Effect of Cellulose Material on Oil Well Smart Cement

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Abstract: The effect of monosaccharide on the oil well cement properties was investigated by adding various percentages monosaccharide into cement. Modification of smart cement by monosaccharide increased the initial resistivity of the oil based smart cement. Hydration process of the smart cement was delayed. Monosaccharide enhanced the piezo-resistivity and tensile strength.

1. Introduction

Monosaccharides, polysaccharide and some salts exhibit retarding action (Neville 2006; Lea 1988; Ramachandran et al. 1993). It is found that retarders modify crystal growth or morphology, becoming absorbed on rapidly formed membrane of hydrated cement and gradually slow down the growth of calcium hydroxide nuclei thereby forming a barrier to further hydration than is the case without a retarder (Neville 2004). Monosaccharide is used in producing retarders (Shetty 2004). In this paper, we investigated effects of it on smart oil well cement.

2. Objectives

The effects of monosaccharide addition on the curing time, piezo resistivity and compressive strength of smart cement was investigated.

3. Materials and Methods.

Initially the monosaccharide was mixed with water, and then the cement with (0.02%) conductive filler was added to it. The sample was blended for 3 minutes. The mixing time for all the samples was same and the cement slurry was then cast in cylindrical molds for compressive test. After 48 hours, they were demolded. Setting time and compression testing was done on the specimen. The resistance of 1-day smart cement lies in the range (100-200 Ω) whereas the resistance of monosaccharide added smart cement resistance lies between (50-100 Ω).

4. Results and Discussion

Addition of monosaccharide into oil well cement shows significant change in the hydration properties. The monosaccharide has a general formula C6H12O6. It has five hydroxyl group (-OH) and carbonyl group(C=0), it delays the hydration of cement. Also, the percentage required to achieve the intended property is less than 0.1% of the cement weight. To delay the setting time of cement, this can be used an alternative. Also the piezo-resistivity of the cement with monosaccharide and conductive filler shows enhanced piezo resistivity.

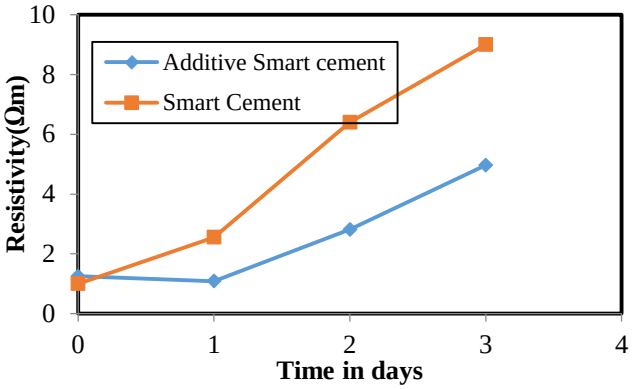

Fig 1. Resistivity Vs Time in Days

The setting time of cement added with (0.1%) monosaccharide is plotted in terms of resistivity of the sample. From the graph it is clear that monosaccharide addition delays the setting time of cement. The compressive strength of the specimen with the resistivity is plotted and it shows that piezo resistivity of the sample gets enhanced on addition of monosaccharide.

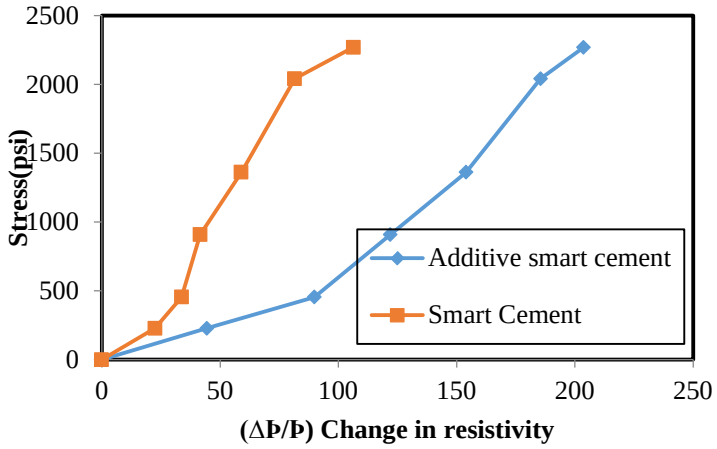

Fig 2. Stress Vs Change in Resistivity

From the curves, it is evident that piezo resistivity of smart cement with monosaccharide additive is more it acts as a retarder and extremely low quantity is effective in achieving the desired properties.

5. Conclusion

Addition of monosaccharide into the smart cement delays the hydration of cement and increase the piezo-resistivity of the sample.

6. Acknowledgment

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7. References

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