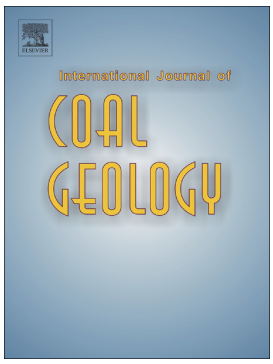


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# Nanostructure of cokes

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**Key words**: Blast furnace coke; porosity; pore size distribution; small angle neutron scattering; inertinite; closed porosity.

**Abstract**

Twenty eight cokes made from Australian coals and prepared under a range of experimental conditions were examined using Small Angle Neutron Scattering (SANS) and Ultra Small Angle Neutron Scattering (USANS) to determine the size distribution of all of their pores and also pores inaccessible to deuterated toluene (closed pores) in the size range 1 to 1000 nm radius. The main findings were that in all cokes, even those made from relatively inertinite-rich coals, nearly all pores of less than 5 nm radius were closed and more than 70% of the pores of 1000 nm in radius or larger were open. At intermediate pore sizes, the fraction of open pores was highly variable, with cokes made from inertinite-rich coals having more open pores. For all cokes made from coals sourced in Queensland, Australia, the number of open pores increased linearly with increasing inertinite content of the original coal and was not strongly affected by rank over the range investigated (0.9 - 1.3% mean maximum vitrinite reflectance). In contrast, all of the cokes made from the coals from the Illawarra region, New South Wales, Australia, had less than half the number of total or open pores than the other cokes. The number of pores of less than 5 nm radius decreased with increasing rank of the starting coal and was not strongly affected by the starting maceral composition or region of origin. The ratio of number of pores in cokes