

Carbon particles synthesized by pyrolysis in closed container

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Different types of carbon structures as perfect in shape spheres, ellipsoids, nanotubes, and crystals have been produced by pyrolysis in a hermetically sealed steel container. Aromatic hydrocarbons like benzene toluene, xylene and their mixtures with water have been used as starting materials. The container air-tight high pressure sealing is achieved by pressing a steal sphere against the opening. The experiments have been made at a comparatively low for a pyrolytic process temperature of the range 400–800°C. The temperature is linearly growing with a rate of 200°C/min and after the experiment is accomplished cooling goes down with a rate of 300°C/min. Particle morphology has been examined by Scanning and Transmission Electron Microscopy (SEM, TEM) and their chemical composition and crystal structure by the means of X-ray diffraction (XRD), infrared spectroscopy, Electron Probe X-ray Micro Analysis and Energy Dispersive X-ray Spectrometry (EDS). The results obtained show the spheres and ellipsoids to consist of pure incompletely graphitized carbon. They are thermally stable at heating up to 600°C in the air and in vacuum or in inert atmosphere they remain unchanged up to 1000 °C.