

5.3.2 Vitrinite Reflectance and Thermal Alteration Index

Tissot and Welte (1978, p. 451) make the following correlation of vitrinite reflectance (R_o) with source rock maturity, emphasising that there are no definite rules and that the general scheme should be fine-tuned to a particular basin.

- (i) $R_o < 0.5$ to 0.7% : diagenesis stage, source rock is immature,
- (ii) 0.5 to $0.7\% < R_o < 1.3\%$: catagenesis stage, main zone of oil generation, also referred to as the "oil window",
- (iii) $1.3\% < R_o < 2\%$: catagenesis stage, zone of wet gas and condensate,
- (iv) $R_o > 2\%$: metagenesis stage; methane remains as the only hydrocarbon (dry gas zone).

R_o values from $0.36 - 1.2\%$ have been obtained from the Bass Basin. In general all units above the lower EVCM have R_o values indicating immaturity. However the lower EVCM have reached marginal maturity, a result consistent with independent spore/pollen thermal alteration index studies. This marginal maturity is reached only in deeper levels of the Bass Basin. Figure 5.2 modified from Nicholas and others (1981) summarises the vitrinite reflectance data.

5.3.3. Geothermal Gradient Review

(i) General Heat Flow Data

The following data from Tissot and Welte (1978, p. 512-518) is relevant to the general geological evolution of the Bass