

Group of companies
«QazMunayHim»

INNOVATION FOR GOOD

THE FIRST FULL CYCLE PRODUCTION
OF CHEMICAL REAGENTS AND ADDITIVES
FOR THE OIL AND GAS INDUSTRY IN THE REPUBLIC OF KAZAKHSTAN

www.qazmunayhim.kz

INNOVATION FOR GOOD – SINCE OCTOBER, 2018

RELIABILITY

we guarantee the fulfillment of obligations in due time



HONESTY

we support ethical behavior and open communication



INNOVATION

we encourage people to look for new ways to create value



TO BE THE LEADER IN THE PRODUCTION OF **SPECIALIZED PETROCHEMICAL PRODUCTS** IN THE DOMESTIC AND FOREIGN MARKETS TO IMPROVE THE QUALITY AND LIVING CONDITIONS OF THE POPULATION

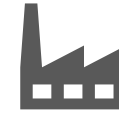
STRUCTURE OF THE GROUP OF COMPANIES

QazMunayHim
Group of companies



It is a modern manufacturer of chemical solutions for the oil and gas industry.

Today we work with the largest oil and oil service companies in the region.



«QazMunayHim» LLP



«QazMunayHim-Service» LLP



«Qazaqstan Ormany»
LLP

PRODUCTION CAPACITY



CURRENT

30 000 tons / year

PERSPECTIVE

50 000 tons / year

1

Factory in Pavlodar city, SEZ territory

2

More than 5 hectares of area

3

More than 50 highly qualified employees

4

More than 50 types of products and services in the portfolio of solutions, including innovative – 20



Located in **Pavlodar**
The area of the complex is ~ **150 m2**



More than **40** pieces of equipment
(SI, test and auxiliary equipment)



Development and production of reagents
comparable with foreign analogues in terms of
price-quality ratio



The specialists of our laboratory are
always ready to **exchange experience** with
consumers

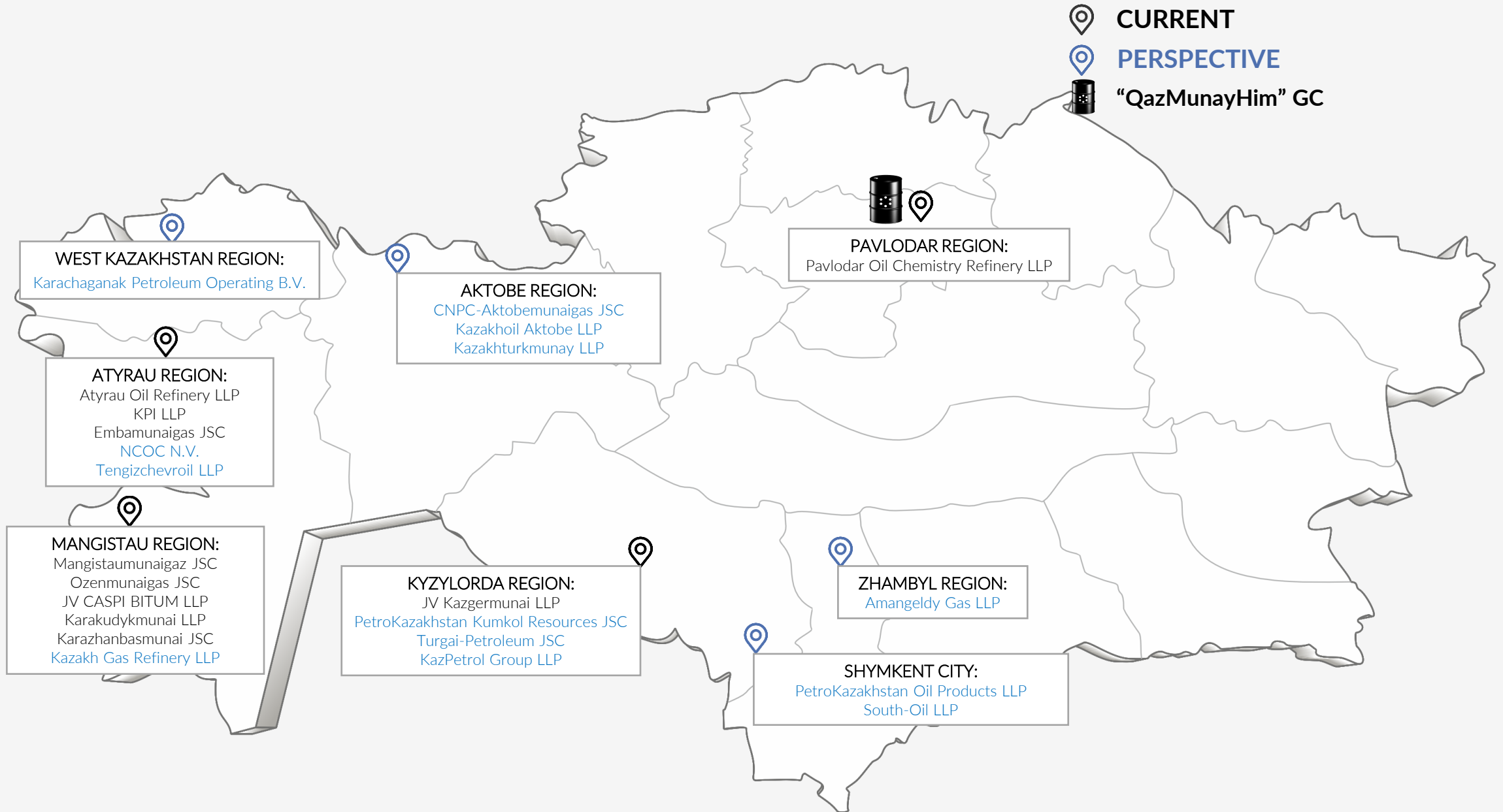


Guarantee of **high efficiency** of reagents for
various production and refining processes

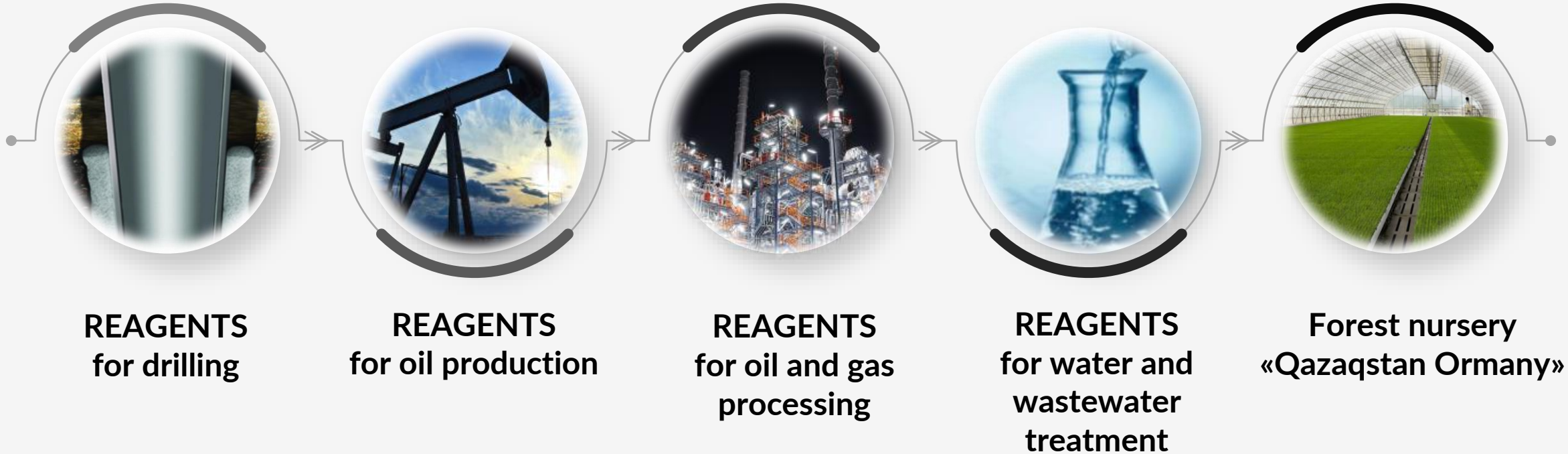


Experience working with the **largest**
companies operating in the field of oil
production, transportation and
refining

GEOGRAPHY OF ACTIVITIES



KEY DIRECTIONS

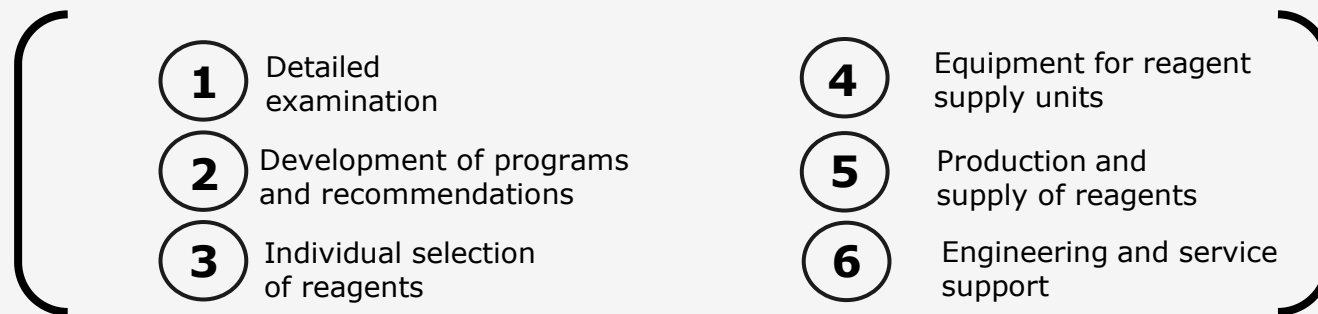


Development and implementation of new technologies and chemical solutions to ensure the technological and economic efficiency of oil and gas refining processes.

MAIN TYPES OF SERVICES:

- Supply of reagents to improve the quality of light and dark petroleum products, as well as to ensure uninterrupted and trouble-free operation of the main technological processes of NP; Selection, implementation, delivery and periodic monitoring of the effectiveness of reagents for primary and secondary oil refining processes

Advantages of working with QazMunayHim LLP:

- 
- 1** Detailed examination
 - 2** Development of programs and recommendations
 - 3** Individual selection of reagents
 - 4** Equipment for reagent supply units
 - 5** Production and supply of reagents
 - 6** Engineering and service support

REAGENTS FOR OIL AND GAS PROCESSING



**REAGENTS
FOR PRIMARY OIL REFINING
PROCESSES (ELOU, AUTH)**



**REAGENTS FOR SECONDARY OIL
REFINING PROCESSES**



**ADDITIVES
FOR DARK PETROLEUM PRODUCTS
(FUEL OIL)**



**ABSORBERS OF HYDROGEN
SULFIDE AND MERCAPTANS**



**ADDITIVES FOR INCREASING THE
QUALITY OF DIESEL FUELS**



REAGENTS FOR PRIMARY OIL REFINING PROCESSES (ELOU, AUTH)

NAME	CORROSION INHIBITOR OF THE BRAND "KMH 2001" DEMULSIFIER "KMH 1626" NEUTRALIZER "KMX 1001"
ACTUAL CONSUMERS	PAVLODAR PETROCHEMICAL PLANT LLP ATYRAU OIL REFINERY LLP LLP "JV "CASPI BITUM"
ADVANTAGES	IMPORT SUBSTITUTION, COMPETITIVE PRICE, LOW EFFECTIVE DOSAGES, SERVICE SUPPORT, FLEXIBLE DELIVERIES, INDIVIDUAL SOLUTION OF CUSTOMER PROBLEMS CONCLUSION "ON THE POSSIBILITY OF USING REAGENTS IN THE TRANSPORTATION AND PROCESSING OF OIL AT REFINERIES"
SCHEME OF WORK	CONDUCTING INDUSTRIAL TESTS AND TESTING, INCLUSION IN THE LIST OF SUPPLIERS, DELIVERY CONTRACT

Chemical and technological protection of primary oil refining plants

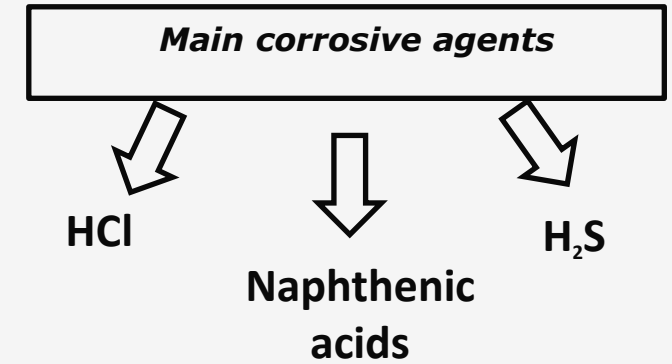
- AIM:**
- Reducing equipment corrosion
 - Increase in the inter-repair mileage

Desalination of oil

Latching of raw materials

Application of a corrosion inhibitor

Neutralization of gasoline flows of atmospheric columns



Chemical and technological protection of primary oil refining plants

***Effective desalination of oil** is the first step in protecting the system from corrosion and deposits*

Desalination of oil



Removal of inorganic salts and impurities from crude oil

INORGANIC SALTS

Sodium Chloride [NaCl] - 70%

Magnesium Chloride [MgCl₂]- 20%

Calcium Chloride [CaCl₂] - 10%

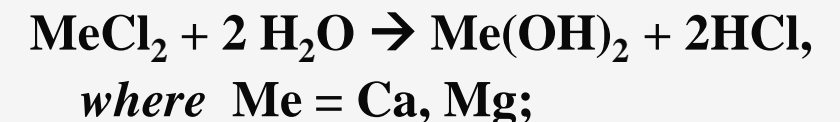
IMPURITIES

clay, sand, scalecorrosion products- iron oxides and sulfides organic impurities- asphaltenes, paraffins



- ✓ formation of deposits in heat exchange equipment
- ✓ ash formation in coke
- ✓ presence of oil in wastewater

Inorganic salts are the source of HCl formation

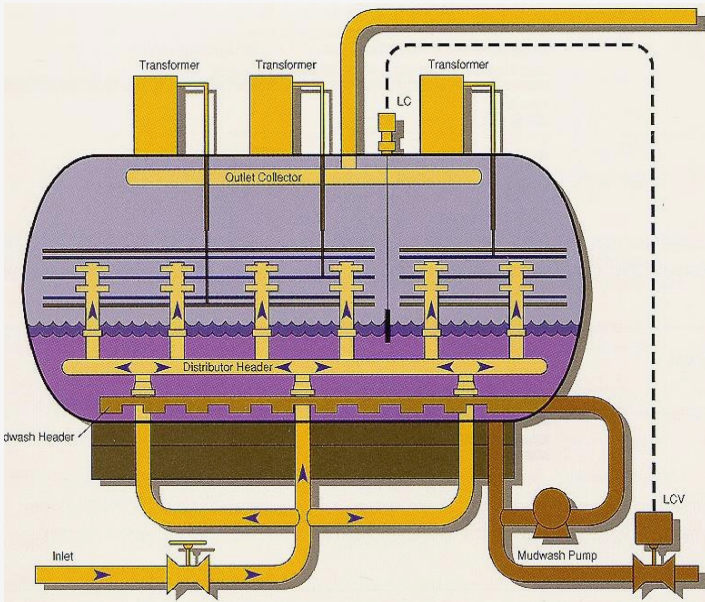


Noticeable hydrolysis begins at temperatures **120 – 150 °C**

Chemical and technological protection of primary oil refining plants

Desalination of oil

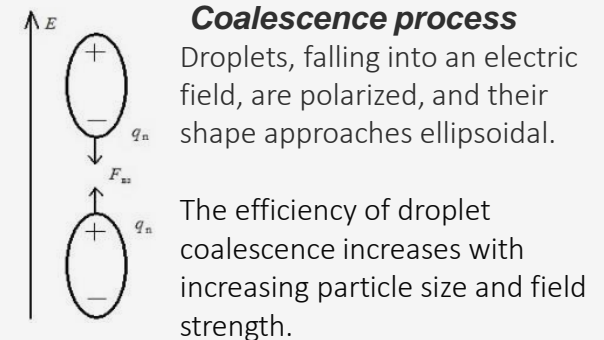
occurs on an electric desalting plant - ELOU



- Heating of crude oil**
 - decrease in viscosity
 - increase in the difference in the densities of oil and water
- Using a demulsifier**
- Adding fresh water to crude oil**
- Efficient mixing of washing water with crude oil**
- Electrostatic coalescence of water droplets in an electric field followed by their gravitational deposition**

Demulsifier actions :

- ✓ **reducing the surface tension between water and oil**
- ✓ **preventing the formation of persistent emulsions**
- ✓ **improving the quality of effluents with ELOU**

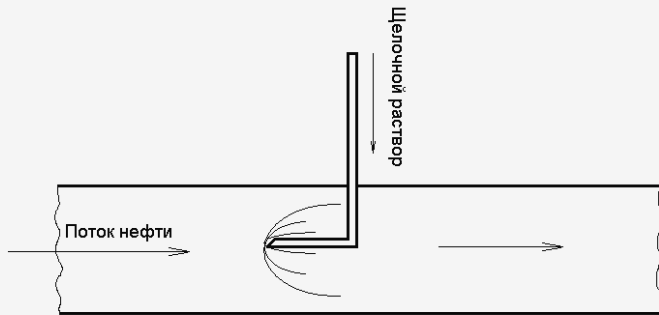


Deep desalination is an important, but still insufficient measure to provide reliable protection against corrosion damage

Chemical and technological protection of primary oil refining plants

Latching of raw materials

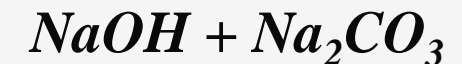
The goal is to minimize the formation of HCl



In the ELOU process, the maximum removal of inorganic chlorides is ensured, however, residual chlorides are hydrolyzed to form HCl, which causes corrosion of the gasoline path AT.

To convert easily hydrolyzable Mg and Ca chloride salts into difficult-to-hydrolyze NaCl, the **method of oil leaching is used**.

Alkalizing reagents:



The introduction of the latching reagent is most effectively carried out in the desalinated oil before the heating heat exchangers

The consumption of alkali during desalination to **2-3 mg/l** of residual salts is up to **10 g /t** of oil



Chemical and technological protection of primary oil refining plants

Application of a corrosion inhibitor

Corrosion inhibitors are substances that, being in a corrosive environment in sufficient concentration, greatly slow down or even stop the corrosive destruction of metal.

The effectiveness of the inhibitor depends on:

- Chemical composition of the reagent
- The nature of corroding metal
- Composition and properties of the corrosive medium
- Ambient temperatures

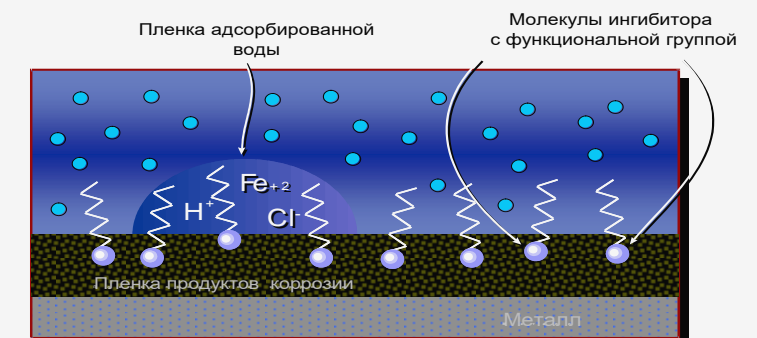
The effect of **corrosion inhibitors** is caused by a change in the state of the metal surface due to the adsorption of the inhibitor or the formation of difficult-to-dissolve compounds with metal cations. **Corrosion inhibitors** reduce the area of the active surface.

Mechanism of action of the corrosion inhibitor

The formation of a protective inhibitory film on the metal surface is determined by two factors:

- by the adsorption force,
- by the configuration of the hydrocarbon chain of the inhibitor molecules

Since the adsorption process is reversible, in order to reduce desorption, it is necessary to have a sufficient concentration of the inhibitor in the solution, as well as a certain time of contact with the metal



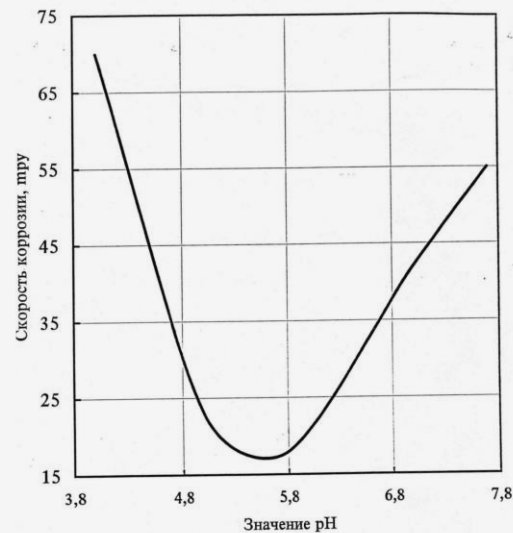
Chemical and technological protection of primary oil refining plants

Neutralization of gasoline flows of atmospheric columns

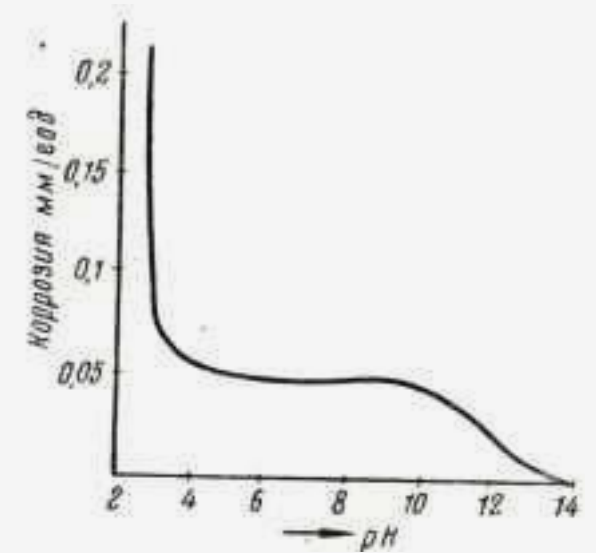
neutralizer supply to helmet lines of atmospheric columns

- ❑ Effectively neutralizes acidic compounds that cause corrosion
- ❑ Allows you to maintain the pH in the required range
- ❑ Ensures the effective operation of the corrosion inhibitor

Optimal pH values for steel protection in an environment containing HCl and H₂S



Dependence of the corrosion rate on pH



Neutralizers are mainly aimed at removing hydrogen chloride from the system. In this case, H₂S additionally forms a sulfide FeS film on the metal, on which the inhibitor is adsorbed. It turns out a double protective layer with a high protective effect.

Reagents for oil recycling plants

NAME	CORROSION INHIBITOR OF THE BRAND "KMH 2001" CORROSION INHIBITOR OF THE BRAND "KMH 2002" INHIBITOR-NEUTRALIZER OF THE BRAND "KMH 2007" ANTI-FOAMING AGENT KMS R-230 ANTI-FOAMING AGENT KMS R-231 (FOR INSTALLATIONS OF AMINE GAS PURIFICATION) DISPERSANT OF COKE DEPOSITS "UMAY R-241" COKING INHIBITOR "UMAY R-240"
ACTUAL CONSUMERS	PAVLODAR PETROCHEMICAL PLANT LLP
ADVANTAGES	IMPORT SUBSTITUTION, COMPETITIVE PRICE, LOW EFFECTIVE DOSAGES, SERVICE SUPPORT, FLEXIBLE DELIVERIES, INDIVIDUAL SOLUTION OF CUSTOMER PROBLEMS
SCHEME OF WORK	CONDUCTING INDUSTRIAL TESTS AND TESTING, INCLUSION IN THE LIST OF SUPPLIERS, DELIVERY CONTRACT

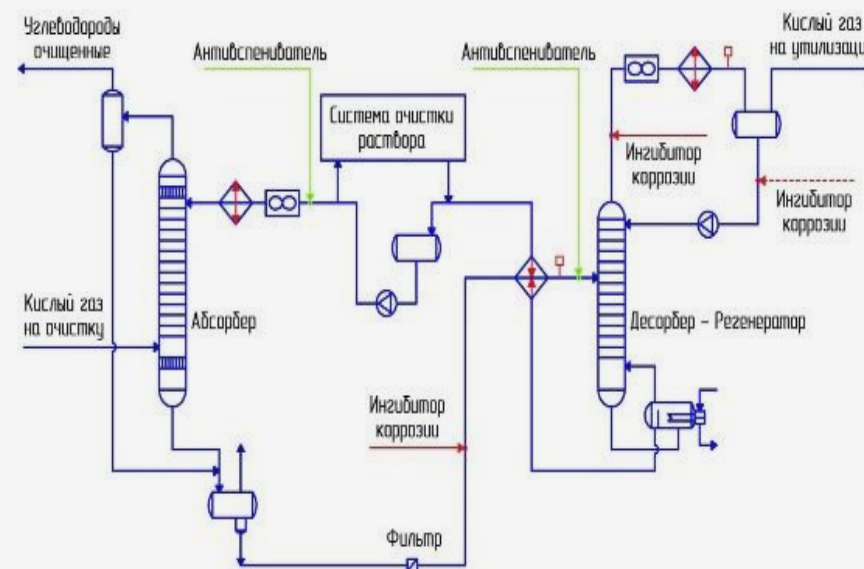
Corrosion inhibitors "KMH 2001", "KMH 2002";
Inhibitor-neutralizer brand "KMH 2007"

Secondary processes where chemical and technological corrosion protection is applied at fractionation units:

- stabilization, secondary acceleration of straight-run gasoline fraction;
- thermal cracking, visbreaking; amine purification unit, amine regeneration unit;
- acid effluent stripping; catalytic processes: cracking of vacuum distillates, hydrotreating of light distillates, hydrocracking of vacuum distillates, isomerization, reforming of gasoline, hydrogenation processing of oil residues

Anti-foaming agent
KMS R-230, KMS R-231

- Delayed coking units
- installations of amine purification of hydrocarbon gases



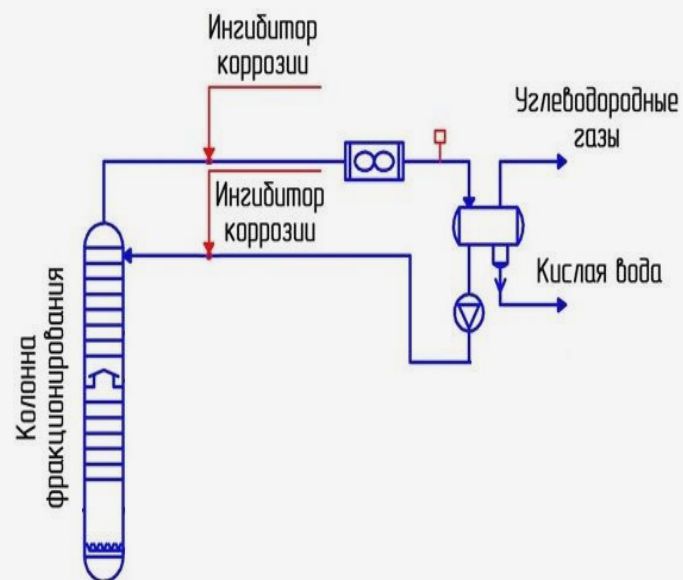
Reagents for oil recycling plants

❑ into the slurry pipeline:

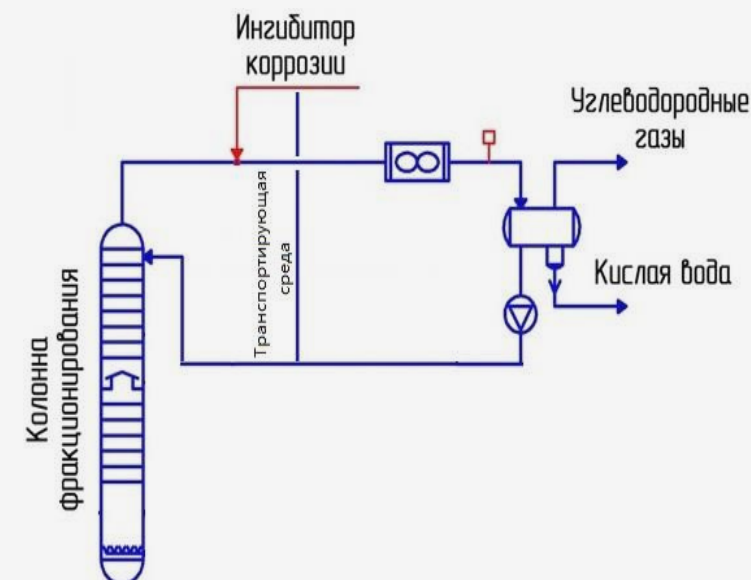
- at the outlet of the column;
 - before condensation and refrigeration equipment;
- ## ❑ into the phlegm pipeline;

- in commercial form with a transported medium (fractionated medium);
- in commercial form without the transported medium;
- in diluted form (reagent solution in straight-run gasoline, kerosene fraction, water);

Variants of corrosion inhibitor supply schemes



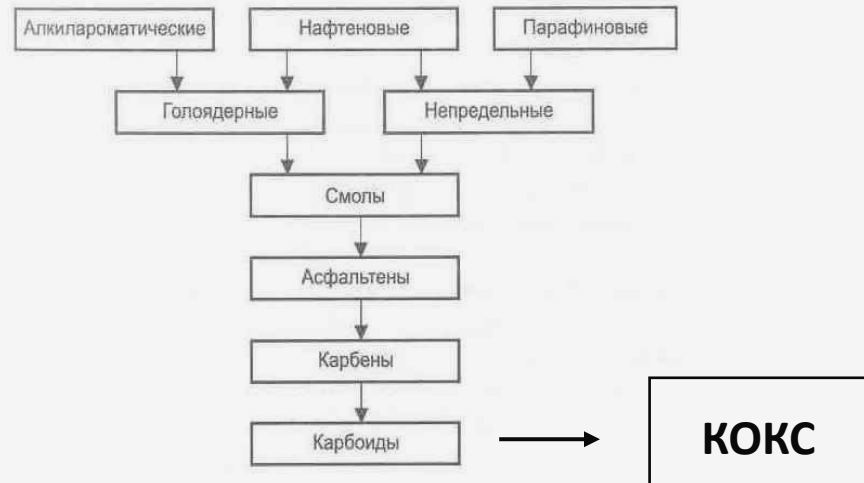
Reagent supply scheme (without transporting agent)



Reagent supply scheme (with transporting agent)

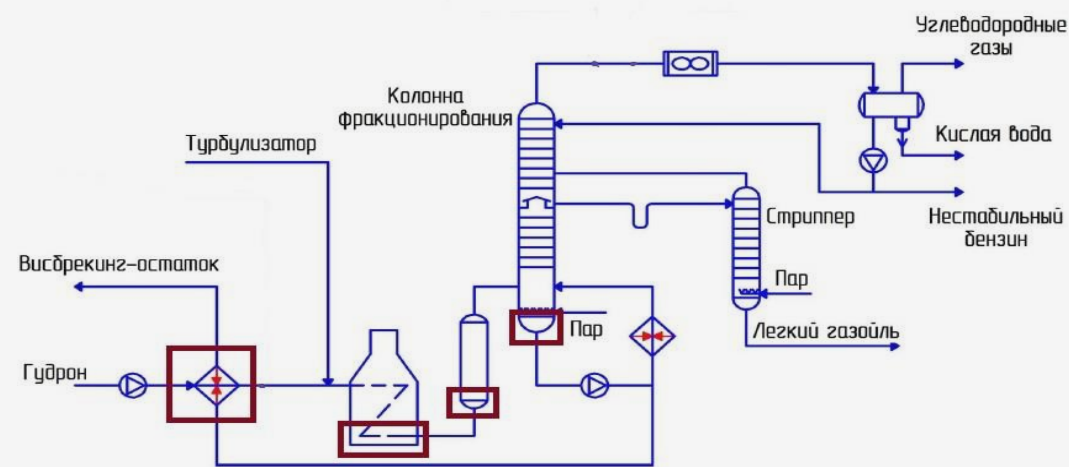
Tar VISBREAKING

CHEMISTRY OF Visbreaking



Stages of the process	Equations of main and side reactions
1. The stage of destruction of raw material molecules	1.1. Splitting of molecules of sulfur compounds and hydrocarbons $R_1-CH_2-CH_2-S-CH_2-CH_2-R_2 \xrightarrow{t} R_1-CH_2-CH_2-\dot{S} + R_2-CH_2-\dot{C}H_2$ $R-CH_2-CH_2-R_3 \xrightarrow{t} R-\dot{C}H_2 + R_3-\dot{C}H_2$
2. Radical and radical-molecular transformations	2.1. Redistribution of hydrogen atoms $R_1-CH_2-CH_2-\dot{S} + R-CH_2-CH_3 \rightarrow R_1-CH_2-CH_2-SH + R-\dot{C}H-CH_3$ $R_2-CH_2-\dot{C}H_2 + R-CH_2-CH_3 \rightarrow R_2-CH_2-CH_2-R + R-\dot{C}H-CH_3$ $R_2-CH-\dot{C}H_2 + R-CH_2-CH_3 \rightarrow R_2-CH=CH_2 + R-\dot{C}H-CH_3$
3. Recombination of radicals	3.1. Education more high molecular weight products $R-\dot{C}H_2 + R-\dot{C}H-CH_3 \rightarrow R-CH_2-CH(R)-CH_3$

Places of sediment formation

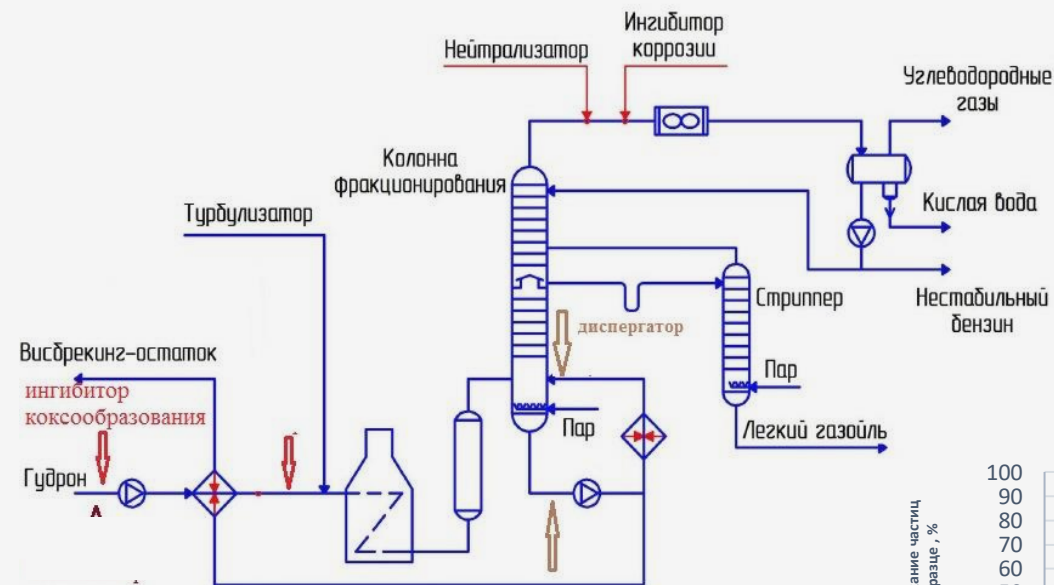


Tar VISBREAKING

The main task of operating a visbreaking plant is to maintain a high conversion rate in the process, reduce the viscosity of boiler fuel, thereby obtaining the maximum economic effect.

The desire to maintain the highest degree of conversion (an increase in the rigidity of the process) will inevitably lead to an increase in the degree of contamination of the equipment, and a **decrease in the stability** of the resulting product, which is caused by the deposition of asphaltenes.

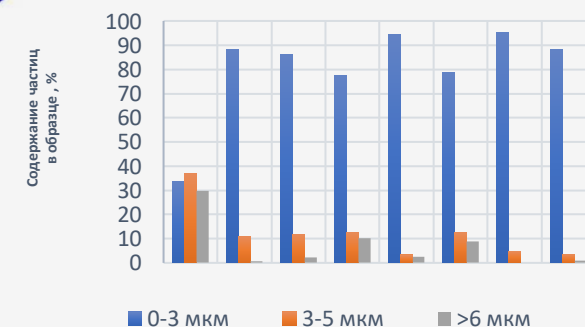
REAGENT SUPPLY SCHEME



Application of reagents

Increase in the inter-repair mileage

Increase in the output of the target product



Reduction of the formation of large coke particles deposited on the surface of the equipment by more than 80 %

INSTALLATION OF DELAYED COKING (UZK)

The main purpose of the UZK is the production of large-lump petroleum coke.

As well as receiving:

- ❑ Gases
- ❑ Gasoline fraction (5-16%by weight)
- ❑ Gas oil fractions

Special working conditions of reaction coils of tubular furnaces and coking reactors.

Raw material

- Fuel oil
- Tar Asphalts
- Cracking leftovers
- Heavy Pyrolysis Resin
- Heavy catalytic cracking gas oil, etc.

Heavy residues rich in coke components



**COKING OF RAW MATERIALS
IN THE COILS OF THE
FURNACE UNDER THE
INFLUENCE OF HIGH
TEMPERATURES**

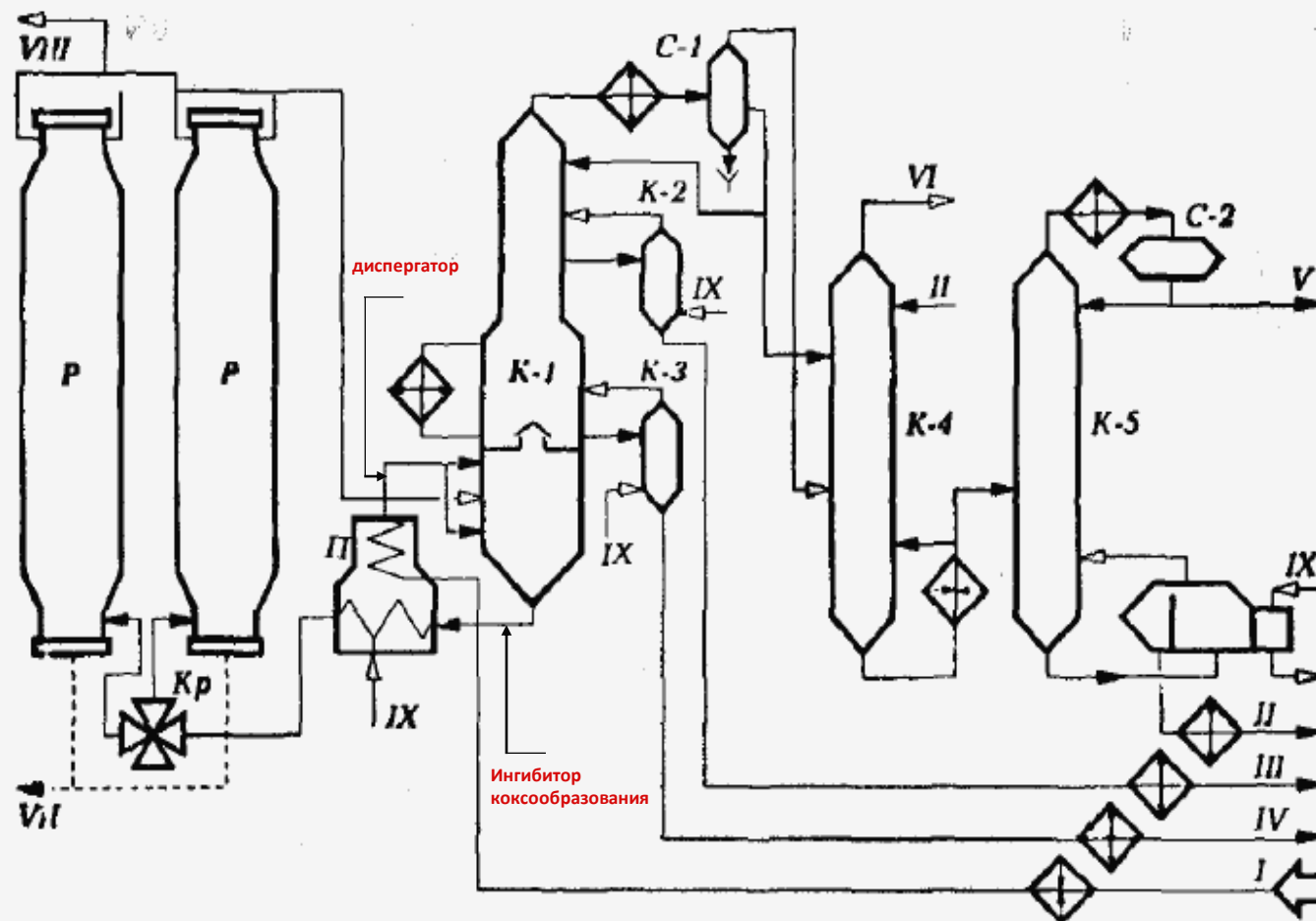
The raw materials are preheated in the furnace to a high temperature (470-510 ° C), and then fed into unheated, externally insulated coke chambers, where coking occurs due to the heat coming with the raw materials.

INSTALLATION OF DELAYED COKING (UZK)

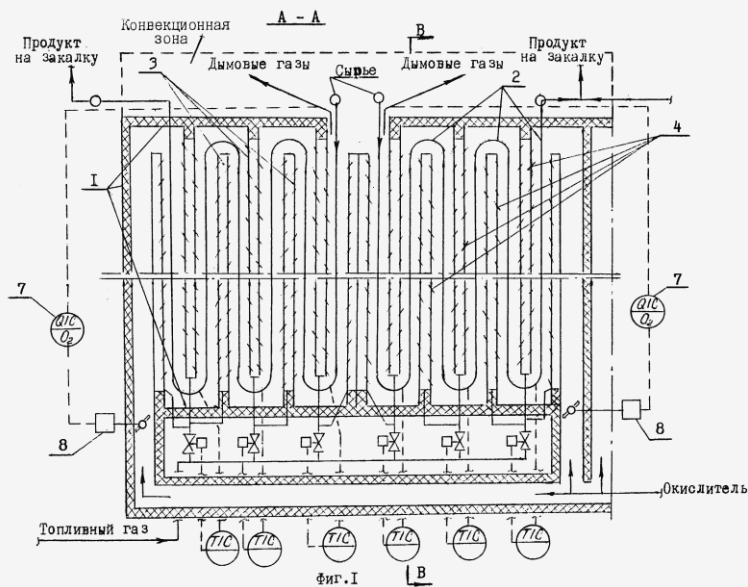
The basic technological scheme of the installation of the UZK

- I – raw materials;
- II – stable gasoline;
- III – light gas oil;
- IV – heavy gas oil;
- V – stabilization head;
- VI – dry gas;
- VII – coke;
- VIII – pairs of stripping chambers;
- IX – water vapor;

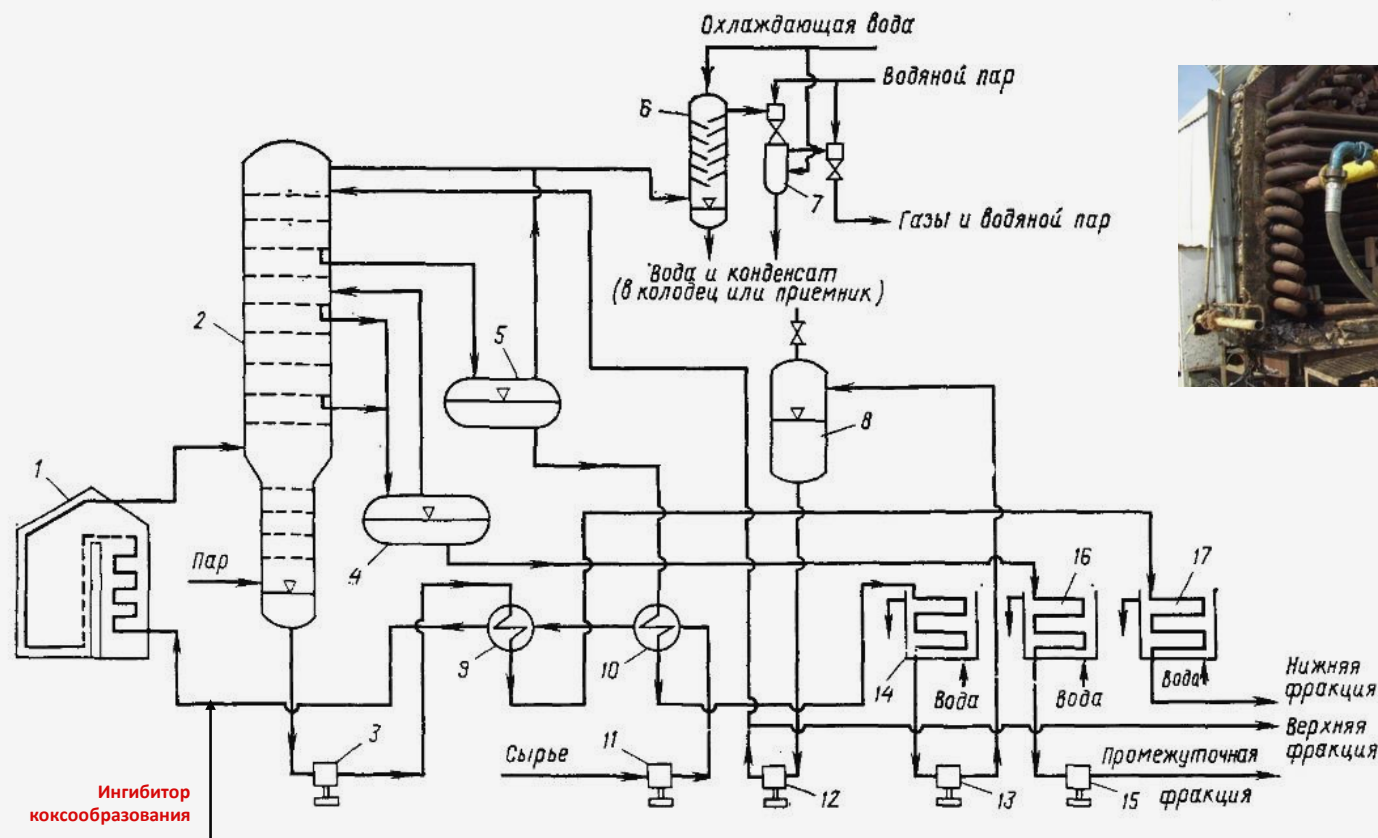
REAGENT SUPPLY SCHEME



Vacuum unit of the AVT installation



FLOW DIAGRAM OF REAGENTS for protection of furnace equipment



- Технологическая схема вакуумной установки вторичной перегонки:
- 1 — трубчатая печь; 2 — вакуумная колонна; 3, 11, 12, 13, 15 — насосы;
 - 4, 5 — вакуумные приемники; 6 — барометрический конденсатор;
 - 7 — двухступенчатая вакуумная парожеткаторная система; 8 — сборник;
 - 9, 10 — теплообменники; 14, 16, 17 — холодильники.

Hydrogen sulfide absorbers "KMS R-280"

Regulatory regulation of hydrogen sulfide content in residual fuels



Inner market

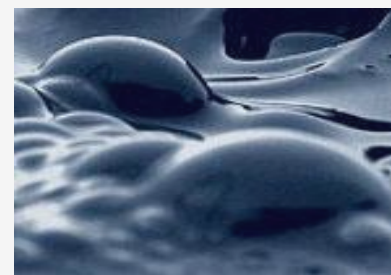
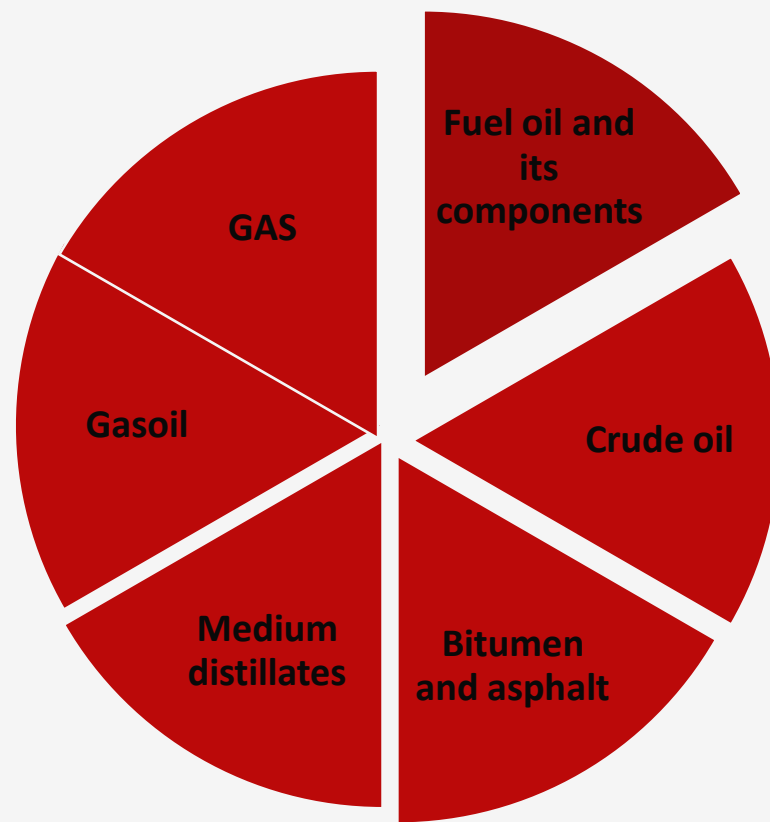
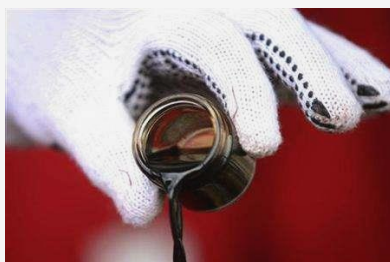
- ✓ **Technical Regulations of the Customs Union TR CU 013/2011 "On requirements for automotive and aviation gasoline, Diesel and Marine Fuel, Jet Fuel and fuel oil":**
- **no more than 10 mg/kg** from January 1, 2017

European market

- ✓ **Export specifications of fuel oil;**
- ✓ **GOST R 54299 (ISO 8217 *) "Marine fuels. Technical conditions".**
- **no more than 2 mg/kg**

Hydrogen sulfide absorbers "KMS R-280"

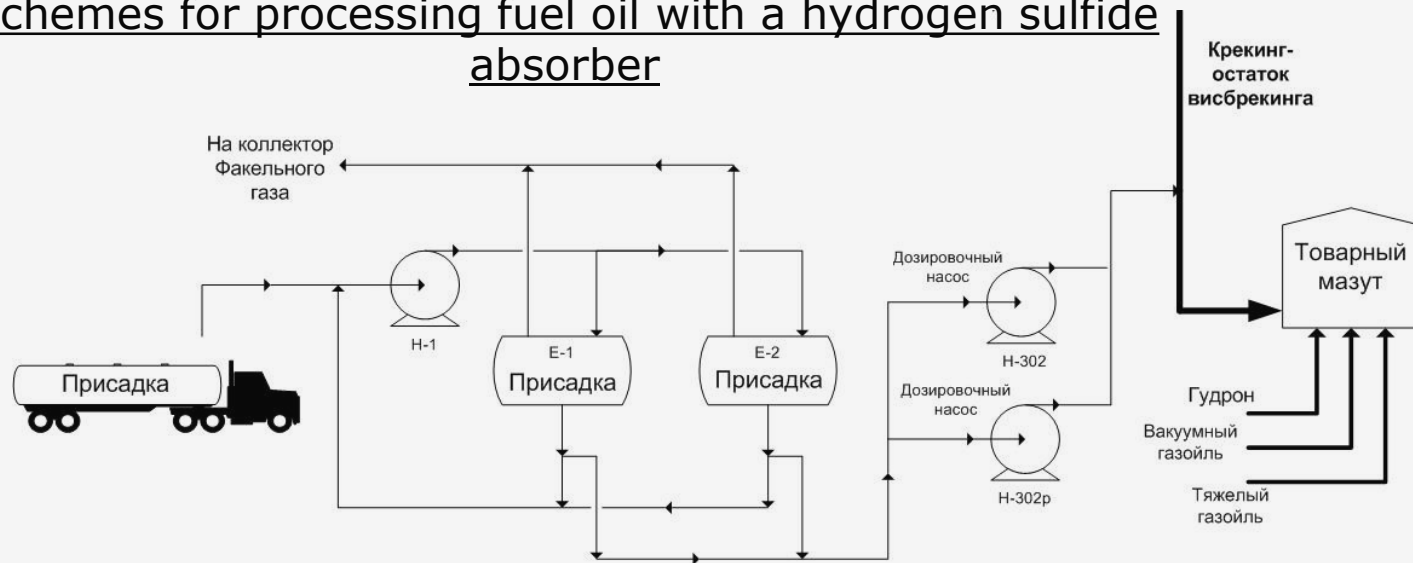
Petroleum products processed by hydrogen sulfide absorbers



Hydrogen sulfide absorbers "KMS R-280"



Schemes for processing fuel oil with a hydrogen sulfide absorber



Important aspects of absorber treatment in industrial conditions

- ✓ **Temperature (determines the reaction rate and viscosity of fuel oil);**
- ✓ **Efficiency of mixing the absorber with fuel oil;**
- ✓ **Reaction time;**
- ✓ **Initial content of hydrogen sulfide and mercaptans;**
- ✓ **Thermal stability of oil;**
- ✓ **Type of hydrogen sulfide absorber and its dosage;**
- ✓ **Correct sampling and accuracy of analytical control;**

Intended purpose:

- bringing the quality of DT to the requirements of the standard,
- -improving low-temperature properties

- Lubricating additives
- Cetane-boosting additives
- Depressant-dispersing additives

The effectiveness of additives depends on:

- fuel quality
- the amount of n-paraffin hydrocarbon
- sand their molecular mass distribution of the composition of the hydrocarbon medium



Application of additives to diesel fuels

- Involvement in the flow of diesel fuel through a mixing device (at the refinery)
- Typical for the involvement of depressor-dispersing, cetane-boosting and lubricating additives
- Typical for Europe and the rest of the world, excluding the USA
- Involvement in terminals, at oil depots (post-production processing /addition through the top)
- Difficult conditions for the involvement of depressor additives
- Typical for the USA
- Transshipment at ports (Rotterdam, Singapore)

What are depressant-dispersing additives for?

❑ To increase the selection of light oil products by increasing the boiling point of the diesel fraction;

- ❑ For the production of winter and summer grades of diesel fuels by reducing PTF and TST;
- ❑ For the production of Arctic fuels, the turbidity temperature of which is 10-15 ° C higher than PTF;

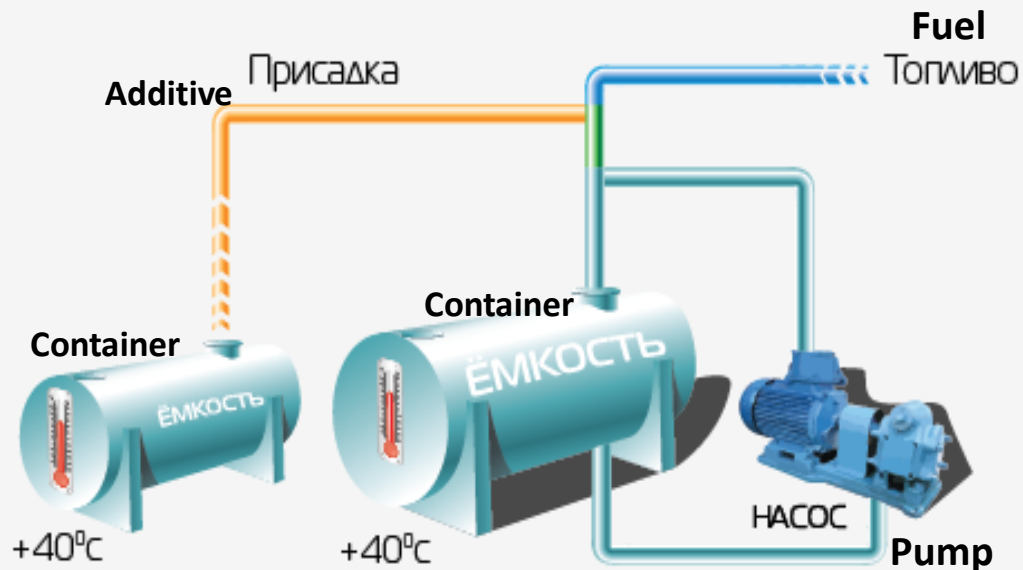
Technical effects of using depressant-dispersing additives

- Reduce PTF and solidification temperature;
- Provide sedimentation stability of DT during cold storage;
- Prevent the formation of a layer of paraffins at the bottom of the tank (long-term storage) and at the bottom of the tank of the vehicle;
- They act as an antistatic additive, increasing the electrical conductivity of the fuel.



Features of the use of depressor systems

- The depressant-dispersing additive affects the size and shape of paraffin crystals at the stage of formation-nucleation, i.e. the additive treatment must be carried out BEFORE the formation of crystals, UP to the turbidity temperature. Usually the processing temperature is at least 10°C above the turbidity temperature;
- The turbidity temperature of DT changes slightly when using the additive;

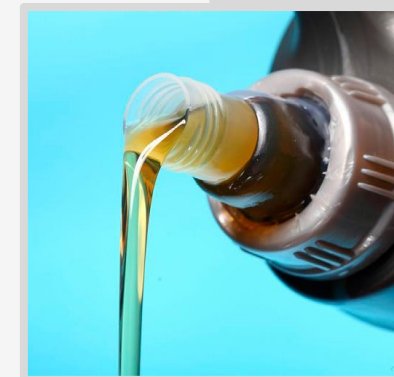
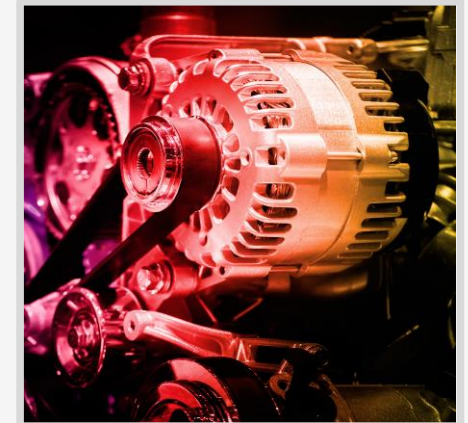


The effect of the mixing temperature of the fuel with the depressor additive on the effectiveness of its action

The mixing temperature of the fuel with the additive	Температура застывания, °C	The maximum temperature of filterability, °C
5	-22	-11
20	-25	-14
40	-30	-20
60	-30	-20

Depressant-dispersing additives "KMS R-260"

✓ Name	Depressant-dispersing additives "KMS R-260"
✓ Actual consumers	Depressant-dispersing additives "KMS R-260"
✓ Advantages of cooperation with QazMunayHim Group of Companies	Engineering (individual selection) Competitive price Flexible logistics system High efficiency of products Service support



Lubricating (anti-wear) additive "KMC LUB"

Intended purpose :

It is intended for low-sulfur fuels to improve the lubricity of diesel fuel.

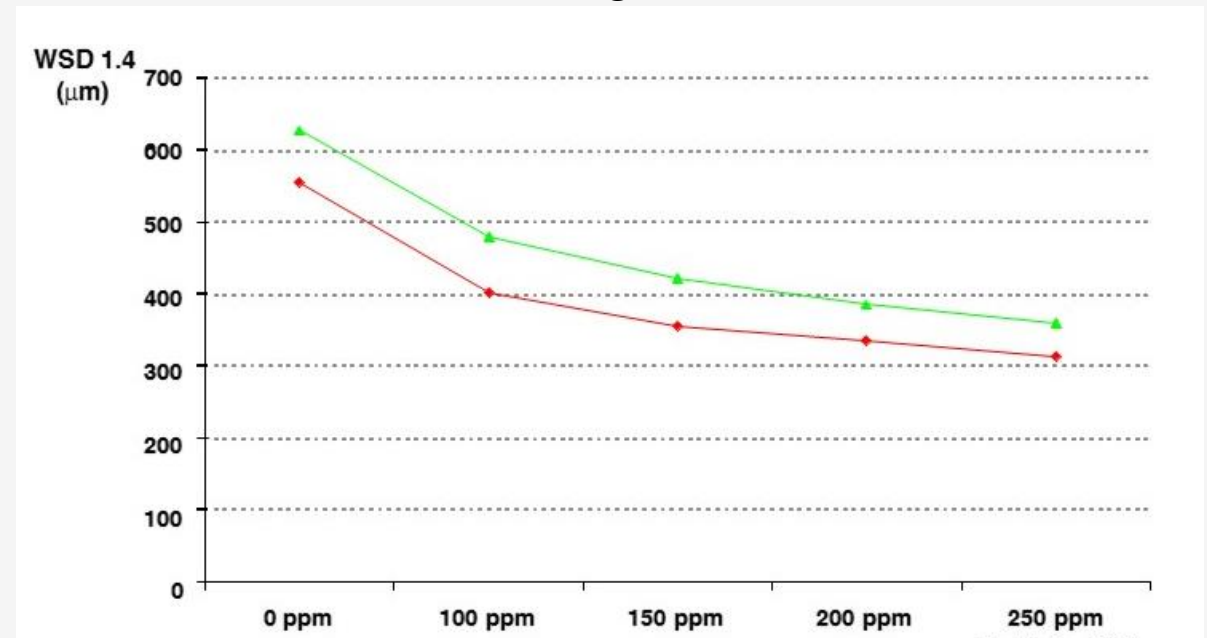
- reduction of mechanical wear;
- protection of the fuel pump and injection system;



The effectiveness of anti-wear additives depends on:

- the sulfur content in the fuel;
- fractional composition and viscosity of fuel;
- the content of additives of other functional purpose in the fuel (cetane-boosting, depressant-dispersing);

Efficiency of processing with a lubricating additive fuel



Anti-wear additives for diesel fuels

✓ Name	Anti-wear (lubricating)additives "KMC LUB"
✓ Actual consumers	ATYRAU OIL REFINERY LLP
✓ Advantages of cooperation with QazMunayHim Group of Companies	Competitive price Flexible logistics system High efficiency





PURPOSE

This innovative additive is a comprehensive solution for improving such commercial characteristics of diesel fuel:

- lubricity
- cetane number
- electrical conductivity

Combinations of additives are possible:

- cetane-boosting+lubricating
- cetane-boosting+lubricating+antistatic
- lubricating+antistatic



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