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APPENDICES

Appendix A Derivation of equation (2.8) from equation (2.7)

From equation (2.7):

$$\delta_{onset} = \phi_o \delta_o + \phi_s \delta_s + \phi_p \delta_p \tag{A.1}$$

From

$$\phi_o = \frac{V_o}{V_o + V_s + V_p} \tag{A.2a}$$

$$\phi_s = \frac{V_s}{V_o + V_s + V_p} \tag{A.2b}$$

$$\phi_p = \frac{V_p}{V_o + V_s + V_p} \tag{A.2c}$$

Equation (A.1) can be written as:

$$\delta_{onset} = \frac{V_o}{V_o + V_s + V_p}\delta_o + \frac{V_s}{V_o + V_s + V_p}\delta_s + \frac{V_p}{V_o + V_s + V_p}\delta_p \tag{A.3}$$

Or

$$(V_o + V_s + V_p)\delta_{onset} = V_o\delta_o + V_s\delta_s + V_p\delta_p \tag{A.4}$$

Equation (A.4) can be rearranged to:

$$(\delta_{onset} - \delta_p)V_p = (\delta_o - \delta_{onset})V_o + (\delta_s - \delta_{onset})V_s \tag{A.5}$$

Divide every term by $(\delta_{onset} - \delta_p)V_o$ will give the result as in equation (2.8):

$$\frac{V_p}{V_o} = \left(\frac{\delta_s - \delta_{onset}}{\delta_{onset} - \delta_p}\right)\frac{V_s}{V_o} + \left(\frac{\delta_o - \delta_{onset}}{\delta_{onset} - \delta_p}\right) \tag{A.6}$$

Appendix B Derivation of equation (4.8) from equation (4.7)

From equation (4.4):

$$\delta_{LO} = \phi_{STO}^{L}\delta_{STO}^{L} + \phi_{DG}^{L}\delta_{DG}^{L} \tag{B.1}$$

$$\delta_{LO} = \frac{V_{STO}^{L}}{V_{STO}^{L} + V_{DG}^{L}}\delta_{STO}^{L} + \frac{V_{DG}^{L}}{V_{STO}^{L} + V_{DG}^{L}}\delta_{DG}^{L} \tag{B.2}$$

Let $$B = \frac{V_{STO}^{L} + V_{DG}^{L}}{V_{STO}^{L}} \tag{B.3}$$

Then equation (B.2) can be rearranged to:

$$\delta_{LO} = \frac{1}{B}\delta_{STO}^{L} + \frac{1}{B}\frac{V_{DG}^{L}}{V_{STO}^{L}}\delta_{DG}^{L} \tag{B.4}$$

And from molar solubility parameter of dissolved gas (normal alkanes):

$$\delta_{DG}^{L} = \frac{\delta_{DG}^{M}}{v_{DG}^{L}} \tag{B.5}$$

Then equation (B.4) can be written as:

$$\delta_{LO} = \frac{1}{B}\delta_{STO}^{L} + \frac{1}{B}\frac{V_{DG}^{L}/v_{DG}^{L}}{V_{STO}^{L}}\delta_{DG}^{M} \tag{B.6}$$

Let $$R = \frac{V_{DG}^{L}/v_{DG}^{L}}{V_{STO}^{L}} \tag{B.7}$$

Then equation (B.6) can be written as in equation (4.5) as:

$$\delta_{LO} = \frac{1}{B}\delta_{STO}^{L} + \frac{R}{B}\delta_{DG}^{M} \tag{B.8}$$

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