



Contribution ID: 608

Type: Oral Presentation

A gel front liquid system with delayed properties for pore-type cracks

Monday, 13 May 2024 13:25 (15 minutes)

With the deepening of oil and gas resources exploration and development, drilling wells will encounter various problems, especially the leakage problem, which will lead to a substantial increase in drilling costs. At the same time, the uncertainty of the leakage channel in the process of reservoir leakage not only has a great impact on the drilling efficiency but also causes a large amount of drilling fluid leakage and other problems. At this stage, cement slurry plugging material is the most commonly used plugging material to deal with cracks, holes, and other malignant leakage, but the disadvantage of cement slurry is easy to be dilute with formation water mixing, so it is difficult to stay in the leakage layer in the near-well zone to the point that it can't form a dense blocking layer, so the effect of the cement plugging agent isn't particularly ideal. This paper uses anionic polyacrylamide HPAM and organic chromium crosslinker, a stabilizer to form a temperature and PH-sensitive gel system, the gel system can be added to the pre-positioning liquid to delay the gel formation time, and the system before and after the addition of the pre-positioning liquid, respectively, the performance of the analysis and evaluation, and ultimately determine the gel system. It was found that within a certain range, the release rate of Cr^{3+} from the organochromium crosslinker in this system accelerated with the increase in temperature, and the release rate of Cr^{3+} was slower when the pH was 5-7. Since the release rate of Cr^{3+} determines the speed of hydroxyl bridge reaction with HPAM, the purpose of delayed gel formation in a weak acidic environment can be achieved by controlling these two variables, so that the predisposed liquid system added into the gel can be controlled and sealed after arriving at the target layer, obtaining good plugging effect and laying the foundation for the future cement cementing process.

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References

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Session Classification: MS06-B

Track Classification: (MS06-B) Interfacial phenomena across scales