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Influence of MW Irradiation on the Hydroxyapatite/Chitosan Composite Structure and Drug Release Kinetics

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Biocomposite material based on hydroxyapatite (HA) and chitosan (CS) in form of beads was synthesized using microwave irradiation (MW) of different power and investigated by methods of XRD and HPLC. MW reduces the time of HA formation to 20 min without affecting its structure. Liquid absorption and liquid retention for the synthesized at maximum MW power HA-CS-MW800 sample is 27%, while for the control HA-CS 5%. HPLC showed significant differences in the release kinetics of the hydrophilic Chlorhexidine (CHX) and hydrophobic benzocaine (BZ) and proved the composite ability to prolonged drug release to 336 h for CHX and 384 h for BZ. The HA-CS-MW800 demonstrates the highest release rate for CHX and the lowest one for BZ. From HA-CS-MW800 sample in the first 2 hours is released the smallest amount of BZ (about 32%), compared to 45% for others. The effect of MW contributes to the specific location of binding sites in composite and access of drug molecules to these sites.