



From Nonlinear Chemical Dynamics to Analytical Chemistry: Estimation of metals and Selectivity studies of Ion Exchange resins via Belousov-Zhabotinsky reaction

Sna Rashid¹, Nadeem Bashir², Ghulam Mustafa Peerzada³

^{1,2}Department of Chemistry, University of Kashmir Srinagar, J&K (India)

³Department of Chemistry, Govt. College for Women Nawakadal Srinagar (India)

ABSTRACT

The investigation refers to the use of a nonlinear chemical reaction (Belousov-Zhabotinsky Reaction) as an analytical tool to estimate different metal ions present in a particular BZ mixture. Three different BZ systems were employed viz- Phloroglucinol-ferroin-bromate-sulfuric acid system, Malonic acid-Ferroin-bromate-sulfuric acid system and Malonic acid-Cerium-Bromate-Sulfuric acid BZ system. Cationic, anionic as well as chelating resins were used to interact with the BZ reaction systems. The ion exchangers were loaded with the catalyst moiety of a particular BZ system under study for different time intervals so as to monitor the effect of time on the adsorption of the metal ion by the ion exchange resin. The supernatant was then used in optimized BZ system so as to compare the results (oscillatory parameters) with the optimized system. The interaction was studied through Potentiometry, Spectrophotometry, Advanced cyclic voltammetry and microscopic techniques as well. The estimation of metal ion-ferroin in this case was also done via the nonlinear reaction studied. Mixed metal systems were also estimated via the BZ reaction. The other part of the investigation was to check the selectivity of resins towards the different ionic species present in a particular BZ system in situ. In this part of investigation, the loading was done with respect to substrate and bromate ions. This part of the study of course opens a new path to understand the mechanism of otherwise very complex reaction. After gaining the selectivity coefficients, an attempt was made to study the effect of different solvents on the ion exchange capacity of resins and this was monitored using the BZ system under investigation which may be helpful in modification of some selective ion exchangers so as to control their ion exchange capacity and their applications in analytical estimations.

Keywords: Belousov-Zhabotinsky Reaction, Ion exchange capacity, Nonlinear chemical Dynamics, Selectivity.