

List of Tables

Table 1.1: Six major steel producing countries in world (Mt)[1]	2
Table 1.2: Reserves/Resources of iron ore (hematite) as on 01.04.2010 and 01.04.2015[7]:[8].....	3
Table 1.3: Estimated iron ore mine life.....	5
Table 2.1: Iron bearing Minerals and its properties[46]	15
Table 2.2: Threshold values of iron ore	17
Table 2.3: End-use graded specification for hematite.....	18
Table 2.4: Chemical analyses and nature of iron ore	19
Table 2.5: Occurrence of hematite iron ore and its characteristics	20
Table 2.6: Relative lump metallurgical qualities of common iron ore textural groups[23]	27
Table 2.7: Research work carried out on iron ore-coal composite pellet / briquette	39
Table 2.8: Reduction studies of composite pellet agglomerate.....	46
Table 3.1: Density of low grade iron ores.....	55
Table 3.2: XRD analysis of Odisha ore (sample-O)	60
Table 3.3: XRD analysis of Rajasthan ore (R-1)	61
Table 3.4: XRD analysis of Rajasthan ore (R-2)	62
Table 3.5: Chemical analysis of iron ore (by XRF)	66
Table 3.6: Proximate analysis of coke and charcoal	68
Table 3.7: Sieve analysis of Odisha iron ore (after grinding)	69
Table 3.8: Result of jigging operation for Odisha ore	71
Table 3.9:Result of tabling operation for Odisha ore.....	71
Table 3.10: Result of Beneficiation of Odisha iron ore	72
Table 3.11: Sieve analysis of Rajasthan iron ore (after grinding).....	74
Table 3.12: Sieve analysis of coke (after grinding)	75
Table 3.13: Sieve analysis of charcoal (after grinding)	75
Table 3.14: XRD analysis of roasted ore at 873 K	77
Table 3.15: XRD analysis of roasted ore at 1173 K	78
Table 3.16: magnetic roasting of iron ore	80
Table 3.17: Beneficiation results of iron ore by coke	81
Table 3.18: Beneficiation results of iron ore by charcoal	81
Table 4.1: Calculated weight of raw materials for briquette making.....	86
Table 4.2: Test results for composite briquette.....	87

Table 4.3: Variable for isothermal reduction of composite briquettes.....	91
Table 4.4: Variable for smelting reduction of composite briquettes.....	95
Table 5.1: Overall composition of composite briquette for reduction studies.....	98
Table 5.2: Reduction data for composite briquette - AA at different temperature	99
Table 5.3: Rate of reduction and activation energy for composite briquette - AA.....	101
Table 5.4: Reduction data for composite briquette - AB at different temperature	102
Table 5.5: Rate of reduction and activation energy for composite briquette - AB	104
Table 5.6: Reduction data for composite briquette - BA at different temperature	106
Table 5.7: Rate of reduction and activation energy for composite briquette - BA	109
Table 5.8: Reduction data for composite briquette - BB at different temperature.....	110
Table 5.9: Rate of reduction and activation energy for composite briquette - BB	112
Table 5.10: Activation energy of isothermal reduction of composite briquettes	113
Table 5.11: XRD analysis of composite briquette AA	115
Table 5.12: XRD analysis of composite briquette AB.....	116
Table 5.13: XRD analysis of composite briquette of BA	117
Table 5.14: XRD analysis of composite briquette BB	118
Table 5.15: TG results for non-isothermal reduction of composite briquettes	122
Table 5.16: Activation energy of non-isothermal reduction of composite briquettes.....	126
Table 5.17: Comparison of activation energy by isothermal and non-isothermal studies	126
Table 5.18: Chemical analysis of initial samples.....	128
Table 5.19: Chemical analysis of final samples.....	128
Table 5.20: Chemical analysis TMT steel rod	129
Table 5.21: Yield calculation of smelting reduction.....	130
Table 5.22: Hardness of steel.....	132