Faculty of Science

Department: Chemistry

Name: Nehal Salahuddin

Title: Synthesis and characterization of new reducing agent based on methylmethacrylate-vinylpyridene copolymer-clay nanocomposites

Authors: Nehal Salahuddin

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Abstract:

Methylmethacrylte (MMA)-vinylpyridine(VP) copolymer-montmorillonite (MMT) nanocomposites were prepared, by direct interaction of sodium montmorillonite with various copolymers of MMA-VP, using different ratios of VP. The interaction occurred through ion exchange between sodium cations in MMT and pyridinium ions in the copolymers. The resulting composites were reacted with lithium aluminum hydride forming the supported reagents. The structure of the resulting composites, as determined by elemental analysis, Infrared spectroscopy, and X-ray diffraction, consisted of the insertions of MMA-VP macromolecules between lamellar layers. Because of cooperative formation of electrostatic bonding the copylymers were strongly fixed to the inorganic surfaces. The absence of observable transition in the thermogram, using differential scanning calorimetry, confirmed the copolymer sandwiching between the inorganic layers. The thermal stability of nanocomposites was investigated by thermogravimetry analysis. The dispersion of the NMT particles in the polymer matrix was confirmed using scanning electron microscopy. The effectiveness of these materials has been examined in the reduction of potassium fericyanide.

Key words:

Poly-methylmethacrylate); vinylpyridine, nano-composies, clay, intercalating

Faculty of Science

Department: Chemistry

Name: N. Salahuddin

Title: Synthesis and characterization of polyaniline-organoclay nanocomposites

Authors: N. Salahuddin, M.M. Ayad,& M. Ali

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Abstract:

Polyaniline (PANI)-organoclay nanocomposites were prepared. Intercalation of aniline monomer into montmorillonite (MMT) modified by polyoxyalkylene was followed by subsequent oxidative polymerization of the aniline in the interlayer spacing. The organoclay was prepared by cation exchange process between sodium cationim MMT and onium ion in four different types of polyoxyalkylene diamine and triamine with different molecular weight. Infrared spectra confirm the electrostatic interaction between the psotively charged onium group (NH^+_3) and the negatively charged surface of MMT. X-ray diffraction analysis provides a structural information. The absence of d_{001} diffraction band in the nanocomposites was observed at certain types and contents of organoclay. Scanning electron microscopy and trnamission electron microscopy were employed to determine the dispersion of the clay into PANI . The thermal degradation behavior of PANI in the nanocomposites has been investigated by thermogravimetric analysis. The weight loss suggests that the PANI chains in the nanocomposites are more thermally stable than pristine PANI. This improvement is attributed to the presence of nanolayers with high aspect ratio acting as barriers, this shielding the diffusion of degraded PANI from the nanocomposites. The electrical conductivity of the nanocomposites was increased 30 times more than that of pure MMT at a certain concentration .

Key words:

Nanocomposites, polyaniline, organoclay

Faculty of Science

Department: Chemistry

Name: N. Salahuddin

Title: Preparation, morphology and electrical conductivity of polyaniline /polyoxyalkylene-montmorillonite exfoliatd anaocomposites.

Authors: N. Salahuddin, M.M.Ayad and M.Ali

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Abstract:

Polyaniline (PANI)/organoclay exfoliated nanaocomposites containing different organoclay contents (14-50wt%) were prepared. PANI emeraldine base (EB) and oligomeric PANI (o-PANI) were intercalated into montmorillonite (MMT) modified by four types of polyoxyalylene diamine or triamine (organoclay) using N-methyl pyrolidinone (NMP) as a solvent in the presence of 0.1M HCl. O-PANI and EB have been synthesized by oxidative polymerization of aniline using ammonium peroxydisulfate (APS). Infrared absorption spectra (IR) confirm the electrostatic interaction between negatively charged surface of MMT and positively charged sites in PANI. X-ray diffraction (XRD) studies disclosed that the d_{001} spacing between interlamellar surface disappeared at low content f the organoclay. The morphology of these materials was examined by scanning electron microscopy (SEM) and transmission electron microscopy (REM) . Electrical conductivities of the PANI-organoclay and o-PANI-organoclay nanocomposites were $1.5x10^{-3}$ -2 $x10^{-4}$ and $9.5x10^{-9}$ S/cm, respectively depending on the ratio of PANI.

Key words:

Oligomeric polyaniline (o-PANI) , emeraldine base (EB), nanocomposites, layered silicate.