Reactions between platinum metals and organic color reagents are often used in the determination of platinum metals. However, such reactions usually proceed slowly and could be accelerated by traditional boiling-water bath heating for a long time. Besides, it is difficult to determine the platinum metals in their technological solutions. This is related with different kinetic activity of platinum metals complexes formed in such solutions. So it is important to develop new and rapid techniques for platinum metals determination in their technological solutions. Microwave (MW) activation of reactions has become very popular in modern chemistry. It can be used for intensification of metal ions complexation with organic reagents in solutions.

Approach to determination of elements by spectrophotometric procedure in technological solutions using MW irradiation is suggested. Two ways can be used: 1) synthesis of labile chloride complexes and further complex forming with organic reagent or, if it is possible, 2) immediate complex forming with organic reagent. In one's turn the complex forming with organic reagent consist of: 1) the investigation of organic analytical reagents solutions stability under MW irradiation; 2) test complexation experiments in MW field under conditions of reagent stability; 3) choosing of optimal complexation conditions in MW field. This approach is used for Ru(IV) and Os(IV) determination.

The stability of Nitroso R salt, Xylenol orange, 4-(2'-Pyridylazo)-resorcinol, Arsenazo III, Crystal violet, 4-Nitrozodiethylaniline and Chromazurol S under MW irradiation was studied. It is shown that all of investigated organic analytical reagents are destructed under MW irradiation of their aqueous solutions.

Test complexation experiments in MW field with reagents named above have shown that we can use for further investigation Nitroso R salt, 4-(2'-Pyridylazo)-resorcinol and 4-Nitrozodiethylaniline. Optimal conditions of Ru(IV) complexation with these reagents and Os(IV) with Nitroso R salt are chosen.

As follows from Arrhenius law \( k = A \times \exp(-E_a/RT) \), rate constant can increase because of two reasons. First reason, the pre-exponential factor \( A \) increasing. Pre-exponential factor \( A \) representative of the probability of molecular impacts. It is dependent on the vibration frequency of the atoms at the reaction interface. Second reason, decrease in activation energy \( E_a \), i.e. because of changing of process mechanism. Accordingly, one could refer to two MW specific effects. For example, in our work we are pointing out that in case of Ru(IV) complexation with NRS non-thermal effect of MW irradiation is showed up in pre-exponential factor \( A \) increasing.