

Contents

สมุดคำของห้องสมุด กองการศึกษาเคมีปฏิบัติ

CHAPTER 1	MECHANICAL TESTS	1
1.1	Introduction	1
1.2	The Tensile Test	2
1.3	The Compression Test	9
1.4	The Hardness Test	10
1.5	The Impact Test	11
1.6	The Fatigue Test	14
1.7	Creep and Stress Rupture	16
CHAPTER 2	ELASTIC PROPERTIES	23
2.1	Introduction	23
2.2	Atomic Basis of Elastic Behavior	26
2.3	Thermal Effects	32
2.4	Effect of Alloying	35
2.5	Elastic Anisotropy	35
CHAPTER 3	ANELASTICITY	43
3.1	Introduction	43
3.2	The Thermoelastic Effect	44
3.3	Atom Diffusion	48
3.4	General Features of Anelasticity	49
3.5	Relaxation Times	51
3.6	Measurement of Damping Capacity	52
CHAPTER 4	DISLOCATIONS	61
4.1	Introduction	61
4.2	Geometry of Dislocations	63
4.3	Energy of a Dislocation	66

4.4	Dislocation Motion	68
4.5	Interactions Between Parallel Dislocations	73
4.6	Interaction Between Intersecting Dislocations	76
4.7	Dislocation Reactions	79
4.8	Work-Hardening and Recrystallization	84
4.9	Precipitation-Hardening	88
4.10	Observation of Dislocations	89
CHAPTER 5	MICROPLASTICITY OF CRYSTALS	97
5.1	Introduction	97
5.2	Slip Planes and Slip Directions	98
5.3	Resolved Shear Stress	102
5.4	Strain-Hardening and Recovery of Single Crystals	104
5.5	Twinning	111
5.6	Grain-Boundary Sliding and Diffusional Creep	113
CHAPTER 6	PLASTIC DEFORMATION	121
6.1	Introduction	121
6.2	Grain Boundaries	122
6.3	Strain-Hardening	123
6.4	Strain Aging	128
6.5	Temperature Dependence	129
6.6	Strain Rate	130
6.7	Strain Rate and Temperature	131
6.8	Creep	133
6.9	Combined Stresses	136
6.10	Plastic Constraint	137
CHAPTER 7	FRACTURE	143
7.1	Introduction	143
7.2	Theoretical Cohesive Strength	145

7.3	Brittle Fracture—Griffith Theory	145
7.4	Brittle Fracture in Crystalline Materials	149
7.5	Ductile Fracture	151
7.6	Theories of Crack Initiation	153
7.7	Ductile to Brittle Transition	159
7.8	Fatigue Fracture	161
CHAPTER 8 STRENGTHENING MECHANISMS		168
8.1	Introduction	168
8.2	Cold-Working and Annealing	169
8.3	Solute-Hardening	170
8.4	Precipitation-Hardening	173
8.5	Diffusion-Hardening	179
8.6	Martensitic Transformations	179
8.7	Iron-Carbon Martensite	180
CHAPTER 9 CERAMICS AND OTHER INORGANIC NONMETALLICS		189
9.1	Introduction	189
9.2	Plasticity of Single Crystals	190
9.3	Viscous Behavior of Glasses	193
9.4	Fabrication of Ceramic Bodies	198
9.5	Strength of Ceramics	200
9.6	Thermal Conductivity	201
9.7	Thermal Stresses	202
9.8	Cement and Concrete	206
9.9	Reinforced Structures	210
9.10	Graphite	212
CHAPTER 10 POLYMERS		218
10.1	Introduction	218
10.2	Types of Polymers	219
10.3	Crystallinity of Polymers	220
10.4	Response to Change in Temperature	225

10.5	The Glass Transition Temperature	229
10.6	Elastomers and Rubber Elasticity	230
10.7	Orientation Effects	235
10.8	Wood	236
10.9	Modification of Properties	238
10.10	Design Considerations	238