Departament de Cristal.lografia,
Mineralogia i Dipòsits Minerals.

GEOLOGIA I METAL.LOGENIA DEL CONTACTE SUD DEL GRANIT D'ANDORRA (PIRINEU CENTRAL).

Albert SOLER i GIL

Gener 1990

ANNEX 4.

ANALISIS DE LES FASES MINERALS A LA MICROSONDA ELECTRONICA.

ANALISIS DE GRANATS A LA MICROSONDA. Skarns d'Hedembergita.

ANALISI NUM:	413A1558	413A1555	413A1553	413A1560	413A1557	413A1531	131-50	131-47	131-46
%PES									
SiO2·	35 41	35 64	36 01	37 10	35 09	37 19	38 38	39 21	38 14
TiO2·	0 04	0 01	0 06	0 00	0 03	0 00	1 46	1 07	0 31
Al2O3.	1 16	1 32	2.83	12 65	0 81	11 22	18 69	18 58	17 02
FeO :	28 39	27 99	27 04	14 00	29 35	15 90	5 37	5 24	7 86
MnO :	0 11	0 16	0 23	0 86	0 23	0 45	0 23	0 21	0 32
MgO :	0 00	0 00	0 00	0 00	0 04	0 00	0 49	0 50	0 24
CaO :	33 19	33 36	33 17	34 21	33 10	34 20	36 56	36 20	34 84
Cr203	0 15	0 21	0 17	0 15	0 20	0 16	0 21	0 22	0 10
SnO2·	0 03	0 20	0 20	0 33	0 12	0 27	0 06	0 04	0 07
Na2O·	0 00	0 04	0 02	0 01	0 00	0 00	0 00	0 00	0 00
K2O :	0 00	0 01	0 00	0 00	0 00	0 00	0 00	0 00	0 00
TOTAL:	98 48	98 94	99 73	99 31	98 97	99 39	101 45	101 27	98 90
FORMULA ESTRUCTURAL									
Si(T)	6 03	6 04	6 01	5 93	5 98	5 97	5 81	5 93	5 95
Al(T)·	0 00	0 00	0 00	0 07	0 02	0 03	0 19	0 07	0 05
TOTAL (T)	6 03	6 04	6 01	6 00	6 00	6 00	6 00	6 00	6 00
Al (M2)	0 23	0 26	0 56	2 31	0 14	2.09	3 15	3 24	3 08
Sn (M2)	0 00	0 01	0 01	0 02	0 01	0 02	0 00	0 00	0 00
Cr (M2)	0 02	0 03	0 02	0 02	0 03	0 02	0 03	0 03	0 01
Ti (M2)	0 01	0 00	0 01	0 00	0 00	0 00	0 17	0 12	0 04
FE3 (M2)	3 64	3 57	3 40	1 65	3 76	1 87	0 61	0 60	0 87
TOTAL M2	3 90	3 88	4 00	4 00	3 95	4 00	3 96	3 98	4 00
Mg (M1)	0 00	0 00	0 00	0 00	0 01	0 00	0 11	0 11	0 06
Fe2 (M1)	0 00	0 00	0 00	0 03	0 00	0 04	0 00	0 00	0 05
Mn (M1)	0 02	0 02	0 03	0 12	0 03	0 06	0 03	0 03	0 04
Ca (M1)	6 06	6 06	5 93	5 86	6 04	5 88	5 93	5 86	5 82
TOTAL M1	6 08	6 08	5 97	6 00	6 09	5 98	6 07	6 00	5 97
%MOLS									
PIROP	0.00	0.00	0.00	0.00	017	0.00	1.86	1.88	093
ESPESSARTINA	027	039	0.54	193	0.56	1.01	0.50	045	070
UVAROVITA	0.52	072	0.56	047	0.68	0.51	0.63	0.66	031
ALMANDINA	0.00	0.00	0.00	051	000	0.68	000	0.00	0.83
GROSSULARIA	570	6.38	13 34	55 03	2.88	50 30	77 16	78 88	74 45
ANDRADITA	93 41	91 80	84 89	41 02	95 30	46 64	19 66	18 01	22 56
ANDRADITA ESTANNIFERA	010	0.69	0.66	1.05	041	086	018	012	022
ACTIVITATS									
PIROP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ESPESSARTINA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UVAROVITA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALMANDINA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GROSSULARIA	0.00	0.00	0.02	0.30	0.00	0.25	0.55	0.59	0.53
ANDRADITA	0.86	0.83	071	0.16	0.89	0.21	0.03	0.03	0.05
ANDRADITA ESTANNIFERA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

ANALISIS DE GRANATS A LA MICROSONDA. Skarns d'Hedembergita.

ANALISI NUM:	413A1533	413A1536	413A1538	413A1546	413A1547	413A1548	413A1551	413A1554	413A1561
%PES									
SiO2:	34.31	35.11	34.64	34.88	37.03	35.36	35.19	35.72	35.08
TiO2:	0.00	0.00	0.01	0.00	0.06	0.00	0.00	0.49	0.00
Al2O3:	0.06	0.75	0.24	0.19	11.15	0.98	0.06	3.62	0.15
FeO :	29.33	29.68	29.93	29.05	15.54	28.99	29.38	24.95	29.98
MnO :	0.38	0.17	0.38	0.18	0.43	0.23	0.56	0.39	0.44
MgO :	0.01	0.06	0.07	0.05	0.00	0.04	0.06	0.00	0.11
CaO :	32.64	33.46	31.63	33.05	34.73	32.53	32.76	33.30	32.48
Cr203:	0.16	0.16	0.17	0.28	0.23	0.18	0.19	0.19	0.20
SnO2:	0.43	1.73	0.48	1.59	0.37	1.59	0.40	0.08	0.42
Na2O:	0.00	0.00	0.00	0.40	0.02	0.00	0.00	0.00	0.00
K2O :	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00
TOTAL:	97.32	101.13	97.55	99.67	99.56	99.90	98.61	98.74	98.86
FORMULA ESTRUCTURAL									
Si(T):	5.98	5.90	6.01	5.96	594	5.99	6.04	5.99	6.01
Al(T):	0.02	0.10	0.00	0.04	0.06	0.01	0.00	0.01	0.00
TOTAL (T):	6.00	6.00	6.01	6.00	6.00	6.00	6.04	6.00	6.01
Al (M2):	0.01	0.05	0.05	-0.00	2.05	0.18	0.01	0.71	0.03
Sn (M2):	0.03	0.12	0.03	0.11	0.02	0.11	0.03	0.01	0.03
Cr (M2):	0.02	0.02	0.02	0.04	0.03	0.02	0.03	0.03	0.03
Ti (M2):	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.06	0.00
FE3 (M2):	3.85	3.76	3.89	3.73	1.88	3.69	3.79	3.15	3.86
TOTAL M2 :	3.89	3.95	4.00	3.88	3.99	4.00	3.86	3.95	3.95
Mg (M1):	0.00	0.02	0.02	0.01	0.00	0.01	0.02	0.00	0.03
Fe2 (M1):	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00
Mn (M1):	0.06	0.02	0.06	0.03	0.06	0.03	0.08	0.06	0.06
Ca (M1):	6.10	6.03	5.88	6.05	5.97	5.90	6.02	5.99	5.96
TOTAL M1:	6.15	6.07	5.96	6.09	6.03	5.95	6.12	6.04	6.05
%MOLS									
PIROP:	0.04	0.25	0.30	0.21	0.00	0.16	0.26	0.00	0.47
ESPESSARTINA	0.94	0.40	0.92	0.43	0.97	0.54	1.38	0.93	1.06
UVAROVITA	0.56	0.52	0.58	0.94	0.73	0.59	0.65	0.64	0.68
ALMANDINA	0.00	0.00	0.19	0.00	0.00	0.10	0.00	0.00	0.00
GROSSULARIA	0.00	0.67	0.00	0.00	50.16	3.63	0.00	16.99	0.00
ANDRADITA	96.95	92.45	96.37	93.02	46.96	89.76	96.32	81.17	96.37
ANDRADITA ESTANNIFERA	1.51	5.71	1.64	5.39	1.18	5.23	1.39	0.27	1.43
ACTIVITATS									
PIROP:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ESPESSARTINA.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UVAROVITA.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALMANDINA.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GROSSULARIA.	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.03	0.00
ANDRADITA	0.95	0.86	0.91	0.87	0.22	0.82	0.92	0.64	0.92
ANDRADITA ESTANNIFERA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

ANALISIS DE GRANATS A LA MICROSONDA. Skarns d'Hedembergita.

ANALISI NUM:	131-45	126AB42	126A-F4	126A-F3	126A-F2	126A-F1	126A-B44	126A-B43	126-B41
%PES.									
SiO2:	38.45	35.35	38.18	38.00	36.19	34.82	35.06	34.97	35.40
TiO2:	0.57	0.00	0.65	1.08	0.44	0.03	0.00	0.04	0.08
Al2O3:	17.14	0.01	16.79	16.42	7.83	0.10	0.00	0.00	1.14
FeO :	8.99	29.98	7.81	7.88	19.23	27.31	28.66	29.37	28.27
MnO :	0.38	0.62	0.19	0.17	0.70	0.16	0.64	0.65	0.78
MgO :	0.36	0.08	0.19	0.41	0.00	0.41	0.06	0.00	0.06
CaO :	35.28	32.55	35.01	34.91	34.02	32.31	32.79	32.78	32.16
Cr203:	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SnO2:	0.00	0.39	0.01	0.00	0.30	3.07	0.83	0.44	0.34
Na2O:	0.07	0.00	0.00	0.04	0.00	0.04	0.02	0.04	0.00
K2O :	0.01	0.01	0.01	0.00	0.03	0.02	0.00	0.00	0.00
TOTAL:	101.41	98.99	98.84	98.91	98.74	98.27	98.06	98.29	98.23
FORMULA ESTRUCTURAL									
Si(T):	5.87	6.04	5.96	5.93	5.95	6.03	6.06	6.03	6.05
Al(T):	0.13	0.00	0.04	0.07	0.05	0.00	0.00	0.00	0.00
TOTAL (T):	6.00	6.04	6.00	6.00	6.00	6.03	6.06	6.03	6.05
Al (M2):	2.96	0.00	3.05	2.95	1.47	0.02	0.00	0.00	0.23
Sn (M2):	0.00	0.03	0.00	0.00	0.02	0.21	0.06	0.03	0.02
Cr (M2):	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ti (M2):	0.07	0.00	0.08	0.13	0.05	0.00	0.00	0.01	0.01
FE3 (M2):	0.96	3.86	0.88	0.92	2.38	3.56	3.73	3.81	3.64
TOTAL M2:	4.00	3.89	4.00	4.00	3.93	3.80	3.78	3.85	3.90
Mg (M1):	0.08	0.02	0.04	0.10	0.00	0.11	0.02	0.00	0.02
Fe2 (M1):	0.07	0.00	0.04	0.01	0.00	0.00	0.00	0.00	0.00
Mn (M1):	0.05	0.09	0.03	0.02	0.10	0.02	0.09	0.09	0.11
Ca (M1):	5.77	5.96	5.85	5.84	6.00	6.00	6.07	6.05	5.89
TOTAL M1:	5.97	6.07	5.96	5.96	6.09	6.13	6.18	6.15	6.02
%MOLS									
PIROP:	1.37	0.34	0.74	1.59	0.00	1.73	0.26	0.00	0.26
ESPESSARTINA	0.82	1.50	0.42	0.37	1.65	0.38	1.60	1.61	1.92
UVAROVITA	0.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALMANDINA	1.15	0.00	0.60	0.08	0.00	0.00	0.00	0.00	0.00
GROSSULARIA	70.62	0.00	74.37	71.78	35.66	0.00	0.00	0.00	3.67
ANDRADITA	25.55	96.82	23.85	26.18	61.70	87.47	95.22	96.86	92.97
ANDRADITA ESTANNIFERA	0.00	1.33	0.03	0.00	1.00	10.41	2.92	1.54	1.18
ACTIVITATS									
PIROP:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ESPESSARTINA.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UVAROVITA.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALMANDINA.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GROSSULARIA.	0.46	0.00	0.53	0.49	0.13	0.00	0.00	0.00	0.00
ANDRADITA	0.06	0.93	0.05	0.06	0.36	0.80	0.90	0.94	0.82
ANDRADITA ESTANNIFERA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

ANALISIS DE GRANATS A LA MICROSONDA. Skarns Santa LLOGAIA

ANALISI NUM:	417B-2	417B-6	417B-7	417B-11	417B-12	417B-13	417B-14	419B-3	419B-4
%PES									
SiO2:	38.53	38.83	36.82	36.72	38.17	36.22	38.08	37.24	37.12
TiO2:	0.07	0.40	0.35	0.00	0.19	0.00	0.32	0.86	0.29
Al2O3:	18.93	16.09	6.97	6.60	15.68	5.93	16.65	14.09	10.70
FeO :	6.50	10.38	22.58	22.21	11.12	23.56	10.16	11.68	17.13
MnO :	2.09	0.52	0.29	0.34	0.63	0.29	0.69	0.90	0.32
MgO :	0.00	0.00	0.04	0.03	0.00	0.05	0.00	0.00	0.04
CaO :	33.98	34.11	34.04	33.94	34.62	34.10	34.67	34.29	34.59
Cr203:	0.01	0.05	0.01	0.01	0.03	0.02	0.00	0.00	0.00
SnO2:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.31
Na2O:	0.00	0.18	0.01	0.00	0.00	0.00	0.02	0.00	0.01
K2O :	0.00	0.02	0.00	0.00	0.00	0.00	0.01	0.00	0.00
TOTAL:	100.12	100.59	101.11	99.86	100.44	100.18	100.59	99.67	100.52
FORMULA ESTRUCTURAL	5.92	5.99	5.94	6.00	5.93	5.94	5.89	5.89	5.92
Si(T):	0.08	0.01	0.06	0.00	0.07	0.06	0.11	0.11	0.08
Al(T):	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
TOTAL (T):									
	3.35	2.91	1.27	1.27	2.80	1.08	2.92	2.51	1.93
Al (M2):	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.02
Sn (M2):	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cr (M2):	0.01	0.05	0.04	0.00	0.02	0.00	0.04	0.10	0.03
Ti (M2):	0.64	1.04	2.69	2.73	1.18	2.91	1.04	1.35	2.02
FE3 (M2):	4.00	4.00	4.00	4.00	4.00	3.99	4.00	4.00	4.00
TOTAL M2 :									
Mg (M1):	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.01
Fe2 (M1):	0.10	0.15	0.04	0.00	0.11	0.00	0.12	0.04	0.03
Mn (M1):	0.27	0.07	0.04	0.05	0.08	0.04	0.09	0.12	0.04
Ca (M1):	5.60	5.63	5.88	5.94	5.76	5.99	5.74	5.81	5.91
TOTAL M1:	5.97	5.85	5.98	6.00	5.95	6.04	5.95	5.96	5.99
%MOLS									
PIROP:	0.00	0.00	0.15	0.12	0.00	0.19	0.00	0.02	0.15
ESPESSARTINA	4.54	1.13	0.66	0.78	1.39	0.68	1.50	1.99	0.73
UVAROVITA	0.03	0.16	0.02	0.05	0.10	0.06	0.01	0.00	0.00
ALMANDINA	1.67	2.53	0.75	0.06	1.83	0.00	2.06	0.59	0.54
GROSSULARIA	77.53	69.12	30.07	30.81	66.69	26.28	69.41	59.60	46.51
ANDRADITA	16.22	27.05	68.35	68.19	29.99	72.79	27.03	35.98	51.09
ANDRADITA ESTANNIFERA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.83	0.98
ACTIVITATS									
PIROP:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ESPESSARTINA.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UVAROVITA.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALMANDINA.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GROSSULARIA.	0.55	0.44	0.09	0.10	0.42	0.07	0.44	0.34	0.21
ANDRADITA	0.02	0.06	0.44	0.46	0.08	0.52	0.06	0.12	0.25
ANDRADITA ESTANNIFERA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

ANALISIS DE GRANATS A LA MICROSONDA. Skarns Sta LLOGAIA

ANALISI NUM:	419B-5	419B-6	423A-25	423A-30	423A-31	423A-32	423A-33	429A-47	432A-22
%PES									
SiO2:	36.92	36.43	39.19	39.25	39.11	39.33	39.11	36.47	37.43
TiO2:	0.38	0.96	0.80	0.76	0.87	0.86	0.86	0.44	0.04
Al2O3:	9.24	7.54	20.25	20.68	20.31	20.41	20.61	16.90	13.86
FeO :	18.78	20.62	4.44	3.70	4.02	3.73	3.77	6.93	12.82
MnO :	0.29	0.31	0.29	0.38	0.41	0.35	0.42	0.20	0.25
MgO :	0.08	0.07	0.48	0.45	0.42	0.50	0.43	1.67	0.19
CaO :	34.54	34.14	35.33	35.59	35.22	35.27	35.32	35.40	35.29
Cr203:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
SnO2:	0.38	0.41	0.10	0.08	0.06	0.05	0.08	0.00	0.00
Na2O:	0.00	0.00	0.02	0.01	0.02	0.01	0.00	0.03	0.04
K2O :	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
TOTAL:	100.60	100.48	100.90	100.90	100.44	100.51	100.60	98.02	99.96
FORMULA ESTRUCTURAL	5.92	5.90	5.91	5.90	5.91	5.93	5.90	5.76	5.90
Si(T):	0.08	0.10	0.09	0.10	0.09	0.07	0.10	0.24	0.10
Al(T):	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
TOTAL (T):									
	1.67	1.34	3.50	3.57	3.53	3.56	3.56	2.91	2.47
Al (M2):	0.02	0.03	0.01	0.00	0.00	0.00	0.01	0.00	0.00
Sn (M2):	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cr (M2):	0.05	0.12	0.09	0.09	0.10	0.10	0.10	0.05	0.00
Ti (M2):	2.26	2.51	0.40	0.34	0.37	0.34	0.33	0.82	1.52
FE3 (M2):	4.00	4.00	4.00	4.00	4.00	4.00	4.00	3.78	4.00
TOTAL M2 :									
Mg (M1):	0.02	0.02	0.11	0.10	0.10	0.11	0.10	0.39	0.04
Fe2 (M1):	0.01	0.00	0.09	0.07	0.08	0.08	0.08	0.00	0.00
Mn (M1):	0.04	0.04	0.04	0.05	0.05	0.04	0.05	0.03	0.03
Ca (M1):	5.94	5.92	5.70	5.74	5.70	5.70	5.71	5.99	5.96
TOTAL M1:	6.00	5.98	5.94	5.95	5.93	5.93	5.94	6.41	6.04
%MOLS									
PIROP:	031	027	1.79	1.66	1.59	1.87	1.60	691	0.74
ESPESSARTINA	0.66	0.70	0.62	0.80	0.87	0.74	0.89	0.47	0.55
UVAROVITA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05
ALMANDINA	0.10	0.00	1.50	1.18	1.37	1.26	1.41	0.00	0.03
GROSSULARIA	40.45	32.33	83.45	85.49	84.37	85.04	85.07	69.47	60.56
ANDRADITA	57.30	65.39	12.34	10.63	11.61	10.93	10.78	23.14	38.08
ANDRADITA ESTANNIFERA	1.19	1.30	0.30	0.23	0.19	0.17	0.25	0.00	0.00
ACTIVITATS									
PIROP:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ESPESSARTINA.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UVAROVITA.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALMANDINA.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GROSSULARIA.	0.16	0.10	0.63	0.66	0.64	0.66	0.65	0.47	0.36
ANDRADITA	0.32	0.41	0.01	0.01	0.01	0.01	0.01	0.04	0.14
ANDRADITA ESTANNIFERA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

ANALISIS DE GRANATS A LA MICROSONDA. Skarns Sta LLOGAIA

ANALISI NUM:	432A-29	432A-30	432A-77	432A-78	432A-82	432A-112	433B-148	433B-149	451B-114
%PES									
SiO2:	34.44	36.72	34.83	34.80	34.89	34.92	36.67	36.99	37.92
TiO2:	0.02	0.03	0.03	0.05	0.02	0.03	0.00	0.28	0.12
Al2O3:	0.18	8.06	0.31	0.07	0.01	0.13	7.12	9.40	14.47
FeO :	29.00	20.98	28.88	30.31	30.55	29.29	21.86	18.26	11.89
MnO :	0.04	0.53	0.14	0.14	0.15	0.21	0.39	0.52	0.33
MgO :	0.20	0.00	0.14	0.10	0.17	0.13	0.05	0.08	0.07
CaO :	32.97	33.68	32.86	32.87	32.94	32.77	33.97	34.14	35.58
Cr203:	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SnO2:	3.20	0.10	3.38	2.29	1.76	3.67	0.62	0.89	0.13
Na2O:	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00
K2O :	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL:	100.09	100.13	100.57	100.63	100.52	101.16	100.69	100.56	100.52
FORMULA ESTRUCTURAL	5.90	5.95	5.92	5.91	5.92	5.92	5.95	5.94	5.92
Si(T):	0.04	0.05	0.06	0.01	0.00	0.03	0.05	0.06	0.08
Al(T):	5.93	6.00	5.99	5.92	5.92	5.95	6.00	6.00	6.00
TOTAL (T):									
	0.00	1.49	0.00	0.00	0.00	0.00	1.31	1.72	2.59
Al (M2):	0.22	0.01	0.23	0.16	0.12	0.25	0.04	0.06	0.01
Sn (M2):	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cr (M2):	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0 03	0.01
Ti (M2):	3.74	2.50	3.70	3.84	3.88	3.74	2.65	2.19	1.39
FE3 (M2):	3.96	4.00	3.93	4.00	4.00	3.99	4.00	4.00	4.00
TOTAL M2 :									
Mg (M1):	0.05	0.00	0.04	0.03	0.04	0.03	0.01	0.02	0.02
Fe2 (M1):	0.00	0.06	0 00	0 03	0 02	0.00	0.02	0.01	0.01
Mn (M1):	0.01	0.07	0.02	0.02	0.02	0.03	0.05	0.07	0.04
Ca (M1):	6.05	5.85	5.99	5.98	5.99	5.95	5.91	5.87	5.95
TOTAL M1:	6.10	5.98	6.05	6 06	6.08	6.01	5.99	5.98	6.02
%MOLS									
PIROP:	0.81	0.00	0.58	0.42	0.68	0.50	0.22	0.33	0.27
ESPESSARTINA	0.09	1.21	0.32	0.31	0.35	0.47	0.88	1.16	0.73
UVAROVITA	0.10	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALMANDINA	0.00	0.95	0.00	0.51	0.35	0.00	0.32	0.22	0.12
GROSSULARIA	0.00	35.10	0.00	0.00	0.00	0.00	31.09	40 65	63.45
ANDRADITA	88.65	62.39	88.18	91.38	92.90	87.42	65.53	54 84	35.02
ANDRADITA ESTANNIFERA	10.36	0.32	10.92	7.37	5.71	11.60	1.97	2.80	0.41
ACTIVITATS									
PIROP:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ESPESSARTINA.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UVAROVITA.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALMANDINA.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GROSSULARIA.	0.00	0.13	0.00	0.00	0.00	0.00	0.10	0 17	0.39
ANDRADITA	0.86	0.37	0.83	0.89	0.91	0.84	0.42	0.29	0.12
ANDRADITA ESTANNIFERA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

ANALISI_NUM:	451B-115	455C-54	455C-55	455C-56	464B-151	469-31	469-33	469A-83	469A-87
%PES									
SiO2:	38.29	36.43	35.09	34.70	38.75	38.37	38.68	39.16	39.40
TiO2:	0.23	0.28	0.00	0.04	0.12	0.18	0.22	0.51	0.71
Al2O3:	15.29	8.26	0.13	0.25	16.12	20.88	20.86	20.55	21.21
FeO :	11.53	19.88	31.08	29.72	10.11	3.45	3.07	4.15	3.17
MnO :	0.29	0.14	0.15	0.07	0.25	0.07	0.33	0.21	0.29
MgO :	0.10	0.09	0.12	0.10	0.19	0.29	0.39	0.47	0.47
CaO :	34.88	34.35	32.90	32.82	35.14	34.95	34.32	35.58	35.30
Cr203:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SnO2:	0.14	0.79	0.58	2.60	0.09	0.04	0.12	0.05	0.04
Na2O:	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.04	0.00
K2O :	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
TOTAL:	100.76	100.22	100.05	100.32	100.77	98.23	98.00	100.71	100.59
FORMULA ESTRUCTURAL	5.93	5.91	5.95	5.91	5.97	5.91	5.96	5.91	5.92
Si(T):	0.07	0.09	0.03	0.05	0.03	0.09	0.04	0.09	0.08
Al(T):	6.00	6.00	5.98	5.96	6.00	6.00	6.00	6.00	6.00
TOTAL (T):									
	2.73	1.48	0.00	0.00	2.90	3.70	3.75	3.56	3.68
Al (M2):	0.01	0.05	0.04	0.18	0.01	0.00	0.01	0.00	0.00
Sn (M2):	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cr (M2):	0.03	0.03	0.00	0.01	0.01	0.02	0.03	0.06	0.08
Ti (M2):	1.24	2.43	3.96	3.81	1.09	0.27	0.22	0.38	0.24
FE3 (M2):	4.00	4.00	4.00	3.99	4.00	4.00	4.00	4.00	4.00
TOTAL M2 :									
Mg (M1):	0.02	0.02	0.03	0.03	0.04	0.07	0.09	0.11	0.10
Fe2 (M1):	0.10	0.00	0.01	0.00	0.08	0.11	0.12	0.08	0.11
Mn (M1):	0.04	0.02	0.02	0.01	0.03	0.01	0.04	0.03	0.04
Ca (M1):	5.79	5.97	5.98	5.99	5.80	5.77	5.66	5.75	5.68
TOTAL M1:	5.95	6.01	6.04	6.02	5.95	5.96	5.92	5.96	5.93
%MOLS									
PIROP:	0.40	0.35	0.49	0.42	0.74	1.11	1.49	1.76	1.74
ESPESSARTINA	0.64	0.31	0.36	0.15	0.54	0.15	0.72	0.46	0.61
UVAROVITA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALMANDINA	1.61	0.00	0.10	0.00	1.30	1.89	2.05	1.31	1.75
GROSSULARIA	65.39	36.02	0.00	0.00	69.70	89.35	89.26	85.32	87.74
ANDRADITA	31.53	60.79	97.13	91.00	27.44	7.38	6.12	11.02	8.05
ANDRADITA ESTANNIFERA	0.44	2.53	1.91	8.43	0.28	0.12	0.37	0.14	0.11
ACTIVITATS									
PIROP:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ESPESSARTINA.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UVAROVITA.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALMANDINA.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GROSSULARIA.	0.40	0.13	0.00	0.00	0.47	0.73	0.72	0.66	0.69
ANDRADITA	0.09	0.36	0.96	0.88	0.07	0.00	0.00	0.01	0.01
ANDRADITA ESTANNIFERA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

ANALISIS DE GRANATS A LA MICROSONDA. Skarns Sta LLOGAIA

ANALISI NUM:	469B-104	471B4-42	471b4-44	471B4-49					
%PES									
SiO2:	39.47	37.87	37.12	38.05					
TiO2:	0.82	0.31	0.22	0.14					
Al2O3:	20.22	13.32	10.38	15.83					
FeO :	4.12	12.66	17.45	10.20					
MnO :	0.12	0.67	0.36	0.55					
MgO :	0.46	0.04	0.05	0.04					
CaO :	35.52	34.62	34.67	35.20					
Cr203:	0.00	0.00	0.00	0.00					
SnO2:	0.08	0.36	0.40	0.20					
Na2O:	0.00	0.01	0.00	0.00					
K2O :	0.00	0.00	0.00	0.00					
TOTAL:	100.83	99.86	100.65	100.22					
FORMULA ESTRUCTURAL	5.94	5.98	5.92	5.92					
Si(T):	0.06	0.02	0.08	0.08					
Al(T):	6.00	6.00	6.00	6.00					
TOTAL (T):									
	3.53	2.46	1.87	2.83					
Al (M2):	0.00	0.02	0.03	0.01					
Sn (M2):	0.00	0.00	0.00	0.00					
Cr (M2):	0.09	0.04	0.03	0.02					
Ti (M2):	0.38	1.49	2.07	1.15					
FE3 (M2):	4.00	4.00	4.00	4.00					
TOTAL M2 :									
Mg (M1):	0.10	0.01	0.01	0.01					
Fe2 (M1):	0.08	0.02	0.02	0.04					
Mn (M1):	0.02	0.09	0.05	0.07					
Ca (M1):	5.73	5.85	5.92	5.87					
TOTAL M1:	5.93	5.97	6.00	5.99					
%MOLS									
PIROP:	1.73	0.14	0.18	0.13					
ESPESSARTINA	0.26	1.48	0.80	1.20					
UVAROVITA	0.00	0.00	0.00	0.00					
ALMANDINA	1.35	0.28	0.30	0.74					
GROSSULARIA	84.68	59.15	45.26	68.33					
ANDRADITA	11.74	37.82	52.20	28.95					
ANDRADITA ESTANNIFERA	0.24	1.13	1.28	0.63					
ACTIVITATS									
PIROP:	0.00	0.00	0.00	0.00					
ESPESSARTINA.	0.00	0.00	0.00	0.00					
UVAROVITA.	0.00	0.00	0.00	0.00					
ALMANDINA.	0.00	0.00	0.00	0.00					
GROSSULARIA.	0.66	0.35	0.20	0.45					
ANDRADITA	0.01	0.14	0.26	0.08					
ANDRADITA ESTANNIFERA	0.00	0.00	0.00	0.00					

ANALISIS DE GRANATS A LA MICROSONDA. Skarns ESTERILS

ANALISI NUM:	449E-127	449E-128	449W1D39	449W1D40	449W1D41	449WFC34	449WFC35	449WFD38	449WFD39
%PES									
SiO2:	38.95	38.91	33.93	30.46	33.33	35.08	35.02	31.69	34.34
TiO2:	0.23	0.28	3.48	7.40	4.47	4.10	3.88	5.90	3.78
Al2O3:	17.42	17.39	6.48	6.17	6.37	9.09	9.14	5.84	9.56
FeO :	8.17	8.29	9.00	12.43	14.19	16.04	16.83	12.09	15.11
MnO :	0.13	0.14	0.08	0.11	0.25	0.12	0.05	0.12	0.12
MgO :	0.47	0.47	0.36	0.53	0.56	0.35	0.37	0.46	0.29
CaO :	35.62	35.61	34.80	34.17	34.56	34.28	34.03	33.44	34.49
Cr203:	0.00	0.00	10.28	6.72	4.34	0.00	0.00	11.20	3.10
SnO2:	0.08	0.09	0.08	0.11	0.00	0.09	0.04	0.00	0.00
Na2O:	0.00	0.00	0.00	0.00	0.00	0.06	0.02	0.00	0.00
K2O :	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
TOTAL:	101.08	101.17	98.49	98.10	98.07	99.21	99.40	100.74	100.79
FORMULA ESTRUCTURAL	5.94	5.93	5.62	5.13	5.56	5.69	5.67	5.21	5.51
Si(T):	0.06	0.07	0.38	0.87	0.44	0.31	0.33	0.79	0.49
Al(T):	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
TOTAL (T):									
	3.07	3.06	0.89	0.35	0.81	1.43	1.42	0.34	1.32
Al (M2):	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00
Sn (M2):	0.00	0.00	1.35	0.89	0.57	0.00	0.00	1.45	0.39
Cr (M2):	0.03	0.03	0.43	0.94	0.56	0.50	0.47	0.73	0.46
Ti (M2):	0.89	0.90	1.12	1.58	1.78	1.96	2.05	1.48	1.83
FE3 (M2):	4.00	4.00	3.80	3.77	3.73	3.89	3.95	4.00	4.00
TOTAL M2 :									
Mg (M1):	0.11	0 11	0.09	0.13	0.14	0.08	0.09	0.11	0 07
Fe2 (M1):	0.04	0 04	0.00	0.00	0.00	0.00	0 00	0.01	0.00
Mn (M1):	0.02	0 02	0.01	0 02	0.04	0.02	0.01	0.02	0.02
Ca (M1):	5.82	5.82	6.18	6.16	6.18	5.96	5.91	5.88	5.93
TOTAL M1:	5.99	5.99	6.28	6.31	6.35	6.06	6.00	6.03	6.02
%MOLS									
PIROP:	1.78	1.79	1.56	2.35	2.49	1.45	1.51	1.88	1.16
ESPESSARTINA	0.28	0.29	0.20	0.28	0.63	0.28	0.12	0.28	0.27
UVAROVITA	0.00	0.00	35.43	23.70	15.36	0.00	0.00	36.36	9.84
ALMANDINA	0.67	0.72	0.00	0.00	0.00	0.00	0.00	0.19	0.00
GROSSULARIA	74.04	73.59	21.59	6.73	18.68	34.90	34.31	6.05	31.66
ANDRADITA	22.99	23.33	40.94	66.55	62.84	63.08	63.94	55.25	57.07
ANDRADITA ESTANNIFERA	0.24	0.28	0.28	0.39	0.00	0.30	0.13	0.00	0.00
ACTIVITATS									
PIROP:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ESPESSARTINA.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UVAROVITA.	0.00	0.00	0.10	0.03	0.02	0.00	0.00	0.08	0.01
ALMANDINA.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GROSSULARIA.	0.52	0.52	0.04	0.01	0.04	0.11	0.10	0.00	0.08
ANDRADITA	0.05	0.05	0.14	0.30	0.31	0.33	0.35	0.22	0.27
ANDRADITA ESTANNIFERA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

ANALISIS DE GRANATS A LA MICROSONDA. Skarns ESTERILS

ANALISI NUM:	869B1-26	63410A22	63410A23	63410A24	63410A26	634DOL28	634DOL29		
%PES									
SiO2:	36.13	35.61	34.33	34.34	34.34	36.10	35.86		
TiO2:	0.48	0.00	0.00	0.00	0.00	0.00	0.06		
Al2O3:	10.26	0.00	0.13	0.08	0.90	0.00	0.00		
FeO :	16.58	30.55	29.68	29.90	29.70	32.17	31.78		
MnO :	0.00	0.07	0.05	0.23	0.17	0.03	0.09		
MgO :	0.00	0.00	0.08	0.10	0.00	0.00	0.00		
CaO :	34.07	31.87	32.01	32.12	32.12	33.77	33.64		
Cr203:	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
SnO2:	0.00	0.74	1.03	0.71	0.54	0.21	0.45		
Na2O:	0.03	0.06	0.02	0.01	0.00	0.02	0.00		
K2O :	0.00	0.01	0.02	0.00	0.00	0.00	0.01		
TOTAL:	97.55	98.91	97.35	97.49	97.77	102.30	101.89		
FORMULA ESTRUCTURAL	5.92	6.08	5.98	5.98	5.94	5.98	5.97		
Si(T):	0.08	0.00	0.02	0.02	0.06	0.00	0.00		
Al(T):	6.00	6.08	6.00	5.99	6.00	5.98	5.97		
TOTAL (T):									
	1.91	0.00	0.01	0.00	0.12	0.00	0.00		
Al (M2):	0.00	0.05	0.07	0.05	0.04	0.01	0.03		
Sn (M2):	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Cr (M2):	0.06	0.00	0.00	0.00	0.00	0.00	0.01		
Ti (M2):	2.03	3.93	3.89	3.92	3.84	3.99	3.96		
FE3 (M2):	4.00	3.98	3.97	3.97	4.00	4.00	4.00		
TOTAL M2 :									
Mg (M1):	0.00	0.00	0.02	0.03	0.00	0.00	0.00		
Fe2 (M1):	0.01	0.00	0.00	0.00	0.02	0.02	0.02		
Mn (M1):	0.00	0.01	0.01	0.03	0.02	0.00	0.01		
Ca (M1):	5.98	5.83	5.98	5.99	5.95	5.99	6.00		
TOTAL M1:	6.00	5.84	6.00	6.05	6.00	6.02	6.03		
%MOLS									
PIROP:	0.00	0.00	0.34	0.43	0.00	0.00	0.00		
ESPESSARTINA	0.00	0.17	0.12	0.56	0.41	0.07	0.21		
UVAROVITA	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
ALMANDINA	0.19	0.00	0.00	0.00	0.37	0.35	0.28		
GROSSULARIA	47.49	0.00	0.00	0.00	2.24	0.00	0.00		
ANDRADITA	52.32	97.33	96.01	96.59	95.14	98.90	98.04		
ANDRADITA ESTANNIFERA	0.00	2.50	3.53	2.43	1.84	0.69	1.48		
ACTIVITATS									
PIROP:	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
ESPESSARTINA.	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
UVAROVITA.	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
ALMANDINA.	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
GROSSULARIA.	0.22	0.00	0.00	0.00	0.00	0.00	0.00		
ANDRADITA	0.27	0.93	0.93	0.95	0.89	0.98	0.98		
ANDRADITA ESTANNIFERA	0.00	0.00	0.00	0.00	0.00	0.00	0.00		

ANALISIS DE GRANATS A LA MICROSONDA. Skarns ESTERILS

ANALISI NUM:	449WFD40
%PES	
SiO2:	32.73
TiO2:	5.13
Al2O3:	6.11
FeO :	9.55
MnO :	0.05
MgO :	0.32
CaO :	33.54
Cr2O3:	13.05
SnO2:	0.00
Na2O:	0.00
K2O :	0.01
TOTAL:	100.49
FORMULA ESTRUCTURAL	5.36
Si(T):	0.64
Al(T):	6.00
TOTAL (T):	
	0.53
Al (M2):	0.00
Sn (M2):	1.69
Cr (M2):	0.63
Ti (M2):	1.15
FE3 (M2):	4.00
TOTAL M2 :	
Mg (M1):	0.08
Fe2 (M1):	0.03
Mn (M1):	0.01
Ca (M1):	5.88
TOTAL M1:	5.99
%MOLS	
PIROP:	1.30
ESPESSARTINA	0.12
UVAROVITA	42.20
ALMANDINA	0.42
GROSSULARIA	11.50
ANDRADITA	44.46
ANDRADITA ESTANNIFERA	0.00
ACTIVITATS	
PIROP:	0.00
ESPESSARTINA.	0.00
UVAROVITA.	0.12
ALMANDINA.	0.00
GROSSULARIA.	0.01
ANDRADITA	0.15
ANDRADITA ESTANNIFERA	0.00

ANALISIS DE GRANATS A LA MICROSONDA. SKARNS MIXTES

ANALISI NUM:	827J2B33	827J2B34	827J2B35	827J2B36	826B-13	826B-14	826B-16	826B-17
%PES								
SiO2:	36.76	37.08	37.45	37.27	39.06	39.24	39.05	39.17
TiO2:	0.20	0.21	0.18	0.21	1.02	0.49	1.14	0.71
Al2O3:	11.28	9.73	11.39	11.13	19.65	20.23	19.17	19.61
FeO :	15.60	17.27	14.97	15.68	3.98	3.98	4.13	3.72
MnO :	0.37	0.19	0.34	0.32	0.52	0.44	0.32	0.45
MgO :	0.03	0.12	0.07	0.05	0.40	0.32	0.43	0.35
CaO :	35.20	34.43	35.13	34.51	33.92	34.21	34.25	33.60
Cr203:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SnO2:	0.26	0.55	0.27	0.42	0.00	0.00	0.15	0.17
Na2O:	0.06	0.00	0.00	0.00	0.02	0.00	0.00	0.07
K2O :	0.00	0.00	0.00	0.00	0.01	0.00	0.03	0.00
TOTAL:	99.76	99.58	99.80	99.59	98.58	98.91	98.67	97.85
FORMULA ESTRUCTURAL	5.89	5.98	5.97	5.97	6.00	6.00	6.00	6.05
Si(T):	0.11	0.02	0.03	0.03	0.00	0.00	0.00	0.00
Al(T):	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.05
TOTAL (T):								
	2.02	1.83	2.12	2.07	3.55	3.64	3.47	3.57
Al (M2):	0.02	0.04	0.02	0.03	0.00	0.00	0.01	0.01
Sn (M2):	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cr (M2):	0.02	0.03	0.02	0.03	0.12	0.06	0.13	0.08
Ti (M2):	1.88	2.10	1.80	1.88	0.33	0.30	0.39	0.34
FE3 (M2):	3.95	3.99	3.95	4.00	4.00	4.00	4.00	4.00
TOTAL M2 :								
Mg (M1):	0.01	0.03	0.02	0.01	0.09	0.07	0.10	0.08
Fe2 (M1):	0.00	0.00	0.00	0.01	0 12	0.14	0.08	0.09
Mn (M1):	0.05	0.03	0.05	0.04	0.07	0.06	0.04	0.06
Ca (M1):	6.05	5.95	6.00	5.92	5.58	5.60	5.64	5.56
TOTAL M1:	6.10	6.00	6.07	5.98	5.86	5.88	5.86	5.78
%MOLS								
PIROP:	0.12	0.48	0.28	0.20	1.53	1.22	1.64	1.34
ESPESSARTINA	0.84	0.43	0.77	0.72	1.13	0.95	0.69	0.98
UVAROVITA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALMANDINA	0.00	0.00	0.00	0.15	1.99	2.39	1.37	1.42
GROSSULARIA	50.12	44.57	52.25	50.29	84.21	86.56	82.92	85.27
ANDRADITA	48.08	52.76	45.84	47.31	11.14	8.89	12.92	10.47
ANDRADITA ESTANNIFERA	0.84	1.76	0.87	1.33	0.00	0.00	0.46	0.52
ACTIVITATS								
PIROP:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ESPESSARTINA.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UVAROVITA.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALMANDINA.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GROSSULARIA.	0.25	0.20	0.28	0.25	0.63	0.68	0.63	0.65
ANDRADITA	0.22	0.27	0.21	0.22	0.01	0.01	0.01	0.01
ANDRADITA ESTANNIFERA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

ANALISI NUM:	364A-6	364A-7	364A-8	364A-9	364A-16	6332FF13	6331B-14	6332FF15	6332FF17
%PES									
SiO2:	39.27	38.62	39.38	38.67	39.05	39.17	39.94	38.98	39.80
TiO2:	0.02	0.18	0.05	0.23	0.48	0.62	0.77	1.05	0.53
Al2O3:	21.19	19.61	20.50	19.54	19.84	19.03	20.18	19.59	19.19
FeO :	3.09	6.60	3.96	6.55	4.04	6.56	1.96	5.53	5.94
MnO :	0.13	0.66	0.13	0.59	0.47	0.87	0.00	0.37	0.37
MgO :	0.01	0.05	0.00	0.01	0.12	0.43	0.57	0.43	0.47
CaO :	36.57	34.38	35.85	34.59	35.68	34.27	36.80	34.06	33.99
Cr203:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SnO2:	0.06	0.00	0.04	0.00	0.01	0.00	0.00	0.00	0.00
Na2O:	0.00	0.01	0.02	0.01	0.00	0.03	0.01	0.03	0.00
K2O :	0.03	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL:	100.37	100.23	99.93	100.19	99.69	100.98	100.23	100.04	100.29
FORMULA ESTRUCTURAL	5.93	5.90	5.98	5.90	5.96	5.93	6.02	5.93	6.03
Si(T):	0.07	0.10	0.02	0.10	0.04	0.07	0.00	0.07	0.00
Al(T):	6.00	6.00	6.00	6.00	6.00	6.00	6.02	6.00	6.03
TOTAL (T):									
	3.70	3.43	3.64	3.42	3.53	3.33	3.58	3.43	3.43
Al (M2):	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sn (M2):	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cr (M2):	0.00	0.02	0.01	0.03	0.06	0.07	0.09	0.12	0.06
Ti (M2):	0.29	0.55	0.35	0.55	0.42	0.60	0.22	0.44	0.51
FE3 (M2):	4.00	4.00	4.00	4.00	4.00	4.00	3.89	4.00	4.00
TOTAL M2 :									
Mg (M1):	0.00	0.01	0.00	0.00	0.03	0.10	0.13	0.10	0.11
Fe2 (M1):	0.05	0.18	0.09	0.18	0.04	0.13	0.00	0.17	0.15
Mn (M1):	0.02	0.09	0.02	0.08	0.06	0.11	0.00	0.05	0.05
Ca (M1):	5.92	5.62	5.83	5.66	5.83	5.56	5.94	5.55	5.52
TOTAL M1:	5.99	5.91	5.94	5.91	5.96	5.90	6.07	5.86	5.82
%MOLS									
PIROP:	0.04	0.19	0.00	0.04	0.45	1.62	2.19	1.62	1.77
ESPESSARTINA	0.28	1.42	0.28	1.27	1.01	1.86	0.00	0.79	0.79
UVAROVITA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALMANDINA	0.91	3.08	1.58	2.98	0.71	2.24	0.00	2.81	2.44
GROSSULARIA	91.29	80.95	89.20	81.20	86.00	77.55	89.84	80.64	80.63
ANDRADITA	7.30	14.36	8.82	14.51	11.79	16.73	7.97	14.13	14.37
ANDRADITA ESTANNIFERA	0.18	0.00	0.12	0.00	0.03	0.00	0.00	0.00	0.00
ACTIVITATS									
PIROP:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ESPESSARTINA.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UVAROVITA.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALMANDINA.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GROSSULARIA.	0.80	0.57	0.75	0.58	0.70	0.53	0.79	0.56	0.58
ANDRADITA	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.02
ANDRADITA ESTANNIFERA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

ANALISIS DE GRANATS A LA MICROSONDA. Skarns d' ARSENOPIRITA

ANALISI NUM:	*6332FF18	6332FF20
%PES		
SiO2:	39.65	39.70
TiO2:	0.68	0.37
Al2O3:	19.38	18.93
FeO :	6.44	7.19
MnO :	0.00	0.00
MgO :	0.46	0.39
CaO :	33.86	34.28
Cr203:	0.00	0.00
SnO2:	0.00	0.00
Na2O:	0.00	0.05
K2O :	0.14	0.00
TOTAL:	100.61	100.91
FORMULA ESTRUCTURAL	5.99	6.00
Si(T):	0.01	0.00
Al(T):	6.00	6.00
TOTAL (T):		
	3.44	3.37
Al (M2):	0.00	0.00
Sn (M2):	0.00	0.00
Cr (M2):	0.08	0.04
Ti (M2):	0.48	0.59
FE3 (M2):	4.00	4.00
TOTAL M2 :		
Mg (M1):	0.10	0 09
Fe2 (M1):	0.22	0.20
Mn (M1):	0.00	0.00
Ca (M1):	5.48	5.55
TOTAL M1:	5.81	5.84
%MOLS		
PIROP:	1.73	1.46
ESPESSARTINA	0.00	0.00
UVAROVITA	0.00	0.00
ALMANDINA	3.71	3.39
GROSSULARIA	80.52	79.30
ANDRADITA	14.04	15.85
ANDRADITA ESTANNIFERA	0.00	0.00
ACTIVITATS		
PIROP:	0.00	0.00
ESPESSARTINA.	0.00	0.00
UVAROVITA.	0.00	0.00
ALMANDINA.	0.00	0.00
GROSSULARIA.	0.56	0.56
ANDRADITA	0.02	0.02
ANDRADITA ESTANNIFERA	0.00	0.00

ANALISI NUM:	856A-52	856A-53
%PES		
SiO2:	37.38	38.68
TiO2:	0.18	0.00
Al2O3:	15.70	17.71
FeO :	12.79	8.69
MnO :	0.35	0.59
MgO :	0.34	0.23
CaO :	32.29	33.71
Cr203:	0.00	0.00
SnO2:	0.01	0.00
Na2O:	0.00	0.00
K2O :	0.00	0.00
TOTAL:	99.04	99.61
FORMULA ESTRUCTURAL	5.88	5.97
Si(T):	0.12	0.03
Al(T):	6.00	6.00
TOTAL (T):		
	2.79	3.20
Al (M2):	0.00	0.00
Sn (M2):	0.00	0.00
Cr (M2):	0.02	0.00
Ti (M2):	1.19	0.80
FE3 (M2):	4.00	4.00
TOTAL M2 :		
Mg (M1):	0 08	0.05
Fe2 (M1):	0.29	0.18
Mn (M1):	0.05	0.08
Ca (M1):	5.44	5.58
TOTAL M1:	5.86	5.89
%MOLS		
PIROP:	1.33	0.88
ESPESSARTINA	0.78	1.29
UVAROVITA	0.00	0.00
ALMANDINA	4.84	3.08
GROSSULARIA	62.73	74.63
ANDRADITA	30.29	20.12
ANDRADITA ESTANNIFERA	0.03	0.00
ACTIVITATS		
PIROP:	0.00	0.00
ESPESSARTINA.	0.00	0.00
UVAROVITA.	0.00	0.00
ALMANDINA.	0.00	0.00
GROSSULARIA.	0.34	0.51
ANDRADITA	0.07	0.03
ANDRADITA ESTANNIFERA	0.00	0.00

ANALISIS DE GRANATS A LA MICROSONDA. SKARNS MAGNETITA

ANALISI NUM:	862L-12	849C-32	849C-33	856A1-19	856A1-21	856A1-22	856A-45	856A-46
%PES								
SiO2:	35.17	37.81	38.32	38.04	38.56	38.73	37.23	38.68
TiO2:	0.00	0.96	0.86	0.18	0.35	0.28	0.01	0.00
Al2O3:	0.51	16.63	16.30	18.11	17.49	17.68	16.73	16.88
FeO :	29.97	8.51	8.92	10.42	11.37	11.36	9.16	11.97
MnO :	0.08	1.93	1.71	0.55	0.44	0.56	0.74	0.37
MgO :	0.07	0.50	0.31	0.58	0.64	0.73	0.00	0.31
CaO :	33.14	31.25	31.77	31.25	31.47	31.13	35.29	32.62
Cr203:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SnO2:	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.00
Na2O:	0.00	0.00	0.00	0.03	0.00	0.01	0.02	0.00
K2O :	0.00	0.04	0.03	0.01	0.03	0.00	0.00	0.00
TOTAL:	98.94	97.63	98.22	99.17	100.37	100.49	99.18	100.83
FORMULA ESTRUCTURAL	6.00	5.97	6.02	5.89	5.91	5.93	5.85	5.93
Si(T):	0.00	0.03	0.03	0.11	0.09	0.07	0.15	0.07
Al(T):	6.00	6.00	6.05	6.00	6.00	6.00	6.00	6.00
TOTAL (T):								
	0.10	3.07	2.99	3.20	3.08	3.11	2.94	2.99
Al (M2):	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sn (M2):	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cr (M2):	0.00	0.11	0.10	0.02	0.04	0.03	0.00	0.00
Ti (M2):	3.85	0.82	0.91	0.78	0.88	0.85	1.06	1.01
FE3 (M2):	3.95	4.00	4.00	4.00	4.00	4.00	4.00	4.00
TOTAL M2 :								
Mg (M1):	0.02	0.12	0.07	0.13	0.15	0.17	0.00	0.07
Fe2 (M1):	0.00	0.17	0.13	0.39	0.39	0.41	0.02	0.33
Mn (M1):	0.01	0.26	0.23	0.07	0.06	0.07	0.10	0.05
Ca (M1):	6.05	5.29	5.35	5.18	5.17	5.10	5.94	5.36
TOTAL M1:	6.08	5.84	5.78	5.78	5.76	5.75	6.06	5.81
%MOLS								
PIROP:	0.30	1.96	1.21	2.23	2.44	2.77	0.00	1.18
ESPESSARTINA	0.20	4.30	3.79	1.20	0.95	1.21	1.64	0.80
UVAROVITA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALMANDINA	0.00	2.90	2.19	6.49	6.45	6.79	0.38	5.53
GROSSULARIA	2.03	67.52	67.54	69.99	67.04	67.02	71.53	67.15
ANDRADITA	97.47	23.32	25.27	20.09	23.06	22.17	26.45	25.33
ANDRADITA ESTANNIFERA	0.00	0.00	0.00	0.00	0.06	0.03	0.00	0.00
ACTIVITATS								
PIROP:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ESPESSARTINA.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UVAROVITA.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALMANDINA.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GROSSULARIA.	0.00	0.40	0.40	0.39	0.36	0.36	0.48	0.38
ANDRADITA	0.94	0.04	0.05	0.03	0.04	0.03	0.07	0.05
ANDRADITA ESTANNIFERA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

ANÀLISIS DE GRANATS A LA MICROSONDA: Skarns DE MAGNETITA

ANALISI NUM:	862L-1	862L-2	862L-3	862L-4	862L-5	862L-6	862L-7	862L-10	862L-11
%PES									
SiO2:	35.04	33.97	35.01	35.70	34.67	35.21	35.68	35.12	35.03
TiO2:	0.02	0.00	0.00	0.09	0.05	0.06	0.03	0.00	0.00
Al2O3:	0.52	0.00	0.27	4.06	1.02	0.87	6.10	0.00	0.37
FeO :	30.08	29.80	29.24	25.31	30.43	29.80	22.43	30.33	30.62
MnO :	0.12	0.21	0.20	0.27	0.11	0.19	0.18	0.04	0.12
MgO :	0.00	0.08	0.00	0.00	0.05	0.00	0.00	0.06	0.00
CaO :	33.02	33.70	33.03	33.56	33.44	32.67	33.60	33.06	33.30
Cr203:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SnO2:	0.11	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.10
Na2O:	0.06	0.03	0.03	0.00	0.00	0.00	0.02	0.01	0.00
K2O :	0.02	0.03	0.04	0.00	0.01	0.00	0.02	0.00	0.00
TOTAL:	98.99	97.82	97.82	98.99	99.78	98.88	98.06	98.62	99.54
FORMULA ESTRUCTURAL	5.98	5.91	6.04	5.97	5.88	6.00	5.96	6.02	5.96
Si(T):	0.02	0.00	0.00	0.03	0.12	0.00	0.04	0.00	0.04
Al(T):	6.00	5.91	6.04	6.00	6.00	6.00	6.00	6.02	6.00
TOTAL (T):									
	0.09	0.00	0.05	0.77	0.08	0.17	1.16	0.00	0.03
Al (M2):	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01
Sn (M2):	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cr (M2):	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00
Ti (M2):	3.86	3.90	3.80	3.19	3.88	3.82	2.82	3.91	3.92
FE3 (M2):	3.96	3.90	3.85	3.97	3.97	4.00	3.98	3.91	3.96
TOTAL M2 :									
Mg (M1):	0.00	0.02	0.00	0 00	0.01	0.00	0.00	0.02	0.00
Fe2 (M1):	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mn (M1):	0.02	0.03	0.03	0.04	0.02	0.03	0.03	0.01	0.02
Ca (M1):	6.04	6.28	6.10	6 01	6.07	5.96	6.01	6.07	6.07
TOTAL M1:	6.05	6.33	6.13	6.05	6.10	5.99	6.04	6.09	6.08
%MOLS									
PIROP:	0.00	0.35	0.00	0.00	0.21	0.00	0.00	0.26	0.00
ESPESSARTINA	0.29	0.52	0.51	0.64	0.27	0.46	0.43	0.10	0.29
UVAROVITA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALMANDINA	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00
GROSSULARIA	1.86	0.00	0.92	18.82	1.58	3.76	28.70	0.00	0.49
ANDRADITA	97.48	99.12	98.57	80.53	97.94	95.44	70.87	99.64	98.88
ANDRADITA ESTANNIFERA	0.38	0.00	0.00	0.00	0.00	0.27	0.00	0.00	0.34
ACTIVITATS									
PIROP:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ESPESSARTINA.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UVAROVITA.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALMANDINA.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GROSSULARIA.	0.00	0.00	0.00	0.04	0.00	0.00	0.08	0.00	0.00
ANDRADITA	0.94	1.01	0.94	0.64	0.93	0.90	0.49	0.99	0.97
ANDRADITA ESTANNIFERA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

ANALISIS PIROXENS

SKARNS D'HEDENBERGITA

ANALISI NUM:	480a1	480A2	480A3	480A4	480A6	480A7	480A9	131-48	131-49
SiO2 :	49.04	49.02	49.42	48.08	48.96	49.16	48.54	48.70	48.90
TiO2 :	0.05	0.00	0.00	0.00	0.00	0.07	0.00	0.11	0.02
Al2O3:	0.34	0.23	0.14	0.24	0.15	0.19	0.12	0.29	0.11
FeO :	24.35	22.09	22.44	21.85	22.73	22.17	23.39	24.39	25.05
MnO :	2.87	5.16	5.30	5.48	5.21	5.82	4.03	3.32	2.74
MgO :	0.35	0.00	0.04	0.04	0.09	0.00	0.25	0.27	0.82
CaO :	22.80	22.61	22.59	22.23	22.68	22.59	22.35	23.15	23.58
Cr203:	0.08	0.07	0.05	0.00	0.00	0.06	0.07	0.15	0.15
SnO2 :	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.08
Na2O :	0.00	0.03	0.04	0.12	0.02	0.08	0.12	0.02	0.02
K2O :	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL :	99.88	99.21	%100.03	98.04	99.84	%100.14	98.87	100.45	101.47
Si(T):	2.01	2.02	2.02	2.01	2.01	2.01	2.01	1.99	1.98
Al(T):	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02
Al:	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-0.01
Sn:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cr:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ti:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mg	0.02	0.00	0.00	0.00	0.01	0.00	0.02	0.02	0.05
Fe2	0.83	0.76	0.77	0.76	0.78	0.76	0.81	0.83	0.85
Mn:	0.10	0.18	0.18	0.19	0.18	0.20	0.14	0.11	0.09
Ca:	1.00	1.00	0.99	1.00	1.00	0.99	0.99	1.01	1.02
% MOLS DIOPSIDA:	1.09	0.00	0.13	0.13	0.28	0.00	0.79	0.83	2.46
% MOLS HEDENBER.	47.75	48.54	48.94	48.98	48.95	49.23	48.58	47.94	46.77
% MOLS WOLLASTO.	51.16	51.46	50.93	50.90	50.77	50.77	50.63	51.23	50.77
a DIOPSIDA:	0.02	0.00	0.00	0.00	0.01	0.00	0.02	0.02	0.05
a HEDEMBERGITA:	0.84	0.77	0.78	0.77	0.79	0.76	0.81	0.84	0.85

ANALISIS PIROXENS

SKARNS D'ARSENOPIRITA

ANALISI NUM:	6332EE10	6332EE11	364AC10	364AC11	364AC12
SiO2 :	47.34	46.55	54.06	52.95	52.99
TiO2 :	0.64	0.97	0.12	0.00	0.06
Al2O3:	8.88	9.08	0.60	0.42	0.62
FeO :	6.62	6.45	3.77	6.07	4.89
MnO :	0.52	0.17	0.20	0.51	0.35
MgO :	11.05	10.41	15.75	14.16	15.15
CaO :	25.29	25.29	25.15	24.39	24.94
Cr203:	0.00	0.00	0.00	0.00	0.00
SnO2 :	0.00	0.00	0.00	0.00	0.02
Na2O :	0.05	0.11	0.00	0.00	0.03
K2O :	0.00	0.00	0.01	0.00	0.00
TOTAL :	100.39	99.03	99.66	98.50	99.05
Si(T):	1.77	1.76	1.99	1.99	1.98
Al(T):	0.23	0.24	0.01	0.01	0.02
Al:	0.00	0.00	0.00	0.00	0.00
Sn:	0.00	0.00	0.00	0.00	0.00
Cr:	0.00	0.00	0.00	0.00	0.00
Ti:	0.02	0.03	0.00	0.00	0.00
Mg	0.61	0.59	0.86	0.79	0.84
Fe2	0.21	0.20	0.12	0.19	0.15
Mn:	0.02	0.01	0.01	0.02	0.01
Ca:	1.01	1.02	0.99	0.98	1.00
% MOLS DIOPSIDA:	33.24	32.22	43.68	40.01	42.06
% MOLS HEDENBER.	12.07	11.50	6.18	10.44	8.17
% MOLS WOLLASTO.	54.69	56.27	50.14	49.54	49.77
a DIOPSIDA:	0.48	0.46	0.85	0.78	0.82
a HEDEMBERGITA:	0.16	0.16	0.11	0.19	0.15

ANALISIS PIROXENS

SKARNS PIRROTINA

ANALISI NUM:	869B1A22	869B1A23	869B1A24	869B1A25
SiO2 :	51.89	53.51	47.95	53.53
TiO2 :	0.03	0.02	0.23	0.02
Al2O3:	0.76	0.51	1.72	0.85
FeO :	16.05	2.47	7.47	2.40
MnO :	0.16	0.27	0.09	0.17
MgO :	11.56	16.75	15.03	16.60
CaO :	16.26	25.39	22.68	25.24
Cr203:	0.00	0.00	0.00	0.00
SnO2 :	0.00	0.00	0.00	0.00
Na2O :	0.05	0.01	0.00	0.00
K2O :	0.04	0.00	0.05	0.00
TOTAL :	96.80	98.93	95.22	98.81
Si(T):	2.03	1.98	1.89	1.98
Al(T):	0.00	0.02	0.08	0.02
Al:	0.00	0.00	0.00	0.00
Sn:	0.00	0.00	0.00	0.00
Cr:	0.00	0.00	0.00	0.00
Ti:	0.00	0.00	0.01	0.00
Mg	0.67	0.92	0.88	0.91
Fe2	0.52	0.08	0.25	0.07
Mn:	0.01	0.01	0.00	0.01
Ca:	0.68	1.00	0.96	1.00
% MOLS DIOPSIDA:	35.74	45.84	42.25	45.87
% MOLS HEDENBER.	28.13	4.21	11.93	3.99
% MOLS WOLLASTO.	36.13	49.95	45.83	50.14
a DIOPSIDA:	0.47	0.91	0.75	0.89
a HEDEMBERGITA:	0.37	0.07	0.21	0.07

ANALISIS PIROXENS — SKARN PIRROTINA

ANALISI NUM:	869A1	869A2	869A3	869A4	869A5	869A6	869A7	869A8	869B1A21
SiO2 :	53.90	53.78	54.47	54.15	54.24	53.74	53.34	52.14	53.40
TiO2 :	0.00	0.49	0.05	0.09	0.24	0.11	0.07	0.13	0.23
Al2O3:	0.16	1.53	0.04	0.59	0.47	0.41	0.09	1.24	0.76
FeO :	3.76	3.92	3.81	3.30	3.51	5.71	6.69	4.43	3.95
MnO :	0.13	0.12	0.12	0.08	0.15	0.00	0.71	0.24	0.17
MgO :	16.14	15.62	16.31	15.72	16.24	14.48	13.62	15.20	15.23
CaO :	24.80	24.80	24.70	24.50	24.28	24.35	23.98	24.40	25.30
Cr203:	0.00	0.13	0.00	0.05	0.06	0.00	0.04	0.15	0.00
SnO2 :	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na2O :	0.03	0.03	0.06	0.13	0.07	0.03	0.01	0.02	0.00
K2O :	0.00	0.00	0.03	0.00	0.05	0.00	0.00	0.00	0.00
TOTAL :	98.92	100.42	99.59	98.61	99.31	98.83	98.55	97.95	99.04
Si(T):	2.00	1.96	2.00	2.00	2.00	2.00	2.01	1.96	1.98
Al(T):	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.04	0.02
Al:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sn:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cr:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ti:	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.01
Mg	0.89	0.85	0.89	0.87	0.89	0.80	0.77	0.85	0.84
Fe2	0.12	0.12	0.12	0.10	0.11	0.18	0.21	0.14	0.12
Mn:	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.01
Ca:	0.98	0.97	0.97	0.97	0.96	0.97	0.97	0.98	1.01
% MOLS DIOPSIDA:	44.65	43.74	44.97	44.62	45.43	41.15	38.90	42.98	42.63
% MOLS HEDENBER.	6.04	6.35	6.08	5.39	5.75	9.11	11.87	7.42	6.47
% MOLS WOLLASTO.	49.31	49.91	48.95	49.99	48.82	49.74	49.23	49.60	50.90
a DIOPSIDA:	0.87	0.79	0.87	0.84	0.85	0.79	0.75	0.80	0.83
a HEDEMBERGITA:	0.11	0.11	0.11	0.10	0.10	0.17	0.21	0.13	0.12

PIROXENS Sta LLOGAIA

ANALISI NUM:	423A26	423A27	423AC28	423AB36	423AE37	423AE38	423A40	455C52	455C53
SiO2:	52.55	52.96	49.34	52.13	51.14	53.89	48.98	53.40	53.47
TiO2:	0.12	0.13	0.01	0.01	0.02	0.00	0.01	0.04	0.03
Al2O3:	1.25	1.37	0.17	0.42	0.57	0.31	0.08	0.56	0.45
FeO:	7.08	5.49	20.14	10.65	14.37	4.12	22.19	4.78	4.57
MnO:	0.38	0.47	3.35	0.45	1.51	0.48	3.97	0.30	0.26
MgO:	13.81	14.42	3.75	11.48	8.47	15.63	2.04	15.09	15.38
CaO:	24.74	25.19	22.85	24.65	22.99	25.43	22.86	25.30	25.45
Cr2O3:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SnO2:	0.06	0.05	0.12	0.06	0.09	0.09	0.08	0.06	0.05
Na2O:	0.06	0.06	0.08	0.02	0.37	0.02	0.04	0.06	0.06
K2O:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL:	100.03	100.13	99.82	99.87	99.53	99.97	100.25	99.59	99.71
Si(T):	1.96	1.96	1.99	1.98	1.99	1.99	1.99	1.98	1.98
Al(T):	0.04	0.04	0.01	0.02	0.01	0.01	0.00	0.02	0.02
Al:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sn:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ti:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mg:	0.77	0.80	0.23	0.65	0.49	0.86	0.12	0.83	0.85
Fe2:	0.22	0.17	0.68	0.34	0.47	0.13	0.75	0.15	0.14
Mn:	0.01	0.01	0.11	0.01	0.05	0.02	0.14	0.01	0.01
Ca:	0.99	1.00	0.99	1.00	0.96	1.00	0.99	1.00	1.01
% MOLS DIOPSIDA.	38.59	40.19	11.24	32.40	24.98	42.83	6.16	41.78	42.26
% MOLS HEDENBER.	11.71	9.32	39.56	17.59	26.30	7.08	44.33	7.90	7.46
% MOLS WOLLASTO.	49.70	50.48	49.20	50.00	48.72	50.09	49.52	50.33	50.28
a DIOPSIDA:	0.73	0.76	0.22	0.64	0.46	0.85	0.12	0.82	0.84
a HEDENBERGITA:	0.21	0.16	0.66	0.33	0.44	0.13	0.74	0.15	0.14

PIROXENS	Sta LLOGAIA								
ANALISI NUM:	440-54	469B101	469B102	451B122	451B123	433B146	433B147	452A161	452A162
SiO2:	53.70	16.70	53.20	53.63	52.72	53.39	50.24	53.08	51.76
TiO2:	0.00	0.20	0.12	0.05	0.09	0.05	0.07	0.15	0.40
Al2O3:	0.29	53.98	1.21	0.53	0.80	0.33	0.12	1.26	2.44
FeO:	3.44	1.64	2.43	4.92	6.70	7.25	17.52	4.15	5.88
MnO:	0.49	0.17	0.25	0.70	0.91	0.59	2.04	0.55	0.48
MgO:	16.15	0.03	16.11	14.76	13.69	13.65	5.88	15.06	13.55
CaO:	25.62	25.72	25.43	25.50	25.17	24.88	23.38	25.37	24.92
Cr2O3:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SnO2:	0.00	0.00	0.05	0.08	0.03	0.04	0.13	0.09	0.05
Na2O:	0.00	0.18	0.10	0.01	0.01	0.03	0.07	0.05	0.13
K2O:	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
TOTAL:	99.69	98.62	98.88	100.17	100.12	100.20	99.44	99.75	99.60
Si(T):	1.98	0.63	1.97	1.98	1.97	1.99	1.99	1.96	1.93
Al(T):	0.01	1.37	0.03	0.02	0.03	0.01	0.01	0.04	0.07
Al:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sn:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ti:	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Mg:	0.89	0.00	0.89	0.81	0.76	0.76	0.35	0.83	0.75
Fe2:	0.11	0.05	0.08	0.15	0.21	0.23	0.58	0.13	0.18
Mn:	0.02	0.01	0.01	0.02	0 03	0.02	0.07	0.02	0.02
Ca:	1.01	1.04	1.01	1.01	1.01	0.99	0.99	1.00	1.00
% MOLS DIOPSIDA.	43.91	0.16	44.89	40.72	37.96	37.98	17.46	41.90	38.67
% MOLS HEDENBER.	6.01	5.21	4.18	8.71	11.86	12.25	32 64	7.36	10.19
% MOLS WOLLASTO.	50.08	94.63	50.93	50.57	50.19	49.77	49.90	50.74	51.14
a DIOPSIDA:	0.88	0.00	0.86	0.81	0.74	0.74	0.34	0.80	0.70
a HEDENBERGITA:	0.11	0.01	0.07	0.15	0.20	0.22	0.58	0.12	0.17

PIROXENS STA llogaia

ANALISI NUM:	432A31	434A2B34	434A2F35	434A2C36	434A2F39	434A2C40	429AC44	429AD45	429AE46
SiO2:	48.76	49.19	48.01	48.97	48.82	49.24	51.59	50.91	51.96
TiO2:	0.01	0.00	0.03	0.12	0.07	0.02	0.01	0.06	0.05
Al2O3:	0.08	0.07	0.21	0.74	0.23	0.11	0.16	0.18	0.39
FeO:	24.04	21.21	24.22	22.39	22.90	21.63	12.46	14.09	10.98
MnO:	1.09	1.28	2.47	1.16	1.11	1.22	0.79	0.74	0.48
MgO:	2.57	4.27	1.63	3.74	3.35	4.33	10.58	9.28	11.65
CaO:	23.05	23.03	22.66	23.40	23.04	23.25	24.43	24.31	25.03
Cr2O3:	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SnO2:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na2O:	0.04	0.07	0.04	0.05	0.10	0.06	0.00	0.06	0.01
K2O:	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.02	0.00
TOTAL:	99.65	99.12	99.28	100.57	99.62	99.87	100.02	99.65	100.56
Si(T):	1.99	1.99	1.98	1.96	1.98	1.98	1.98	1.98	1.97
Al(T):	0.00	0.00	0.01	0.03	0.01	0.01	0.01	0.01	0.02
Al:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sn:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ti:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mg:	0.16	0.26	0.10	0.22	0.20	0.26	0.60	0.54	0.66
Fe2:	0.82	0.72	0.84	0.75	0.78	0.73	0.40	0.46	0.35
Mn:	0.04	0.04	0.09	0.04	0.04	0.04	0.03	0.02	0.02
Ca:	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.01	1.02
% MOLS DIOPSIDA.	7.74	12.75	4.96	11.07	10.04	12.79	29.74	26.45	32.29
% MOLS HEDENBER.	42.43	37.75	45.55	39.14	40.37	37.88	20.91	23.73	17.84
% MOLS WOLLASTO.	49.83	49.49	49.49	49.79	49.59	49.33	49.35	49.82	49.87
a DIOPSIDA:	0.16	0.25	0.10	0.22	0.20	0.25	0.59	0.53	0.65
a HEDENBERGITA:	0.81	0.71	0.82	0.72	0.76	0.71	0.39	0.45	0.34

PIROXENS	SKARN DE Sta LLOGAIA								
ANALISI NUM:	442C18	442D-20	442D21	432D24	432AC25	432AC26	432AC27	432AE28	432A30
SiO2:	52.86	53.25	52.40	48.28	48.35	48.90	48.72	48.31	36.72
TiO2:	0.15	0.06	0.02	0.02	0.00	0.07	0.00	0.00	0.03
Al2O3:	1.93	0.92	0.98	0.07	0.11	0.03	0.04	0.03	8.06
FeO:	5.45	3.57	6.82	24.71	25.67	23.75	25.01	24.63	18.90
MnO:	0.42	0.55	1.05	2.40	1.53	2.06	1.18	2.33	0.53
MgO:	14.16	15.98	13.20	1.27	1.29	2.21	1.99	1.42	0.00
CaO:	25.31	25.58	25.30	22.71	22.98	23.18	23.00	22.96	33.68
Cr2O3:	0.04	0.01	0.03	0.01	0.02	0.01	0.00	0.03	0.01
SnO2:	0.01	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00
Na2O:	0.03	0.01	0.20	0.04	0.04	0.02	0.00	0.04	0.00
K2O:	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.01
TOTAL:	100.37	99.92	100.10	99.52	99.99	100.23	99.95	99.75	97.95
Si(T):	1.95	1.96	1.96	1.99	1.98	1.99	1.99	1.98	1.57
Al(T):	0.05	0.04	0.04	0.00	0.01	0.00	0.00	0.00	0.41
Al:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sn:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ti:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mg:	0.78	0.88	0.74	0.08	0.08	0.13	0.12	0.09	0.00
Fe2:	0.17	0.11	0.21	0.85	0.88	0.81	0.85	0.85	0.68
Mn:	0.01	0.02	0.03	0.08	0.05	0.07	0.04	0.08	0.02
Ca:	1.00	1.01	1.01	1.00	1.01	1.01	1.01	1.01	1.55
% MOLS DIOPSIDA.	39.72	43.58	36.85	3.87	3.90	6.63	5.99	4.29	0.00
% MOLS HEDENBER.	9.25	6.31	12.36	46.40	46.17	43.44	44.26	45.80	31.05
% MOLS WOLLASTO.	51.03	50.12	50.78	49.74	49.93	49.93	49.75	49.91	68.95
a DIOPSIDA:	0.74	0.85	0.72	0.08	0.08	0.13	0.12	0.09	0.00
a HEDENBERGITA:	0.16	0.11	0.21	0.84	0.87	0.80	0.85	0.84	0.65

PIRROTINA SKARNS MIXTES

ANALISI NUM:	827F2C10	827F2C11	827F212	827F2D13	827F2D14	827F2D16	827F2C18	827J2B37	827J2B38
SiO2:	49.60	49.27	49.87	49.10	49.23	49.48	49.58	53.60	53.14
TiO2:	0.05	0.11	0.23	0.09	0.08	0.00	0.02	0.03	0.00
Al2O3:	0.10	0.12	0.27	0.19	0.15	0.06	0.20	0.24	0.26
FeO:	23.71	23.86	19.87	26.21	25.95	24.46	24.08	5.60	6.00
MnO:	1.20	1.19	1.06	0.83	1.33	1.21	1.15	0.27	0.40
MgO:	3.29	3.42	5.63	1.87	2.89	2.95	3.57	14.98	14.64
CaO:	21.87	20.84	22.08	20.61	19.47	21.42	20.68	24.88	25.38
Cr2O3:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SnO2:	0.00	0.08	0.00	0.04	0.01	0.04	0.00	0.06	0.07
Na2O:	0.17	0.29	0.15	0.30	0.19	0.09	0.16	0.06	0.00
K2O:	0.06	0.00	0.02	0.00	0.09	0.04	0.09	0.05	0.00
TOTAL:	100.05	99.18	99.18	99.24	99.39	99.75	99.53	99.77	99.89
Si(T):	2.00	2.00	1.99	2.01	2.01	2.01	2.01	1.99	1.98
Al(T):	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.01
Al:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sn:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ti:	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Mg:	0.20	0.21	0.33	0.11	0.18	0.18	0.22	0.83	0.81
Fe2:	0.80	0.81	0.66	0.90	0.89	0.83	0.81	0.17	0.19
Mn:	0.04	0.04	0.04	0.03	0.05	0.04	0.04	0.01	0.01
Ca:	0.94	0.91	0.94	0.90	0.85	0.93	0.90	0.99	1.01
% MOLS DIOPSIDA.	9.97	10.53	16.93	5.87	8.97	9.00	10.95	41.43	40.13
% MOLS HEDENBER.	42.39	43.33	35.34	47.64	47.57	44.00	43.45	9.12	9.85
% MOLS WOLLASTO.	47.64	46.14	47.73	46.49	43.46	47.00	45.60	49.46	50.01
a DIOPSIDA:	0.19	0.19	0.31	0.10	0.15	0.17	0.19	0.81	0.80
a HEDENBERGITA:	0.75	0.74	0.62	0.82	0.76	0.78	0.73	0.17	0.19

	PIROXENS		SKARN Sta LLOGAIA						
ANALISI NUM:	455CB57	455CB58	174BC64	174BC65	174BB67	174BA70	174BA74	432AA79	432AA80
SiO2:	54.02	52.43	49.65	49.98	50.16	49.63	49.30	48.93	49.63
TiO2:	0.07	0.04	0.04	0.00	0.04	0.03	0.06	0.03	0.05
Al2O3:	0.74	0.83	0.22	0.17	0.29	0.31	0.25	0.05	0.03
FeO:	2.60	4.39	20.82	20.68	19.63	20.74	20.84	21.49	21.13
MnO:	0.21	0.20	1.00	1.03	0.95	1.07	1.10	3.30	1.33
MgO:	16.48	15.51	4.77	4.93	5.47	4.72	4.48	2.86	4.32
CaO:	25.54	25.56	23.09	23.56	23.20	23.22	23.29	23.19	23.56
Cr2O3:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SnO2:	0.06	0.04	0.02	0.05	0.09	0.07	0.07	0.05	0.03
Na2O:	0.07	0.05	0.12	0.07	0.14	0.13	0.11	0.00	0.03
K2O:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL:	99.79	99.04	99.73	100.47	99.98	99.92	99.50	99.90	100.10
Si(T):	1.98	1.96	1.99	1.98	1.99	1.98	1.98	1.98	1.99
Al(T):	0.02	0.04	0.01	0.01	0.01	0.01	0.01	0.00	0.00
Al:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sn:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ti:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mg:	0.90	0.86	0.28	0.29	0.32	0.28	0.27	0.17	0.26
Fe2:	0.08	0.14	0.70	0.69	0.65	0.69	0.70	0.73	0.71
Mn:	0.01	0.01	0.03	0.03	0.03	0.04	0.04	0.11	0.05
Ca:	1.00	1.02	0.99	1.00	0.99	0.99	1.00	1.01	1.01
% MOLS DIOPSIDA.	45.26	42.54	14.18	14.47	16.24	14.03	13.36	8.55	12.76
% MOLS HEDENBER.	4.32	7.06	36.45	35.80	34.28	36.39	36.74	41.64	37.24
% MOLS WOLLASTO.	50.42	50.40	49.37	49.73	49.48	49.58	49.91	49.82	50.00
a DIOPSIDA:	0.88	0.84	0.28	0.29	0.32	0.27	0.26	0.17	0.26
a HEDENBERGITA:	0.08	0.13	0.68	0.68	0.63	0.68	0.69	0.72	0.70

ANALISIS PIROXENS SKARNS D'HEDENBERGITA

ANALISI NUM:	413A1544	413A1552	413A1556	413A1559	131-42	131-43	131-44
SiO2 :	49.93	52.07	49.99	48.69	47.94	49.20	48.17
TiO2 :	0.00	0.00	0.00	0.01	0.00	0.07	0.03
Al2O3:	0.00	0.00	0.00	0.08	0.55	0.04	0.19
FeO :	19.22	11.70	15.43	15.36	24.67	22.24	24.77
MnO :	3.24	1.84	2.29	1.77	3.87	4.85	3.15
MgO :	3.48	9.88	6.96	6.89	0.12	1.66	0.00
CaO :	22.64	24.47	23.97	25.02	22.90	23.01	23.14
Cr203:	0.20	0.13	0.19	0.13	0.18	0.15	0.24
SnO2 :	0.10	0.11	0.09	0.02	0.41	0.00	0.12
Na2O :	0.00	0.00	0.00	0.00	0.12	0.08	0.03
K2O :	0.00	0.01	0.02	0.02	0.05	0.00	0.00
TOTAL :	98.81	100.21	98.94	97.99	100.81	101.30	99.84
Si(T):	2.02	1.99	1.98	1.96	1.97	1.99	1.99
Al(T):	0.00	0.01	0.02	0.04	0.03	0.01	0.01
Al:	0.00	-0.01	-0.02	-0.04	-0.01	-0.01	-0.00
Sn:	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Cr:	0.01	0.00	0.01	0.00	0.01	0.00	0.01
Ti:	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mg	0.21	0.56	0.41	0.41	0.01	0.10	0.00
Fe2	0.65	0.37	0.51	0.52	0.85	0.75	0.86
Mn:	0.11	0.06	0.08	0.06	0.13	0.17	0.11
Ca:	0.98	1.00	1.02	1.08	1.01	0.99	1.02
% MOLS DIOPSIDA:	10.75	28.16	20.38	19.97	0.37	4.96	0.00
% MOLS HEDENBER.	39.00	21.70	29.17	27.90	49.18	45.57	48.54
% MOLS WOLLASTO.	50.26	50.14	50.45	52.13	50.46	49.47	51.46
a DIOPSIDA:	0.21	0.56	0.41	0.43	0.01	0.10	0.00
a HEDEMBERGITA:	0.65	0.37	0.51	0.53	0.83	0.74	0.87

ANALISIS PIROXENS

SKARNS D'HEDENBERGITA

ANALISI NUM:	413a1530	413A1532	413A1534	413A1535	413A1537	413A1539	413A1540	413A1542	413A1543
SiO2 :	49.34	48.64	49.16	48.26	49.18	48.95	49.74	49.36	48.75
TiO2 :	0.01	0.00	0.00	0.00	0.01	0.09	0.02	0.00	0.01
Al2O3:	0.00	1.08	0.11	1.03	0.00	0.00	0.00	0.00	0.57
FeO :	19.67	22.18	20.10	22.76	19.36	18.97	19.81	19.47	20.89
MnO :	3.07	3.04	3.47	3.01	3.58	3.72	3.65	3.58	3.81
MgO :	3.49	1.43	3.02	1.03	3.49	3.45	3.22	3.27	2.30
CaO :	23.49	22.60	22.97	22.26	23.35	23.02	23.49	23.14	22.86
Cr203:	0.18	0.14	0.20	0.20	0.22	0.21	0.12	0.14	0.16
SnO2 :	0.07	0.09	0.00	0.03	0.08	0.07	0.00	0.09	0.00
Na2O :	0.08	0.26	0.07	0.12	0.03	0.01	0.00	0.05	0.10
K2O :	0.00	0.00	0.00	0.00	0.02	0.04	0.00	0.00	0.01
TOTAL :	99.40	99.46	99.10	98.70	99.32	98.53	100.05	99.10	99.46
Si(T):	1.99	1.98	2.00	1.99	1.99	2.00	2.00	2.00	1.98
Al(T):	0.01	0.02	0.00	0.01	0.01	0.00	0.00	0.00	0.02
Al:	-0.01	0.04	0.00	0.04	-0.01	-0.00	-0.00	0.00	0.01
Sn:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cr:	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.01
Ti:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mg	0.21	0.09	0.18	0.06	0.21	0.21	0.19	0.20	0.14
Fe2	0.66	0.76	0.68	0.78	0.66	0.65	0.67	0.66	0.71
Mn:	0.11	0.10	0.12	0.10	0.12	0.13	0.12	0.12	0.13
Ca:	1.02	0.99	1.00	0.98	1.01	1.01	1.01	1.01	1.00
% MOLS DIOPSIDA:	10.53	4.49	9.21	3.27	10.52	10.53	9.67	9.95	7.05
% MOLS HEDENBER.	38.55	44.50	40.42	45.96	38.88	38.95	39.62	39.44	42.58
% MOLS WOLLASTO.	50.92	51.01	50.37	50.77	50.60	50.52	50.71	50.61	50.37
a DIOPSIDA:	0.21	0.08	0.18	0.06	0.21	0.21	0.19	0.20	0.14
a HEDEMBERGITA:	0.67	0.73	0.68	0.76	0.66	0.65	0.67	0.66	0.70

ANALISIS PIROXENS

SKARNS D'HEDENBERGITA

ANALISI NUM:	480A27	480A29	480A30	480A34	480A39	480A41	480A23	480A42	480A43
SiO2 :	49.59	48.79	49.44	48.58	48.87	48.82	49.37	49.03	49.38
TiO2 :	0.07	0.00	0.04	0.04	0.03	0.10	0.03	0.00	0.00
Al2O3:	0.00	0.13	0.07	0.22	0.35	0.51	0.13	0.38	0.28
FeO :	22.05	21.78	21.31	22.63	23.12	23.88	22.46	24.73	24.55
MnO :	4.92	5.31	5.64	3.96	3.14	3.20	5.01	3.87	2.87
MgO :	0.44	0.00	0.08	0.37	0.25	0.15	0.11	0.20	0.23
CaO :	22.54	22.64	22.76	22.83	22.52	23.25	22.78	22.97	23.51
Cr203:	0.04	0.00	0.00	0.00	0.00	0.10	0.02	0.00	0.10
SnO2 :	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na2O :	0.18	0.15	0.04	0.06	0.09	0.13	0.09	0.07	0.09
K2O :	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
TOTAL :	99.83	98.80	99.38	98.69	98.37	100.14	100.00	101.26	101.01
Si(T):	2.03	2.02	2.03	2.01	2.02	2.00	2.02	1.99	2.00
Al(T):	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Al:	0.00	0.01	0.00	0.01	0.02	0.02	0.01	0.01	0.01
Sn:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cr:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ti:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mg	0.03	0.00	0.00	0.02	0.02	0.01	0.01	0.01	0.01
Fe2	0.75	0.75	0.73	0.78	0.80	0.82	0.77	0.84	0.83
Mn:	0.17	0.19	0.20	0.14	0.11	0.11	0.17	0.13	0.10
Ca:	0.99	1.00	1.00	1.01	1.00	1.02	1.00	1.00	1.02
% MOLS DIOPSIDA:	1.38	0.00	0.25	1.17	0.80	0.47	0.34	0.61	0.71
% MOLS HEDENBER.	47.69	48.36	47.98	47.12	47.31	47.44	48.38	49.03	47.35
% MOLS WOLLASTO.	50.93	51.64	51.77	51.72	51.89	52.09	51.27	50.36	51.94
a DIOPSIDA:	0.03	0.00	0.01	0.02	0.02	0.01	0.01	0.01	0.01
a HEDEMBERGITA:	0.76	0.77	0.75	0.80	0.82	0.83	0.78	0.83	0.85

ANALISIS PIROXENS

SKARNS D'HEDENBERGITA

ANALISI NUM:	480A11	480A12	480A13	480a14	480A15	480A16	480A17	480A21	480A22
SiO2 :	48.72	53.33	53.12	48.92	53.91	53.24	52.79	49.40	49.45
TiO2 :	0.08	0.03	0.11	0.05	0.01	0.15	0.21	0.00	0.02
Al2O3:	1.72	0.61	0.80	0.94	0.64	0.79	1.26	0.16	0.16
FeO :	23.87	8.28	8.35	22.21	8.12	7.59	8.06	21.80	22.02
MnO :	2.66	1.22	1.30	3.45	1.05	1.07	0.99	5.38	5.87
MgO :	0.32	12.82	12.69	0.19	12.83	12.91	12.74	0.12	0.00
CaO :	22.90	25.08	25.06	22.70	24.41	23.99	24.41	22.63	22.82
Cr203:	0.00	0.00	0.04	0.00	0.02	0.08	0.02	0.00	0.01
SnO2 :	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na2O :	0.30	0.06	0.02	0.90	0.07	0.03	0.05	0.00	0.02
K2O :	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.03	0.00
TOTAL :	100.57	101.43	101.49	99.36	101.06	99.86	100.53	99.52	100.37
Si(T):	1.97	1.98	1.97	2.00	2.00	1.99	1.97	2.03	2.02
Al(T):	0.03	0.02	0.03	0.00	0.00	0.01	0.03	0.00	0.00
Al:	0.06	0.00	0.01	0.05	0.02	0.03	0.02	0.01	0.01
Sn:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cr:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ti:	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Mg	0.02	0.71	0.70	0.01	0.71	0.72	0.71	0.01	0.00
Fe2	0.81	0.26	0.26	0.76	0.25	0.24	0.25	0.75	0.75
Mn:	0.09	0.04	0.04	0.12	0.03	0.03	0.03	0.19	0.20
Ca:	0.99	1.00	1.00	1.00	0.97	0.96	0.98	0.99	1.00
% MOLS DIOPSIDA:	1.01	35.43	35.12	0.61	36.11	36.86	36.02	0.38	0.00
% MOLS HEDENBER.	47.04	14.76	15.01	46.63	14.50	13.90	14.38	48.27	48.89
% MOLS WOLLASTO.	51.95	49.82	49.86	52.75	49.39	49.24	49.61	51.35	51.11
a DIOPSIDA:	0.02	0.69	0.68	0.01	0.68	0.69	0.67	0.01	0.00
a HEDEMBERGITA:	0.78	0.25	0.25	0.76	0.24	0.23	0.24	0.76	0.76

1 LINIA NUM MOSTRA
2 LINIA ELEMENTS % EN PES FeO, Na, K, Mn, Mg, Ca, SiO2, Ti, Al
3 LINIA FORMULA ESTRUCTURAL.
Si(T),Al(T),tot(T),Al(O),Mg(O),Fe3(O),Fe2(O),total(O)
4 LINIA RELACIO Mg/(Mg+Fe2+Fe3)

ANALISIS A LA MICROSONDA ELECTRONICA DE CLORITES DEL SKARN D'ARSENOPIRITA SK-377

633-3B-E-T6
35.69 0.05 0.04 0.00 5.79 0.12 26.29 0.00 15.95
3.011 0.989 4.000 1.164 0.988 0.684 2.735 5.571
0.224

633-2DD1-A-S1
36.02 0.07 0.00 0.94 6.64 0.00 25.16 0.00 19.33
2.751 1.249 4.000 1.243 1.169 0.593 2.701 5.706
0.262

633-2DD1-A-S2
33.21 0.00 0.08 0.30 8.00 0.00 25.68 0.09 19.88
2.788 1.212 4.000 1.332 1.322 0.543 2.472 5.669
0.305

633-2DD1-A-S3
40.79 0.32 0.12 0.00 3.55 0.04 26.36 0.15 11.42
3.198 0.802 4.000 0.831 0.642 0.745 3.394 5.613
0.134

633-2DD1-A-S4
41.80 0.28 0.05 0.00 4.10 0.05 26.51 0.05 13.57
3.062 0.938 4.000 0.909 0.706 0.727 3.310 5.652
0.149

633-2DD1-A-S5
36.08 0.00 0.00 1.35 6.32 0.06 24.87 0.10 19.95
2.710 1.290 4.000 1.273 1.151 0.592 2.696 5.712
0.259

633-2DD1-A-S6
35.39 0.00 0.02 1.60 6.36 0.00 24.15 0.01 21.39
2.617 1.383 4.000 1.348 1.174 0.577 2.630 5.729
0.268

633-2DD1-B-S7
40.14 0.28 0.00 0.00 3.80 0.06 25.77 0.00 12.52
3.112 0.888 4.000 0.894 0.684 0.730 3.324 5.632
0.144

633-2DD1-D-S8
31.20 0.01 0.00 0.10 10.32 0.00 25.83 0.00 19.73
2.772 1.228 4.000 1.268 1.660 0.504 2.296 5.728
0.372

1 LINIA NUM MOSTRA
2 LINIA ELEMENTS % EN PES FeO, Na, K, Mn, Mg, Ca, SiO2, Ti, Al
3 LINIA FORMULA ESTRUCTURAL.
Si(T),Al(T),tot(T),Al(O),Mg(O),Fe3(O),Fe2(O),total(O)
4 LINIA RELACIO Mg/(Mg+Fe2+Fe3)

ANALISIS A LA MICROSONDA ELECTRONICA DE CLORITES DEL SKARN D'ARSENOPIRITA SK-377

633-2DD-D-P10 VORA
26.69 0.00 0.00 1.91 4.70 0.00 23.33 0.00 21.57
2.575 1.425 4.000 1.380 0.952 0.610 2.777 5.718
0.219

633-2DD-D-P11
26.20 0.00 0.05 2.75 6.34 0.00 24.34 0.00 20.57
2.625 1.375 4.000 1.239 1.270 0.588 2.677 5.774
0.280

633-2FF-F-P19
21.30 0.04 0.25 0.00 11.09 0.91 30.44 0.01 12.93
2.309 0.691 4.000 0.965 1.797 0.512 2.333 5.607
0.387

633-2FF-A-P22
26.75 0.00 0.05 0.00 15.26 0.51 30.93 0.00 14.24
2.221 0.779 4.000 0.969 2.384 0.443 1.887 5.683
0.506

633-10B-B-09
23.67 0.06 0.02 0.30 16.04 0.01 26.62 0.00 19.60
2.786 1.214 4.000 1.203 2.528 0.414 1.654 5.799
0.550

633-10B-B-010
32.59 0.02 0.00 0.47 6.35 0.00 24.09 0.05 20.79
2.683 1.317 4.000 1.417 1.095 0.626 2.503 5.639
0.260

633-10B-B-011
32.57 0.01 0.27 0.10 6.73 0.02 24.28 0.11 20.96
2.704 1.296 4.000 1.456 1.127 0.607 2.427 5.616
0.271

633-3B-F-T2
21.04 0.02 0.08 0.00 16.15 0.00 27.28 0.00 21.40
2.812 1.188 4.000 1.412 2.481 0.363 1.451 5.707
0.578

633-3B-E-T5
38.27 0.05 0.00 0.00 5.38 0.08 26.92 0.01 16.12
3.002 0.998 4.000 1.120 0.894 0.714 2.855 5.582
0.200

1 LINIA NUM MOSTRA
2 LINIA ELEMENTS % EN PES FeO, Na, K, Mn, Mg, Ca, SiO2, Ti, Al
3 LINIA FORMULA ESTRUCTURAL.
Si(T),Al(T),tot(T),Al(O),Mg(O),Fe3(O),Fe2(O),total(O)
4 LINIA RELACIO Mg/(Mg+Fe2+Fe3)

ANALISIS A LA MICROSONDA ELECTRONICA DE CLORITES DEL SKARN D'ARSENOPIRITA SK-377

633-2EE-C-1
32.50 0.02 0.02 1.37 8.88 0.08 24.85 0.00 21.44
2.640 1.360 4.000 1.325 1.530 0.549 2.339 5.743
0.346

633-2EE-G2-3
31.75 0.11 0.43 0.00 8.43 0.29 28.43 0.00 16.22
3.130 0.870 4.000 1.234 1.383 0.555 2.368 5.540
0.321

633-2EE-G2-4
32.20 0.10 0.25 0.00 8.21 0.49 28.91 0.00 14.63
3.227 0.773 4.000 1.152 1.366 0.571 2.435 5.525
0.312

633-2EE-H-8
31.51 0.00 0.47 0.18 8.02 0.22 28.92 0.00 15.20
3.222 0.778 4.000 1.217 1.349 0.558 2.378 5.502
0.315

633-2EE-J-13
26.37 0.00 0.10 0.00 14.52 0.08 27.84 0.05 18.65
2.899 1.101 4.000 1.188 2.254 0.436 1.860 5.738
0.495

633-2EE-J-14
32.69 0.04 0.13 0.00 8.25 0.32 28.57 0.00 13.93
3.226 0.774 4.000 1.079 1.388 0.586 2.500 5.554
0.310

633-2DD-D-P7
41.16 0.17 0.00 0.00 4.21 0.00 26.87 0.00 14.40
3.059 0.941 4.000 0.990 0.714 0.705 3.213 5.623
0.154

633-2DD-D-P8
35.08 0.00 0.04 0.50 7.72 0.06 24.63 0.00 19.67
2.695 1.305 4.000 1.232 1.305 0.578 2.632 5.748
0.289

633-2DD-D-P9-CENTRE
36.92 0.08 0.02 0.10 6.99 0.00 25.49 0.00 18.46
2.793 1.207 4.000 1.177 1.151 0.609 2.774 5.711
0.254

1 LINIA NUM MOSTRA
2 LINIA ELEMENTS % EN PES FeO, Na, K, Mn, Mg, Ca, SiO2, Ti, Al
3 LINIA FORMULA ESTRUCTURAL.
Si(T),Al(T),tot(T),Al(O),Mg(O),Fe3(O),Fe2(O),total(O)
4 LINIA RELACIO Mg/(Mg+Fe2+Fe3)

ANALISIS A LA MICROSONDA ELECTRONICA DE CLORITES DEL SKARN D'ARSENOPIRITA SK-377

633-2DD1-D-S9
31.39 0.04 0.04 0.23 9.86 0.00 25.26 0.00 19.78
2.742 1.258 4.000 1.272 1.616 0.513 2.336 5.737
0.362

633-2DD1-D-S10
42.65 0.10 0.00 0.00 4.25 0.08 26.29 0.00 12.80
3.056 0.944 4.000 0.810 0.736 0.746 3.400 5.693
0.151

633-2DD1-C-S11-CENTRE
42.96 0.03 0.03 0.22 3.93 0.00 26.19 0.00 12.99
3.042 0.958 4.000 0.820 0.702 0.751 3.421 5.694
0.144

633-2DD1-C-S12-VORA
39.61 0.15 0.00 0.00 4.72 0.08 26.42 0.00 14.73
3.031 0.969 4.000 1.023 0.807 0.684 3.117 5.631
0.175

633-2DD1-C-S13-MIG
39.33 0.21 0.00 0.00 4.95 0.09 26.70 0.00 15.20
3.027 0.973 4.000 1.057 0.836 0.671 3.057 5.622
0.183

633-3A2-H-R11
21.17 0.02 0.63 0.00 15.60 0.09 28.62 0.35 20.06
2.959 1.041 4.000 1.403 2.404 0.366 1.464 5.636
0.568

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1 LINIA NUM MOSTRA
2 LINIA ELEMENTS % EN PES FeO, Na, K, Mn, Mg, Ca, SiO2, Ti, Al
3 LINIA FORMULA ESTRUCTURAL.
Si(T),Al(T),tot(T),Al(O),Mg(O),Fe3(O),Fe2(O),total(O)
4 LINIA RELACIO Mg/(Mg+Fe2+Fe3)

ANALISIS A LA MICROSONDA ELECTRONICA DE CLORITES DEL SKARN MIXTE SK-827

827-J2A-A-P1
41.96 0.00 0.00 0.00 1.95 0.00 23.98 0.00 20.16
2.761 1.239 4.000 1.496 0.335 0.000 4.040 5.871
0.076

827-J2A-A-P2
41.55 0.07 0.00 1.01 2.10 0.05 23.90 0.04 19.85
2.751 1.249 4.000 1.444 0.459 0.000 4.000 5.902
0.103

827-J2A-B-P3
40.07 0.03 0.00 0.00 3.18 0.14 24.30 0.00 19.57
2.801 1.199 4.000 1.460 0.546 0.000 3.863 5.869
0.124

827-J2A-B-P4
41.84 0.00 0.00 0.00 2.48 0.06 23.91 0.09 19.67
2.760 1.240 4.000 1.436 0.427 0.000 4.039 5.902
0.096

827-J2A-D-P5
40.79 0.00 0.06 0.00 2.24 0.08 24.30 0.00 19.79
2.811 1.189 4.000 1.509 0.386 0.000 3.946 5.840
0.089

1 LINIA NUM MOSTRA
2 LINIA ELEMENTS % EN PES FeO, Na, K, Mn, Mg, Ca, SiO2, Ti, Al
3 LINIA FORMULA ESTRUCTURAL.
Si(T),Al(T),tot(T),Al(O),Mg(O),Fe3(O),Fe2(O),total(O)
4 LINIA RELACIO Mg/(Mg+Fe2+Fe3)

ANALISIS A LA MICROSONDA ELECTRONICA DE CLORITES DEL SKARN MIXTE SK-826
clorites associades a la pirita de sulfuració tardana.

826A2-A24
31.24 0.02 0.00 2.78 7.90 0.07 24.41 0.03 21.76
2.679 1.321 4.000 1.494 1.551 0.000 2.868 5.913
0.351

826A2-A25
32.25 0.71 0.17 1.34 5.94 0.22 23.49 0.06 19.57
2.774 1.226 4.000 1.498 1.180 0.000 3.185 5.864
0.270

826A2-A26
31.52 0.00 0.10 2.29 7.82 0.02 23.61 0.00 21.26
2.649 1.351 4.000 1.461 1.526 0.000 2.958 5.945
0.340

826A2-B27
31.05 0.04 0.00 2.66 8.33 0.00 23.61 0.08 21.28
2.634 1.366 4.000 1.433 1.637 0.000 2.897 5.967
0.361

826A2-B28
33.09 0.06 0.06 1.89 7.49 0.03 24.33 0.03 21.14
2.693 1.307 4.000 1.451 1.413 0.000 3.063 5.928
0.316

826A2-B29
19.85 0.16 4.26 1.21 4.54 0.07 17.93 0.14 27.22
2.316 1.684 4.000 2.461 1.007 0.000 2.145 5.612
0.319

826A2-B30
8.99 0.00 9.22 0.33 2.16 0.08 42.02 0.19 29.89
3.978 0.022 4.000 3.312 0.331 0.000 0.712 4.355
0.318

1 LINIA NUM MOSTRA
2 LINIA ELEMENTS % EN PES FeO, Na, K, Mn, Mg, Ca, SiO2, Ti, Al
3 LINIA FORMULA ESTRUCTURAL.
Si(T),Al(T),tot(T),Al(O),Mg(O),Fe3(O),Fe2(O),total(O)
4 LINIA RELACIO Mg/(Mg+Fe2+Fe3)

ANALISIS A LA MICROSONDA ELECTRONICA DE CLORITES DEL SKARN DE PIRROTINA SK-368

634-2-A-27
39.32 0.03 0.05 0.43 3.53 0.07 22.73 0.01 21.79
2.598 1.402 4.000 1.533 0.643 0.000 3.758 5.934
0.146

634-2-28
39.19 0.00 0.03 0.35 5.27 0.01 24.34 0.09 19.57
2.744 1.256 4.000 1.343 0.919 0.000 3.694 5.957
0.199

634-2-B-29
39.66 0.00 0.08 0.40 4.74 0.06 24.58 0.03 18.97
2.792 1.208 4.000 1.331 0.841 0.000 3.767 5.939
0.182

634-2-30
39.75 0.00 0.09 0.34 5.10 0.07 24.50 0.01 18.90
2.776 1.224 4.000 1.300 0.894 0.000 3.767 5.962
0.192

634-2-C
39.29 0.00 0.06 0.34 6.43 0.12 25.64 0.00 16.70
2.906 1.094 4.000 1.136 1.119 0.000 3.724 5.979
0.231

1 LINIA NUM MOSTRA
2 LINIA ELEMENTS % EN PES FeO, Na, K, Mn, Mg, Ca, SiO2, Ti, Al
3 LINIA FORMULA ESTRUCTURAL.
Si(T),Al(T),tot(T),Al(O),Mg(O),Fe3(O),Fe2(O),total(O)
4 LINIA RELACIO Mg/(Mg+Fe2+Fe3)

ANALISIS A LA MICROSONDA ELECTRONICA DE CLORITES DEL SKARN DE PIRROTINA SK-368

369-2-T11
41.83 0.00 0.00 0.00 3.51 0.11 25.81 0.00 17.79
2.931 1 069 4.000 1.312 0.594 0.000 3.973 5.879
0.130

369-2-T13
42.73 0.00 0.07 0.00 2.64 0.09 30.02 0.10 11.48
3.502 0.498 4.000 1.081 0.459 0.000 4.169 5.709
0.099

369-2-T14
39.72 0.05 0.00 0.00 3.53 0.00 24.55 0.06 20.41
2.779 1.221 4.000 1.503 0.596 0.000 3.761 5.859
0.137

1 LINIA NUM MOSTRA
2 LINIA ELEMENTS % EN PES FeO, Na, K, Mn, Mg, Ca, SiO2, Ti, Al
3 LINIA FORMULA ESTRUCTURAL.
Si(T),Al(T),tot(T),Al(O),Mg(O),Fe3(O),Fe2(O),total(O)
4 LINIA RELACIO Mg/(Mg+Fe2+Fe3)

ANALISIS A LA MICROSONDA ELECTRONICA DE CLORITES DEL SKARN DE PIRROTINA SK-392

392B-A-37									
40.07	0.00	0.09	0.21	1.17	0.03	21.74	0.03	24.13	
2.504	1.496	4.000	1.779	0.221	0.000	3.859	5.859		
0.054									
392B-D-38									
40.74	0.04	0.07	0.41	0.87	0.07	21.29	0.06	24.01	
2.469	1.531	4.000	1.750	0.191	0.000	3.951	5.891		
0.046									
392B-E-41									
28.62	0.04	0.05	1.84	12.07	0.04	25.61	0.00	19.65	
2.770	1.230	4.000	1.275	2.114	0.000	2.589	5.978		
0.450									
392B-E-43									
37.58	0.01	0.16	1.38	5.23	0.07	23.69	0.03	20.27	
2.683	1.317	4.000	1.389	1.015	0.000	3.560	5.964		
0.222									
392B-E-44									
36.72	0.06	0.03	0.16	4.43	0.05	22.41	0.00	24.14	
2.511	1.489	4.000	1.699	0.755	0.000	3.441	5.895		
0.180									

1 LINIA NUM MOSTRA
2 LINIA ELEMENTS % EN PES FeO, Na, K, Mn, Mg, Ca, SiO2, Ti, Al
3 LINIA FORMULA ESTRUCTURAL.
Si(T),Al(T),tot(T),Al(O),Mg(O),Fe3(O),Fe2(O),total(O)
4 LINIA RELACIO Mg/(Mg+Fe2+Fe3)

ANALISIS A LA MICROSONDA ELECTRONICA DE CLORITES DEL SKARN DE MAGNETITA SK-856

856A1-D29
26.27 0.02 0.14 0.24 12.81 0.15 24.77 0.00 21.08
2.708 1.292 4.000 1.423 2.109 0.000 2.402 5.934
0.468

856-L-41
23.16 0.01 0.03 0.04 17.26 0.04 25.90 0.06 20.72
2.715 1.285 4.000 1.275 2.700 0.000 2.030 6.005
0.571

856-L-42
24.36 0.07 0.08 0.19 16.20 0.08 25.91 0.00 20.12
2.747 1.253 4.000 1.260 2.577 0.000 2.160 5.997
0.544

1 LINIA NUM MOSTRA
2 LINIA ELEMENTS % EN PES FeO, Na, K, Mn, Mg, Ca, SiO2, Ti, Al
3 LINIA FORMULA ESTRUCTURAL.
Si(T),Al(T),tot(T),Al(O),Mg(O),Fe3(O),Fe2(O),total(O)
4 LINIA RELACIO Mg/(Mg+Fe2+Fe3)

ANALISIS A LA MICROSONDA ELECTRONICA DE CLORITES DEL SKARN DE MAGNETITA SK-862

862L-C-8
26.72 0.12 0.65 0.08 13.44 0.21 28.33 0.01 16.18
3.106 0.894 4.000 1.196 2.203 0.000 2.450 5.849
0.474

862L-E-9
26.92 0.00 0.37 0.23 13.47 0.15 28.17 0.05 17.03
3.052 0.948 4.000 1.226 2.196 0.000 2.439 5.861
0.474

862F1-13
28.00 0.01 0.17 0.27 13.43 0.16 27.97 0.09 18.63
2.954 1.046 4.000 1.274 2.139 0.000 2.473 5.886
0.464

862F1-14
26.93 0.00 0.24 0.31 12.94 0.12 27.32 0.01 18.27
2.965 1.035 4.000 1.301 2.122 0.000 2.444 5.867
0.465

862F1-15
28.21 0.07 0.13 0.10 11.14 0.19 25.92 0.02 20.41
2.830 1.170 4.000 1.457 1.822 0.000 2.576 5.856
0.414

862F1-16
27.28 0.01 0.17 0.21 13.52 0.14 27.80 0.09 18.66
2.954 1.046 4.000 1.292 2.161 0.000 2.425 5.877
0.471

862F1-17
36.18 0.00 0.06 0.18 6.06 0.21 24.85 0.08 21.67
2.730 1.270 4.000 1.535 1.009 0.000 3.324 5.868
0.233

862F1-18
27.41 0.00 0.17 0.22 12.68 0.11 26.22 0.00 18.86
2.872 1.128 4.000 1.308 2.091 0.000 2.511 5.910
0.454

1 LINIA NUM MOSTRA
2 LINIA ELEMENTS % EN PES FeO, Na, K, Mn, Mg, Ca, SiO2, Ti, Al
3 LINIA FORMULA ESTRUCTURAL.
Si(T),Al(T),tot(T),Al(O),Mg(O),Fe3(O),Fe2(O),total(O)
4 LINIA RELACIO Mg/(Mg+Fe2+Fe3)

ANALISIS A LA MICROSONDA ELECTRONICA DE CLORITES DEL SKARN D'HEDENBERGITA SK-413

187-A-A-19
33.54 0.00 0.02 0.87 9.42 0.13 24.97 0.07 17.80
2.814 1.186 4.000 1.178 1.665 0.000 3.161 6.004
0.345

187-A-A-20
33.43 0.03 0.03 0.77 9.89 0.10 25.39 0.06 17.71
2.834 1.166 4.000 1.163 1.718 0.000 3.120 6.002
0.355

187-A-A-21
34.25 0.00 0.00 0.82 9.11 0.07 24.51 0.05 18.15
2.767 1.233 4.000 1.181 1.611 0.000 3.233 6.026
0.333

187-A-B-22
34.75 0.01 0.03 0.79 8.23 0.04 23.91 0.09 18.47
2.733 1.267 4.000 1.222 1.479 0.000 3.322 6.023
0.308

1 LINIA NUM MOSTRA
2 LINIA ELEMENTS % EN PES FeO, Na, K, Mn, Mg, Ca, SiO2, Ti, Al
3 LINIA FORMULA ESTRUCTURAL.
Si(T),Al(T),tot(T),Al(O),Mg(O),Fe3(O),Fe2(O),total(O)
4 LINIA RELACIO Mg/(Mg+Fe2+Fe3)

ANALISIS A LA MICROSONDA ELECTRONICA DE CLORITES DEL SKARN D'HEDENBERGITA

sk-124 i sk-413

126A-C5
28.90 0.00 0.00 2.55 11.19 0.11 24.88 0.11 19.08
2.754 1.246 4.000 1.242 2.085 0.000 2.675 6.002
0.438

126-C6
29.62 0.02 0.00 2.26 11.42 0.22 25.42 0.03 18.67
2.790 1.210 4.000 1.205 2.078 0.000 2.719 6.002
0.433

126-C7
29.01 0.02 0.01 2.50 10.93 0.16 24.85 0.03 18.10
2.797 1.203 4.000 1.199 2.072 0.000 2.731 6.002
0.431

187A - 1
6
38.92 0.05 0.00 1.73 4.01 0.00 23.00 0.01 20.61
2.630 1.370 4.000 1.408 0.851 0.000 3.722 5.981
0.186

187A - 2
39.31 0.02 0.00 1.48 3.90 0.00 23.15 0.06 20.90
2.631 1.369 4.000 1.430 0.803 0.000 3.736 5.969
0.177

187A - 3
39.26 0.04 0.04 1.52 3.21 0.03 22.89 0.00 20.63
2.645 1.355 4.000 1.455 0.702 0.000 3.794 5.950
0.156

187D - 8
40.17 0.00 0.00 1.33 3.18 0.01 23.33 0.07 21.28
2.640 1.360 4.000 1.477 0.664 0.000 3.801 5.942
0.149

187D - 9
38.95 0.01 0.06 1.67 2.90 0.21 22.87 0.09 21.13
2.637 1.363 4.000 1.509 0.662 0.000 3.756 5.927
0.150

187L - 5'
39.59 0.01 0.05 1.44 2.65 0.05 22.58 0.06 21.24
2.613 1.387 4.000 1.509 0.598 0.000 3.831 5.939
0.135

1 LINIA NUM MOSTRA
2 LINIA ELEMENTS % EN PES FeO, Na, K, Mn, Mg, Ca, SiO2, Ti, Al
3 LINIA FORMULA ESTRUCTURAL.
Si(T),Al(T),tot(T),Al(O),Mg(O),Fe3(O),Fe2(O),total(O)
4 LINIA RELACIO Mg/(Mg+Fe2+Fe3)

ANALISIS A LA MICROSONDA ELECTRONICA DE CLORITES DEL SKARN DE WOLFRAM SK-171

171-J-D-7
30.80 0.00 0.00 0.69 10.61 0.15 24.75 0.09 19.51
2.747 1.253 4.000 1.299 1.820 0.000 2.859 5.977
0.389

171-J-D-8
28.97 0.00 0.00 0.63 11.93 0.08 25.27 0.10 19.43
2.776 1.224 4.000 1.292 2.012 0.000 2.662 5.986
0.431

171-J-D-9
32.56 0.00 0.00 0.83 9.09 0.03 24.15 0.07 19.67
2.714 1.286 4.000 1.320 1.602 0.000 3.061 5.983
0.344

171-G-A-17
29.50 0.01 0.00 0.51 11.72 0.02 25.05 0.04 19.03
2.776 1.224 4.000 1.262 1.984 0.000 2.734 5.981
0.420

171-G-A-18
30.09 0.01 0.00 0.52 11.55 0.02 25.17 0.07 18.77
2.789 1.211 4.000 1.240 1.956 0.000 2.788 5.985
0.412

171-G-B1-15
31.13 0.01 0.00 0.74 8.80 2.39 23.36 0.06 18.20
2.756 1.244 4.000 1.286 1.621 0.000 3.071 5.979
0.346

171-G-B1-16
30.80 0.04 0.00 0.59 10.61 0.07 24.64 0.04 19.25
2.751 1.249 4.000 1.284 1.822 0.000 2.876 5.982
0.388

171-G-B2-14
29.86 0.00 0.00 0.65 11.43 0.02 24.91 0.06 19.27
2.758 1.242 4.000 1.273 1.947 0.000 2.765 5.985
0.413

171-J-B-12
29.70 0.01 0.00 0.63 11.59 0.02 25.18 0.11 18.99
2.785 1.215 4.000 1.260 1.970 0.000 2.747 5.977
0.418

1 LINIA NUM MOSTRA
2 LINIA ELEMENTS % EN PES FeO, Na, K, Mn, Mg, Ca, SiO2, Ti, Al
3 LINIA FORMULA ESTRUCTURAL.
Si(T),Al(T),tot(T),Al(O),Mg(O),Fe3(O),Fe2(O),total(O)
4 LINIA RELACIO Mg/(Mg+Fe2+Fe3)

ANALISIS A LA MICROSONDA ELECTRONICA DE CLORITES DELS SKARNS DE WOLFRAM SK-171 i SK-404

171-J-B-13
30.43 0.00 0.00 0.66 10.59 0.07 25.04 0.08 19.28
2.783 1.217 4.000 1.309 1.817 0.000 2.829 5.954
0.391

171-J-C-10
31.45 0.00 0.15 0.72 9.87 0.04 25.00 0.20 18.75
2.805 1.195 4.000 1.285 1.719 0.000 2.951 5.955
0.368

171-J-C-11
31.55 0.00 0.05 0.72 9.90 0.04 24.54 0.07 19.13
2.756 1.244 4.000 1.288 1.726 0.000 2.963 5.978
0.368

400-T7-B-107
30.04 0.04 0.03 1.36 10.68 0.15 25.13 0.09 18.87
2.796 1.204 4.000 1.271 1.900 0.000 2.796 5.966
0.405

400-T7-B-108
27.07 0.07 0.03 0.98 12.78 0.16 27.03 0.06 16.18
3.022 0.977 4.000 1.156 2.223 0.000 2.532 5.911
0.468

400-T7-C-109
30.81 0.01 0.01 1.23 10.56 0.05 25.32 0.06 18.65
2.810 1.190 4.000 1.249 1.862 0.000 2.859 5.971
0.394

400-T7-C-110
30.13 0.03 0.00 1.36 10.71 0.03 25.43 0.02 18.53
2.827 1.173 4.000 1.255 1.903 0.000 2.801 5.959
0.404

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1 LINIA NUM MOSTRA
2 LINIA ELEMENTS % EN PES FeO, Na, K, Mn, Mg, Ca, SiO2, Ti, Al
3 LINIA FORMULA ESTRUCTURAL.
Si(T),Al(T),tot(T),Al(O),Mg(O),Fe3(O),Fe2(O),total(O)
4 LINIA RELACIO Mg/(Mg+Fe2+Fe3)

ANALISIS A LA MICROSONDA ELECTRONICA DE CLORITES DEL SKARN D' HEMATITES SK-849

849C-B-22
36.06 0.00 0.04 0.75 4.60 0.28 23.97 0.03 20.32
2.762 1.238 4.000 1.521 0.863 0.000 3.475 5.859
0.199

849C-B-21
34.43 0.02 0.00 0.71 5.32 0.23 24.34 0.04 20.19
2.800 1.200 4.000 1.537 0.981 0.000 3.312 5.831
0.229

849C-A-20
37.95 0.02 0.01 1.14 4.56 0.06 23.77 0.08 20.57
2.697 1.303 4.000 1.447 0.881 0.000 3.601 5.928
0.197

849C-A-19
36.96 0.02 0.00 0.82 4.33 0.15 23.91 0.04 20.58
2.738 1.262 4.000 1.515 0.819 0.000 3.539 5.873
0.188

849C-E34
36.54 0.00 0.02 0.88 4.91 0.13 24.23 0.09 20.35
2.757 1.243 4.000 1.485 0.917 0.000 3.477 5.879
0.209

849C-D36
37.30 0.12 0.06 0.65 4.67 0.22 24.40 0.00 19.91
2.784 1.216 4.000 1.461 0.857 0.000 3.559 5.877
0.194

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1 LINIA NUM MOSTRA
2 LINIA ELEMENTS % EN PES FeO, Na, K, Mn, Mg, Ca, SiO2, Ti, Al
3 LINIA FORMULA ESTRUCTURAL.
Si(T),Al(T),tot(T),Al(O),Mg(O),Fe3(O),Fe2(O),total(O)
4 LINIA RELACIO Mg/(Mg+Fe2+Fe3)

ANALISIS A LA MICROSONDA ELECTRONICA DE CLORITES DEL SKARN DE MAGNETITA SK-850

850A-20
28.32 0.07 0.33 0.08 8.19 0.26 26.14 0.00 21.56
2.896 1.104 4.000 1.712 1.360 0.000 2.624 5.696
0.341

850A-18
27.82 0.04 0.31 0.11 9.08 0.19 26.50 0.06 22.16
2.874 1.126 4.000 1.707 1.478 0.000 2.524 5.709
0.369

850A-15
28.66 0.16 0.78 0.06 8.78 0.18 26.18 0.01 20.64
2.910 1.090 4.000 1.614 1.460 0.000 2.664 5.738
0.354

850A-16
26.40 0.02 0.05 0.14 10.01 0.13 25.56 0.00 22.07
2.812 1.188 4.000 1.674 1.655 0.000 2.429 5.757
0.405

850A-17
27.88 0.00 0.00 0.05 10.52 0.00 25.26 0.09 22.21
2.745 1.255 4.000 1.590 1.709 0.000 2.534 5.832
0.403

Albita

	693A2B 1	693A2B 2	693A2B 3
K	0.0007	0.0011	0.0007
FE	0.0013	0.0003	0.0009
NA	0.1138	0.1042	0.1085
SN	0.0000	0.0000	0.0000
MN	0.0000	0.0000	0.0000
MG	0.0000	0.0000	0.0000
CA	0.0008	0.0017	0.0006
AL	0.2009	0.1991	0.1979
TI	0.0004	0.0004	0.0001
SI	0.6916	0.6936	0.6937
	1.0146	1.0005	1.0025
K	0.0039	0.0064	0.0039
FE	0.0045	0.0012	0.0034
NA	0.9929	0.8765	0.9121
SN	0.0000	0.0000	0.0000
MN	0.0000	0.0000	0.0000
MG	0.0000	0.0000	0.0000
CA	0.0035	0.0078	0.0027
AL	1.0204	1.0183	1.0117
TI	0.0014	0.0012	0.0003
SI	2.9799	3.0096	3.0086
	5.0064	4.9210	4.9427
FM	0.9996	0.9986	0.9995
AB	0.9926	0.9841	0.9928
OR	0.0039	0.0071	0.0043
AN	0.0035	0.0088	0.0030

Muscovita

	693A2A 4	693A2A 5	693B-A 35
K	0.1113	0.0879	0.1010
FE	0.0088	0.0085	0.0124
NA	0.0019	0.0009	0.0044
SN	0.0000	0.0000	0.0003
MN	0.0000	0.0008	0.0000
MG	0.0135	0.0107	0.0038
CA	0.0006	0.0000	0.0000
AL	0.3298	0.2703	0.3591
TI	0.0014	0.0014	0.0006
SI	0.4714	0.4074	0.4797
OH	0.0444	0.0375	0.0458
	0.9830	0.8255	1.0071
K	1.9185	1.7929	1.6876
FE	0.0989	0.1140	0.1355
NA	0.0463	0.0285	0.1112
SN	0.0000	0.0000	0.0014
MN	0.0000	0.0113	0.0000
MG	0.2710	0.2561	0.0742
CA	0.0094	0.0000	0.0000
AL	5.2501	5.0950	5.5414
TI	0.0143	0.0171	0.0060
SI	6.3666	6.5149	6.2813
OH	2.0000	2.0000	2.0000
	15.9751	15.8298	15.8386
FM	0.2674	0.3285	0.6461

Anàlisis a la microsonda electrònica de albites i muscovites de la mineralització intragranítica M-693

	827F2A 1	827F2A 2	827F2A 4	827F2A 5	827F2A 6	827F2A 8	827F2A 7
K	0.0025	0.0025	0.0025	0.0016	0.0029	0.0040	0.0407
FE	0.0011	0.0009	0.0003	0.0011	0.0015	0.0008	0.0000
NA	0.0632	0.0699	0.0923	0.0627	0.0719	0.0873	0.0861
SN	0.0000	0.0000	0.0000	0.0000	0.0001	0.0003	0.0000
MN	0.0000	0.0000	0.0008	0.0000	0.0018	0.0000	0.0005
MG	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CA	0.0947	0.0792	0.0384	0.0947	0.0835	0.0518	0.0098
AL	0.2796	0.2631	0.2340	0.2776	0.2654	0.2421	0.2072
TI	0.0010	0.0000	0.0003	0.0006	0.0000	0.0009	0.0001
SI	0.5642	0.5836	0.6417	0.5586	0.5771	0.6239	0.6670
	1.0064	0.9992	1.0103	0.9969	1.0043	1.0112	1.0115
K	0.0143	0.0143	0.0139	0.0090	0.0166	0.0223	0.2279
FE	0.0041	0.0035	0.0011	0.0040	0.0057	0.0030	0.0000
NA	0.5477	0.6065	0.7821	0.5489	0.6240	0.7440	0.7333
SN	0.0000	0.0000	0.0001	0.0000	0.0002	0.0005	0.0000
MN	0.0002	0.0000	0.0029	0.0000	0.0068	0.0000	0.0019
MG	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CA	0.4535	0.3800	0.1798	0.4580	0.4003	0.2439	0.0462
AL	1.4731	1.3878	1.2049	1.4760	1.3999	1.2537	1.0727
TI	0.0035	0.0000	0.0008	0.0019	0.0000	0.0030	0.0005
SI	2.5220	2.6120	2.8042	2.5204	2.5830	2.7409	2.9304
	5.0185	5.0040	4.9899	5.0182	5.0366	5.0114	5.0129
FM	0.9996	0.9995	0.9996	0.9996	0.9999	0.9995	0.9991
AB	0.5394	0.6060	0.8015	0.5403	0.5995	0.7365	0.7279
OR	0.0141	0.0143	0.0142	0.0089	0.0160	0.0221	0.2263
AN	0.4466	0.3797	0.1843	0.4508	0.3845	0.2414	0.0459

	827G4 5	827G4 2	827G4 3
CL	0.0000	0.0000	0.0000
FE	0.0005	0.0022	0.0002
F	0.0000	0.0000	0.0000
K	0.0064	0.0031	0.0051
MN	0.0000	0.0000	0.0000
NA	0.0772	0.0717	0.0692
SN	0.0000	0.0002	0.0000
MG	0.0000	0.0000	0.0000
TI	0.0000	0.0007	0.0000
CA	0.0651	0.0706	0.0609
AL	0.2520	0.2538	0.2465
SI	0.5966	0.5965	0.6024
P	0.0008	0.0016	0.0011
	0.9986	1.0004	0.9854
CL	0.0000	0.0000	0.0003
FE	0.0020	0.0082	0.0008
F	0.0000	0.0000	0.0000
K	0.0367	0.0177	0.0292
MN	0.0000	0.0000	0.0000
NA	0.6688	0.6194	0.6031
SN	0.0000	0.0003	0.0000
MG	0.0000	0.0000	0.0000
TI	0.0000	0.0025	0.0000
CA	0.3119	0.3370	0.2933
AL	1.3275	1.3328	1.3068
SI	2.6670	2.6578	2.7091
P	0.0031	0.0062	0.0043
	5.0170	4.9818	4.9469
FM	0.9992	0.9998	0.9981
AB	0.6574	0.6359	0.6516
OR	0.0361	0.0182	0.0315
AN	0.3065	0.3460	0.3169

Anàlisis a la microsonda electrònica de plagiòclasis del skarn mixte sk-827

	Corindó	Diàspor					Prehnita
	827J 19	827JC 26	827JH 30	827JH 31	827JH 32	827JE 36	827JF 35
P.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0004	0.0005
FE	0.0020	0.0040	0.0029	0.0033	0.0058	0.0048	0.0025
FE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0011
NA	0.0000	0.0002	0.0002	0.0000	0.0000	0.0000	0.0000
SN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0003	0.0000
MN	0.0000	0.0000	0.0002	0.0001	0.0000	0.0000	0.0000
MG	0.0000	0.0003	0.0000	0.0000	0.0000	0.0002	0.2617
CA	0.0001	0.0002	0.0001	0.0004	0.0002	0.0004	0.2417
AL	1.0078	0.3685	0.8691	0.8555	0.8527	0.8766	0.0000
TI	0.0023	0.0002	0.0008	0.0009	0.0011	0.0003	0.4333
SI	0.0000	0.0002	0.0000	0.0000	0.0000	0.0000	0.0788
	1.0123	0.8736	0.9736	0.8602	0.8650	0.8830	1.0194
P.	0.0000	0.0000	0.0000	0.0001	0.0000	0.0009	0.0090
FE	0.0029	0.0065	0.0048	0.0055	0.0096	0.0078	0.0315
FE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0315
NA	0.0000	0.0008	0.0008	0.0000	0.0000	0.0000	0.0000
SN	0.0000	0.0000	0.0000	0.0000	0.0001	0.0003	0.0000
MN	0.0000	0.0000	0.0003	0.0002	0.0000	0.0000	0.0000
MG	0.0000	0.0007	0.0000	0.0000	0.0000	0.0007	4.2645
CA	0.0003	0.0004	0.0003	0.0008	0.0005	0.0008	4.3324
AL	1.9940	1.9935	1.9944	1.9937	1.9908	1.9925	0.0000
TI	0.0029	0.0003	0.0012	0.0013	0.0017	0.0004	6.5918
SI	0.0000	0.0004	0.0000	0.0000	0.0000	0.0000	4.0000
	2.0000	2.0027	2.0018	2.0016	2.0027	2.0033	19.2607
FM	0.9998	0.8975	0.9999	0.9999	0.9987	0.9225	0.9998

Anàlisis a la micosonda electrònica de corindó, diàspor i prehnita del skarn mixte sk-827

	827JA 23	827JA 24	827JC 27	827JC 28	827JC 29	827JH 33	827JH 34	826A2A 23	826A2A 30	826A2A 31
K	0.1092	0.1146	0.1057	0.1154	0.1066	0.1177	0.1174	0.1002	0.0922	0.1077
FE	0.0178	0.0256	0.0210	0.0119	0.0222	0.0181	0.0254	0.0486	0.0899	0.0853
NA	0.0009	0.0009	0.0029	0.0005	0.0014	0.0010	0.0003	0.0011	0.0000	0.0009
SN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0003	0.0000	0.0002	0.0008	0.0000
MN	0.0012	0.0000	0.0000	0.0003	0.0006	0.0007	0.0003	0.0023	0.0033	0.0074
MG	0.0051	0.0099	0.0035	0.0012	0.0042	0.0071	0.0040	0.0239	0.0216	0.1802
CA	0.0025	0.0012	0.0054	0.0019	0.0010	0.0021	0.0002	0.0000	0.0008	0.0036
AL	0.3567	0.3444	0.3698	0.3626	0.3485	0.3589	0.3431	0.3219	0.2989	0.1932
TI	0.0008	0.0006	0.0004	0.0000	0.0008	0.0004	0.0002	0.0012	0.0019	0.0077
SI	0.4845	0.4819	0.4680	0.4702	0.4778	0.4793	0.4890	0.4478	0.4202	0.3578
OH	0.0462	0.0459	0.0460	0.0455	0.0454	0.0463	0.0460	0.0438	0.0420	0.0405
	1.0251	1.0249	1.0227	1.0095	1.0086	1.0318	1.0260	0.9910	0.9716	0.9843
K	1.8050	1.9082	1.7559	1.9393	1.7925	1.9452	1.9521	1.7471	1.6780	2.0304
FE	0.1932	0.2793	0.2287	0.1312	0.2448	0.1962	0.2767	0.5552	1.0731	1.0545
NA	0.0224	0.0228	0.0736	0.0129	0.0347	0.0249	0.0068	0.0286	0.0008	0.0261
SN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0017	0.0000	0.0012	0.0044	0.0000
MN	0.0134	0.0000	0.0000	0.0035	0.0063	0.0077	0.0034	0.0261	0.0405	0.0928
MG	0.0988	0.1924	0.0673	0.0234	0.0828	0.1362	0.0785	0.4876	0.4585	3.9701
CA	0.0352	0.0174	0.0759	0.0269	0.0139	0.0287	0.0023	0.0000	0.0124	0.0569
AL	5.4484	5.2992	5.6762	5.6308	5.4150	5.4786	5.2708	5.1849	5.0249	3.3652
TI	0.0076	0.0055	0.0038	0.0000	0.0084	0.0039	0.0024	0.0122	0.0204	0.0856
SI	6.2782	6.2921	6.0951	6.1957	6.2988	6.2079	6.3737	6.1188	5.9939	5.2886
OH	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
	15.9023	16.0170	15.9765	15.9637	15.8975	16.0309	15.9666	16.1617	16.3068	17.9701
FM	0.6765	0.5921	0.7726	0.8518	0.7520	0.5995	0.7811	0.5438	0.7084	0.2242

Anàlisi a la microsonda electrònica de muscovites dels skarns mixtes SK-827 i sk-826

	364A 17	364A 18	364A 19	364A 20	827J2BB 23	827J2BB 24	827J2BB 25	827J2BB 26	827J2BB 27	827J2BB 28
K	0.0000	0.0000	0.0001	0.0000	0.0000	0.0001	0.0000	0.0005	0.0000	0.0001
FE	0.0383	0.0478	0.0330	0.0366	0.1012	0.0904	0.0647	0.0905	0.0264	0.0277
NA	0.0000	0.0002	0.0009	0.0000	0.0013	0.0008	0.0000	0.0019	0.0003	0.0007
SN	0.0000	0.0000	0.0004	0.0000	0.0056	0.0045	0.0308	0.0054	0.0000	0.0000
MN	0.0011	0.0004	0.0000	0.0003	0.0049	0.0017	0.0048	0.0036	0.0007	0.0012
MG	0.0198	0.0196	0.0227	0.0257	0.0008	0.0000	0.0000	0.0000	0.0299	0.0265
CA	0.3434	0.3475	0.3458	0.3437	0.1843	0.2088	0.2271	0.2053	0.3560	0.3547
AL	0.1456	0.1486	0.1476	0.1424	0.1986	0.2231	0.2702	0.2192	0.1593	0.1615
TI	0.0323	0.0284	0.0347	0.0370	0.0028	0.0024	0.0013	0.0005	0.0282	0.0265
SI	0.3566	0.3590	0.3547	0.3600	0.3370	0.3523	0.3773	0.3555	0.3639	0.3639
OH	0.0248	0.0251	0.0249	0.0251	0.0226	0.0241	0.0267	0.0240	0.0257	0.0256
	0.9620	0.9766	0.9649	0.9708	0.8592	0.9081	1.0027	0.9063	0.9904	0.9884
K	0.0000	0.0000	0.0044	0.0000	0.0000	0.0035	0.0003	0.0147	0.0007	0.0016
FE	0.7728	0.9555	0.6630	0.7304	2.2396	1.8789	1.2131	1.8858	0.5139	0.5418
NA	0.0005	0.0088	0.0443	0.0000	0.0682	0.0393	0.0000	0.0895	0.0157	0.0315
SN	0.0000	0.0000	0.0038	0.0000	0.0589	0.0446	0.2752	0.0535	0.0000	0.0001
MN	0.0223	0.0088	0.0000	0.0063	0.1093	0.0350	0.0906	0.0761	0.0139	0.0243
MG	0.7139	0.6990	0.8128	0.9169	0.0307	0.0000	0.0000	0.0000	1.0378	0.9236
CA	8.8828	8.8911	8.9074	8.7998	5.2261	5.5618	5.4586	5.4814	8.8960	8.8808
AL	4.1431	4.1812	4.1821	4.0095	6.1943	6.5382	7.1434	6.4390	4.3792	4.4472
TI	0.5864	0.5105	0.6280	0.6646	0.0561	0.0444	0.0211	0.0095	0.4944	0.4657
SI	8.6091	8.5731	8.5269	8.6005	8.9182	8.7576	8.4638	8.8590	8.4853	8.5042
OH	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
	25.7310	25.8280	25.7726	25.7280	24.9015	24.9035	24.6662	24.9084	25.8368	25.8208
FM	0.5269	0.5798	0.4493	0.4455	0.9871	1.0000	1.0000	1.0000	0.3371	0.3800

Anàlisis a la microsonda electrònica d'idocrases del skarn d'arsenopirita sk-364 i del skarn mixte sk-827.

Moscovita		Feldspat potàssic			Moscovita		
	389-7		364AD	364AD		392BD	392BE	392BE
	8		13	14		39	40	42
PB	0.0000	K	0.1748	0.1713	K	0.1011	0.0940	0.0866
FE	0.0000	FE	0.0010	0.0010	FE	0.0123	0.0088	0.0128
NA	0.0023	NA	0.0012	0.0013	NA	0.0039	0.0106	0.0088
K	0.0904	SN	0.0000	0.0000	SN	0.0010	0.0004	0.0000
MN	0.0000	MN	0.0003	0.0001	MN	0.0000	0.0000	0.0004
MG	0.0091	MG	0.0000	0.0000	MG	0.0020	0.0051	0.0043
CA	0.0000	CA	0.0000	0.0000	CA	0.0002	0.0005	0.0000
CR	0.0000	AL	0.1849	0.1832	AL	0.3581	0.3630	0.3771
SI	0.4908	TI	0.0002	0.0003	TI	0.0013	0.0011	0.0006
TI	0.0032	SI	0.6353	0.6467	SI	0.4760	0.4714	0.4988
SN	0.0005		0.9981	1.0039	OH	0.0455	0.0455	0.0476
AL	0.3363					1.0014	1.0004	1.0371
OH	0.0451	K	1.0418	1.0106				
	0.9777	FE	0.0041	0.0040	K	1.6996	1.5782	1.3919
		NA	0.0149	0.0115	FE	0.1358	0.0965	0.1348
		SN	0.0000	0.0000	NA	0.1001	0.2698	0.2157
PB	0.0000	MN	0.0012	0.0002	SN	0.0052	0.0023	0.0000
FE	0.0000	MG	0.0000	0.0000	MN	0.0000	0.0000	0.0040
NA	0.0595	CA	0.0000	0.0000	MG	0.0394	0.1001	0.0809
K	1.5336	AL	1.0181	0.9989	CA	0.0025	0.0068	0.0000
MN	0.0000	TI	0.0008	0.0012	AL	5.5601	5.6288	5.5979
MG	0.1805	SI	2.9685	2.9918	TI	0.0133	0.0105	0.0059
CA	0.0000		5.0494	5.0182	SI	6.2719	6.2012	6.2832
CR	0.0000				OH	2.0000	2.0000	2.0000
SI	6.5246					15.8280	15.8942	15.7143
TI	0.0325	FM	0.9997	0.9996				
SN	0.0031	AB	0.0141	0.0112				
AL	5.2695	OR	0.9859	0.9888	FM	0.7753	0.4908	0.6318
OH	2.0000	AN	0.0000	0.0000				
	15.6034							

Anàlisis a la microsonda electrònica de moscovita i feldspat potàssic dels skarns d'arsenopirita sk-389 i sk-364 i de moscovita del skarn de pirrotina sk-392

	633-10B 1	633-10B 2	633-10B 3	633-10B 4	633-10B 5	633-10B 6	633-10B 7
PB	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0014
FE	0.0309	0.0266	0.0256	0.0345	0.0181	0.0235	0.0220
NA	0.0000	0.0000	0.0007	0.0004	0.0000	0.0004	0.0000
K	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MG	0.0479	0.0475	0.0457	0.0459	0.0355	0.0368	0.0363
CA	0.3617	0.3566	0.3562	0.3562	0.3628	0.3629	0.3616
CR	0.0000	0.0000	0.0000	0.0034	0.0000	0.0000	0.0000
SI	0.3600	0.3601	0.3575	0.3595	0.3739	0.3676	0.3732
TI	0.0065	0.0035	0.0112	0.0021	0.0110	0.0061	0.0015
SN	0.0007	0.0000	0.0000	0.0011	0.0000	0.0000	0.0007
AL	0.1366	0.1446	0.1392	0.1416	0.1515	0.1491	0.1524
	0.9449	0.9389	0.9360	0.9446	0.9528	0.9464	0.9491
PB	0.0000	0.0000	0.0000	0.0000	0.0000	0.0013	0.0184
FE	1.2965	1.1163	1.0777	1.4444	0.7426	0.9728	0.9097
NA	0.0000	0.0008	0.0663	0.0344	0.0000	0.0413	0.0000
K	0.0318	0.0000	0.0000	0.0003	0.0000	0.0000	0.0000
MN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MG	3.5778	3.5469	3.4273	3.4300	2.5951	2.7240	2.6728
CA	19.4181	19.1535	19.2170	19.1315	19.0565	19.2836	19.1224
CR	0.0000	0.0000	0.0000	0.1360	0.0000	0.0000	0.0000
SI	18.0392	18.0491	17.9996	18.0186	18.3292	18.2349	18.4217
TI	0.2468	0.1331	0.4234	0.0790	0.4074	0.2264	0.0555
SN	0.0147	0.0000	0.0000	0.0238	0.0000	0.0000	0.0145
AL	8.0670	8.5426	8.2628	8.3660	8.7521	8.7135	8.8688
	50.6919	50.5423	50.4741	50.6641	49.8829	50.1980	50.0839
FM	0.2660	0.2394	0.2392	0.2963	0.2225	0.2632	0.2539

Anàlisis a la microsonda electrònica de les idocrases de la veta de calcita del skarn d'arsenopirita SK-377

	Museovita						Feldspat potàssic			Albita
	187A 4	187A 5	187D 11	187D 12	187 L 8	187 L 9	187J-13 13	187L 6	187L 7	187J 1
K	0.1108	0.1124	0.1043	0.1138	0.1055	0.1105	0.1700	0.1696	0.1656	0.0030
FE	0.0182	0.0189	0.0208	0.0355	0.0240	0.0251	0.0005	0.0000	0.0000	0.0005
NA	0.0003	0.0013	0.0017	0.0013	0.0013	0.0020	0.0075	0.0063	0.0077	0.0943
SN	0.0021	0.0009	0.0000	0.0034	0.0012	0.0013	0.0000	0.0002	0.0000	0.0000
MN	0.0011	0.0008	0.0001	0.0008	0.0000	0.0016	0.0001	0.0000	0.0000	0.0008
MG	0.0012	0.0010	0.0004	0.0004	0.0008	0.0019	0.0000	0.0000	0.0000	0.0003
CA	0.0002	0.0000	0.0004	0.0006	0.0014	0.0004	0.0000	0.0000	0.0000	0.0200
AL	0.3510	0.3522	0.3583	0.3381	0.3466	0.3457	0.1847	0.1843	0.1851	0.2076
TI	0.0005	0.0002	0.0015	0.0013	0.0013	0.0008	0.0003	0.0003	0.0000	0.0000
SI	0.4794	0.4773	0.4842	0.4848	0.4822	0.4663	0.6531	0.6505	0.6434	0.6858
OH	0.0455	0.0455	0.0461	0.0457	0.0455	0.0448	1.0161	1.0113	1.0018	1.0123
	1.0104	1.0105	1.0179	1.0258	1.0098	1.0003				
K	1.8616	1.8895	1.7311	1.9044	1.7706	1.8870	0.9916	0.9936	0.9785	0.0163
FE	0.2002	0.2088	0.2266	0.3895	0.2640	0.2813	0.0018	0.0000	0.0000	0.0019
NA	0.0085	0.0327	0.0424	0.0328	0.0332	0.0508	0.0668	0.0562	0.0693	0.7889
SN	0.0113	0.0050	0.0000	0.0179	0.0063	0.0069	0.0000	0.0004	0.0000	0.0000
MN	0.0122	0.0093	0.0013	0.0085	0.0000	0.0176	0.0005	0.0002	0.0000	0.0031
MG	0.0236	0.0190	0.0071	0.0084	0.0147	0.0376	0.0000	0.0000	0.0000	0.0017
CA	0.0033	0.0000	0.0062	0.0078	0.0203	0.0056	0.0000	0.0000	0.0000	0.0923
AL	5.4459	5.4704	5.4942	5.2252	5.3775	5.4517	0.9953	0.9976	1.0105	1.0552
TI	0.0046	0.0020	0.0151	0.0132	0.0125	0.0085	0.0009	0.0011	0.0000	0.0000
SI	6.3119	6.2904	6.2995	6.3578	6.3469	6.2396	2.9866	2.9875	2.9799	2.9576
OH	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	5.0435	5.0366	5.0382	4.9169
	15.8830	15.9271	15.8236	15.9656	15.8460	15.9866				
FM	0.8999	0.9199	0.9699	0.9794	0.9472	0.8883	0.9993	0.9911	0.4215	0.7476
AB							0.0631	0.0536	0.0662	0.8790
OR							0.9369	0.9464	0.9338	0.0181
AN							0.0000	0.0000	0.0000	0.1028

Anàlisi a la microsonda electrònica de moscovites, feldspats potàssics i albites del skarn de hedenbergita sk-413

	Turmalina							Muscovita	Turmalina		
	856A1 14	856A1 15	856A1 16	856A1 17	856A1 18	856A1 26	856A1 27	856A1C 28	856AD 49	856AD 50	856AD 51
K	0.0005	0.0001	0.0000	0.0003	0.0001	0.0000	0.0000	0.0940	0.0004	0.0004	0.0000
FE	0.0930	0.0875	0.0694	0.0626	0.0791	0.1090	0.0641	0.0154	0.0716	0.0586	0.0698
NA	0.0145	0.0165	0.0109	0.0163	0.0167	0.0206	0.0201	0.0025	0.0136	0.0195	0.0122
SN	0.0000	0.0000	0.0012	0.0000	0.0000	0.0000	0.0005	0.0003	0.0000	0.0001	0.0000
MN	0.0000	0.0005	0.0000	0.0005	0.0000	0.0001	0.0010	0.0019	0.0005	0.0010	0.0000
MG	0.0486	0.0697	0.0880	0.0817	0.0724	0.0358	0.0855	0.0053	0.0814	0.0916	0.0838
CA	0.0257	0.0223	0.0358	0.0236	0.0199	0.0114	0.0209	0.0015	0.0312	0.0221	0.0307
AL	0.3440	0.3077	0.3236	0.3284	0.3208	0.3388	0.3309	0.3570	0.3288	0.3080	0.3300
TI	0.0006	0.0011	0.0007	0.0000	0.0008	0.0000	0.0022	0.0003	0.0020	0.0006	0.0018
SI	0.3183	0.3418	0.3203	0.3341	0.3351	0.3287	0.3330	0.4417	0.3236	0.3549	0.3311
OH	0.0437	0.0440	0.0442	0.0445	0.0441	0.0436	0.0449	0.0436	0.8530	0.8568	0.8595
	0.8888	0.8911	0.8940	0.8920	0.8891	0.8880	0.9030	0.9635			
K	0.0288	0.0033	0.0000	0.0161	0.0083	0.0000	0.0020	1.6465	0.0098	0.0113	0.0000
FE	3.7325	3.4907	2.7551	2.4680	3.1455	4.3903	2.5031	0.1766	1.2706	1.0236	1.2255
NA	1.3478	1.5262	1.0051	1.4866	1.5382	1.9205	1.8156	0.0661	0.5602	0.7912	0.4959
SN	0.0000	0.0000	0.0219	0.0000	0.0000	0.0000	0.0084	0.0019	0.0000	0.0007	0.0000
MN	0.0000	0.0205	0.0000	0.0203	0.0000	0.0047	0.0381	0.0226	0.0091	0.0169	0.0000
MG	3.4759	4.9553	6.2322	5.7345	5.1345	2.5705	5.9454	0.1087	2.5750	2.8502	2.6233
CA	1.3216	1.1392	1.8208	1.1915	1.0154	0.5889	1.0459	0.0219	0.7088	0.4948	0.6916
AL	19.4562	17.2993	18.1152	18.2353	17.9883	19.2209	18.2013	5.7796	8.2289	7.5792	8.1657
TI	0.0221	0.0377	0.0244	0.0000	0.0288	0.0000	0.0770	0.0027	0.0319	0.0102	0.0289
SI	15.2744	16.3005	15.2098	15.7386	15.9435	15.8249	15.5408	6.0670	6.8712	7.4103	6.9516
OH	7.0000	7.0000	7.0000	7.0000	7.0000	7.0000	7.0000	2.0000	20.2655	20.1885	20.1826
	51.6594	51.7727	52.1845	51.8908	51.8025	51.5206	52.1777	15.8936			
FM	0.5178	0.4147	0.3066	0.3026	0.3799	0.6310	0.2994	0.6469	0.3320	0.2674	0.3184

Anàlisis a la microsonda electrònica de turmalines i moscovites del skarn de magnetita sk-856

Albita		Feldspat potàssic			Andalucita	
	559		559G	559G5		559F
	7		4	5		8
CL	0.0001	K	0.1604	0.1637	K	0.0001
FE	0.0000	FE	0.0005	0.0004	FE	0.0044
F	0.0000	NA	0.0110	0.0081	NA	0.0000
K	0.0013	SN	0.0000	0.0000	SN	0.0000
MN	0.0010	MN	0.0005	0.0001	MN	0.0000
NA	0.1060	MG	0.0000	0.0000	MG	0.0000
SN	0.0003	CA	0.0002	0.0000	CA	0.0005
MG	0.0000	AL	0.1870	0.1852	AL	0.6215
TI	0.0000	TI	0.0007	0.0007	TI	0.0011
CA	0.0172	SI	0.6526	0.6521	SI	0.3687
AL	0.2134		1.0128	1.0104		0.9963
SI	0.6508					
P	0.0012					
	0.9911	K	0.9348	0.9571	K	0.0011
		FE	0.0018	0.0017	FE	0.0398
		NA	0.0976	0.0720	NA	0.0000
CL	0.0005	SN	0.0001	0.0000	SN	0.0000
FE	0.0000	MN	0.0020	0.0005	MN	0.0000
F	0.0000	MG	0.0000	0.0000	MG	0.0000
K	0.0076	CA	0.0008	0.0000	CA	0.0059
MN	0.0036	AL	1.0070	1.0005	AL	7.9523
NA	0.9124	TI	0.0022	0.0023	TI	0.0090
SN	0.0004	SI	2.9818	2.9888	SI	4.0030
MG	0.0000		5.0281	5.0227		12.0111
TI	0.0000					
CA	0.0817					
AL	1.1165	FM	0.9996	0.9992	FM	0.9999
SI	2.8893	AB	0.0945	0.0700		
P	0.0102	OR	0.9048	0.9300		
	5.0222	AN	0.0008	0.0000		
FM	0.9995					
AB	0.9109					
OR	0.0076					
AN	0.0815					

Anàlisis a la microsonda electrònica de muscovites, feldspat potàssic i andalucita del contacte intrusiu de la granodiorita amb les metapelites de l'Ordovicià Superior.

	Moscovita						Albita	
	559D 1	559D 2	559G 6	559G 7	559H 11	559H 12		559B-10 10
K	0.1020	0.0982	0.1087	0.1089	0.1076	0.1027	K	0.0005
FE	0.0032	0.0263	0.0193	0.0159	0.0122	0.0157	FE	0.0000
NA	0.0057	0.0046	0.0021	0.0018	0.0054	0.0049	NA	0.1162
SN	0.0002	0.0000	0.0003	0.0000	0.0001	0.0000	SN	0.0000
MN	0.0003	0.0004	0.0000	0.0000	0.0000	0.0000	MN	0.0000
MG	0.0003	0.0030	0.0087	0.0044	0.0035	0.0046	MG	0.0000
CA	0.0000	0.0003	0.0001	0.0002	0.0000	0.0000	CA	0.0032
AL	0.3817	0.3588	0.3385	0.3558	0.3676	0.3632	AL	0.2002
TI	0.0000	0.0004	0.0004	0.0000	0.0007	0.0017	TI	0.0004
SI	0.4852	0.4554	0.4945	0.4746	0.4659	0.4687	SI	0.6966
OH	0.0468	0.0447	0.0460	0.0455	0.0455	0.0455		1.0170
	1.0254	0.9921	1.0185	1.0071	1.0084	1.0072		
							K	0.0029
K	1.6653	1.6809	1.8058	1.8308	1.8062	1.7240	FE	0.0000
FE	0.0343	0.2951	0.2108	0.1751	0.1337	0.1731	NA	0.9665
NA	0.1423	0.1206	0.0523	0.0448	0.1373	0.1243	SN	0.0000
SN	0.0008	0.0000	0.0013	0.0000	0.0005	0.0000	MN	0.0000
MN	0.0034	0.0042	0.0000	0.0000	0.0000	0.0000	MG	0.0000
MG	0.0052	0.0591	0.1684	0.0865	0.0679	0.0896	CA	0.0143
CA	0.0000	0.0038	0.0010	0.0033	0.0000	0.0000	AL	1.0124
AL	5.7562	5.6727	5.1972	5.5254	5.6998	5.6311	TI	0.0012
TI	0.0000	0.0041	0.0042	0.0000	0.0068	0.0171	SI	2.9895
SI	6.2080	6.1092	6.4413	6.2539	6.1305	6.1655	OH	4.9873
OH	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000		
	15.8155	15.9497	15.8822	15.9198	15.9827	15.9247		
								0.4057
								0.9821
FM	0.8795	0.8352	0.5559	0.6695	0.6634	0.6591		0.0029
								0.0150

Anàlisis a la microsonda electrònica de moscovites i albites del contacte intrusiu de la granodiorita amb les metapelites de l'Ordovicià Superior

32 280486 303 SOLER 434A2 CERCLE B WOLLASTONITA X=

O=6, CAT.=4 STOECHIOMETRIE : 0.9787

SI	AL4	AL6	FE2	FE3	F	NA	MG	CL	BA	K	CA	TI	CR	MN	TT
1.987	0.001	0.000	0.017	0.007	0.003	0.000	0.002	0.000	0.000	0.001	1.969	0.002	0.000	0.014	4.003
50.76	0.01		0.52	0.22	0.02	0.00	0.04	0.00	00.00	0.01	46.94	0.08	00.00	0.42	99.04

37 280486 303 SOLER 434A2 WOLLASTONITA

O=6, CAT.=4 STOECHIOMETRIE : 0.9827

SI	AL4	AL6	FE2	FE3	F	NA	MG	CL	BA	K	CA	TI	CR	MN	TT
1.992	0.000	0.000	0.017	0.004	0.001	0.000	0.003	0.008	0.000	0.000	1.973	0.002	0.000	0.008	4.009
50.93	0.01		0.52	0.13	0.01	0.00	0.06	0.12	00.00	0.00	47.08	0.05	00.00	0.25	99.16

38 280486 303 SOLER 434A2 CERCLE

O=6, CAT.=4 STOECHIOMETRIE : 1.0083

SI	AL4	AL6	FE2	FE3	F	NA	MG	CL	BA	K	CA	TI	CR	MN	TT
1.976	0.001	0.000	0.000	0.013	0.032	0.000	0.005	0.000	0.000	0.000	2.009	0.001	0.000	0.007	4.045
50.69	0.02		00.00	0.44	0.26	0.00	0.09	0.00	00.00	0.01	48.10	0.03	00.00	0.23	99.86

Anàlisis a la microsonda electrònica de wollastonites del skarn de Sta. LLogaia

8 280486 303 SOLER 417 B CERCLE G ANFIBOL

AMPHIBOLE, O=22, OH,F,CL=2,

OH	F	CL	K	NAA	NAM	CA	SI	ALT	ALM	FE3	FE2	MG	BA	TI	CR	MN	
1,973	0,003	0,024	0,026	0,000	0,195	1,705	7,465	0,535	0,060	0,818	3,241	0,677	0,004	0,012	0,002	0,186	15
1,89	0,01	0,09	0,13	0,64		10,15	47,62	3,22		6,93	24,72	2,90	0,07	0,10	0,02	1,40	

(NORME:13+CA+NA+K)

1,973	0,003	0,024	0,027	0,170	0,029	1,736	7,600	0,400	0,206	0,000	4,132	0,689	0,005	0,012	0,002	0,190	15
1,85	0,01	0,09	0,13	0,64		10,15	47,62	3,22		00,00	30,95	2,90	0,07	0,10	0,02	1,40	

(NORME:15+NA+K)

1,973	0,003	0,024	0,027	0,000	0,197	1,716	7,515	0,485	0,114	0,515	3,570	0,681	0,004	0,012	0,002	0,188	15
1,87	0,01	0,09	0,13	0,64		10,15	47,62	3,22		4,34	27,05	2,90	0,07	0,10	0,02	1,40	

(NORME:15+K)

52 280486 303 SOLER 418 B

AMPHIBOLE, O=22, OH,F,CL=2,

OH	F	CL	K	NAA	NAM	CA	SI	ALT	ALM	FE3	FE2	MG	BA	TI	CR	MN	
1,896	0,083	0,022	0,030	0,012	0,113	1,887	7,486	0,514	0,113	0,286	3,271	1,155	0,000	0,011	0,000	0,165	15,
1,83	0,17	0,08	0,15	0,41		11,32	48,10	3,42		2,44	25,13	4,98	00,00	0,09	00,00	1,25	99

(NORME:13+CA+NA+K)

1,895	0,083	0,022	0,030	0,106	0,020	1,899	7,533	0,467	0,163	0,000	3,579	1,162	0,000	0,011	0,000	0,166	15,
1,81	0,17	0,08	0,15	0,41		11,32	48,10	3,42		00,00	27,32	4,98	00,00	0,09	00,00	1,25	99

(NORME:15+NA+K)

1,896	0,082	0,022	0,030	0,000	0,125	1,886	7,480	0,520	0,106	0,322	3,232	1,154	0,000	0,011	0,000	0,165	15,
1,83	0,17	0,08	0,15	0,41		11,32	48,10	3,42		2,75	24,85	4,98	00,00	0,09	00,00	1,25	99

(NORME:15+K)

Anàlisis a la microsonda electrònica d'actinolites del skarn de Sta. LLogaia

48 280486 303 SOLER 414 X= 157 Y= 089

EPIDOTE, O=12, OH=1, CAT.=8, MN TRIVALENT

OH	SI	AL4	AL6	FE2	FE3	F	NA	MG	CL	BA	K	CA	TI	CR	MN	TT
0.786	3.214	0.000	1.870	0.832	0.474	0.129	0.000	0.144	0.035	0.000	0.000	1.338	0.100	0.000	0.028	8.164
0.99	26.99	13.32		8.36	5.29	0.34	0.00	0.81	0.17	00.00	0.00	10.48	1.12	00.00	0.31	68.18

49 280486 303 SOLER 414 MES ARRODONIT X= 142 Y=102

EPIDOTE, O=12, OH=1, CAT.=8, MN TRIVALENT

OH	SI	AL4	AL6	FE2	FE3	F	NA	MG	CL	BA	K	CA	TI	CR	MN	TT
0.475	3.237	0.000	1.800	0.768	0.511	0.253	0.024	0.133	0.058	0.000	0.003	1.385	0.102	0.000	0.037	8.311
0.59	26.76	12.62		7.59	5.61	0.66	0.10	0.74	0.28	00.00	0.02	10.68	1.12	00.00	0.40	67.19

55 280486 303 SOLER 440 CERCLE B

EPIDOTE, O=12, OH=1, CAT.=8, MN TRIVALENT

OH	SI	AL4	AL6	FE2	FE3	F	NA	MG	CL	BA	K	CA	TI	CR	MN	TT
0.466	3.005	0.000	3.045	0.021	0.000	0.007	0.000	0.000	0.002	0.000	0.000	1.896	0.003	0.000	0.001	7.979
0.94	40.46	34.80		0.34	00.00	0.03	0.00	0.00	0.01	00.00	0.00	23.83	0.04	00.00	0.01	100.48

Anàlisis a la microsonda electrònica d'epidotes del skarn de Sta. LLogaia.

(Anàlisis 48 i 49 corresponents a allanites de l'endocontacte).

Muscovita

	633-2EE 5	633-2EE 6	633-2EE 7	633-2EE 9	633-2EE 12	633-2EE 16	633-2EE 17
PB	0.0000	0.0002	0.0000	0.0000	0.0010	0.0005	0.000C
FE	0.0339	0.0104	0.0238	0.0244	0.0457	0.0000	0.0052
NA	0.0000	0.0002	0.0000	0.0003	0.0000	0.0000	0.0000
K	0.1104	0.1173	0.1172	0.1087	0.1000	0.1181	0.1125
MN	0.0003	0.0000	0.0026	0.0000	0.0039	0.0000	0.0000
MG	0.0154	0.0222	0.0128	0.0080	0.0131	0.0202	0.0050
CA	0.0000	0.0000	0.0000	0.0000	0.0007	0.0000	0.0000
CR	0.0000	0.0027	0.0000	0.0000	0.0000	0.0000	0.0001
SI	0.4227	0.4419	0.4507	0.4404	0.4281	0.4536	0.4404
TI	0.0012	0.0000	0.0009	0.0002	0.0000	0.0000	0.0000
SN	0.0002	0.0000	0.0000	0.0000	0.0007	0.0000	0.0011
AL	0.3660	0.3642	0.3557	0.3706	0.3564	0.3675	0.3727
OH	0.0440	0.0449	0.0449	0.0446	0.0439	0.0453	0.0442
	0.9941	1.0041	1.0087	0.9972	0.9935	1.0053	0.9813
PB	0.0000	0.0007	0.0000	0.0000	0.0036	0.0017	0.0000
FE	0.3860	0.1165	0.2659	0.2741	0.5218	0.0000	0.0589
NA	0.0000	0.0058	0.0000	0.0086	0.0000	0.0000	0.0000
K	1.9173	1.9975	1.9963	1.8615	1.7410	1.9941	1.9444
MN	0.0032	0.0000	0.0291	0.0000	0.0448	0.0000	0.0000
MG	0.3117	0.4420	0.2549	0.1598	0.2669	0.3986	0.1018
CA	0.0000	0.0000	0.0000	0.0000	0.0096	0.0000	0.0000
CR	0.0000	0.0285	0.0000	0.0000	0.0000	0.0000	0.0007
SI	5.7536	5.8996	6.0180	5.9144	5.8408	6.0023	5.9659
TI	0.0123	0.0000	0.0093	0.0016	0.0000	0.0000	0.0003
SN	0.0014	0.0000	0.0000	0.0001	0.0044	0.0000	0.0066
AL	5.8707	5.7306	5.5973	5.8651	5.7303	5.7311	5.9504
OH	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
	16.2561	16.2212	16.1708	16.0852	16.1632	16.1279	16.0291
FM	0.5553	0.2086	0.5364	0.6317	0.6798	0.0000	0.3667

Feldspat potàssic

	633-2FE 18	633-2FF 12	633-2FF 16
PB	0.0012	0.0000	0.0004
FE	0.0258	0.0000	0.0000
NA	0.0016	0.0035	0.0055
K	0.1624	0.1740	0.1742
MN	0.0000	0.0000	0.0000
MG	0.0077	0.0000	0.0000
CA	0.0000	0.0011	0.0005
CR	0.0000	0.0000	0.0000
SI	0.6262	0.6508	0.6510
TI	0.0002	0.0000	0.0000
SN	0.0000	0.0000	0.0005
AL	0.1774	0.1845	0.1844
	1.0026	1.0138	1.0166
PB	0.0016	0.0000	0.0005
FE	0.1012	0.0000	0.0000
NA	0.0144	0.0312	0.0488
K	0.9722	1.0184	1.0185
MN	0.0000	0.0000	0.0000
MG	0.0539	0.0000	0.0000
CA	0.0000	0.0055	0.0024
CR	0.0000	0.0000	0.0000
SI	2.9383	2.9862	2.9837
TI	0.0006	0.0000	0.0000
SN	0.0000	0.0000	0.0010
AL	0.9812	0.9978	0.9963
	5.0633	5.0392	5.0513
FM	0.6524	0.4226	0.4222
AB	0.0146	0.0296	0.0456
OR	0.9854	0.9652	0.9521
AN	0.0000	0.0052	0.0023

Anàlisis a la microsonda electrònica de moscovites i feldspats potàssics del skarn d'arsenopirita sk-377

ANALISIS A LA MICROSONDA ELECTRONICA DE LES FASES METAL.LIQUES DEL SKARN D'ARSENOPIRITA SK-377.

LINIES SANASES HI HA EL NUM MOSTRA a=I,b=II,c=III,d=IV,g=gn,h=hes,i=bi I A LES LINIES PARELLES = Pb,Bi,S,Se,Te,Cu,Ge,Ag,Au,Sb,Co,As % àtomic

132-cosalita
18.50,21.84,55.35, 0.36, 0.01, 0.30, 0.22, 1.95, 0.00, 1.47, 0.00, 0.00

133-cosalita
17.77 21.78 55.16 0.41 0.00 0.17 1.29 1.88 0.00 1.54 0.00 0.00

134-Fase I
0.52 56.44 14.79 0.52 27.54 0.00 0.00 0.00 0.04 0.15 0.00 0.00

135-Fase II
8.14 39.42 29.03 0.57 22.34 0.00 0.00 0.00 0.08 0.02 0.39 0.00

136-hessita
0.00 0.14 0.00 0.00 33.04 0.19 0.00 66.20 0.00 0.00 0.00 0.00

137-galena
47.03 1.37 49.67 0.09 0.10 0.09 0.29 1.36 0.00 0.00 0.00 0.00

138-galena
47.10 1.65 48.29 0.42 0.21 0.10 0.80 1.33 0.10 0.00 0.00 0.00

140-Fase II
7.42 40.60 28.72 0.33 22.38 0.00 0.54 0.00 0.00 0.02 0.00 0.00

141-Fase II
8.95 38.94 28.50 0.43 23.08 0.00 0.00 0.00 0.00 0.10 0.00 0.00

142-galena
47.43 1.61 47.61 0.30 1.04 0.00 0.00 1.99 0.02 0.00 0.00 0.00

143-galena
48.31 1.22 49.36 0.29 0.00 0.00 0.00 0.82 0.01 0.00 0.00 0.00

145-galena
46.86 1.80 48.99 0.38 0.20 0.08 0.00 1.63 0.00 0.00 0.06 0.00

146-hessita
1.84 0.00 1.36 0.00 32.28 0.00 0.00 64.36 0.15 0.00 0.00 0.00

148-hessita
0.10 0.00 0.26 0.00 33.37 0.00 0.69 65.53 0.04 0.00 0.00 0.00

149-Fase I
0.37 56.55 13.37 0.51 29.20 0.00 0.00 0.00 0.00 0.00 0.00 0.00

150-galena
47.59 1.74 48.53 0.21 0.15 0.00 0.00 1.68 0.10 0.00 0.00 0.00

151-galena
47.71 2.21 47.59 0.38 0.72 0.19 0.00 1.20 0.00 0.00 0.00 0.00

152-Bismut natiu
0.09 95.79 1.49 0.18 0.00 0.00 0.80 0.00 0.02 0.12 0.47 1.05

153-cosalita
18.02 23.52 52.65 0.25 0.01 0.00 0.79 2.76 0.13 1.85 0.00 0.00

154-cosalita
19.27 22.51 54.06 0.56 0.00 1.05 0.00 1.43 0.02 1.09 0.00 0.00

155-galena
48.77 2.01 47.83 0.05 0.00 0.00 0.00 1.28 0.05 0.00 0.00 0.03

156-cosalita
19.43 23.42 51.12 0.39 0.02 0.99 0.83 2.13 0.00 1.49 0.18 0.00

157-cosalita
17.85 22.05 56.26 0.28 0.17 0.75 0.00 1.50 0.01 1.09 0.00 0.05

158-galena
46.58 1.53 49.79 0.03 0.22 0.00 0.46 1.36 0.00 0.00 0.00 0.03

159-Fase I
0.35 56.06 13.29 0.55 28.12 0.00 1.00 0.00 0.00 0.29 0.34 0.00

160-Fase II
7.84 40.50 27.79 0.54 22.20 0.00 0.32 0.21 0.25 0.24 0.11 0.00

161-cosalita
18.19 21.49 54.52 0.36 0.22 0.89 0.32 2.43 0.00 1.59 0.00 0.00

162-cosalita
19.15 21.49 54.14 0.26 0.00 0.32 0.12 2.82 0.06 1.64 0.00 0.00
163-cosalita
18.12 22.41 55.06 0.33 0.01 0.19 0.00 2.37 0.03 1.49 0.00 0.00
164-Fase I
0.00 57.89 15.23 0.92 25.58 0.00 0.14 0.00 0.01 0.22 0.00 0.00
165-Fase I
1.85 52.43 28.02 0.99 15.75 0.00 0.96 0.00 0.00 0.00 0.00 0.00
166-Fase I
1.20 58.96 15.58 0.78 23.10 0.00 0.00 0.22 0.00 0.17 0.00 0.00
167-Fase I
0.54 57.39 17.37 0.81 22.68 0.00 1.09 0.00 0.00 0.11 0.00 0.00
168-galena
44.69 2.47 48.81 0.59 0.21 0.00 1.09 2.13 0.00 0.00 0.00 0.00
169-Fase II
4.75 45.68 31.13 0.76 17.49 0.00 0.17 0.00 0.01 0.00 0.00 0.00
170-Fase II
3.56 47.72 27.88 0.97 18.20 0.00 1.60 0.00 0.08 0.00 0.00 0.00
171-Fase II
3.94 47.19 27.92 0.73 17.79 0.00 2.07 0.28 0.00 0.07 0.00 0.00
172-Fase I
4.96 48.06 27.41 0.91 18.66 0.00 0.00 0.00 0.00 0.00 0.00 0.00
173-Fase I
4.27 47.85 28.45 0.56 18.88 0.00 0.00 0.00 0.00 0.00 0.00 0.00
176-cosalita
18.45 22.33 54.45 0.43 0.00 1.38 0.14 1.83 0.01 0.98 0.00 0.00
177-cosalita
19.19 23.38 54.03 0.49 0.00 0.40 0.00 1.68 0.00 0.83 0.00 0.00
178-cosalita
19.17 23.18 53.58 0.40 0.06 0.49 0.00 1.85 0.00 1.24 0.00 0.03
179-Fase I
0.53 56.49 13.95 0.17 28.51 0.00 0.17 0.12 0.07 0.00 0.00 0.00
180-Fase I
0.44 57.37 13.65 0.28 27.24 0.00 0.95 0.00 0.08 0.00 0.00 0.00
181-Fase I
0.00 57.73 13.09 0.40 28.53 0.00 0.00 0.00 0.25 0.00 0.00 0.00
182-Fase I
0.16 57.95 12.92 0.35 28.03 0.37 0.03 0.00 0.18 0.00 0.00 0.00
183-galena
49.29 1.86 46.82 0.23 0.22 0.00 0.00 1.57 0.00 0.00 0.00 0.00
184-Fase II
7.85 40.89 28.15 0.34 22.76 0.00 0.00 0.00 0.01 0.00 0.00 0.00
185-Fase II
8.79 41.47 26.85 0.34 22.44 0.00 0.06 0.00 0.00 0.04 0.00 0.00
186-Fase II
8.76 41.45 25.29 0.53 22.32 0.00 1.46 0.00 0.00 0.00 0.19 0.00
187-Fase II
7.54 40.46 27.16 0.52 22.07 0.00 2.17 0.00 0.00 0.10 0.00 0.00
188-Fase II
8.67 41.09 27.11 0.32 22.49 0.00 0.09 0.08 0.07 0.08 0.00 0.00
189-galena
49.91 1.24 46.57 0.46 0.28 0.18 0.00 1.36 0.00 0.00 0.00 0.00
190-cosalita
8.39 41.15 27.11 0.43 22.62 0.12 0.00 0.00 0.02 0.15 0.00 0.00
191-Fase II
7.88 41.11 27.65 0.37 22.71 0.00 0.00 0.00 0.27 0.00 0.00 0.00
192-Fase II
8.49 41.40 26.55 0.36 22.34 0.23 0.46 0.00 0.05 0.12 0.00 0.00

193-hessita

0.00	0.00	0.00	0.05	33.65	0.00	0.78	65.33	0.02	0.00	0.17	0.00

194-hessita

0.00	0.00	0.02	0.00	33.51	0.00	0.00	66.24	0.23	0.00	0.00	0.00

195-Fase II

8.99	40.32	26.98	0.45	23.21	0.00	0.00	0.00	0.05	0.00	0.00	0.00

196-Fase II

8.73	41.50	25.78	0.38	22.35	0.00	1.01	0.17	0.00	0.08	0.00	0.00

197-Fase II

7.59	42.50	27.00	0.45	22.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00

198-Fase I

0.39	57.70	12.74	0.40	28.27	0.00	0.00	0.00	0.26	0.24	0.00	0.00

199-Fase I

0.46	56.51	13.29	0.39	28.74	0.00	0.00	0.01	0.03	0.54	0.03	0.00

201-Fase I

0.00	58.69	13.08	1.03	24.88	0.00	1.93	0.17	0.03	0.20	0.00	0.00

203-Fase I

0.00	57.79	14.82	1.16	25.61	0.00	0.00	0.37	0.01	0.23	0.00	0.00

204-Fase I

0.00	56.73	14.59	1.15	25.54	0.00	1.84	0.00	0.13	0.01	0.00	0.00

205-Fase IV (telurat)

0.00	51.65	24.90	1.34	22.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00

206-Fase IV (telurat)

0.00	50.69	25.40	1.64	19.61	0.00	1.64	0.00	0.00	0.16	0.19	0.66

ANALISIS A LA MICROSONDA ELECTRONICA DE LES FASES METAL.LIQUES
DEL SKARN D'ARSENOPIRITA SK-377.
LINIES SANASES HI HA EL NUM MOSTRA
I A LES LINIES PARELLES = Pb,Bi,S,Se,Te,Cu,Ge,Ag,Fe,Sb % àtomic.
ATENCIO AMB EL " Pt" JA QUE NO ES REAL SINO UNA INTERFERENCIA DE "Bi "

371-bismut natiu										
	0.00	95.73	0.18	0.00	0.15	0.00	0.00	0.03	1.32	0.35
372-bismut natiu										
	0.00	93.70	0.00	0.00	0.02	0.94	0.00	0.12	2.91	0.14
373-cosalita										
	19.36	24.03	50.77	0.31	0.31	0.61	0.08	2.55	0.00	1.26
374-cosalita										
	40.32	7.99	49.69	0.25	0.12	0.00	0.00	1.48	0.00	0.14
375-cosalita										
	20.26	21.55	53.61	0.40	0.24	0.46	0.01	2.41	0.00	0.96
376-cosalita										
	23.15	20.60	51.52	0.31	0.24	0.26	0.31	2.24	0.00	1.01
377-Fase IV (telurat)										
	0.09	51.76	24.11	0.86	18.86	0.35	0.00	0.18	2.88	0.01
378-Fase IV (telurat)										
	0.03	49.84	26.46	1.10	17.46	0.27	0.00	0.13	3.28	0.14
379-galena										
	48.27	2.02	47.54	0.28	0.00	0.00	0.00	1.67	0.00	0.00
383-cosalita										
	19.05	22.89	52.93	0.48	0.05	0.95	0.00	1.84	0.00	1.03
384-cosalita										
	19.21	23.25	52.87	0.26	0.00	1.13	0.19	1.33	0.00	1.17
385-Fase I										
	0.08	56.60	12.85	0.38	28.49	0.00	0.00	0.00	0.08	0.04
386-Fase I										
	0.00	57.81	13.02	0.37	27.25	0.00	0.00	0.00	0.00	0.12
387-Fase I										
	0.09	55.93	13.00	0.58	27.98	0.00	0.12	0.00	0.09	0.35
388-Fase I										
	0.25	56.91	13.17	0.30	27.83	0.00	0.08	0.00	0.00	0.15
389-Fase II										
	7.81	40.93	26.18	0.35	23.32	0.00	0.00	0.14	0.00	0.32
390-Fase II										
	7.85	41.53	26.80	0.18	22.82	0.00	0.00	0.00	0.00	0.18
391-Fase II										
	7.80	40.67	25.59	0.36	23.34	0.33	0.51	0.05	0.00	0.11
392-hessita										
	0.00	0.00	0.29	0.00	34.32	0.00	0.24	65.15	0.00	0.00
393-Fase I										
	0.00	56.37	12.48	0.17	29.27	0.00	0.00	0.00	0.00	0.32
394-hessita										
	0.00	0.00	0.19	0.00	34.86	0.00	0.08	64.87	0.00	0.00
395-Fase II										
	19.26	23.97	52.61	0.33	0.24	0.11	0.07	2.43	0.00	0.50
396-Fase II										
	19.85	23.06	51.90	0.41	0.00	0.59	0.01	2.40	0.00	1.21
397-Fase I										
	0.10	57.07	13.29	0.23	27.32	0.00	0.40	0.00	0.05	0.08
400-Fase I										
	1.53	54.30	25.92	0.64	16.10	0.00	0.05	0.13	0.00	0.02
401-Fase I										
	1.51	54.60	25.85	0.71	16.04	0.00	0.03	0.00	0.00	0.16

402-galena
50.12 1.75 45.84 0.31 0.13 0.00 0.04 1.62 0.00 0.00
403-Fase I
1.23 55.27 25.02 0.97 15.72 0.00 0.00 0.00 0.36 0.10
404-Fase IV (telurat)
0.07 52.98 19.47 0.91 23.14 0.00 0.00 0.21 1.94 0.29
405-Fase I
0.88 54.89 26.01 0.64 15.17 0.00 0.35 0.00 0.23 0.19
406-galena
47.31 1.60 49.30 0.37 0.02 0.00 0.00 1.08 0.00 0.00
407-Fase I
1.69 53.37 27.44 0.59 15.17 0.00 0.10 0.12 0.00 0.12
408-Fase I
1.63 51.69 29.01 0.88 15.27 0.00 0.00 0.00 0.01 0.02
409-Fase IV (telurat)
6.70 46.23 22.95 1.03 20.81 0.17 0.00 0.26 0.73 0.37
410-Fase II
2.91 50.26 28.03 0.62 17.33 0.00 0.00 0.00 0.00 0.16
411-Fase II
4.58 48.70 28.47 0.57 16.84 0.00 0.00 0.08 0.00 0.03
412-Fase I
0.00 57.54 14.23 0.39 26.16 0.00 0.00 0.00 0.57 0.00
413-Fase IV (telurat)
0.00 48.83 25.91 0.54 21.49 0.00 0.12 0.13 1.97 0.21
414-Fase IV (telurat)
0.00 40.73 36.11 0.93 10.87 0.00 0.00 8.54 1.91 0.11
415-Fase IV (telurat)
0.00 47.83 26.01 1.18 20.74 0.00 0.62 0.00 2.15 0.01
416-Fase IV (telurat)
4.32 45.40 26.58 0.82 18.64 0.00 0.77 0.06 1.89 0.20
417-Fase I
0.00 57.59 14.63 0.70 25.90 0.00 0.00 0.00 0.00 0.27
427-Fase I
2.02 51.90 27.81 0.59 15.69 0.00 0.34 0.10 0.08 0.21
428-Fase I
1.67 52.60 28.04 0.42 15.64 0.00 0.00 0.16 0.15 0.10
431-Fase I
0.00 57.64 13.98 0.62 25.82 0.00 0.11 0.00 0.00 0.35
432-cosalita
17.91 22.02 55.48 0.23 0.09 0.36 0.12 2.34 0.00 1.06
433-cosalita
18.49 22.43 55.33 0.28 0.10 0.22 0.00 1.69 0.00 0.85
434-cosalita
18.29 21.88 55.54 0.34 0.18 0.25 0.06 1.92 0.00 0.75
435-cosalita
19.13 22.48 54.51 0.30 0.05 0.50 0.00 1.93 0.00 0.86
436-galena
47.59 1.63 49.25 0.26 0.00 0.00 0.20 1.06 0.00 0.00
437-galena
48.35 1.30 49.09 0.23 0.00 0.00 0.18 0.83 0.00 0.00
438-cosalita
12.62 24.02 54.25 0.30 0.00 0.00 0.06 7.48 0.00 0.90
447-galena
46.76 2.21 48.91 0.24 0.18 0.00 0.20 1.34 0.00 0.00
448-Fase I
2.02 52.01 27.96 0.68 15.66 0.00 0.00 0.00 0.00 0.06
449-Fase I
1.08 53.83 28.15 0.75 14.43 0.00 0.00 0.00 0.00 0.21

450-Fase IV (telurat)
2.70 48.31 25.09 0.62 18.10 0.00 0.28 1.84 1.50 0.18
451-v
1.78 26.87 45.10 0.46 3.78 2.21 0.17 15.44 3.75 0.00
452-v
7.72 26.70 40.23 0.96 7.40 4.21 0.00 11.66 0.72 0.15
453-Fase IV (telurat)
0.00 48.61 28.85 0.69 19.34 0.32 0.13 0.00 0.73 0.16
454-Fase IV (telurat)
0.00 52.81 24.50 0.77 20.28 0.00 0.00 0.00 0.69 0.00
455-Fase IV (telurat)
0.00 50.99 26.84 0.98 19.10 0.00 0.00 0.00 0.76 0.30
456-v
2.23 24.49 44.08 0.73 3.69 3.53 0.16 14.72 5.89 0.00
457-v
1.71 27.98 42.09 0.57 5.29 1.80 0.15 13.46 6.03 0.00
458-Fase I
0.00 57.40 14.30 0.61 25.90 0.00 0.20 0.00 0.00 0.16
459-Fase I
0.00 57.53 14.59 0.13 26.13 0.03 0.00 0.00 0.07 0.26
460-galena
46.76 1.64 48.99 0.36 0.35 0.00 0.38 1.43 0.00 0.00
461-Fase I
0.00 57.23 15.09 0.53 25.25 0.00 0.00 0.00 0.00 0.53
465-bismut natiu
0.00 93.34 0.32 0.00 0.00 0.00 0.62 0.00 3.54 0.00
466-bismut natiu
0.16 95.63 0.11 0.00 0.00 0.00 0.00 0.00 0.59 0.59

ANNEX 5.

EL PROGRAMA ISOTOP3

PROGRAMA ISOTOP3.- Autor: Soler, A. (1989)
Aquest programa modelitza els empobriments en ^{13}C i ^{18}O en calcites, produits tant per fenomens d'intercanvi isotòpic, com per fenomens de volatilització isotòpica entre una calcària i un fluid, a diferents temperatures i fraccions molars de CO_2. En el cas de la volatilització modelitza els empobriments en ^{13}C i ^{18}O produits per volatilitzacions tipus **"BATCH"** i **"RAYLEIGH"**per reaccions de formació de wollastonita i diòpsid. Basat en Taylor (1974, 1977), Sverjensky (1980) i Bowman et al (1985a, 1985b).
El programa consta d'una subrutina (isotop5) que permet calcular també els procesos d'intercanvi isotòpic entre una calcita filoniana (depenen del fraccionament exclusivament amb el fluid) i la calcària regional, fet que simplifica els errors d'estimació de la temperatura i la composició del fluid metasomàtic. Aquesta subrutina també permet calcular les relacions aigua/roca per les diferents calcites analitzades que són englobades pel intercanvi isotòpic, així com la fracció molar de CO2 concreta per la calcita problema.
La font dels coeficients de fraccionament s'indica a l'interior del programa, així com en el texte del capítol 8.1.

```
REM
REM
REM
REM ************************************************************************
REM
REM PROGRAMA       ISOTOP3.BAS
REM ALBERT SOLER i GIL
REM Departament de Cristal.lografia, Mineralogia i Diposits Minerals
REM Facultat de Geologia, Universitat de Barcelona
REM BARCELONA 1989
REM
REM ************************************************************************
REM
REM
REM PROGRAMA PER CALCULAR LES CORVES TEORIQUES D'INTERCANVI ISOTOPIC.
REM PER ISOTOPS ESTABLES DE CARBONI I OXIGEN.
REM CALCUL PER CORVES D'INTERCANVI SISTEMA OBERT I TANCAT.
REM CALCUL PER CORVES DE DESTILACIO SISTEMA OBERT I TANCAT
REM
REM LES EQUACIONS DELS COEFICIENTS DE FRACCIONAMENT S'HAN OBTINGUT
REM DE "DATA OF GEOCHEMISTRY (6 ed).  Ed. MICHAEL FLEISCHER
REM Geological Survey Professional Paper 440-KK
REM
REM EQUIVALENCIES:
REM delta 13C inicial de la calcita = Cic
REM delta 13C inicial del fluid (CO2) = Cif
REM delta 13C final de la calcita = Cfc
REM delta 13C final del fluid (CO2) = Cff
REM delta 18O inicial de la calcita = Oic
```

```
REM delta 18O inicial del fluid = Oif
REM delta 18O final de la calcita = Ofc
REM delta 18O final del fluid = Off
REM Coef fraccionament 13C calcita-CO2 = FC
REM Coef fraccionament 18O calcita-H2O = FO
REM Coef fraccionament 18O CO2-calcita = FO2
REM Coef fraccionament 18O Wollas-Aigua = FW
REM Coef fraccionament 18O CO2 - Wollast = FCW
REM Coef fraccionament 18O Wollas - Calcita = FWC
REM Coef fraccionament 18O CO2 - roca (Cc+Wo) = FT
REM relacio aigua roca = WR
REM Fraccio molar de CO2 = XC
REM
REM
DIM Ofc.(200),Cfc(200),Cfcr(10),Cfcs(10),Ofc(11)
e=log (10)
REM ENTRADA DE DADES
REM *****************
COLOR 14,9:CLS
LOCATE 5,10:INPUT "Š13C inicial calcita";Cic
LOCATE 6,10:INPUT "Š13C inicial CO2";Cif
LOCATE 7,10:INPUT "Š18O inicial calcita";Oic
LOCATE 8,10:INPUT "Š18O inicial fluid";Oif
LOCATE 9,10:INPUT "Temperatura inicial del calcul    ºC ";TI
LOCATE 10,10:INPUT "Interval de Temperatura entre calcul i calcul ºC";I
LOCATE 11,10:INPUT "Temperatura final del calcul   ºC ";TF
LPRINT "*****************************************************************"
LPRINT "*****************************************************************"
LPRINT "MODELITZACIO DE LES INTERACCIONS DELS ISOTOPS ESTABLES "
LPRINT "13C i 18O ENTRE FLUID I ROCA, EN CALCITES "
LPRINT "Calcul de les corves de intercanvi (Sistema obert i tancat)"
LPRINT "i de les corves de destil.lació (Sistema obert i tancat)  "
LPRINT
LPRINT "   A.SOLER (1989) Dep. Cristal.lografia, Mineralogia i "
LPRINT " Dipòsits Minerals.  Fac. Geologia.  Univ Barcelona"
LPRINT "*****************************************************************"
LPRINT "*****************************************************************"
LPRINT
LPRINT
LPRINT
LPRINT "-------------------------------------------------------------"
LPRINT "CORBA D'INTERCANVI (sistema tancat) segons TAYLOR (1974,77)"
"
LPRINT "CORBA D'INTERCANVI (sistema obert) segons TAYLOR (1974,77)"
LPRINT "TAYLOR (1977).Geol. Soc. London. Jour., v.133, p.509-559"
LPRINT "CORBA DESTIL.LACIO (sistema tancat) segons BOWMAN et al 1985."
LPRINT "CORBA DESTIL.LACIO (sistema obert) segons BOWMAN et al 1985."
LPRINT "BOWMAN et al. (1985).- Amer. Jour. Science. Vol 285, pp.621-660."
LPRINT "............................................................."
LPRINT "Frac. Isot. 13CCc-CO2 segons Botinga (1968)"
LPRINT "Jour. Phys. Chem. V.72, p.800-808."
LPRINT "Frac. Isot. 18OCc-H2O segons O'Neil, Clayton and Mayeda (1969)"
LPRINT "Jour Chem Physics. V.51. p.5547-5558"
LPRINT "Frac. Isot. 18OCO2-Cc segons Botinga (1968)"
LPRINT "Jour. Phys. Chem. V.72, p.800-808."
LPRINT "Frac. Isot. 18OWoll-H2O segons Matthews et al. (1983)."
LPRINT "Geochimica et Cosmochimica Acta. V.47. p. 631-644."
LPRINT "Frac. Isot. 18OWoll-Cc calculat  restant 18OWoll-H2O i 18OCc-H2O"
```

```
        LPRINT "Frac. Isot. 18OCO2-Woll calculat  restant 18OCO2-Cc i 18OWoll-Cc"
        LPRINT "Frac. Isot. 18ODiop-H2O segons Matthews et al. (1983)."
        LPRINT "Geochimica et Cosmochimica Acta. V.47. p. 631-644."
        LPRINT "Frac. Isot. 18ODiop-Cc calculat  restant 18OWoll-H2O i 18OCc-H2O"
        LPRINT "Frac. Isot. 18OCO2-Diop calculat  restant 18OCO2-Cc i 18OWoll-Cc"
        LPRINT "....................................................."
        LPRINT
        LPRINT "Š13C inicial calcita = ";Cic
        LPRINT "Š13C inicial CO2 = ";Cif
        LPRINT "Š18O inicial calcita = ";Oic
        LPRINT "Š18O inicial fluid = ";Oif:LPRINT:LPRINT
        LPRINT "Temperatura inicial del calcul = ";:LPRINT TI;:LPRINT " ºC"
        LPRINT "Interval de Temperatura entre calcul i calcul = ";:LPRINT I;:LPRINT " ºC"
        LPRINT "Temperatura final del calcul = ";:LPRINT TF;:LPRINT " ºC"
        LPRINT
        LPRINT "....................................................."
        LPRINT
        REM CALCUL COEFICIENTS DE FRACCIONAMENT
        T = TI + 273.15
        GOTO 11
10      T = T + I
11      FO = 2.78*(1000000/(T*T))-2.892
        FC = -(-2.9880*(1000000/(T*T))+7.6663*(1000/T)-2.4612)
        FO2 = -1.8034*(1000000/(T*T))+10.611*(1000/T)-2.7798
        FW = 110.0778-.5469393*T+.001070838*(T*T)-
.000001047098*(T*T*T)+.0000000005118257*(T*T*T*T)-.00000000000000999135*(T*T*T*T*T)
        FWC = FW - FO
        FCW = FO2 - FWC
        FD = 110.6911-.54888*T+0.001078742*(T*T)-
0.00000106281*(T*T*T)+0.0000000005250181*(T*T*T*T)-0.00000000000001038514*(T*T*T*T*T)
        FDC = FD - FO
        FCD = FO2 - FDC
        LPRINT
        LPRINT
        IF T-273.15 > 750 THEN 20
15      IF T-273.15 > 845 THEN 22
16      IF T-273.15 > 500 THEN 24
17      IF T-273.15 < 401 THEN 26
        GOTO 28
20      LPRINT "  ** ATENCIO T > 750 ºC **"
        LPRINT " Coeficient de fraccionament 13C Cc-CO2 extrapolat "
        LPRINT
        GOTO 15
22      LPRINT "  ** ATENCIO T > 845 ºC **"
        LPRINT " Coeficient de fraccionament 18O Woll-H2O extrapolat "
        LPRINT " i per tant tambe el 18O CO2-Wollastonita."
        LPRINT " Coeficient de fraccionament 18O Diop-H2O extrapolat "
        LPRINT " i per tant tambe el 18O CO2-Diopsida."
        LPRINT
        GOTO 16
24      LPRINT "  ** ATENCIO T > 500 ºC **"
        LPRINT " Coeficient de fraccionament 18O H2O-Cc extrapolat "
        LPRINT " i per tant tambe el 18O CO2-Diopsida."
        LPRINT
        GOTO 17
26      LPRINT "  ** ATENCIO T < 401 ºC **"
        LPRINT " Coeficient de fraccionament 18O Woll-H2O extrapolat "
        LPRINT " i per tant tambe el 18O CO2-Wollastonita."
```

```
        LPRINT " Coeficient de fraccionament 18O Diop-H2O extrapolat "
        LPRINT " i per tant tambe el 18O CO2-Diopsida."
        LPRINT
28   LPRINT
        LPRINT "*********************************************************"
        LPRINT "     CALCUL CORBA INTERCANVI  PER UN SISTEMA TANCAT"
        LPRINT "*********************************************************"
        LPRINT
        LPRINT "********************  OXIGEN  *************************"
        LPRINT
        LPRINT "Temperatura = ";T;:LPRINT " (K)"
        LPRINT "coeficient de fraccionament 18OCC-H2O = ";
        LPRINT USING "###.###"; FO:LPRINT:
        LPRINT  "RELACIO AIGUA/ROCA  ";:LPRINT "d18Occ final"
        WR = 0.5:LPRINT USING "###.##";WR;:LPRINT "              ";
        Ofc.5=((WR/3)*FO+(WR/3)*Oif+Oic)/(1+(WR/3))
        LPRINT USING "###.###"; Ofc.5
        WR = 1:LPRINT USING "###.##";WR;:LPRINT "              ";
        Ofc1=((WR/3)*FO+(WR/3)*Oif+Oic)/(1+(WR/3))
        LPRINT USING "###.###"; Ofc1
        WR = 5:LPRINT USING "###.##";WR;:LPRINT "              ";
        Ofc5=((WR/3)*FO+(WR/3)*Oif+Oic)/(1+(WR/3))
        LPRINT USING "###.###"; Ofc5
        WR = 10:LPRINT USING "###.##";WR;:LPRINT "              ";
        Ofc10=((WR/3)*FO+(WR/3)*Oif+Oic)/(1+(WR/3))
        LPRINT USING "###.###"; Ofc10
        WR = 30:LPRINT USING "###.##";WR;:LPRINT "              ";
        Ofc30=((WR/3)*FO+(WR/3)*Oif+Oic)/(1 +(WR/3))
        LPRINT USING "###.###"; Ofc30
        WR = 70:LPRINT USING "###.##";WR;:LPRINT "              ";
        Ofc70=((WR/3)*FO+(WR/3)*Oif+Oic)/(1+(WR/3))
        LPRINT USING "###.###"; Ofc70
        WR = 100:LPRINT USING "###.##";WR;:LPRINT "              ";
        Ofc100=((WR/3)*FO+(WR/3)*Oif+Oic)/(1+(WR/3))
        LPRINT USING "###.###"; Ofc100
        WR = 200:LPRINT USING "###.##";WR;:LPRINT "              ";
        Ofc200=((WR/3)*FO+(WR/3)*Oif+Oic)/(1+(WR/3))
        LPRINT USING "###.###"; Ofc200
        WR = 500:LPRINT USING "###.##";WR;:LPRINT "              ";
        Ofc500=((WR/3)*FO+(WR/3)*Oif+Oic)/(1+(WR/3))
        LPRINT USING "###.###"; Ofc500
        LPRINT
        LPRINT
        LPRINT "*****************  CARBONI X=.01 ********************"
        LPRINT
        LPRINT "Temperatura = ";T;:LPRINT " (K)"
        XC=.01:LPRINT "Xco2 = 0.01"
        LPRINT "Fraccionament isotopic Cc-CO2 = ";FC:LPRINT:
        LPRINT  "RELACIO AIGUA/ROCA  ";:LPRINT "d13Ccc final"
        WR = 0.5:LPRINT USING "###.##";WR;:LPRINT "              ";
        Cfc.5a=((WR*XC)*FC+(WR*XC)*Cif+Cic)/(1+(WR*XC))
        LPRINT USING "###.###"; Cfc.5a
        WR = 1:LPRINT USING "###.##";WR;:LPRINT "              ";
        Cfc1a=((WR*XC)*FC+(WR*XC)*Cif+Cic)/(1+(WR*XC))
        LPRINT USING "###.###"; Cfc1a
        WR = 5:LPRINT USING "###.##";WR;:LPRINT "              ";
        Cfc5a=((WR*XC)*FC+(WR*XC)*Cif+Cic)/(1+(WR*XC))
        LPRINT USING "###.###"; Cfc5a
```

```
WR = 10:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc10a=((WR*XC)*FC+(WR*XC)*Cif+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc10a
WR = 30:LPRINT USING "###.##";WR;:LPRINT "              ";
 Cfc30a=((WR*XC)*FC+(WR*XC)*Cif+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc30a
WR = 70:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc70a=((WR*XC)*FC+(WR*XC)*Cif+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc70a
WR = 100:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc100a=((WR*XC)*FC+(WR*XC)*Cif+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc100a
WR = 200:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc200a=((WR*XC)*FC+(WR*XC)*Cif+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc200a
WR = 500:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc500a=((WR*XC)*FC+(WR*XC)*Cif+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc500a
LPRINT
LPRINT
REM
REM
REM *************** CARBONI *****************
REM ***************XCO2 = 0.05 ***************
LPRINT
LPRINT
LPRINT "***** CARBONI X=.05 ******************"
LPRINT:LPRINT "Temperatura = ";T;:LPRINT " (K)"
XC=.05:LPRINT "Xco2 = 0.05":
LPRINT "Fraccionament isotopic Cc-CO2 = ";FC:LPRINT
LPRINT  "RELACIO AIGUA/ROCA  ";:LPRINT "d13Ccc final"
WR = 0.5:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc.5b=((WR*XC)*FC+(WR*XC)*Cif+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc.5b
WR = 1:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc1b=((WR*XC)*FC+(WR*XC)*Cif+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc1b
WR = 5:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc5b=((WR*XC)*FC+(WR*XC)*Cif+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc5b
WR = 10:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc10b=((WR*XC)*FC+(WR*XC)*Cif+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc10b
WR = 30:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc30b=((WR*XC)*FC+(WR*XC)*Cif+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc30b
WR = 70:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc70b=((WR*XC)*FC+(WR*XC)*Cif+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc70b
WR = 100:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc100b=((WR*XC)*FC+(WR*XC)*Cif+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc100b
WR = 200:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc200b=((WR*XC)*FC+(WR*XC)*Cif+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc200b
WR = 500:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc500b=((WR*XC)*FC+(WR*XC)*Cif+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc500b
```

```
LPRINT
LPRINT
LPRINT
LPRINT
LPRINT
LPRINT "****************** CARBONI X=.1 ********************"
LPRINT
LPRINT "Temperatura = ";T;:LPRINT " (K)"
XC=.1:LPRINT "Xco2 = 0.1":
LPRINT "Fraccionament isotopic 13Ccc-CO2 = ";FC
LPRINT  "RELACIO AIGUA/ROCA  ";:LPRINT "d13Ccc final"
WR = 0.5:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc.5c=((WR*XC)*FC+(WR*XC)*Cif+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc.5c
WR = 1:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc1c=((WR*XC)*FC+(WR*XC)*Cif+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc1c
WR = 5:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc5c=((WR*XC)*FC+(WR*XC)*Cif+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc5c
WR = 10:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc10c=((WR*XC)*FC+(WR*XC)*Cif+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc10c
WR = 30:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc30c=((WR*XC)*FC+(WR*XC)*Cif+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc30c
WR = 70:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc70c=((WR*XC)*FC+(WR*XC)*Cif+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc70c
WR = 100:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc100c=((WR*XC)*FC+(WR*XC)*Cif+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc100c
WR = 200:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc200c=((WR*XC)*FC+(WR*XC)*Cif+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc200c
WR = 500:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc500c=((WR*XC)*FC+(WR*XC)*Cif+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc500c
LPRINT
LPRINT
LPRINT
LPRINT
LPRINT
LPRINT
LPRINT
LPRINT
LPRINT
LPRINT
LPRINT "..........................................................."
LPRINT
LPRINT "***********************************************************"
LPRINT "     CALCUL CORBA INTERCANVI  PER UN SISTEMA OBERT"
LPRINT "***********************************************************"
LPRINT
LPRINT
LPRINT
LPRINT "SISTEMA TANCAT              SISTEMA OBERT"
WR=.5:TT=LOG (WR+1)
```

```
        LPRINT USING "###.##";WR;:LPRINT "                    ";:LPRINT USING "###.##";TT
        WR=1:TT=LOG (WR+1)
        LPRINT USING "###.##";WR;:LPRINT "                    ";:LPRINT USING "###.##";TT
        WR=5:TT=LOG (WR+1)
        LPRINT USING "###.##";WR;:LPRINT "                    ";:LPRINT USING "###.##";TT
        WR=10:TT=LOG (WR+1)
        LPRINT USING "###.##";WR;:LPRINT "                    ";:LPRINT USING "###.##";TT
        WR=20:TT=LOG (WR+1)
        LPRINT USING "###.##";WR;:LPRINT "                    ";:LPRINT USING "###.##";TT
        WR=30:TT=LOG (WR+1)
        LPRINT USING "###.##";WR;:LPRINT "                    ";:LPRINT USING "###.##";TT
        WR=40:TT=LOG (WR+1)
        LPRINT USING "###.##";WR;:LPRINT "                    ";:LPRINT USING "###.##";TT
        WR=50:TT=LOG (WR+1)
        LPRINT USING "###.##";WR;:LPRINT "                    ";:LPRINT USING "###.##";TT
        WR=60:TT=LOG (WR+1)
        LPRINT USING "###.##";WR;:LPRINT "                    ";:LPRINT USING "###.##";TT
        WR=70:TT=LOG (WR+1)
        LPRINT USING "###.##";WR;:LPRINT "                    ";:LPRINT USING "###.##";TT
        WR=80:TT=LOG (WR+1)
        LPRINT USING "###.##";WR;:LPRINT "                    ";:LPRINT USING "###.##";TT
        WR=90:TT=LOG (WR+1)
        LPRINT USING "###.##";WR;:LPRINT "                    ";:LPRINT USING "###.##";TT
        WR=100:TT=LOG (WR+1)
        LPRINT USING "###.##";WR;:LPRINT "                    ";:LPRINT USING "###.##";TT
        WR=200:TT=LOG (WR+1)
        LPRINT USING "###.##";WR;:LPRINT "                    ";:LPRINT USING "###.##";TT
        WR=500:TT=LOG (WR+1)
        LPRINT USING "###.##";WR;:LPRINT "                    ";:LPRINT USING "###.##";TT
        LPRINT
        LPRINT
        LPRINT
        LPRINT
        LPRINT
        LPRINT
        LPRINT
        LPRINT
        LPRINT
        LPRINT
        LPRINT "*********************************************************"
        LPRINT "CALCUL CORBA DESTIL.LACIO PER UN SISTEMA TANCAT"
        LPRINT "               (SINGLE STAGE) "
        LPRINT "DECARBONATACIO DEGUDA A LA FORMACIO DE WOLLASTONITA."
        LPRINT "*********************************************************"
        LPRINT
        LPRINT "********************  OXIGEN  **************************"
        LPRINT
        LPRINT
        LPRINT
        LPRINT
        MOL = 100
        LPRINT "Temperatura = ";T;:LPRINT " (K)":LPRINT
        LPRINT "frac. molar d'O    ";:LPRINT "      Frac CO2-roca";:LPRINT "  d18O final
calcita"
        LPRINT "que resta a la roca":LPRINT
        FOR J=1 TO 9
        REM CALCUL Coef Frac. 18Oco2- Roca depenen propor de Wo i Cc
        MOL = MOL-10
```

```
        MOLCC= MOL/100
        OXW = (1-MOLCC)/3
        TOT=MOLCC+OXW
        MOLCC=(MOLCC*1)/TOT
        OXW=(OXW*1)/TOT
        FT = MOLCC*FO2 + OXW*FCW
        FT2=-FT
        Ofc(J) = Oic + FT2 * (1-TOT)
        LPRINT USING "###.###";TOT;:LPRINT "                    ";:LPRINT USING "###.###";
FT;:LPRINT "          ";:LPRINT USING "###.###"; Ofc(J)
        NEXT J
        REM CALCUL Coef Frac. CO2- Roca depenen propor de Wo i Cc PROPORCIONS BAIXES
        MOLCC= 0.05
        OXW = (1-MOLCC)/3
        TOT=MOLCC+OXW
        MOLCC=(MOLCC*1)/TOT
        OXW=(OXW*1)/TOT
        FT = MOLCC*FO2 + OXW*FCW
        Ofc(10) = Oic + FT2 * (1-TOT)
        LPRINT USING "###.###";TOT;:LPRINT "                    ";:LPRINT USING "###.###";
FT;:LPRINT "          ";:LPRINT USING "###.###"; Ofc(J)
        REM CALCUL Coef Frac. CO2- Roca depenen propor de Wo i Cc PROPORCIONS BAIXES
        MOLCC= 0.01
        OXW = (1-MOLCC)/3
        TOT=MOLCC+OXW
        MOLCC=(MOLCC*1)/TOT
        OXW=(OXW*1)/TOT
        FT = MOLCC*FO2 + OXW*FCW
        Ofc(11) = Oic + FT2 * (1-TOT)
        LPRINT USING "###.###";TOT;:LPRINT "                    ";:LPRINT USING "###.###";
FT;:LPRINT "          ";:LPRINT USING "###.###"; Ofc(J)
        LPRINT
        LPRINT
        LPRINT
        LPRINT
        LPRINT
        LPRINT
        LPRINT
        LPRINT
        LPRINT "********************  CARBONI  *************************"
        LPRINT
        FC4=-FC
        LPRINT "Coef. Fracc CO2-Cc = ";:LPRINT USING "###.###"; FC4:LPRINT
        LPRINT "  % mols C            ";:LPRINT" Xco2   ";:LPRINT "     d13Ccc  final"
        LPRINT "que resten":LPRINT
        MOL = 100
        FOR J = 1 TO 9
        MOL =MOL-10
        XC=1-(MOL/100)
        Cfcs(J)=Cic-XC*-FC
        LPRINT USING "###.###"; MOL;:LPRINT "           ";:LPRINT USING "###.###"; XC;:LPRINT
"       ";:LPRINT "      ";:LPRINT USING "###.###"; Cfcs(J)
        NEXT J
        Cfcs(10)=Cic-0.99*-FC
        LPRINT "  1";:LPRINT "        ";:LPRINT "           .99";:LPRINT "       ";:LPRINT "
";:LPRINT USING "###.###"; Cfcs(10)
        LPRINT
        LPRINT
```

```
        LPRINT
        LPRINT
        LPRINT
        LPRINT "*********************************************************"
        LPRINT "CALCUL CORBA DESTILACIO  PER UN SISTEMA OBERT"
        LPRINT "                        RAYLEIGH  "
        LPRINT "DECARBONATACIO DEGUDA A LA FORMACIO DE WOLLASTONITA."
        LPRINT "*********************************************************"
        LPRINT
        LPRINT "********************  OXIGEN  **************************"
        LPRINT
        LPRINT
        LPRINT "Temperatura = ";T;:LPRINT " (K)":LPRINT
        MOL = 100
        LPRINT "frac. molar d'O    ";:LPRINT "    Frac CO2-roca";:LPRINT "  d18O final calcita"
        LPRINT "que resta a la roca":LPRINT
        FOR J=1 TO 9
        REM CALCUL Coef Frac. CO2- Roca depenen propor de Wo i Cc
        MOL = MOL-10
        MOLCC= MOL/100
        OXW = (1-MOLCC)/3
        TOT=MOLCC+OXW
        MOLCC=(MOLCC*1)/TOT
        OXW=(OXW*1)/TOT
        FT = MOLCC*FO2 + OXW*FCW
        Ofc(J) = (Oic+1000)*exp((FT/1000)*log (TOT))-1000
        LPRINT USING "###.###";TOT;:LPRINT "              ";:LPRINT USING "###.###"; FT;:LPRINT
"               ";:LPRINT USING "###.###"; Ofc(J)
        NEXT J
        REM CALCUL Coef Frac. CO2- Roca depenen propor de Wo i Cc PROPORCIONS BAIXES
        MOLCC= 0.05
        OXW = (1-MOLCC)/3
        TOT=MOLCC+OXW
        MOLCC=(MOLCC*1)/TOT
        OXW=(OXW*1)/TOT
        FT = MOLCC*FO2 + OXW*FCW
        Ofc(10) = (Oic+1000)*exp((FT/1000)*log (TOT))-1000
        LPRINT USING "###.###";TOT;:LPRINT "              ";:LPRINT USING "###.###"; FT;:LPRINT
"               ";:LPRINT USING "###.###"; Ofc(J)
        REM CALCUL Coef Frac. CO2- Roca depenen propor de Wo i Cc PROPORCIONS BAIXES
        MOLCC= 0.01
        OXW = (1-MOLCC)/3
        TOT=MOLCC+OXW
        MOLCC=(MOLCC*1)/TOT
        OXW=(OXW*1)/TOT
        FT = MOLCC*FO2 + OXW*FCW
        Ofc(11) = (Oic+1000)*exp((FT/1000)*log (TOT))-1000
        LPRINT USING "###.###";TOT;:LPRINT "              ";:LPRINT USING "###.###"; FT;:LPRINT
"               ";:LPRINT USING "###.###"; Ofc(J)
        LPRINT
        LPRINT
        LPRINT
        LPRINT
        LPRINT
        LPRINT
        LPRINT "******************  CARBONI  **********************"
        LPRINT
        LPRINT "Temperatura = ";T;:LPRINT " (K)":LPRINT
```

```
        FC4=-FC
        LPRINT "Coef. Fracc CO2-Cc = ";:LPRINT USING "###.###"; FC4:LPRINT
        LPRINT
        LPRINT "  % mols C   ";:LPRINT"         Xco2   ";:LPRINT "         f    ";:LPRINT "
d13Ccc final"
        LPRINT "que resten":LPRINT
        MOL = 100
        y=1
        FOR J = 1 TO 9
        y = y-.1
        MOL =MOL-10
        XC=1-(MOL/100)
        Cfcr(J)=(Cic+1000)*exp((-FC/1000)*log (y))-1000
        LPRINT USING "###.###"; MOL;:LPRINT "            ";:LPRINT USING "###.###"; XC;:LPRINT
"        ";:LPRINT USING "###.###";  y;:LPRINT "      ";:LPRINT USING "###.###"; Cfcr(J)
        NEXT J
        Cfcr(10)=(Cic+1000)*exp((-FC/1000)*log (.01))-1000
        LPRINT "  1";:LPRINT "                   ";:LPRINT ".99";:LPRINT "       ";:LPRINT "
0.01";:LPRINT "       ";:LPRINT USING "###.###"; Cfcr(10)
        LPRINT
        LPRINT
        LPRINT
        LPRINT
        LPRINT "*********************************************************"
        LPRINT "CALCUL CORBA DESTIL.LACIO PER UN SISTEMA TANCAT"
        LPRINT "               (SINGLE STAGE)               "
        LPRINT "DECARBONATACIO DEGUDA A LA FORMACIO DE DIOPSIDA."
        LPRINT "*********************************************************"
        LPRINT
        LPRINT "********************  OXIGEN  *************************"
        LPRINT
        LPRINT
        LPRINT
        LPRINT
        MOL = 100
        LPRINT "Temperatura = ";T;:LPRINT " (K)":LPRINT
        LPRINT "frac. molar d'O    ";:LPRINT "      Frac CO2-roca";:LPRINT "  d18O final
calcita"
        LPRINT "que resta a la roca":LPRINT
        FOR J=1 TO 9
        REM CALCUL Coef Frac. 18Oco2- Roca depenen propor de Diop i Cc
        MOL = MOL-10
        MOLCC= MOL/100
        OXW = (1-MOLCC)/3
        TOT=MOLCC+OXW
        MOLCC=(MOLCC*1)/TOT
        OXW=(OXW*1)/TOT
        FT = MOLCC*FO2 + OXW*FCD
        FT2=-FT
        Ofc(J) = Oic + FT2 * (1-TOT)
        LPRINT USING "###.###";TOT;:LPRINT "                    ";:LPRINT USING "###.###";
FT;:LPRINT "            ";:LPRINT USING "###.###"; Ofc(J)
        NEXT J
        REM CALCUL Coef Frac. CO2- Roca depenen propor de Wo i Cc PROPORCIONS BAIXES
        MOLCC= 0.05
        OXW = (1-MOLCC)/3
        TOT=MOLCC+OXW
        MOLCC=(MOLCC*1)/TOT
```

```
        OXW=(OXW*1)/TOT
        FT = MOLCC*FO2 + OXW*FCD
        Ofc(10) = Oic + FT2 * (1-TOT)
        LPRINT USING "###.###";TOT;:LPRINT "                    ";:LPRINT USING "###.###";
FT;:LPRINT "           ";:LPRINT USING "###.###"; Ofc(J)
        REM CALCUL Coef Frac. CO2- Roca depenen propor de Wo i Cc PROPORCIONS BAIXES
        MOLCC= 0.01
        OXW = (1-MOLCC)/3
        TOT=MOLCC+OXW
        MOLCC=(MOLCC*1)/TOT
        OXW=(OXW*1)/TOT
        FT = MOLCC*FO2 + OXW*FCD
        Ofc(11) = Oic + FT2 * (1-TOT)
        LPRINT USING "###.###";TOT;:LPRINT "                    ";:LPRINT USING "###.###";
FT;:LPRINT "           ";:LPRINT USING "###.###"; Ofc(J)
        LPRINT
        LPRINT
        LPRINT
        LPRINT
        LPRINT
        LPRINT
        LPRINT:LPRINT:LPRINT "******************  CARBONI  ************************"
        LPRINT
        FC4=-FC
        LPRINT "Coef. Fracc CO2-Cc = ";:LPRINT USING "###.###"; FC4:LPRINT
        LPRINT "  % mols C            ";:LPRINT" Xco2   ";:LPRINT "     d13Ccc  final"
        LPRINT "que resten":LPRINT
        MOL = 100
        FOR J = 1 TO 9
        MOL =MOL-10
        XC=1-(MOL/100)
        Cfcs(J)=Cic-XC*-FC
        LPRINT USING "###.###"; MOL;:LPRINT "            ";:LPRINT USING "###.###"; XC;:LPRINT
"        ";:LPRINT "      ";:LPRINT USING "###.###"; Cfcs(J)
        NEXT J
        Cfcs(10)=Cic-0.99*-FC
        LPRINT "  1";:LPRINT "        ";:LPRINT "           .99";:LPRINT "       ";:LPRINT "
";:LPRINT USING "###.###"; Cfcs(10)
        LPRINT
        LPRINT
        LPRINT
        LPRINT
        LPRINT
        LPRINT "*********************************************************"
        LPRINT "CALCUL CORBA DESTILACIO  PER UN SISTEMA OBERT"
        LPRINT "                        RAYLEIGH  "
        LPRINT "DECARBONATACIO DEGUDA A LA FORMACIO DE DIOPSIDA"
        LPRINT "*********************************************************"
        LPRINT
        LPRINT "******************  OXIGEN  ************************"
        LPRINT
        LPRINT
        LPRINT "Temperatura = ";T;:LPRINT " (K)":LPRINT
        MOL = 100
        LPRINT "frac. molar d'O    ";:LPRINT "    Frac CO2-roca";:LPRINT "  d18O final calcita"
        LPRINT "que resta a la roca":LPRINT
        FOR J=1 TO 9
        REM CALCUL Coef Frac. CO2- Roca depenen propor de Diop i Cc
```

```
        MOL = MOL-10
        MOLCC= MOL/100
        OXW = (1-MOLCC)/3
        TOT=MOLCC+OXW
        MOLCC=(MOLCC*1)/TOT
        OXW=(OXW*1)/TOT
        FT = MOLCC*FO2 + OXW*FCD
        Ofc(J) = (Oic+1000)*exp((FT/1000)*log (TOT))-1000
        LPRINT USING "###.###";TOT;:LPRINT "             ";:LPRINT USING "###.###"; FT;:LPRINT
"               ";:LPRINT USING "###.###"; Ofc(J)
        NEXT J
        REM CALCUL Coef Frac. CO2- Roca depenen propor de Wo i Cc PROPORCIONS BAIXES
        MOLCC= 0.05
        OXW = (1-MOLCC)/3
        TOT=MOLCC+OXW
        MOLCC=(MOLCC*1)/TOT
        OXW=(OXW*1)/TOT
        FT = MOLCC*FO2 + OXW*FCD
        Ofc(10) = (Oic+1000)*exp((FT/1000)*log (TOT))-1000
        LPRINT USING "###.###";TOT;:LPRINT "             ";:LPRINT USING "###.###"; FT;:LPRINT
"               ";:LPRINT USING "###.###"; Ofc(J)
        REM CALCUL Coef Frac. CO2- Roca depenen propor de Wo i Cc PROPORCIONS BAIXES
        MOLCC= 0.01
        OXW = (1-MOLCC)/3
        TOT=MOLCC+OXW
        MOLCC=(MOLCC*1)/TOT
        OXW=(OXW*1)/TOT
        FT = MOLCC*FO2 + OXW*FCD
        Ofc(11) = (Oic+1000)*exp((FT/1000)*log (TOT))-1000
        LPRINT USING "###.###";TOT;:LPRINT "             ";:LPRINT USING "###.###"; FT;:LPRINT
"               ";:LPRINT USING "###.###"; Ofc(J)
        LPRINT
        LPRINT
        LPRINT
        LPRINT
        LPRINT
        LPRINT
        LPRINT "*****************  CARBONI  ********************"
        LPRINT:LPRINT "Temperatura = ";T;:LPRINT " (K)":LPRINT
        FC4=-FC
        LPRINT "Coef. Fracc CO2-Cc = ";:LPRINT USING "###.###"; FC4:LPRINT
        LPRINT
        LPRINT "  % mols C   ";:LPRINT"         Xco2   ";:LPRINT "         f    ";:LPRINT "
d13Ccc final"
        LPRINT "que resten":LPRINT
        MOL = 100
        y=1
        FOR J = 1 TO 9
        y = y-.1
        MOL =MOL-10
        XC=1-(MOL/100)
        Cfcr(J)=(Cic+1000)*exp((-FC/1000)*log (y))-1000
        LPRINT USING "###.###"; MOL;:LPRINT "            ";:LPRINT USING "###.###"; XC;:LPRINT
"        ";:LPRINT USING "###.###";  y;:LPRINT "      ";:LPRINT USING "###.###"; Cfcr(J)
        NEXT J
        Cfcr(10)=(Cic+1000)*exp((-FC/1000)*log (.01))-1000
        LPRINT "  1";:LPRINT "                  ";:LPRINT ".99";:LPRINT "       ";:LPRINT "
0.01";:LPRINT "       ";:LPRINT USING "###.###"; Cfcr(10)
```

```
        LPRINT
        LPRINT
        LPRINT
        LPRINT
        IF T-273.15=TF then 1000
        IF T-273.15>TF then 1000
        GOTO 10
1000    PRINT "VOLS CALCULAR L'INTERCANVI ISOTOPIC ENTRE LA CALCITA"
        PRINT "FILONIANA MES EMPOBRIDA EN 13C I 180 I LA CALCARIA"
        INPUT "REGIONAL, S/N";RESPP$
        IF RESPP$="N" THEN 1111
        IF RESPP$="n" THEN 1111
        RUN "ISOTOP5"
1111    END
```

SUBRUTINA ISOTOP5

```
REM
REM
REM
REM ********************************************************************
REM
REM PROGRAMA       ISOTOP5.BAS
REM ALBERT SOLER i GIL
REM Departament de Cristal.lografia, Mineralogia i Diposits Minerals
REM Facultat de Geologia, Universitat de Barcelona
REM BARCELONA 1989
REM
REM ********************************************************************
REM
REM
REM PROGRAMA PER CALCULAR LES CORVES TEORIQUES D'INTERCANVI ISOTOPIC.
REM PER ISOTOPS ESTABLES DE CARBONI I OXIGEN A PARTIR DE LA COMPOSICIO
REM ISOTOPICA DE LES CALCITES DELS FILONS I LES REGIONALS
REM PER TANT INDEPENDENT DE LA TEMPERATURA
REM CALCULA TAMBE RELACIONS MOLARS AIGUA/ROCA.
REM CALCULA TAMBE FRACCIONS MOLARS DE CO2.
REM CALCUL PER SISTEMA OBERT I TANCAT.
REM
REM
REM EQUIVALENCIES:
REM delta 13C inicial de la calcita = Cic
REM delta 13C inicial del fluid (CO2) = Cif
REM delta 13C final de la calcita = Cfc
REM delta 13C calcita equilibri fluid (filó)= Cf
REM delta 13C final del fluid (CO2) = Cff
REM delta 18O inicial de la calcita = Oic
REM delta 18O inicial del fluid = Oif
REM delta 18O final de la calcita = Ofc
REM delta 18O calcita equilibri fluid (filó)= Of
REM delta 18O final del fluid = Off
REM relacio aigua roca = WR
REM FraCico molar de CO2 = XC
REM
REM
DIM Ofc.(200),Cfc(200),Cfcr(10),Cfcs(10),Ofc(11),Of(11),Cf(11),WR(11)
REM ENTRADA DE DADES
REM *****************
COLOR 14,9:CLS
LOCATE 5,10:INPUT "Š13C inicial calcita";Cic
LOCATE 7,10:INPUT "Š13C final calcita (filó)";Cf
LOCATE 9,10:INPUT "Š18O inicial calcita";Oic
LOCATE 11,10:INPUT "Š18O final calcita (filó)";Of
LOCATE 13,10:INPUT "SKARN MODELITZAT";SK$
LPRINT "*****************************************************************"
LPRINT "*****************************************************************"
LPRINT "MODELITZACIO DE LES CORVES D'INTERCANVI ISOTOPIC DE "
LPRINT "13C i 18O ENTRE FLUID I ROCA, EN CALCITES. "
LPRINT "CAS PARTICULAR EN QUE CONEIXEM LA d13C I d18O D'UNA CALCITA"
LPRINT "EN EQUILIBRI AMB EL FLUID (CALCITA FILONIANA)."
LPRINT "CALCUL FRACCIO MOLAR CO2."
LPRINT "CALCUL RELACIONS MOLARS AIGUA/ROCA."
LPRINT "Calcul de les corves de intercanvi (Sistema obert i tancat)"
LPRINT
LPRINT "   A.SOLER (1989) Dep. Cristal.lografia, Mineralogia i "
```

```
LPRINT " Dipòsits Minerals.  Fac. Geologia.  Univ Barcelona"
LPRINT "*****************************************************************"
LPRINT "*****************************************************************"
LPRINT:LPRINT:LPRINT
LPRINT "---------------------------------------------------------"
LPRINT "CORBA D'INTERCANVI (sistema tancat) segons RYE i BRADBURY, 1988"
LPRINT "CORBA D'INTERCANVI (sistema obert) segons RYE i BRADBURY, 1988"
LPRINT "RYE i BRADBURY (1988). aMERICAN jOURNAL OF sCIENCE, VOL 288, P.197-235"
LPRINT "........................................................."
LPRINT
LPRINT "*****************************************************************"
LPRINT "*****************************************************************"
LPRINT "MODELITZACIO DE LES CORVES D'INTERCANVI ISOTOPIC DE "
LPRINT "13C i 18O ENTRE FLUID I ROCA, EN CALCITES. "
LPRINT "DEL SKARN:";
LPRINT SK$
LPRINT "*****************************************************************"
LPRINT "*****************************************************************"
LPRINT
LPRINT
LPRINT
LPRINT "*****************************************************************"
LPRINT "*****************************************************************"
LPRINT "Š13C inicial calcita = ";Cic
LPRINT "Š13C final calcita = "Cf
LPRINT "Š18O inicial calcita = ";Oic
LPRINT "Š18O final calcita (filó)";Of:LPRINT:LPRINT
LPRINT "*****************************************************************"
LPRINT "*****************************************************************"
LPRINT
LPRINT
LPRINT
LPRINT "*********************************************************"
LPRINT "     CALCUL CORBA INTERCANVI  PER UN SISTEMA TANCAT"
LPRINT "*********************************************************"
LPRINT
LPRINT "********************  OXIGEN  *************************"
LPRINT
LPRINT  "RELACIO AIGUA/ROCA  ";:LPRINT "d18Occ final"
WR = 0.5:LPRINT USING "###.##";WR;:LPRINT "              ";
Ofc.5=(Oic+(WR/3)*Of)/((WR/3)+1)
LPRINT USING "###.###"; Ofc.5
WR = 1:LPRINT USING "###.##";WR;:LPRINT "              ";
Ofc1=(Oic+(WR/3)*Of)/((WR/3)+1)
LPRINT USING "###.###"; Ofc1
WR = 5:LPRINT USING "###.##";WR;:LPRINT "              ";
Ofc5=(Oic+(WR/3)*Of)/((WR/3)+1)
LPRINT USING "###.###"; Ofc5
WR = 10:LPRINT USING "###.##";WR;:LPRINT "              ";
Ofc10=(Oic+(WR/3)*Of)/((WR/3)+1)
LPRINT USING "###.###"; Ofc10
WR = 30:LPRINT USING "###.##";WR;:LPRINT "              ";
Ofc30=(Oic+(WR/3)*Of)/((WR/3)+1)
LPRINT USING "###.###"; Ofc30
WR = 70:LPRINT USING "###.##";WR;:LPRINT "              ";
Ofc70=(Oic+(WR/3)*Of)/((WR/3)+1)
LPRINT USING "###.###"; Ofc70
WR = 100:LPRINT USING "###.##";WR;:LPRINT "              ";
```

```
Ofc100=(Oic+(WR/3)*Of)/((WR/3)+1)
LPRINT USING "###.###"; Ofc100
WR = 200:LPRINT USING "###.##";WR;:LPRINT "              ";
Ofc200=(Oic+(WR/3)*Of)/((WR/3)+1)
LPRINT USING "###.###"; Ofc200
WR = 500:LPRINT USING "###.##";WR;:LPRINT "              ";
Ofc500=(Oic+(WR/3)*Of)/((WR/3)+1)
LPRINT USING "###.###"; Ofc500
LPRINT
LPRINT
LPRINT "*****************  CARBONI X=.01 ********************"
XC=.01:LPRINT "Xco2 = 0.01"
LPRINT  "RELACIO AIGUA/ROCA  ";:LPRINT "d13Ccc final"
WR = 0.5:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc.5a=((WR*XC*Cf)+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc.5a
WR = 1:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc1a=((WR*XC*Cf)+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc1a
WR = 5:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc5a=((WR*XC*Cf)+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc5a
WR = 10:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc10a=((WR*XC*Cf)+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc10a
WR = 30:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc30a=((WR*XC*Cf)+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc30a
WR = 70:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc70a=((WR*XC*Cf)+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc70a
WR = 100:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc100a=((WR*XC*Cf)+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc100a
WR = 200:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc200a=((WR*XC*Cf)+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc200a
WR = 500:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc500a=((WR*XC*Cf)+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc500a
LPRINT
LPRINT
REM
LPRINT
LPRINT
LPRINT "*****************  CARBONI X=.05 ********************"
XC=.05:LPRINT "Xco2 = 0.05"
LPRINT  "RELACIO AIGUA/ROCA  ";:LPRINT "d13Ccc final"
WR = 0.5:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc.5a=((WR*XC*Cf)+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc.5a
WR = 1:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc1a=((WR*XC*Cf)+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc1a
WR = 5:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc5a=((WR*XC*Cf)+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc5a
WR = 10:LPRINT USING "###.##";WR;:LPRINT "              ";
```

```
Cfc10a=((WR*XC*Cf)+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc10a
WR = 30:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc30a=((WR*XC*Cf)+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc30a
WR = 70:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc70a=((WR*XC*Cf)+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc70a
WR = 100:LPRINT USING "###.##";WR;:LPRINT "             ";
Cfc100a=((WR*XC*Cf)+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc100a
WR = 200:LPRINT USING "###.##";WR;:LPRINT "             ";
Cfc200a=((WR*XC*Cf)+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc200a
WR = 500:LPRINT USING "###.##";WR;:LPRINT "             ";
Cfc500a=((WR*XC*Cf)+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc500a
LPRINT
LPRINT
REM
LPRINT
LPRINT
LPRINT "*****************  CARBONI X=.1 *********************"
XC=.1:LPRINT "Xco2 = 0.1"
LPRINT  "RELACIO AIGUA/ROCA  ";:LPRINT "d13Ccc final"
WR = 0.5:LPRINT USING "###.##";WR;:LPRINT "             ";
Cfc.5a=((WR*XC*Cf)+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc.5a
WR = 1:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc1a=((WR*XC*Cf)+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc1a
WR = 5:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc5a=((WR*XC*Cf)+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc5a
WR = 10:LPRINT USING "###.##";WR;:LPRINT "             ";
Cfc10a=((WR*XC*Cf)+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc10a
WR = 30:LPRINT USING "###.##";WR;:LPRINT "             ";
Cfc30a=((WR*XC*Cf)+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc30a
WR = 70:LPRINT USING "###.##";WR;:LPRINT "             ";
Cfc70a=((WR*XC*Cf)+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc70a
WR = 100:LPRINT USING "###.##";WR;:LPRINT "             ";
Cfc100a=((WR*XC*Cf)+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc100a
WR = 200:LPRINT USING "###.##";WR;:LPRINT "             ";
Cfc200a=((WR*XC*Cf)+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc200a
WR = 500:LPRINT USING "###.##";WR;:LPRINT "             ";
Cfc500a=((WR*XC*Cf)+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc500a
LPRINT
LPRINT
REM
LPRINT
LPRINT
LPRINT "*****************  CARBONI X=.2 *********************"
```

```
XC=.2:LPRINT "Xco2 = 0.2"
LPRINT  "RELACIO AIGUA/ROCA  ";:LPRINT "d13Ccc final"
WR = 0.5:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc.5a=((WR*XC*Cf)+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc.5a
WR = 1:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc1a=((WR*XC*Cf)+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc1a
WR = 5:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc5a=((WR*XC*Cf)+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc5a
WR = 10:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc10a=((WR*XC*Cf)+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc10a
WR = 30:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc30a=((WR*XC*Cf)+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc30a
WR = 70:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc70a=((WR*XC*Cf)+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc70a
WR = 100:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc100a=((WR*XC*Cf)+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc100a
WR = 200:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc200a=((WR*XC*Cf)+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc200a
WR = 500:LPRINT USING "###.##";WR;:LPRINT "              ";
Cfc500a=((WR*XC*Cf)+Cic)/(1+(WR*XC))
LPRINT USING "###.###"; Cfc500a
LPRINT
LPRINT
LPRINT "........................................................."
LPRINT
LPRINT "*********************************************************"
LPRINT "     CALCUL CORBA INTERCANVI  PER UN SISTEMA OBERT"
LPRINT "*********************************************************"
LPRINT
LPRINT
LPRINT
LPRINT "SISTEMA TANCAT                                  SISTEMA OBERT"
WR=.5:T=LOG (WR+1)
LPRINT USING "###.##";WR;:LPRINT "                    ";:LPRINT USING "###.##";T
WR=1:T=LOG (WR+1)
LPRINT USING "###.##";WR;:LPRINT "                    ";:LPRINT USING "###.##";T
WR=5:T=LOG (WR+1)
LPRINT USING "###.##";WR;:LPRINT "                    ";:LPRINT USING "###.##";T
WR=10:T=LOG (WR+1)
LPRINT USING "###.##";WR;:LPRINT "                    ";:LPRINT USING "###.##";T
WR=20:T=LOG (WR+1)
LPRINT USING "###.##";WR;:LPRINT "                    ";:LPRINT USING "###.##";T
WR=30:T=LOG (WR+1)
LPRINT USING "###.##";WR;:LPRINT "                    ";:LPRINT USING "###.##";T
WR=40:T=LOG (WR+1)
LPRINT USING "###.##";WR;:LPRINT "                    ";:LPRINT USING "###.##";T
WR=50:T=LOG (WR+1)
LPRINT USING "###.##";WR;:LPRINT "                    ";:LPRINT USING "###.##";T
WR=60:T=LOG (WR+1)
LPRINT USING "###.##";WR;:LPRINT "                    ";:LPRINT USING "###.##";T
```

```
WR=70:T=LOG (WR+1)
LPRINT USING "###.##";WR;:LPRINT "                    ";:LPRINT USING "###.##";T
WR=80:T=LOG (WR+1)
LPRINT USING "###.##";WR;:LPRINT "                    ";:LPRINT USING "###.##";T
WR=90:T=LOG (WR+1)
LPRINT USING "###.##";WR;:LPRINT "                    ";:LPRINT USING "###.##";T
WR=100:T=LOG (WR+1)
LPRINT USING "###.##";WR;:LPRINT "                    ";:LPRINT USING "###.##";T
WR=200:T=LOG (WR+1)
LPRINT USING "###.##";WR;:LPRINT "                    ";:LPRINT USING "###.##";T
WR=500:T=LOG (WR+1)
LPRINT USING "###.##";WR;:LPRINT "                    ";:LPRINT USING "###.##";T
LPRINT
LPRINT
LPRINT
LPRINT
REM CALCUL RELACIO AIGUA ROCA DE CALCITES.
PRINT "VOLS CONEIXER LA RELACIO AIGUA ROCA CONCRETA"
3   PRINT "D'ALGUNA CALCITA D'AQUEST SKARN, S/N"
INPUT RESP$
IF RESP$ = "N" THEN 10
IF RESP$ = "n" THEN 10
INPUT "MOSTRA Nº ";MOS$
INPUT "d13C CALCITA PROBLEMA";Cfc
INPUT "d18O CALCITA PROBLEMA";Ofc
WRo=3*(Ofc-Oic)/(Of-Ofc)
LWRo=LOG (WRo+1)
XC=0.01
WRc1=(1/XC)*((Cfc-Cic)/(Cf-Cfc))
LWRc1=LOG (WRc1)
XC=0.05
WRc2=(1/XC)*((Cfc-Cic)/(Cf-Cfc))
LWRc2=LOG (WRc2)
XC=0.1
WRc3=(1/XC)*((Cfc-Cic)/(Cf-Cfc))
LWRc3=LOG (WRc3)
XC=0.2
WRc4=(1/XC)*((Cfc-Cic)/(Cf-Cfc))
LWRc4=LOG (WRc4)
LPRINT "*****************************************************************"
LPRINT "               CALCUL DE LA RELACIO AIGUA ROCA"
LPRINT "*****************************************************************"
LPRINT
LPRINT MOS$
LPRINT "d13C CALCITA = ";:LPRINT Cfc
LPRINT "d18O CALCITA = ";:LPRINT Ofc
LPRINT
LPRINT "A PARTIR DE L'OXIGEN "
LPRINT "SISTEMA TANCAT                              SISTEMA OBERT"
LPRINT USING "###.##";WRo;:LPRINT "                 ";:LPRINT USING "###.##";LWRo
LPRINT
LPRINT "A PARTIR DEL CARBONI"
LPRINT "Xco2 = 0.01";
LPRINT USING "###.##";WRc1;:LPRINT "                ";:LPRINT USING "###.##";LWRc1
LPRINT
LPRINT "Xco2 = 0.05";
LPRINT USING "###.##";WRc2;:LPRINT "                ";:LPRINT USING "###.##";LWRc2
LPRINT
```

```
        LPRINT "Xco2 = 0.1";
        LPRINT USING "###.##";WRc3;:LPRINT "                    ";:LPRINT USING "###.##";LWRc3
        LPRINT
        LPRINT "Xco2 = 0.2";
        LPRINT USING "###.##";WRc4;:LPRINT "                    ";:LPRINT USING "###.##";LWRc4
        LPRINT
        LPRINT "*****************************************************************************"
        LPRINT
        LPRINT "*****************************************************************************"
        LPRINT "XCO2 CALCULAT"
        LPRINT
        XCt=0
        XCt=((Cfc-Cic)/(Cf-Cfc))/(3*((Ofc-Oic)/(Of-Ofc)))
        LPRINT USING "#.####";XCt
        LPRINT
        LPRINT
        LPRINT
        LPRINT
        GOTO 3
10      END
```