

MSE160 REFERENCE INFORMATION

$$\% \text{ ionic character} = \left(1 - e^{-\frac{(X_A - X_B)^2}{4}} \right) \times (100\%)$$

$$\rho = \frac{n A}{V_C N_A}$$

$$d = \frac{n\lambda}{2 \sin \theta_C}$$

$$d_{hkl} = \frac{a}{\sqrt{h^2 + k^2 + l^2}}$$

$$N_v = N \exp\left(-\frac{Q_v}{kT}\right)$$

$$\tau_R = \sigma \cos \phi \cos \lambda$$

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

$$\sigma = n |e| \mu_e$$

$$J = -D \frac{dC}{dx}$$

$$\sigma = n_i |e| (\mu_e + \mu_h)$$

$$\frac{dC}{dt} = D \frac{\partial^2 y}{\partial x^2} \quad \frac{C_x - C_o}{C_s - C_o} = 1 - \operatorname{erf}\left(\frac{x}{2\sqrt{Dt}}\right)$$

$$\sigma_T = \sigma (1 + \epsilon)$$

$$\sigma_y = \sigma_o + k_y d^{-1/2}$$

$$K_c = Y \sigma \sqrt{\pi a}$$

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

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

$$\%CW = \frac{D_o^2 - D_d^2}{D_o^2} (100)$$

$$\frac{da}{dN} = (\Delta K)^m$$

$$\sigma_m = 2\sigma_o \left(\frac{a}{\rho_t} \right)^{1/2} = K_t \sigma_o$$

$$V = IR \quad \rho = \frac{RA}{l}$$

$$J = \sigma \left(\frac{V}{l} \right)$$

$$\sigma_c = \left(\frac{2E\gamma_s}{\pi a} \right)^{1/2}$$

$$\Delta V = (V_2^0 - V_1^0) - \frac{RT}{n\mathcal{F}} \ln \frac{[M_1^{n+}]}{[M_2^{n+}]}$$

H																	He
Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	*	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	**	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn	Uut	Fl	Uup	Lv	Uus	Uuo
*			La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
**			Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

Constants

$k = 1.38 \times 10^{-23} \text{ J/atom-K}$
 $k = 8.62 \times 10^{-5} \text{ eV/atom-K}$
 $R = 8.31 \text{ J/mol-K}$
 $e = 1.6 \times 10^{-19} \text{ C}$
 $\mathcal{F} = 96,500 \text{ C/mol}$
 $N_A = 6.022 \times 10^{23}$

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

<i>z</i>	<i>erf(z)</i>	<i>z</i>	<i>erf(z)</i>	<i>z</i>	<i>erf(z)</i>
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