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The concept of the submitted dissertation concerned the design of highly efficient, fast and “one pot” type procedures leading to saturated and unsaturated aryl ketones, based on the Heck reaction. Due to the high interest in these compounds from the food and pharmaceutical industries, their use in the production of phytotherapeutics and agrochemicals, a wide bioavailability (plant organisms) and interesting properties, a dynamic development of the chemistry of these compounds has been noted in recent years. Therefore, a big challenge and opportunity to meet the constantly growing demand for this class of compounds is to develop simple, effective and environmentally friendly synthesis routes.

The synthesis of saturated monoarylated ketones, based on the Heck coupling of aryl iodides with alkenol or alkenone was the first step of research. The developed method for the arylation of allyl alcohols of different carbon chain length proceeded with rapid isomerization of the resulting Heck product (unsaturated arylated alcohol) to the ketone. In turn, the unsaturated aryl ketone, which is the product of alkenone arylation, was used next as a substrate in the hydrogenation reaction. As a part of the work on the above-mentioned strategies, the activity different palladium catalysts were studied. Thus, $PdCl_2$(cod) was used alone and in the presence of the cocatalyst [CA]Cl (CA - substituted imidazolium cation containing (-) – methoxymenthyl group). Anionic complexes of palladium (II) of the type $[CA]_2[PdCl_4]$ were also tested. Moreover, catalysts immobilized on polysiloxane microspheres, Pd/polymer, catalysts formed *in situ* ([Pd] + polymer) and a catalyst obtained by pyrolysis $[Pd]_{pir}$ have been used for the first time in aryl ketones synthesis. In the course of experiments, their high durability and catalytic activity in subsequent runs were confirmed. In addition, the effectiveness of immobilized catalysts was compared with those created *in situ* and obtained by pyrolysis.

An important aim of the work was also to develop a new methodology for methylvinyl ketone diarylation with microwave energy, leading to unsaturated and saturated diarylated ketones. Optimization of the type of base for the 4-aryl-3-butene-2-one arylation has proved its significant role in the hydrogenation of diarylated ketones. The use of microwaves allowed to reduce the time of both synthesis stages from 17 to 3-4 hours.