# Production of an adsorbent from dried and shredded Household Food Waste

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The scope of the current research work was to produce and evaluate an adsorbent generated by pyrolysis/activation of a biomass product, FORBI (Food Residue Biomass), which is produced by drying and shredding source-collected Household Food Waste. A two-step chemical activation process was used.

Pyrolysis conditions (temperature, duration) and activation parameters (chemical agents, impregnation ratio, soak time) affect the properties of the resultant adsorbent significantly. The adsorbent was prepared by chemical activation with KOH and $ZnCl_2$. Pyrolysis and activation were conducted at a temperature of 800˚C. The sample was impregnated with the chemical agents and then activated at 800˚C under constant $N_2$ flow. The impregnation ratio of carbon / KOH was 1:4.

Pyrolysis was carried out in a metallic-tube pyrolytic furnace. FORBI was placed into a metallic carrier located close to the nitrogen inlet. The heating profile in the metallic tube is monitored by a NiCr/Ni thermocouple.

Thermogravimetric analysis (TGA) was used in order to assess the thermal stability of biomass (measuring weight loss as a function of temperature or time in a controlled atmosphere). TGA was carried out in a thermal analyzer under dynamic nitrogen ($N_2$) atmosphere as purge gas, with a flow rate of 10 - 20 $cm^3$/min. The sample (~60 mg) was placed in a cylindrical crucible made of quartz and then heated with a constant heating rate of 10 °C/min from ambient temperature to 1000°C. The information on dynamic residual weight and derivative thermogravimetry (DTG) with temperature was analyzed to determine the decomposition rate and thermal stability.

The obtained adsorbent was characterized by measuring their porosity and pore size distribution and BET surface area. The surface chemical characteristics were determined by FT-IR. The microstructure of the produced activated carbon/adsorbent was examined by scanning electron microscopy (SEM).

In the sequel, the potential of using the generated adsorbent for hexavalent chromium as well as COD removal was examined. Langmuir and Freundlich isotherms were determined.

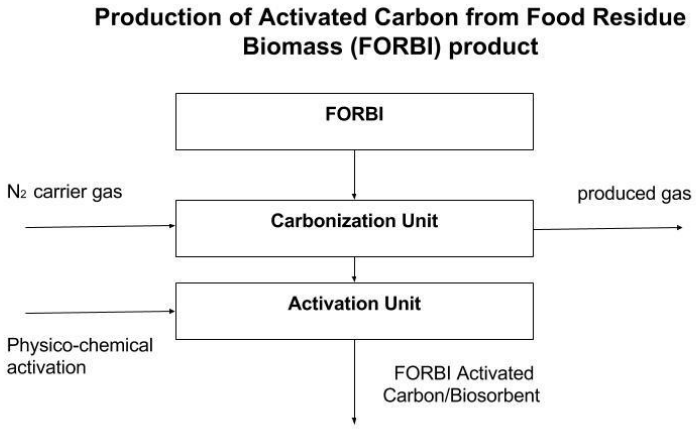


Figure 1. Flow diagram of the production of Activated Carbon/Biosorbent from FORBI

**Keywords:** Household Food Waste, adsorbent, FORBI.

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