Production of Valuable Products from Carbonaceous and Siliceous Solid Wastes

by

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Abstract

The production of waste is an important problem facing the modern world. Although in previous centuries the disposal of waste has not been of high importance, in the current and future state of the world, it is an alarming issue that cannot be overlooked. Landfilling is simply not compatible with a truly sustainable approach to resource management. When possible, the recovery of potentially valuable materials and products from solid wastes is a preferred alternative to mere disposal. Initiatives which aim to produce valuable products from wastes not only help confront the problem of environmental pollution, but also potentially entail significant economic gains. This thesis is aimed at providing evidence that valuable materials and products can be obtained from a wide variety of solid wastes. The central theme of all examined case studies herein is that the considered wastes are rich in carbon and/or silica. Both organic and synthetic wastes are chosen in order to add variety to the thesis project. The considered wastes are rice husks, electronic wastes (printed circuit boards), palm kernel shell gasification residues, and plastics. The valuable products obtained from these wastes include: solid fuels, oil sorbent materials, high purity porous silica, heavy metal adsorbent briquettes, porous (activated) carbons, biodiesel catalysts, and carbon nanoproducts. In addition to the production of oil sorbents, the topic of oil spill remediation with sorbents is more closely examined. A series of modifications are proposed for the current ASTM standards and a novel model for the evaluation of the oil retention curve in unsteady state gravimetric experiments is developed. A total of 25 peer-reviewed publications (ISI), international conference presentations, and book chapters have been produced from the research carried out during the PhD (21 first authorships).

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- ALL ARE WELCOME -