

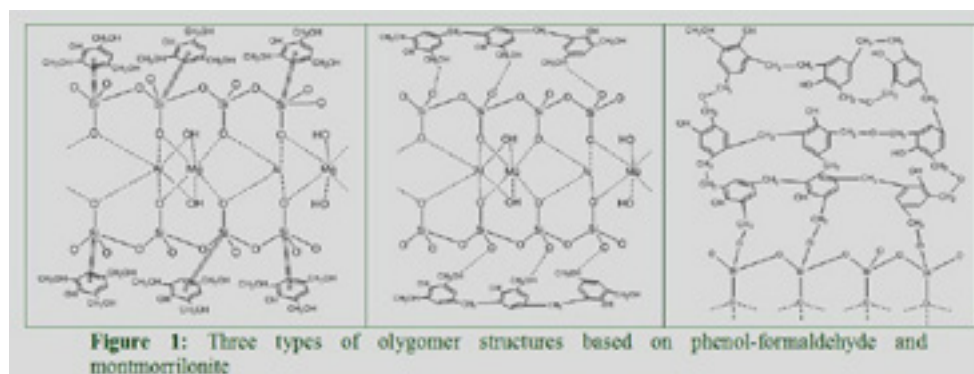
3<sup>rd</sup> International Conference on

## POLYMER SCIENCE AND ENGINEERING

October 02-03, 2017 Chicago, USA

**The synthesis and structure of oligomers based on phenol-formaldehyde resins and montmorillonite, the influence of concentration and acidity on their structures****Denys O Savchenko, Eugene O. Paschenko, Andrey N. Chernenko, Olga V. Lazhevskaya, Vyacheslav. V. Bichihin and Nikolay N. Nekoval**  
V. Bakul Institute for Superhard Materials, Ukraine

**I**ntroduction: Montmorillonite is one of the fillers for polymers that are studied now. It attracts scientists due to the following reasons: 1) improvement of polymeric materials properties due to filler introducing 2) particularities of montmorillonite behavior in polymer melts and solutions 3) abundance and availability of the mineral Introduction of montmorillonite into polymers and oligomers may improve their mechanical properties, heat-resistance, gas selectivity (for membranes), compatibility of polymers, and accelerate relaxation process and reduce water absorption. Polymeric composite materials based on montmorillonite can be applied for electrochemical sensors, drug delivery systems, packaging materials, sorbents, etc. However there are no literature data about application of such polymeric composite materials as binders for grinding tools. In addition, there is no enough information about structure peculiarities of oligomers based on phenol-formaldehyde, containing montmorillonite. Objectives of this work were: 1) to make the synthesis of oligomers based on phenol-formaldehyde and montmorillonite, 2) to study oligomer structures and the influence of concentration of montmorillonite and alkali on them, 3) to provide a substantiate preposition about a chemical reaction mechanism of oligomer formation. Experimental part: the synthesis of oligomers was conducted in seven steps: 1) the water was added to montmorillonite, 2) phenol-formaldehyde was dissolved in alkaline medium and a catalyst was added to it, 3) both mixtures were heated and stirred during 30 days, 4) montmorillonite sorbed the water was added in portions to the phenol-formaldehyde solution 5) the obtained system was heated and stirred as well 6) during heating and stirring the residue of oligomer has formed 7) oligomer was filtered and dried. The structure of oligomer was studied with IR-spectra. Findings: Oligomers based on phenol-formaldehyde, containing silica-alumina layers of montmorillonite were synthesized. Synthesized oligomers were of three structure types: 1) aromatic rings of phenol-formaldehyde are coordinated around silica atoms of silica-alumina layers 2) methoxyl and hydroxyl groups are coordinated around silica-oxide groups of above mentioned layers 3) phenol-formaldehyde chains are chemically bound with such layers via Si-O-C bonds.

**Biography**

Denys Savchenko is a passionate chemical researcher. He studies development of materials for grinding tools. In 2014 he got PhD in Material Sciences. His research is dedicated to the study of the polymer structure and improvement of heat-resistance and mechanical properties of materials based on polymers.

denissavchenko@inbox.ru

**Notes:**