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Application of eggshell as catalyst for low rank coal gasification: experimental and kinetic studies

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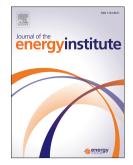
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1	Application of eggshell as catalyst for low rank coal gasification: experimental and kinetic
2	studies
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7	Abstract:
8	The objective of this research was to study effects of waste eggshells (ES) as a catalyst on the gasification of
9	Indonesian sub-bituminous Komisi Pemilihan Umum(KPU) coal in a fixed-bed reactor under atmospheric pressure
10	at three temperatures (700, 800, and 900 °C). With the ES catalyst, the highest $H_2$ yield of 1.24 mol-/mol-C (64
11	vol%) was obtained, an 80% increase compared with that of raw coal gasification without catalyst (0.69mol-/mol-C).
12	In addition, a CO yield of 0.34 mol-/mol-C was obtained, which is31% higher than that of raw coal gasification
13	(0.26 mol-/mol-C). Compared to raw coal gasification without catalyst, the ES catalytic gasification had higher
14	syngas yield and reactivity. Through comparison, the best model for describing the reactivity of KPU coal with ES
15	catalyst was the RPM (Random pore model) among the three gas-solid reaction models adopted in this research.
16	The RPM could adequately describe the conversion rate, giving an accurate prediction and explanation of the rate
17	change during gasification. Rational kinetic parameters were determined from the RPM, which provided a basis for
18	design and operation of a realistic system.
19	Keywords:
20	Catalytic steam gasification, Low rank coal, Egg shell catalyst, Kinetics, H <sub>2</sub> -richsyngas.
21	
22	1. Introduction
23	Coal is an important source of energy. Coal gasification has been considered as one of the most promising clean
24	coal technologies that can convert a "dirty" solid fuel into a "clean" gaseous fuel [1]. Steam gasification proves to

be a promising route for hydrogen production, which has long been an important source of hydrogen for many industrial sectors. Catalytic gasification is always an attractive topic because of its advantages of low operating temperature, high energy conversion efficiency, and a variety of reaction pathways towards the production of desired gases. Calcium materials are highly active in the gasification process. Among alkali and alkaline earth Download English Version:

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