Thermal decomposition of Ln(C$_2$H$_5$CO$_2$)$_3$·H$_2$O (Ln = Ho, Er, Tm and Yb) - DTU Orbit

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Thermal decomposition of Ln(C$_2$H$_5$CO$_2$)$_3$·H$_2$O (Ln = Ho, Er, Tm and Yb)

The thermal decomposition of Ho(III), Er(III), Tm(III) and Yb(III) propionate monohydrates in argon was studied by means of thermogravimetry (TG), differential thermal analysis (DTA), IR-spectroscopy and X-ray diffraction (XRD). Dehydration takes place around 90 °C. It is followed by the decomposition of the anhydrous propionates to Ln$_2$O$_2$CO$_3$ (Ln = Ho, Er, Tm or Yb) with the evolution of CO$_2$ and 3-pentanone (C$_2$H$_5$COC$_2$H$_5$) between 300 and 400 °C. The further decomposition of Ln$_2$O$_2$CO$_3$ to the respective sesquioxides Ln$_2$O$_3$ is characterized by an intermediate plateau extending from approximately 500–700 °C in the TG traces. This stage corresponds to an overall composition of Ln$_2$O$_2$.5(CO$_3$)0.5 but is more probably a mixture of Ln$_2$O$_2$CO$_3$ and Ln$_2$O$_3$. The stability of this intermediate state decreases for the lighter rare-earth (RE) compounds studied. Full conversion to Ln$_2$O$_3$ is achieved at about 1,100 °C. The overall thermal decomposition behaviour of the title compounds is similar to that previously reported for Lu(C$_2$H$_5$CO$_2$)$_3$·H$_2$O.

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