

LECTURE 7: Treatment of BHR with surfactants solutions

Lecture № 7

Treatment of BHR with surfactants solutions

**It was estimated that the
efficiency of surfactants usage
depends on the geological and
industrial conditions, the type and**

**LECTURE 7: Treatment of
BHR with surfactants
solutions
concentration of surfactant, and
other factors.**

The most effective surfactant, which has successfully passed many industrial tests in various geological conditions, is micellar solution based on petroleum sulfonates.

Micellar solutions are complex mixtures, containing petroleum sulfonate, hydro-carbon, sodium or potassium, or ammonium sulfate and water.

LECTURE 7: Treatment of BHR with surfactants solutions

Usually, 5 % micellar solution with surfactant is used for the treatment of BHR.

Technology of BHR treatment using surfactants:

1. The concentrate of the micellar solution is diluted to the required concentration with fresh water.
2. Stir until a homogeneous mixture is formed.
3. The planned volume of the micellar solution is pumped into the BHR. The volume of the micellar ranges from 6 to 100 m³.
4. Squeezing of the solution inside the formation is carried out either by formation

LECTURE 7: Treatment of BHR with surfactants solutions

water, or fresh water, treated with surfactants, or oil.

5. The micellar solution is left in the reservoir for 6 – 24 hours for the destruction of water-oil emulsions and capillary saturation.

It is often necessary to treat rock formations with heterogeneity of permeability. For effective treatment in such cases, the micellar solution in combination with a temporarily blocking fluid is partially pumped. This technology provides a step-by-step effect of the micellar solution on the interlayers with different permeability due to temporary blocking of the already treated parts of layer.

LECTURE 7: Treatment of BHR with surfactants solutions

As a temporary blocking fluid, self-destructive polymer system, which is based on a mixture of polymer and degradation agent, should be used.

Due to the presence of degradation agent, the polymer will self-destruct at formation temperatures, that is the solution will gradually lose its viscosity.

Treatment of gas and gas condensate wells

Unlike oil wells treatment, surfactant injection must ensure the proper operation of the gas well while the removal of water and condensate from the bottomhole and HBR. Removal of water and condensate from the gas

LECTURE 7: Treatment of BHR with surfactants solutions

well is achieved both by their dissolution in an aqueous surfactant solution and by conversion into the structure of the foam system.

Technological method included sequential injection into the reservoir of water absorber (methanol) and cyclic injection of a methanol solution of surfactant, dispersed by a gaseous agent. Each portion of solution is squeezed with high pressure hydrocarbon gas.

To increase the reaching depth of technological fluids into the BHR of oil wells, it was proposed to use special process solutions with improved penetrating ability.

For usage in oil producing wells the following surfactant systems with increased penetrating ability are suggested:

LECTURE 7: Treatment of BHR with surfactants solutions

- 0.5 – 5 % nonionic surfactants + 5 – 30 % methanol + water;
- 0.5 – 5 % nonionic surfactants + 5 – 30 % methanol + 1-2 % sodium hydroxide + water;
- 0.5 – 5 % nonionic surfactants + 5 – 30 % isopropanol + water;
- 0.5 – 5 % nonionic surfactants + 5 – 30 % methylcellosolve + water;
- 0.5 – 5 % nonionic surfactants + 5 – 30 % mixture of methylcellosolve and methylcarbitol + water.

At the same time the following surfactant systems are proposed for the treatment of injection wells:

LECTURE 7: Treatment of BHR with surfactants solutions

- 0.5 – 5 % nonionic surfactants
+ 5 – 30 % monoethanolamine +
water;**
- 0.5 – 5 % nonionic surfactants
+ 5 – 30 % monoethanolamine + 1
– 2 % sodium hydroxide + water.**

Directional and selective methods of formation treatment

Directional treatment is a method of direct action in which all formation intervals are shut off, except the one it is scheduled for

LECTURE 7: Treatment of BHR with surfactants solutions

treatment. Directional methods provide greater control over the process of treatment at a scheduled interval.

Selective treatment methods are aimed at temporarily or permanently reduction of the permeability of high-permeable or flooded layers and enhancement of the permeability of low-permeable or oil-saturated layers. Selective treatment is simpler in technological process than directional methods.