EXPERIMENTAL STUDY ON THE IMPACT OF PRESSURIZED GASES IN THE EFFICIENT ENERGY CONVERSION OF GASIFIED COAL-CHAR TO SYNGAS IN THE CONTEXT OF UNDERGROUND COAL GASIFICATION

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Abstract:
An investigation was undertaken to determine the impact of pressurised gases to the efficient energy conversion of coal char to syngas produced during the reduction zone of underground coal gasification. Different types of Welsh coal are being tested with a bespoke high pressure high temperature rig operating up to 50 bar and 1173 K. Different sizes of coal from 4-5 mm up to blocks of several cm were pyrolysed under the flow of nitrogen gas at atmospheric pressure and 1173 K temperature to produce char. The char was then reacted with CO₂ and steam under different flow rates and pressures at 1173 K and the syngas produced was analysed. The variation of concentration of CO, H₂, CH₄ and CO₂ over time determines important process parameters such as carbon conversion and cold gas efficiency which indicate the efficient energy conversion of coal to syngas. Reaction rates were also calculated.

Keywords: underground coal gasification, coal char, gasification

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