

LABORATORY MEASUREMENT OF OIL/WATER SATURATIONS BY AN ULTRASONIC TECHNIQUE

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Abstract: This paper describes the measurement of liquid saturations using sound velocity. This technique has already been used for measurement of the concentration of miscible fluids, but the calibration was still a problem for immiscible fluids. In this study, calibration curves had been obtained for various samples of sandstone and carbonates, with oil and water. A Cat-scanner and mass balance on effluent production served as references for saturations. Results show that an approximate linear calibration law can be used in the range of oil saturation 0.2-0.5, for imbibition. In addition, a single calibration curve can be used for all the sections of a homogeneous sample, which enable calibration by using effluent production only. Effects of temperature and pressure on the pure fluids and on the sample were also quantified. In conclusion, sound velocity is an accurate technique for saturation measurements but it requires an efficient thermal regulation.