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Phytofiltration: Investigations of passive heavy metal binding to plant-derived materials

The ability of non-viable biologically generated materials to remove heavy metal ions from contaminated water has been recognized for several years. Such biogenic materials are not, however, widely used as substrates for the separation or preconcentration of metal ions. Much of the reluctance to use these potentially inexpensive materials stems from a lack of an acceptable level of predictability regarding their behavior in real world systems. This is primarily a result of an incomplete understanding of the fundamental chemical interactions governing the binding of metal ions to plant-based biomaterials. We have selected for these studies a materials derived from the plant *Datura innoxia*. Because of the chemical complexity of this material, multiple orthogonal probes have been applied to the study of these materials. These probes have included both spectroscopic techniques and derivation of thermodynamic parameters. Chemical functionalities containing carboxylates have been identified as responsible for sorption of heavy metal ions. These involve both the formation of surface complexes and electrostatic attraction to the negatively charge material. Studies of heavy metal ion sorption to root and stem tissues will be described. The impact of these findings on assessment of biosorbent for contaminated water remediation will be discussed.

Biography

Gary D Rayson has received his Bachelor of Science (BS) degree in 1979 from Baker University (Kansas) in Chemistry and Mathematics and his Doctorate (PhD) in Chemistry from the University of Texas at Austin in 1983. Following a Postdoctoral position at Indiana University, he joined the Faculty in the Chemistry and Biochemistry Department at NMSU in 1986, where he currently holds the rank of Professor. His field of study is the development and application of optical spectrochemical methods of analysis to the investigation of chemically complex systems (e.g., high temperature, environmental or biological).

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