Spectroscopic characterization of mixed cation diphosphates of the type $\text{M}^\text{i}\text{Fe}^{\text{III}}\text{P}_2\text{O}_7$ (with $\text{M}^\text{i} = \text{Li}, \text{Na}, \text{K}, \text{Rb}, \text{Cs}, \text{Ag}$)

B.S. Parajón-Costa$^a$, R.C. Mercader$^b$ y E.J. Baran$^a$

$^a$ Centro de Química Inorgánica (CEQUINOR, CONICET/UNLP), Facultad de Ciencias Exactas, Universidad Nacional de La Plata, C. Correo 962, 1900-La Plata, Argentina. e-mail: baran@quimica.unlp.edu.ar

$^b$ Departamento de Física e Instituto IFLP (CONICET, Facultad de Ciencias Exactas, Universidad Nacional de La Plata, 1900-La Plata, Argentina.


The mixed cation diphosphates of composition $\text{M}^\text{i}\text{Fe}^{\text{III}}\text{P}_2\text{O}_7$ have been prepared using the so called co-precipitation method starting with Fe(III) and M(I) nitrate solutions and solid $(\text{NH}_4)\text{H}_2\text{PO}_4$, and characterized by X-ray powder diffractometry. The infrared and Raman spectra of the compounds were recorded and the results are briefly discussed on the basis of their structural peculiarities. The $^{57}\text{Fe}$-Mössbauer spectra show that the typical high-spin Fe$^{\text{III}}\text{O}_6$ octahedra existent in these compounds exhibit almost no distortion. However, the hyperfine parameters are sensitive to some characteristics of the $\text{M}^\text{i}$ cations and to the different structural types.

Vibrational spectra of bis(maltolato)zinc(II), an interesting insulin mimetic agent

B.S. Parajón-Costa y E.J. Baran

Centro de Química Inorgánica (CEQUINOR, CONICET/UNLP), Facultad de Ciencias Exactas, Universidad Nacional de La Plata, C. Correo 962, 1900-La Plata, Argentina. e-mail: baran@quimica.unlp.edu.ar

The FTIR and FT-Raman spectra of the zinc(II) complex of 3-hydroxy-2-methyl-4-pyrene (maltol), bis(maltolato)zinc(II), were recorded and briefly discussed by comparison with the spectra of uncoordinated maltol and with some related maltolato complexes.

Investigation on the bioactivities of clioquinol and its bismuth(III) and platinum(II, IV) complexes

K.S.O. Ferraz\textsuperscript{a}, D.C. Reis\textsuperscript{a}, J.C. Da Silva\textsuperscript{a}, E.M. Souza-Fagundes\textsuperscript{b}, E.J. Baran\textsuperscript{c} y H. Beraldo\textsuperscript{a}

\textsuperscript{a} Departamento de Quimica, Universidade Federal de Minas Gerais, Belo Horizonte, MG, Brasil.

\textsuperscript{b} Departamento de Fisiologia. Universidade Federal de Minas Gerais, Belo Horizonte, MG, Brasil.

\textsuperscript{c} Centro de Química Inorgánica (CEQUINOR, CONICET/UNLP), Facultad de Ciencias Exactas, Universidad Nacional de La Plata, C. Correo 962, 1900-La Plata, Argentina. e-mail: baran@quimica.unlp.edu.ar


Complexes [Bi(HCQ)\textsubscript{2}(H\textsubscript{2}O)Cl\textsubscript{3}] (1), [Pt(CQ)\textsubscript{2}]\textsubscript{-2}KCl (2) and [Pt(CQ)\textsubscript{2}Cl\textsubscript{2}]-KCl (3) were obtained with 5-chloro-7-iodo-8-hydroxyquinoline, “clioquinol”, HCQ. Upon coordination to Bi(III) the antimicrobial activity improves. Complex 1 was 70-fold more active than fluconazole against \textit{Candida albicans}. HCQ proved to be cytotoxic to HL-60 and jurkat human leukemia cells. Although coordination to Bi(III) did not result in significant modification of HCQ’s cytotoxic effect, on coordination to Pt(II, IV) cytotoxicity improved against both cell lines. Complexes 2 and 3 were more active than HCQ against HL-60 cells. Complex 2 also revealed to be the most cytotoxic compound against jurkat cells, being fivefold more active than \textit{cisplatin}. Although HCQ and 1 did not show a pro-aptotic effect, 2 and 3 presented moderate pro-aptotic activity.
Bis(oxalato)dioxovanadate(V) and bis(oxalato)oxoperoxovanadate(V) complexes: Spectroscopic characterization and biological activity

I.E.León, S.B. Etcheverry, B.S. Parajón-Costa y E.J. Baran

Centro de Química Inorgánica (CEQUINOR, CONICET/UNLP), Facultad de Ciencias Exactas, Universidad Nacional de La Plata, C. Correo 962, 1900-La Plata, Argentina. e-mail: baran@quimica.unlp.edu.ar


Two structurally related vanadium(V) complexes, K₃[VO₂(C₂O₄)₂]·3H₂O and K₃[VO(O₂)(C₂O₄)₂]·1/2H₂O, were thoroughly characterized by infrared, Raman and electronic spectroscopies. The effect of both complexes on the viability of the human MG-63 osteosarcoma cells was tested using the MTT assay. The monoperoxo-complex shows a very strong antiproliferative activity (at 100 µM concentration this complex diminished the cell viability ca. 80%), whereas the dioxo-complex was inactive.

Spectroscopic characterization of an oxovanadium(IV) complex of oxodiacetic Acid and 2,2'-bipyridine. Bioactivity on osteoblast-like cells in culture

I. E. León, S. B. Etcheverry, B. S. Parajón-Costa y E. J. Baran

Centro de Química Inorgánica (CEQUINOR, CONICET/UNLP), Facultad de Ciencias Exactas, Universidad Nacional de La Plata, C. Correo 962, 1900-La Plata, Argentina. e-mail: baran@quimica.unlp.edu.ar

The oxovanadium(IV) complex of oxodiacetic acid (H₂ODA) and 2,2’-bipyridine (bipy) of stoichiometry [VO(ODA)(bipy)]·H₂O, was thoroughly characterized by infrared, Raman and electronic spectroscopies. The biological activity of the complex on the cell proliferation was tested on osteoblast-like cells (MC3T3E1 osteoblastic mouse calvaria-derived cells and UMR106 rat osteosarcoma-derived cells) in culture. The complex caused inhibition of cellular proliferation in both osteoblast-like cells in culture, but its action was statistically stronger in the tumoral cells. This effect was specially marked with increasing concentrations of the complex. Based on these preliminary biological results, [VO(ODA)(bipy)]·H₂O can be considered as a good candidate to be further investigated in relation to cancer treatment.

Synthesis and characterization of a zinc(II) complex of bispicen

B.S. Parajón-Costa, G.A. Echeverría, O.E. Piro y E.J. Baran

a Centro de Química Inorgánica (CEQUINOR, CONICET/UNLP), Facultad de Ciencias Exactas, Universidad Nacional de La Plata, C. Correo 962, 1900-La Plata, Argentina. e-mail: baran@quimica.unlp.edu.ar

b Departamento de Física e Instituto IFLP (CONICET, Facultad de Ciencias Exactas, Universidad Nacional de La Plata, 1900-La Plata, Argentina.


The synthesis of a Zn(II) complex of bispicen, the tetradebate ligand N,N’-bis(2-pyridylmethyl)-ethylenediamine, of composition [Zn(bispicen)Cl(H₂O)]₂(ZnCl₄) is reported. Its crystal and molecular structure was determined by single-crystal X-ray diffraction methods. It crystallizes in the monoclinic space group C2/c with Z = 4 molecules per unit cell. The Zn(II) cation in the [Zn(bispicen)Cl(H₂O)]⁺ complex is in a distorted octahedral environment, coordinated to a neutral bispicen molecule acting as a tetra-dentate ligand through its two amine nitrogen atoms, at cis positions with each other, and its two pyridyl N-atoms, at trans positions. The six-fold coordination is completed by a chloride ion and a water molecule. The tetrahedral [ZnCl₄]²⁻ counter-ion lies on a crystallographic two-fold axis. The complex was further characterized by
FTIR spectroscopy, and its vibrational behavior compared with that of the dihydrated tetrahydrochloride of free bispicen.

Phytosiderophores and Related Systems: Metal Uptake by Plants

E.J. Baran

Centro de Química Inorgánica (CEQUINOR, CONICET/UNLP), Facultad de Ciencias Exactas, Universidad Nacional de La Plata, C. Correo 962, 1900-La Plata, Argentina. e-mail: baran@quimica.unlp.edu.ar


TABLE OF CONTENTS

1. INTRODUCTION
2. STRATEGIES USED BY HIGHER PLANTS FOR IRON ACQUISITION
   2.1. General aspects
   2.2. Mechanistic details of Strategies I and II
       2.2.1. Strategy I
       2.2.2. Strategy II
       2.2.3. Utilization of microbial siderophores by plants
3. PHYTOSIDEROPHORES AND RELATED SYSTEMS
   3.1. General aspects
   3.2. Nicotianamine
       3.2.1. Biosynthesis of nicotianamine
       3.2.2. Metal complexes of nicotianamine
   3.3. Mugineic acid
       3.3.1. Biosynthesis of mugineic acid and related phytosiderophores
       3.3.2. General characteristics of mugineic acid as a ligand
       3.3.3. Metal complexes of mugineic acid
       3.3.3.1. Metal uptake by mugineic acid and related phytosiderophores
       3.3.3.2. Synthetic metal complexes of mugineic acid
   3.4. Other phytosiderophores
       3.4.1. Metal complexes of other phytosiderophores

Acknowledgement

REFERENCES