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Exposure to the Layer with Steam Heat and Hot Water

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Abstract
In this traditional method, heat carriers of a calculated volume are driven through the driving wells for the effect of steam heat, thermal borders are formed, and unheated water is directed towards the well to be mined. In order to increase oil recovery in the productive layer, the properties of oil and water are absorbed at the expense of increasing the temperature by driving the heat carrier.

Keywords:

Introduction

As the temperature rises, the viscosity of oil, their density and the ratio between the phases decrease, the elasticity of vapors increases, they have a positive effect on oil recovery. As a working agent, water vapor or hot water is used, which means that they have a high specific heat capacity and good compressibility. In the process of pumping the steam into the oil formations, it first heats the oil formation. In this case, steam accumulates in the porous phase and condensation occurs. After heating the layer, the heat of the heated condensate is used, the condensate cools at the initial temperature of the layer. Vaporization of hydrocarbons is improved under the influence of partial pressures during oil vapor compression. Here two layers of internal compression front are formed, the first is a cold compression front. These characteristics require taking into account the dynamic expansion of the thermal field in the layer during the operation of the heap, determining the shape of the wells and the distance between the wells. The size of the total heat carriers driven into each drive well is determined based on the required heating level of the productive layer. The decrease in partial pressure is due to the absence of water vapor in the evaporation zone. The light components of the residual oil vaporize and move to the front boundary of the porosity zone, that is, it becomes liquid and dissolves in the oil package, forming solution rims and increasing additional oil availability.

When the density of oil is 934kg/m3, about 10% of oil can be driven at temperature of 375ºC and atmospheric pressure.

When the layer is exposed to steam heat, 3 zones appear:

1. Oil vapor compression zone;
2. Hot condensate zone, compression of oil with water in non-exothermic conditions the mechanism works;
3. Zone of compression of oil with water at formation temperature, not affected by heat.

All these zones are tested against each other.

When steam is pumped to increase oil recovery from a productive formation, the viscosity of the oil decreases, as a result, the formation is affected and the compressibility coefficient increases. Due to the increase in temperature, the viscosity of oil decreases to a large value, mainly in the temperature range of 30-85ºC. The rapid decrease in the viscosity of oil, with the increase in temperature, the viscosity of oil compared to the viscosity of water decreases rapidly and increases the mobility coefficient of oil, and the last decrease in oil yield due to the influence of heat is taken up by the thickness of the layer and the compression zone expands. Residual oil saturation (a) and volume coverage coefficient (b) of the formation with a compressive agent as a function of formation fluid temperature (permeability of formation 1μm2, initial water saturation 25%, water-oil factor greater than 50) 1.2 - oil density, respectively 876 and 986 kg/m3.

In the figure, the dependence of the coefficient of volume coverage of the formation with the compressive agent on temperature is presented for heavy and light oils.

As can be seen from the figure, the coverage coefficient increases rapidly in heavy oils.

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