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### INDUSTRIAL OIL TREATMENT

The purpose of commercial oil treatment is to degas it, dehydrate it, desalination and stabilization.

#### **Degassing**

Oil degassing is carried out to separate gas from oil. The apparatus in which this happens is called a separator, and the separation process itself is called - separation.

The separation process is carried out in several stages. The more separation stages there are, the greater the yield of degassed oil from the same amount of formation fluid. However, this increases the investment in separators. For this reason, the number of separation stages is limited to two or three.

#### **Dehydration**

When oil and water are extracted from the formation, moving through tubing in the wellbore, as well as through industrial pipelines, a mixture of oil and water is formed - a mechanical mixture of liquids insoluble in each other and in a finely dispersed state.

In emulsions, it is customary to distinguish between the dispersion medium and the dispersed phase. According to the nature of the dispersion medium and the dispersed phase, two types of emulsions are distinguished: “oil in water” and ‘water in oil’. The type of emulsion formed mainly depends on the ratio of phase volumes, as well as on temperature, surface tension at the oil-water interface, etc.

The methods are used to break down emulsions:

- gravitational cold separation;
- in-tube demulsification;
- thermal action;
- thermochemical action;
- electrical action;
- filtration;
- distribution in the field of centrifugal forces [1].

#### **Desalting**

Refinery desalting is typically done in one or two stages. This is determined by the characteristics and expected level of contamination after any pre-treatment done at the well head or pre-transportation stage.

The desalting process consists of mixing heated crude oil with wash water and emulsion breaking chemicals. Proper mixing is critical to the salt removal and is achieved using mixing valves and static mixers. The emulsion is broken by a high voltage electrostatic field within the gravity settler tank. The brine water phase containing extracted salts and other impurities is removed from the bottom for treatment. The desalted crude oil is then transferred to the atmospheric distillation column.

The brine fluid produced is extremely corrosive and requires special materials of construction to avoid possible desalter shutdown and risk of plant shutdown. Austenitic stainless steel or Duplex materials are commonly specified [2].

#### **Stabilization**

Stabilization is an essential process to prepare oil for safe transportation and storage by reducing its vapor pressure. This process primarily involves the removal of lighter hydrocarbon fractions, which are highly volatile and can easily evaporate.

Stabilization of oil is carried out by hot separation or by rectification.

During hot separation, the oil is first heated to a temperature of 40-80 °C, and then fed into the separator. The light hydrocarbons released during this process are sucked out by the compressor and sent to the refrigerating unit. Here, heavy hydrocarbons are condensed, and light ones are collected and pumped into the pipeline.

During rectification, oil is heated in a special stabilization column under pressure and at elevated temperatures (up to 240 °C). The light fractions separated in the stabilization column are condensed and pumped to gas fractionation units for further processing.

#### References:

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2. Crude oil desalting process | Sulzer. URL: <https://www.sulzer.com/en/shared/applications/refining-crude-oil-desalting-process>. (date of access: 09.11.2024).

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