



# Hydroscav

## H<sub>2</sub>S & RSH REMOVAL

### Product Description

**Hydroscav** is a water-soluble blend of amine resin solution in a complex alcohol system. This product is extremely effective in removing H<sub>2</sub>S from gas, water, crude and fuel oils.

Despite what the name infers, **Hydroscav** is **not** a scavenger in chemical terms. Rather than 'scavenging' H<sub>2</sub>S, it converts H<sub>2</sub>S & RSH into a stable non hazardous Sulphate salt (SO<sub>4</sub><sup>-2</sup>). This eliminates several issues in the process system, often associated with triazine / formaldehyde based scavengers.

**Hydroscav** is also effective in removing mercaptans from liquids in the same manner, however, the reaction time required to remove the mercaptans is slightly longer.

### Product Characteristics

**Hydroscav** converts H<sub>2</sub>S & RSH into a non toxic sulphate salt and water:

1. **Hydroscav** will chelate the H<sub>2</sub>S & RSH molecules
2. It then converts the molecules into a liquid salt – SO<sub>4</sub><sup>-2</sup>
3. This solution then attaches to the Amine molecule
4. The water based molecule then mixes with the produced water
5. The result is a water salt with a very low COD
6. The water salt is stable and the reaction is irreversible



### Dosage Rates

<b>Gas:</b>	1ppm of H <sub>2</sub> S requires 0.2ppm of <b>Hydroscav</b> (measured in gas phase)
<b>Water:</b>	1ppm of H <sub>2</sub> S requires 3 ppm of <b>Hydroscav</b> (measured in liquid phase)
<b>Crude:</b>	1ppm of H <sub>2</sub> S requires 3–6 ppm of <b>Hydroscav</b> (measured in liquid
<b>Fuel Oils:</b>	phase) 1ppm of H <sub>2</sub> S requires 3-4 ppm of <b>Hydroscav</b> (measured in liquid phase)

Removal of mercaptans: for each ppm of mercaptans you will require between 3–5ppm of **Hydroscav** depending on the sulphur speciation of the mercaptans.



## Application

Like any chemical, application is the key. Applied with a good mixing mechanism, the performance of the chemical will be enhanced. For oil and gas production, **Hydroscav** can be injected down hole, and it is not affected by high temperatures. For treatment of crude, condensates or fuels oils, ideally Hydroscav should be injected at or near the inlet valve of the transfer pump, as the asset is being transferred from one tank to another. Alternatively, Hydroscav can be added to a storage tank and circulated, however, this may require longer time at possibly higher dosage rates depending on the capacity of the tank and the effectiveness of the circulation pump.

## Gas

**Hydroscav** needs to be injected under pressure to ensure good migration. The reaction is instantaneous in the gaseous phase and the separation of the newly formed Sulfate salts is very fast. The only drawback is that **Hydroscav** cannot be used where there are high levels of CO<sub>2</sub> as the CO<sub>2</sub> will reduce the chemicals effectiveness.

## Water

**Hydroscav** is extremely effective in removing H<sub>2</sub>S and mercaptans from water. The effect of the chemical (both used and unused) on water is very interesting. The chart below shows changes to the water after different rates of injection.

Sample Description	pH	Conductivity uS/cm	Turbidity (NTU)	Silica as SiO <sub>2</sub> (ppm)	Total Iron (ppm)	H <sub>2</sub> S in Liquid Phase (ppm)
Raw Water Feed	7.67	29,400	211	7.5	3.0	5.5
Hydroscav @ 15 ppm	8.35	29600	203	7.6	0.8	Nil
Hydroscav @ 25 ppm	8.45	29300	198	7.3	0.8	Nil
Hydroscav @ 30 ppm	8.51	29200	199	8.7	0.5	Nil
Hydroscav @ 40 ppm	8.59	29000	199	10.7	0.5	Nil
Hydroscav @ 50 ppm	8.52	30000	199	8.5	0.5	Nil
Hydroscav @ 60 ppm	8.52	30100	180	6.0	0.8	Nil
Hydroscav @ 80 ppm	8.67	30000	166	3.8	0.8	Nil
Hydroscav @ 120 ppm	8.65	30000	133	10.0	0.8	Nil
Hydroscav @ 160 ppm	8.72	30000	75	9.0	0.5	Nil
Hydroscav @ 200 ppm	8.84	30000	2.93	9.9	0.3	Nil
Hydroscav @ 1000 ppm	10.02	29800	3.78	Nil	0.0	Nil

Total Iron is dramatically reduced even at low dosage whereas H<sub>2</sub>S is reduced to NIL as both undissociated H<sub>2</sub>S and dissociated HS ions are neutralized by **OURScavanger**. This is important as it represents a drastic reduction in Total Suspended Solids (TSS).



## OILCONTROL

The pH remains within 8 – 9, which indicates that the chemical does not bestow higher alkalinity on the produced water. This is an important finding where there are high levels of TSS.

### Crude & Fuels

**Hydroscav** converts the H<sub>2</sub>S and Mercaptans into sulphate salts. The chemical then separates from the hydrocarbons due to the higher specific gravity. For extremely heavy crudes, adjustments to the chemical can be made to increase the specific gravity and speed up the separation process. **Hydroscav** will not affect the hydrocarbons in any way.

Naphtha Sample: H<sub>2</sub>S = 112ppm ; RSH = 191 (ASTM D3227)

Hydroscav @	100 ppm		400 ppm		800 ppm	
	H <sub>2</sub> S	RSH	H <sub>2</sub> S	RSH	H <sub>2</sub> S	RSH
SAMPLE	112	191	112	191	112	191
IMMEDIATE	63	131	59	96	42	80
AFTER 4HR	49	97	14	63	NIL	39
AFTER 8HR	40	73	NIL	34	NIL	22
AFTER 12HR	33	62	NIL	24	NIL	3.4

The amount of **Hydroscav** required to remove H<sub>2</sub>S from any system is typically around 30% less than that of a triazine based Scavenger. The reaction is stable and the result is a non toxic sulphate salt that can be easily handled.

### Frequently Asked Questions

**How fast is **Hydroscav** able to removal of H<sub>2</sub>S?** The reaction with **Hydroscav** and H<sub>2</sub>S is instant once contact is made. RSH reaction time can take longer depending on the RSH species. Typically, the treatment time required is more a function of the efficiency of the application and nature of the asset that is being treated.

**Are light thiols or other sulphur compounds effected or only H<sub>2</sub>S ?** All sulphur compounds react with the chemical.

**What is the level of Effectiveness of **Hydroscav** to remove H<sub>2</sub>S / RSH in the liquid phase?** 650 mg/L (combined H<sub>2</sub>S & RSH) in liquid phase was tested and was successful. No upper limit has been established.

**How do you remove the used and unused **Hydroscav** from Fuel Oil?** The product is 100% miscible with water and this is a SINGLE PHASE system only. In liquid hydrocarbon applications, the sulphates which are created by **Hydroscav** stay in the water phase and are separated from hydrocarbons during normal separation.



**What is the effect of the scaling potential of the system?** *Hydroscav* will slightly increase the pH of the water, therefore, analysis has to be carried out to determine the effect of this increase in pH, particularly where there are high levels or suspended solids or calcium carbonates in the produced water.

**What is the potential of scaling with the reacted or un-reacted *Hydroscav*?** NONE - No potential scaling in ordinary environments. The increase of SO<sub>4</sub><sup>-2</sup> in the water phase will depend on the mole-mole equilibrium between quantity of H<sub>2</sub>S / RSH and *Hydroscav*. Cat ions such as Barium, phosphorous and others associated SO<sub>4</sub>-2 Cat ions may cause fouling or deposits once it has reached maximum solubility. Excess THIScavenger will not cause any deposits.

**Do you use an air oxidiser? If so, how can you ensure that you have enough O<sub>2</sub> under anaerobic conditions?** - No, enclosed system; hence no Oxygen ingress.

**What is formed at higher temperatures?** It does not decompose thermally within the operating temperature range up to 300 Deg. C

**Did you find increased sulphate levels in the water after treatment?** Yes - the amount of increase is directly related to the amount of H<sub>2</sub>S / RSH treated by the chemical.

**How effective does the mixing have to be?** No special mixing tooling required with water. In gas lines, inject with sprayer nozzle under positive pressure. For heavy crudes and HSFO, it is recommended to inject as early as possible or at pump inlet to ensure efficient mixing.

**How fast or complete is the phase separation afterwards?** There is complete separation from the hydrocarbon phase, and the speed of the separation can be adjusted by adjusting the specific gravity of the chemical.

## Disclaimer

*The information on this document is not intended to be exhaustive and any person using this product without first contacting the manufacturer or associated representatives for confirmation, does so at their own risk. Health and safety precautions in this data sheet may not be adequate for all individuals and/or situations. It is the user's obligation to evaluate and use this product safely and to comply with all applicable laws and regulations. No statement made in this data sheet shall be construed as a permission or recommendation for the use of any product in a manner that might infringe existing patents. No warranty is made, either expressed or implied. The information in this sheet is liable for modification from time to time in the light of new experiences – please contact us for the latest version.*