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On the relationship between gases and their sorption capacity by coals

S. Day, R. Sakurovs and S. Weir

CSIRO Energy Technology PO Box 330 Newcastle 2300 Australia

(stuart.day@csiro.au / Fax : +61 2 4960 6054)

Recently it was found that the sorption capacity of coals and charcoals by a supercritical gas decreases with increasing temperature. In one charcoal examined, there was a linear relationship between sorption capacity and inverse temperature. If this were general, then the molar sorption capacity of a material for a supercritical gas would be linearly proportional to its critical temperature, explaining why the sorption capacity of coal for methane and nitrogen is significantly less than that for carbon dioxide. Here we test this by determining the sorption capacity of 3 coals by a range of gases under supercritical conditions, and 19 coals by methane and carbon dioxide at 55 ˚C. The molar sorption capacity ratio of methane and carbon dioxide is very close to the ratio of their critical temperatures, suggesting that this model explains the differences between their sorption capacities very simply. The implications of these findings on gas displacement models used for enhanced coal bed methane will be discussed.