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Design and development of graphene sand composite using traditional and advanced synthesis

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Graphene sand composite was prepared as part of the final year project through biosynthesized process from the sugar anchoring on sand particles without any binder resulting in a composite, referred to as graphene sand composite (GSC), which is used in water filtration. River sand was firstly treated with 0.1 M nitric acid to remove impurities, washed with deionized water and dried at 100±3°C. 20 gm of sand was added in 1 M sugar solution, magnetically stirred for 5 hours at 85oC and then allowed to get dried. Then the mixture was placed in the crucible and covered with activated charcoal and heat treated in muffle furnace for 6 hours, with specified cycle, subsequently powder was treated with concentrated sulfuric acid and washed with deionized water. Later this powder was dried at 120°C on a hot plate, which resulted in a black powder, known as graphene sand composite. The morphology and composition of the synthesized Graphene Sand Composite (GSC) was investigated by means of X-ray powder diffraction (XRD), Scanning Electron Microscopy (SEM), Fourier Transform Infra-Red Spectroscopy (FTIR). SEM images show wrinkly edges and this is the characteristic of graphene morphology. Filter of GSC was made and different samples were analyzed by UV-Visible spectroscopy and different tests were taken to analyze drinkability of filtered water.

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The excellent performance of amorphous M_0O_3, V_2O_5 and graphene oxide in fructose conversion into 5-hydroxymethylfurfural

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Nowadays, due to the reduction of fossil fuels, the use of renewable energy sources is highly regarded. Here upon, a growing interest has recently been devoted to fuels and chemicals from the sustainable biomass resource, which not only reduce the consumption of fossil resources, but environmental pollution will be prevented. In this context, 5-Hydroxymethyl furfural (HMF), which is a dehydration product of carbohydrates such as fructose, glucose, inulin is considered to have particularly high potential as one of the most usable platforms chemicals and can be used as a various precursor for the production of fine chemicals, plastics, pharmaceuticals and liquid fuels. In recent years, toward other raw materials, there is growing focus on the synthesis of HMF from fructose, because the fructofuranoic structure of fructose cause of acid-promoted dehydration be more facile. Therefore, fructose has been desired feedstock to compare the efficiency of catalytic systems for biomass conversion. In this respect, preparation of highly active catalyst for the conversion is very important. Hence, Graphene oxide (GO) prepared from Hummer,s method was proven to be a green and efficient carbocatalyst for the dehydration of fructose into 5-hydroxymethylfurfural (HMF). The most common approach to maximizing surface area of catalysts, is using a support, the materials over which the catalysts are spread. The metal-containing catalysts often give a relative high yield. In continuing previous report, we study V_2O_5/M_0O_3 based on GO as nanocatalyst in the dehydration process of fructose and turns to 5-HMF. Ease of handling, greater selectivity, simple workup, and recoverability of catalysts and high yield are advantages of this reaction.

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