MSE160 REFERENCE INFORMATION

$$\%\ \text{ionic character} = \left(1 - e^{-\frac{(X_A - X_B)^2}{4}}\right) x\,(100\%) \qquad \rho = \frac{n\,A}{V_C N_A}$$

$$d = \frac{n\lambda}{2\sin\theta_C} \qquad d_{hkl} = \frac{a}{\sqrt{h^2 + k^2 + l^2}}$$

$$N_v = N exp\left(-\frac{Q_v}{kT}\right) \qquad \tau_R = \sigma \cos\phi \cos\lambda$$

$$D = D_o exp\left(-\frac{Q_d}{RT}\right)$$

$$\sigma = n\,|e|\,\mu_e \qquad \boldsymbol{J = -D\frac{dC}{dx}}$$

$$\sigma = n_i\,|e|\,(\mu_e + \mu_h) \qquad \boldsymbol{\frac{dC}{dt} = D\frac{\partial^2 y}{\partial x^2}} \qquad \frac{C_x - C_o}{C_s - C_o} = 1 - erf\left(\frac{x}{2\sqrt{Dt}}\right)$$

$$\sigma_T = \sigma(1 + \epsilon) \qquad \boldsymbol{\sigma_y = \sigma_o + k_y d^{-1/2}} \qquad \boldsymbol{K_c = Y\sigma\sqrt{\pi a}}$$

$$\epsilon_T = \ln(1 + \epsilon)$$

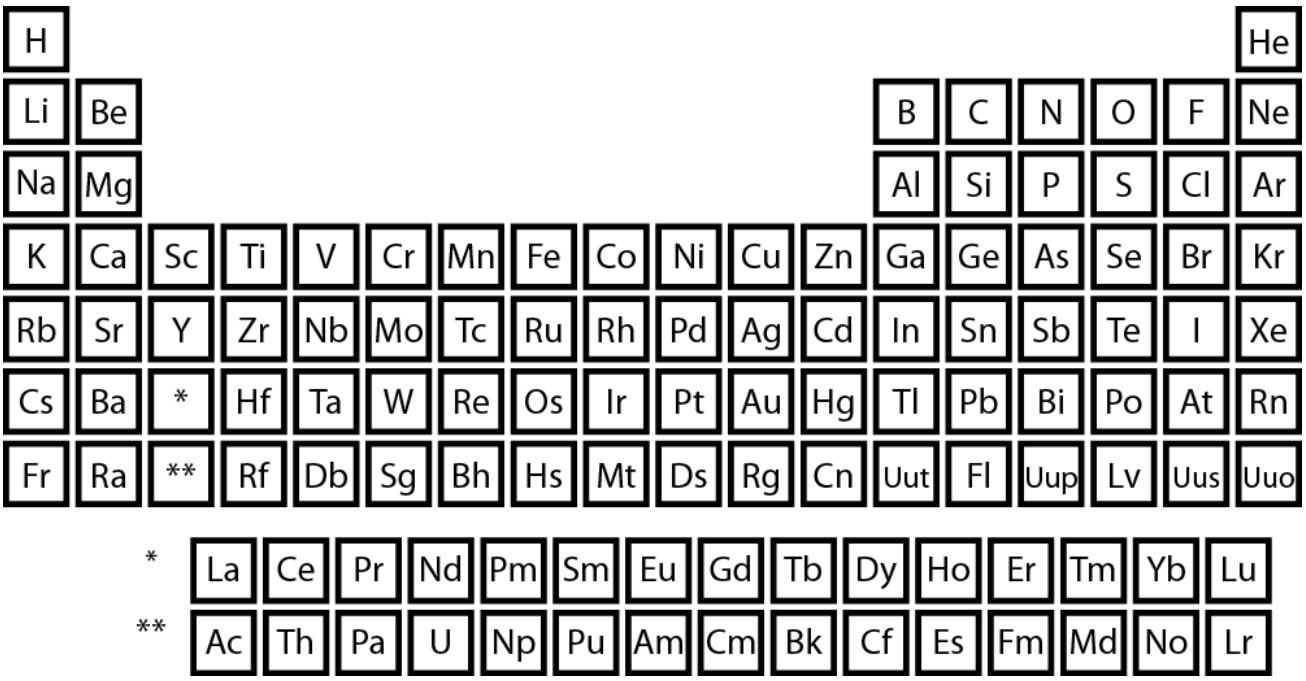
$$\boldsymbol{\%CW = \frac{D_o^2 - D_d^2}{D_o^2}(100)} \qquad \boldsymbol{\frac{da}{dN} = (\Delta K)^m}$$

$$U_r = \int_0^{\epsilon_y} \sigma\, d\epsilon$$

$$\boldsymbol{V = IR} \qquad \boldsymbol{\rho = \frac{RA}{l}}$$

$$\sigma_m = 2\sigma_o\left(\frac{a}{\rho_t}\right)^{1/2} = K_t\sigma_o \qquad \boldsymbol{J = \sigma\left(\frac{V}{l}\right)}$$

$$\sigma_c = \left(\frac{2E\gamma_s}{\pi a}\right)^{1/2} \qquad \Delta V = (V_2^0 - V_1^o) - \frac{RT}{n\mathcal{F}} ln \frac{[M_1^{n+}]}{[M_2^{n+}]}$$



Constants

$k = 1.38 \times 10^{-23}$ J/atom-K

$k = 8.62 \times 10^{-5}$ eV/atom-K

R = 8.31 J/mol-K

$e = 1.6 \times 10^{-19}$ C

$\mathcal{F} = 96{,}500\ C/mol$

$N_A = 6.022 \times 10^{23}$

Radius Ratio	CN	Coordination
1.0	12	Cubic closest packed (CCP) Hexagonal closest packed (HCCP)
1.0–0.732	8	Cubic
0.732–0.414	6	Octahedral
0.414–0.225	4	Tetragonal
0.225–0.155	3	Triangular
<0.155	2	Linear

TABLE 5.1 Tabulation of Error Function Values

z	$erf(z)$	z	$erf(z)$	z	$erf(z)$
0	0	0.55	0.5633	1.3	0.9340
0.025	0.0282	0.60	0.6039	1.4	0.9523
0.05	0.0564	0.65	0.6420	1.5	0.9661
0.10	0.1125	0.70	0.6778	1.6	0.9763
0.15	0.1680	0.75	0.7112	1.7	0.9838
0.20	0.2227	0.80	0.7421	1.8	0.9891
0.25	0.2763	0.85	0.7707	1.9	0.9928
0.30	0.3286	0.90	0.7970	2.0	0.9953
0.35	0.3794	0.95	0.8209	2.2	0.9981
0.40	0.4284	1.0	0.8427	2.4	0.9993
0.45	0.4755	1.1	0.8802	2.6	0.9998
0.50	0.5205	1.2	0.9103	2.8	0.9999