

Oilfield Chemicals

Product Brochure



Luoyang Pacific United Petrochemical Co., Ltd.

Company Profile



Founded in 2014, Luoyang Pacific United Petrochemical Co., Ltd. (UNPChemicals) focuses on the research, development, manufacturing and sales of oilfield chemicals, special lubricant additives, and industrial lubricant additives. The company has an area of more than 120 acres with modern and standardized fine chemical manufacturing plant, producing more than 10,000 tons of functional fine chemicals annually.

UNPChemicals oilfield chemical solutions cover the entire process of oilfield production, including drilling and completion, production stimulation operations, oil and gas production and transportation, and refinery. We are committed to providing efficient and environmentally friendly chemical solutions to the global oilfield industry, helping customers improve oil drilling and production efficiency, reduce costs, and protecting the environment.

Product application areas

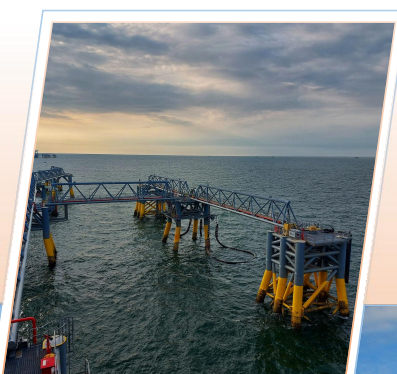


Well stimulation

Acidizing
Fracturing
EOR

Drilling & Completion

Drilling
Oilfield cleaning
Well completion



Refinery

Electrodesalting
Vacuum distillation
Ethylene cracking
PE/PP antistatic

Production

Production optimization
Asset integrity
Flow assurance



Drilling & Completion Solution



Water-based mud additive



Drilling muds are mainly divided into two categories: water-based muds (WBM) with water as the continuous phase and oil-based muds (OBM) with oil as the continuous phase. Oil-based muds use crude oil or refined hydrocarbons (such as diesel) as the continuous phase and are thickened by hydrophobically modified bentonite. Compared with water-based muds, oil-based muds perform well in terms of lubricity and reduced fluid loss, but the toxicity of its base fluid needs to be paid attention to.

Water-based muds use water as the continuous phase, and achieve thickening by adding bentonite or polymers, and increase density by dissolving salts or dispersing inorganic minerals of a specific particle size (such as barium sulfate) to balance the pressure of the formation fluid and prevent mud contamination. Due to the low cost of water-based fluids, water-based muds are usually the first choice when performance requirements are met. In the past, water-based muds were mainly used in low-temperature environments because they had poor rheological stability and high fluid loss under high temperature conditions. However, with the development of additives that can maintain stability at high temperatures, water-based muds can now be used in extreme drilling environments. From an environmental perspective, water-based muds are a better choice because their ingredients are relatively less toxic.

Water based mud additive



The following two tables list the properties and functions of UNPChemicals' water-based mud products.

General Information			Typical Properties		
Product	Description	Type	Form	pH	Typical Solids % (a)
VESMET APA-T	Tallow amidoamine oxide	Nonionic	Liquid	6	50
VESMET EHS	Zwitterionic surfactant	Cationic	Liquid	6.5	40
BIMET 1227	Benzalkonium chloride	Cationic	Liquid	7	35
BIMET 210	Didecyltrimethyl ammonium chloride	Cationic	Liquid	7	30
BIMET Y12D	Dodecyl dipropylene triamine	Nonionic	Liquid	8	100
CIMET TOI/TOH	Imidazoline (amino, hydroxyethyl)	Nonionic	Liquid	8	100
CIMET TOI-A/O	Imidazoline (modified)	Anions	Liquid	8	75
CIMET TOI-7/9	Imidazoline (ethoxylated)	Nonionic	Liquid	7	100
CIMET 515	Oligomeric ester amine	Cationic	Liquid	7	50
EUMET 6000	Alkyl glucoside	Nonionic	Liquid	7	65
EUMET 6040	Alkyl glucoside	Nonionic	Liquid	7	75
EUMET 6060	Alkyl glucoside	Nonionic	Liquid	6	60

Note: (a) Polymers are expressed as % of total solids, surfactants are expressed as % of active substances

General Information		Typical functions					
Product	Biocide	Corrosion inhibitor	Friction reduction	Dispersant	Wetting Agents	Salt water/Fresh water	High temperature stability
VESMET APA-T	–	–	•	–	–	Salt water	•
VESMET EHS	–	–	•	–	–	Salt water	•
BIMET 1227	•	–	–	–	–	–	–
BIMET 210	•	–	–	–	–	–	–
BIMET Y12D	•	–	–	–	–	–	–
CIMET TOI/TOH	–	•	–	–	•	Salt water	•
CIMET TOI-A/O	–	•	–	–	–	Salt water	•
CIMET TOI-7/9	–	•	–	–	–	Salt water	•
CIMET 515	–	•	–	–	–	Salt water	–
EUMET 6000	–	–	–	•	•	Salt water	–
EUMET 6040	–	–	–	•	•	Salt water	–
EUMET 6060	–	–	–	•	•	Salt water	–

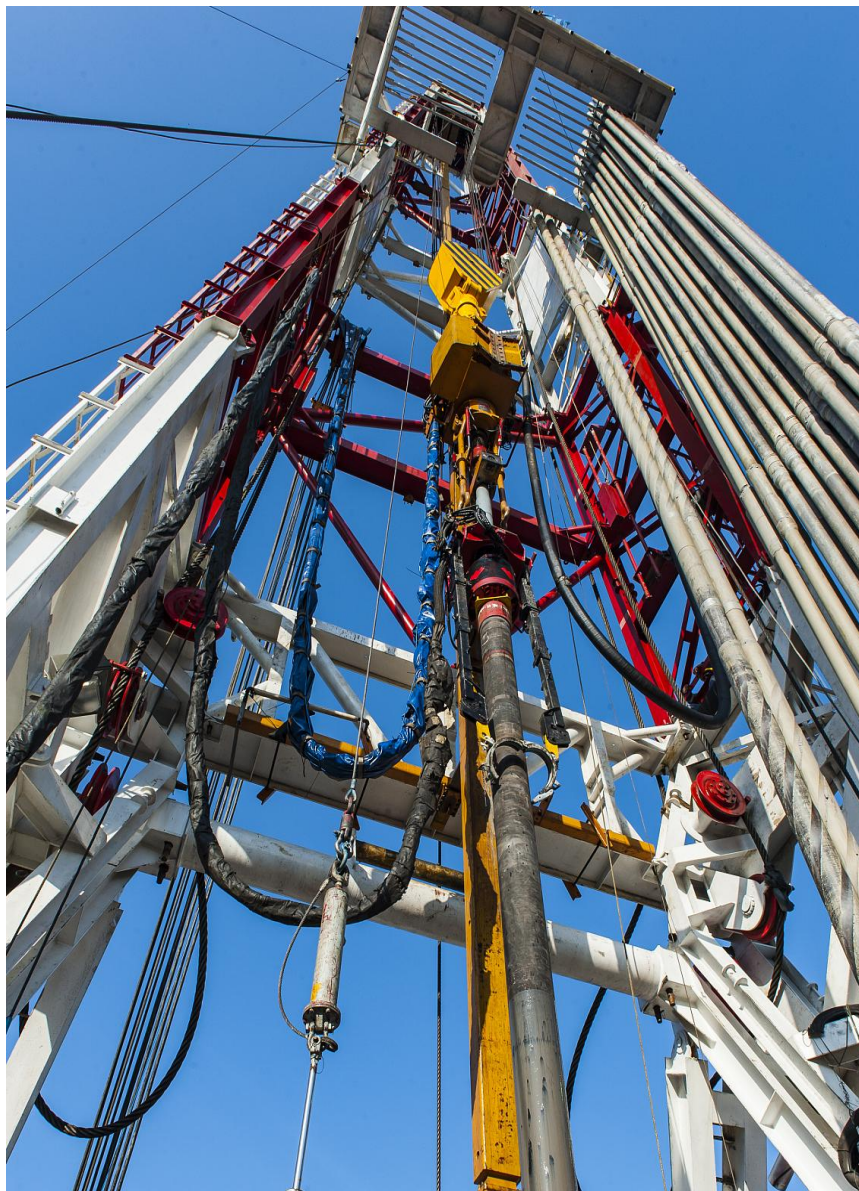
Oil-based mud additive



Oil-based muds use crude oil or refined hydrocarbons (e.g., diesel, white oil) as the continuous phase and are thickened by the addition of hydrophobically modified bentonite. The lubricity and fluid loss characteristics of these muds are superior to those of water-based muds, but the toxicity of their base fluids is a particular concern.

In recent years, "green" synthetic hydrocarbons known as synthetic-based muds (SBMs) have been developed. These non-aromatic materials contain easily breakable chemical bonds that facilitate biodegradation, making them suitable for use in environmentally sensitive areas. They are similar to traditional oil-based muds in terms of matrix properties, but due to their aliphatic nature, other chemical additives need to be adjusted accordingly. Although oil-based muds and synthetic-based muds are collectively referred to as oil-based muds, they are generally invert emulsions containing a high proportion of water. The viscosity of such emulsions is provided by the internal phase, which is usually denser using a high-salinity brine (e.g., calcium chloride).

To maintain the stability of invert emulsions, high-performance emulsifiers are required, which are composed of multiple components that optimize performance. One of the main advantages of oil-based mud is that it can keep the reservoir surface wet, thereby inhibiting shale expansion, reducing fluid loss and reducing damage to the production layer. In order to maintain the oil-wet characteristics, wetting agents are also added to the formulation. In addition, commonly used chemical additives include dispersants, lubricants and foaming agents.



Oil-based mud additive



The following two tables list the properties and functions of UNPChemicals' oil-based mud products.

General Information				Typical Properties						
Product	Description	Type	Form	pH	Brookfield Viscosity (20°C)	Pour Point (°F)	Kerosene	Water	Aromatic 150	Isopropyl alcohol
FMET 51/28	Alkanolamide	Nonionic	Liquid	8.6	850	<0	S	D	I	S
FMET 1017	Modified alkanolamide	Nonionic	Liquid	9.5	1300	32	S	S	I	S
CIMET TOI/TOH	Imidazoline	Nonionic	Liquid	8.0	--	--	S	I	S	S
EUMET 4050	Proprietary blend	Nonionic	Liquid	8.0	--	--	S	I	S	S
EUMET 3020	Surfactant blend	Nonionic/Anionic	Liquid	6.5	50	18	S	D	S	S
EUMET 3158	Surfactant blend	Nonionic/Anionic	Liquid	7	65	<0	ND	ND	ND	ND

Note: S = Soluble/Clear, D = Dispersible/Cloudy, I = Insoluble/Phase Separated, ND = Not Determined

General Information		Typical functions				
Product	Drilling mud Primary emulsifier	Drilling mud Auxiliary emulsifier	Drilling mud Lubricant	Blocked pipe additives	Drilling Mud Detergent	Wetting Agents
FMET 51/28	•	–	–	–	–	–
FMET 1017	–	–	•	–	•	–
CIMET TOI/TOH	–	–	•	–	–	–
EUMET 4050	•	•	–	–	–	–
EUMET 3020	–	–	–	•	–	–
EUMET 3158	•	•	–	–	–	–



Cleaning agent



In the field of oil and gas exploration, cleaning and wetting are crucial to the success of oilfield operations, and their applications are wide and diverse. There are still many other application scenarios in the oilfield field, in which the use of cleaning agents is the key to achieving performance requirements.

These application scenarios include but are not limited to: cleaning and degreasing of various drilling equipment, cleaning of storage tanks, cleaning of drilling cuttings, cleaning of cement isolation layers, drilling cleaning and isolation systems, removal of screen blockages, removal of drilling emulsions, cleaning of reservoir rocks, and adjustment of reservoir wettability.

In the oilfield, when people extract fluids and inject them into the well or introduce them into the reservoir, the interface will form rapidly and be modified as the physical and chemical conditions change. Therefore, in the process of developing formulations suitable for oilfields, in addition to scientific methods, there are still many technical components. Therefore, understanding the functional properties of each component in the mixture is very important for designing the best multi-component mixture.



Cleaning agent



UNPChemicals' EUMET™ series of surfactants can be divided into several different categories: water-soluble solubilizers, wetting agents, emulsifiers, solubilizers, and specific functions and performance information are shown in the following two tables.

General Information			Typical performance						
Product	Type	Description	Low foam	Medium foam	High foam	Water soluble solubilization	Wetting	Dispersion	Emulsification
EUMET 1000	Nonionic/Cationic	Dedicated	–	–	•	–	–	•	•
EUMET 1025	Nonionic/Cationic	Dedicated	–	–	•	–	–	•	•
EUMET 1100	Nonionic	Dedicated	•	–	–	–	•	–	•
EUMET 2000	Nonionic	Dedicated	–	–	–	–	–	–	•
EUMET 3000	Nonionic	Amide alkoxyolate	•	–	–	–	–	–	•
EUMET 4000	Nonionic	Alcohol alkoxyolate	•	–	–	–	•	–	•
EUMET 4150	Nonionic	Alcohol alkoxyolate	•	–	–	–	•	–	•
EUMET 4200	Nonionic	Alcohol alkoxyolate	–	–	•	–	•	–	•
EUMET 4350	Nonionic	Alcohol alkoxyolate	•	–	–	–	Optimal	–	•
EUMET 4380	Nonionic	Alcohol alkoxyolate	–	•	–	–	•	–	•
EUMET 6000	Nonionic	Alkyl glucoside	•	–	–	•	•	–	–
EUMET 6040	Nonionic	Alkyl glucoside	•	–	–	•	–	–	–
EUMET 6060	Nonionic	Alkyl glucoside	–	–	•	–	•	•	–
EUMET 6100	Cationic	Four Elements	–	–	•	•	–	•	–
EUMET 6250	Cationic	Four Elements	–	–	•	•	–	•	–

General Information				Typical Applications						
Product	Electrolyte stability	Requires water-soluble solubilizer	Indicative thermal stability (°C)	Acidic Cleaners	Alkaline (pH<12)	Strong alkalinity (pH>12)	Water-based degreaser	Solvent-based cleaners	Microemul-sion	Quick-break effect
EUMET 1000	Favorable	–	>150	•	•	–	•	–	–	•
EUMET 1025	Favorable	–	>150	•	•	–	•	–	–	–
EUMET 1100	Excellent	–	Short-term stability >150	–	•	•	•	–	–	•
EUMET 2000	Favorable	–	>150	–	–	–	–	–	•	–
EUMET 3000	Favorable	–	Short-term stability >150	–	–	–	–	•	–	–
EUMET 4000	When preparing	•	>150	•	•	•	•	–	•	–
EUMET 4150	When preparing	•	>150	•	•	•	•	–	–	–
EUMET 4200	When preparing	•	>150	•	•	•	•	–	–	–
EUMET 4350	When preparing	•	>150	•	•	•	•	•	•	–
EUMET 4380	When preparing	•	>150	–	–	–	–	–	•	–
EUMET 6000	Excellent	–	Short-term stability >150	–	•	•	•	–	–	–
EUMET 6040	Excellent	–	Short-term stability >150	–	•	•	•	–	–	–
EUMET 6060	Excellent	–	Short-term stability >150	–	•	•	•	–	–	–
EUMET 6100	Favorable	–	>150	•	•	–	•	–	•	–
EUMET 6250	Favorable	–	>150	•	•	–	•	–	•	–



As a professional supplier in the field of oilfield chemicals, UNPChemicals has a rich and diverse product line, which not only covers efficient and diverse oilfield cleaning agents, but also widely involves a variety of key oilfield chemicals such as emulsifiers, solubilizers and dispersants. These products play an indispensable role in the daily operations and complex processing of oilfields, providing all-round chemical support for oil and gas extraction and production.

In oilfield operations, the role of emulsifiers is crucial. It can effectively promote the mixing between oil and water to form a stable emulsion. This feature has significant advantages in many links of oilfields. For example, in the process of crude oil extraction, emulsifiers can help to better mix the crude oil dispersed in the formation with water, making it easier to be extracted; in the subsequent crude oil processing process, emulsifiers can be used to adjust the rheological properties of crude oil for easy transportation and processing. By optimizing the oil-water mixing process, emulsifiers not only improve operating efficiency, but also reduce equipment blockage and corrosion problems caused by incomplete oil-water separation, thereby extending the service life of equipment and reducing maintenance costs.

Hydrotropes are key products for improving the solubility of organic matter. In the process of oilfield development, some organic impurities or additives are often difficult to dissolve, which may hinder the smooth progress of the production process. Hydrotropes can significantly increase the solubility of organic matter in solvents by changing the polarity of solvents or forming micelle structures. For example, in the chemical flooding process of oil fields, solubilizers can help dissolve some high molecular polymers or other active agents so that they can play a better role and improve the recovery rate of crude oil. In addition, in the sewage treatment link of oil fields, hydrotropes can also help dissolve some difficult-to-degrade organic pollutants, thereby improving the efficiency of sewage treatment and reducing the impact on the environment.

Dispersants also play an important role in oilfield operations. It can prevent solid particles from agglomerating and maintain the uniform dispersion of particles in the liquid. In the drilling fluid and completion fluid of the oil field, dispersants can prevent drill cuttings and other solid particles from agglomerating and precipitating, thereby maintaining the good fluidity and cuttings carrying capacity of the drilling fluid, reducing the risk of drill bit wear and well wall collapse. In the process of oil and gas production, dispersants can also prevent solid particles in the formation from clogging pores, protect the permeability of the reservoir, and improve the flow efficiency of oil and gas. By preventing particle aggregation, dispersants not only improve operational efficiency, but also reduce the additional cleaning and repair costs caused by particle blockage, further reducing production costs.



Emulsifier/Hydrotrope/Dispersant



The oilfield chemicals such as emulsifiers, solubilizers and dispersants provided by UNPChemicals provide a full range of optimization solutions for oilfield operations through their unique chemical properties and synergistic effects. These products not only improve operational efficiency and reduce production costs, but also effectively protect equipment and reservoirs and reduce potential impacts on the environment. With its rich product line and excellent product performance, UNPChemicals has established a good reputation in the field of oilfield chemicals and provided strong support for the efficient, safe and sustainable development of the oil and gas industry.

Product	Type	Function Application	Remark
EUMET 3000	Oleyl monoethanolamide	Emulsifier	In oilfield cleaning, it has been mentioned
EUMET 6250	Quaternary ammonium compound	Hydrotrope	In oilfield cleaning, it has been mentioned
SCMET 602N	Water-soluble polycarboxylate	Dispersant	--
SCMET 100	Polymer	Dispersant	--
SCMET 747	Hydrophobically modified copolymer	Dispersant	--



Well stimulation Solution





As a leader in the field of oilfield chemicals, UNPChemicals has built a rich and complete product system with its profound technical accumulation and innovation capabilities. The company is not only famous in the industry for its star product, viscoelastic surfactants, but also has carefully developed and launched a series of high-efficiency and high-quality oilfield chemicals, including acid viscosifiers and acid emulsifiers **ACMET™** series, as well as diverting agent **VESMET™** and many other categories.

These products play a vital role in the production increase and acidizing process of oilfields. Acid viscosifier can effectively adjust the viscosity of acid, so that it has better retention capacity in the formation, thereby extending the contact time between acid and rock, improving the acidizing effect, more accurately dissolving blocking materials in the formation, unblocking oil and gas channels, and thus significantly improving the permeability and production of oil and gas.

Acid emulsifiers reduce the oil-water interfacial tension, promote the full mixing of acid and oil and water, form a stable emulsified system, optimize fluid performance, reduce the loss of acid in the formation, and prevent excessive damage to the formation by acid, ensuring the efficiency and safety of acidizing operations.

As an advanced acidizing technology product, diverting agent can automatically adjust the flow direction of the acid according to the pressure and permeability differences of the formation, preferentially flow to the low permeability area, achieve uniform acidizing treatment, further improve the overall development effect of the oil and gas field, and tap the potential production capacity of the formation.

In the context of the increasing emphasis on efficient and environmentally friendly production in today's oil and gas industry, UNPChemicals is committed to meeting the diverse needs of different users in the oilfield development process by providing these diversified and high-performance oilfield chemicals. Whether facing complex geological conditions or pursuing green and sustainable production goals, we can provide customers with customized solutions. With its professional products and services, UNPChemicals helps customers achieve higher efficiency, lower costs and less environmental impact in the process of oil and gas extraction, promotes the high-quality development of the oil and gas industry, and contributes to ensuring energy supply and promoting industry progress.

Product	Type	Function Application
ACMET O	Oleic alkylamine ethoxylate	Acid viscosifier
ACMET T	Tallow alkylamine ethoxylate	Acid viscosifier
ACMET 2C	Coco dimethyl quat	Acid emulsifier
ACMET 2HT	Tallow dimethylammonium chloride	Acid emulsifier
VESMET EHS	Hydroxypropyl sulfobetaine	Diverting agent
VESMET APA-T	Tallow aminoamine oxide	Diverting agent
VESMET O12	Ethoxylated ammonium quat	Diverting agent



Viscoelastic surfactant



The viscoelastic surfactant **VESMET™** series products developed by UNPChemicals can spontaneously form worm-like micelles in acid and brine, and construct a three-dimensional network structure through the mutual entanglement between micelles, thereby significantly improving the viscoelasticity of the solution. This unique property gives it a wide range of application prospects in oil fields, such as fracturing, completion, acidizing and water plugging. It is worth noting that UNPChemicals' products are not only suitable for medium and low temperature environments, but can also withstand high temperatures up to 350°F (175°C), providing a comprehensive solution for clean fracturing and acidizing operations in oil fields.

Product	Type	Function Application
VESMET EHS	Hydroxypropyl sulfobetaine	High temperature viscoelastic surfactant
VESMET APA-T	Tallow aminoamine oxide	Medium and low temperature viscoelastic surfactant
VESMET O12	Ethoxylated ammonium quat	Low temperature viscoelastic surfactant
VESMET COM	Surfactant blend	Well completion viscoelastic surfactant





VESMET™ EHS has many advantages for carbonate reservoir acidizing, in particular:

- It can effectively increase the viscosity of spent acid even under extreme conditions of bottomhole temperatures up to 350°F (175°C);
- It has elastic fluid properties, which significantly improves the self-steering ability in high temperature environments;
- It has greatly improved tolerance to iron ions, which can effectively prevent potential phase separation and damage to the reservoir caused by acidizing operations;
- It has significantly reduced ecotoxicity compared with similar viscoelastic surfactants;
- It requires less dosage to achieve the required self-steering viscosity, thereby further reducing the environmental burden, while showing better performance under low temperature conditions;
- It can achieve efficient debonding of spent acid using hydrocarbons in the field;
- In core displacement tests, it can form highly penetrating worm-like holes even at medium and high bottomhole temperatures, and its performance is better than all current similar products.

VESMET™ COM is an viscoelastic surfactant with unique properties for gravel-packed completion fluids. This low pour point product mixes easily with a variety of completion fluids, enhancing the fluid's viscoelastic properties, which in turn improves the suspension, transfer and replacement of gravel. It can also be used in wells with high bottom hole temperatures. Features:

- Excellent temperature resistance: Excellent gravel packing in mixed bromide brines at bottom hole temperatures up to 375°F.
- Unique chemical structure: Applicable to a variety of high-density inorganic salts, including ZnBr_2 (specific gravity 2.02), can be widely used in brine systems of different densities.
- Easy to operate: Can quickly increase fluid viscosity and simplify the operation process.
- Stable rheological properties: Maintains stable rheological properties under different working conditions to ensure the reliability of the construction process.
- Enhanced gravel suspension and sand carrying capacity: Viscoelastic fluids are particularly suitable for inclined and horizontal wells, effectively improving gravel suspension and sand carrying.
- High performance at surface temperature: The viscoelasticity of brine can be significantly increased at surface temperature, providing excellent proppant dispersion and transfer performance.
- Reduce pump pressure and shear resistance: Effectively reduce pump pressure, while having good shear resistance and reducing energy consumption.
- Polymer-free, easy to flow back: Contains no polymer components, easy to flow back, significantly improves gravel permeability, and reduces damage to the reservoir.
- Low pour point, adaptable to various climatic conditions: The low pour point property enables it to maintain good fluidity under various climatic conditions.

Production Solution





In the field of crude oil and natural gas extraction, extracting these precious resources from deep underground and achieving their separation and purification is a very challenging and complex project. It not only requires strict guarantee of operational safety and avoidance of any potential risks and accidents, but also pursues efficient and rapid extraction speed and economical and reasonable cost control, and must strictly comply with the laws, regulations and norms related to the local environment. In order to achieve these goals, it is essential to have a deep understanding of the characteristics of the liquids such as crude oil and natural gas being extracted, including their chemical composition, physical properties and behavior under different conditions. In addition, continuous optimization and innovation in engineering design, such as the layout of mining equipment, the planning of pipeline systems, and the design of separation and purification devices, are key factors in improving mining efficiency and quality. Advances in materials science also play an important role. The use of more corrosion-resistant, high-strength materials that can adapt to complex working conditions to manufacture mining equipment and facilities can effectively extend the service life of equipment and reduce maintenance costs and downtime. At the same time, attaching great importance to and actively planning mechanisms and conditions for solving various problems that may arise in the production process, such as establishing a complete monitoring system, emergency response plans, and efficient communication and coordination mechanisms, can help to quickly respond to emergencies and ensure the continuity of production. These factors interact with each other and jointly promote the significant increase in the scale and speed of mining, laying a solid foundation for the development of the energy industry. However, despite the progress made, this task remains complex and arduous, and the industry's demand for special chemical products always exists. These special chemical products play an indispensable role in ensuring the smooth progress of the mining process, improving production efficiency, reducing production costs and protecting the environment.

After years of unremitting efforts, UNPChemicals has successfully developed a wide range of high-efficiency products, covering [demulsifiers](#), [water clarifier](#), [corrosion inhibitors](#), [biocide](#), [paraffin inhibitors](#), [asphaltene inhibitor](#), [scale inhibitors](#) and [other categories](#). These products have been carefully developed and rigorously tested, and can accurately solve the various difficult problems faced by mining engineers and service providers in their daily work, providing them with strong guarantees and helping the efficient, safe and sustainable development of the energy mining industry.





In crude oil extraction, the multiphase fluid formed by oil, natural gas and a large amount of brine is subjected to strong shear at the perforation layer, downhole pump and wellhead, resulting in aggravated emulsification. Natural emulsifiers and solid impurities in crude oil further stabilize the emulsification interface, making it difficult to separate the emulsion. Most of the crude oil initially extracted is oil-in-water emulsion, which needs to be converted into a water continuous phase to achieve effective oil-water separation. However, gravity separation efficiency is low, especially when the relative density difference between hydrocarbons and water is small. In order to improve the demulsification effect, natural gas in the fluid is often removed first, which can be achieved by heating oil or emulsion, which can not only promote static coagulation of emulsion, but also melt wax, reduce crude oil viscosity, and make water droplets easy to settle. The most commonly used method is to add chemical demulsifiers, which are injected from the wellhead and mixed with the fluid to reach the emulsification interface, and adsorbed to the emulsifier through polarity differences, neutralizing the emulsification, making the water droplets merge and increase, and achieving separation. In addition, demulsifiers are also used for desalting in refineries. Imported crude oil contains 1% water, which dissolves a large amount of salt and damages the catalyst. Fresh water is added and demulsifier is used to condense salt. Under the action of electrostatic grid and desalting demulsifier, condensation and dehydration are achieved to produce crude oil suitable for refining.





Relative Solubility Number (RSN) is a measure of the solubility of demulsifiers in water, which is used to optimize demulsifier formulations and reduce experimental errors. The following is key information about RSN:

RSN value range and its meaning:

- $RSN < 13$: The product is insoluble in water.
- $13 \leq RSN < 17$: The product is dispersible at low concentrations in water and forms a gel at high concentrations.
- $RSN \geq 17$: The product is completely soluble in water.

Application criteria of RSN:

- For crude oil emulsions, the RSN of demulsifiers should be between 8 and 15.
- RSN values can be added algebraically. For example, when a product with an RSN of 10 and a product with an RSN of 20 each account for half, the RSN of the mixture is 15.
- The synergistic effect between intermediates usually makes mixed demulsifiers better than single-component formulations.
- Demulsifiers with very low or very high RSN values are rarely used alone, and their characteristics can be better exerted in mixtures.
- Demulsifiers formulated with intermediates from different chemical families are usually better than those formulated with intermediates from the same family because of synergistic effects.
- Some demulsifiers have special mixing characteristics, such as highly oil-soluble polyethylene glycol (low RSN), which can make excellent demulsifiers when mixed with alkoxylated resins.

By rationally utilizing RSN, demulsifier formulations can be designed more scientifically, improving demulsification effects and reducing experimental costs.





UNPChemicals' demulsifier **DEMET™** series is mainly divided into two categories: "dry type" and "fast dehydration type", based on the dehydration speed and the water content of the crude oil after dehydration. However, this classification is not absolute, and the actual screening results may require adjustments to the classification. This classification is based on a lot of practical experience and is for reference only. The specific classification needs to be verified by bottle test experiments. In addition, electric desalting demulsifiers are also provided, and the relevant product portfolio is detailed in the product list.

General Information		Solubility (10% product)					Function			Application		
Product	Description	RSN	Isopropyl alcohol	Kerosene	Water	Aromatic 150	Dehydrating agent	Drying agent	Wetting effect	Oil-in-water demulsifier	Waste oil demulsifier	Desalting agent
DEMET A-21	Resin oxyalkylate	14.9	S	D	D	S	•	–	–	•	•	–
DEMET A-22	Resin oxyalkylate	20.2	S	I	S	S	•	–	–	•	–	•
DEMET B-11	Resin oxyalkylate	11.5	S	I	I	S	–	•	–	•	–	–
DEMET B-127	Resin oxyalkylate	8.9	S	D	I	S	–	•	–	•	–	–
DEMET C-163	Resin oxyalkylate	14.9	S	I	I	S	•	–	–	•	–	–
DEMET C-168	Resin oxyalkylate	20.5	S	S	I	S	•	–	•	•	–	Optimal
DEMET C-232	Resin oxyalkylate	14.3	S	D	I	S	•	–	–	•	–	•
DEMET I-9010	Polymerized polyol	5	S	S	D	I	–	•	–	•	•	•
DEMET I-9026	Polymerized Polyol	5.7	S	S	I	S	–	•	–	•	•	•
DEMET I-9030	Esterified phenolic polymer	7.5	D	I	I	S	•	–	–	–	–	–
DEMET I-9037	Polymerized polyol	7.8	S	I	I	S	•	–	–	•	•	–
DEMET I-9045	Alkoxyamine	16	S	D	S	S	•	–	•	•	•	•
DEMET L-3134	Resin oxyalkylate	13.5	D	D	I	D	–	•	–	•	–	•
DEMET M-9510	Proprietary blend	7.9	S	I	D	S	•	–	–	•	•	•
DEMET G-62	Polyoxyalkylene glycol	23.4	D	I	D	S	•	•*	–	•	•	•
DEMET G-3172	Resin oxyalkylate	10.6	S	I	I	S	•	–	–	•	–	–
DEMET G-482	Polyethylene glycol	17	S	I	S	S	•	•*	–	•	–	•

Note: •* - Accessibility features, if available, work very well.

S = Soluble/Clear, D = Dispersible/Cloudy, I = Insoluble/Phase Separated, ND = Not Determined

Bottle test recommendations

- Dilute the demulsifier to 5%-10% with aromatic hydrocarbon solvent (use isopropyl alcohol for solubilization if necessary).
- After adding the dose to the oil sample, shake it thoroughly to ensure that the demulsifier is mixed evenly.
- The single agent with the best compounding performance (usually mixing ratio 1:1, 1:2, 2:1).
- Small amounts (1-2%) of demulsifier additives can improve the performance of the formulation.

Compounding suggestions

- 25-35% resins
- 5-10% polyamines
- 10-20% alcohol esters
- 50-60% solvents



During the primary separation of produced fluids, demulsification and separation of the hydrocarbon phase often fails to completely remove hydrocarbons from the water phase, resulting in the water phase failing to meet discharge standards for water treatment. Depending on the geographic location, discharge standards may allow for a maximum concentration of residual oil in water of 40 ppm and a minimum of 10 ppm. Environmental regulations may further reduce these discharge limits in the future, especially in marine environments.

To meet these requirements, separation systems are often equipped with wastewater treatment equipment such as hydrocyclones, flotation tanks, filtration equipment, and centrifuges to further separate the oil droplets from the water. The performance of these equipment can be significantly improved by the use of chemical flocculants. Flocculants can act as both oil-water separators (removing oil) and water clarifiers (improving water quality). Emulsified droplets that are not removed by the primary separation system are difficult to further coagulate due to two mechanisms. First, the surface of the emulsified droplets has a negative charge, which repels each other and hinders the coagulation of the droplets. When the fluid is treated, the reduced pressure causes the pH of the water to increase, causing the fatty acids and cyclohexane acids in the crude oil to deprotonate and form negatively charged salts, which increases the repulsion between the droplets. Secondly, in brine with high concentrations of soluble solids, fatty acids and cyclohexane acids will combine with calcium ions to form calcium soaps, which adhere to the oil-water interface and further hinder the coagulation of droplets. In addition, organic and inorganic solid particles will adsorb at the oil-water interface, forming a protective film that prevents droplets from contacting and coagulating. If the droplets are small enough, Brownian motion will keep them stable for a long time.

For effective oil removal, polyelectrolytes can be used. Polyelectrolytes can neutralize the negative charge on the surface of the droplets and promote the flocculation of the droplets into larger clusters, which are easier to remove by physical separation equipment during water treatment. The ideal flocculant should be able to work in high-salinity produced water, by neutralizing the charge and acting as a "bridge" to connect the droplets, promoting their aggregation and eventual coagulation.





The water clarifiers **WAMET™** and **DEMET™** produced by UNPChemicals are specially designed for oilfield water treatment and can effectively solve the above problems. Our water clarifiers use advanced formulas that can quickly neutralize the negative charge on the surface of emulsified droplets, break the emulsified state, and promote the flocculation and sedimentation of oil droplets and solid particles. The products are suitable for oilfield produced water with high salinity and high hardness. They can maintain high performance under complex water quality conditions, significantly reduce the residual oil content in the water, and ensure that the treated water quality meets strict emission standards. By using our company's water clarifiers, oilfield companies can optimize wastewater treatment processes, improve treatment efficiency, reduce operating costs, and meet increasingly stringent environmental protection requirements.

General Information			Typical Properties		
Product	Description	Form	pH	Solid content (≥%)	Molecular weight
WAMET CCP	Polycations	Aqueous solution	4.5	6.2	1,000,000
WAMET 19	Amphiphilic polymers	Aqueous solution	4.0	27.5	100,000
WAMET 34	Amphiphilic polymers	Aqueous solution	4.8	27.5	100,000
WAMET DTC-8034	Dithioamide	Aqueous solution	7.0	40	--
WAMET 265/229/237	Polymer	Aqueous solution	7.0	30	--
DEMET RC-330	Polyolamine quaternary ammonium salt	Aqueous solution	4.5	70	--



Paraffin inhibitors/Wax inhibitor



Paraffin is a complex mixture of normal alkanes, branched alkanes and cycloalkanes. It is widely found in nature, and its carbon chain length is usually between C18 and C64. Paraffin has a high melting point and good chemical stability, so it is widely used in many fields. However, in the process of crude oil extraction, the presence of paraffin brings many challenges to production.

As crude oil is extracted from deep underground, the temperature and pressure gradually decrease, and the light components in the crude oil (such as natural gas, etc.) will gradually escape. This process causes the solubility of paraffin in crude oil to decrease significantly, so it begins to crystallize and precipitate. Paraffin crystals initially exist in the form of tiny particles, but over time, these particles will gradually aggregate to form larger crystals and needle-like structures. These structures have strong adhesion and will firmly adhere to the wall of the oil pipe and the sucker rod, causing the oil pipe to be blocked and the sucker rod to be stuck. This phenomenon will not only increase the cost of extraction and reduce production efficiency, but may also cause damage to the equipment, seriously affecting the normal production of the oil well.

In order to solve this problem, UNPChemicals has successfully developed a series of high-performance chemical additives after years of research and practice. These additives are specifically designed to address the problems of the pour point and pour point of crude oil and refined oil caused by paraffin, and can effectively improve the low-temperature fluidity of crude oil and prevent paraffin from crystallizing and precipitating. By lowering the pour point and pour point of crude oil, these additives can ensure that crude oil can still maintain good fluidity in low-temperature environments, thereby reducing the blockage of oil pipes and the jamming of pumping rods caused by paraffin deposition.



Paraffin inhibitors/Wax inhibitor



These chemical additives also have good compatibility and stability, and can work under different crude oil compositions and mining conditions. They can not only improve crude oil extraction efficiency and reduce production costs, but also extend the service life of equipment and reduce the frequency of maintenance and replacement. By using these high-performance chemical additives, the PCMET™ series of products produced by UNPChemicals provides an efficient and reliable solution for the crude oil extraction industry, helping companies achieve stable and efficient production in complex mining environments.

Product	Description	Function
PCMET 420	Graft copolymer/ester	Suitable for medium pour point crude
PCMET 820		Suitable for high pour point crude
PCMET 818	Graft copolymer/imide	Suitable for medium to high pour point crude
PCMET 42182		Suitable for medium pour point crude
PCMET 82182		Suitable for high pour point crude
PCMET 41822		Suitable for medium to high pour point crude
PCMET 81822		Suitable for high pour point crude
PCMET 422818		Suitable for high pour point crude
PCMET 822418		Suitable for medium pour point crude
PCMET TO	Amine salts	Suitable for medium pour point crude



Three major categories of products

- Paraffin dispersant: Through the action of surfactants, the precipitated paraffin is treated with solvents, or the paraffin is kept in a microcrystalline suspension state in continuous applications to prevent it from being deposited in the solvent or crude oil, thereby avoiding the formation of paraffin deposition in the system.
- Paraffin inhibitor: Use oil-soluble polymers to reduce the temperature of paraffin precipitation, change the shape and size of wax crystals, keep them in a dispersed state, and prevent wax crystals from adhering to the surface of the equipment, thereby effectively preventing the formation of paraffin precipitation.
- Decline agent: By interfering with the crystallization process of paraffin, changing the growth direction and crystal form of wax crystals, it forms uniform and loose crystals, thereby delaying or preventing the formation of a three-dimensional network structure that causes the solidification of oil products, thereby limiting the gelation of wax at low temperatures and maintaining the fluidity of bulk fluids.

Basic compounding principles

- Compounding of different types of anti-waxing products: dispersion type, wax crystal change type, paraffin inhibition type compounding.
- Compounding of paraffin inhibitors with different main carbon chain lengths: When the carbon number of the main carbon chain matches that of normal alkane paraffin, it can be easily adsorbed on the surface of the newly formed wax crystal.
- Compounding of pour point depressants with different polar side chains: Compounding of pour point depressants with different polar side chains expands the range of the main carbon chain number, and the range of wax crystals with different carbon numbers of crude oil is also increased accordingly.

Scale inhibition

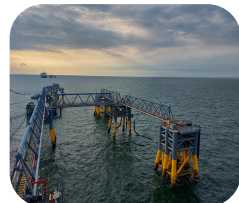


In the production of crude hydrocarbons, water is a byproduct of oil and gas extraction and needs to be separated from oil and gas to ensure that hydrocarbons meet the export or sales specifications of the refinery. However, this water is not only a waste product, but also causes inorganic salt precipitation during the production process, forming scale. The type and severity of scale depends on the unique chemical properties of the formation water and the temperature and pressure changes experienced by the fluid during the production and separation process. Common scales include calcium carbonate and barium sulfate, of which barium sulfate is extremely difficult to treat due to its extremely low solubility. Other scales such as strontium sulfate, ferrous carbonate and calcium sulfate can also have serious impacts on production, such as blocking wellheads, compromising oil layer production capacity, and even affecting equipment operation and safety.

To deal with scaling problems, oil fields usually adopt preventive and remedial measures, the most common of which is the continuous injection of chemical antiscale in the production and water injection systems. These antiscale prevent scale formation by preventing crystal growth or re-dissolving microcrystals. UNPChemicals' **SCMET™** series of special scale inhibitors have undergone rigorous performance evaluation and have high-efficiency scale inhibition capabilities. They have also launched environmentally friendly green products that can provide reliable and sustainable solutions for the oil and gas extraction industry.

General Information						Typical Applications
Product	Description	Form	Approximate molecular weight	Typical pH	Typical solid content (%)	Function
SCMET 540	Maleic Anhydride Copolymer	Aqueous solution	10000	4.3	44	Calcium phosphate scale and iron deposit control, zinc stabilization and system cleaning, polymer performance to 175C.
SCMET 802	Polymaleic Anhydride	Aqueous solution	800	2.0	50	Barium sulfate scale inhibitor.
SCMET 921	Polyacrylic acid	Aqueous solution	3000	2.6	50	Calcium Sulfate Scale Inhibitor.
SCMET 545	Maleic Anhydride Copolymer	Aqueous solution	5000	4.4	44	Control of calcium phosphate scale and iron deposits with zinc stabilized polymers for performance up to 150C.
SCMET 100	Polyacrylic acid	Aqueous solution	3000	2.5	50	High solids content, excellent carbonate inhibitor, limited salt tolerance.
SCMET 250	Polycarboxylate	Aqueous solution	800	3.5	40	Excellent barium sulfate inhibitor. Super brine stable. High solids content.
SCMET 270	Copolymer	Aqueous solution	5000	4.5	40	Broad Range Antiscalant - High pH.
SCMET 963	Polyacrylic acid	Aqueous solution	2000	2.6	63	High solid polymer
SCMET 300	Copolymer	Aqueous solution	15000	4.4	44	Calcium phosphate inhibitors.
SCMET 920	Sulfonate copolymer	Aqueous solution	10000	8.0	35	Unique sodium chloride inhibitor.
SCMET 602N	Polyacrylic acid	Aqueous solution	4500	7.5	45	General scale inhibitor, dispersant.





Oilfield corrosion is usually not caused by common metal oxidation and rust, but by the multiphase fluid in an oxygen-free reducing environment, in which dissolved acidic gases come into contact with steel pipes and induce corrosion. The formation of corrosion depends on the generation of galvanic cells, where a small potential difference causes oxidation of iron and reduction of water, which in turn forms corrosion.

Common types of corrosion in oil fields include:

Carbon dioxide (CO₂)-induced "sulfur-free corrosion": This type of corrosion is ubiquitous, especially under high pressure and high temperature conditions, because carbon dioxide dissolved in water forms carbonic acid and reacts with the iron surface. Although a protective film can be formed under certain conditions, corrosion will continue once the conditions change. Sulfur-free corrosion usually forms small pits with smooth edges and a relatively low metal loss rate.

Hydrogen sulfide (H₂S)-induced "acid corrosion": This type of corrosion is more destructive. Hydrogen sulfide reacts directly with the iron surface to form a ferrous sulfide (FeS) protective film, but fluid flow destroys this film, leading to continuous corrosion. Acid corrosion also causes hydrogen atoms to diffuse into the metal, causing blistering, embrittlement and cracks in the steel, while sulfate-reducing bacteria (SRB) also exacerbate local corrosion.

To control corrosion, film-forming corrosion inhibitors are widely used in oil fields. These inhibitors work by interrupting the formation of galvanic cells. The positively charged film-forming surfactants are adsorbed onto the negatively charged surface of the pipe, and their hydrophobic tails aggregate to form a hydrophobic layer, reducing the contact between water and the pipe, thereby reducing the corrosion potential.

UNPChemicals has developed a variety of **CIMET™** series products for oilfield corrosion, providing different forms of corrosion inhibition, including oil-soluble, oil-soluble/water-dispersible and water-soluble products. Refer to the table below for specific product selection and application guidance.

General Information					Solubility				Typical Applications	
Product	Description	Total active matter (%)	Appearance	Pour point (°C)	Isopropyl alcohol	Kerosene	Water	Aromatic 150	Inhibition Type	Purpose
CIMET 515	Oligomeric ester quat	50	Liquid	-12	S	I	S	I	CO ₂	--
CIMET 18	Proprietary Blend	ND	Liquid	-12	ND	ND	ND	ND	Hydrochloric acid/mud acid	Add acid solution
CIMET 13	Proprietary Blend	ND	Liquid	<0	ND	ND	ND	ND	Sulfuric acid	Add acid solution
CIMET TOI	Tololeate imidazoline	100	Liquid	<-15	S	S	I	S	CO ₂ , H ₂ S	Suitable for oil/water
CIMET TOI-7	Tololeate imidazoline(7EO)	100	Liquid	<0	S	I	D	S	CO ₂ , H ₂ S	--
CIMET TOI-9	Tololeate imidazoline(9EO)	100	Liquid	<0	S	I	S	I	CO ₂ , H ₂ S	--
CIMET O	Oleic acid hydroxyethyl imidazoline	100	Liquid	<-15	S	S	I	S	CO ₂ , H ₂ S	--
CIMET TOI-A	Oleic acid imidazoline polyacrylate	75	Liquid	<-10	I	I	S	ND	CO ₂ , H ₂ S	--
CIMET TOH	Tall Oil Hydroxyethyl Imidazolinium	100	Liquid	<-10	S	S	I	S	CO ₂ , H ₂ S	--
CIMET TO	Tall Oil Acid Imidazolinium (Mixed)	100	Liquid	<0	S	S	D	S	CO ₂ , H ₂ S	Suitable for oil/water
CIMET TAE	Fatty amine ether	100	Liquid	<0	S	S	I	S	CO ₂ , H ₂ S	--
PCMET PE1650	Phosphate	100	Liquid	12	S	S	D	S	O ₂	Suitable for oil/water

Note: ND = Not sure, NA = Not applicable, S = Soluble/clear, D = Dispersible/turbid, I = Insoluble/phase separated, P = Paste/gel



Unproduced oil and gas formations are biologically free, but once they come into contact with the surface, they can become biocontaminated. The downhole environment is harsh and only a few organisms can survive, but once these organisms enter, they find an environment with less competition and rich nutrients. The greatest risk of biocontamination during production occurs when surface fluids are injected directly into the reservoir, such as produced water re-injection (PWRI), scale squeezes, and other wellbore remediation or stimulation measures. In these operations, biological purification of the fluids is critical and is usually achieved using chemical biocides.

Microorganisms in the reservoir can have many negative effects on production. For example, sessile bacteria that form slimes can block pore channels and reduce the water absorption index of injection wells. The most serious damage is usually caused by sulfate-reducing bacteria (SRB), such as *Desulfovibrio*. These bacteria convert sulfate in the injected water into hydrogen sulfide gas, which, over time, can cause increased corrosion, increase production costs (such as hydrogen sulfide removal costs), and cause health and safety issues. These bacteria are extremophiles that can survive in reservoir environments with high salt, pressure, temperature, and neutral pH.

Once bacterial colonies are formed, complete sterilization is almost impossible. Therefore, the key to controlling microbial contamination downhole is to use adequate biocides for treatment before fluid injection.

The **BIMET™** series of biocide provided by UNPChemicals are non-oxidizing surface-active organic products that can adsorb on cell walls and disrupt the normal functions of cells. Although their sterilization rate may not be as fast as oxidizing biocides, they are less corrosive to production pipelines and can even be used as corrosion inhibitors, especially quaternary ammonium compounds. These biocides stop working after reaching the surface environment and are easily biodegraded into harmless metabolites. Choosing the right biocide requires consideration of the target microorganisms, applicable regulatory requirements, and recommended treatment methods.

Product	Description	Form 25°C
BIMET 1227	Benzalkonium chloride	Liquid
BIMET 210	Didecylmethyl ammonium chloride	Liquid
BIMET Y12D	Dodecyl dipropylene triamine, Distillation	Liquid



Asphaltene inhibitor



Asphaltenes are a class of high molecular weight organic components in crude oil, consisting of polycyclic aromatic compounds and aliphatic arms containing heteroatoms. Their structure varies depending on the source of the crude oil, but wherever they occur, they can cause blockages and interruptions in the production process. Asphaltenes can cause problems both downhole and above the well.

Asphaltenes are generally soluble in aromatic solvents (such as benzene) but insoluble in aliphatic solvents (such as n-pentane). Their presence in crude oil does not necessarily cause problems, but if asphaltenes precipitation occurs, it is usually due to unstable solubility of high molecular weight components. This instability can be caused by changes in production conditions, such as reduced pressure, pH changes, or crude oil mixing. When non-chemical methods cannot solve the asphaltenes problem, chemical inhibitors become a necessary solution. **FMET™ O** developed by UNPChemicals is a specially formulated asphaltene inhibitor that can effectively deal with the problems caused by asphaltene precipitation during production.

Product	Typical Properties			
	Description	Form	Pour Point (°C)	Solubility (25% or more)
FMET O	Amphoteric surfactant	Liquid/Paste	35	Isopropyl alcohol, benzene, mineral oil



Refining Solution





With its strong technical strength and innovation capabilities, Luoyang Pacific United Petrochemical has successfully developed and produced a series of high-performance refining additives, including demulsifiers (introduced in the oil and gas production and gathering section), cyclopentane acid inhibitors and antistatic agents. These products not only have significant advantages in performance, but also show excellent reliability in a variety of application scenarios, providing efficient and safe solutions for the refining industry.

Naphthenic acid is a common organic acid in crude oil. It can cause serious corrosion to equipment during the refining process, especially under high temperature and high pressure conditions, where the corrosiveness of naphthenic acid is more significant. This corrosion will not only shorten the service life of the equipment, increase the cost of maintenance and replacement, but also may lead to safety hazards in the production process. In order to effectively deal with this problem, UNPChemicals has developed **EUMET™** and **PCMET™** naphthenic acid inhibitors.

During the refining process, the flow and stirring of oil products are prone to static electricity accumulation, which may lead to spark discharge, thereby causing safety accidents such as fire and explosion. In order to reduce this risk, UNPChemicals has developed **ACMET™** anti-static agent.

Product	Description	Function Application
EUMET EL-200	Castor oil polyoxyethylene ether	Naphthenic acid inhibitors
PMET PE1310	Isomeric alcohol ether phosphate	Naphthenic acid inhibitors
PMET PE1690	Isomeric alcohol ether phosphate	Naphthenic acid inhibitors
ACMET 1000	Fatty acid glycerides	Anti-static agents
ACMET 300	Fatty amine ether2EO	Anti-static agents
ACMET 400	Fatty amine ether2EO	Anti-static agents
ACMET 700	Fatty amine ether2EO	Anti-static agents
ACMET 1800	Fatty amine ether2EO	Anti-static agents
ACMET 2002	Alkanolamide	Anti-static agents





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