Stellenbosch University Iyunivesithi Universiteit — forward together sonke siya phambili saam vorentoe

interatomic energy: ***interatomieseenergie:***	attractive *aantrekking* $E_A = -\frac{A}{r}$	repulsive *afstotend* $E_R = \frac{B}{r^n}$	interatomic force *interatomiese krag*	$F = \frac{dE}{dr}$

Table 3.2 Summary of Equations Used to Determine Crystallographic Point, Direction, and Planar Indices

Coordinate Type	*Index Symbols*	*Representative Equation*[a]	*Equation Symbols*
Point	$q\ r\ s$	qa = lattice position referenced to x axis	—
Direction			
Non-hexagonal	$[uvw]$, $[UVW]$	$u = n\left(\frac{x_2 - x_1}{a}\right)$	x_1 = tail coordinate—x axis x_2 = head coordinate—x axis
Hexagonal	$[uvtw]$	$u = 3n\left(\frac{a_1' - a_1''}{a}\right)$	a_1' = head coordinate—a_1 axis a_1'' = tail coordinate—a_1 axis
		$u = \frac{1}{3}(2U - V)$	—
Plane			
Non-hexagonal	(hkl)	$h = \frac{na}{A}$	A = plane intercept—x axis
Hexagonal	$(hkil)$	$i = -(h + k)$	—

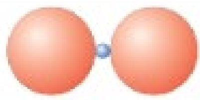
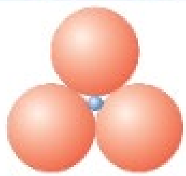
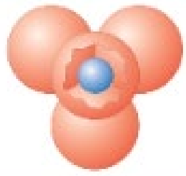
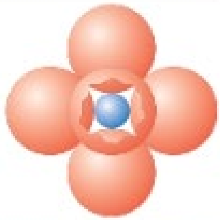
[a]In these equations a and n denote, respectively, the x-axis lattice parameter, and a reduction-to-integer parameter.

linear density: ***lineêre digtheid:***	$LD = \frac{\#\ atoms\ centered\ on\ direction\ vector}{length\ of\ direction\ vector}$	**atomic packing factor:** ***atomiesepakfaktor*:**
planar density: ***vlakdigtheid:***	$PD = \frac{\#\ atoms\ centered\ on\ plane}{area\ of\ plane}$	$APF = \frac{volume\ of\ atoms\ in\ unit\ cell}{volume\ of\ unit\ cell}$

density: ***digtheid:***	metals / *metaal* $\rho = \frac{nA}{V_C N_A}$	ceramics / *keramiek* $\rho = \frac{n'(\sum A_c + \sum A_a)}{V_C N_A}$	Avogadro's number/*nommer* $N_A = 6.022 \times 10^{23}$ atoms/mol
polymers: ***polimere:***	$\%\ crystallinity = \frac{\rho_c(\rho_s - \rho_a)}{\rho_s(\rho_c - \rho_a)} \times 100$	degree of polymerisation: *graad van polimerisering:*	$DP = \frac{\overline{M_n}}{m}$
composition ***samestelling***	weight % / *gewig %* $C_1 = \frac{m_1}{m_1 + m_2} \times 100$	atom % / *atom %* $C_1' = \frac{n_{m1}}{n_{m1} + n_{m2}} \times 100$	$n_{m1} = \frac{m_1}{A_1}$
constants ***konstantes***	Boltzmann: $k = 1.38 \times 10^{-23}\ \frac{\mathrm{J}}{\mathrm{atoms\cdot K}}$	Universal gas: $R = 8.314\frac{\mathrm{J}}{\mathrm{mol\cdot K}}$	
vacancies ***leemte***	equilibrium / *ewewig* $N_v = N\exp\left(-\frac{Q_v}{kT}\right)$	Frenkel $N_{fr} = N\exp\left(-\frac{Q_{fr}}{2kT}\right)$	Schottky $N_s = N\exp\left(-\frac{Q_s}{2kT}\right)$
diffusion ***diffusie***	flux / *vloed* $J = \frac{M}{At}$	Fick's 1st law $J = -D\frac{dC}{dx}$	Fick's 2nd law $\frac{\partial C}{\partial t} = D\frac{\partial^2 C}{\partial x^2}$
	diffusion coefficient *diffusie koëffisiënt* $D = D_0\exp\left(-\frac{Q_d}{RT}\right)$	Fick's 2nd law: solution for constant surface concentration *Fick se 2de wet: oplossing vir konstante oppervlakte konsentrasie*	$\frac{C_x - C_0}{C_s - C_0} = 1 - \mathrm{erf}\left(\frac{x}{2\sqrt{Dt}}\right)$

engineering stress and strain *ingenieursspanning en -vervorming*			**true stress and strain** *warespanning en -vervorming*		**Poisson's ratio** *Poisson verhouding*
$\sigma = \dfrac{F}{A_0}$ $\quad \tau = \dfrac{F}{A_0}$		$\varepsilon = \dfrac{l_i - l_0}{l_0} = \dfrac{\Delta l}{l_0}$	$\sigma_T = \dfrac{F}{A_i}$	$\varepsilon_T = \ln \dfrac{l_i}{l_0}$	$\upsilon = -\dfrac{\varepsilon_x}{\varepsilon_z} = -\dfrac{\varepsilon_y}{\varepsilon_z}$
convert from engineering to true stress and strain *ingenieurs na ware spanning en vervorming omsit*			$\sigma_T = \sigma(1+\varepsilon)$ $\varepsilon_T = \ln(1+\varepsilon)$	**Hooke's law** ***Hooke se wet***	$\sigma = E\varepsilon$ $\tau = G\gamma$
Elastic constants ***Elastisieteitskonstantes***		$E = 2G(1+\upsilon)$	**ductility / *rekbaarheid*** $\%EL = \left(\dfrac{l_f - l_0}{l_0}\right) \times 100$		$\%RA = \left(\dfrac{A_0 - A_f}{A_0}\right) \times 100$
slip ***glip***	resolved shear stress *opgeloste skuifspanning*	$\tau_R = \sigma \cos\phi \cos\lambda$	critical resolved shear stress *kritiese opgeloste skuifspanning*		$\sigma_y = \dfrac{\tau_{crss}}{(\cos\phi\cos\lambda)_{\max}}$
strengthening in metals ***versterking in metale***		Hall-Petch equation $\sigma_y = \sigma_0 + k_y d^{-1/2}$	cold work / *koudwerk* $\%CW = \left(\dfrac{A_0 - A_d}{A_0}\right) \times 100$		grain growth / *korrelgroei* $d^n - d_0^n = Kt$

Table 4.3 Coordination Numbers and Geometries for Various Cation–Anion Radius Ratios (r_C/r_A)

Coordination Number	*Cation–Anion Radius Ratio*	*Coordination Geometry*
2	<0.155	
3	0.155–0.225	
4	0.225–0.414	
6	0.414–0.732	
8	0.732–1.0