

Laboratory Tests of Hydrogen Production through Coal Gasification with Reduction of CO₂ Emission with CaO – Adam Smoliński

Summary

The paper presents the results of laboratory-scale tests of Polish hard coal steam gasification process combined with CO₂ capture by absorption on CaO in a single step. Polish coal mine Piast was selected as a coal samples supplier based on the coal resources, quality, price and reactivity which makes it a potential supplier for a future full-scale gasification system. Steam gasification tests were conducted in a vertical fixed bed reactor at the temperature range of 923–1173K in three series: with addition of CaO layered on a coal sample (II), mixed with a coal sample (III) and without adding CaO (I). The CaO increased both the hydrogen yield and content in gaseous products mixture in comparison with series I. As expected, mixing of CaO with coal sample improved the effects in terms of hydrogen yield and concentration in outlet gas when compared with CaO layered on a coal sample. An effective CO₂ absorption was observed in tests with CaO mixed with a coal sample and at relatively low temperatures. At higher temperatures a reaction resulting in CO₂ concentration increase in the produced gas mixture was observed.