FRACTURING MATERIALS
DRILLING CHEMICALS
UPSTREAM/MIDSTREAM CHEMICALS
CONTENT

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NIKA-PetroTech is the Russian modern chemicals & proppants manufacturer. Our company was founded at 2014 & it seems young but the team itself is having more than from 10 to 15 years of management, oilfield, manufacturing experience for every key team player.

Today our clients portfolio having most of the largest oil & gas companies & as well as the service companies operating in Russia. Our R&D center has a high potential for the development of new solutions for the oil industry.
NIKA-PETROTECH
COMPANY PORTFOLIO

THE «NIKA-PETROTECH» TEAM IS OPERATING AT THE RUSSIA MARKET FOR MORE THAN 10 YEARS. THE COMPANY CONSISTS OF THE FOLLOWING DIVISIONS:

1. DIVISION «SEMILUKI» (MANUFACTURE PROPPANTS), VORONEZH REGION

TODAY:
Proppants production – 15,000 tn/month with ability to increase up to 50,000 tn/month in case of the additional investments
TOMORROW:
Additional increase of the manufacture will lead to 50,000 tn/month. Registration of industrial park at Department of Industry of Voronezh region

2. DIVISION «KAMBARKA» (PRODUCTION OF CHEMICALS), UDMURTIA REPUBLIC

TODAY:
Production of the chemicals for the fracturing – 2,000 tn/month with ability to increase up to 4,000 tn/month
TOMORROW:
Additional increase of production of the chemicals for the production enhancement up to 4,000 tn/month. Registration of Industrial park at the Department of Industry of Udmurtia republic

3. PLANT FOR PROPPANTS REGENERATIONS & LOGISTICS CENTER, MEGION

TODAY:
Regenerating/recycling of the proppants 2,000 tn/month. Logistics center with area 70,000 m2
TOMORROW:
Production start for the regeneration of RCP proppants, up to 1,000 tn/month

4. RESEARCH & DEVELOPMENT CENTER (R&D) – NIKA-Research

TODAY:
Development of the new chemical solutions for the oil & gas industry with support of Russian academy of Science
TOMORROW:
Design and development of industry standards of quality. Development of technological regulations for production of chemicals. Implementation and support of technologies for the end user. Ready to work with each individual consumer and make product suggestions for our clients that will ensure their competitive advantage. Nika PetroTech uses alternative raw materials for production of proppant. Not only are these materials more environmentally friendly, but they are easier to manufacture than traditional proppants and provide unique properties that the industry has never seen before. We employ a business model that focuses on continuous improvement. By introducing new technologies, our Company is going to revolutionize the oil industry of the world by providing new types of proppants that aim to reduce production costs while increasing production volume.
ABOUT

QUALITY ASSURANCE
QUALITY CONTROL

LONG-TERM RELATIONSHIP WITH
RUSSIAN ACADEMY OF SCIENCE

R&D GROUP

EXCELLENT PRICE/QUALITY RATIO

HIGH-QUALITY PRODUCTS

DEVELOPMENT OF NEW UNIQUE PRODUCTS
NIKA-PETROTECH

INDUSTRIAL PARK KAMBARKA (RUSSIA, UDMURTIA)
CHEMICALS PRODUCTION

SEMLUKI REFRACTORY PLANT (RUSSIA, VORONEZH AREA)
PROPPANT PRODUCTION

R&D CENTER
(RUSSIA, YEKATERINBURG)
PROPPANT

PTPROP
High and intermediate strength ceramic proppant

PT RCP
Magnesium-silicate based intermediate strength resin coated ceramic proppant

Available mesh sizes are 10/14, 12/18, 16/20, 16/30, 20/40, 30/50
**PT PROP**

**CERAMIC PROPPANT**

This is our company’s primary product; therefore we pay special attention to it. We work towards continuously improving this product and have been able to reduce the bulk weight to an impressive 1.56 g/cm\(^3\) while maintaining excellent technical characteristics.

<table>
<thead>
<tr>
<th></th>
<th>20/40</th>
<th>16/30</th>
<th>16/20</th>
<th>12/18</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRUSHING STRENGTH AT 7500 PSI, %</td>
<td>1.8</td>
<td>2.6</td>
<td>5.5</td>
<td>7.0</td>
</tr>
<tr>
<td>CRUSHING STRENGTH AT 10 000 PSI, %</td>
<td>5.3</td>
<td>6.6</td>
<td>10.0</td>
<td>14.0</td>
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<tr>
<td>CONDUCTIVITY AT 6000 PSI, MDFT</td>
<td>3841</td>
<td>6114</td>
<td>8053</td>
<td>13967</td>
</tr>
<tr>
<td>PERMEABILITY AT 6000 PSI, DARCY</td>
<td>228</td>
<td>385</td>
<td>513</td>
<td>885</td>
</tr>
</tbody>
</table>

**PT RCP**

**CERAMIC PROPPANT WITH POLYMERIC COATING**

Due to adhesion, the proppant with a polymeric coating prevents the carryover of a basic batch of a propping agent. It works well in combination with PTProp.

**PT RCP 12/18 PHYSICAL PROPERTIES**

<table>
<thead>
<tr>
<th></th>
<th>7 500 PSI</th>
<th>10 500 PSI</th>
<th>12 500 PSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRUSH RESISTANCE</td>
<td>0.6%</td>
<td>1.3%</td>
<td>4.3%</td>
</tr>
<tr>
<td>Sieve analysis</td>
<td>98%</td>
<td>Sphericity</td>
<td>0.9</td>
</tr>
<tr>
<td>Bulk density</td>
<td>1.49 g/cm(^3)</td>
<td>Roudness</td>
<td>0.9</td>
</tr>
<tr>
<td>Acid solubility</td>
<td>2.1%</td>
<td></td>
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</tr>
<tr>
<td>COMP. STRENGTH</td>
<td>24 HRS AT 55 °C</td>
<td>48 HRS AT 55 °C</td>
<td></td>
</tr>
<tr>
<td>280 PSI</td>
<td>320 PSI</td>
<td></td>
<td></td>
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</table>

**PT RCP 16/20 PHYSICAL PROPERTIES**

<table>
<thead>
<tr>
<th></th>
<th>7 500 PSI</th>
<th>10 500 PSI</th>
<th>12 500 PSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRUSH RESISTANCE</td>
<td>0.4%</td>
<td>1.5%</td>
<td>4.5%</td>
</tr>
<tr>
<td>Sieve analysis</td>
<td>98%</td>
<td>Sphericity</td>
<td>0.9</td>
</tr>
<tr>
<td>Bulk density</td>
<td>1.49 g/cm(^3)</td>
<td>Roudness</td>
<td>0.9</td>
</tr>
<tr>
<td>Acid solubility</td>
<td>4.2%</td>
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</tr>
<tr>
<td>COMP. STRENGTH</td>
<td>24 HRS AT 55 °C</td>
<td>48 HRS AT 55 °C</td>
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<tr>
<td>335 PSI</td>
<td>410 PSI</td>
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**PT RCP 12/18 CONDUCTIVITY AND PERMEABILITY**

<table>
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<tr>
<th></th>
<th>2 000 PSI</th>
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<tbody>
<tr>
<td>CONDUCTIVITY, MDFT</td>
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<td>25742</td>
<td>15821</td>
<td>9741</td>
<td>6143</td>
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<td>1525</td>
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**PT RCP 16/20 CONDUCTIVITY AND PERMEABILITY**

<table>
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<tr>
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<td>12123</td>
<td>9712</td>
<td>8081</td>
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<td>660</td>
<td>551</td>
<td>475</td>
<td>389</td>
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# PT PROP
## TECHNICAL DATA SHEET

### PT PROP 12/18
#### PHYSICAL PROPERTIES

<table>
<thead>
<tr>
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<th>7 500 PSI</th>
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<tbody>
<tr>
<td>Crush Resistance</td>
<td>7%</td>
<td>14%</td>
<td>20%</td>
</tr>
<tr>
<td>Sieve analysis</td>
<td>98%</td>
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<td></td>
</tr>
<tr>
<td>Bulk density</td>
<td>1.57 g/cm³</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sphericity</td>
<td>0.9</td>
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<td></td>
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### PT PROP 12/18
#### LONG TERM CONDUCTIVITY AND PERMEABILITY

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### PT PROP 16/20
#### PHYSICAL PROPERTIES

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<tbody>
<tr>
<td>Crush Resistance</td>
<td>5.5%</td>
<td>10%</td>
<td>17%</td>
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<tr>
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<td>Bulk density</td>
<td>1.57 g/cm³</td>
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<td></td>
</tr>
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<td>Sphericity</td>
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### PT PROP 16/20
#### LONG TERM CONDUCTIVITY AND PERMEABILITY

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<tr>
<td>Conductivity, Md-FT</td>
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### PT PROP 16/30
#### PHYSICAL PROPERTIES

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</thead>
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<tr>
<td>Crush Resistance</td>
<td>2.6%</td>
<td>6.6%</td>
<td>11%</td>
</tr>
<tr>
<td>Sieve analysis</td>
<td>98%</td>
<td></td>
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</tr>
<tr>
<td>Bulk density</td>
<td>1.57 g/cm³</td>
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<td>Sphericity</td>
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### PT PROP 16/30
#### LONG TERM CONDUCTIVITY AND PERMEABILITY

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<th>10 000 PSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conductivity, Md-FT</td>
<td>11500</td>
<td>8122</td>
<td>6053</td>
<td>3533</td>
<td>2931</td>
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<td>870</td>
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### PT PROP 20/40
#### PHYSICAL PROPERTIES

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</thead>
<tbody>
<tr>
<td>Crush Resistance</td>
<td>1.8%</td>
<td>5.3%</td>
<td>9.3%</td>
</tr>
<tr>
<td>Sieve analysis</td>
<td>98%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bulk density</td>
<td>1.57 g/cm³</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sphericity</td>
<td>0.9</td>
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### PT PROP 20/40
#### LONG TERM CONDUCTIVITY AND PERMEABILITY

<table>
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<th>6 000 PSI</th>
<th>8 000 PSI</th>
<th>10 000 PSI</th>
</tr>
</thead>
<tbody>
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<td>Conductivity, Md-FT</td>
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<td>4944</td>
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<td>381</td>
<td>295</td>
<td>228</td>
<td>160</td>
<td>121</td>
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</table>
PT PROP

<table>
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<tr>
<th>CONDUCTIVITY</th>
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</thead>
<tbody>
<tr>
<td>PSI</td>
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<tr>
<td>6000</td>
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<tr>
<td>8000</td>
</tr>
<tr>
<td>10000</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>PERMEABILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSI</td>
</tr>
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</tr>
<tr>
<td>6000</td>
</tr>
<tr>
<td>8000</td>
</tr>
<tr>
<td>10000</td>
</tr>
</tbody>
</table>

PT PROP 20/40
PT PROP 16/20
PT PROP 16/30
PT PROP 12/18
COMPARISON

Buying proppant from NIKA-PetroTech, you get 15% more proppant at the same price and equal quality. This is due to the proppant bulk weight difference.

Hydraulic fracturing operation pumping 100 tons of proppant.

**PROPPANT A (PTPROP)**
- 1.55 g/cm³
- 100%

**PROPPANT B**
- 1.82 g/cm³
- 85%

**V = 64.5 m³**

**V = 54.9 m³**
CHEMICALS

FRACTURING CHEMICALS
- GELING AGENTS
- CROSS-LINKERS
- ORGANIC BREAKERS
- NON-EMULSIFIERS
- CLAY STABILIZER
- SPECIAL CHEMICALS
- ENCAPSULATED BREAKER
- BIocide

DRILLING CHEMICALS
- FLUID LOSS CONTROL
- VISCOSIFIERS
- DEFOAMING AGENTS
- LUBRICANTS
- COMPLEX AGENTS

UPSTREAM/MIDSTREAM CHEMICALS
- NON-EMULSIFIERS
- CORROSION INHIBITOR
- SCALE INHIBITOR
- KINETIC HYDRATE INHIBITOR
- PARAFFIN INHIBITOR
- BIocide
- HYDROGEN SULFIDE SCAVENGER
- FLOW IMPROVER ADDITIVE
FRACTURING CHEMICALS

- BIocide
- CLAY STABILIZER
- NON-EMULSIFIERS
- GELLING AGENTS
- ENCAPSULATED BREAKER
- ORGANIC BREAKERS
- ACTIVATORS FOR BREAKERS
- CROSS-LINKERS
- DRY GUAR
- SLURRY GUAR
- FAST
- DELAYED
PT GS-7000 is the guar gum suspended in an environmental mineral oil.
PT WG-7000F is the fast hydrating guar gum powder.

The product viscosity obtains the following values after 3-minute hydration: PT WG-7000F & PT GS-7000 – min 85% and reaches recommended maximum in 13 minutes.

PT WG-7000F & PT GS-7000 are pure guar gum, they do not contain any pH buffers that provides better retained conductivity after hydraulic fracturing and gives freedom of choice to a service company while working with additional chemical reagents.

Both products are perfectly cross-linked by borate cross-linkers. After crosslinking the gel can transport high proppant concentration. Cross-linked gel provide optimal viscosity for excellent transfer of proppant at temperatures from 40°F to 270°F (5C to 130°C).
# Gelling Agent

## Technical Data Sheet

### PT WG 7000F

<table>
<thead>
<tr>
<th>Specification</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Yellowish white powder</td>
</tr>
<tr>
<td>The moisture content, max %</td>
<td>10</td>
</tr>
<tr>
<td>Particle size</td>
<td></td>
</tr>
<tr>
<td>Through US 100, % min</td>
<td>100</td>
</tr>
<tr>
<td>Through US 200, % min</td>
<td>95</td>
</tr>
<tr>
<td>PH (as is 1% solution)</td>
<td>6.5–8.0</td>
</tr>
<tr>
<td>Fan viscosity at 77°F (25°C) (concentration 40 lb/1000 gal in 2% KCL solution)</td>
<td></td>
</tr>
<tr>
<td>3 min</td>
<td>MIN 38 CPS</td>
</tr>
<tr>
<td>60 min</td>
<td>MIN 43 CPS</td>
</tr>
</tbody>
</table>

### PT GS-7000

<table>
<thead>
<tr>
<th>Specification</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Brown non-transparent liquid</td>
</tr>
<tr>
<td>Specific gravity</td>
<td>1.04–1.15</td>
</tr>
<tr>
<td>PH (as is 1% solution)</td>
<td>6.5–8.0</td>
</tr>
<tr>
<td>Active concentration</td>
<td>4.0 lbs/gal</td>
</tr>
<tr>
<td>Fan viscosity at 77°F (25°C) (40 lb gel in 2% KCL solution)</td>
<td></td>
</tr>
<tr>
<td>3 min</td>
<td>MIN 38 CPS</td>
</tr>
<tr>
<td>60 min</td>
<td>MIN 43 CPS</td>
</tr>
</tbody>
</table>

![Chemical structure of gelling agent](image)
FRACURING CROSS-LINKER PT LTC

- Borate cross-linker
- High resistance to shear stress
- Effective fast-acting (10 sec) borate cross-linker
- Recommended concentration 2.0–4.0 GPT (2.0–4.0 l/m)
- Wide range of working temperatures as a single cross-linker: 41–140 °F (5–60 °C)
- Possibility of use as an additive improving resistance to shear stress
- pH of cross-linked gel more than 8.3
- Freezing temperature: -25°C

**STABILITY-SHEAR TEST DISTILLED WATER**

**Water:**
- T – 23°C
- pH – 6.90

**Concentration:**
- Guar – 3.0 kg/m³
- PT LTC – 3.0 l/m³

**Linear gel:**
- pH – 6.95 (25.0°C)
- Viscosity – 19.2 cP (25°C, 300rpm)

**Crosslinked gel:**
- pH – 8.3 (25.0°C)
- XL – 15s

**Geometry:**
- R1/85
  - 100c^-1 = 1170 rpm
  - 511c^-1 = 601.2 rpm

**Conditions:**
- T – 30°C
- P – 500 psi
Borate cross-linker

- Recommended concentration: 1.0–2.0 PGT (1.0–2.0 l/m³)
- pH of cross-linked gel at the range of 10.0–10.8 pH
- Wide range of working temperatures: to 270 °F (to 130°C)
- Freezing temperature: ~30°C

### Stability-Shear Test Distilled Water

<table>
<thead>
<tr>
<th>Data</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water:</td>
<td>T=23°C, pH=6.80</td>
</tr>
<tr>
<td>Concentration:</td>
<td>Guar – 3.0 kg/m³, PT BCF-9 – 1.5 l/m³</td>
</tr>
<tr>
<td>Linear gel:</td>
<td>pH = 7.10 (25.0°C), Viscosity = 19.0 cP (25°C, 300rpm)</td>
</tr>
<tr>
<td>Crosslinked gel:</td>
<td>pH = 10.05 (25.0°C), XL = 10s</td>
</tr>
<tr>
<td>Geometry:</td>
<td>R1/B5, 100c^-1 = 1170 rpm</td>
</tr>
<tr>
<td>Conditions:</td>
<td>T – 85°C, P – 500 psi</td>
</tr>
</tbody>
</table>
FRACTURING CROSS-LINKER PT BCD

- Effective delayed (from 30 sec to 3 min in accordance with PT BCD modification) borate cross-linker
- Recommended concentration 2.0—4.0 PGT (2.0—4.0 l/m³)
- Wide range of working temperatures: to 270°F (to 130°C)
- Possibility of use as buffer in salt water
- pH of cross-linked gel more than 8.9
- Freezing temperature: ~25°C

### STABILITY-SHEAR TEST DISTILLED WATER

**Water:**
- T – 23°C
- pH – 6.80

**Concentration:**
- Guar – 3.0 kg/m³
- PT BCD – 3.0 l/m³

**Linear gel:**
- pH – 7.10 (25.0°C)
- Viscosity – 19.2 cP (25°C, 300rpm)

**Crosslinked gel:**
- pH – 9.15 (25.0°C)
- XL – 45s

**Geometry:**
- R1/65
- 100c^-1 = 1170 rpm

**Conditions:**
- T – 95°C
- P – 500 psi
PT OBP-breakers reduce viscosity of hydraulic fracturing liquids. At the heart of PT OBP-breakers acting through soft oxidation of a polymer chain; reacting with carbon atoms it destroys the polymer and by that reduces the viscosity. The effective concentration level of PT OBP-breakers group at the level of mg/m³, the rest of the breaker is necessary for cleaning of the fracture.

PT OBA series are highly effective activator of the PT OBP breakers. PT OBA starts to work with some delay without changing rheological properties of a liquid sufficient for carrying out of frac job. PT OBA reduces a temperature range of work of oxidizing PT OBP breakers on 5–30°F (10–20°C) by means of formation of an intermediate complex with an oxidizer.

The main advantage of PT OBP in compare with standard encapsulated ammonium persulfate is follow: Ammonium persulfate is involved in the following redox process:

\[ \text{S}_2\text{O}_8^{2-} \rightarrow 2\text{SO}_4^{2-} \]

As shown there are two sulfate ions are formed from only one persulfate ion. Every sulfate ion can make insoluble sediments with Ca²⁺ and Ba²⁺ which are commonly present in formation water. Thus, solubility of CaSO₄ in 100 g water is only 0.067 g at 100 oC. These sediments are additionally decrease permeability of proppant pack.
# FRACTURING CHEMICALS

## PT OBP-1
- **Purpose**: Breaker Activator for Breaker
- **Form**: Solid
- **Concentration**: 0.5–3.0
- **Temp.**: 40–140°F (5–60°C)

## PT OBP-2
- **Purpose**: Breaker Activator for Breaker
- **Form**: Liquid
- **Concentration**: 0.5–3.0
- **Temp.**: 40–140°F (5–60°C)

## PT OBP-5
- **Purpose**: Breaker Activator for Breaker
- **Form**: Solid
- **Concentration**: 0.5–3.0
- **Temp.**: 140–175°F (60–80°C)

## PT OBP-6
- **Purpose**: Breaker Activator for Breaker
- **Form**: Liquid
- **Concentration**: 0.5–3.0
- **Temp.**: 140–175°F (60–80°C)

## PT OBA-1
- **Purpose**: Breaker Activator for Breaker
- **Form**: Solid
- **Concentration**: 0.5–3.0
- **Temp.**: 175–200°F (80–93°C)

## PT OBA-2
- **Purpose**: Breaker Activator for Breaker
- **Form**: Liquid
- **Concentration**: 0.5–3.0
- **Temp.**: 175–200°F (80–93°C)

## Temp.

<table>
<thead>
<tr>
<th>Temperature, °F (°C)</th>
<th>PT OBP-1</th>
<th>PT OBP-2</th>
<th>PT OBP-5</th>
<th>PT OBP-6</th>
<th>PT OBA-1</th>
<th>PT OBA-2</th>
<th>Name of Product</th>
<th>Form</th>
<th>Concentration</th>
<th>Temp. (°F (°C))</th>
</tr>
</thead>
<tbody>
<tr>
<td>40–140 (5–60)</td>
<td>0.83–8.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Purpose</td>
<td>Solid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>140–175 (60–80)</td>
<td></td>
<td>1.0–2.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Liquid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>175–200 (80–93)</td>
<td></td>
<td></td>
<td>0.5–2.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Solid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>175–200 (80–93)</td>
<td></td>
<td></td>
<td></td>
<td>1.0–2.0</td>
<td></td>
<td></td>
<td></td>
<td>Liquid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>200–230 (93–110)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.0–2.0</td>
<td></td>
<td></td>
<td>Liquid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>230–270 (110–130)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.0–2.0</td>
<td></td>
<td>Liquid</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**NON-EMULSIFIER PT NE-13**

**CLAY STABILIZER PT CS-13**

**PT CS-13** is a combination chemistry designed to stabilize reactive clay and shale when stimulated with fluids that may induce clay swelling.

**FEATURES AND BENEFITS:**
- Immediately and permanently inhibit clay swelling
- Stabilizes small clay particles
- Do not block the reservoir rocks with a permeability about micro Darcy
- More efficient than the existing analogs

**PT NE** is a mixture of nonionic surfactants, which have been specifically designed to prevent the occurrence of emulsions formed in the process of fracturing. Being nonionic, PT NE also leaves the rock wetted with water. PT NE, thereby increasing the flow of oil.

**FEATURES AND BENEFITS:**
- Excellent non-emulsifying
- Low interfacial tension with oil
- Nonionic surfactants
- Leaves a rock wetted with water
# Fracturing Chemicals

<table>
<thead>
<tr>
<th>Definitions</th>
<th>Gelling Agent</th>
<th>Breakers (For Any Guar &amp; HPG Systems)</th>
<th>Activators for Breakers (Only for OBP-Breakers)</th>
<th>Borate Cross-Linkers (For Any Guar &amp; HPG Systems)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dry Guar</td>
<td>Slurry Guar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>PT WG-7000F</td>
<td>PT GS-7000F</td>
<td>PT OBP-1</td>
<td>PT OBA-2</td>
</tr>
<tr>
<td>Units</td>
<td>LB/1000GAL</td>
<td>PGT</td>
<td>LB/1000GAL</td>
<td>PGT</td>
</tr>
<tr>
<td>Concentration</td>
<td>15–50</td>
<td>6.0–10.0</td>
<td>0.8–3.3</td>
<td>0.5–2.0</td>
</tr>
</tbody>
</table>
DRILLING CHEMICALS

- PT PAC
  (FLUID LOSS CONTROL)

- PT BPOL
  (VISCOSIFIER)

- PT AST
  (COMPLEX AGENT)

- PT CS-13
  (CLAY CONTROL AGENT / SHALE STABILIZER)

- PT LB
  (LUBRICANT AGENT)

- PT BIO
  (BIOCIDE)

- PT DEF
  (DEFOAMING AGENT)
XANTHAN GUM
PT BPOL

Xanthan gum is a clarified, high-purity, high-performance xanthan gum that can be used in most types of water-based fluids where clarity of the solution is critical. A high-performance powder Xanthan provides excellent carrying and suspending characteristics. It is compatible with most mud additives commonly used in water-based fluids for rheology control.

Xanthan has excellent shear thinning properties that promote thinning of the fluid at high velocities and thickening of the fluid at low velocity. It performs effectively over a wide range of pHs in fresh water, salt water and various brine-based work over and completion fluids.

<table>
<thead>
<tr>
<th>ADVANTAGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>– Excellent viscosifier – requires less material than other xanthan’s</td>
</tr>
<tr>
<td>– Excellent suspension characteristics and rheology control</td>
</tr>
<tr>
<td>– Produces shear thinning fluid for optimum penetration rates</td>
</tr>
<tr>
<td>– Performs well in fresh water, seawater, brine and saturated salt environments</td>
</tr>
<tr>
<td>– Minimizes formation damage</td>
</tr>
<tr>
<td>– Helps maintain the integrity of cuttings</td>
</tr>
<tr>
<td>– Reduces circulating pressure losses</td>
</tr>
<tr>
<td>– Effective friction reducer in coil tubing applications</td>
</tr>
</tbody>
</table>

LUBRICANT AGENT PT LB
DEFOAMER PT DEF

PT DEF (DEFOAMING AGENT)
PT DEF formulated to control foaming in viscous brine systems or drilling fluids containing freshwater or seawater. The product reduces the foaming tendencies of water-base muds. It is applicable and compatible with freshwater muds, seawater muds, brine systems and all common mud additives. It has proved to be especially effective in seawater muds and saturated saltwater muds. Defoamer can be mixed easily and is effective in low concentrations. Normal treatments range from 0.15 to 0.40 kg/m³ When used as a pretreatment, prevents foam from developing.

PT LB:
PT LB is a Hi-performance lubricant designed to reduce torque & drag and to lower the potential of bottom hole assembly balling in all water base mud’s under extreme pressure conditions. It imparts extreme pressure Lubricating Properties to the drilling fluids and prevents wall sticking.

<table>
<thead>
<tr>
<th>ADVANTAGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>– It reduces torque &amp; drag.</td>
</tr>
<tr>
<td>– It will not adversely affect rheology or gel strength.</td>
</tr>
<tr>
<td>– It is easily miscible in water base muds and works in all fresh water or salt water muds.</td>
</tr>
<tr>
<td>– Stable at high circulation temperatures and does not undergo chemical degradation.</td>
</tr>
<tr>
<td>– Dispersible in water based muds and high compatibility with most additives.</td>
</tr>
</tbody>
</table>
**PT CS-13**

PT CS-13 is a combination chemistry designed to stabilize reactive clay and shale when drilled with water-based drilling fluids or stimulated with fluids that may induce clay swelling. The product was designed primarily to be used as a potassium chloride (KCl) brine substitute and has a proven track record of successful use providing outstanding performance and onsite savings over brine salts. Stabilizer will not affect permeability as many clay treatments and is compatible with polymers and lubricants required for speedy drilling and lowered friction coefficients. The product is extremely effective at low concentrations and can be added readily to the system without shear.

**ADVANTAGES**

- Broad spectrum use includes KCl substitute, acidizing, fracturing, drilling, and aqueous flushing fluids.
- Compatible with most fluid systems and lubrication or friction reduction chemistries, as well as brine and solids intrusion during drill outs.
- Performs well over a wide pH range and is soluble in all types of aqueous solutions.
- Thermally stable downhole (>200°C) in drilling & completion environments.

**POLYANIONIC CELLULOSE PT PAC**

PT PAC (fluid loss control additive). PT PAC is a Polyanionic cellulose polymer that is available in both regular viscosity (R) grade as well as a medium-viscosity (LV) grade.

**CONCENTRATION**

- Fluid-loss control (0.3 to 9.0 kg/m³)
- Inhibition/encapsulation (2.0 to 9.0 kg/m³)
- Improved filter cake (1.5 kg/m³)
- Improved and Stabilized Rheology (2.0 to 3.0 kg/m³)

**ADVANTAGES**

- Works at any salinity
- Control fluid loss
- Inhibits hydrateable, swelling shales
- Increases resistance of clay muds to contamination
- Retards drilled solids build-up by inhibiting cutting disintegration
- Produces thin, slick, tough filter cake
- Non-fermenting, no preservative needed
- Reduces friction and frequency of differential sticking
- Increases carrying capacity
**BIOCIDE PT BIO**

The biocide PT Bio-7 is applied for growth inhibit of the sulfate-reducing bacteria causing microbiological corrosion of the oilfield equipment.

Biocide loadings depend on bacteria concentration and bacteria type:
- 10–100 g/tn for sulfate-reducing bacteria
- 100–500 g/tn for adhesive cells

**ADVANTAGES**

- Prevent hydrogen saturation of steel
- Prevent colmatation by bacteria activity products
- Reduce the rate of H₂S and Carbon Dioxide corrosion
- Has non-emulsifying properties
- Creates a protective film that prevents the paraffin adhesion

---

**PT AST**

PT AST is a high molecular weight modified hydrocarbon compound of sodium asphalt sulfonate. It is a black, free-flowing flake material. PT AST is partly soluble in water (approx 75%), the water insoluble portion being soluble in oil. This property gives PT AST an excellent emulsifying characteristic. It is also highly resistant to temperatures and the softening point is in excess of 500°F (260°C).

**ADVANTAGES**

- Prevent hydrogen saturation of steel
- Prevent colmatation by bacteria activity products
- Reduce the rate of H₂S and Carbon Dioxide corrosion
- Has non-emulsifying properties
- Creates a protective film that prevents the paraffin adhesion
WELL RECOVERY IN CASE NO FLOW RATES OR FLOW RATES CLOSE TO ZERO

**UPSTREAM/MIDSTREAM CHEMICALS**

- **PT NHI** (Kinetic Hydrate Inhibitor)
- **PT NSH** (Hydrogen Sulfide Scavenger)
- **PT FA** (Flocculant)
- **PT NSI** (Scale Inhibitor)
- **PT CBT** (Complex Additive)
- **PT COR** (Corrosion Inhibitor)
- **PT FLYDE** (Flow Improver Additive)
- **PT BIO** (Biocide)
- **PT LIBRE** (Paraffin Inhibitor)
- **PT NE** (Non-Emulsifiers)
PT Cor is designed to protect the wells, oil pipeline systems, pressure sewers etc. It is effective for corrosion protection in aggressive environments containing carbon dioxide, hydrogen sulfide, oxygen traces. Forms a durable protective inhibitor film on the metal surface. Corrosion protection >95%.

Concentration: Inhibitor of corrosion is used in a mode of continuous dispensing of 20–50 g/tn or in a mode of periodic shock processing 500–3000 g/tn.
FLOCCULANT PT FA

PT FA-7 is a mixture of water-soluble polymers with long and short chains. The mechanism of action of organic flocculant PT FA-7 includes two simultaneous processes due to the presence of polymers with a long-chain and short.

Action of high polymers with long chain is described by bridging model, in which polymer chains of the molecules connect to the surface of solid particles only in some areas and the particles combined with each other. The polymers with short chain fall directly onto the surface of solid particles affect their charge.

**ADVANTAGES**

- Reduce flocculation time in comparison with inorganic flocculants
- Decreasing non-emulsifier loadings due to removal of natural emulsifiers from emulsion
- Extra width separating oil
- Reduce demulsification time
Drag Reducing Agent additive (DRA) to the crude oil positively altering the frictional pressure occurring in a pipeline. DRA are long-chain hydrocarbon polymers modifies the thixotropic characteristics of the crude oil to achieve a more favorable kinematic viscosity without altering the initial composition of the crude oil. DRA achieves reduction of turbulence induced drag in the pipeline of the crude oil due to a rearrangement of the compounds in the crude oil without altering the inherent properties of the crude oil. This decreases pressure in the pipeline resulting in a higher flow stream at the same pressure.

**APPLICATION OF DRA ON ACTIVE CRUDE OIL PIPELINES / REFINED OIL PRODUCTS PIPELINES:**

1. To increase pipeline flow as alternative to the construction of additional pumping stations and loopings;
2. To reduce the energy consumption of pumping stations and infrastructure in general at the same productivity;
3. To increase operational safety of the pipeline through decreasing working pressures at the same productivity.

**APPLICATION OF DRA ON DESIGNED CRUDE OIL PIPELINES / REFINED OIL PRODUCTS PIPELINES:**

1. To decrease quantity of pumping stations which provide transporting from oilfield with uneven oil production;
2. To decrease pipeline diameter and pipeline wall thickness.

Thus, application of DRA provide a decreasing of CAPEX at construction new oil pipelines and OPEX of active pipelines.
UPSTREAM/MIDSTREAM CHEMICALS

MANUFACTURING PROCESS

NIKA PETROTECH CATALYST

ETHYLENE

OLIGOMERIZATION

MIXTURE OF ALPHA-OLEFINS

POLYMERIZATION

NIKA PETROTECH CATALYST

HEXENE-1

POLYMERIZATION

NIKA PETROTECH CATALYST

POLYHEXENE

PURPOSE: INCREASING
ENERGY EFFICIENCY

OBTAINING OF COMMODITY FORM

PURPOSE: INCREASING
FLOW RATE

DRAG REDUCING AGENT
## DRAG REDUCING AGENT PT FLYDE

<table>
<thead>
<tr>
<th></th>
<th>PT FLYDE-H</th>
<th>PT FLYDE-L</th>
<th>PT FLYDE-S</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FORM</strong></td>
<td>Suspension of high molecular polyalphaolefines in the mixture of aliphatic alcohols</td>
<td>Suspension white/light yellow/light brown color with app. viscosity 400cP</td>
<td>Solution of high molecular polyalphaolefines in the mixture high-boiling hydrocarbons</td>
</tr>
<tr>
<td><strong>PARAMETERS</strong></td>
<td>The polymer content more than 20% by mass. Suspension white/light yellow/light brown color with app. viscosity 400cP</td>
<td>The polymer content more than 8% by mass. Suspension white/light yellow/light brown color with app. viscosity 300cP</td>
<td>The polymer content more than 4% by mass. Suspension white/light yellow/light brown color with app. viscosity 50000cP</td>
</tr>
<tr>
<td><strong>APPLICATION</strong></td>
<td>Oil transporting on difficult segments of pipeline requiring high loadings of DRA</td>
<td>Oil transporting on segments of pipeline requiring low loadings of DRA</td>
<td>Refined oil product transporting at any DRA loadings</td>
</tr>
<tr>
<td><strong>FEATURES</strong></td>
<td>Convenient DRA pumping to pipeline Necessity of DRA mixing at long storage</td>
<td>Necessity of special pumping equipment High product viscosity</td>
<td></td>
</tr>
</tbody>
</table>
High efficiency of drag reducing agent PT FLYDE was proven by industrial trial tests on main oil-products pipelines. The efficiency of the PT FLYDE is similar to efficiency competing drag reducing agents which are used in this segment oil pipeline.

The obtained data are correlated with the lab results on the following test equipment:
- The stand unit of Nika-PetroTech
- The capillary rheometer of Nika-PetroTech
- The turbulent rheometer of Transneft Research and Development Department
Hydrogen sulfide (H₂S) occurs naturally in the oil and gas industry. It is also produced by bacterial breakdown of organic materials. Specifically, sulfate reducing bacteria excrete H₂S via a dissimilatory process.

PT NSH-118 reduce the level of hydrogen sulfide gas in crude oil, intermediates, and refined products. Use of these scavengers ensures safer operations with reduced environmental, regulatory, and operational concerns at refineries, storage tank facilities, terminals, and in transport vessels. The by-products of the H₂S reaction are water-soluble and are removed with the water in the system.

There are no insoluble deposition as in case using inorganic H₂S scavengers. Recommended concentration of 3 to 5 ppm : 1 ppm H₂S.
The precipitation of paraffins, which are natural components of crude oil, may lead to challenges during production, transportation, or storage. Important factors influencing paraffin wax precipitation are: temperature, climatic conditions, cooling rates of storage tanks and pipelines, and rheological parameters in the pipelines. Under the correct conditions, PT Libre prevent wax deposition on pipeline walls, by modifying the shape and size of paraffin crystals, so that the crystals stay dispersed and do not agglomerate. By dispersing paraffins back into the oil, the potential waste stream is minimized. This creates additional revenues through increased sales volume (less pipeline downtime) and decreases disposal expenditure.

**FEATURES OF THE APPLICATION:**
Maximum efficiency is achieved when introducing the inhibitor into the formation fluid at a temperature above the melting most refractory components. It is necessary for the subsequent cocrystallization.

1 – W/O INHIBITOR
2 – WITH INHIBITOR
SCALE INHIBITOR
PT NSI

A high performance scale inhibitor developed to prevent both calcium carbonate and calcium sulfate salt deposits.

FEATURES:
- PT NSI will complex with the calcium cations, impeding crystal growth and subsequent scale formation and deposition.
- PT NSI controls barium sulfate, iron hydroxide and will disperse colloids and fine particles such as clay.

The scale is inhibited by the following mechanisms.
- Solubility enhancement or threshold effect which reduces precipitation of low solubility inorganic salts.
- Crystal modification which produces crystals which do not adhere well to surfaces.
- Dispersing activity which prevents precipitated crystals or other inorganic particles from depositing on surfaces.
- Buffering effect, which minimizes precipitation of inorganic salts and limits corrosion and formation of iron oxides.

CRYSTAL MODIFICATION PROCESS

MICROPHOTO OF CALCIUM CARBONATE CRYSTAL (WITH PT NSI)
PT CBT-4 based on the following:

— Comprehensive breakdown of the mineral component and inhibition of its formation. This process occurs due to the presence in the reagent systems that contribute to the destruction of the surface layers, subsequent wedging mineral structure and facilitate its dissolution.

— Included oxidizers that can destroy organic deposits

— The surfactant composition, decrease the surface tension. These surfactants have a high activity, is much greater than its natural compound and improving demulsification process. Effect of demulsifier in the process of dehydration and desalting is the destruction of booking the lining that surrounds the droplet formation water and prevent its flocculation around the droplets.

— Dissolution and inhibition of asphaltene, resin and paraffin deposits. The formulation of the product include special agents dissolving the layer of paraffin. A special purpose additives which reduce the adhesion of these compounds can greatly slow down the further deposition.

Concentration – 1–10 kg/tn.
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