



Global Oilfield Solutions

Basolon® GL 40 and Basolon® IN 40:
H₂S scavengers for the oilfield application



Hydrogen sulfide (H_2S) occurs naturally and is frequently encountered in the oil and gas industry. Natural gas or crude containing hydrogen sulfide (H_2S) is commonly referred to as sour gas and/or sour crude. H_2S is soluble in both water and hydrocarbon. Operators are faced with several major issues when producing gas containing H_2S and these include safety, environmental and regulatory concerns and operational issues. A variety of solutions is available for the removal of H_2S from gas and crude oil stream with one of the most common use of liquid H_2S scavenger. For many operators, this is the preferred option of scavenging H_2S .

H_2S SCAVENGERS

General information

Product	Description	Form	Solids content	Pour Point	pH
Basolon® GL 40	Glyoxal	Liquid	40%	- 14 °C	3.5
Basolon® IN 40	Inhibited Glyoxal	Liquid	39.5%	- 14 °C	3.5

Cover picture:
Cryo-SEM (Scanning
Electron Microscopy)
image of iron sulfide
particles in false color
representation

Advantages of Basolon® GL 40 and Basolon® IN 40

- **Basolon® GL 40** and **Basolon® IN 40** can be more efficient than the alternative triazine products
 - Example: 13 liters of **Basolon® GL 40** and **Basolon® IN 40**/kg H₂S versus 15–17 liters of triazine scavenger/kg H₂S has been observed in field application
- No precipitation of calcium scale in **Basolon® GL 40** and **Basolon® IN 40**/brine solutions
 - Case studies #2 revealed no scaling produced from **Basolon® GL 40** and **Basolon® IN 40** treatment
- **Basolon® GL 40** and **Basolon® IN 40** has very high temperature stability with no decomposition up to 150 °C
- **Basolon® GL 40** and **Basolon® IN 40** + H₂S reaction products are 100% water soluble and do not precipitate by oversaturation
- **Basolon® GL 40** is non-amine based

ADDITIONAL SECONDARY FEATURES

- No foaming is observed with **Basolon® GL 40** and **Basolon® IN 40**
- No emulsion is observed with **Basolon® GL 40** and **Basolon® IN 40**
- Carbon Steel CS 1018: minimal corrosion (0.01 mmpy) observed with **Basolon® IN 40**
- Water miscible solvents such as MEG/MeOH are compatible
- **Basolon® GL 40** and **Basolon® IN 40** materials compatibility (NACE standard TM-01-69)
 - Stainless Steel 304 and 316: no corrosion observed
 - HD PE and PP, Hytrel 6356, PTFE, Viton, EPDM: no significant changes
 - Nylon 11, Nitrile Buna N, HNBR: satisfactory

SUGGESTED APPLICATION

- 3-phase production streams
- 2-phase gas streams
- Downhole
- Subsea
- Wellhead
- Bulk storage tanks
- Produced water streams



Initial recommendation

Scavenging H₂S is considered a two step process. The hydrogen sulfide must first be dissolved into the fluid and then once dissolved, it must quickly react with the scavenger molecules. The rate of removal is governed by the rate at which the H₂S dissolves into the scavenger-containing phase (mass transfer rate) and the rate that the scavenger reacts with H₂S. For this reason, contact time is the major consideration when designing an H₂S scavenger program.

Scavenging rate/efficiency is governed by the following parameters:

- Temperature
- Flow regimes
- Contact time
- Equipment design

A suggested treatment is 7 to 12 ppm of **Basolon® GL 40** or **Basolon® IN 40** per ppm H₂S per bbl of fluid. It is highly recommended to use an atomizing injection quill for all continuous treatments.

Basolon® IN 40 inhibited glyoxal

It is a requirement for products used in the production of crude oil or natural gas to not increase the corrosion of the rate of fluids. It has been observed that **Basolon® GL 40** can cause corrosion of carbon steel. Corrosion in fluid streams containing 0.1 – 1% (i.e. 1,000 – 10,000 ppm) of **Basolon® GL 40** can easily be mitigated by the application of standard production corrosion inhibitors. These standard corrosion inhibitors types include quaternary ammonium compounds, alkylalkylenediamine and fatty acid salts and derivatives.

For concentration higher than 1% **Basolon® GL 40** in production streams or in application that require concentrated forms of **Basolon® GL 40**, BASF has developed **Basolon® IN 40**.

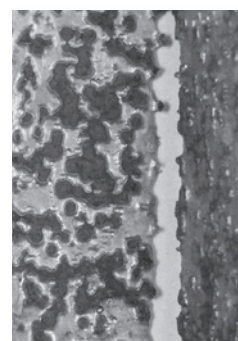
LAB RESULTS

TEST METHOD **Basolon® IN 40** (40%) for 14 days at 60 °C with mild steel 1018 NACE standard TM-01-69

TARGET 0.1 mmpy

RESULTS **Basolon® IN 40** reached the target of 0.1 mmpy with no pitting observed and was stable at 4 °C, 25 °C and 50 °C for 30 days.

Basolon® GL 40
7 – 12 mmpy



Basolon® IN 40
0.1 mmpy



Basolon® GL 40 case studies

CASE STUDY #1 ONSHORE

CHALLENGES

- The primary goal was to reduce levels of H₂S primarily for HSE and cost efficiency
- H₂S scavenger that could be applied to produced fluids prior to depressurization and separation either at wellhead or downhole
- Storage Tank H₂S levels 3,600 ppm (Acceptable level <1,000 ppm)
- Fuel Gas H₂S levels 2,800 ppm (Acceptable level <500 ppm)

RESULTS

- 86% reduction of H₂S levels in storage tank was achieved
- 64% reduction in fuel gas whilst injecting **Basolon® GL 40** (40%) at 4,500 ppm
- During the field trials **Basolon® GL 40** (40%) had no adverse effects on:
 - Produced water pH and bicarbonate levels therefore did not affect the carbonate scaling potential
 - No issues in oil-in-water quality or fluid separation were observed
 - Increase in production of approx. 4% crude was observed

CASE STUDY #2 OFFSHORE

CHALLENGES

- In the North Sea sector, H₂S levels in gas are typically maintained at the required specification by injecting triazine based H₂S scavenger's topside into the gas stream.
- Triazine scavenger residuals and reaction by-products that are returned from the gas system into produced water can cause severe scaling problems.
- With triazine, calcium carbonate scale was found to build up within equipment to an unworkable level within 2 weeks and production had to be halted for the application of a dissolver.

RESULTS

- The service provider formulated **Basolon® GL 40** and recommended it for field trial
- **Basolon® GL 40** was found to reduce topside H₂S levels by 83% from 32 ppm to 4 ppm with injection at 850 ppm based on total fluids
- Due to the nature of **Basolon® GL 40**, the scaling tendency of the produced waters was reduced and no build up/restriction was observed
- **Basolon® GL 40** treatment eliminated the requirement of the regular process shut-downs to carry out scale dissolver treatments

CASE STUDY #3 OFFSHORE

- **Basolon® GL 40** has been used since 2006 to control the H₂S from a field which is tied back to a highly sensitive separation process 14 km away
- The product is supplied subsea directly into the wellheads providing excellent reaction temperature for **Basolon® GL 40**
- The long tie back provides excellent reaction environment for **Basolon® GL 40** with long contact time and high turbulence during the transit time to the installation
- It efficiently reduces H₂S at an average of 88% to 4 ppm, which is well below the 9 ppm gas lift riser specification for this field
- **Basolon® GL 40** has been found to have no detrimental effect on the oil-in-water or separation of the process

**North America –
Global Headquarters**

BASF Corporation

Global Oilfield Solutions
3120 Hayes Road
Suite 200
Houston, TX 77082
US
Phone: +1 800 7941019
Fax: +1 877 2451806

Europe

BASF SE

Global Oilfield Solutions
G-EVG/GM – J542 S
67056 Ludwigshafen
Germany
Phone: +49 621 60-0

Asia

BASF South East Asia Pte. Ltd.

Global Oilfield Solutions
33 Tuas Avenue 11,
Singapore 639090
Singapore
Phone: +65 6860 7051

South America

BASF S.A.

Global Oilfield Solutions
Avenida das Nações Unidas,
14.171 Morumbi
04794-000 São Paulo
Brazil
Phone: +55 11 2039-3482
Fax: +55 11 2039-2786

Middle East/North Africa

BASF Middle East LLC

Global Oilfield Solutions
P. O. Box 2996
Dubai
United Arab Emirates
Phone: +971 4 8072222
Fax: +971 4 8072149

For further information:

oilfieldsolutions@basf.com
www.oilfield-solutions.basf.com