

A B S T R A C TThe Formation of Glasslike Carbons by Pyrolysis of
Nonmelting Resins .

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Five nonmelting resins consisting of furfurylalcohol, furfurylalcohol-formaldehyde and phenol-formaldehyde were synthesized and pyrolyzed after thermal setting under controlled conditions to glasslike carbons. In all cases homogeneous carbon products with impermeability to gases could be obtained. The decomposition behaviour of these five resins is investigated by different methods, such as TG, DTA, IR-spectroscopy, gas- and C,H,O-analysis.

The carbon residues are studied at different states of thermal treatment by measurements of density, linear shrinkage, BET-surface area, X-ray structure (wide and small angle scattering) in addition to light- and electron microscopy. The glasslike carbons heattreated at 2000° C and 3000° C are comparable to the commercial products. Between the 4 furfurylalcohol resins no great differences in the pyrolysis behaviour could be found.

Typical constituents of the pyrolysis gas are:

H₂O 39,9%, CH₄ 42,9%, CO₂ 6,8%, CO 34,6%.

The carbon yield is found to be 84% in all cases.

We could show that the density of these glasslike carbons of 1,50 g/cm³ is caused by uniform pores with a diameter of 25 Å.

The only difference in pyrolysis behaviour between furfuryl-alcohol and phenol resins could be found in the temperature dependence of the weight loss, which below 350° C is higher for phenol resins.

No increase of BET-surface could be found during decomposition of the resins. In contrary to these results one of us has found an increase of porosity and BET-surface with a maximum at 800° C pyrolyzing commercial products .