

Paper Number: 1211

Fracturing fluids additives selection for Polish Sylurian shale – from laboratory research to field application

Kasza, P.¹, Wilk, K.¹, Prugar, W.², Kenar, P.² and Pietka, W.²

¹Oil and Gas Institute – National Research Institute, Poland; piotr.kasza@inig.pl

²ORLEN Upstream, Poland

One of the primary factors affecting the performance of hydraulic fracturing, both in conventional and unconventional deposits, is the properly selected treatment fluid. In order to improve their properties, proper amounts and kinds of chemical additives ought to be defined. The proper selection of the additives is crucial to provide inter alia maximum formation protection, non-damaging effect (swelling, clogging) additive compatibilities and efficient wellbore cleaning. After detailed laboratory survey the final additive set is offered for treatment design.

Laboratory testing of the commercially available treatment fluid chemical additives were conducted by an independent institution at the request of the operator. All tests were performed in conjunction with shale rocks core samples, in order to optimize the composition of the fluid. XRD research on the cores of Silurian shale rock indicates presence of smectite and illite. In order to minimize the possibility of clay swelling, great emphasis was put on the selection of the most suitable clay controls. Additionally, to facilitate post-treatment flowback, an effort was put to select optimum surfactant.

Due to the fact that the stimulation treatment was performed in unexplored area detailed approach was the must. The first step during the preparation of the treatment is reservoir analysis, it serves as the basis for a general strategy of performing a simulation, and then design development. The conducted laboratory survey was aimed at selection of chemical additives for the treating fluid, which was planned for use during one of subsequent treatments. One focused especially on the selection of an appropriate stabilizer for clay minerals and a surfactant. The conditions obtained, on the basis of capillary suction time tests, indicated that the deposit rock is not very sensitive to the impact of the fresh water based treatment fluids selected for the tests. In such a case, more accurate information regarding the efficiency of operation of individual inhibitors came from LSM shale rock swelling tests. On the basis of wetting angle and surface tension tests, one has selected the best agent facilitating the recovery of fluid after the fracturing.

Another step was made towards the preparation of an effective fracking technology for Polish shale formations. From the technological point of view, the procedures were performed in accordance with the best practices, however in order to obtain the best results, the works on the selection of appropriate additives for fracturing fluids for Polish shale formations should be developed further and continued.

