

EFFECT OF PRESSURE ON THERMAL ANNEALING OF CARBONS

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Previous work allowed to evaluate the extent and the timescale of thermal annealing on the reactivity of coal chars towards oxygen and carbon dioxide upon heat treatment at atmospheric pressure. Experiments involved a variety of coal and char types and the use of different experimental techniques, ranging from fixed bed to wire mesh reactors and drop tube furnaces to scan the temperature range 600-2000°C.

In the present paper thermal annealing was accomplished under high pressure conditions, typical of pulverized fired combustion and oxy-combustion. To this end a special pressurized heated strip reactor (PSHR) was developed, which is able to reach up to 2000°C with heating rates in the order of 10000K/s and pressures up to 20 bar.

Different coal types were subjected to heat treatment in the PHSR at temperatures up to 1600°C and 15 bar under inert conditions. Following the heat treatment chars were characterized by TGA to compare their rate of reaction in O₂/CO₂/N₂ atmospheres.

Results indicate that while the reactivity of chars decreases monotonously with temperature of heat treatment, the effect of pressure is non monotonous.