VARAZON®

sasol
reaching new frontiers

rubber & tire

Sasol Wax
Wax is all we do. So we do it best.

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***Sasol Wax** is the leading specialist in innovative wax technology.*

at a glance

Paraffin wax is the major raw material for the production of candles and a wide variety of other applications such as rubber & tires, chipboard, food-processing and packaging, pharmaceuticals, cosmetics, inks paints & coatings, textiles as well as in road construction and many more.
For many decades Sasol Wax has focussed on the development of paraffin waxes and specialty wax blends for a lot of different industries. Due to the wide range of our products, we are able to offer solutions suitable for almost all production processes.

Micro and macro crystalline waxes are renown for a broad spectrum of applications. Their use ranges from rather simple applications to process oriented tailor-made products for state of the art production equipment. Specialties are created for innovative solutions.

Refined paraffin waxes are mixtures of saturated hydrocarbon, purified by modern, environmentally friendly technologies.
All our products are constantly monitored by a stringent quality control and are non-toxic. Their environmental properties are characterized by good biodegradability and non-cumulative effects.

Paraffin waxes in the rubber and tire industry

The greatest naturally occurring threats to tires and all other synthetic and natural rubbers are ozone and ultraviolet (UV) light. Ozone is an odorless gas and part of the atmosphere. Highest levels are found in cities and industrialized centers. UV light protection of rubber goods is preferably achieved by the addition of carbon black. This gives tires the typical colour. Also some high performance chemical UV absorber are used. UV stabilizers are generally used up while they perform their function. Tires turn from black to grey while the carbon black is loosing its function and the degradation of the rubber material takes place. This makes the rubber turn brittle and leads to the formation of cracks.

For ozone protection manufacturers add waxes to their compounds at common dose rates between 1 and 3 phr. During operation the tire bends and flexes. This activates the migration of the antiozonant wax to the surface of the tire forming a thin, protective wax film. This migration intensifies with increasing temperature. Ozone attack on rubber compounds occurs in a temperature range between 0 °C and 55 °C. Below this temperature range the ozone does not have a high enough activation energy to react with the rubber. Above it ozone levels in the atmosphere decrease to minimal levels.

Antiozonant waxes are complex and thoroughly designed blends. They consist of unbranched straight chain n-paraffins as well as branched iso-paraffins of different chain length. Compared to iso-paraffins n-paraffins with a similar number of carbon atoms have a greater migration tendency. Generally the 'solubility' of antiozonant waxes in rubber increases with decreasing molecular weight (carbon atom number). Paraffin waxes with high n-paraffin content provide rapid protection for newly produced goods. Micro waxes especially with high molecular weight iso-paraffins guarantee slow release and long lasting protection.

Antiozonat waxes with a high micro wax content are used e. g. for tire sidewall protection. Additionally antiozonant waxes may act as a transport medium for other antiozonants and antioxidants (like amines and phenolic derivates).

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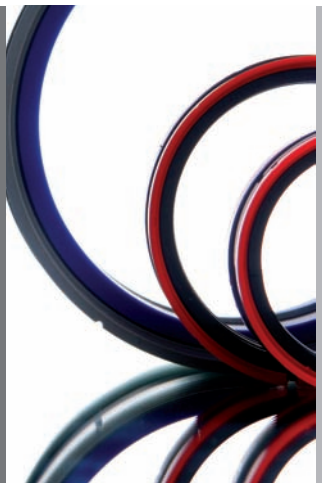
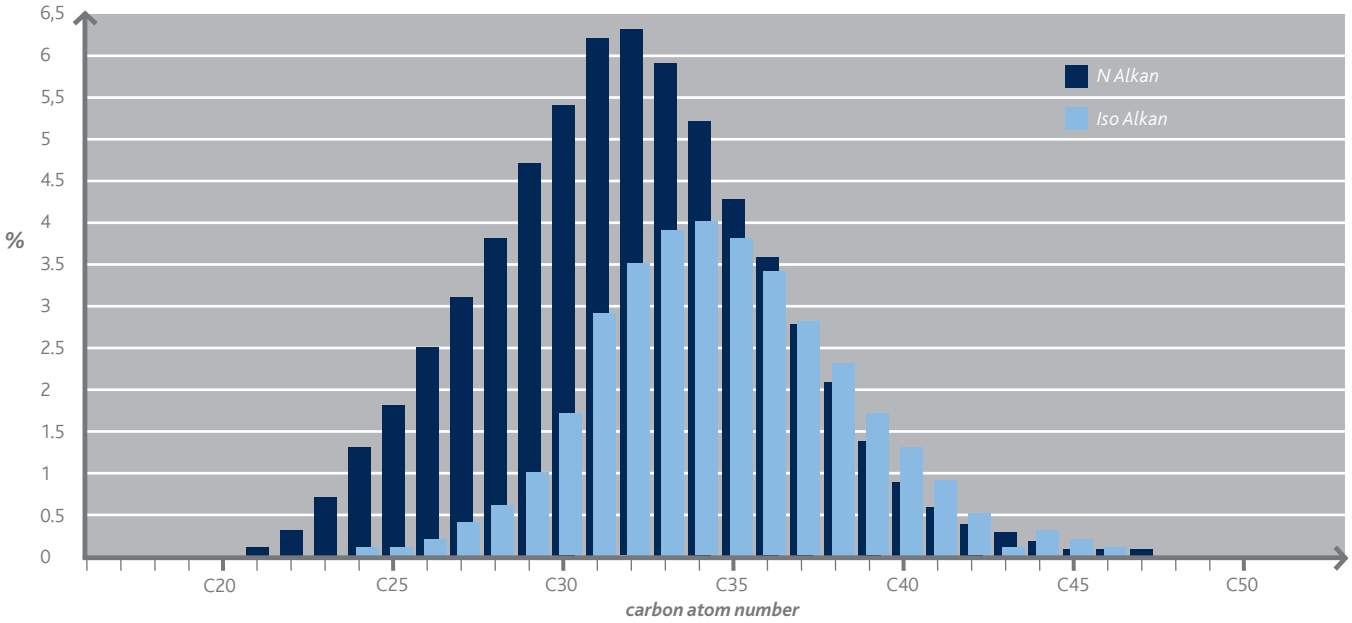


VARAZON 5998

VARAZON 5998 is the tire industries first choice when it comes to ozone protection. Especially in a temperature range of 10-50 °C the protection against ozone attack is outstanding. Additionally with its fine balance between straight and iso components an excellent migration behaviour is achieved. This ensures the formation of a thin layer of wax on the surface of the tire. Quick acting and long lasting. ***VARAZON 5998*** features UV-protection and good processability as well as anti blocking behaviour.

	Congealing Point [°C]	Penetration at 25°C [1/10 mm]	n-paraffin Content [%]	C max	Color
VARAZON 5998	64 - 68	14 - 19	60 - 70	30 - 32	White

Typical Gas Chromatogram of VARAZON 5998



Besides that Sasol Wax produces a wide variety of different products for the rubber and tire industry. All of these waxes combine the finest properties in their function as anti ozonants, mould release agents, plasticizers and lubricants. Additionally Sasol Wax is able to blend waxes according to the special needs of our customers.

	Congealing Point [°C]	Penetration at 25°C [1/10 mm]	n-paraffin Content [%]	C max	Color
VARAZON 5138	64 - 68	14 - 20	56 - 64	30 - 32	White
VARAZON 8893	66 - 68	14 - 17	55 - 65	30 - 33	Off-white
VARAZON 4959	63 - 69	16 - 21	55 - 74	31 - 33	Blue
VARAZON 8221	58 - 62	15 - 19	70 - 75	28 - 29	White
VARAZON 6066	61 - 67	14 - 20	65 - 75	30 - 32	Yellowish
VARAZON 0299	60 - 62	50 - 60	42 - 50	30 - 33	Yellowish
VARAZON 2396	60 - 62	15 - 17	70 - 80	28 - 30	White
VARAZON 8080	70 - 74		37 - 53	36 - 38	Brown
VARAZON 6403	63 - 66	16 - 20			White
VARAZON 6050	60 - 65	55 - 80			Yellow
VARAZON 5605	54 - 56	20 - 24			White

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Synthetic waxes from Sasol Wax

Up to now anti ozonant waxes are typically petroleum based waxes. They are used to minimize cracking in tires by protecting the polymeric back bone of the rubber against ozone attack. Usually anti ozonant waxes are blended from intermediate waxes, paraffin and micro crystalline waxes to specification. Their iso alkane content may vary between twenty and sixty percent. Depending on the congealing point and the iso alkane content of the wax, blooming is more or less intense.

From now on synthetic anti ozonant waxes are also available from Sasol Wax. They are produced by synthesis from either natural gas or coal gasification products and may be blended with petroleum based waxes to gain specific properties. A variety of products have been composed with materials available at present as well as potentially available in the future. Their properties are comparable to traditional anti ozonant waxes made from petroleum based raw materials. Their performance has been confirmed independently by laboratory tests as well as industrial usage.

New products are now available:

- **VARAZON 9300** a fully synthetic wax
- **VARAZON 9302** a blend of a synthetic wax and a petro based wax
- **VARAZON 9304** a blend of a synthetic wax and a petro based wax

Physical properties

	Congealing Point [°C]	Penetration at 25°C [1/10 mm]	Penetration at 40°C [1/10 mm]	Viscosity at 100°C [mm²/s]
VARAZON 9300	63	16	60	4.9
VARAZON 9302	65	17	51	6.5
VARAZON 9304	60	58		6.1

All tested materials performed similarly well. With the current results at hand all combinations of synthetic wax intermediates with petro based components proofed to be suitable as anti ozonant waxes in the rubber industry.

Wax solutions for every process

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