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Sulfur composite technology from oil refinery waste

Yusupova A., Akhmetova R., Treshchev A., Shafigullin L., Lakhno A., Bobrishev A.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© Research India Publications.Oil and gas waste is a valuable material for chemical industry and new material intensive alternative. The article studies a possibility of obtaining inorganic sulfides from elemental sulfur and an active silica containing material with better mechanical and physical properties and analyses their formation. The usage of an aluminum chloride activator allows activating sulfur and silica components of materials that contributes to obtain unyielding and long-lasting sulfur composites having better performance properties. To understand the chemical processes developing in the system and prove new chemical bond formation, the quantum-chemical research using software products is undertaken. The comparative thermodynamic assessment of insertion and replacement reactions in triple and singlet state of sulfur is carried out. The impact of silicagel premodification with aluminum chloride on reaction with sulfur and calcium sulphide formation is defined. The quantum-chemical calculation results confirm the chemical reaction possibility between sulfur and silicagel modified with aluminum chloride. According to the research results, the schemes of obtaining silica containing materials from opal cristobalite rock of various deposits are suggested. According to the research results, we can offer the manufacture technology of inorganic sulfides and sulfur composites employing an activator-aluminum chloride. A key technology scheme of sulfur composite manufacturing from inorganic sulfides is developed. The acquired data on usage of interaction mechanisms of sulfur with various inorganic compounds can provide background for developing recycling technologies of sulfur obtained in the process of oil refining into sulfides and multipurpose materials.

Keywords

Aluminum chloride, Quantum-chemical calculations, Silicon dioxide, Sulfides, Sulfur concretes