

Contact Potential Difference of Phenol-Formaldehyde Resin Carbons

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The contact potential difference (V_{cpd}) of phenol-formaldehyde resin carbon (P-F resin carbon), 3-methylphenol formaldehyde resin carbon (3 MP-F resin carbon) and 3,5-dimethylphenol-formaldehyde resin carbon (3,5 DMP-F resin carbon) heat treated over the range of 500° C to 3000° C was measured. The measurements of V_{cpd} were done at room temperature under vacuum by using a dynamic condenser electrometer. The value of V_{cpd} for samples were estimated by comparison with the surface potential of gold. The variation of V_{cpd} with HTT is shown in Fig. The V_{cpd} decreases with increase of heat treatment temperature (HTT) to a minimum at about 900° C, increases with HTT to a maximum at about 1100° C, decreases again with increase of HTT to a minimum at about 1400° C, and thereafter increases up to a constant value at about 3000° C. The approach to the constant value is fast for 3,5 DMP-F resin carbon (graphitizing-type carbon) and is slow for P-F resin carbon (non-graphitizing-type carbon) above 2000° C. As the work function of gold is 4.83 ± 0.02 eV, those of phenol-formaldehyde resin carbons at HTT 3000° C are estimated as about 4.76 ± 0.02 eV. This value agrees well with those reported for graphite. The difference between surface potential in air and that in vacuum for P-F resin carbon and 3MP-F resin carbon showed a minimum at about 800 - 900° C, although that for 3,5 DMP-F resin carbon was negligible over the range from 500° C to 3000° C.

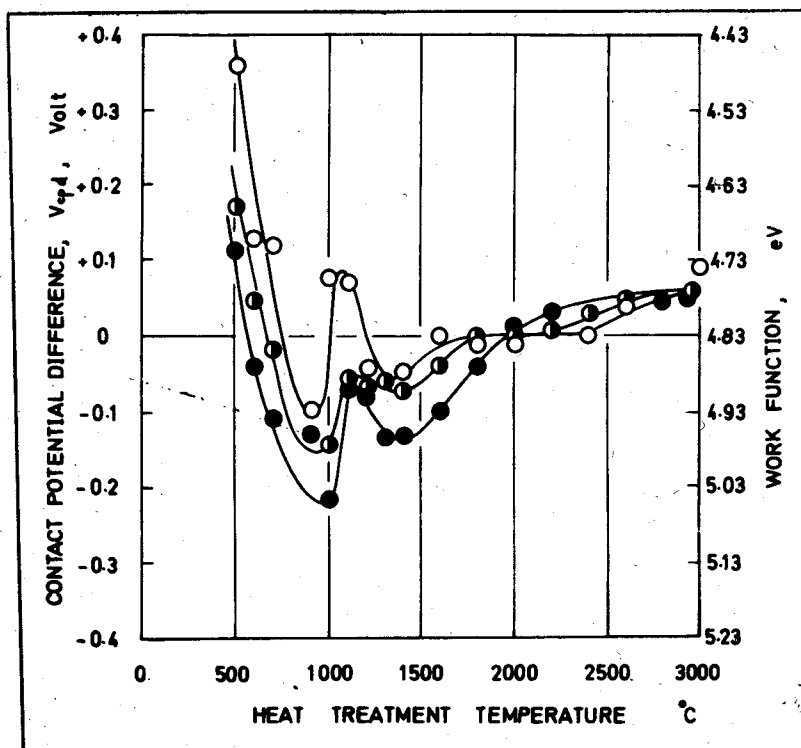


Fig.

The variation of the contact potential difference with HTT.

