ABSTRACT

Current open-hole, gravel-packed, slotted-liner completions for wells drilled in unconsolidated and weakly consolidated sandstone are relatively expensive and result in greatly reduced operational flexibility of the well. Furthermore brighter idea for sand consolidation is to try to solve sand problem with positioning polymer as an adhesive material to consolidate the sand without loosing its permeability. Hopefully, this new idea would be able to decrease cost recovery and to enhance PI (production index).

The scope of this research is to find the optimum composition of epoxy resin and furan, and also to compare the quality that will be given before and after treatment. The physical and chemical respon of sand will be monitored when treated by each of the resin or by the combination of both polymer.

This method of sand control treatment based on the prior hypothesis where the polymers have an ability to bind the sand grain together, so it can strengthened the structure and decreasing the sand production. The tests of the polymer is done by adding each polymer in the core sample and perform tensile strength and permeability tests.

By comparing the result, the most suitable and profitable way comes to core that added with combination of epoxy and furan resin where the production of sand decrease, the good permeability, long life time, and short curing time.

INTRODUCTION

Poorly consolidated and unconsolidated reservoir has created its own problem. People knows sand production as a big trouble as effect of poorly consolidated and unconsolidated reservoir. Sand production causes erosion in tanks and pipe lines, leading to increased maintenance cost, and lost oil production. Many researches and papers has been published concerning this topic. Based on the observation we conclude that sand problem could be solved by injecting the polymer to cement or to consolidate the sand grains. Hence it was not carried out together with oil production. Adhesive characteristics owned by the polymers are the key for the work.

After evaluating previous work, epoxy resin and furan resin are mostly used. Both enhance good attempt to achieve better result among others. Nevertheless it is never stated the comparison between both resin on the same rock. Each research showed their own strength utilizing their own polymer. So that readers have less chance to evaluate the best.

What we have done is to select all alternative polymers which can be used to overcome sand production. Readers will be able to evaluate the best resin by their own. Furan resin and epoxy resin used on our work, as the best resin so far will be compared directly. Furan resin are thermally stable and experience self condensation with existing acid catalyst. Polymer produced is strong and brittle but low adhesion compared to epoxy resin. Meanwhile epoxy resin will create polymer with great stiffness and strongly bind caused by crosslink structure.

This work had few steps. Firstly, it is important to remove the formation fluid from the reservoir before injecting resin, well known as preflush system. Mud acid or alcohol mostly acts its role for this objective. Alcohol preflush is used to remove clay mineral around the rock sand. The agent used for preflush system must be suitable with the resin.
After that, resin solution is injected to the reservoir and completed with overflush. All steps must be completed as an unity to create the best result.

After consolidating the sand rock, the next step for this work is to inject the resin to the reservoir. The permeability of the fluid is also been considered. It will be approached by adjusting the concentration for of resin used in the system. By examining any range of concentration we evaluate the best one that fulfilled the parameter wanted, to consolidate sand rock and to enhance the permeability.

METHODS

This method based on ability of chemical material to bind the grains together thus creating a strong bond. With cementing the sand structure, we will get the stronger core. It can affect the ability in producing more oil. With the increasing of core strength, we expect that the oil production can be done as much as possible. Chemical compound frequently used is epoxy that stand for epoxide resin and hardener. Epoxide resin generally synthesized between bisphenol-A and epichlorohydrin those finally produced chemical compound with epoxide group. Hardener on this objective comes from compound containing amine group those react with epoxy to form covalen bond. Consequently, resulting polymer will have great stiffness and strongly bind caused by polymer crosslink structure.

Furan resin also extensively applied as an adhesive for this investigation. Furan resin has its own strength to be polymerized. This compound need no curing agent (kind of hardener). In addition, furan is able to experience self condensation with existing acid catalyst. Polymer produced from this process is very strong and brittle, but it has low adhesion power.

From each polymer’s characteristics, we can combine the two to get new good feature, such as excellent acid and alkali resistance, high penetration ability, quicker curing speed, and have higher resistance with moisture.

This research has used thirty six core samples from “T” reservoir. Twelve cores are treated by furan, the second twelve are treated by epoxy and the others treated by the combination of epoxy furan resin.

RESULT

From the laboratory test, it can be seen that the mechanical strength from the core treated by epoxy, furan and the combination of both resin have a different result.

CONCLUSION

Conducting sand consolidation with epoxy-furan resin create optimum condition where sand is less produced without reducing fluid permeability, maximum shelf time and minimum curing time. Chemical sand consolidation by using epoxy furan resin has showed a better result when applied to synthesis core.

Chemical sand consolidation is a profitable ways in tackling the sand problem. This method not only have an advantages in maintaining the well facility, but also saving more production cost.