Esterification Reactions of Dichloromaleic Acid with Isoamyl Alcohol in the Presence of Zeolite Catalysts

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Abstract:

One of the causes of environmental problems is the excessive amount of toxic organic and inorganic waste discharged into the environment. The processes resulting from the production of some industrial products create harmful pollutants for soil, water, and air. These contaminants can accumulate in the environment and in food, posing potential threats to food safety, the environment and human health [1]. Heterogeneous catalysis is one of the fastest growing areas of chemistry and is also associated with well-known applications related to the environment. There are very rapid changes in this field, due to which heterogeneous catalysis is considered useful (for example, numerous discoveries in nanoscience and nanotechnology) [2]. Innovations involving the development of heterogeneous catalysis from an ecological perspective constitute a major part of the research work. The importance of heterogeneous catalysis is confirmed by the fact that catalysts are involved in the synthesis or technologies of numerous products that are regularly used. Intensive research conducted over the years to replace existing catalysts or create new active catalysts has been devoted to solving these problems. In this regard, the synthesis of zeolite catalysts with precisely controlled activity and selectivity for specific applications is of interest and has versatile applications [3]. The catalytic activity of zeolite samples is widely used in the esterification processes of carboxylic acids with alcohols. The presence of centers exhibiting acidity on their surface allows the use of zeolite-based catalysts in esterification reactions. This work aims to study the kinetic laws of the esterification reaction of isoamyl alcohol with dichloromaleic acid in the presence of aluminosilicate zeolite-based catalysts (mordenite and H-ZSM-5). The creation of a highly selective process for the production of dichloromaleic acid esters in the presence of aluminosilicate zeolite-based catalyst is of great practical and theoretical importance. Among the substances with a wide range of applications in the chemical industry, esters and compounds based on them have a special place. Their paramount importance in the production of esters and organic synthesis stems from their