Synthesis of Layered Double Hydroxides, Intercalated by Anionic Forms of Active Chlorine as a New Type of Antibiotic-Free Solid Disinfectant With Prolonged Activity for Wound Dressings and Other Application

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The wide spectrum and prolonged antimicrobial activity of active chlorine-containing compounds make them suitable for addressing the control of sensitive and resistant infectious agents in hospital settings. We proved the possibility of synthesis of active chlorine intercalated layered double hydroxides and investigated the influence of the obtaining parameters on the synthesis process characteristics and the solid phase actives for future development into disinfectants. Active chlorine samples were synthesized by chemical co-precipitation with constant pH (8,10) and t=15°C, 35 C. Sedimentation process was combined with precipitate thickness measurement. The active chlorine content of samples, initial solutions, and mother liquors was evaluated by iodometric titrations and further characterized by PXRD. Conclusions. 1) Proprietary, the possibility of obtaining solid-state active chlorine intercalated LDH has been proved. Synthesis of samples of ClO- and dichloroisocyanurate(DChlC)-intercalated Zn-Al LDH were carried out; 2) During sedimentation investigation for the first time LDH exfoliation directly during the synthesis in the presence of ClO- has been detected; 4) The active chlorine content of synthesized compounds was determined - 0.3-0.69% for ClO-LDH and 0.46-1.57% for DChlC-LDH. The content of active chlorine in the solid active phase after 0.5 years of storage was evaluated. The material balance of obtaining samples was compiled, and the yield was determined - 83.5-88% (ClO-LDH), 73-77% (DChlC-LDH). According to technology, ClO-intercalated LDHs are more promising. 5) Prolonged-release of active chlorine from the obtained active ingredients may be suitable for disinfectant use and possess high cleaning ability for greasy and dye contaminated surfaces.