



DEMETRIO HUERTA





Using Citric Acid to Activate Charcoal Obtained From Agricultural Wastes as an Affordable Alternative to Adsorb Oil From Water

Demetrio Huerta^[1], Yong X. Gan^[2]
 Citrus College, 1000 W Foothill Blvd, Glendora CA, 91741^[1]
 Department of Mechanical Engineering, California State Polytechnic University, Pomona^[2]



Objectives

- ❖ To prepare activated carbon (AC) derived from pistachio shells using lemon juice as the activating agent.
- ❖ Test and compare adsorption properties of the pistachio shell activated carbon (PSAC) to that of commercial activated carbon (CAC).

Background

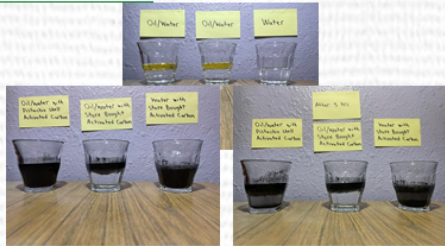
- ❖ AC is one of the best technologies to use to clean up organic compounds in water and air through a technique called adsorption.
- ❖ Adsorption is the process by which a solid holds molecules on its surface.
- ❖ Regular Carbon has some pores while activated carbon has more pores which means it has a higher surface area to adsorb more
- ❖ There are 2 different methods of activation, physical activation and chemical activation.
- ❖ CAC is too expensive as a result of being produced from mostly fossil coal and wood so there is a need for a cheaper and more sustainable resource that can be turned into AC.
- ❖ Agricultural wastes such as pistachio shells, coconut shells, orange peels, etc. have all been investigated as an affordable alternative.

Methods - Preparation of PSAC

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graph TD
    A[Eat Pistachios And Save The Shells] --> B[Bath Pistachio Shells For 24h]
    B --> C[Heat Pistachio Shells At High Temperature]
    C --> D[Rinse Pistachio Charcoal To Get Rid Of Any Ash]
    D --> E[Conduct Experiments And Observe]
    E --> F[Activation Is Complete]
    F --> G[Rinse And Heat Charcoal At Medium Heat]
    G --> H[Mix Charcoal In Citric Acid Solution For 24h]
    H --> I[Grind Pistachio Charcoal Into Fine Size]
    I --> J[Activation Is Complete]
    J --> K[Conduct Experiments And Observe]
    
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Results and Discussion



- ❖ As can be seen, the PSAC did not perform as well as the CAC but given time it was still capable of adsorbing the oil.
- ❖ Done in another experiment, the CAC was found to adsorb more oil than the PSAC.
- ❖ Therefore, the CAC has a higher surface area than the PSAC.
- ❖ The source of error can most likely be traced back to the activating agent.

Conclusions

- ❖ Although the PSAC was not as efficient as the CAC, pistachio shells are indeed a suitable resource to produce AC.
- ❖ Citric Acid from lemon juice was not quite as effective in activating the pistachio charcoal.
- ❖ For future implementations, developing a more efficient method of activation is a necessity to prepare AC from pistachio shells than can replicate the efficiency of CAC.

Acknowledgments

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My research project was to find a more sustainable resource that can yield activated carbon to absorb oil from water mainly. But the activated carbon can be used for many other things such as adsorbing CO2 from the air.

Alternate Text:

Demetrio Huerta

Quote: "My research project was to find a more sustainable resource that can yield activated carbon to absorb all from water mainly. But the activated Carbon can be used for many other things such as absorbing CO₂ from the air."

Image of Demetrio Huerta

Image of text and graphic laden project presentation entitled "Using Citric Acid to Activate Charcoal Obtained from Agricultural Wastes as an Affordable Alternative to Absorb Oil from Water. Demetrio Huerta, Yong X. Gan"