

TESTING MARKER-CONTAINING DISPERSION FOR ACID RESISTANCE
AND ASSESSMENT OF WORK DURATION AT CARBONATE ROCK ACID STIMULATION

CHALLENGE

To assess the stability of a marker-containing dispersion in hydrochloric acid and the duration of marker release from carbonate rock after treatment with hydrochloric acid in the presence of a marker-containing dispersion.

SOLUTION

The tested was the samples of marker-containing dispersions for acid stimulation of carbonate rock. Two experiments were carried out using hydrochloric acid (HCl) aqueous solutions in different concentrations - 15% and 24%. Dispersions of marker-containing material were added to these solutions. Next, the resulting composition of the mixtures was kept while stirring and samples were taken from them at specific time ranges. Finally, samples were exposed to ultrasound to determine the concentration of markers.

The results of the long-term stability of markers in 15% and 24% hydrochloric acid solutions are shown in Fig. 1.

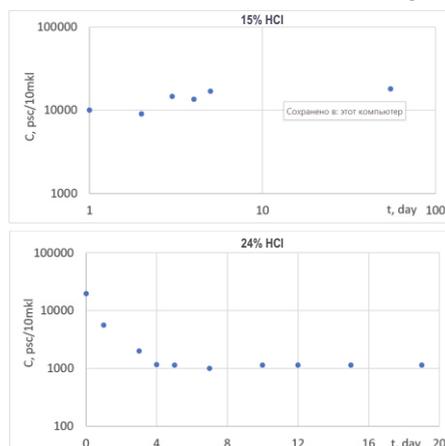


Fig. 1 - Results of the long-term stability of markers in 15% and 24% hydrochloric acid solutions

There has been no significant decrease in the concentration of markers in the dispersion sample over a period of more than 20 days. This indicates a high stability of markers in a hydrochloric acid solution over a period of time significantly exceeding the average time of acid stimulation.

CONCLUSION

Laboratory conditions confirmed the duration of the use of marker-containing dispersed material for the well flow diagnostics. Based on the findings, the duration is at least 1 year after acid stimulation of the carbonate formation. According to the expert opinion of the authors, the actual monitoring time in real conditions can range from several months to one year.

To determine the long-term performance of the markers in conditions as close to real conditions as possible, an experiment was carried out to determine the duration of marker release from carbonate rock (Fig. 2):

- Production of cylindrical samples of carbonate rock (d = 16 mm, length from 20 to 30 mm);
- Supply of HCl solution to the laboratory unit;
- Water was passed through an acid-treated sample at a flow rate that was 44 times higher the design flow rate;
- Constant concentration over a long period of time.



Fig. 2 – Laboratory experiment using carbonate rock samples