Green Chemistry for Plastic Waste Circulations and Its Application

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The Earth’s population is growing at an exponential pace and with it synthetic pollutants. For instance, plastics or synthetic polymeric materials, are well-known ocean and land pollutants with low biodegradability and a toxic nature. According to BioEnergy Consultant, a national awareness-raising organization, 5% to 17% of the total solid waste generated in the Arabian Peninsula is composed of mainly plastic materials. This issue is further exasperated by the fact that the current industrial methods are not efficient in producing useful recycled products. Motivated by this, attempts have been made to develop alternative recycling methods capable of producing materials that could be utilized as industrially raw materials. In this research work, waste polyethylene terephthalate bottles have been converted to oligo-amides by reacting with different amines under solvent and catalyst free conditions. The structures of the products were characterized by fourier transform infrared, 1H nuclear magnetic resonance, 13C NMR, mass spectroscopies and high-performance liquid chromatography technique. The 1H and 13C NMR spectra of all compounds exhibit the expected signals, including those from the amide backbone. Results of mass spectra and total ion chromatogram of the product hinted at low molecular weight as the major product. These oligo-amides can be potentially used as corrosion inhibitors as well as carbon dioxide adsorbents.

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