# Converting Plastic Waste into Activated Carbon for Use in Water Treatment

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Plastic waste accumulation and generation is increasing, which poses a tremendous threat to ecological systems; as plastics may take 500 years to decompose. Activated carbon is a preferred adsorbent for the removal of water pollutants; however, its widespread use is restricted due to high associated costs. This study aimed to convert plastic waste into efficient activated carbon for filtering phenol contaminated water. The study methodology contained three phases. First, pyrolysis of HDPE and PS pure plastic, and waste at different temperatures and residence times were studied for char production. Second, 2 Methods of chemical activation were used to activate the char; using H3PO4 and KOH. SEM, FTIR and BET surface area tests were done to determine the characteristics of the activated carbon produced. Third, activated carbon adsorption efficiency of phenol from OMWW was examined. The results showed that Pyrolysis of these plastics at 450 C with 1-hour residence time produced char. PS plastic waste gives a higher char yield (9.3%) than HDPE plastic waste (1.04%). The gas given off the pyrolysis process was identified using a MQ2 Arduino gas sensor, and was found to be either methane, propane, butane, H2, alcohol, or LPG; which are high value gases that could be collected and used. It was found that KOH activated carbon had higher BET surface area, of 238.5 m2/g, which explains the higher phenol adsorption percentage of 99.96%. PS- KOH activated carbon removal % of phenolic compounds from OMWW is 97%. After all, this recycling method is a solution for multiple problems; plastic waste accumulation in the natural environment, increasing activated carbon demand, and OMWW treatment.