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Nota di contenuto	A Guide to the Economic Removal of Metals from Aqueous Solutions; Contents; Preface; 1. Introduction; 1.1 Environment; 1.2 World Water Distribution; 1.3 Environmental Pollution; 1.3.1 Air Pollution; 1.3.2 Soil or Land Pollution; 1.3.3 Noise Pollution; 1.3.4 Water Pollution; 1.4 Chromium; 1.4.1 Ecological Effects of Chromium; 1.5 Nickel; 1.6 Objectives; 1.7 Literature Review; 1.7.1 Water Pollution by Heavy Metals and the Removal of Nickel and Chromium; 1.8 Adsorption; 1.8.1 Physical Adsorption; 1.8.2 Chemical Adsorption; 1.8.3 Adsorption from Solutions; 1.8.4 Film Diffusion 1.8.5 Pore Diffusion1.9 Adsorption Forces; 1.10 Adsorption Theories;

1.10.1 Classification of Adsorption Isotherms; 2. Material and Methods; 2.1 Adsorbent Collection and Storage; 2.2 Adsorbent Modification; 2.3 Preparation of Adsorbate Cr (VI) and Ni (II) Solution; 2.4 Instrumentation; 2.5 Batch Adsorption Experiment; 2.5.1 Adsorption Experiments; 2.5.2 Chromium (III) Analysis; 2.5.3 Analysis of Nickel; 3. Results and Discussions; 3.1 Characterization of Silica Sand; 3.1.1 Chemical Characterization of Silica Sand; 3.1.2 Fourier Transform Infrared Spectroscopy; 3.1.3 SEM Characterization of Silica Sand; 3.1.4 Determination of pH_{zpc}; 3.2 Effect of Contact Time and Initial Concentration of Cr (VI) and Ni (II); 3.3 Effect of pH on the Removal of Cr (VI) and Ni (II); 3.4 Effect of Temperature on the Removal of Cr (VI) and Ni (II); 3.5 Effect of Adsorbent Dosage on the Removal of Cr (VI) and Ni (II); 3.6 Adsorption Isotherm; 3.6.1 Langmuir Isotherm Model; 3.6.2 Assumptions in Langmuir Isotherm Model; 3.6.3 Freundlich Isotherm Model; 3.7 Adsorption Kinetics; 3.7.1 Pseudo-first-order Kinetic Model; 3.7.2 Pseudo-second-order Kinetic Model; 3.7.3 Intraparticle Diffusion Model; 3.8 Thermodynamic Studies; 4. Conclusions; References; Index

Sommario/riassunto

"Water pollution is topic of immense and common concern throughout the world. With a rapidly escalating global population and increased industrial development in a growing number of countries, the world's freshwater resources have become stressed. One way to get more out of less is 'treatment and reuse'. Nickel and chromium are toxic metals and they are used extensively in numerous industries such as textiles, beverages, steel, pulp and paper, and electroplating. Their industrial effluent contains large measures of non-biodegradable traces that are harmful to flora, fauna, and human beings. Although there are a number of methodologies used for treatment of metal-containing industrial effluents and waste water, there is not one up to now that offers a high capacity removal rate at an economical cost. This book presents the results and data from research and adsorption experiments carried out on the removal of nickel and chromium (as well as other metals) from aqueous solutions using modified silica sand. The data resulting from detailed kinetic, equilibrium and thermodynamic studies, show that the removal capacity is increased so the treated water has a higher quality or purity. It also demonstrates that the extraction of metals is achieved at a significant lower cost because the treated water adsorption is a simple process with less maintenance, and because silica is a nontoxic natural material widely available in all parts of the world. "--