

SULFUR-FREE ODORANT FOR NATURAL GAS







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CONTENT





SULFUR-FREE ODORANT



SMOG

TH.GEYER

SULFUR IS HARMFUL TO THE ENVIRONMENT, CLIMATE-DAMAGING AND DETRIMENTAL TO HEALTH!

Sulfur dioxide is primarily formed as an unwanted by-product of combustion processed through oxidation of the sulfur.

Within the atmosphere SO2 partly reacts to sulfurous acid and sulfuric acid, which in turn leads to acidification of precipitation, the **acid rain**.

WITH REGARD TO PHYSICAL HEALTH:

- Irritation of the conjunctiva and throat.
- At higher concentrations sneezing and lacrimation.
- Breakdown of the self-cleaning mechanism of the respiratory system,
- Acute and chronic respiratory diseases are the result.

PARTICULARLY DANGEROUS ARE WINTER SMOG EPISODES WITH INCREASED DUST POLLUTION IN COMBINATION WITH INCREASED SULFUR DIOXIDE EMISSIONS:

- Increased occurrence of **pseudocroup** predominantly in small children.
- Severe reaction in sick or old people incl. pneumonia





SULFUR-FREE ODORANT



SIGNIFICANT REDUCTION OF SULFUR DUE TO GASODOR S-FREE

Calculation example versus THT:

Odorant		THT	Gasodor®S-Free	
Main raw materials	Unit	Tetrahydrothiophen	Acrylate,Pyrazin	
Sulfur Content of odorant	%	36,4	0,0	
Ususal dosage	mg/m³	20,0	15,0	
Minimum dosage	mg/m³	10,0	8,0	
Sulfur content at dosage level	mg/m³	7,3	0,0	
Natrual gas consuption Germany 2018	gas consuption Germany 2018 m ³ 44.		50.000.000,00	
Natural sulfur content of natural gas	mg/m³	2,00		
Total sulfur content	mg/m³	9,3	2	
SO2-Emission	kg/Jahr	410.595,00	88.300,00	
Difference	kg/Jahr	322.295,00		
		+ 365%		

Switching to GASODOR S-FREE sulfur emission can be reduced by **80%** (circa **323 t/a**) in comparison to THT.





SULFUR-FREE ODORANT



SULFUR-FREE OFFERS STILL MORE ADVANTAGES!

• Less risk of corrosion because of missing elementary sulfur



CNG

Desulfurization becomes unnecessary

Natural gas filling stations / industrial usage, which require sulfur-free gas

Perfect odorant for sulfur-free biogas



Great basis for further development of hydrogen odorization





EASY CONVERSION GUARANTEED!

GASODOR S-FREE:

- Can be used in existing customary odor stations!
- Does not change the service interval of the odor station!
- Can be transported and stored in the common containers!

CONDITIONS:

- Sealants need to be chemically stable in contact with the liquid product (Perhaps exchange is required)
- Former odorant should be compatible to GASODOR S-FREE (possible system cleaning before first usage)
- GASODOR S-FREE is highly sensitive to UV-light. Sight glass for filling level control in the odor stations needs to be replaced/removed.
- Special inner lacquer (R78433 Epoxy-Phenolic) is generally necessary for containers which are varnished on the inside







EASY CONVERSION GUARANTEED!

Interferences and reactive behavior in **LIQUID** phase: (Test conditions: 4 weeks with RT and +40°C)

- Ethyl mercaptane:
- Propyl mercaptan:
- Sec. butyl mercaptan:
- Tert. Butyl mercaptan:
- Dimethyl sulfide:
- Tetrahydrothiophene:

Reduction:	Yes
Reduction:	Yes
Reduction:	Yes
Reduction:	Yes, but low
Reduction:	None
Reduction:	None

GASODOR S-FREE is compatible with THT.

In case of previous use of **MERCAPTANS** it is recommend to **CLEAN** the containers, the affected pipes, the nozzles and the odorization systems.

EON recommends this cleaning process independently from the used odorant.







EASY CONVERSION GUARANTEED!

Suitable sealing materials for contact with **liquid** GASODOR S-FREE: (Studie: Symrise AG)

Changes in Mass				
	Storage	Drying		
	72 h	168 h / 40°C		
Requirements acc. DIN EN 549	+10 % bis -5%	+5% bis -8%		
MATERIAL TRADE NAMES:				
Kalrez [®]	+ 0,64 %	\pm 0,00%		
Isolast [®]	+ 1,04 %	+ 0,03 %		
Viton [®] Extreme	+ 3,52 %	+ 1,02 %		
Teflon	+ 1,99 %	+ 0,13 %		
K-Therm	+ 0,15 %	- 0,36 %		
Simriz	+ 0,81 %	+ 0,48 %		
FFKM 900	+ 0,90 %	+ 0,08 %		

In the GAS PHASE ALL common sealing materials are COMPATIBLE.





EASY CONVERSION GUARANTEED!

GASODOR S-FREE IS ESPECIALLY SUITABLE FOR PE & STEEL PIPES:

- No induction of chemical reactions
- No degradation
- Low adsorption



Source: DVGW-Forschungsstelle am Engler-Bunte-Institut der Universität Karlsruhe





WARNING ODOR



GASODOR S-FREE SHOWS A LEARNED PROFILE!











GASODOR S-FREE HAS AN UNUSUAL SCENT!



The consumers confirm the significant **SUPERIORITY** in comparison to **DAILY SCENTS** for all three odorants – including scents of the onion family.

LINK to study: https://www.gasodor-s-free.com/fileadmin/user_upload/160128_Verbraucherstudie_Gaswarngerueche.pdf





WARNING ODOR GASODOR S-FREE IS ALARMING!





All three gas odorants are classified as significantly more unpleasant, **ALARMING**, strange and **DANGEROUS** compared to everyday odors. They provoke a consumer action to ensure his own safety.

As a result, the study shows that all three investigated gas odorants are performing this function **excellently**.

LINK to study:

https://www.gasodor-s-free.com/fileadmin/user_upload/160128_Verbraucherstudie_Gaswarngerueche.pdf



Th. Geyer Ingredients | 2020





GASODOR S-FREE REDUCES FALSE ALARMS!

		OLD		NEW	
		ODORANT		GASODOR	
		Dez./Jan.06/07	dav. F	Dez./Jan.07/08	dav. F
Region 1	TB-1 H	7	3	3	1
	TB-1 N	2	2	1	0
	TB-1 Y	0	0	3	0
	TB-1 S	2	0	5	4
	TB-1 M	6	4	8	3
	TB-1 F	3	2	3	1
Region 2	TB-2 D	11	5	6	2
	TB-2 P	7	5	5	1
	TB-2 Z	0	0	0	0
	TB-2 S	4	4	1	0
	TB-2 K	4	3	5	0
	TB-2 A	9	4	11	4
	TB-2 U	8	4	13	7
Region 3	TB- 3 T	33	11	71	17
	TB- 3 A	29	11	50	21
	TB- 3 H	25	9	24	3
	TB- 3 M	1	0	8	1
Gesamt		151	67	217	65

Quelle: EON-Netz

False alarms before the change: approx. 44 % False alarms after the change to GASODOR S-FREE:

approx. 30 %





WARNING ODOR



GASODOR S-FREE SHOWS A HIGH RATE OF CORRECT ALARMS!

GASODOR S-FREE



Abb. 5: Auswertung Gasodor® S-Free®-Geruchsmeldungen

MERCAPTAN



Compared to mercaptans the rate of correct alarms is clearly higher (approx. 10 %-points).







GASODOR S-FREE SHOWS SUPERIOR SOLUBILITY



Source: Engler-Bunte-Institut der Universität Karlsruhe (TH) 2002

Temperatur [°C]

The high solubility leads to less sedimentation in pipes (condensate) and less product use to reach the minimum odorization rate.







GASODOR S-FREE HAS GOT STEAM!



High vapor pressure leads to **faster distribution** in natural gas, **less product use** and **less injection systems** are required.





GASODOR S-FREE IS TESTED AND CERTIFIED!



Link to certification: https://www.gasodor-s-free.com/fileadmin/user_upload/Sicherheitsbewertung_Gasodor_S-free_2016.pdf



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GASODOR S-FREE PERFORMS IN HIGH PRESSURE NETWORKS!



- Before (in RED): Decentralized odorization with 15 dosing stations
- After: Fixed measuring takes place only at net transfer points (High Pressure to Household Distribution Networks)





GASODOR S-FREE WORKS IN HIGH PRESSURE NETWORKS!



Reduction of set value by around 20% on day after initial injection





GASODOR S-FREE SAVES MONEY AND RESOURCES!

GASODOR S-FREE makes direct odorization in **high pressure networks** possible. The normal **recovery rate** at the five transmission stations is at **93** % of injection concentration.

Across all networks the average recovery rate is up to 74 %.

The total loss of odorant is about 26 % and can be categorized as relatively low.

Approx. 20.000 EUR/a saving potential resulting from central odorization:

- Less consumption of odorant,
- Less filling service,
- Less monitoring and maintenance of odorization systems



GASODOR[®]



STORAGE STABILITY



GASODOR S-FREE REMAINS STABLE!

Storage Stability:

- At least 18 months
- Shows no crystallization at low temperature (- 30°C) over a period of 12 months
- Successful test of stability over a period of 6 months up to 50°C (DVGW)
- High temperature of short duration: Stable (> 50°C)

Storage Conditions:

- Ideal: Dark and dry, at 20°C (room temperature) in sealed containers
- Avoid direct sun exposure and at high temperature over extended periods.



MEASUREMENT TECHNOLOGY



GASODOR S-FREE IS WELL DETECTABLE!

GC-IMS-ODOR mit Stickstoffgenerator

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GASODOR S-FREE CREATES OPPORTUNITIES!

Odorization of biogas for a sulfur-free end product

All industrial actions, in which a sulfur-free process has to be secured:

- Aluminum industry
- Porcelain industry

Natural gas filling stations with odorized CNG

Injection into high pressure distribution systems

Additional safety in traffic areas not having been regulated: e.g. shipping; LNG odorized in gas phase







PRODUCT DATA GASODOR S-FREE: EVERYTHING AT A GLANCE!





GASODOR®



https://www.gasodor-s-free.com/fileadmin/user_upload/Ingredients/GASODOR/SDB_TG900900_D.pdf https://www.gasodor-s-free.com/fileadmin/user_upload/900900_Product_Specification.pdf

Th. Geyer Ingredients | 2020

Safety data sheet:

Product specification:





ADDITIONAL PRODUCTS



NEUTRALOR is a special product from Symrise developed to counter the odor of GASODOR S-FREE spills.

It masks the unpleasant, powerful warning odor of GASODOR S-FREE.

An accidental spill from liquid GASODOR S-FREE in production space, dosing stations or during transport, NEUTRALOR should be sprayed onto the contaminated surfaces in addition to the necessary, complete cleaning process.

The intensive, citric smell of NEUTRALOR overlays the typical warning odor of GASODOR S-FREE until it has vanished.

 Safety Data Sheet:
 https://www.gasodor-s-free.com/fileadmin/user_upload/Ingredients/GASODOR/467794-SDS-D.pdf

 Product Specification:
 https://www.gasodor-s-free.com/fileadmin/user_upload/Ingredients/GASODOR/467794-PSPEC_AC-E-EUR.pdf









ADDITIONAL PRODUCTS



ODOR CARDS: TRAIN & PROTECT THE END CONSUMER!

Before you insert GASODOR S-FREE into your natural gas grid, you naturally you would want to know exactly, how GASODOR S-FREE smells.

Do you use GASODOR S-FREE already? Protect your customers and inform them with customized odor cards on how to discern the smell of leaking natural gas.

Order the customized flyer easily over the link below.







YOUR CONTACT



WE ARE PLEASED TO ANSWER YOUR QUESTIONS!

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