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Hybrid materials from zinc hydroxy salts and dithiocarbimate

Eline Barbosa Ferreira[1], Eder do Couto Tavares[1], Fábio da Silva Lisboa[1]

[1]Institute of Physics and Chemistry, UNIFEI, Itajubá, Brazil

E-mail: d2016016892@unifei.edu.br

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In this work, two new hybrid compounds formed by the potassium N-(4-buthylsulfonyl)dithiocarbimate dihydrate (BUTDCBI), zinc hydroxynitrate (ZHN) and zinc hydroxyacetate (ZHA) were synthesized by coprecipitation method.

X-ray diffraction analysis indicated that layered structures of ZHA and ZHN were formed. In Figure 1, the red curve refers to the layered materials, and the blue curve refers to the hybrid materials. For the solid ZHN, basal order peaks (200), (400), and (600) were observed. The value obtained for basal spacing, 9.69 Å, is compatible with values found in the literature [1]. The hybrid compound formed by the dithiocarbimate and zinc hydroxynitrate (ZHN-iBUTDCBI) presents a basal spacing of 24.37 Å, an increase of 14.68 Å. Analyzing the curve of the ZHN-iBUTDCBI solid (Figure 1(a), blue line), it is possible to observe a shift of the basal peaks and loss of crystallinity of the structure.

For the layered compound ZHA, basal order peaks (001), (002), and (003) were observed. The calculated value of the basal spacing, 13.60 Å, was compared with that reported in the literature, 13.50 Å, being compatible with the formation of zinc hydroxy acetate [2]. While the hybrid compound formed by the dithiocarbimate and zinc hydroxyacetate (ZHA-iBUTDCBI) exhibits a basal spacing of 22.28 Å, an increase of 8.68 Å.

Comparing the ZHA and ZHA-iBUTDCBI solids (Figure 1(b), blue line), it is possible to confirm that the intercalation product was obtained, because of the shift of the basal space. In both cases, the increase in basal distance values corroborates the calculated anion length and confirms the intercalation of the matrices. It is important to mention that the DCBI does not necessarily need to be perpendicular to the layers; it can assume a horizontal or diagonal (inclined) position.

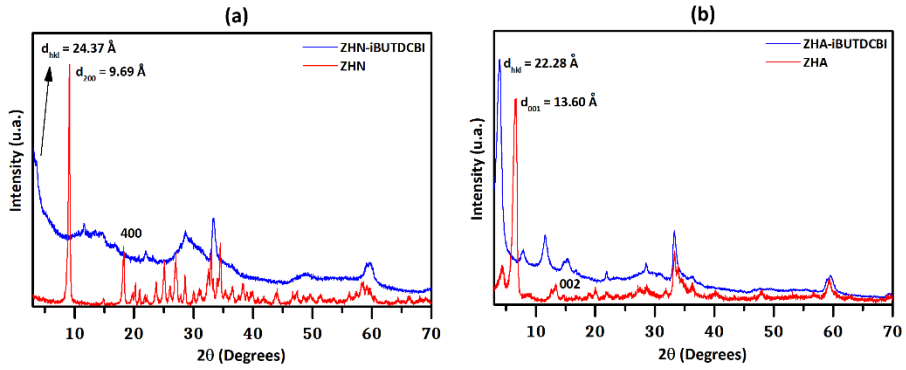

Figure 1 - Diffractograms of the solids (a) ZHN (red line), ZHN-iBUTDCBI (blue line); (b) ZHA (red line), and ZHA-iBUTDCBI (blue line)

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References

[1] N. Thomas, Mater Res Bull, 47, 3568–3572 (2012).
[2] A. Moezzi et al., Inorg. Chem, 52, 95−102 (2013).