Synthesis and Characterization of Complex-Forming Properties of Imino Pyranoses

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Throughout Germany, uranium can be found as contamination in phreatic water. Especially in Saxony – being a former main region of German uranium mining - it has also migrated into potable water sources. The uranium concentration usually remains below the legal threshold value and could be considered uncritical for adults but may represent a threat to infants. Thus, advanced cleaning strategies are sought. Complex chemistry may provide one opportunity to address this challenge: Uranium ions could be coordinately bonded by organic ligands and then be filtered out more efficiently. That field being rather unexplored, it is this project's goal to expand the knowledge by synthesizing different imines and investigating their complex formation characteristics. Imines emerge when primary amines and carbonyls react with each other. For this project, an imine formed by reaction of glucosamine and salicylaldehyde was synthesized first. Then, the product's purity and structure were characterized by elementary analysis and NMR spectroscopy. Finally, using copper (II) instead of (hazardous) uranium ions, its metal-organic complex formation features were investigated by ultraviolet-visible spectroscopy. The synthesis proceeded weil. The examined ligand formed an emerald complex with copper (II) ions in solution. The goal to prepare crystals could not be achieved and should be pursued in future research. All in all, the results indicate that glucosamine-based imines can be used as ligands to bond heavy metals in solutions and that they are worth further investigations - also exploring the complex formation characteristics of related imines and actually using uranium ions as coordination center.

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