Preparation of crushed glass as a filter media in granular filters

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Silica sand is the most widely used rapid filter medium around the world. In recent years, the use of pulverized recycled glass instead of silica sand has started attracting attention in some countries.

In this project, two pilot scale mono-media filters were prepared containing sand and crushed glass separately. One filter contained the silica sand medium that is currently used in all the municipal water treatment plants in Istanbul.

The other filter contained crushed glass which was obtained from Anadolu Şişecam, Inc. which is one of the glass factories in Istanbul. The following steps were performed for the preparation of this material before placing it into the filter column:

(i) Removal of impurities from all glass pieces (which were about 3-4 cm in size),
(ii) Crushing: for the size reduction of glass pieces,
(iii) Washing the crushed material to eliminate fines which can lead to difficulties in the subsequent sieving process,
(iv) Sieving the bulk material to the desired range.

The size distribution of the glass medium was adjusted by preparing/mixing the separate fractions as the main purpose here was to get an effective size and uniformity coefficient which are sufficiently close to those of the sand medium. This is needed for the comparison of the performances of two filters to be meaningful.

Densities of the of the two materials were measured by a water-displacement technique. Equivalent diameters have been measured by counting and weighing 200 grains of each fraction.
Crushed glass as obtained from glass factory

Crushing after cleaning

Glass particles after crushing, containing fine glass dust
Cleaned and sieved to the desired size range, ready to use.