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Plik pochodzi z repozytorium Wydziału Chemii Uniwersytetu Wrocławskiego

Chromium(III) acetate, chromium(III) acetate hydroxide or μ_3-oxo-esakis-(μ_2-acetato-*O,O'*)-triaqua-trichromium(III) acetate? Determining the structure of a complexe compound by analytical and spectroscopic methods.

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Rok wydania

1997

Czasopismo

Journal of Chemical Education

Numer woluminu

74

Strony

432-435

DOI

10.1021/ed074p432

Kolekcja

Naukowa

Język

Angielski

Typ publikacji

Artykuł

Streszczenie

An experiment illustrating the use of infrared spectroscopy and model compounds to elucidate the structure of chromium (III) acetate is reported. Two commercial samples with the following conventional formulations $Cr_3(CH_3CO_2)_7(OH)_2$ and $Cr(CH_3CO_2)_3$ were examined and compared to the model compound $[Cr_3(\mu_2\text{-}CH_3COO)_6(\mu_3\text{-}O)(H_2O)3]DHB{\cdot}2H_2O$, DHB = 2,6-dihydroxybenzoate(1-). The experiment may serve to illustrate the advantage of the joint application of analytical and spectroscopic data, in particular the use of symmetry concepts and IR-Raman selection rules, in the assignment of inorganic structures. All the samples exhibit the distinctive vibrational features predicted for a trimetallic carboxylate complex with the μ_3-O-Cr_3 cage. Therefore, it may be concluded that chromium (III) acetates are endowed with a trimetallic arrangement where six acetates bridge three metal ions connected by a triply-bridging oxygen so that a total of four carboxylate oxygens surround each chromium ion. Water molecules act as the terminal ligands and complete an almost regular octahedral coordination polyhedron at each metal center. Analytical data are in good agreement with the $[Cr_3(\mu_2\text{-}CH_3COO)_6(Ì¼_3\text{-}O)(CH_3COO)$ composition.

Słowa kluczowe

Chromium, Analytical Chemistry

Adres publiczny

https://doi.org/10.1021/ed074p432

Strona internetowa wydawcy

https://www.acs.org/content/acs/en.html

Plik został wygenerowany dnia 2026-11-09 18:55:34

Adres w repozytorium https://old.chem.uni.wroc.pl/pl/repozytorium/48nUFX9.