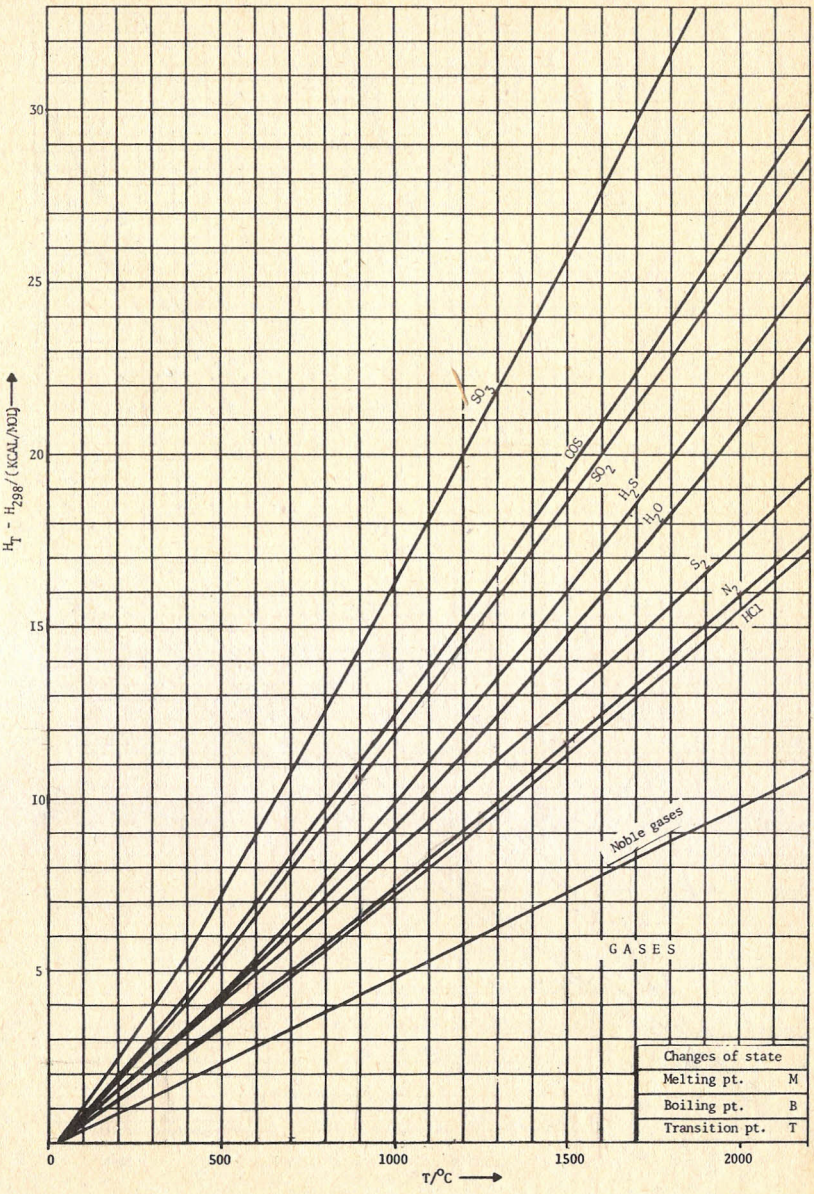
Appendix B

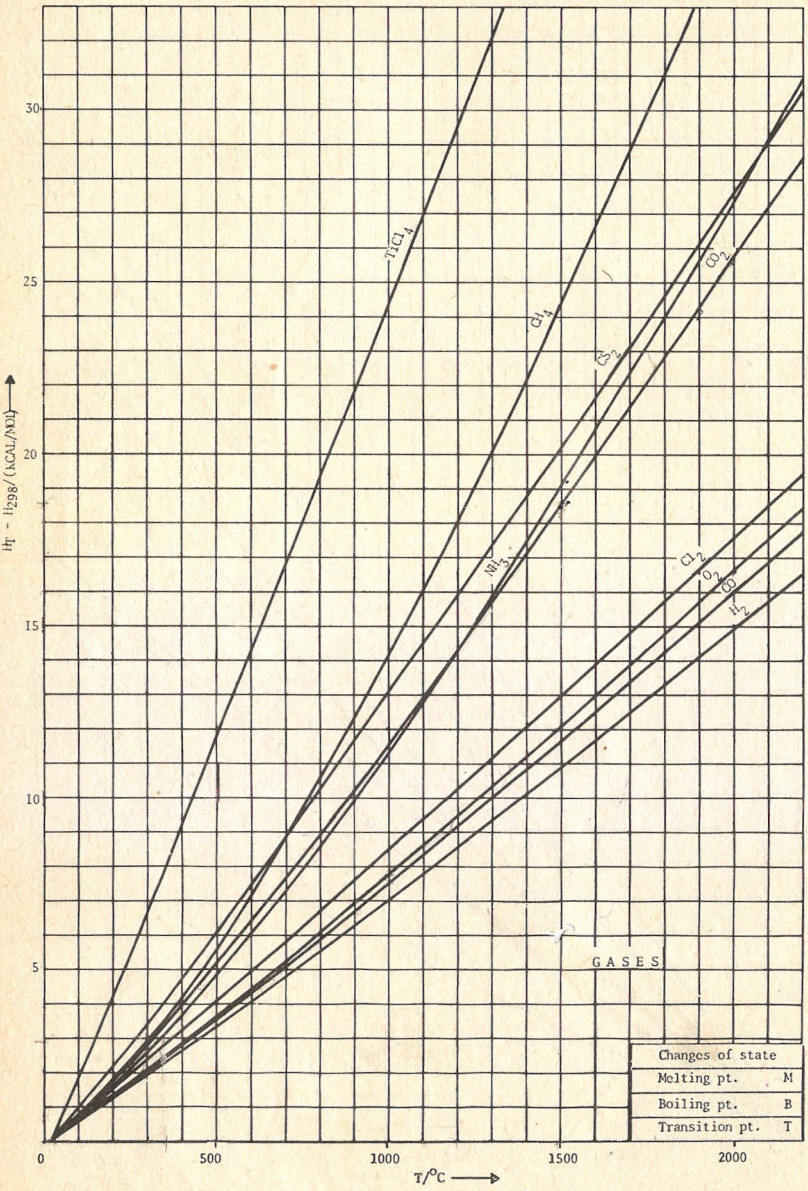
ENTHALPY INCREMENTS ABOVE 25°C

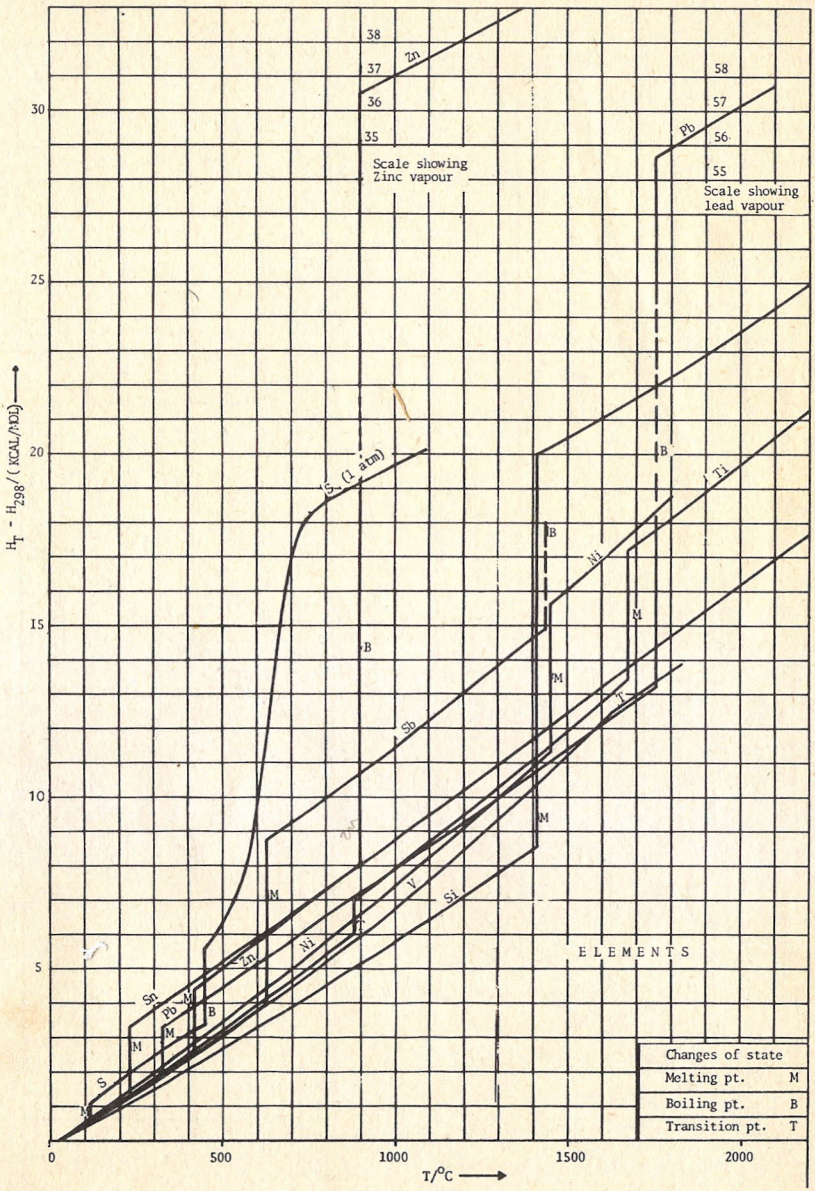
This part gives the increase in enthalpy, $H_T - H_{298}$, when the substance is heated from 25°C to some higher temperature. All values apply to one atmosphere pressure. As mentioned in Appendix A most enthalpies vary only insignificantly with changing pressure, provided this does not involve phase changes, and the curves may, therefore, be used also at pressures different from one atmosphere. All boiling points change with pressure, however. In order to obtain the enthalpy increment for some vapor at low pressure the curve for the vapor may be extrapolated below its normal boiling point.

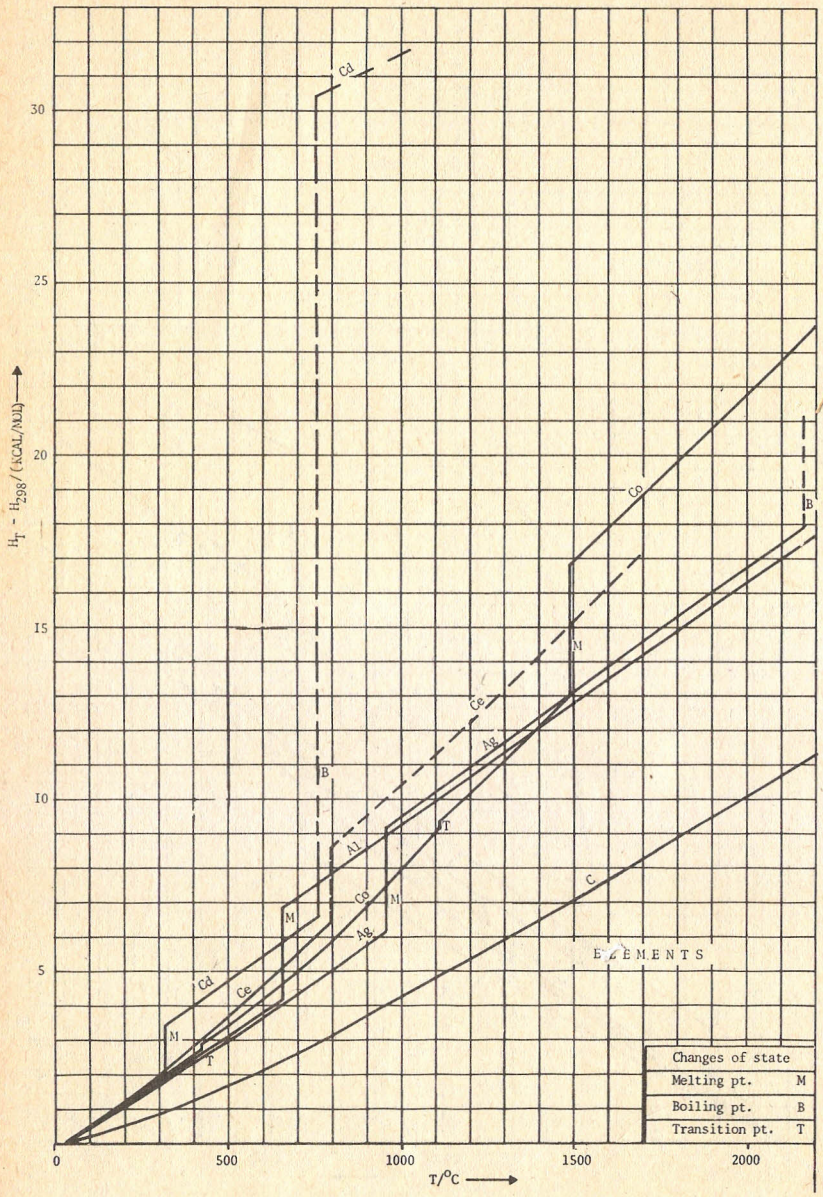
For some vapors, H_2O, CS_2, S_2, etc., the enthalpy increment is referred to the gas at 25°C, even though this is not stable at that temperature. In order to refer the enthalpy increment to the condensed form, the enthalpy of evaporation at 25°C, as given in part A, must be added. The enthalpy increment for equilibrium sulfur vapor is also given under "elements" and now referred to solid sulfur at 25°C. Since, on increased pressure, sulfur vapor undergoes polymerization, accompanied by a decrease in enthalpy, that particular curve applies only to atmospheric pressure.

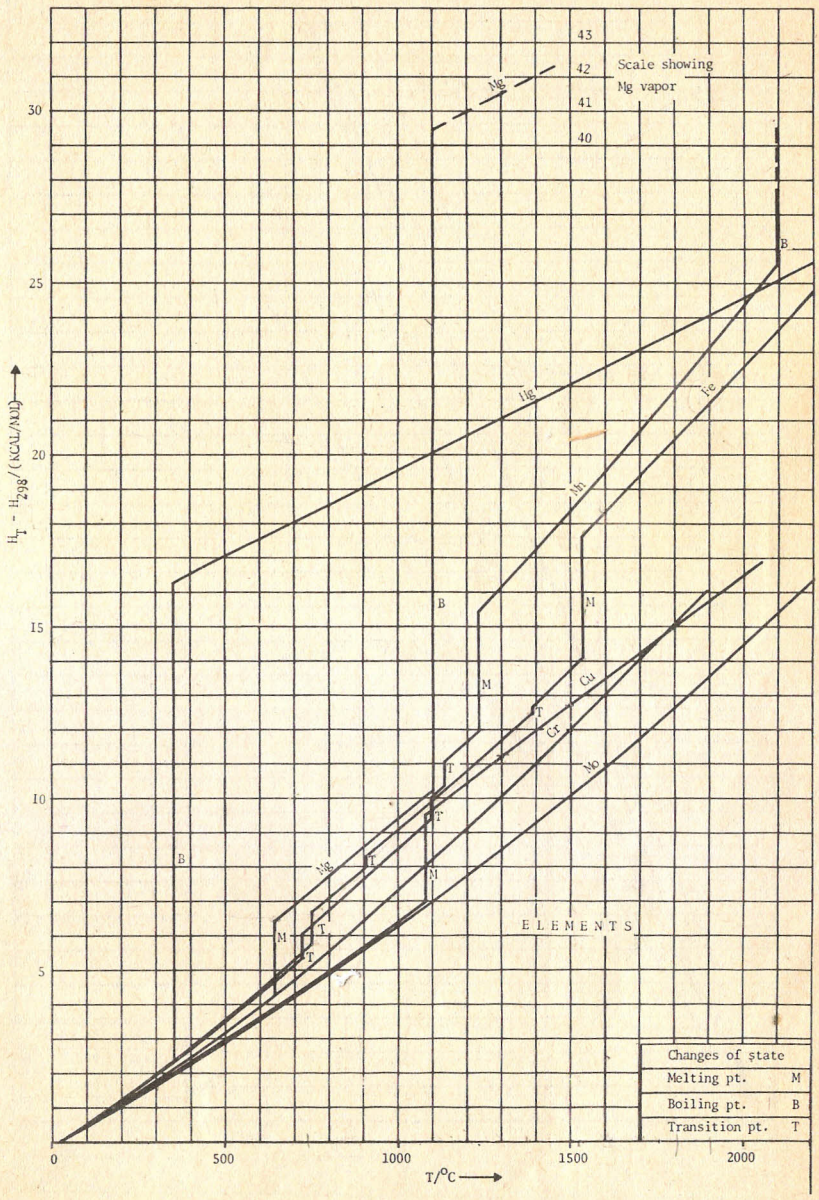
The curves do not allow an accurate calculation of the enthalpy increment for molten alloys and slags, unless these correspond to some specific compound. Approximate values may be obtained by resolving the alloy or slag composition into combinations of nearby compounds, and adding the values for each compound in their relative amount. If these compounds are solid at a temperature when the alloy or the slag is liquid, their enthalpies of fusion must be added. For more accurate calculations enthalpies of solution are required, but these are regarded as outside the scope of the present tabulation.

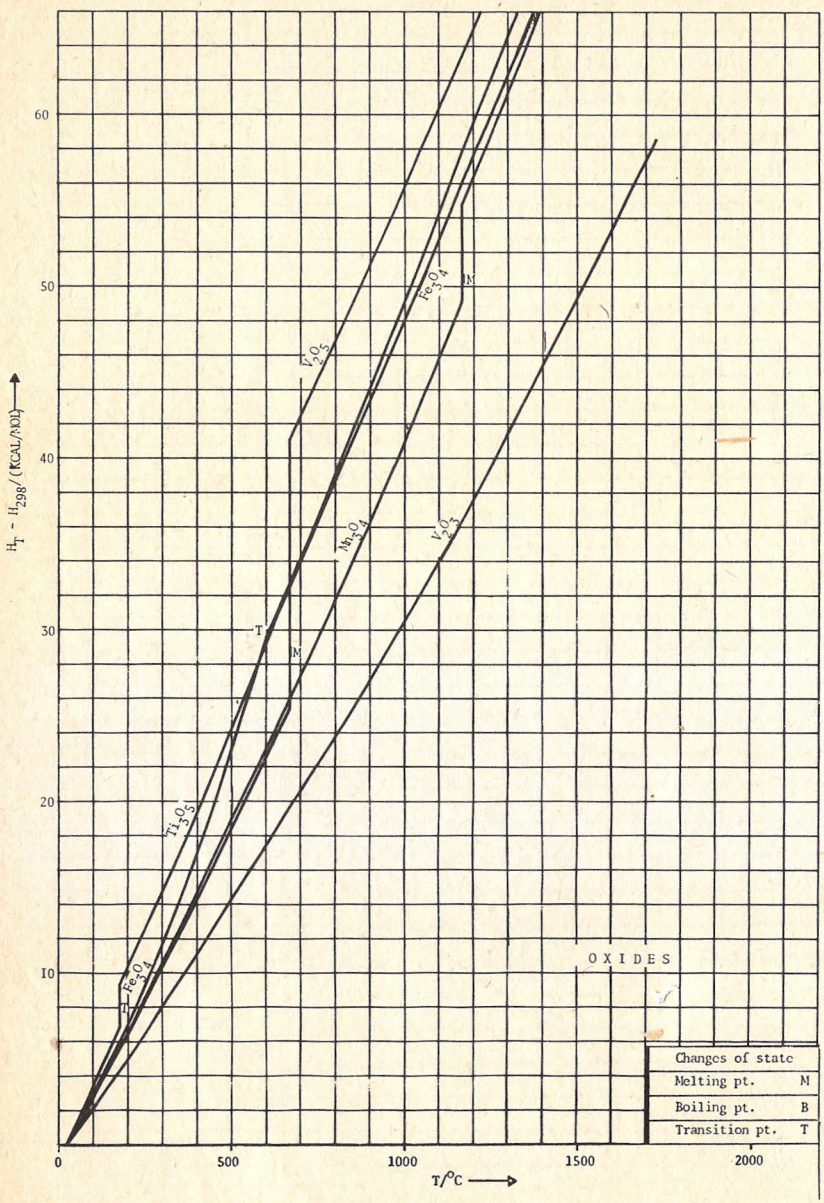

30
25
20
15
10
5
0
500
1000
1500
2000
$H_T - H_{298}$/(KCAL/MOL)
T/°C
SO_3
COS
SO_2
H_2S
H_2O
S_2
N_2
HCl
Noble gases
GASES
Changes of state
Melting pt. M
Boiling pt. B
Transition pt. T

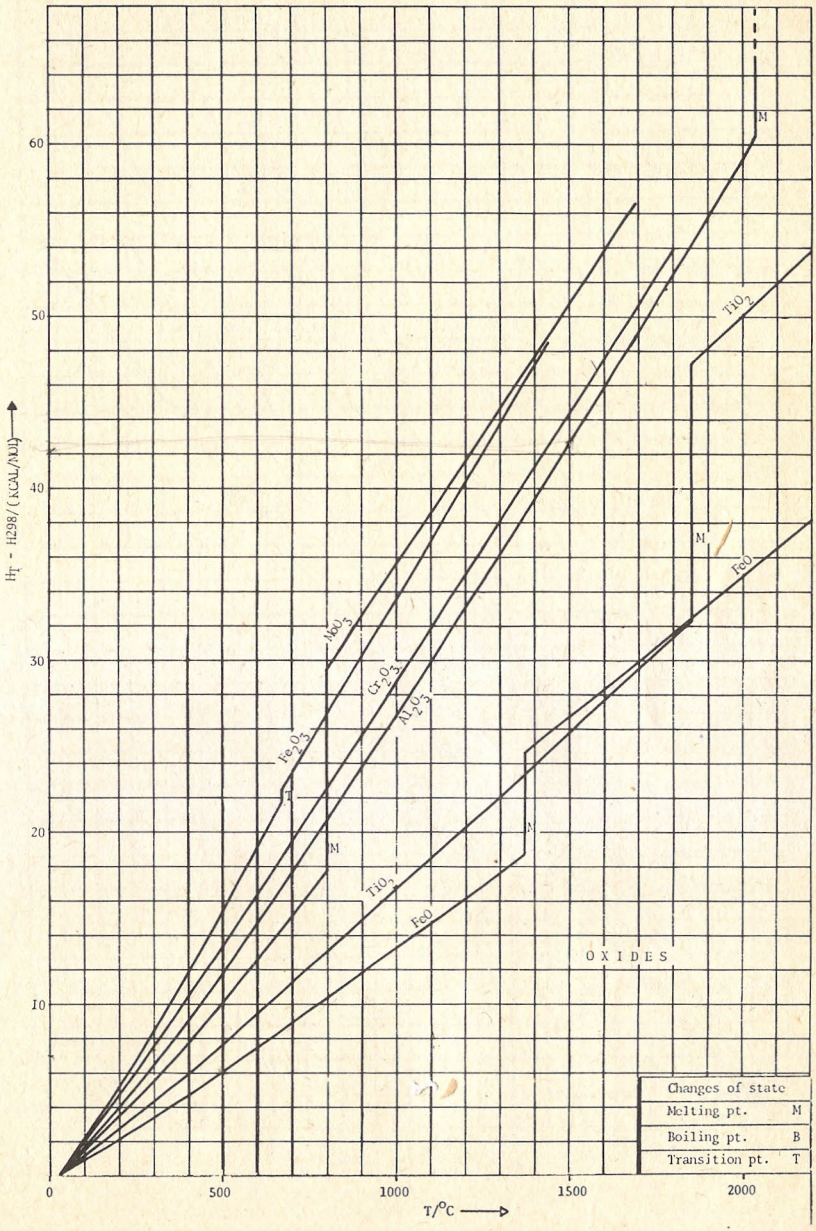

30
25
20
15
10
5
0
500
1000
1500
2000
$H_T - H_{298}$/(kCAL/MOL)
T/°C
$TiCl_4$
CH_4
CS_2
CO_2
NH_3
Cl_2
O_2
CO
H_2
GASES
Changes of state
Melting pt. M
Boiling pt. B
Transition pt. T

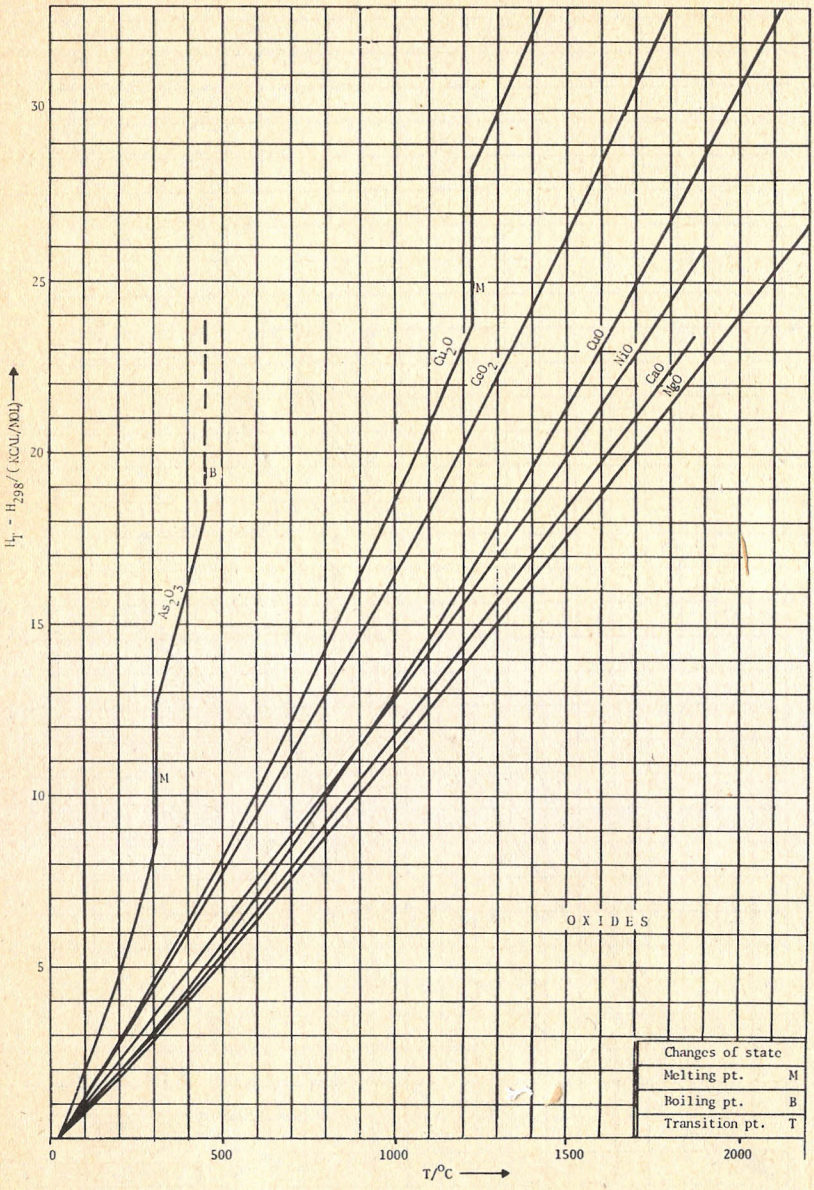

38
37
36
35
Zn
Scale showing Zinc vapour
58
57
56
55
Pb
Scale showing lead vapour
30
25
20
15
10
5
$H_T - H_{298}$/(KCAL/MOL)
S (1 atm)
B
Ti
Ni
M
Sb
T
V
Si
Zn
Sn
Pb
S
ELEMENTS
Changes of state
Melting pt. M
Boiling pt. B
Transition pt. T
0
500
1000
1500
2000
T/°C

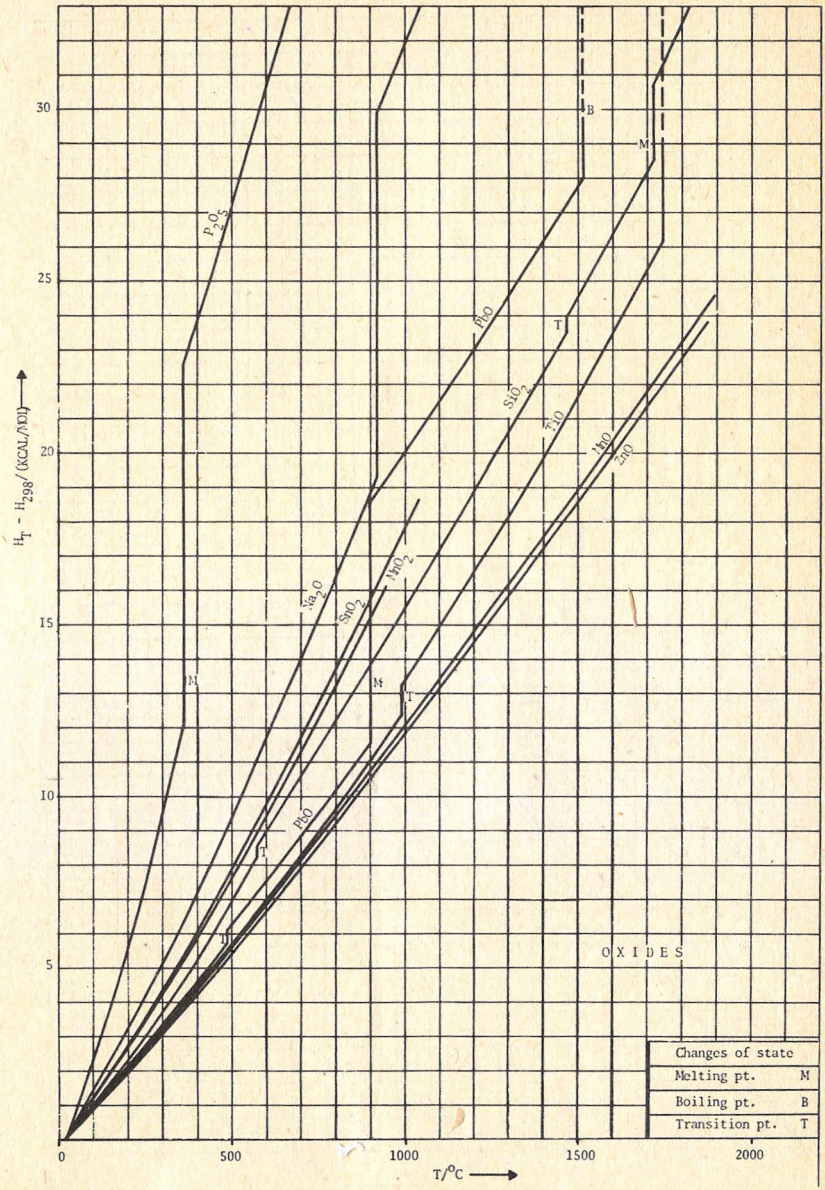

30
25
20
15
10
5
0
500
1000
1500
2000
$H_T - H_{298}$/(KCAL/MOL)
T/°C
Cd
Co
Ce
Ag
Al
C
M
B
T
ELEMENTS
Changes of state
Melting pt. M
Boiling pt. B
Transition pt. T

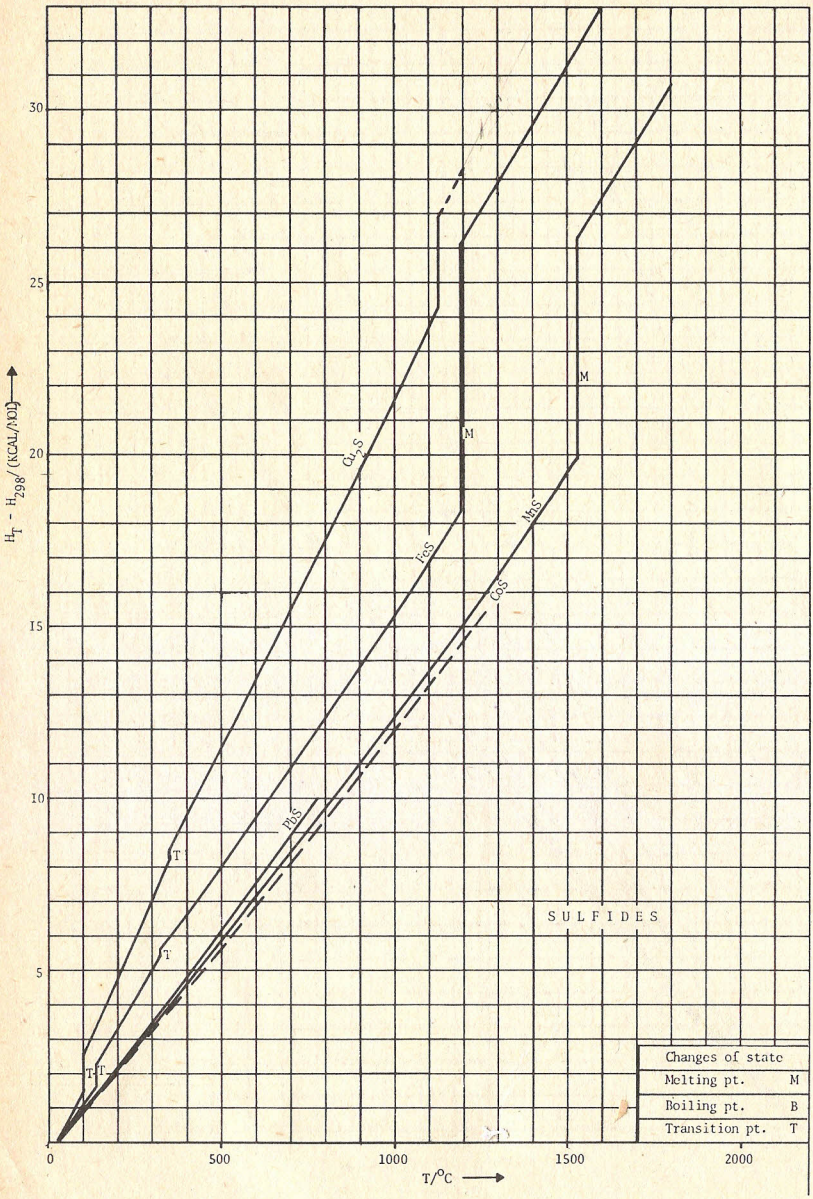

43
42
41
40
Scale showing
Mg vapor
Mg
Mg
Mn
Fe
Cu
Cr
Mo
B
M
T
ELEMENTS
Changes of state
Melting pt. M
Boiling pt. B
Transition pt. T
$H_T - H_{298}$/(KCAL/KGM)
T/°C
0
500
1000
1500
2000
5
10
15
20
25
30

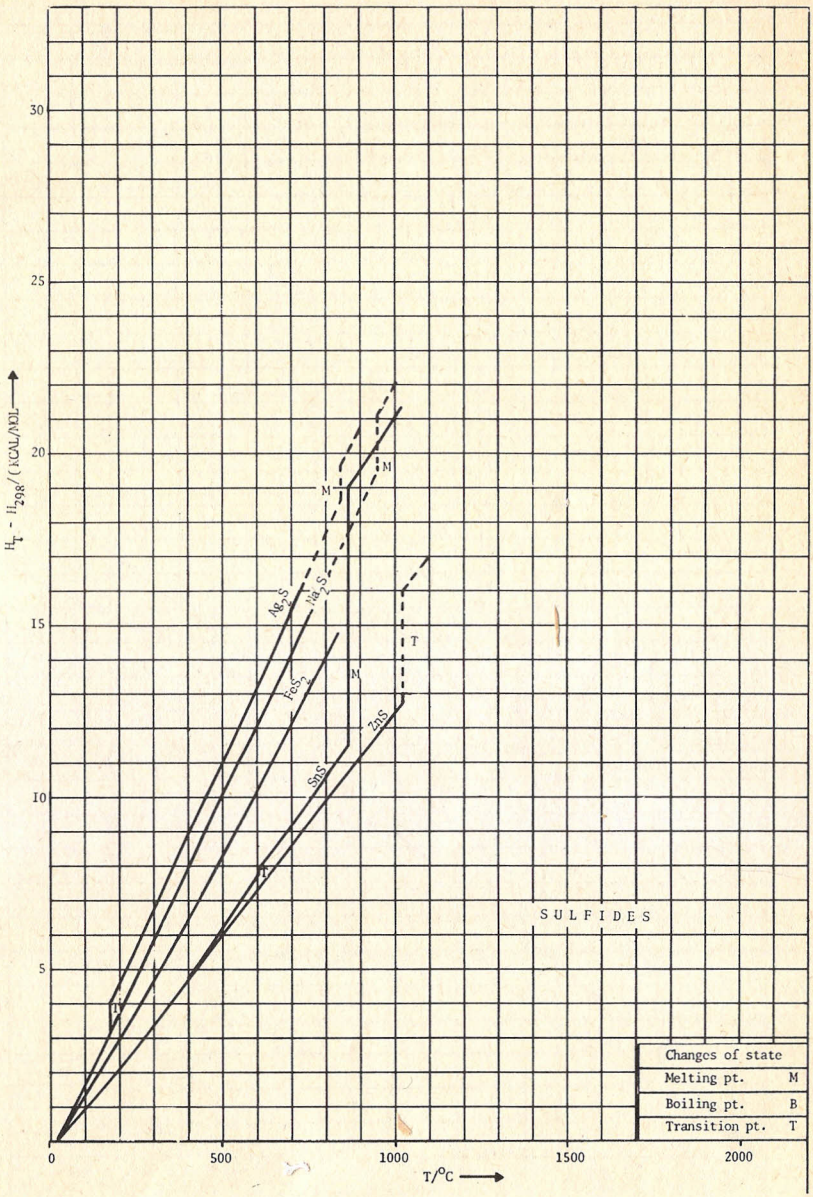

60
50
40
30
20
10
0
500
1000
1500
2000
$H_T - H_{298}$/(KCAL/MOL)
T/°C
V_2O_5
Fe_3O_4
M
Mn_2O_3
V_2O_3
T
M
Ti_3O_5
Fe_3O_4
T
OXIDES
Changes of state
Melting pt. M
Boiling pt. B
Transition pt. T

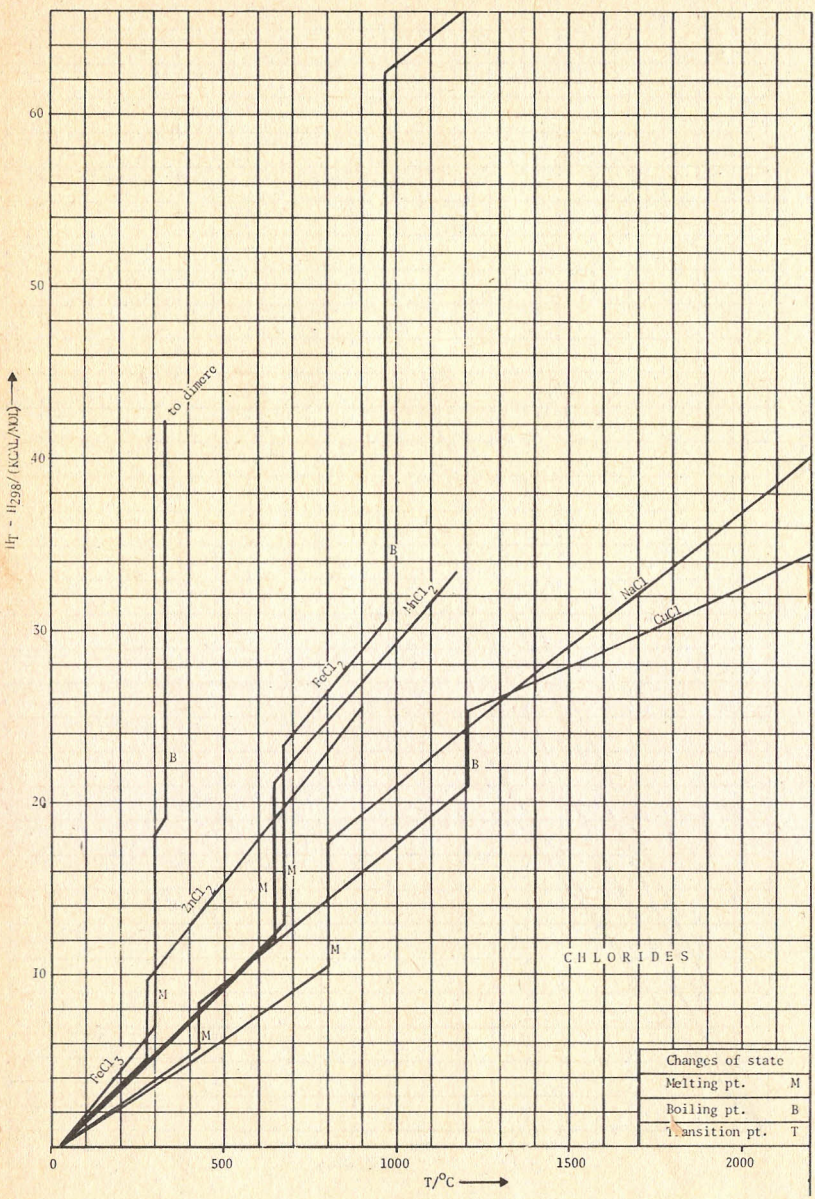

60
50
40
30
20
10
0
500
1000
1500
2000
T/°C
$H_T - H_{298}$/(KCAL/MOL)
M
TiO_2
M
FeO
MoO_3
Cr_2O_3
Al_2O_3
Fe_2O_3
T
M
M
TiO_2
FeO
OXIDES
Changes of state
Melting pt. M
Boiling pt. B
Transition pt. T

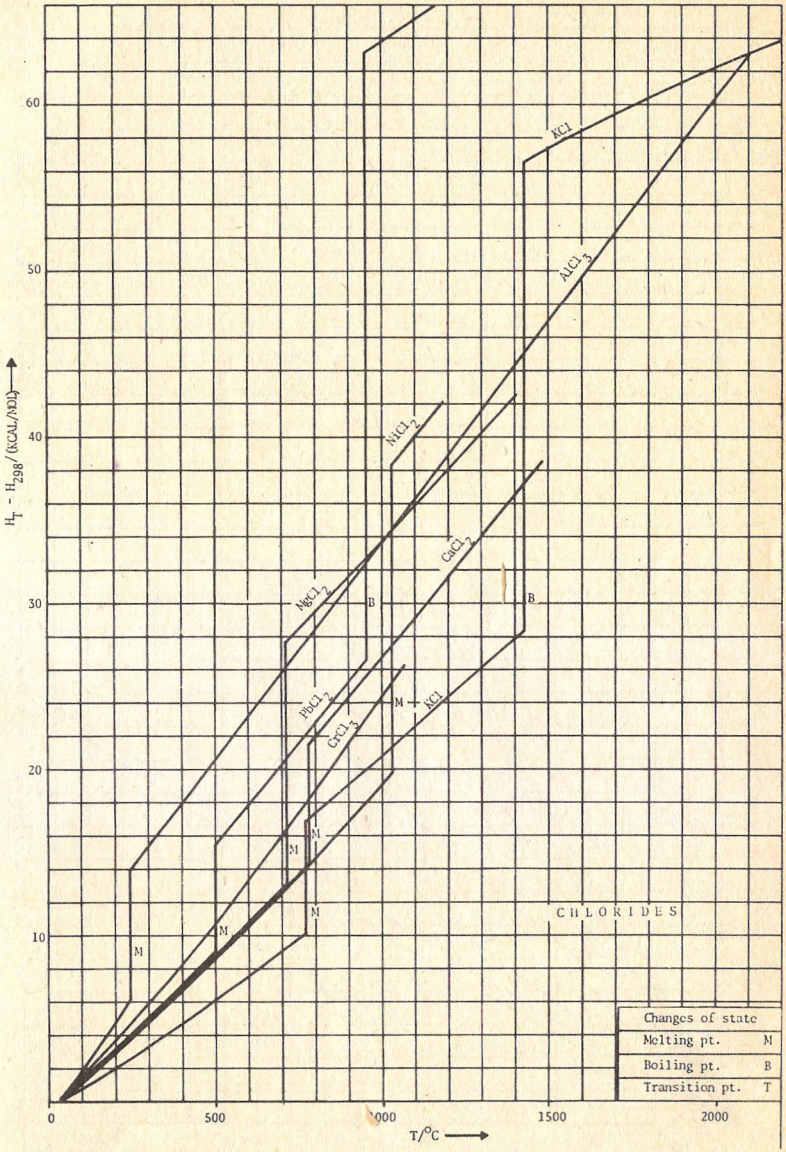

30
25
20
15
10
5
0
500
1000
1500
2000
T/°C
$H_T - H_{298}$/(KCAL/MOL)
As_2O_3
M
B
M
Cu_2O
CoO_2
CuO
NiO
CaO
MgO
OXIDES
Changes of state
Melting pt. M
Boiling pt. B
Transition pt. T

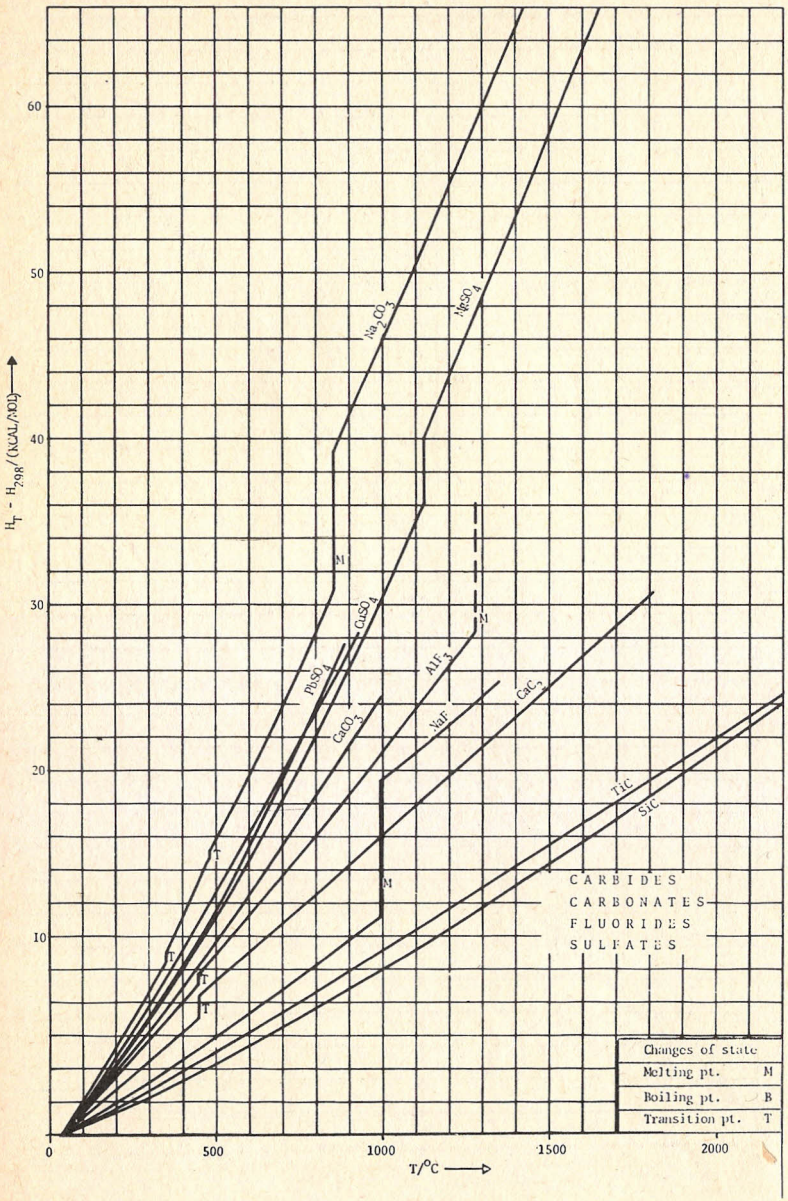

30
25
20
15
10
5
0
500
1000
1500
2000
$H_T - H_{298}$/(KCAL/MOL)
T/°C
P_2O_5
PbO
SiO_2
TiO
MgO
ZnO
Na_2O
SnO_2
MnO_2
PbO
B
M
T
OXIDES
Changes of state
Melting pt. M
Boiling pt. B
Transition pt. T

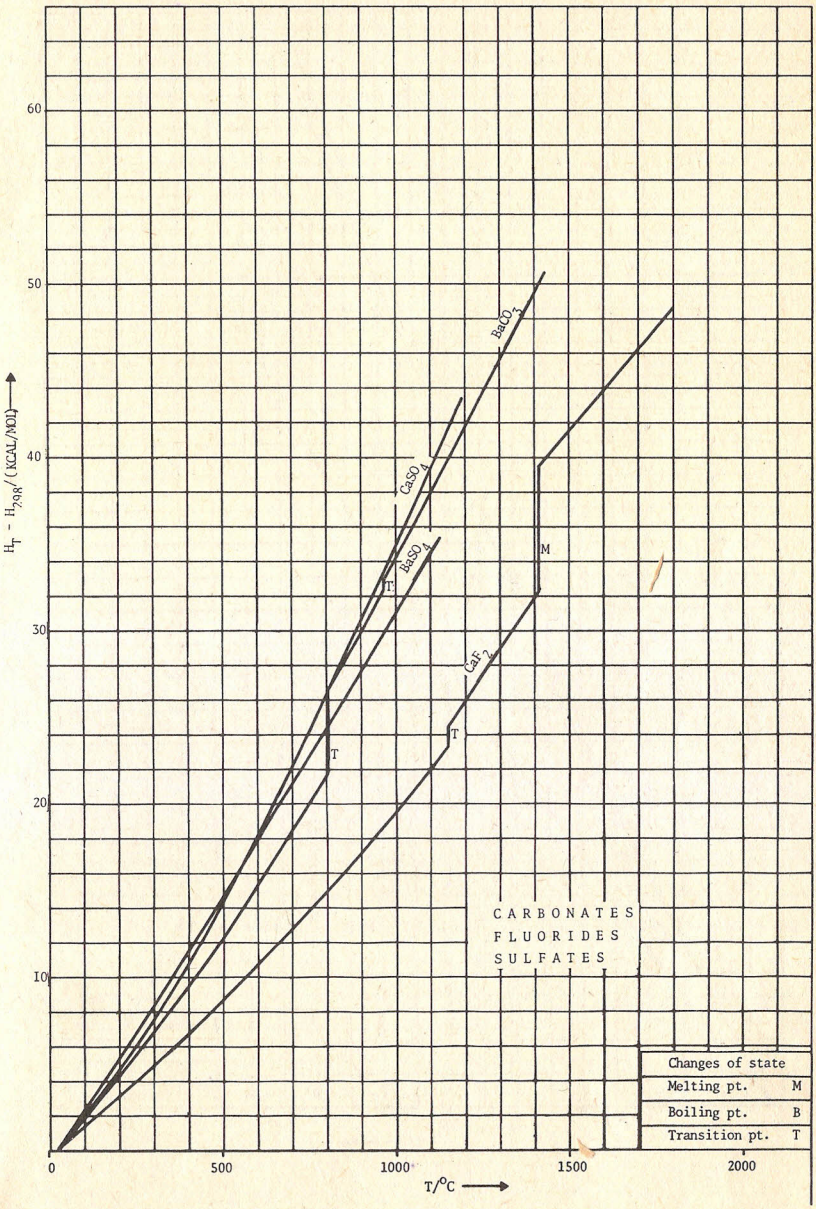

30
25
20
15
10
5
0
500
1000
1500
2000
$H_T - H_{298}$/(KCAL/MOL)
T/°C
Cu_2S
FeS
PbS
CoS
MnS
M
M
T
T
T
T
SULFIDES
Changes of state
Melting pt. M
Boiling pt. B
Transition pt. T

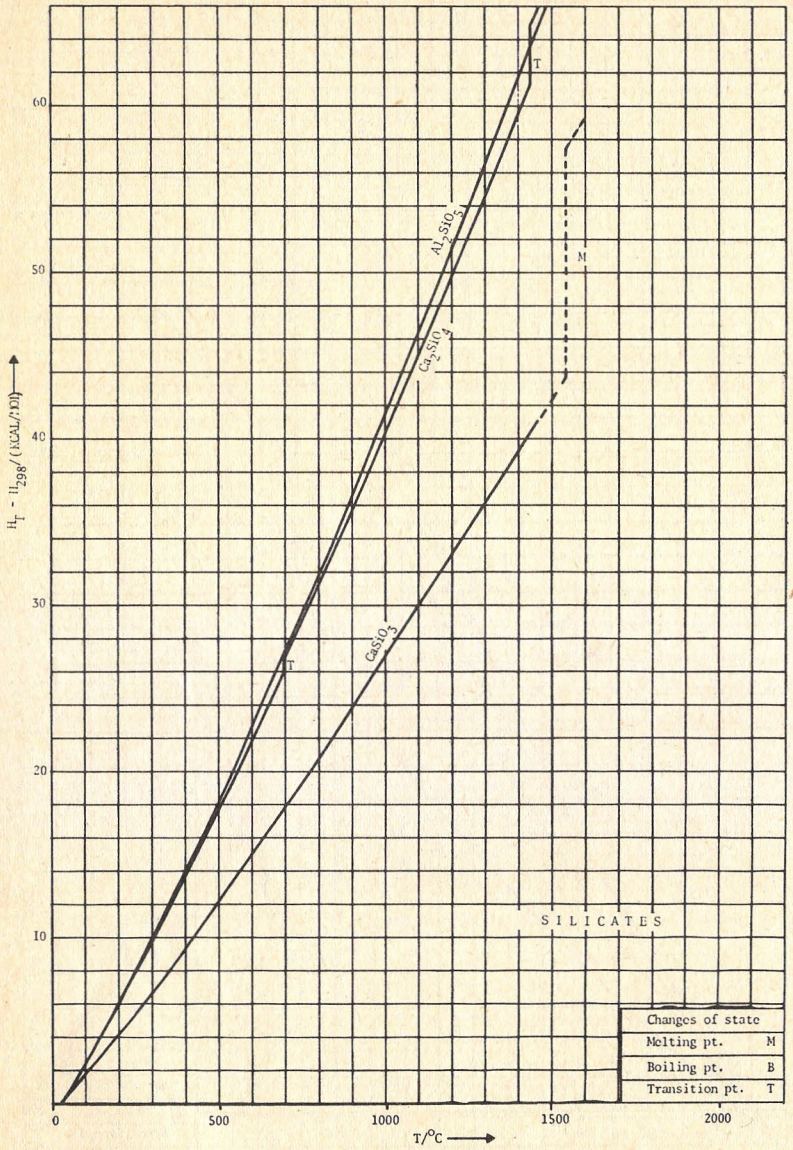

30
25
20
15
10
5
0
500
1000
1500
2000
$H_T - H_{298}$/(KCAL/MOL)
T/°C
Ag_2S
Na_2S
FeS
SnS
ZnS
M
T
SULFIDES
Changes of state
Melting pt. M
Boiling pt. B
Transition pt. T

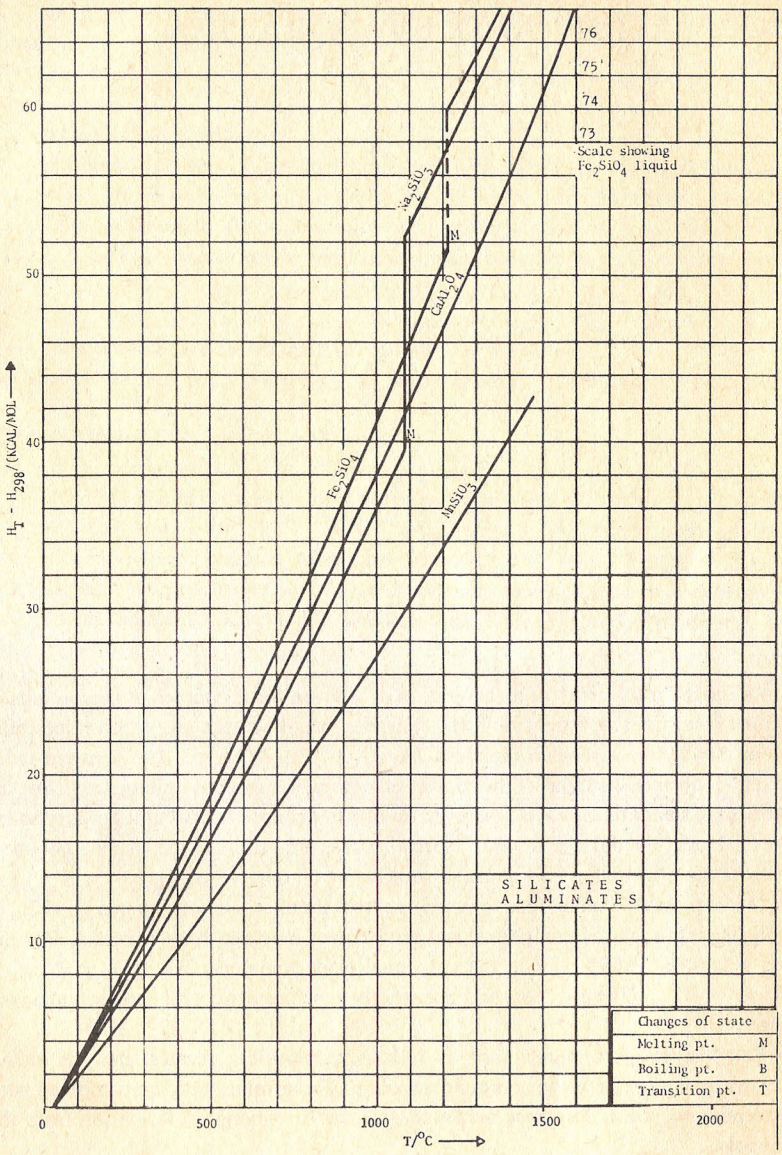

60
50
40
30
20
10
0
500
1000
1500
2000
T/°C
$H_T - H_{298}$/(KCAL/MOL)
to dimere
B
B
B
M
M
M
M
M
$FeCl_3$
$ZnCl_2$
$FeCl_2$
$MnCl_2$
NaCl
CuCl
CHLORIDES
Changes of state
Melting pt. M
Boiling pt. B
Transition pt. T


60
50
40
30
20
10
0
500
1000
1500
2000
$H_T - H_{298}$/(KCAL/MOL)
T/°C
KCl
AlCl3
NiCl2
CaCl2
MgCl2
PbCl2
CrCl3
KCl
B
B
M
M
M
M
M
M
CHLORIDES
Changes of state
Melting pt. M
Boiling pt. B
Transition pt. T


60
50
40
30
20
10
0
500
1000
1500
2000
$H_T - H_{298}$/(KCAL/MOL)
T/°C
Na_2CO_3
$MgSO_4$
$CuSO_4$
$PbSO_4$
$CaCO_3$
AlF_3
NaF
CaC_2
ThC
SiC
M
T
CARBIDES
CARBONATES
FLUORIDES
SULFATES
Changes of state
Melting pt. M
Boiling pt. B
Transition pt. T


60
50
40
30
20
10
0
500
1000
1500
2000
$H_T - H_{298}$/(KCAL/MOL)
T/°C
$BaCO_3$
$CaSO_4$
$BaSO_4$
CaF_2
M
T
T
T
CARBONATES
FLUORIDES
SULFATES
Changes of state
Melting pt. M
Boiling pt. B
Transition pt. T


60
50
40
30
20
10
0
500
1000
1500
2000
T/°C
$H_T - H_{298}$/(KCAL/MOL)
Al_2SiO_5
Ca_2SiO_4
$CaSiO_3$
T
T
M
SILICATES
Changes of state
Melting pt. M
Boiling pt. B
Transition pt. T


76
75
74
73
Scale showing
Fe_2SiO_4 liquid
Na_2SiO_3
M
$CaAl_2O_4$
M
Fe_2SiO_4
$MnSiO_3$
SILICATES
ALUMINATES
Changes of state
Melting pt. M
Boiling pt. B
Transition pt. T
$H_T - H_{298}$ /(KCAL/MOL)
60
50
40
30
20
10
0
500
1000
1500
2000
T/°C