

## ON THE TRANSITION FROM PEAT TO LIGNITE IN THE COALIFICATION SEQUENCE

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*(Received 28 November 2002; Accepted 7 January 2003)*

A previous paper [1] set out thermal experimental data for a range of solid materials representing the peat-to-anthracite series in an attempt to correlate the degree of maturity of a deposit with its reactivity towards oxidation. It should be recalled that the initial transition – from vegetation to peat – is biochemical and that succeeding stages are geochemical. The next stage beyond peat is lignite (brown coal). All of this is well known.

The present author amongst others has investigated brown coals from many sources for propensity to solvent-induced swelling [e.g. 2]. Almost invariably, when a particular low-rank coal is tested for swelling with a set of solvents or solvent mixtures, pyridine is found to be the strongest swelling agent. The reason for this is not fully understood, but has something to do with the solubility parameter of pyridine and the range of such parameters for lignites themselves when they are treated according to the theory of monomer-polymer interaction. In other words, pyridine is a good representation of the notional monomer of many low-rank coals. There have also been suggestions that in addition to monomer-polymer interaction there might be specific sites in a low-rank coal targeted by pyridine. As far as the author is aware, this view awaits hard evidence, and it is difficult to see why other functional groups such as carbonyl should not similarly target particular groups if such mechanisms really do contribute to coal swelling in solvents.

The purpose of this note is to point out that whatever chemical characteristics of lignites render them susceptible to pyridine are totally absent from the precursor material peat. About half a dozen attempts, in apparatus of the type previously described [2], to make oven-dried peat swell in pyridine were unsuccessful. The transition from peat to lignite is from humic acids to ulmins, with a major change of chemical nature and therefore of solubility parameter. This favours the ‘monomer-polymer interaction’ theory of the action of pyridine as one would expect any functional groups in lignite targeted by pyridine also to be represented in the precursor material.

### ACKNOWLEDGEMENT

University of Aberdeen students J. Duff, D. Fulton and S. Sinniah assisted with the experimental work.

### REFERENCES

1. J.C. Jones and J. Godefroy, “Stages in the coalification sequence reflected in oxidation reactivities”, *International Journal on Engineering Performance-Based Fire Codes*, Vol. 4, No. 1, pp. 10-12 (2002).
2. J.C. Jones, R.G. Hewitt and R.A. Innes, “Swelling of a German brown coal in acetone-water and methanol-water mixtures”, *Fuel*, Vol. 76, pp. 575-577 (1997), and other work referenced therein.