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# ENHANCE

Science and Innovation for  
Mineral Processing Solutions

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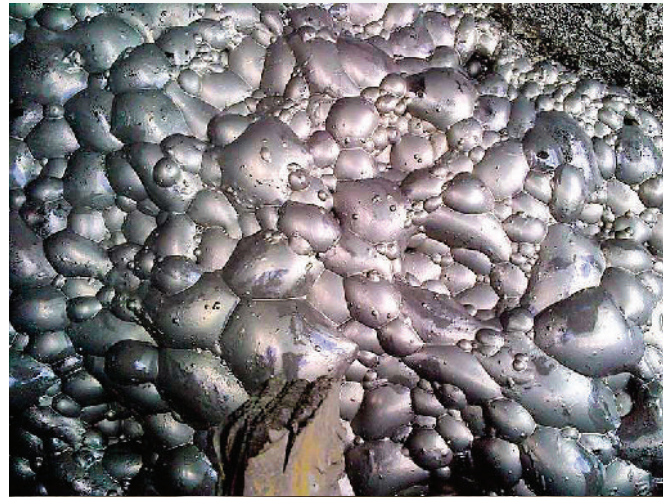
**Flotation Frother Products  
for the Mining Industry**



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# Interchem's Mining Solutions

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**Interchem's Mining Business offers a diverse range of chemicals and technology solutions for mineral processing to improve process efficiencies and help our customers to create sustainable, differentiated processing solutions for a fast-changing world.**

Interchem's Mining division has extensive experience in the mining industry and we offer a number of products for mineral processing, with a specific focus on froth flotation and hydrometallurgy. Flotation reagents include frothers, specialty collectors, depressants, and dispersants. Interchem also offers selected solvent extraction reagents for hydrometallurgical applications, as well as activated carbon for gold leaching, reagents for dewatering processes, and dust control products.

Interchem's mining reagents are used throughout the ASEAN region and finding wider use in the global mineral processing industry as the industry seeks to achieve improved metallurgical performance, cost efficiency and an improved environmental and safety impact from the reagents they use.



With manufacturing sites and technical teams located in Australia, Interchem combines its global feedstock reach with in-depth regional and sector specific support. We utilize our industry leading synthesis and solutions for our customer's specific needs that add value and competitive advantage. Interchem's technical support is driven by that common goal and is provided on a regional and local basis. Our leading frother industrial applications knowledge, combined with the provision of equipment and tailored reagent distribution dosing systems makes Interchem the ideal partner for frother reagent applications.



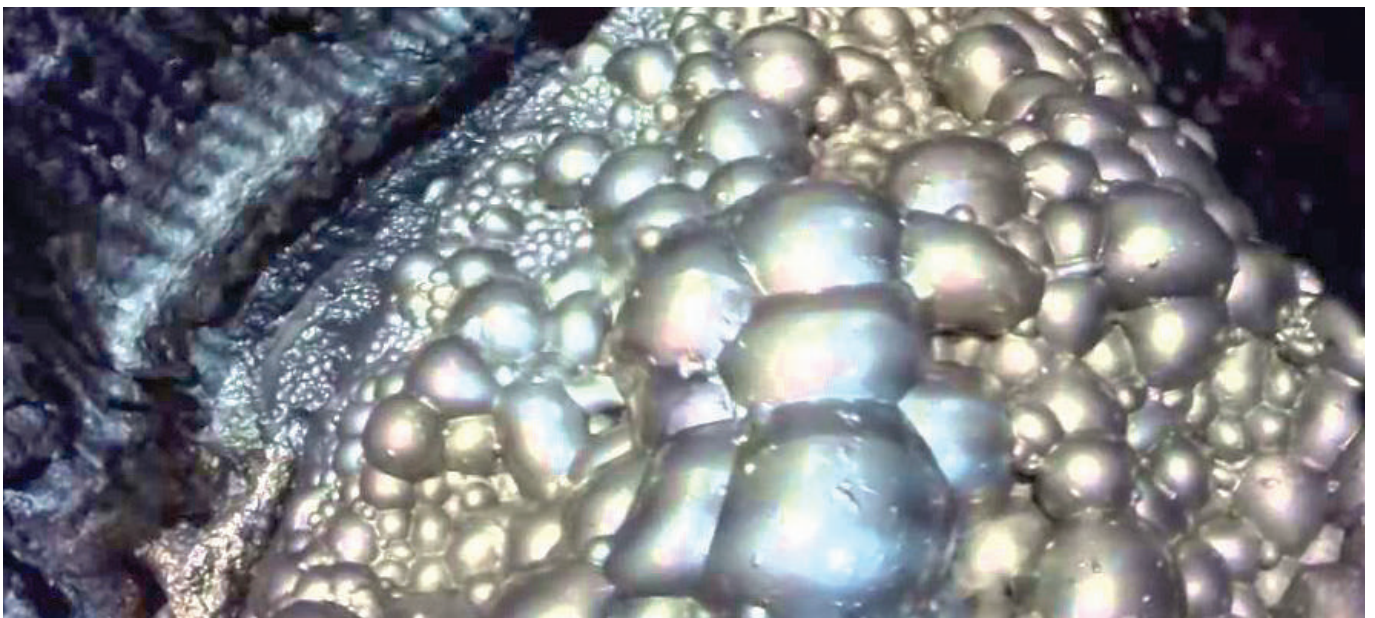
# Flotation Frothers

Our frothers aim to provide improved safety, health and environmental outcomes resulting in lower compliance costs associated with their transportation, storage, handling and use.

**Interchem's frother range is based on various pure aliphatic alcohols including methyl isobutyl carbinol (MIBC) and 2-ethyl hexanol, with a range of molecular weights and physical properties, and polyglycols and polyglycol alkyl ethers formed from condensation of alkylene oxides with lower alcohols. When carefully formulated together these chemistries offer different performance characteristics and flammability ratings to suit differing flotation applications and customer needs.**

The INTERFLOAT® series is a comprehensive range of specialty frothers developed and manufactured by Interchem. We have carefully formulated the INTERFLOAT® range of frothers to deliver the full spectrum of frother properties (e.g. selectivity, water solubility, kinetics) and froth strengths required in coal, mineral sulfide and precious and industrial mineral applications. This is achieved by combining significant industrial experience in frother application and existing product technologies, as

well as utilizing innovative new product development. Each group provides particular characteristics which affect load support, froth stability, bubble diameter, water retention and drainage, air dispersion, and froth formation kinetics. Customised formulation by ore type ensures that our frothers are able to achieve significant benefits from improved metallurgical performance, reduced rates and costs and improved safety profiles.



# INTERFLOAT® Frother Series Properties

Interchem’s range of flotation frothers includes alcohols, glycol ethers and blends, polyglycols, and blends of proprietary chemicals, and covers the full range of requirements, from low strength for selective flotation through to high strength for coarse particle recovery for all ore types as shown in Figure 1.

**The INTERFLOAT® frother series offers a range of frother strength, stability and solution properties, which can be applied to a range of flotation applications.**

They are designed with higher flashpoint properties and stronger than single component alcohol-based frothers such as methyl isobutyl carbinol (MIBC) and 2-ethyl hexanol, whilst being more selective than pure polyglycol and polyglycol ether

chemistries. The special range of frothing properties and selectivity found in the low strength frother products (INTERFLOAT® “200’s Series”) provides application and performance benefits in a wide range of flotation situations, including coal flotation. The INTERFLOAT® “200’s Series” can be successfully used in conventional and column cell flotation and in Jameson cells. These Interchem materials typically generate improved frother efficiency, whilst retaining good grade selectivity and low levels of residual frother in solution. Safety and handling aspects have been carefully considered during formulation, and the frother products in this Series offer an advantage in being classified (GHS) as Category 4 flammable liquids with a flash point above 60 °C making them non-dangerous goods.

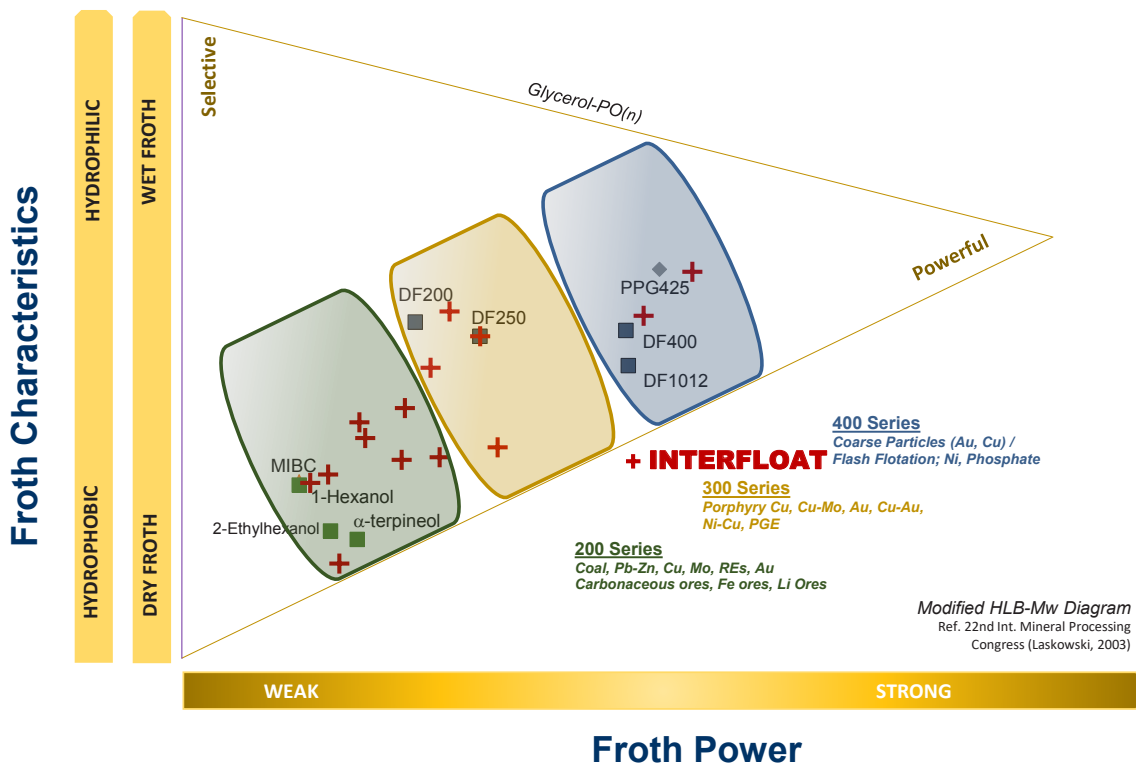


Figure 1. The INTERFLOAT® range of frother chemistries for all ore flotation applications.

# **INTERFLOAT® Frother Series Product Range**

The Interchem Frother Selection Guide (on the next page) has further details on the **INTERFLOAT®** frother range. Principal product characteristics are also described below. They range from the **INTERFLOAT® 400** series of frothers which are recognised as strong frothers, to the **INTERFLOAT® 300** series which are intermediate strength frothers, to the **INTERFLOAT® 200** series which are low to moderate strength frothers, and include some of the weakest and most selective frothers in the range.

**The unique range of frothing properties and selectivity is what gives the different Interchem INTERFLOAT® frothers their application and performance benefits in a wide range of flotation situations.**



# INTERFLOAT®

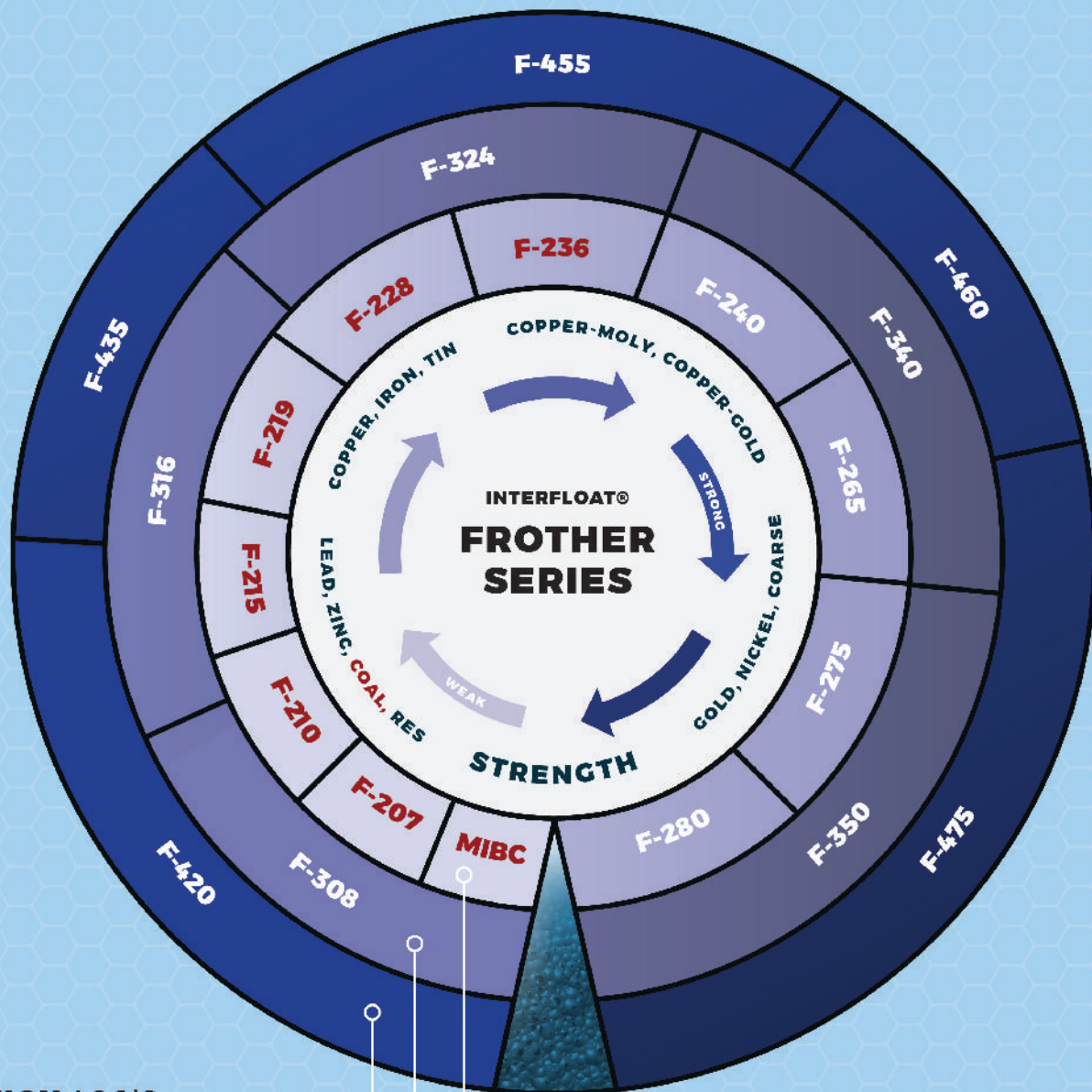
## Optimize your flotation frother reagents.

A comprehensive and carefully formulated range of frothers for the Mining Industry to deliver the full spectrum of frother performance characteristics. Interchem frother reagents are classified as non-Dangerous Goods.

Frother Series	Froth Strength	Mineral Application
200's	Low to Medium	Coal, Pb-Zn-Ag, Mo-Cu, Cu-Mo, Au, Fe, RE
300's	Medium to Strong	Cu, Cu-Au, Au, Ni-Cu, PGA
400's	Strong	Au, Ni, Phosphate, Flash Cell, Coarse Particles

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The information contained in this document is based on trials and data selected from the literature, but shall in no event be held to constitute or imply any warranty from our part. No liability whatsoever can be accepted by Interchem with regard to the handling, processing or use of the product(s) since the conditions and methods of use of the product and of the information referred to herein are beyond our control. The unauthorised copying or distribution of this document or any information it contains is prohibited.



**HIGH** 400'S

**MID** 300'S

**LOW** 200'S



Figure 2. The Interchem Frother Selection Guide

# INTERFLOAT® Frother Series Product Range



The selections from the range include low strength INTERFLOAT® F207 frother, INTERFLOAT® F210 frother, INTERFLOAT® F228 frother for selective flotation, through to INTERFLOAT® F236 frother, INTERFLOAT® F308 frother and INTERFLOAT® F435 frother for higher strength and coarse particle recovery.

<b>INTERFLOAT® 200'S FROTHER SERIES (Low)</b>	<b>INTERFLOAT® 200'S FROTHER SERIES (Low-Mid)</b>	<b>INTERFLOAT® 300'S FROTHER SERIES</b>	<b>INTERFLOAT® 400'S FROTHER SERIES</b>
<b>LOW STRENGTH</b>	<b>LOW TO MODERATE STRENGTH</b>	<b>INTERMEDIATE TO HIGH STRENGTH</b>	<b>HIGHEST STRENGTH</b>
<p><b>INTERFLOAT® F207</b> frother, <b>INTERFLOAT® F210</b> frother are among the weakest, and most selective of the frothers in the series, and comparable to MIBC and other low strength alcohol based frothers.</p> <p><b>INTERFLOAT® F211</b> frother and <b>INTERFLOAT® F215</b> frother are lower strength, selective frothers and comparable to methyl isobutyl carbinol (MIBC) and other low molecular weight alcohol-based frothers. They have been specifically designed as high flashpoint alternatives to MIBC for use at a reduced dose rate than that typical of MIBC in coal flotation.</p>	<p>Intermediate froth strengths and a good balance between strength, hydrophobicity and kinetics are afforded by <b>INTERFLOAT® F219</b> and <b>INTERFLOAT® F228</b> frothers.</p> <p><b>INTERFLOAT® F236</b> frother is hydrophobic and also gives a boost in the flotation froth kinetics with generally higher froth concentrate carry-over (mass pull). It is well suited for use in copper flotation applications.</p> <p><b>INTERFLOAT® F265</b> frother is also hydrophobic and versatile for use in low to mid-strength applications and gold flotation.</p>	<p><b>INTERFLOAT® F308</b> frother is an alcohol-polyglycol ether frother blend that produces fast kinetics and relatively stable froths suited to gold-copper flotation.</p> <p><b>INTERFLOAT® F340</b> frother is an intermediate strength frother and usually gives a boost in the flotation froth kinetics and froth concentrate carry-over suited to gold flotation.</p> <p><b>INTERFLOAT® F350</b> frother is an intermediate to high-strength frother with solution and performance characteristics similar to those of DOWFROTH® 250C frother. It produces froths of well-defined structure and bubble size and is suited to applications requiring good froth depth control.</p>	<p><b>INTERFLOAT® F435</b> frother is among the strongest, most hydrophobic in the series and offers good kinetics and dose efficiency.</p> <p><b>INTERFLOAT® F460</b> frother is a strong and efficient frother, but less selective in use. Suited to coarse particles, flash flotation and nickel flotation.</p> <p><b>INTERFLOAT® F475</b> frother usually results in reduced dosage and better froth control than other alternative strong alcohol/polyglycol ether blends.</p>



## Benefits of Interchem Frother Formulations

Interchem's product development team can develop and customise frother solutions in collaboration with customer needs and flotation circuit duties. Our frother chemistry range is extensive and our team can supply individual components or carefully formulated (or emulsified) blended products to cover the full operational challenges and requirements faced in flotation, including particle size recovery, froth stability, grade selectivity and frother residual in solution requirements. This ability to produce site-specific formulations can lead to operational and economic benefits in terms of increased grade and recovery.

# Other Frother Product Information

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As a group the INTERFLOAT® frothers offer high metallurgical grades with low water carry-over into the concentrate. The INTERFLOAT® frothers have low volatility that gives very good froth efficiency. They have a low level of toxicity and odour, lower VOC (Volatile Organic Carbon) emissions and most are GHS classified Category 4 flammable liquids with flashpoint above 60 °C. The greater froth persistence, together with higher water solubility of selected high strength frothers in the INTERFLOAT® frother product series, can also offer the option of a simpler single point addition.

**Client experience has shown reduced dose rates for Interchem frothers that are typically less than those for other alcohol and glycol ether-based frother blends.**

## Handling and Storage

The INTERFLOAT® frother range can be supplied in drums, IBC Schutz boxes (totes) and as bulk isotanks. Further information on complete storage and handling requirements is provided in our material SDS for each product. The environmental benefits from the use of Interchem frothers arises from reduced handling complications in dealing with non-dangerous Goods.

## Materials Compatibility

Wire reinforced polypropylene is the preferred material for hoses. Compressed asbestos fibre (CAF) is satisfactory for pipework gaskets, and butyl elastomers and TEFLON® polymer (PTFE) are recommended for seals and valve seats. Copper and its alloys, including brass, may cause some discolouration of the products.

## Product Integrity

Maximum effective storage life will be achieved by storing products in sealed containers indoors, away from sunlight and heat sources. Because Interchem cannot control the storage and use conditions of its products, it is not possible to prescribe absolute shelf life. However, as a guide it is recommended that products in storage be checked against published sales specifications after 2 years.

## Environmental Profile

All Interchem frothers have a low level of volatility, toxicity and odour and are non-flammable. They are not classified as dangerous goods for transport by road, rail, air or sea.

# INTERFLOAT® Frother Series



## **Biodegradability**

From operational experience, it is estimated that Interchem flotation frother products will not persist indefinitely in the environment.

## **Service and Technical Support**

We are dedicated to giving our customers the finest quality products and service available. Interchem has the combined advantages of being a regional manufacturer and supplier with the knowledge of local requirements, and we are well positioned to service all your mining reagent needs. Our Mining team is highly experienced to be able to provide professional advice and prompt product support to its customers. We work with customers to provide solutions to complex technical problems and offer new materials from advantaged feedstocks that create value. Supported by scientists, engineers and technical specialists, Interchem is actively developing new products that improve mineral processing performance. Contact our customer sales representatives for more information on these products.

### **Our flotation testing capabilities include, but are not limited to:**

- Froth Stability – half-life measurements
- Laboratory (conventional cell, Jameson cell) and Locked Cycle flotation testing
- Plant Trials and Statistical Randomised Block Design
- Plant Surveys and Sampling
- Mechanical and Column Flotation Cells and the evaluation of Frother Performance
- Optimised frother addition and dosage conditions in all industrial circuits
- Logistics and Inventory Management for reagent supply



# About Interchem

Interchem is a manufacturer and diverse supplier of specialty chemicals and intermediates for a broad range of industrial applications, including the mining sector. As a local and reliable ISO accredited company, Interchem is supported by strong relationships with key global producers to offer an extensive range of alternative supply options. Interchem is a partner who offers superior logistics management services, technical and product support services and can add value by assisting plant operations and personnel meet performance and safety objectives. We are dedicated to giving our customers the finest quality and service available. Customers are valued partners who permit us to remain in business; we are privileged to serve their needs.

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