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Alternative bioderived chelating agent (chelant) for metal recovery

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There is increasing demand for metals for various usages; but their reserves are depleting over the years. Thus recovery of metals from used economy is being considered as means of metals sustainability. One way of recovering metals is with chelants. Notwithstanding, the commonly used chelating agents have some environmental challenges and there is much interest for replacing them. Recent researches have mainly focus on biodegradable alternative chelants for the replacements of the commonly used ones. In this particular work, bioderived lipophilic alternative chelating agent is considered as potential metals recovering agents. The known C31 saturated lipophilic chelant was isolated from biomass and used for the extraction of some metals salts ($NiCl_2$, $Co(NO_3)2.6H_2O$, $Cu(CH_3COO)_2$, $CuCl_2$, $CoCl_2$, $FeCl_3$, $CrCl_3.6H_2O$) using ligand- metal ratio of 1: 10) in relation to a similar commercial compound dibenzoylmethane (DBM). The concentrations of the residual metal ions were measure with UV spectrophotometer, while the changes in the pH before and after the metals extraction were measured with JENWAY 3505 pH meter.The amount of various metals extracted (mg per dm3) with this bioderived chelant was comparable to the commercial chelant (dibenzoylmethane) and better than it in case of NiCl2. The equilibrium pH and the solubility of these chelates in the extracting solvent may have played dominant role in the extent of the extraction of these salts. Thus, the isolated compound can be used potentially as bioderived alternative chelating agents for metals recovery and in related applications.

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Nanomaterials for lithium battery applications

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There is a great demand for developing renewable and pollution free energy sources, because, fossil fuels produce pollution and deflating of fossil fuels reserves. Batteries come under one of the renewable and pollution free energy sources. Also, there is a great demand for developing safe, compact, light weight, better cycle life with high energy density batteries to meet the requirement for the exponential growth of portable electronic devices such as cellular phones, laptop computers, etc. The lithium ion batteries are more suitable to meet the above mentioned applications, since they provide high energy density compared to other available rechargeable batteries. Hence, wide range of materials, as anodes, cathodes and electrolytes, have been developed and investigated for the improved lithium battery technology. Recently, nanostructured materials are found to be better candidates than their respective crystalline counterparts. First, it will be reviewed briefly about various types of energy sources as well as renewable energy sources with special emphasis on batteries. Also, it will be reviewed briefly various types of batteries, need for portable energy devices with special emphasis on lithium batteries and its technology, issues and challenges facing rechargeable lithium batteries, i.e., materials, as anodes, cathodes and electrolytes, used in lithium battery technology, including the influence of use of nanostructured materials and their surface modifications. It will also be reviewed briefly about various synthesis processes used in the development of nanostructured materials. Finally, it gives the information about the investigation of Sol-Gel and combustion processes for the synthesis and surface modification of different types of nanostructured materials, as anodes, cathodes and electrolytes, useful in lithium battery technology. Also, it gives the information how the XRD, FTIR, TG/DTA techniques help to monitor the complete synthesis process for the preparation of the nanostructured materials. Finally, it also gives the information how the XRD, FTIR, DSC, TG/DTA, SEM-EDS, TEM, VSM, UV-Visible, Impedance spectroscopy, etc., techniques help to characterize the synthesized nanostructured materials.

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