

## KEY TO AROMATIC MATURITY INDICATORS

Methylphenanthrene index (MPI), methylphenanthrene ratio (MPR), dimethylnaphthalene ratio (DNR) and calculated vitrinite reflectance ( $VR_{calc}$ ) are derived from the following equations (after Radke and Welte, 1983; Radke *et al.*, 1984):

$$\begin{aligned} \text{MPI} &= \frac{1.5 (2\text{-MP} + 3\text{-MP})}{P + 1\text{-MP} + 9\text{-MP}} \\ \text{VR}_{calc} \text{ (a)} &= 0.6 \text{ MPI} + 0.4 \text{ (for } VR < 1.35\%) \\ \text{VR}_{calc} \text{ (b)} &= -0.6 \text{ MPI} + 2.3 \text{ (for } VR > 1.35\%) \\ \text{MPR} &= \frac{2\text{-MP}}{1\text{-MP}} \\ \text{VR}_{calc} \text{ (c)} &= 0.99 \log_{10} \text{ MPR} + 0.94 \text{ (VR} = 0.5\text{-}1.7\%) \\ \text{DNR} &= \frac{2,6\text{-DMN} + 2,7\text{-DMN}}{1,5\text{-DMN}} \\ \text{VR}_{calc} \text{ (d)} &= 0.046 \text{ DNR} + 0.89 \text{ (for } VR = 0.9\text{-}1.5\%) \end{aligned}$$

Where

P	=	phenanthrene
1-MP	=	1-methylphenanthrene
2-MP	=	2-methylphenanthrene
3-MP	=	3-methylphenanthrene
9-MP	=	9-methylphenanthrene
1,5-DMN	=	1,5-dimethylnaphthalene
2,6-DMN	=	2,6-dimethylnaphthalene
2,7-DMN	=	2,7-dimethylnaphthalene

Peak areas measured from  $m/z$  156 (dimethylnaphthalene),  $m/z$  178 (phenanthrene) and  $m/z$  192 (methylphenanthrene) mass fragmentograms of diaromatic and triaromatic hydrocarbon fraction isolated by thin layer chromatography.

Recalibration of the methylphenanthrene index using data from a suite of Australian coals has given rise to another equation for calculated vitrinite reflectance (after Boreham *et al.*, 1988):

$$\text{VR}_{calc} \text{ (e)} = 0.7 \text{ MPI} + 0.22 \text{ (for } VR < 1.7\%)$$

The methylphenanthrene distribution ratio (MPDF) and calculated vitrinite reflectance  $VR_{calc}$  (f) is derived from the following equation (after Kvalheim *et al.*, 1987):

$$\begin{aligned} \text{MPDF} &= \frac{(2\text{-MP} + 3\text{-MP})}{(2\text{-MP} + 3\text{-MP} + 1\text{-MP} + 9\text{-MP})} \\ \text{VR}_{calc} \text{ (f)} &= -0.166 + 2.242 \text{ MPDF} \end{aligned}$$