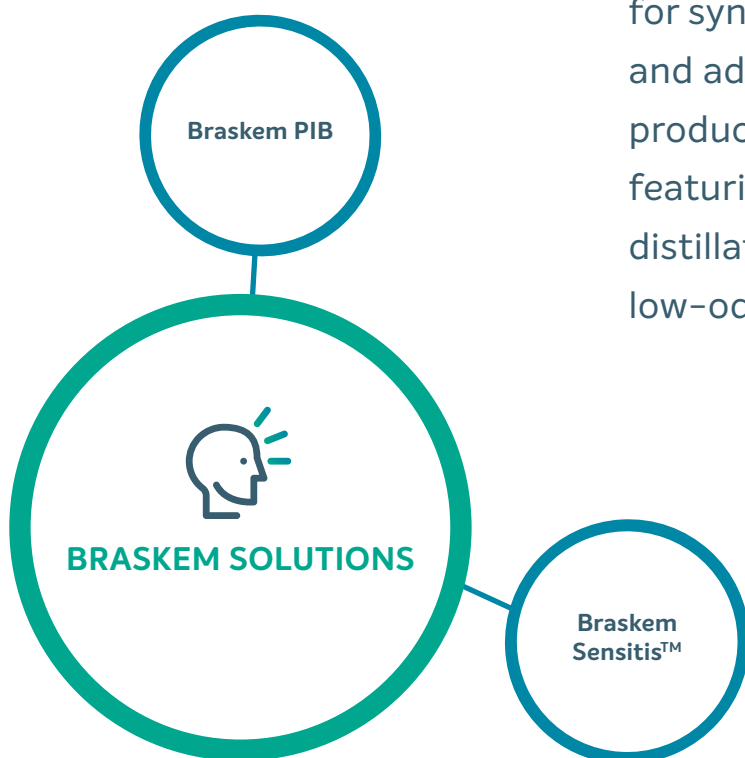
Chemical Solutions for the Lubricants Market

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 the isoparaffin product line, Braskem Sensitis, featuring products with different distillation ranges, colorless and low-odor.





► Braskem PIB

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

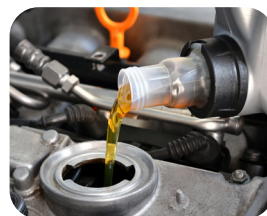
In order to fulfill the needs for these applications, Braskem PIB has a diversified portfolio with different molecular weights: light, medium, and heavy.



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



Chemically stable

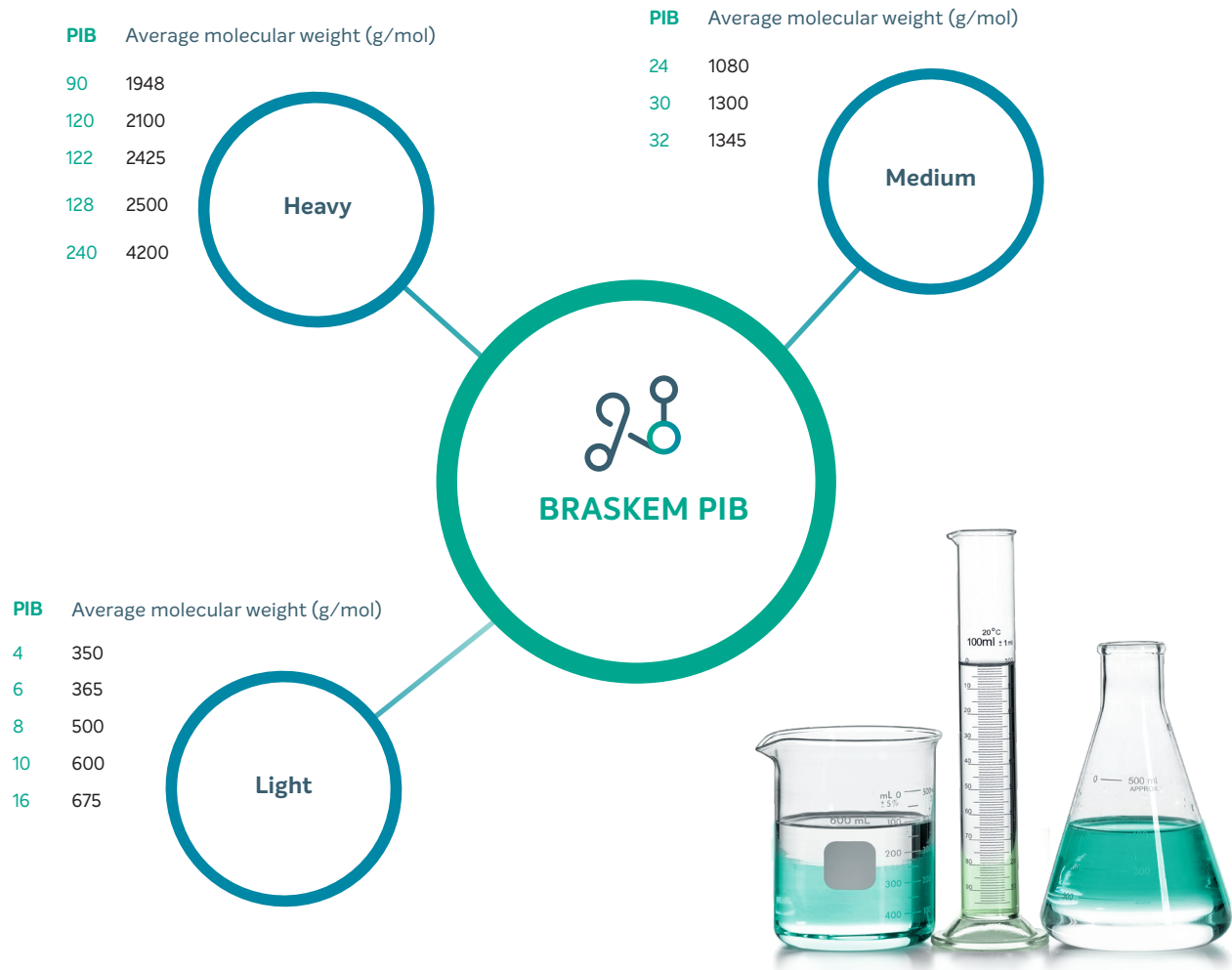


Resistant to oxidization, light, and temperature



Excellent dielectric properties

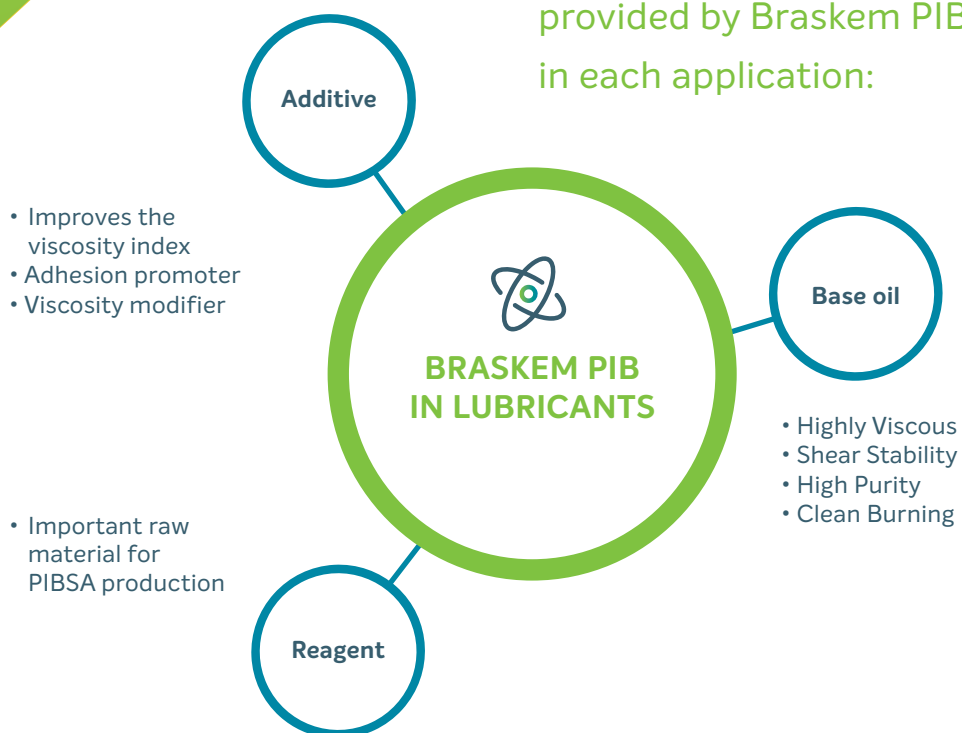
A diversified portfolio



Properties	Average Molecular Weight	Viscosity (37,8°C)	Viscosity (100°C)	Color	Density at 20/4°C	Flash Point
Unit	Daltons	cSt	cSt	-	g/cm3	°C
Test Method	Internal GPC method	ASTM D 445	ASTM D 445	ASTM D 1209	ASTM D 4052	ASTM D 92
Grades						
PIB4	350	16		70	0,82	> 125
PIB6	365	30	6	70	0,84	> 125
PIB8	500	106	12	70	0,85	> 130
PIB10	600	500	25	60	0,87	> 130
PIB16	675	1000	49	60	0,88	> 135
PIB24	1080	8710	220	50	0,89	> 190
PIB30	1300	19500	630	50	0,90	> 190
PIB32	1345	28000	680	50	0,90	> 195
PIB90	1948		2000	10	0,91	> 200
PIB120	2100		2500	50	0,91	> 220
PIB122	2425		3200	50	0,91	> 235
PIB128	2500		4350	50	0,91	> 240
PIB240	4200		12500	50	0,92	> 245

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:

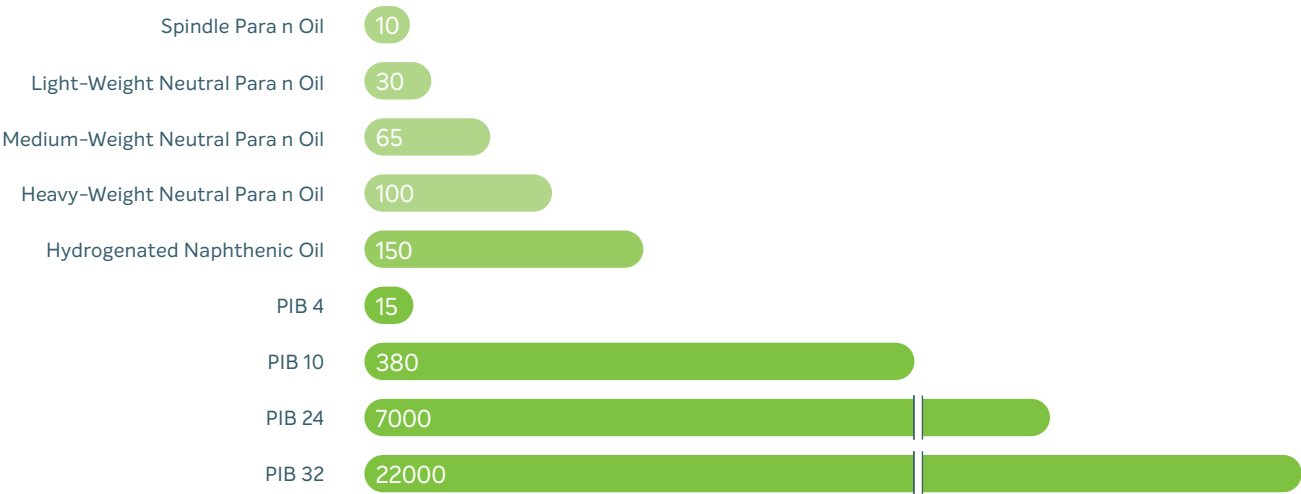


Braskem PIB as
a base oil

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
- 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

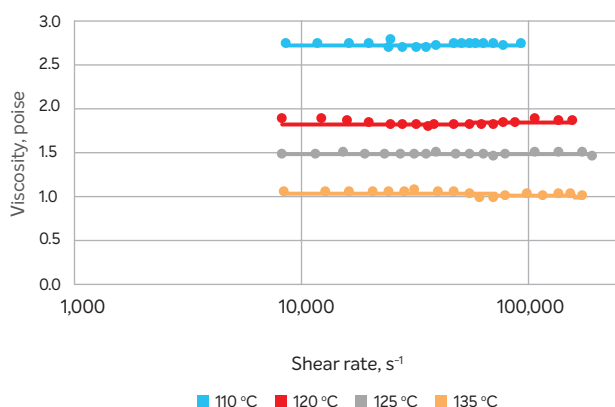
APPLICATION EXAMPLE

- 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



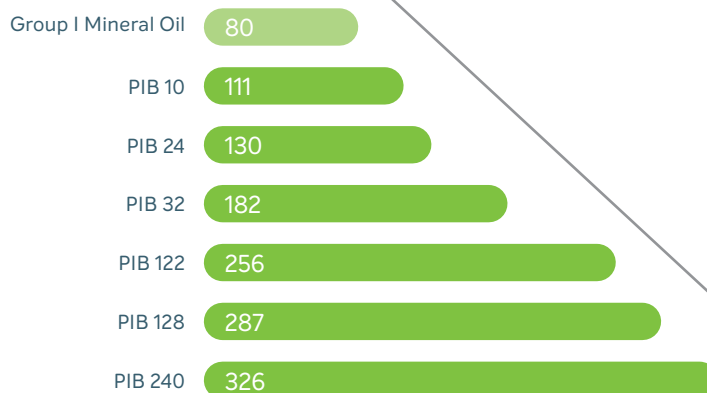
PIB as an Additive for Lubricants

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.

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.

Colorless

Highly adhesive to the substrate

ADVANTAGES BROUGHT BY PIB IN GREASE FORMULATION

Water and temperature-resistant

Shear stability

Dielectric properties





► Braskem Sensitis™

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

Main properties

- Colorless
- low-odor
- Chemically stable



Product	RELATIVE EVAPORATION RATE (Butyl Acetate = 100)	FLASH POINT (°C)	DISTILLATION RANGE aT 760 mmHg (°C)	DENSITY (20/4°C)	COLOR (Pt/Co)	CAS NUMBER
Sensitis™ 17/21	8	52,0	170 - 210	0,750 - 0,760	< 5	68551-18-8
Sensitis™ Hiflash	-	64,0	180 - 210	0,750 - 0,770	< 5	246538-78-3 / 68551-18-8
Sensitis™ 22/25	0,5	90	218 - 259	0,778 - 0,788	< 5	68551-17-7
Sensitis™ 17/21 Circular	-	-	170 - 210	0,750 - 0,770	< 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**