Use Of Chemicals For Paraffin Control

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Paraffin is costing the crude oil producers untold millions of dollars per year. In down time, loss of production, plugged wells, lines and emulsified oil in storage tanks.

This problem has been attacked in many ways and, until a few years ago, the removal of such deposits was done by mechanical means only. Because of the high cost of mechanical methods, oil producers sought the use of chemicals such as solvent and paraffin inhibitors, of which there are several chemicals formulas on the market that are doing the job economically and well, if they are properly applied.

Paraffin is composed of a waxy substance, gum, resin, asphaltic material and crude oil, however we find other things in paraffin such as sand, silt, calcium carbonate, iron oxide, salt, water, etc.

First let us find out what causes paraffin to crystallize out in storage tanks, flow lines, and oil wells. It is due to changes in temperature of produced crude oil caused by the refrigerating effects of gas expansion, or the change in temperature between formations and the surface. When this sudden temperature change takes place the oil becomes supersaturated with paraffin crystals, which starts forming where this change takes place, whether it be down in the well or in the flow line and storage tanks. As these paraffin crystals begin to form the amount will be determined by the foreign materials present in the crude oil. Some oil has little or no foreign material whereas other crude oil has a different make up of these substances. That is why we have to treat individual wells differently and this is why one chemical will work on some wells and won't on others.

There are two types of chemicals used for paraffin on today's market. First, a solvent which is most commonly used to soften and loosen the paraffin deposit so that it is broken up into fine particles or reduced to a soft mush, which can be flushed on through the system by the produced oils.

The amount of solvent to be used will depend upon the type paraffin and the amount that has been deposited. For instance, if you have a flowing or pumping well that is on a time clock that doesn't flow or pump consistently, the oil drains out of the paraffin crystals and deposits change progressively from a Viscous liquid to a drier, harder accumulation. It can readily be seen that this type paraffin would be harder to remove by the use of a solvent.

In using a solvent for down the hole treatment in a pumping well release the back pressure at the trap and allow the tubing partially to empty itself, or if there is insufficient gas to unload the tubing, lift the rods sufficiently to unseat the standing valve, permitting the oil to recede down the hole. Lift the stuffing box, insert a funnel and pour five to ten gallons of the solvent in between the polish rod and the walls of the tubing and leave the well closed in over night. Another method used is to attach a bowl weevil type lubricator to the casing, pour the solvent into the casing, tie the flow line into the casing and circulate the well from 12 to 24 hours, depending on how badly the well is paraffined up. A well was treated near Andrews, Texas, using this circulating method, however, before the treatment was started, it was found that the crude oil not only contained paraffin but iron oxide and calcium carbonate as well. Ten gallons of solvent that weighed 12.7 pounds per gallon and 10 gallons of corrosion inhibitor that was oil soluble dispersible in water were used for treatment. After circulating the well over night the flow line produced some hard material that wouldn't burn. Needless to say that this well's production was increased after getting all this foreign material out of the well.

In contrast to paraffin solvents, paraffin inhibitors are used as a preventative measure in systems which have a tendency toward paraffin trouble and also inhibitors are often injected continuously into the well casing or surface lead lines, unlike paraffin solvents which are applied by batch treatment.

The theory of the operation of paraffin inhibitors is dependent on the action which consists chiefly in coating the crystal surfaces of paraffin by adsorption, thus, stopping the growth of the paraffin crystals and displacing the layer of adsorbed crude oil. Such a coating also may prevent the cohesion of the crystals. The paraffin in crude oil will crystallize even after the use of an inhibitor, but the type crystals formed will not interfere with the movement of the oil.

The effectiveness of the paraffin inhibitor will vary with the treatment the oil receives. Under a condition of slow cooling the paraffin crystals will be large enough so that the inhibitor being used can cover the entire surface area of the crystals. On the other hand, if the oil is chilled rapidly, extremely small paraffin crystals will result. The total of these small crystals will have such a large surface area that the inhibitor is insufficient to cover all of the crystals, thereby, permitting coherence to form a solid structure.

We have discussed the two type paraffin chemicals and how they are used for treating wells and flow lines. Lets talk some about how paraffin affects the treating of the crude oil emulsions. If the well is making water these globules of water will have a paraffinic film around them which may be difficult to treat without the help of some paraffin chemical. This chemical softens the paraffin film and lets the globule of water out and the force of gravity will let it fall to the bottom of the treating system. If this paraffinic film stays around this globule of water it will end up on the bottom of your storage tank and the pipe line will turn down your oil on a high bottom. Another way to help paraffin bottoms is to use the smallest amount of temperature on your treating system possible. Most paraffin will melt from 120 degrees F to 200 degrees F. Most emulsion can be broken with 120 degrees F or less with the proper treating chemical.

Once you have melted the paraffin and it gets cold most all of the paraffin crystals fall out in the storage tank causing a fast build up of the bottoms. We were called to a lease in Northern N. M. because he couldn't sell his oil on account of high bottoms and grind out. We immediately checked his treating system and found 4 percent paraffin and 6 percent water going to stock. Checked his treater temperature it was 160 degrees F. We ran a bottle test on his emulsion and found that an emulsion breaking chemical alone wouldn't clean the oil up completely. We found by using two parts of a paraffin solvent and one part emulsion at 100 degrees F temperature it cleaned.

We immediately started this mixture of chemical thru their treating plant and cut the temperature to 120 degrees F. This cleaned his system up in a matter of two hours. Then we cut back on the amount of chemical used and the company had trace oil and paraffin going to stock.

In closing remember if a paraffin chemical is used properly and the right formula chosen you can help your paraffin problems.