



# Further Enhance your Oil Recovery with Aspiro™ surfactants

BASF, the world's largest chemical company, offers a full suite of surfactants for EOR application.

Conventional oil production methods can only access around 30% of the oil in any given reserve. Enhanced oil recovery methods are critical for oil producers looking to maximize the yield from their existing assets.

Surfactants are chemicals that reduce the interfacial tension between oil and water and alter reservoir rock wettability. This shift helps trapped oil droplets detach more easily from rock surfaces and flow toward production wells. By improving oil and water relations, surfactants can

significantly enhance oil recovery, unlocking additional value from reservoirs previously considered uneconomical.

Our team of dedicated EOR experts, armed with a strong solution portfolio, have the years of experience and application knowledge necessary to guide you on how to apply our products effectively in the field.

## Why choose BASF as your Enhanced Oil Recovery partner?



# The Aspiro™ Product Range

BASF offers a variety of high-quality Aspiro™ surfactants that can be formulated to match diverse crude oils and varying field conditions. Depending on the requirement, our products can either be selected off-the-shelf or tailored for the specific application. We can also work with you on fully customized formulations to fit your reservoir.

The table below is a selection of surfactants from our current portfolio:

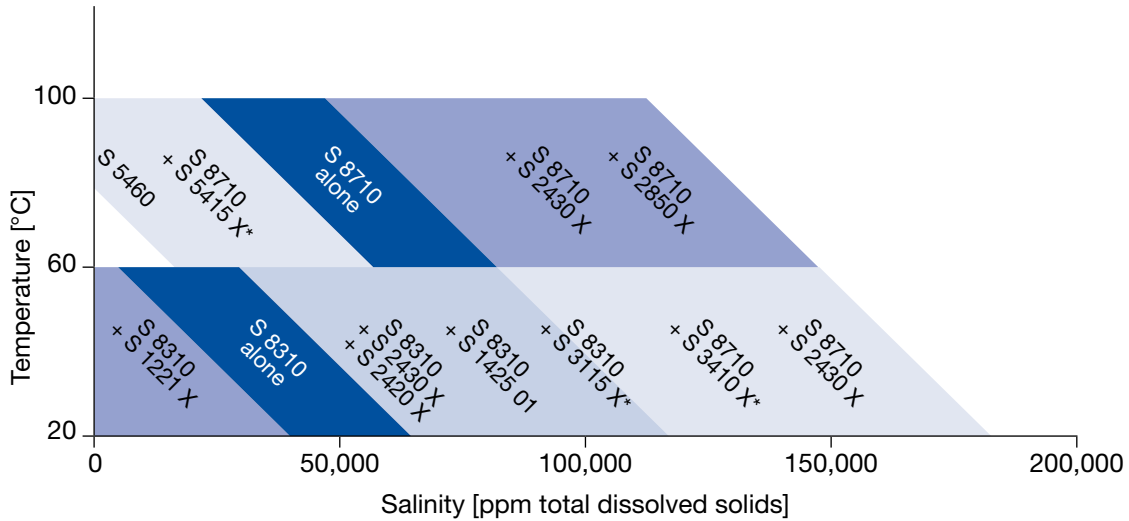


Function	Chemistry	Recommended Product
Surfactants	Alcohol alkoxyates	Aspiro™ S 1235 Aspiro™ S 1661 Aspiro™ S 1685
	Alkyl polyglucosides	Aspiro™ S 2420 Aspiro™ S 2850
	Alkyl ether sulfate	Aspiro™ S 3115
	Alkyl benzene sulfonate	Aspiro™ S 5460
	Cationic	Aspiro™ S 6420
	Higher MW extended anionics	Aspiro™ S 8310 Aspiro™ S 8710
	Co-surfactants	Alcohol alkoxyates

# BASF Surfactant starting formulation guide

The technical development teams within BASF focus on further extending the capabilities of our Aspiro™ Surfactants to match an even wider range of reservoir conditions, especially in the areas of very low and very high salinities combined with high temperatures.

A formulation starting guide of BASF's EOR surfactants for the applicable salinity and temperature window is displayed below, and more options are available upon request:



## Bringing Innovation

With our strong BASF research arm, we are constantly looking for new innovations to enhance the Aspiro™ portfolio and improve formulations. Additionally, our fully equipped oilfield labs with EOR-specific capabilities allows us to carry out lab work to maximize product performance with in-house efficiency.



## Supply Chain

Once product selection has successfully passed applicable testing and piloting, and you are ready to place regular orders for Aspiro™, BASF can assist by identifying the best supply points to minimize lead times.



## Sustainability

Many surfactants are produced from biobased feedstocks, like olio-chemicals and alkyl polyglycosides, meaning they are derived from plants and biodegradable. Surfactants also improve the efficiency of natural resources by improving oil cuts & reducing water use, allowing you to secure more oil out of the ground with less energy spent on uplift.



## Production

Our extensive surfactant production footprint, spanning over 30 sites worldwide, allows us to support EOR customers globally with locally produced surfactants, ensuring a reliable supply to the broader market. Additionally, we offer various packaging solutions tailored to your needs.

# BASF Scientific Expertise: EOR Capabilities

Our team of experts support the whole oilfield value chain from lab evaluation to full field implementation, through a deep understanding of the crude oil-brine interaction.

BASF's holistic approach to surfactant formulation encompasses the specialized lab equipment and process expertise necessary to complete a full suite of tests for EOR.



## Formulation

Surfactant  
Polymer

Cosolvents  
Alkali



## Interfacial tension

Spinning drop  
tensiometer



## Aqueous stability

Variation of electrolyte  
concentration

Assessment of  
solubility



## Phase behavior

Salinity scan  
Water/Oil (W/O) scan

Windsor phase  
behavior



## Coreflooding

Additional oil  
recovery

Adsorption



# Enabling customer success with BASF formulation and testing capabilities




## 1

### Solubility assessment and aqueous stability

These tests measure the compatibility of the identified surfactant formulation with the formation water and other production chemicals at injection and reservoir temperatures. The presence of hydrolysis can also be measured in high temperature and low pH conditions.

#### Evaluation conditions

The images below show a successful solubility assessment at increasing salinities.

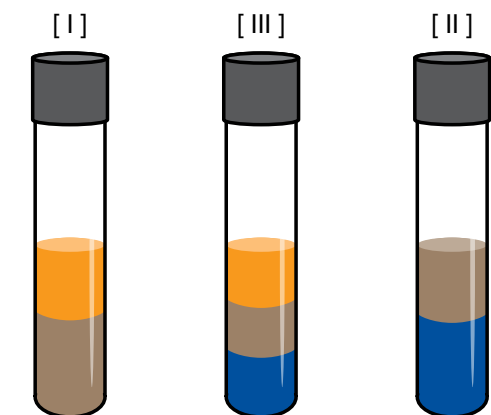
	ASP Formulation 1	ASP Formulation 1 + 0.5% Na <sub>2</sub> CO <sub>3</sub>	ASP Formulation 1 + 1% Na <sub>2</sub> CO <sub>3</sub>
Solution at reservoir temperature			
<b>Assessment</b>	Soluble & Stable	Soluble & Stable	Soluble & Stable

## 2

### Windsor phase behavior study, salinity scan, w/o scan, activity map and interfacial tension

Our lab capabilities enable us to test the ideal surfactant formulation by employing both interfacial tension and solubilization testing methods. This holistic approach allows us to measure the specific interfacial tension of a formulation and describe the specific water-oil interaction via a phase behavior study.

#### Phase behavior tests (Windsor type emulsion evaluation)



Increasing temperature (non-ionic surfactants)  
 Increasing salinity (ionic surfactants)

Water Oil Microemulsion

# 3

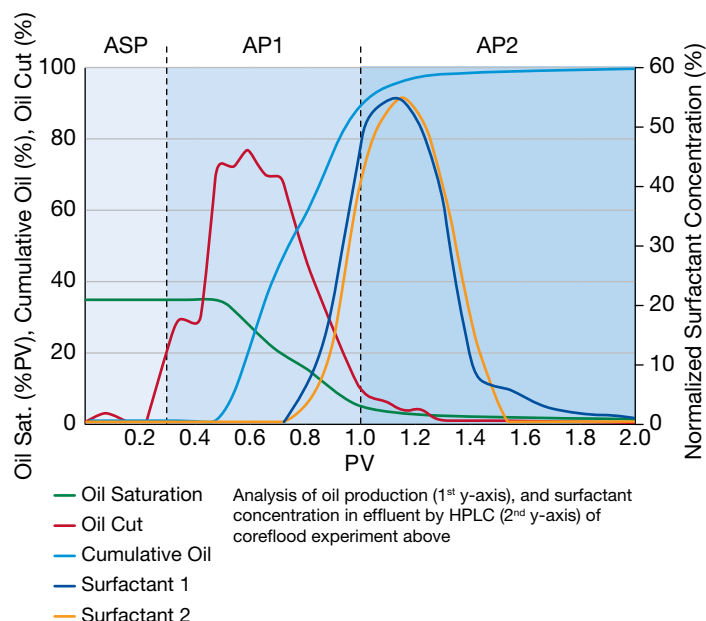
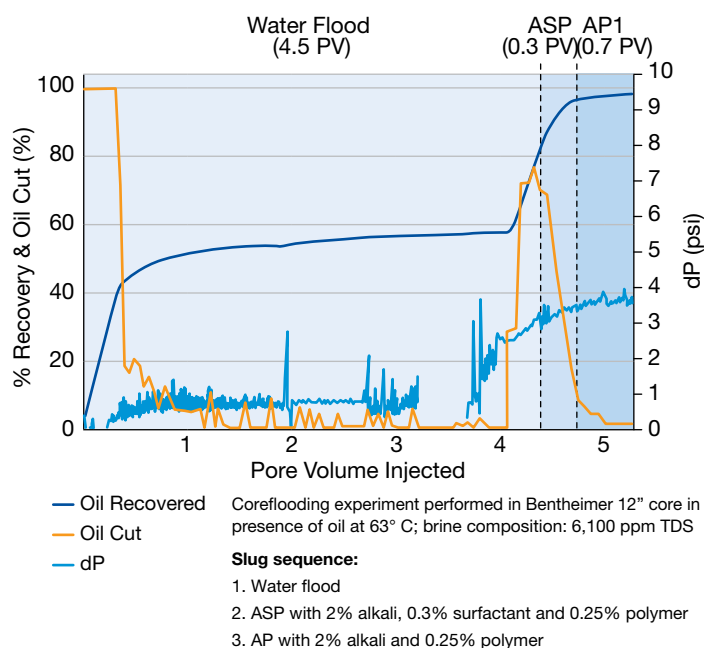
## Studying water/oil interaction

Windsor phase behavior studies, water-oil ratio tests, and microemulsion viscosity and fluidity measurements are all performed to identify surfactant formulations with a profile ideal to enabling high oil recovery. To further assess formulation effectiveness, solutions are studied in core-flooding experiments.

# 4

## Coreflooding of formulations

Coreflood experiments are another important tool to identify the most economic formulation for your field. In our dedicated coreflooding laboratories we can determine the shape of your oil bank and better assess the level of additional oil recovery that can be achieved with a developed formulation through specialized testing of displacement efficiency, formulation retention and adsorption analysis, and identification of chromatographic separation phenomena.



## Formulations, Logistics and HSE (Health, Safety and Environment)

We deliver global solutions while fully complying with HSE regulations. Our surfactants meet high industry standards with comprehensive QA/QC processes. When desired or needed, BASF can create custom concentrated blends, collaborating closely with customers to consider local conditions like climate, logistics, storage, and handling needs.

For further information visit our website:  
[www.oilfield-chemicals.basf.com](http://www.oilfield-chemicals.basf.com)



### **Product availability may vary by region.**

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