

# Environmentally safe route for producing redispersible polymer powders and investigation of materials based on them

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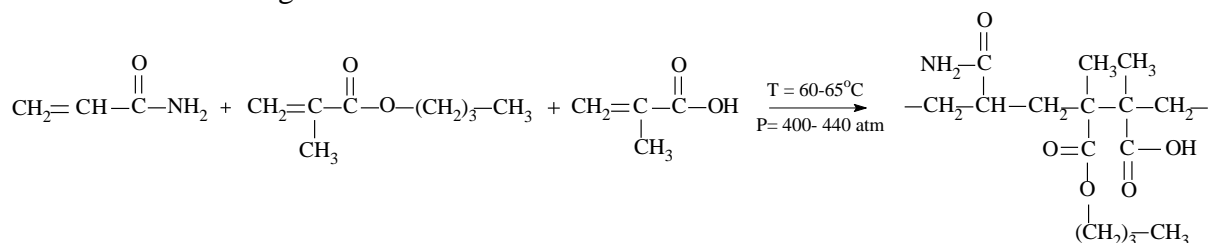
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Redispersible polymers are used as mineral binders' modifiers forming dry building materials basis. Small amount of modifier (1-5 wt.%) significantly improves deformation-strength properties of final material, increase adhesion to various substrates and prolong service life.

Recently, redispersible polymer powders are mainly produced as follow scheme: emulsion polymerization of initial monomers in an aqueous medium, followed by isolation of obtained polymer by high-temperature spray drying. Main drawbacks of this scheme are large number of technological stages and production waste. To eliminate described shortcomings we proposed to use supercritical carbon dioxide (SC-CO<sub>2</sub>) as reaction medium.

In this study we obtained triple copolymers of different composition, which was selected on basis of problem of obtaining an amphiphilic polymer. Thus, methyl and butyl esters of methacrylic acid and vinyl acetate were chosen as basic monomers, and acrylamide, methacrylic acid, vinyl laurate, and others were used as comonomers. To determine optimum synthesis conditions, solubility of monomers in SC-CO<sub>2</sub> was studied. Best results were obtained with following process parameters: temperature 65 °C and pressure 400-440 atm. An example of reaction is shown in Figure 1.



**Figure 1.** Copolymerization scheme of butyl methacrylate, methacrylic acid and acrylamide.

Based on copolymer shown in Figure 1, coating was obtained and its deformation-resistant properties were tested: adhesion, impact and tensile strength, resistance in various media. These properties are comparable with properties of coating obtained on basis of an identical copolymer synthesized in aqueous medium.

Also on basis of copolymer synthesized in SC-CO<sub>2</sub> copolymer, with composition presented in Figure 1, composition of water redispersible dye was developed. Coating obtained on its basis possess high performance characteristics that are comparable to paint based on industrial grade latex.

Authors thank Russian Foundation for Basic Research (project 16-29-05334) for financial support.