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# RHEOLOGICAL PROPERTIES OF PASTES FOR THE PREPARATION OF BIOCOMPATIBLE PHOSPHATE CERAMICS USING EXTRUSION 3D –PRINTING

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Calcium pyrophosphate $Ca_2P_2O_7$ can be used for obtaining porous matrix in regenerative methods for treating bone defects, as a carrier of drugs and for the cultivation of bone cells.

To obtain a porous matrix with a given geometry of the pore space, the method of extrusion layer-by-layer 3D printing from highly concentrated suspensions can be used. The preservation of the form and the formation of brushite or monetite as direct precursors of the pyrophosphate phase is achieved due to the chemical reaction.

The aim of this work was to study the rheological properties of highly concentrated hardening suspensions (HCHS) containing calcium citrate, calcium oxalate and monocalcium phosphate monohydrate and to obtain biocompatible ceramic materials based on them.

The following reaction were used for calculation for amount of the starting component:

$Ca_3(C_6H_5O_7)_2 \cdot 4H_2O + 3Ca(H_2PO_4)_2 \cdot H_2O + 5H_2O \rightarrow 6CaHPO_4 \cdot 2H_2O + 2H_3C_6H_5O_7$

$CaC_2O_4 \cdot H_2O + Ca(H_2PO_4)_2 \cdot H_2O + 2H2O \rightarrow 2CaHPO_4 \cdot 2H_2O + H_2C_2O_4$

The plastic strength decreases when the content of monocalcium phosphate monohydrate and calcium oxalate increases. The values of plastic strength indicate the possibility of stable molding from these pastes for 20-30 minutes. The resulting ceramic materials can be recommended for the manufacture of resorbable bone implants for the treatment of bone defects.

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