

ATOFINA N-DODECYL MERCAPTAN A POLYMERIZATION MODIFIER

ATOFINA n-Dodecyl Mercaptan is a primary mercaptan used as a modifier in various polymerization reactions. It is especially recommended for use in manufacturing hot SBR type synthetic rubbers. n-Dodecyl Mercaptan, often called lauryl mercaptan, functions as a reducing initiator and chain transfer agent during polymerization.

For many years, n-Dodecyl Mercaptan has been the standard modifier for SBR rubbers that are made at about 120°F. **ATOFINA**'s mercaptan is a high purity product and an efficient modifier. It can be used interchangeably with other available products.

PROPERTIES

ATOFINA n-Dodecyl Mercaptan is a high purity, straight chain mercaptan made directly from dodecene-1- and hydrogen sulfide. The high purity is reflected in the specification shown below.

SPECIFICATIONS

Appearance	No Turbidity or Suspended Matter
Color APHA	20 Maximum
Mercaptan Sulfur, Wt%	15.5 Minimum
n-Dodecyl Mercaptan, Wt%	98.0 Minimum

The above specifications are determined according to ATOFINA Chemicals analytical methods.

OTHER PROPERTIES

Specific Gravity @ 15.5/15.5EC	0.850
Average Weight, Pounds Per Gallon @ 60EF	7.08
Flash Point, TCC	>200EF
Vapor Pressure @ 100EF	<0.1 psia
Coefficient of Cubical Expansion/EC	0.00097
Molecular Weight	

POLYMERIZATION TESTS

PROCEDURES

ATOFINAs mercaptan was compared with samples of other commercially available n-Dodecyl mercaptans. The same hot SBR recipe was used for all tests. In one set of experiments, the mercaptans were tested on an equal weight basis. Other tests were carried out in which the quantity of **ATOFINA** used was less than that of the other mercaptans. Blends of the **ATOFINA** product with other lauryl mercaptans were also tested.

The following SBR recipe was used with polymerization carried out in all cases at 122°C:

<u>Component</u>	<u>Parts by Weight</u>
Butadiene	72.0
Styrene	28.0
Water	180.0
NaORR soap	4.7
Potassium Persulfate	0.4
Mercaptan	0.3 (except as noted below)

During the tests, the percent conversion at various times was measured. Following polymerization, samples were tested for viscosity using a Mooney viscosimeter. The samples were preheated to 212°F for one minute and readings taken after four additional minutes.

RESULTS

The following are the results obtained on conversion and viscosity tests using equal parts by weight (0.3%) of **ATOFINA** n-Dodecyl Mercaptan and another commercially available lauryl mercaptan.

<u>n-Dodecyl Mercaptan</u>	<u>2.5 hrs.</u>	<u>% Conversion at</u>			<u>Viscosity</u>
		<u>5 hrs.</u>	<u>7.5 hrs.</u>	<u>8.75 hrs.</u>	<u>ML1+4</u>
ATOFINA 0.3%	18.8	39.5	68.8	68.8	47.5
Other, 0.3%	18.3	38.5	68.5	68.5	56.5

When blends of the two mercaptans were tested, the results were intermediate between the above values.

Tests were also run in which **ATOFINA** mercaptan was reduced 5% and 10%. The results below show that even when the level of **ATOFINA** mercaptan was reduced by 10%, results were obtained that were comparable to other commercially available lauryl mercaptans. The reduction of the amount of **ATOFINA** n-Dodecyl Mercaptan had no effect on the polymerization rate.

<u>n-Dodecyl Mercaptan</u>	% Conversion at				<u>Viscosity ML1+4</u>
	<u>2.5 hrs.</u>	<u>5 hrs.</u>	<u>7.5 hrs.</u>	<u>8.75 hrs.</u>	
ATOFINA, 0.285% (5% reduction)	16.7	42.9	58.7	70.8	57.5
ATOFINA, 0.270% (10% reduction)	17.7	44.7	62.2	71.6	63.5
Other, 0.3%	17.7	45.6	60.8	71.5	62.5

SUMMARY

ATOFINA n-Dodecyl Mercaptan is a high purity, effective, polymerization modifier for hot SBR rubber manufacture. **ATOFINA** n-Dodecyl Mercaptan can be substituted for, or used in blends with, other available lauryl mercaptans.

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