Metalorganic Copolymers From Iron(II) Clathrochelates: Versatile Materials and Conspicuous Adsorbents of Lithium Ions, Iodine, and Organic Dyes

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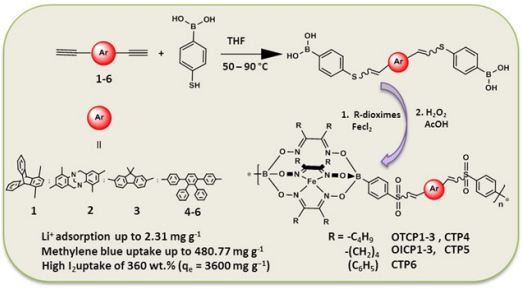
The organometallic copolymers with butyl, cyclohexyl and phenyl lateral groups were made from a one-pot complexation of iron(II) clathrochelate units that are interconnected by various thioether-containing contorted groups and tetraphenylbenzene units. The resultant copolymers were converted into their poly(vinyl sulfone) derivatives OTCP1-3 , OICP1-3 and CTP4-6 quantitatively via the selective oxidation of the thioether moieties into their respective sulfones using mild oxidation reaction conditions. The target copolymers were characterized by various instrumental analysis techniques. The copolymers were tested as potent lithium ions adsorbents revealing a maximum adsorption (q_m) value of 2.31 mg g^{-1} for OTCP2. Furthermore, this same copolymer was found to be a promising adsorbent of methylene blue (MEB); an isothermal adsorption study divulged that OTCP2's uptake of MEB from an aqueous solution (following the Langmuir model) was, at maximum adsorption capacity, (q_m) of 480.77 mg g^{-1}-; whereas the kinetic study divulged that the adsorption follows pseudo second-order kinetics with an equilibrium adsorption capacity ($q_{e,cal}$) of 45.40 mg g^{-1}. The iodine uptake studies of copolymers disclosed excellent iodine properties, reaching a maximum of 360 wt.% (q_e = 3600 mg g^{-1}). The adsorption mechanisms of the copolymers were explored using pseudo-first-order and pseudo-second-order kinetic models. Furthermore, regeneration tests confirmed the efficiency of the target copolymers for their iodine adsorption even after several adsorption-desorption cycles.



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