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Crystallization of fine product CL-20

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Abstract

This article presents the results of the method of obtaining the product high explosive CL-20 with a specific surface area more than 0.3m^2/g and 100% degree of polymorphic purity. This article presents the results of the method of obtaining the product high explosive CL-20 with a specific surface area more than 0.3 m^2/g and 100% degree of polymorphic purity. These specific requirements for the quality of the crystal CL-20 to improve the efficiency of its use in the compositions of high-energy fuels. For this study used the process of recrystallization of ternary systems of CL-20-solvent-precipitator.The process is complicated by the ability of the crystalline CL-20 to form four stable polymorphs of which is necessary to obtain the desired, most high-density ε-modification without any other side polymorphs – α, β, and γ.

To develop a method of crystallization of fine CL-20 was previously established according to the solubility product temperature. Moreover, was defined the temperature limits of formation of the most stable high-density ε polymorphs in three popular solvents: acetone, acetonitrile and ethyl acetate. To select the precipitant for the development of the method of crystallization has been established ability of the six liquids of different functional classes to form a crystalline precipitate CL-20 from a saturated solution in acetone, acetonitrile and ethyl acetate.

As a result, this study proposed a method for obtaining highly dispersed product of CL-20 by making the boiling of a saturated acetone solution of this product in the chilled to 0 °C and rapidly stirred carbon tetrachloride in amount of 20 ml/g. This method allows to obtain 100% ε polymorphic modification of CL-20 with a specific surface area of 0.3-0.5 m^2/g. Studies have shown that the increase in temperature of the acetone solution of CL-20 to the limit values restricted by the boiling temperature leads to an increase in the specific surface area of the resulting product. The use of carbon tetrachloride in quantities of more than 20 ml/g contributes to higher yield of crystalline product, as well as the education side of the β-polymorph to 4% without affecting the specific surface of the obtained powders. Thus, shows the influence of temperature and concentration factors on the polymorphic composition and the dimension of the resulting crystals.