A GREEN ADSORPTIVE SILICA FILTER AID FOR CAKE FILTRATION

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Amorphous silica from Rice Hull Ash has been used as a filter aid for decades due to its highly porous structure, excellent filtration properties and relatively pure chemical compositions. As a filter aid, it is designed for suspended solids removal. For dissolved contaminants, adsorbents such as activated carbon are normally used. Problems with adsorbents include high cost, regeneration loss for granular and low filtration flow rate for powder adsorbents. There is a need for development of a cost-effective adsorptive filter media with both filtration and adsorption properties.

Amorphous silica from Rice Hull Ash is a material with mesoporous structure, and special functional groups on the surface, which contributes to adsorption of various chemicals. However, the adsorption of the raw amorphous silica material is limited due to relatively low BET surface area around 30-40m2/g. Increase of the surface area would enhance the activation of the function groups and the adsorption capacity. A special chemical surface treatment process is developed which increased the surface area by 10-20 times, with a methylene blue number reaching 699 mg/gC. Case studies on cooking oil filtration and wastewater shows effective Free Fatty Acid removal and heavy metal removal. Supporting study with SEM, EDX, FTIR, BET surface area, pore size, pore volume, cake permeability, cake density before and after the treatment will also be presented.