

A new born catalyst and some natal treatment

A catalyst is a substance (chemical substance mostly) that increases the rate of a chemical reaction, actively participating in a reaction but remaining unchanged. A catalyst is always specific for a particular chemical reaction. Living organisms, for instance cells, use a multitude of enzyme as catalyst to enhance various reactions. In all cases, the catalyst takes part with reactant by reducing the activation energy but is not consumed in the reaction. The role of a catalyst can only be understood from modern chemistry and physics.

Catalysis becomes nowadays a central issue in the industrial production of chemicals. Transition metals, especially transition metal oxides, are well-established catalysts in cross coupling reactions to enhance carbon-carbon single bond formation. The present diploma work is concerned with the investigation of transition metal organic catalysis. A platinum complex has been studied here. The catalyst is a so-called n-heterocyclic carbene-platinum complex. It was motivated from analogous structural palladium catalyst. There is only one difference in both catalysts: the central metal atom. We know that platinum is a good catalyst in many other catalytic reactions, so I hope in future that this platinum catalyst would be useful.

Chemical synthesis process was followed to prepare complex in two steps. The steps are ligand preparation and complex formation respectively. An acceptable reaction conditions and purity of the target platinum complex were identified by several spectroscopic technics such as Nuclear magnetic resonance spectroscopy (^1H and ^{13}C), Mass spectroscopy, Elemental analysis, Crystallography and Infrared spectroscopy. The catalytic activity was checked for this new catalyst. A significant amount of product was observed which certified that the catalytic reaction occurred.

The properties of the central metal atom in the catalyst were characterized by X-ray absorption spectroscopy carried out at the MAX IV Laboratory. Here the analysis is based on the oxidation state and bond distances which are fingerprints of the platinum-ligand bond.