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Opinion Article

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Evaluation of Column Hg Adsorption on High-Temperature Activated Carbon

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DESCRIPTION

The present study is focused on the harmful Hg (II) from wastewater using adsorbents that are both affordable and environmentally favourable. Locally, *Syzygium jambolanum* nuts are widely available. It is anticipated that it will have applications in cleaning technologies in addition to medicine. $(NH_4)_{2S2O8}$ has been used to create chemically activated *Syzygium jambolanum* nut carbon (CHSJC). Experiments using column adsorption have been conducted to determine the impact of flow rate, bed height. By using alkaline Na_2S, it is possible to quantify the adsorbed $[HgCl_4]_2$. Even after five cycles of operation, the capacity remained untouched, and it was discovered that the treated water was free from the environment.

Due to effluents released by chlor-alkali plants, pharmaceutical, pulp, paint, and plastic industries as well as agricultural sources including fertilisers and fungicidal spray, mercury (II), a highly hazardous metal ion, poses a threat to the aquatic environment. Discharging mercury and its compounds into water bodies at any level has the potential to have a negative impact on the aquatic environment since mercury is a cumulative poison. The community is additionally alarmed by the fact that mercury (II), which is discharged into the water and then methylated, builds up in fish before eventually entering humans through the food chain.

Chest discomfort, renal problems, brain damage, kidney and pulmonary impairment that are irreversible are all brought on by Hg (II). Technology for environmental clean-up that can efficiently and affordably handle vast amounts of water that has been polluted with Hg (II) is essential. Utilisation of bio wastes, which are readily accessible and anticipated for the removal of heavy metal ions, should be given some thought. For the efficient and dependable removal of heavy metal ions from wastewater by sorption method, activated carbons made from biowaste are an excellent choice. For the removal of different heavy metal ions, several biowastes have been used, including coconut shell, sugarcane fibre, grape stalks, yohimbe bark, walnut hull, *thespesia populnea* bark, maple leaves, African palm fruit, and *pyras pashia* leaves. A biowaste that may be used to create sorbent is the *Syzygium jambolanum nut*. An evergreen tropical tree is the *Syzygium jambolanum* tree. While a tropical tree, it can also flourish in subtropical environments and is widely found throughout India.

For carbonization and activation purposes in the presence of oxidising substances like $(NH_4)_2S_2O_8$, 100 g of *Syzygium jambolanum* nuts were treated with 100 mL of concentrated H_2SO_4. The material was baked for 24 hours

at 140–160°C in an air oven. To remove the free acid, the material was repeatedly rinsed with distilled water, then submerged in a 2% $NaHCO_3$ solution, and ultimately left in that solution overnight. The material was separated, rinsed with distilled water, and then dried at 105°C for five minutes. By sandwiching the dried substance between powdered $CaCO_3$ beds in a sealed container at 800-850°C for 30 minutes, the dry substance was thermally activated in a CO_2 environment. Systematic studies with 10 mg/L of Hg (II) and 10 g/L of NaCl at pH 5.0 revealed that the rate of flow has a significant impact on the removal of Hg (II), and that this influence is greatest when maintained between 10 and 16 mL/min for all carbons. In order to continue the research, a flow rate of 14 mL/min was set. With increasing bed height, more or less Hg (II) was eliminated. For CHSJC and HSJC, a minimum bed height of 8.0 cm must be maintained by filling the 2.5 cm diameter column with 15 g of carbons in order to maintain a consistent capacity per unit weight of carbon.