

Diversity of polyoxometalate-based copper compounds obtained from the same reaction system.

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Streszczenie

Two simple pathways using metallic copper or copper salts are proposed for the synthesis of hybrid compounds under mild conditions. A variety of Strandberg- and mixed-metal Keggin-based products, namely, $(\text{NH}_4)_{5n}\{[\text{Cu}(\text{en})_2][\text{PMo}_8\text{V}_4\text{O}_{40}]\}_n \cdot 9n\text{H}_2\text{O}$ (**1**), $(\text{NH}_4)_{4n}\{[\text{Cu}(\text{en})(\text{H}_2\text{O})][\text{P}_2\text{Mo}_5\text{O}_{23}]\}_n \cdot 3.5n\text{H}_2\text{O}$ (**2**), $(\text{NH}_4)_7[\text{PMo}_8\text{V}_4\text{O}_{40}] \cdot 17\text{H}_2\text{O}$ (**3**) and $(\text{NH}_4)_{2n}\{[\text{Cu}(\text{en})_2][\text{Cu}(\text{en})(\text{H}_2\text{O})][\text{P}_2\text{Mo}_5\text{O}_{23}]\}_n \cdot 3n\text{H}_2\text{O}$ (**4**), were isolated upon the variation of the composition of the reaction system. A rare four-substituted $[\text{PMo}_8\text{V}_4\text{O}_{40}]^{7-}$ Keggin anion was obtained. The influence of the vanadium source [V_2O_5 , NH_4VO_3 or $(\text{NH}_4)_2\text{V}_6\text{O}_{16}$] and the copper precursor (copper powder vs. copper salts) on the nature of the resulting products was studied. An ex situ electron paramagnetic resonance (EPR) spectroscopy study revealed the formation of V^{IV} and Cu^{II} centres in the reaction mixture during Cu^0 dissolution. The obtained compounds possess electrocatalytic activity in the reduction of iodate and nitrite anions, and a carbon-paste electrode modified with **4** exhibited a linear current response to L-cysteine. Furthermore, **4** demonstrated rapid and almost complete adsorption of a cationic dye.

Słowa kluczowe

Polyoxometalates, copper, molybdenum, vanadium, adsorption, synthetic methods

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