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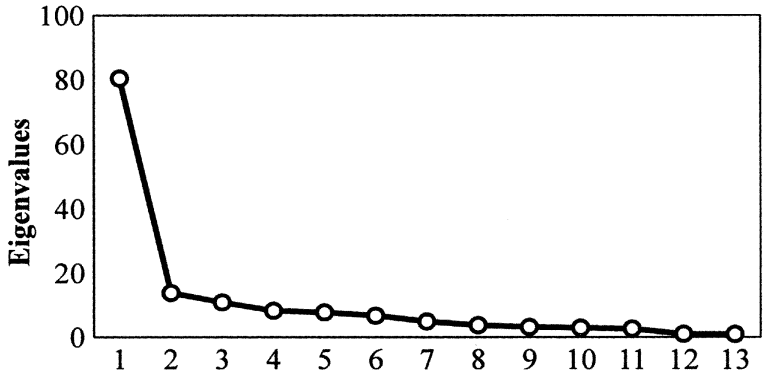
CONTENTS

Management & Information Technology

This study aimed to identify the major research and development (R&D) trends of bioremediation technologies, as well as to build the core technology category framework through the collection of the United States Patent and Trademark Office's (USPTO) patent information. The Patent Co-citation Analysis (PCA) method and the factor analysis technique were applied to categorize the patents of bioremediation and to identify the main technology trends behind it. The result revealed that the major R&D trends comprise the fields of anaerobic degradation, aerobic degradation, anaerobic reductive dechlorination, bioaugmentation, and bioventing. Next, we further applied the fuzzy Delphi method, following former study results, which were chiefly derived from the aforementioned PCA, in order to investigate and decide upon the most appropriate bioremediation technologies for the case studied country of Taiwan, which had had emergent needs for the benefits of developing novel bioremediation technologies in particular.

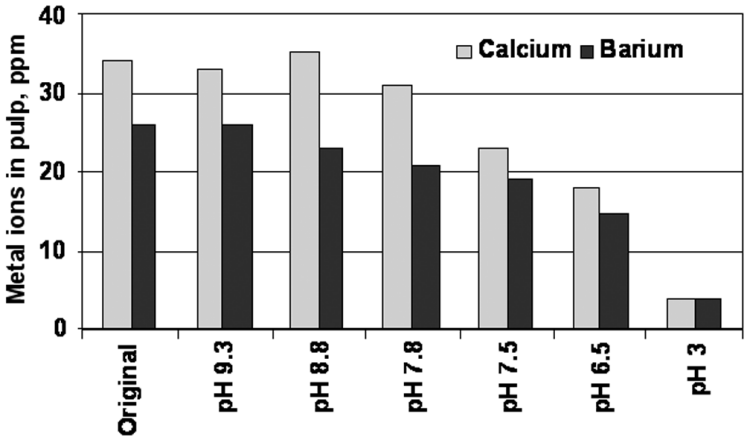


S & T and Industrial Research

Energy and Environment

Waste Utlilization

Troubleshooting of scale deposits and defects in paper samples showed that the problem was caused by barium sulphate and calcium sulphate scales. However, it was ascertained that barium sulphate was more of a concern than calcium sulphate as it is more tenacious than the calcium sulphate scale. A study of the inputs of the scale components found that the major inputs of barium into the mill system were the wood chips and bark contamination. The major inputs of the sulphate component of the scale were sulphuric acid used for pH control and alum used for rosin sizing.Evaluation of several options for mitigating the scale deposition problem showed that bark removal and continuous application of a scale inhibitor comprised of phosphates/phosphonates and polyacrylates were effective in reducing and controlling the scale deposit problems.



Petroleum sludge contains polycyclic aromatic hydrocarbons (PAH) which are hazardous compounds due to their toxic and carcinogenic-mutagenic characteristics. The United States Environmental Protection Agency has identified 16 of these compounds as priority pollutants. This study evaluates the effectiveness of excess air addition in thermal removal of priority PAH from petroleum sludge treated in a rotary-drum electric heater at 650°C with $Ca(OH)_2$ (1 mole) + $NaHCO_3$ (1 mole) (1:1) additives. The concentrations of PAH in flue gas and residue phases were determined using Gas Chromatography-Mass Spectrometry (GC-MS). The samples were extracted with acetonitrile by ultra-sonication prior to GC-MS analysis. The concentrations of 2-3 ring PAH, 4-6 ring PAH, suspect carcinogenic PAH, ΣPAH and ΣTEF were also determined. Excess air addition was found to be instrumental in PAH removal.

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