Vibrational spectra of two Fe(III)/EDTA complexes useful for iron supplementation

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Spectrochimica Acta 75A, 807-810 (2010).

The infrared and Raman spectra of $Na[FeEDTA(H_2O)]\cdot 2H_2O$ and $Na_4[(FeEDTA)_2O]\cdot 3H_2O$ (EDTA = tetra anion of ethylenediaminetetraacetic acid), two complexes proposed as adequate for iron supplementation, were recorded and analyzed in relation to its structural peculiarities. Some comparisons between the recorded spectra are also presented, and the characteristics of the carboxylate motions as well as those of the metal-to-ligand vibrations are discussed in detail.

Vibrational spectra of Sn_2TiO_4

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Journal of Alloys and Compounds 490, L12-L14 (2010).

The infrared and Raman spectra of the recently synthesized tin(II) titanate, Sn_2TiO_4, were recorded and briefly discussed on the basis of its structural peculiarities.

On the interaction of vanadium species with the monoisoamyl ester of *meso*-2,3-dimercaptosuccinic acid

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Biological Trace Element Research 134: 220-225 (2010).

The interaction of the VO^{2+} cation with the monoisoamyl ester of *meso*-2,3-dimercaptosuccinic acid (MiADMSA) was investigated by electron absorption spectroscopy in aqueous solutions at different pH values. The spectral behavior, complemented with a spectrophotometric titration, shows the generation of a $[VO(MiADMSA)_2]^{4-}$ complex in which the oxocation interacts with two pairs of deprotonated –SH groups of the ester. Besides, MiADMSA rapidly reduces VO_3^- to VO^{2+}, which might be chelated by an excess of the ester, and also produces relatively rapid reduction of V_2O_5 suspensions at pH = 6.5. The results of this study suggest that MiADMSA might be a potentially useful detoxification agent for vanadium.

Spectroscopic behavior and biological activity of $K_2[VO(O_2)NTA]\cdot 2H_2O$

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Biological Trace Element Research 136: 241-248 (2010).

The dihydrated potassium salt of the complex anion $[VO(O_2)NTA]^{2-}$ (NTA = nitrilo-triacetate anion, $[N(CH_2\text{-}COO)_3]^{3-}$) was thoroughly characterized by electronic and vibrational (infrared and Raman) spectroscopies. The bioactivity of the complex on the cell proliferation was tested on three cell lines in culture (UMR106 rat osteosarcoma-derived cells, Caco-2 derived from a human colon adenocarcinoma and RAW 264.7 a macrophage murine cell line).

Vibrational spectra of magnesium oxalates

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Vibrational Spectroscopy 53: 218-221 (2010).

The infrared and Raman spectra of anhydrous MgC_2O_4 as well as those of the two polymorphic forms of the di-hydrated oxalate, α-$MgC_2O_4{\cdot}2H_2O$ and β-$MgC_2O_4{\cdot}2H_2O$, were recorded and discussed on the basis of their structural peculiarities and in comparison with the spectra of natural α-$MgC_2O_4{\cdot}2H_2O$ (the mineral glushinskite). Some comparisons between these polymorphs and with other, previously investigated, oxalate complexes were made. The IR spectra of partially deuterated samples of α-$MgC_2O_4{\cdot}2H_2O$ were also discussed, reinforcing some of the performed assignments.

Vibrational spectra of tin(II) oxalate

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Spectrochimica Acta 77A, 334-335 (2010).

The infrared and Raman spectra of anhydrous tin(II) oxalate, SnC_2O_4, were recorded and discussed on the basis of its structural peculiarities. Some comparisons with other previously investigated metallic oxalates were made.

Characterization of calcium oxalate biominerals in some (non-cactaceae) succulent plant species

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Zeitschrift für Naturforschung 65c, 429-432 (2010).

The water-accumulating leaves of crassulacean acid metabolism plants belonging to five different families were investigated for the presence of biominerals by infrared spectroscopic and microscopic analysis. Spectroscopic results revealed that the mineral present in succulent species of Agavaceae, Aizoaceae and Asphodelaceae was calcium oxalate monohydrate (whewellite, $CaC_2O_4 \cdot H_2O$). Crystals were predominantly found as raphides or solitary crystals of various morphologies. However, representative Crassulaceae members and a succulent species of Asteraceae did not show the presence of biominerals. Overall, these results suggest no correlation between calcium oxalate generation and crassulacean acid metabolism in succulent plants.

Characterization of biominerals in species of *Canna* (Cannaceae)

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Revista de Biología Tropical 58, 1507-1515 (2010).

Plant biominerals are not always well characterized, although this information is important for plant physiology and can be useful for taxonomic purposes. In this work, fresh plant material of seven wild neotropical species of genus *Canna*, *C. ascendens*, *C. coccinea*, *C. indica*, *C. glauca*, *C. plurituberosa*, *C. variegatifolia* and *C. fuchsina* sp. ined., taken from different habitats, were studied to characterize the biominerals in their internal tissues. For the first time, samples from primary and secondary veins of leaves were investigated by means of infrared spectroscopy, complemented with X-ray powder diffractometry and scanning electron microscopy. The spectroscopic results, supported by X-ray powder diffractometry, suggest that the calcium oxalate is present in the form of whewellite ($CaC_2O_4 \cdot H_2O$) in all the investigated samples. It is interesting to emphasize that all IR spectra obtained were strongly similar in all species studied, thus indicating an identical chemical composition in terms of the biominerals found. In this sense, the results suggest that the species of *Canna* show similar ability to produce biogenic silica and produce an identical type of calcium oxalate within their tissues. These results can be an additional trait to support the relationship among the families of Zingiberales.

IR- spectroscopic characterization of biominerals in marattiaceous ferns

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Revista Brasileira de Botanica 53, 549-553 (2010).

Frond samples of the eusporangiate ferns Marattiaceae genera *Angiopteris*, *Christensenia*, *Danaea* and *Marattia* were investigated by infrared spectroscopy, under different experimental conditions. The results confirmed the previously reported accumulation of biogenic silica (SiO_2) in tissues of these ferns and also showed, for the first time, the presence of calcium oxalate in this group of plants, probably as weddellite. The ability to biomineralize SiO_2, to produce and accumulate biogenic silica, is suggested now to be a general family trait of the Marattiaceae.

Crystallographic and spectroscopic characterization of $LnFeTeO_6$ (Ln = La, Pr, Nd, Sm) materials"

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Journal and Alloys and Compounds 508, 24-27 (2010).

Four mixed oxides of composition $LnFeTeO_6$ (with Ln = La, Pr, Nd, Sm), belonging to a superstructure of the $PbSb_2O_6$ structural type, have been prepared by solid state reactions and their unit cell parameters determined by X-ray powder diffractometry. The infrared and Raman spectra of these materials were also recorded and briefly discussed, on the basis of a site symmetry analysis. The ^{57}Fe-Mössbauer spectra show that the $Fe^{III}O_6$ octahedra present in these materials are not greatly distorted.

Chelation Therapies: A Chemical and Biochemical Perspective

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Chelation therapy occupies a central place in modern medicine and pharmacology, because continuous studies with laboratory animals and extensive clinical experience demonstrate that acute or chronic intoxications with a variety of metals can be considerable improved by administration of a suitable chelating agent. In this review the chemical characteristics, properties and uses of the most common chelating agents as well as those of some new and very promising agents of this type, are discussed. In the second part of the review the biological and biochemical impact of these agents, as well as their use for the treatment of some selected diseases and disorders, are also analyzed and discussed in detail.

Las Ciencias Exactas y Naturales

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Luego de resumir brevemente la situación de las Ciencias en los siglos XVII y XVIII en Europa y América, de analizar el impacto que tuvieron en nuestra región los viajes y estudios de Félix de Azara, la importante expedición científica de Alejandro Malaspina y la obra de los misioneros jesuitas y de comentar la aparición y consolidación de las nuevas ideas filosófico-políticas, derivadas del Iluminismo en el Río de la Plata, se analiza en detalle la evolución de las Ciencias Exactas y Naturales durante la etapa colonial y aproximadamente hasta la época de la Revolución de Mayo. Este análisis incluye a la Matemática, Astronomía, Física y Química dentro de las Ciencias Exactas, y a la Botánica, Zoología, Paleontología y Mineralogía, en el campo de las Ciencias Naturales, así como breves comentarios sobre el desarrollo de algunas tecnologías relacionadas a estas ciencias. Se resaltan especialmente algunos logros y descubrimientos notables y se los relaciona con la evolución general de la Ciencia y la Tecnología en nuestra región y en el Mundo.