Utilization of cerium-catalyzed belousov-zhabotinsky oscillatory reaction for determination of methanol

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Abstract: We describe a new conceptual procedure for quantifying trace amount of methanol by using the cerium (IV)-catalyzed Belousov-Zhabotinsky oscillating reaction. The method is based on the dynamic change of oscillating waves, i.e., induction period and oscillation period, under an addition of standard methanol solution. The results reveal that the induction period linearly increases with an increase in methanol concentration, whereas the oscillation period exponentially decreases. The linear relation between induction period and methanol concentration can be expressed as follows: induction period (s) = 70.44 × [MeOH] (mM) + 986.83 with R² of 0.9971. These changes of the oscillating behaviors can be explained by the reaction kinetic between methanol and bromate reactant. By using this linear relation, the proposed approach can be employed as an alternative procedure to quantify a trace amount (<5%v/v) of methanol in alcoholic samples.

Keywords: Oscillating reaction; Belousov-Zhabotinsky reaction; Induction period; Methanol