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Article 1

Sarkisov Yu. S.
A hypothetical structure for the future table D. I. Mendeleev
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Keywords: Periodic law, periodicity, quantum number, f – the family, the nd1 effect, the placement of electrons in orbitals, the laws of quantum mechanics, dichotomie, the structure of the table of D. I. Mendeleev, electronic formula

Abstract

The paper discusses a possible variant of the future structure of the D. I. Mendeleev table, based on the hypothesis of the correspondence of the order of distribution of electrons with the increasing charge of the nucleus to the laws of quantum mechanics. For the first time the idea of natural spatial development of the D. I. Mendeleev table structure in the plane perpendicular to the existing plane of the matrix table is put forward, where f elements and their more complex analogues of gf, hgf, ihgf, etc. elements are naturally located. The necessity of introducing quantum numbers of a new generation is indicated. It is shown that the triads of elements are stored in the structure of the table up to large values of atomic nucleus charges. Today it can be argued that the periodic table of D. I. Mendeleev is a consequence of the laws of quantum mechanics, about which at the time of its birth Neither D. I. Mendeleev himself nor his equally great scientist knew practically nothing.

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Article 2

Tokar S. V., Barinova O. P.
Inorganic coatings based on silicates of alkaline metals and their durability to exposure to proton radiation
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Keywords: liquid glass, inorganic binder, the optical characteristics

Abstract

The stability of liquid glasses to the effects of proton irradiation was investigated by changing the absorption coefficient of solar radiation αs. A comparative assessment of gassing, electrophysical and optical characteristics of coatings based on sodium, potassium and lithium liquid glasses has been carried out.

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Article 3

Min'ko N. I., Dobrinskaya O. A.
Technological features of the use of glass in the manufacture of glass materials
Min'ko N. I., Dobrinskaya O. A. Belgorod State Technological University named after V. G. Shukhov (BSTU named after V. G. Shukhov)

Keywords: glass materials, cullet, energy and resource saving, heterogeneity, impurities, beneficiation, glass-making

Abstract

The article is devoted to the technological features of the use of cullet in the technology of glass and glass materials; the main problems that must be considered when using cullet are identified. The article presents specific examples of the use of cullet as a component of glass mixture in production. The results of the study of the effect of cullet content in the charge on the production of suitable products

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Article 4

Хтет, Zin Min Htet, Tikhomirova I. N.
Technology of composite thermal insulation material production using sodium liquid glass and mineral fillers
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Keywords: liquid glass, wollastonite, foaming agent, coefficient of foaming, coefficient of thermal conductivity, porosity, density

Abstract

The article presents experimental data on the selection of compositions and technological methods to obtain thermal insulation materials based on foamed and volumetrically cured liquid glass and wollastonite. The factors, which affect such material properties as thermal conductivity, strength, apparent density and porosity, are considered. Using the method of mathematical analysis, the degree of influence of these factors on the properties of the material is estimated. It was found that the coefficient of foaming is 4 and the content of wollastonite in the mass of 22-23% can be obtained materials with coefficient of thermal conductivity, less than 0.1 W/(m•K) at strength of 2 – 3.5 MPa. These materials will be competitive in the thermal insulation market, because the technology of their production is quite simple and they are absolutely not flammable, durable, and corrosion-resistant. We set ourselves the task to obtain thermal insulation material with a thermal conductivity, less than 0.1 W/(m·K) at strength 1-2 MPa. As a result, with coefficient of foaming is 4 and wollastonite content in the mass of 23%, we achieved the desired thermal properties and the strength was approximately 3.5 MPa, which gives us reason to continue to optimize the compositions, reducing the amount of wollastonite to acceptable strength values, but also reducing coefficient of thermal conductivity.

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Article 5

Guvalov A. A.
Influence of poliarilsulfonate superplasticizer on properties of cement mortar and concrete mix

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Keywords: superplasticizer, mobility, water content, cement mortar, concrete mix, water separation

Abstract

Poliarilsulfonate superplasticizers in the amount of 0.75-1.25 wt.% while maintaining the specified plasticity reduces the water demand of concrete cement mortar and concrete mix by 25-30%. Otherwise they allows to increase the precipitation of the cone from OK = 2 – 4 cm to 24 – 26 cm with the same W/C and also they allows to reduce the amount of water separation of the concrete mix in comparison with the known superplasticizers 2 times. It is shown that with an increase in the cement content in the mixture, the effect of poliarilsulfonate superplasticizer increases.

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Article 6

Zorin D. A.
The use of expanding cements based on calcium sulfoferrite in construction
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Keywords: calcium sulffoferrite, expansive cements, non-shrinkage cements

Abstract

Currently, high-rise construction has received increasing attention around the world. In the big cities under construction is less space and one solution is the high-rise construction. However, high-rise buildings use special requirements, such as strength, thermal insulation, wind load and others. When concrete is exposed to continuous loads by wind or to mechanical loads, it undergoes abrasion. Resistance to this process depends on the characteristics of materials that the concrete and finishing seams are made of. Research on increasing impact and abrasion resistance of calcium sulfoferrite-based cement stone from the perspective of formation of cement stone structure will be instrumental in developing durable materials for application in high-rise construction.

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Article 7

Molchan N. V., Fertikov V. I.
Intermolecular interactions in two-component oxide systems with CaO
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Keywords: concentration of electrons, density, oxides, structure

Abstract

Calculations of intermolecular interactions in bicomponent oxide systems with CaO based on the normalized value of changes in the volumes of the reacted components are presented. Calculations are based on reference data of substance densities. It is proposed to consider the structure of the condensed state as a space filled with a core of atomic nuclei and electrons functioning between them. It has been established that, based on the values characterizing intermolecular interactions, it is possible to predict the properties of compounds.

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