

Equations you need to know:

$$w = p + s + g$$

$$s = -iRTc_s$$

where:

s is the osmotic potential

R is the universal gas constant (8.3 Joules mol⁻¹ °K⁻¹ or 0.0083 MPa mol⁻¹ °K⁻¹ or 2.0 cal mol⁻¹ °K⁻¹)

c_s is the concentration of solutes in (mol)

T is the temperature in (°K), where °K = °C + 273

The ionization constant is i

$$J_v = w / r$$

where:

J_v is the rate of water movement

r is the resistance of to water flow. In roots, $r = r_{pm}$ and in leaves $r_{leaf} = r_{st} + r_{bl}$

$J_v = (w / x)(r^2 / 8 \eta)$ is the rate of water movement through a pipe, where:

η is the viscosity of the liquid

r is the radius of the pipe

w is the change in potential over distance x

$$E = (2.3RT/zF) \log[c^{out}/c^{in}] \text{ for ions}$$

R is the universal gas constant (8.3 Joules mol⁻¹ °K⁻¹ or 0.0083 MPa mol⁻¹ °K⁻¹ or 2.0 cal mol⁻¹ °K⁻¹)

F is Faraday's constant (23.06 kcal mol⁻¹ V⁻¹)

T is the temperature in (°K), where °K = °C + 273

c is the concentration of ions

$$w^{air} = (RT/V_w) \ln(RH) \text{ for air, where}$$

R is the universal gas constant (8.3 Joules mol⁻¹ °K⁻¹ or 0.0083 MPa mol⁻¹ °K⁻¹ or 2.0 cal mol⁻¹ °K⁻¹)

V_w is 18 m³/mol [(RT/V_w) is 135 MPa at 20°C in this equation]

RH is the relative humidity (ranges from 0 to 1.0)