

Analytical Signal Amplification Technologies in Sonoluminescence Spectroscopy by Double-Frequency Ultrasound

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The application of ultrasound (US) of high frequency (2-5 MHz) and simultaneous action of US of high (2-5 MHz) and low (22 KHz) frequencies was studied for the initiation of effect sonoluminescence in sonoluminescence spectroscopy method. It was shown that sonoluminescence spectroscopy - at with US of 4 MHz allows us to determine content of the main substance in natural brines and hot coolants with better metrological characteristics than with use of US below 2 MHz. It was shown, that the simultaneous action of US of high and low frequencies sonoluminescence initiation let us to increase the value of analytical signal of Calcium(II) and Magnesium(II) in 5-10 times and to determine their content according to demanded in salt industry metrological characteristics. The new procedure for determination the main substance in coolants' LiCl, CsCl-1, CsCl-2 solutions, as well as in natural brines, was developed. We also developed the methods for determination of Calcium and Magnesium in natural brines, using simultaneous action of US of high and low frequencies. The accuracy of these methodic were checked by analysis of the same samples, using gravimetric, titrimetric and atomic-absorption methods, also by "injected-found out" method verification.

Keywords: sonoluminescence spectroscopy, double-frequency ultrasound, cavitation field, brine, coolant, metrological characteristics
