

## ZEOLITE AND CLAY-CARBONATE ASSEMBLAGES IN THE BLAIRMORE GROUP (CRETACEOUS), SOUTHWESTERN ALBERTA\*

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### ABSTRACT

Zeolites and clay-carbonate assemblages occur in the Blairmore Group (Cretaceous) sandstones of the southern Alberta Foothills. Laumontite and Ba-Sr heulandite occur in sandstones with albitized plagioclase; they do not occur with kaolinite.

A structural-stratigraphic reconstruction indi-

cates a *maximum* burial depth of 4.7 to 7.8 km. Load pressures ( $P_s$ ) and temperatures ( $T$ ) estimated at these depths are consistent with maximum  $P_s$  and  $T$  estimated from experimental phase equilibria and from clay mineral assemblages in geothermal areas.

The occurrence of the alternative assemblages calcite-kaolinite-quartz and laumontite within tens of feet stratigraphically imply gradients in  $f(\text{CO}_2) / f(\text{H}_2\text{O})$  at essentially the same  $P_s$ - $T$ .

Calculated phase equilibria suggest that (a) albite and kaolinite did not crystallize in equilibrium with one another; (b) the occurrence of authigenic kaolinite in some beds and chlorite in others implies gradients in  $a\text{Mg}^{++}/a(\text{H}^+)^2$ ; (c) at low  $f(\text{O}_2)$  disordered graphite could not have equilibrated with fluids of the same composition as those equilibrated with laumontite or kaolinite; (d) calcite and laumontite could have equilibrated under high  $a\text{Ca}^{++}/a(\text{H}^+)^2$  and low  $f(\text{CO}_2)$ .

\*See also the following papers:

- GHENT, E. D. & MILLER, B. E. (1974): Zeolite and clay-carbonate assemblages in the Blairmore Group (Cretaceous) southern Alberta Foothills, Canada. *Contr. Mineral. Petrol.* 44, 313-329.  
MILLER, B. E. & GHENT, E. D. (1973): Laumontite and barium-strontian heulandite from the Blairmore Group (Cretaceous), Alberta. *Can. Mineral.* 12, 188-192.

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