Emulsifier Free Emulsion Polymerization in Presence of Some Fine Solid Inorganic Particles

A Thesis

Submitted to

Faculty of Science - Ain- Shams University

By

Mahmoud Essam Abd El-Aziz Shaaban

M.Sc. in Org.Chem. Cairo University, 2009

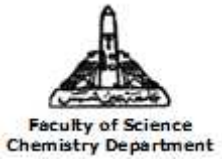
For

The Degree of Ph.D.

in

Organic Chemistry

2014



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Entitled

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Abstract

Name:- Mahmoud Essam Abd El-Aziz

Title:- Emulsifier Free Emulsion Polymerization in Presence of Some Fine Solid Inorganic Particles

Degree:- Ph. D.

Solid nanoparticles can be used as stabilizers for oil/water (o/w) emulsions instead of the conventional surfactants. In this thesis, styrene was initially ultrasonicated in water in the presence of silica nanoparticles as solid particles stabilizer to induce the formation of stable o/w emulsion in the presence of potassium persulfate (PPS) as a water soluble initiator, under wide range of conditions including the initiator, monomer concentration, content of the silica nanoparticles, pH and temperature. The emulsion stability, morphology and the kinetics for this system were illustrated.

Also, the montmorillonite (Nanofil® 116) was used as solid nanoparticles stabilizer to induce the formation of stable (o/w) emulsion in the presence of PPS. Imaging with transmission electron microscope (TEM) and a field emission scanning electron microscope (FESEM) equipped with energy dispersive X-ray (EDX) unit proved the formation of hybrid latex particles

via Pickering mode of emulsification. Furthermore, the thermal gravimetric analysis (TGA) showed the increase in the degradation temperature of polystyrene in the formed composite which proved the formation of protective sheath from silica or montmorillonite surrounding the polystyrene formed.

The prepared nanocomposites (polystyrene/Ludox HS-30 and polystyrene/montmorillonite) were added in different contents (wt%) to polypropylene and ethylene-vinyl acetate copolymer to study their effect on the physico-mechanical properties of these polymers.

Keywords:-

Styrene - Ludox HS-30 - Nanofil® 116 - Pickering emulsion – kinetic study - polystyrene/Ludox HS-30 composite - polystyrene/montmorillonite nanocomposites.

Contents