LIST OF SYMBOLS

A	pre-exponential factor (s^{-1})
A_1	Percent of ash present in coal
A_2	Percent of SiO_2 present in coal-ash
A_3	Percent of MnO present in coal-ash
A_4	Percent of P_2O_5 present in coal-ash
A_5	Percent of CaO present in coal-ash
A_6	Percent of Al_2O_3 present in coal-ash
A_7	Percent of MgO present in coal-ash
A_8	Percent of sulphur present in coal-ash
A_9	Percent of Fe_2O_3 present in coal-ash
C_1	Percent of coal present in composite pellets
E	activation energy ($kJmol^{-1}$)
F	fraction of reduction
F_1	Percent of iron ore present in composite pellets
F_2	Percent of Fe_2O_3 present in iron ore
F_3	Percent of total Fe present in Fe_2O_3
F_4	Percent of Fe loss in slag w.r.t. total Fe-input
F_5	Percent of SiO_2 present in iron ore of composite pellets
F_6	Percent of MnO present in iron ore of composite pellets
F_7	Percent of P_2O_5 present in iron ore of composite pellets
F_8	Percent of Al_2O_3 present in iron ore of composite pellets
F_9	Percent of fixed carbon present in coal
F_{10}	Percent of total iron present in iron ore
F_{11}	Percent of other oxides present in iron ore
F_{12}	Percent of dextrose present in composite pellets
F_{13}	Percent of volatile materials present in coal
F_{14}	Percent of moisture present in coal
f	frequency, Hz
f_{coal}	Fraction of coal present in composite pellet
f_o	Fraction of oxygen present in Fe_2O_3
f_{ore}	Fraction of ore present in composite pellet
ρ_{ore}	Purity of iron oxide (Fe_2O_3)
f_p	factor of proportionality
f_R	fraction of reaction
f_{vm}	Fraction of volatile matters present in coal
f_{vr}	Fraction of volatiles released during reduction at a particular temperature
f_{wl}	Fractional weight loss = (weight loss of sample / initial weight of sample)
I_1	Percent of Fe present in cast iron charged
I_2	Percent of Fe present in cast iron produced
I_3	Percent of Si present in cast iron charged
I_4	Percent of Si present in cast iron produced
I_5	Percent of Mn present in cast iron charged

I_6 Percent of Mn present in cast iron produced
I_7 Percent of P present in cast iron charged
I_8 Percent of P present in cast iron produced
I_9 Percent of C present in cast iron charged
I_{10} Percent of C present in cast iron produced
I_{11} Percent of S present in cast iron charged
I_{12} Percent of S present in cast iron produced
I_{13} Percent of Cr present in cast iron scrap charged
I_{14} Percent of Cr present in cast iron produced
I_{15} Percent of Cu present in cast iron scrap charged
I_{16} Percent of Cu present in cast iron produced
L_1 Percent of lime present in composite pellets
L_2 Percent of SiO_2 present in lime
L_3 Percent of CaO present in lime
L_4 Percent of Al_2O_3 present in lime
L_5 Percent of MgO present in lime

k rate constant (s^{-1})
K Kelvin
O_1 Weight of oxygen required for oxidation of iron, kg
O_2 Weight of oxygen required for oxidation of silicon, kg
O_3 Weight of oxygen required for oxidation of manganese, kg
O_4 Weight of oxygen required for oxidation of phosphorous, kg
O_5 Weight of oxygen required for formation of CO gas, kg
O_6 Weight of oxygen required for formation of CO_2 gas, kg
O_7 Weight of oxygen coming from iron ore present in composite pellets, kg
O_8 Weight of oxygen require from atmosphere for oxidation of elements, kg
O_9 Weight of oxygen required for oxidation of Cr, kg
O_{10} Weight of oxygen required for oxidation of Cu, kg
R gas constant ($kJmol^{-1}K^{-1}$)
T temperature in Kelvin scale
tpa tonnes per annum
tpd tonnes per day
tph tonnes per hour
VM volatile matters
W Weight of Fe_2O_3 in iron ore, kg
W_{cvm} amount of volatiles released during pyrolysis of coal
W_i initial weight of a single pellet (g)
W_f weight of pellet after reduction
W_{pvm} amount of volatiles released during TG-DTA of composite pellet
ΔW_o weight of oxygen removed from iron oxide
ΔW_o^H weight of oxygen loss during hydrogen reduction
W_o^i Total weight of removable oxygen present in iron oxide
W_o^* rate of oxygen loss, g/s
W_r weight loss during reduction (g)

W_t	weight of pellet at time t during reduction (g)
W_1	Weight of cast iron charged, kg
W_2	Weight of composite pellets charged, kg
W_3	Weight of cast iron produced, kg
W_4	Weight of Fe goes to slag, kg
W_5	Weight of FeO goes to slag, kg
W_6	Weight of SiO_2 goes to slag, kg
W_7	Weight of MnO goes to slag, kg
W_8	Weight of P_2O_5 goes to slag, kg
W_9	Weight of CaO goes to slag, kg
W_{10}	Weight of Al_2O_3 goes to slag, kg
W_{11}	Weight of MgO goes to slag, kg
W_C	Weight of carbon converted into CO and CO_2 gases, kg
W_{12}	Weight of CO gas formed after smelting reduction of composite pellets, kg
W_{13}	Weight of CO_2 gas formed after smelting reduction of composite pellets, kg
W_{14}	Weight of sulphur goes to slag, kg
W_{15}	Weight of CaS goes to slag, kg
W_{16}	Weight of CaO converted into CaS that goes to slag, kg
W_{17}	Weight of other oxides except SiO_2, MnO, FeO, Al_2O_3 and P_2O_5 from iron ore that goes to slag, kg
W_{18}	Weight of FeO that goes to slag due to Fe_2O_3 present in coal ash, kg
W_{19}	Weight of dextrose present in composite pellets, kg
W_{20}	Weight of volatile matters present in coal of composite pellets, kg
W_{21}	Weight of moisture present in coal of composite pellets, kg
W_{22}	Weight of slag produced, kg
W_{23}	Weight of Cr_2O_3 goes to slag, kg
W_{24}	Weight of Cu_2O goes to slag, kg
W_0	Weight of iron ore present in composite pellets, kg
W_{car}	Weight of carbon stoichiometrically required for reduction of W_0 kg of iron ore, kg
W_{coal}	Weight of coal required for reduction of W_0 kg of iron ore present in composite pellets, kg
Y_1	Weight of SiO_2 forms due to oxidation of Si, kg
Y_2	Weight of MnO forms due to oxidation of Mn, kg
Y_3	Weight of P_2O_5 forms due to oxidation of P, kg
Z	atomic number
Σ	foaming index of slag
ρ	density of slag
ρ_a	apparent density of pellet
ρ_t	true density of pellet
α	degree of reduction (pct)
μ	viscosity of slag
γ	surface tension of slag
η_{pc}	heat transfer efficiency (pct)