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Selection of raw materials for fabrication of new types, environmental safe fire-extinguishing powders and evaluation of their efficiency



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The aim of the presented investigation is the selection of local mineral raw materials for production of new types, environmental safe, highly effective fire-extinguishing powders. As is known, the commonly produced fire-extinguishing powders are rather expensive and cannot satisfy the modern demands, in the first place with the view point of effective, non-toxic and environmentally safe using. Most of them are halogen containing. Therefore, development of halogen free, non-toxic, environmentally safe fire-extinguishing powders is currently a very important problem. Local mineral raw materials - zeolite, clay shale, perlite, dolomite, barite-calcite and ammophos are taken as the basis for receiving such powders. At destruction at high temperatures of the mentioned raw materials the emission of asphyxiating gases and toxic matters does not happen. Raw materials were selected according to their high-performance properties and due to the factors indicating the reduction of combustion processes, which can be predicted using the results of chemical and thermal gravimetric analysis. Such raw materials mainly contain alkali and alkaline-earth metal carbonates, bicarbonates, oxalates, silicates, Fe, Al and alkali metal hydroxides, crystallization water. At their Intensive heating incombustible gases, water steam and metal oxides are separated. Incombustible gases and water steam in flame zone are functioning as phlegmatizer and in surface zone are causing the formation of swelled layer.

Protective films of metal oxides swelled, and coked layer cause a strong “fire-limiting” effect. This indicates the fact that they are characterized by high inhibition properties. It is stated, that zeolites in composite powders can act as efficient hydrophobizing agents. Thus, the introduction in zeolite containing composite powders of raw materials: dolomites, barite-calcites and ammophos which are hygroscopic, but characterized with high inhibition properties are not cause significant changes of performance properties, but considerably increase fire -extinguishing capacity. It allows to create a wide range of zeolite-containing fire-extinguishing powders on the basis of local mineral raw materials.

Biography

Salome Tkemaladze Chemist, master's degree program student. She works at GTU Vladimir Chavchanidze Institute of Cybernetics (Georgia). Scope of scientific interests: chemical science, analytical chemistry, chemical expertise, chemical engineering. She has 8 publications. She is a participant of the grant project # 216770 - “New type fire-extinguishing powders and foam-suspensions based on local mineral raw materials “funded of the National Science Foundation. She had participated in some international conferences and congresses: Elenite Holiday Village, Bulgaria; Lisbon, Portugal a and Tbilisi, Georgia. And also, she had some years of experience in the study and evaluation of fire-extinguishing and fire- protective materials.

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