

Despite the success of cisplatin, cancer is still one of the most frequent cause of dead in the World [1,2]. Therefore, search for other metal complexes, which can support or replace cisplatin in treatment seems to be one of the most important challenges of the twenty-first century. Many scientists believe that complexes of ruthenium may turn out to be a breakthrough. This hypothesis seems to be reasonable taking into account that two of the ruthenium coordination compounds: NAMI-A and KP1019 undergo clinical trials [3].

In recent years Starosta et al. have synthesized a group of new aminomethylphosphanes possessing morpholine or piperazine rings and their coordination compounds with central copper(I) ion. These complexes exhibit substantial biological activity evaluated in *in vitro* tests [4,5]. The results inspired the applicant to combine the therapeutic advantages of ruthenium with anticancer activity observed as a result of introduction of aminomethylphosphane to the metal coordination sphere. It should be underlined that until today there is only few information about using aminomethylphosphanes in ruthenium compounds preparation. Therefore, the main aim of the project is to develop pathways of preparation of ruthenium coordination compounds with aminomethylphosphanes, based on methods known for aliphatic and aromatic phosphanes (basic research). Additionally, for every obtained compound full physicochemical analysis and preliminary biological studies *in vitro* will be performed in order to compare ruthenium coordination compounds with copper(I) counterparts.

Until the project submission the some preliminary experiments were performed. The studies revealed that the offered aminomethylphosphanes could chelate ruthenium ion by phosphorus and nitrogen atoms [6]. Such a binding mode is unprecedented. To the best of our knowledge, no crystal structure of coordination compound possessing P,N-chelating aminomethylphosphane has yet been published. The bidentate nature of aminomethylphosphanes was observed only in polynuclear complexes, in which they bridged two metal centres [7-9]. Although, there are some known examples of mononuclear complexes, in which phosphanes chelate the metal centre by phosphorus and nitrogen atoms, however, in such cases the N atom is a part of aromatic pyridine or (rarely) an imidazole ring [10,11]. Moreover, the preliminary studies demonstrated another interesting phenomenon. When aminomethylphosphanes coordinate to ruthenium centre, they may undergo simultaneous reduction from tertiary to secondary [12].

Concluding, the preliminary studies proved that mechanism of binding of aminomethylphosphanes to ruthenium ions differs from modes known for other metals, like copper. The results confirm also the totally different nature of aminomethylphosphanes compared to aliphatic or aromatic phosphanes.

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