Catalytic Graphitization of Modified Phenolic Resin and Its Nanoparticles Fillers Behavior Towards High Temperature

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Abstract.

This research is concerned with one of applications of partially graphitized process of carbon compounds. The target of the work is to investigate and study the activity of some additives as catalysts to promote graphitization of phenolic resins to use in preparing thermally stable nanoparticles fillers. Two types of additives have been dedicated as promoting factors. Ni(CH COCH COCH): 2NH, is laboratory prepared. As for HBO, additive, it has been used ready-made. Two types of the modified resins are prepared through a chemical reaction and physical mixing between the resins and the inorganic compounds. Graphitization has successfully been conducted by implementing thermal treatment in a vacuum fumace at (1200-1400°C). This study exhibited the following results: FT-IR for modified resins showed the combination of boron oxygen is attributed to the existence of the boron ion with the HBO3, and the presence of ammonia molecules bonded to nickel ion in Ni(CH COCH COCH); 2NH, allow for hydrogen bonding. confirmed by very broad stretching vibration (OH). On the other hand, the action of these catalysts is referred to their contribution in accelerating the graphitization process and to decrease the operational temperature to 1400°C as compared to that needed by amorphous carbon in order to be changed to graphite via traditional process about 3000°C. X-ray analysis showed the existence of graphite and nurbostratic structures of the type (T&G- comp.). This means the degree of graphitization (D.O.G) and carbon yield of the prepared resins by chemical reaction is more than that produced by physical mixing. HBO, had slight effect on the carbons and less than from Ni(CH COCH COCH)2NH,. Thermal analysis results (T. T.G. and T.G.A) of the modified resins should indicate that this property depends upon the type of the additive. Accordingly, it is possible to use these results in preparing modified resins and thermally stable fillers which can be used with composites. This requires investigating tests and experiments in this field