

Use of lightweight glass aggregates prepared from different waste to mortar manufacture

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Abstract

The aggregates sector is one of the largest non-energy extractive industries. In Europe, 86% of the aggregates consumed are from natural resources (47% crushed rock and 39% sand and gravel) and just 14% from artificial or recycled aggregates. Artificial lightweight aggregates are highly demanded by the construction sector due to their technological properties. They are used for the manufacture of mortars, concretes, thermal and acoustic insulation barriers, etc. The extraction of natural aggregates has a serious impact on the environment, as most of the mining operations are conducted in opencast quarries or gravel pits.

The aim of this study is to prepare artificial lightweight aggregates from different wastes such as glass cullet (base material) and carbonated wastes of both animal (eggshell and mussel shells) and mineral sources (waste from the quarrying, production and commercialization of magnesite and magnesite by-products), and to study their incorporation in the manufacture of lightweight mortars.

The effect of different processing parameters (particle size of glass cullet, percentage and nature of foamy agents, firing rate, firing temperature and time) on the characteristics of the artificial lightweight aggregates was studied. Moreover, the aggregates were characterized to be used in mortars; the fresh state and the mechanical properties of the mortars prepared with the as-obtained artificial lightweight aggregates were compared with those of a reference lightweight mortar produced with a commercial aggregate (arlite based). Good results were obtained but dependent on the density of the aggregate itself.

Biography:

Dr. Aurora López-Delgado (Ph.D in Chemistry, Scientific Researcher at Eduardo Torroja Institute for Construction Science, IETcc-CSIC) has more than 25 years of experience in the synthesis of added-value materials such as glasses, glass-ceramics, ferrites, aluminas, zeolites, etc., using hazardous waste as raw materials. She has co-authored more than 150 scientific publications, 10 patents, and around one hundred presentations at international conferences.

Her current research interest includes processing and technological characterization of industrial and mining wastes in order to develop processes to get added-value materials, and also, in the application of concentrated solar energy to high temperature processes.