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Using Ground Apricot Kernel Shell Material to Remove Pollutants from Sewage Waters

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Editorial

Today, the global community is seeing a rapid development of several environmental protection technologies. The use of industrial and agricultural waste as reagents for the removal of contaminants from gaseous and aqueous environments is one of the cutting-edge trends. Wood biomass components, such as leaves, conifer needles and cones, fruit peels and wood processing waste, such as sawdust, fruit kernels left over from fruit processing and nut shells, are of particular interest because they are produced annually in large amounts, are affordable and have a renewable raw material base.

The common apricot (*Prnus armenaca*), a fruit tree of the Armeniaca section, *Prunus* genus, Rosaceae family, is a typical deciduous tree that is extensively distributed in the southern regions of the Russian Federation as well as in Central Asian and Caucasian countries. The fruits are roundish, elliptical or obovoid, juicy, yellow to red («apricot-colored») drupes with a lengthwise groove. The kernel is smooth, granular, or has thick walls [1].

The apricot tree can live for up to 100 years in a warm area; fruiting starts at 3 to 5 years of age and can last for up to 40 years. Because the trees can withstand droughts, they can flourish in hot climates with little rainfall. It is necessary to assess the efficacy of various processing techniques for this material, notwithstanding the abundance of literature on the possible use of apricot kernels as an absorber of different pollutants. However, research has been done on how iron ions are absorbed by deciduous trees' leaves, especially apricot. It was discovered that Prunus armeniaca leaves had a maximum adsorption capacity for the aforementioned ions of 39.8 mg/g at an initial concentration of Fe^{3+} ions of 100 mg/dm^3 [2].

Thousands of tonnes of kernels are produced as a waste product as a result of processing thousands of tonnes of apricots. In this study, the effectiveness of pulverised native apricot kernel shells in eliminating heavy metal ions and dyes from aqueous media was investigated. Additionally, cellulose-containing apricot fruit shells may have strong sorption qualities for a variety of contaminants. As a result, it is vital to research the viability of employing apricot kernel shell material to purify contaminated streams.

Three different forms of activated carbons made of wood and apricot kernels were researched for their ability to separate Atrazine herbicide and Cr^{3+} ions from model solutions either singly or in combination with different process settings. The research revealed that among the sorbents used, the activated carbon produced from the shells of apricot kernels had the least surface area (276.15 m^2/g). The AC's maximal sorption capacities for atrazine and chromium ions were determined. These parameters were 46.3 and 181.81 mg/g for the adsorption from the solutions of specific pollutants for the activated carbons generated from apricot kernels and 105.26 and 175.44 mg/g, respectively. The Freundlich model and the Langmuir model were found to better describe the atrazine adsorption isotherms and the Cr^{3+} ions adsorption isotherms, respectively [3].

Tetracycline was removed using a variety of process parameters using carbonizate made from apricot kernel shells that had been activated with an H_3PO_4 solution. The average pore diameter, total pore volume and specific surface area of ACs were reported to be 307.6 m^2/g, 0.191 cm^3/g and 1.957 nm, respectively. The obtained activated carbon's maximal sorption capacity for tetracycline was 308.33 mg/g. The Freundlich model and the pseudo-second-order model were shown to better capture the adsorption isotherm and process kinetics, respectively [4].

It was investigated whether activated coal, produced by carbonising ground apricot kernel shells at 350 and 600 °C, might be used to remove petroleum and its byproducts. It was discovered that a bigger surface area was formed as a result of the increased carbonization temperature. Additionally, it was discovered that the sorption capacity for petroleum compounds increased as the diameter of the AC particles shrank. The maximum values of the activated carbons' sorption capacity were calculated and they were 2.0 g/g for petroleum, 4.0 g/g for I-20A oil, 1.5 g/g for kerosene and 0.7 g/g for gasoline [5].

Conclusion

It can be suggested that future research look into using the byproducts and waste from the processing of apricot tree biomass (sawdust, bark and leaves) as sorption materials. Further research on a sink for used adsorbents or potential adsorbent regeneration is also suggested. How pH impacts the removal of heavy metals (cations vs. anions) and organic pollutants is another area that needs further study.

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Conflict of Interest

No potential conflict of interest was reported by the authors.

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