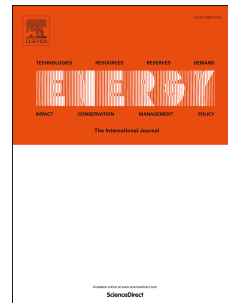


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Interactions between organic nitrogen and inorganic matter in the pyrolysis zone of underground coal gasification: Insights from controlled pyrolysis experiments

Kangle Ding, Changmin Zhang



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5 Kangle Ding<sup>a, b, c, \*</sup>, Changmin Zhang<sup>d</sup>

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7 <sup>a</sup> *Key Laboratory of Exploration Technologies for Oil and Gas Resources of Ministry*  
8 *of Education, Yangtze University, Jingzhou 434023, Hubei, China*

9 <sup>b</sup> *State Key Laboratory of Petroleum Resources and Prospecting, China University of*  
10 *Petroleum, Beijing 102249, China*

11 <sup>c</sup> *School of Chemistry and Environmental Engineering, Yangtze University, Jingzhou*  
12 *434023, Hubei, China*

13 <sup>d</sup> *College of Geoscience, Yangtze University, Wuhan Campus, Wuhan 430100, China*  
14

15 ABSTRACT

16 In recent years, a variety of N-heterocyclic compounds and inorganic nitrogen species  
17 were identified during the field-scale experiment on underground coal gasification  
18 (UCG), leading to concerns about the environmental impact. In an attempt to unravel  
19 the kinetics responsible for the generation of various nitrogen compounds (NCs),  
20 carbazole is selected in this paper as a model organic nitrogen compound in coal  
21 matrix. Hydrous pyrolysis experiments on carbazole were conducted using an  
22 autoclave in the presence and absence of minerals or their main active components in  
23 coal. Effects of inorganic matter, reaction mechanism and chemical kinetics were  
24 investigated on the basis of the experimental data. The results demonstrate negligible  
25 influence of water on thermal destruction of carbazole. However, the combination of  
26 water and aluminium oxide may play a role in the N – O atom exchange, resulting in a  
27 new ammonia formation mechanism. Pyrite exhibits extremely higher reactivity

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