

NGU - rapport nr. 88.189

Utlutning av serpentinit
Del I

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<p>Sammendrag:</p> <p>Serpentin -magnesittbergarten i Raudbergfeltet, Vik i Sogn, er potensielt råstoff for magnesiumfremstilling. Det er i denne forbindelse testet løseligheten av 6 serpentinitprøver. Løseligheten ligger på gjennomsnittlig 49.6 % etter 2 timers utlutingstid med kokende 6N saltsyre (den aktuelle behandlingstid ved utluting).</p> <p>De mikrostrukturelle undersøkelser viser at residuet har gjennomgått en fundamental krystallstrukturell forandring gjennom utlutingsprosessen. Det har hittil ikke lyktes å oppnå ionebyttereffekt med dette materialet.</p>			
Emneord	Serpentin		
	Utluting		
	Ionebytting		

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Forord

I prosjekt 2439.0041 "Utluting av magnesium fra serpentin-magnesittbergarter", har Reidar Trønnes (prosjektleder) fratrudd sin stilling. Prosjektet vil fortsette med Svein Olerud og tidligere medarbeidere Per Reidar Graff og Johs Rye Røste fra kjemisiden. En finner det riktig å sammenfatte de hittil oppnådde resultater i egen rapport for derved å gi bedre grunnlag for videre arbeid. Sammenstillingen er gjort i samråd med Trønnes og Olerud.

Innledning

Det er påvist betydelige mengder talkforekomster i Raudbergfeltet, Vik i Sogn. (Bakke, 1986). Den dominerende ultramafiske bergartstype er imidlertid serpentinit som inneholder varierende mengder magnesitt/kalsitt. Siden sammenvoksningen mellom magnesitt og serpentin er finkornet, ser det ut til å være vanskelig å skille mineralene ved fysisk oppredning. Magnesitt er lettløselig selv i fortennet varm saltsyre. Utlutingsforsøkene som er utført ved Geokjemisk avd. (Graff og Røste 1985) viser dessuten at serpentinmineralene har stor løselighet sett i relasjon til mange andre silikatmineraler som er undersøkt. Disse forsøk er utført med 6N saltsyre og 6 N salpetersyre og med koketid på 2 timer for hver prøve. Saltsyren har ca. 20 % større løseeffekt for de fleste silikatmineralgrupper, men for serpentinmineralene er løseligheten 56 - 58 % i begge syrene. Residuet på 42 - 44 % svarer til andelen av tetraederskikt (SiO₂-tetraedre) i krystallstrukturen for serpentin. Dette indikerer at brucittskiktene er effektivt oppløst og fjernet ved utlutingsprosessen og at magnesiumioner er dominerende kationer i løsningen (Trønnes 1987). Det konkluderes videre med at prosessen kan foregå i en betydelig svakere konsentrasjon av saltsyre enn 6N eller i løpet av kortere reaksjonstid om dette skulle være ønskelig. I motsetning til serpentinmineralenes lettløselighet, løses kun 2 - 8 % av de undersøkte talkprøver. Resultatet stemmer med regelen for silikatmineralers løselighet i syre som kan uttrykkes:

$\frac{\sum \text{Mol elementoksyder}}{\text{Mol SiO}_2}$	< 1	(liten løselighet)
	1 - 2	(diskontinuitetsområde)
	> 2	(stor løselighet)

(Graff og Røste 1985). For talk vil brucittlagene i krystallstrukturen være vanskelig tilgjengelig for syren siden de ligger mellom to tetraederskikt. Andelen av tetraederskikt i talk er dobbelt så stor som i serpentin (Trønnes 1988). Verdien av serpentin-magnesittbergarter som råstoff for magnesiumfremstilling vil ytterligere øke dersom residualmaterialet (hovedsakelig tetraederskiktene fra serpentin) også kan markedsføres. Det er foreslått å teste dette residuet til bruk som ionebyttemasse (Barkey 1987) eller i forbindelse med andre anvendelsesområder.

Prøvematerialet

Til forsøkene ble det valgt ut 4 prøver av magnesittførende serpentinit, 1 prøve magnesittfri serpentinit og 1 prøve serpentinisert dunitt. Prøvene er tatt fra borhullene 1c, 4, 6 og 7 som ble boret under samarbeidsprosjektet mellom NGU og A/S Norwegian Talc i Raubergfeltet, Vik i Sogn, i 1984 og 1985 og er i denne rapport spesifisert i (Tabell 1) og med analyser av hovedelementer i (Tabell 2) og sporelementer i (Tabell 3).

Prosedyre for utluting

5 g pulverisert prøve (-140 mesh) ble overført til Erlenmeyerkolber (500 ml). Kolbene var utstyrt med tilbakeløpskjølere og magnetstaver. Pulverne ble fuktet med dest. vann og kolbene tilsatt 40 ml 6N saltsyre. Kolbene ble videre utstyrt med termometre. Suspensjonene ble varmet opp til koking og holdt på kokepunktet i gitte tidsintervaller (Oppvarmingstid: 10 min.). Etter avkjøling til 50 grader C ble suspensjonene filtrert gjennom glassfiberfilter (Glassfaser nr. 6) og det uløste stoff ble vasket gjentatte ganger med dest. vann. Filtreringene ble gjennomført ved hjelp av sugokolber (250 ml) og residua ble tørket ved 110 grader C. Resultatene er illustrert i (Fig 1, 2, 3, 4 og 5 og i (Tabellene 4, 5, 6 og 7).

Utluting ved forskjellige tider i 6N saltsyre

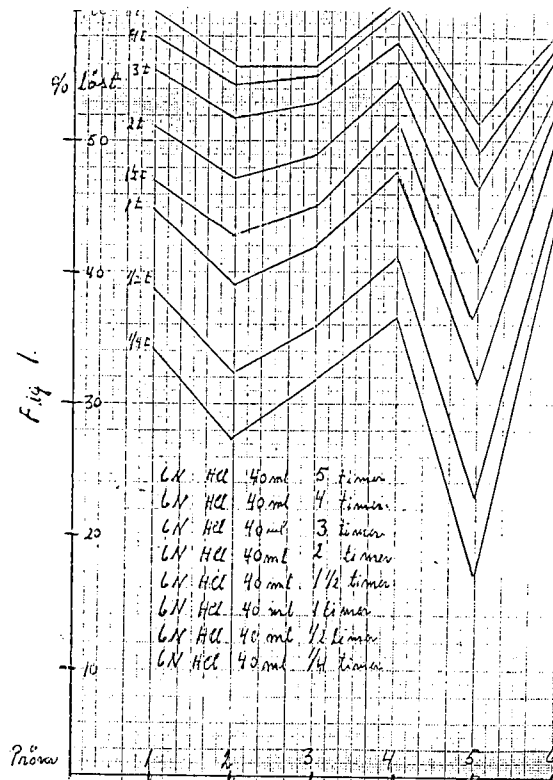


Fig 1

Utluting ved forskjellig syrekonsentrasjon

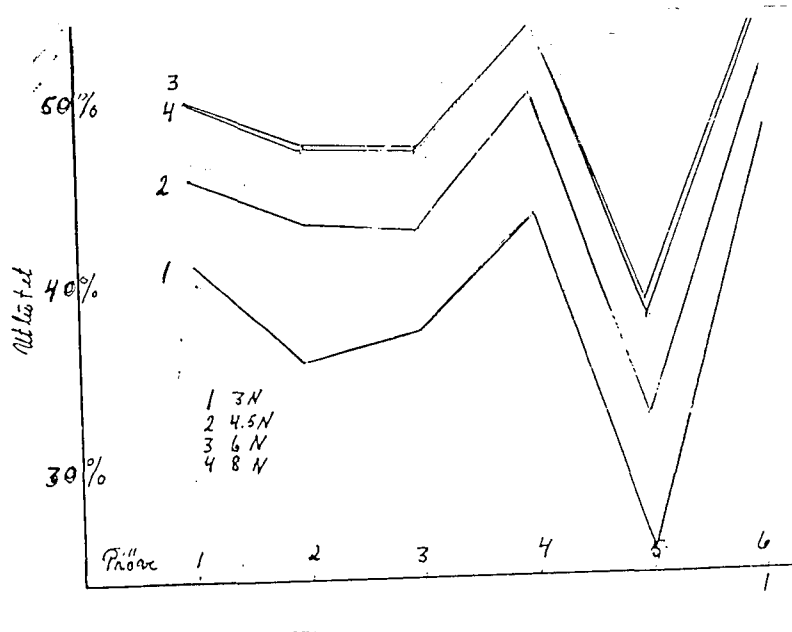


Fig 2

Utluting ved forskjellige syremengder

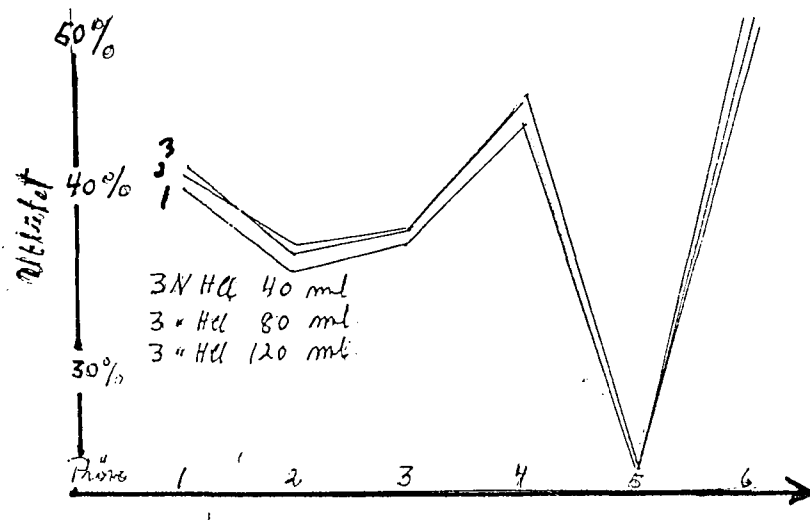


Fig 3

Prosent utluttet materiale

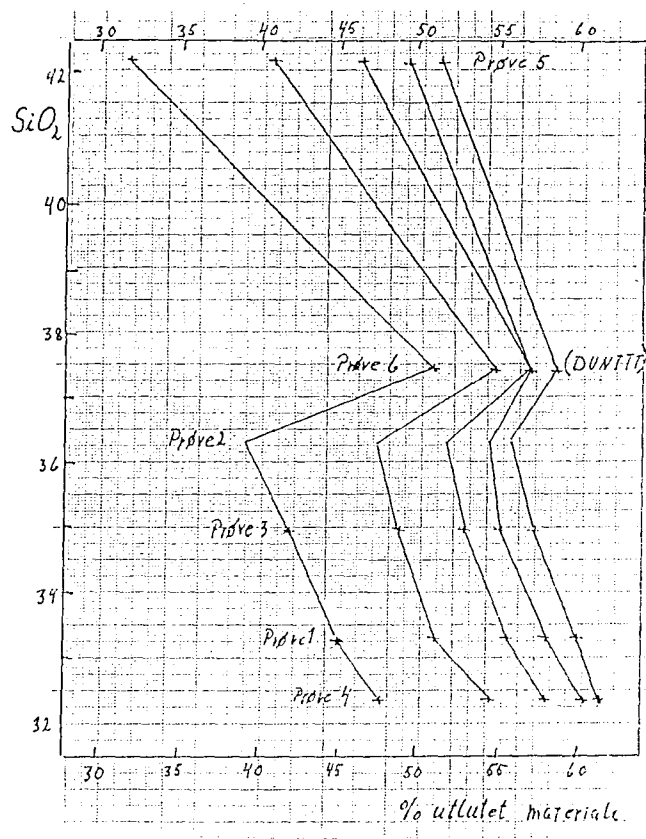


Fig 4

Prosentvis utlutning pr. minutt i tidsintervaller

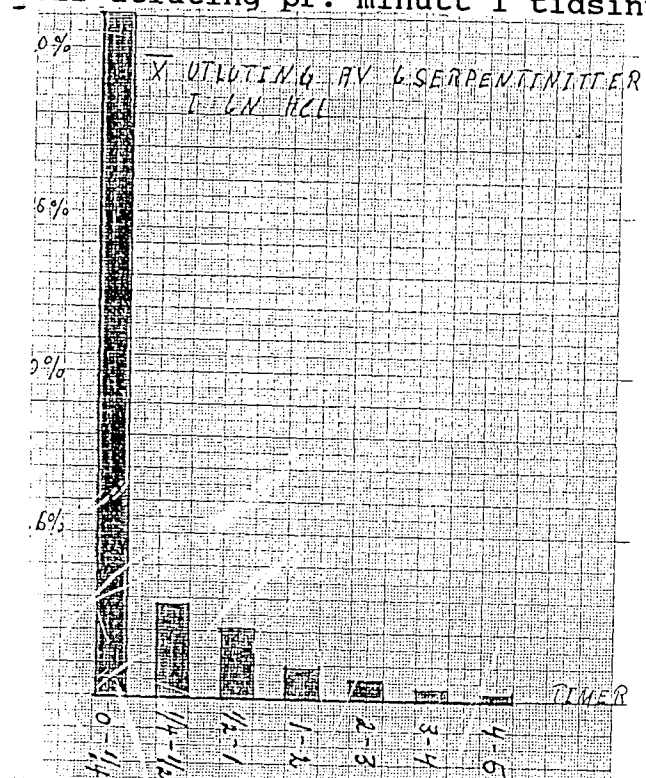


Fig 5

Mikrostrukturelle forandringer ved kjemisk utluting av serpentin

Sitat fra Trønnes 1988:

Forandringen i krystallstrukturen til serpentin ved utluting ble undersøkt ved hjelp av røntgendiffraktometer (XRD) og kjerne-magnetisk resonansspektrometer (NMR). Det ble valgt ut en serpentinittprøve fra Modum til strukturanalyse. Røntgendiffraktogram av utgangsmaterialet viser at prøven består av serpentin (antigoritt) og olivin (Fig 6). Restproduktet fra utlutningen er overveiende amorf, men to av de sterkeste refleksjonene fra antigorittstrukturen (7,2 Å - 001 og 3,6 Å - 002, 0012) er fremdeles synlig.

Trønnes fortsetter: Siden serpentinittprøvene har betydelig Al-innhold blir Si²⁹-toppene meget dominerende interferensfrie, og NMR-spektrene blir dermed lette å tolke. Spekteret av det ubehandlede materiale (Fig 8) har en liten topp ved -62,5 ppm (TMS) og en dominerende og skarp topp ved -95 ppm (TMS). Toppene bekrefter dominansen av silikatmineralene (Q3) i form av serpentin og tilstedeværelsen av nesosilikatmateriale (Q0) i form av olivin (Fig 4 i Kirkpatrick et al 1985 Ann. Rev. Earth Sci. 13, 29-47). Residualproduktet har en bred topp mellom -100 ppm (TMS) og -120 ppm (TMS) som svarer til tektosilikatstrukturen (Q4), sannsynligvis med flere ulike Si-posisjoner (Fig 9).

De mikrostrukturelle undersøkelsene viser at antigoritten gjennomgår en fundamental krystallstrukturell forandring gjennom utlutingsprosessen. Oktaederlagene løses opp samtidig som tetraederlagenes silikatstruktur (skiktsilikat) brytes ned og erstattes av en uordnet røntgenamorf tektosilikatstruktur.

Røntgendiffraktogram av serpentin fra Tingelstadvatn, Modum
(utgangsmaterialet)

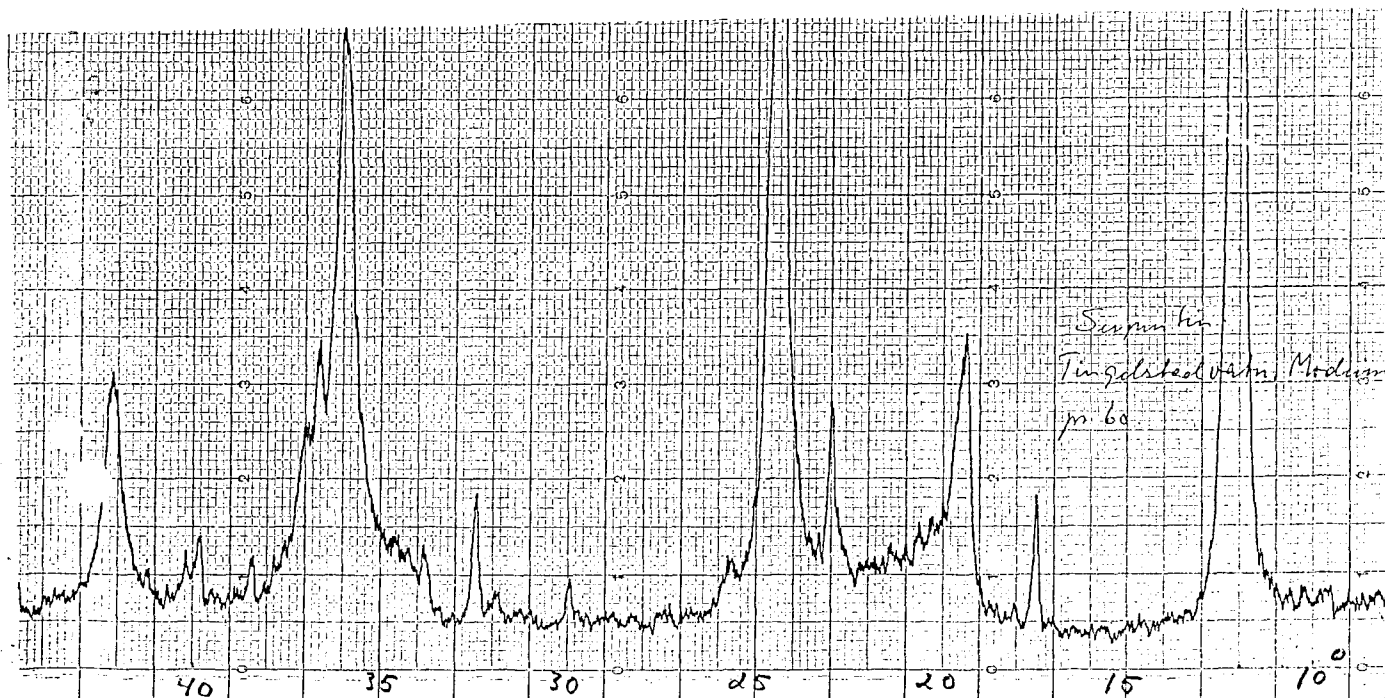


Fig 6

Røntgendiffraktogram av serpentin fra Tingelstadvatn, Modum
(restproduktet fra utlutingen)

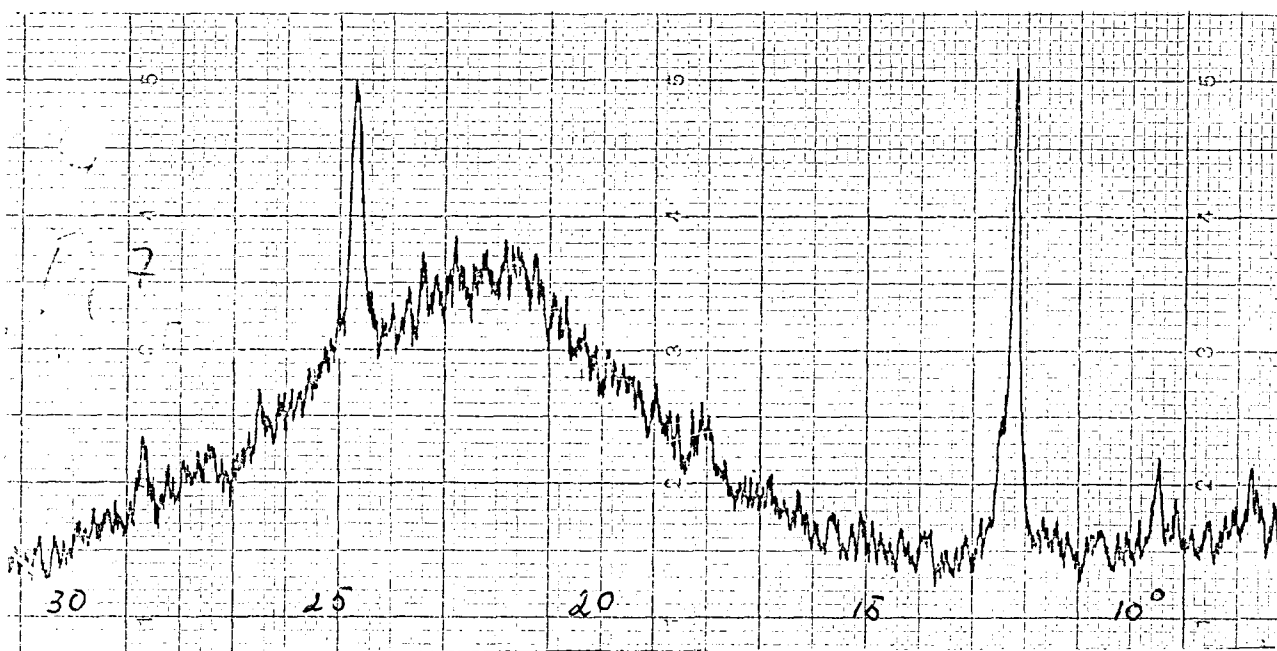


Fig 7

NMR-spektrum av utgangsmaterialet

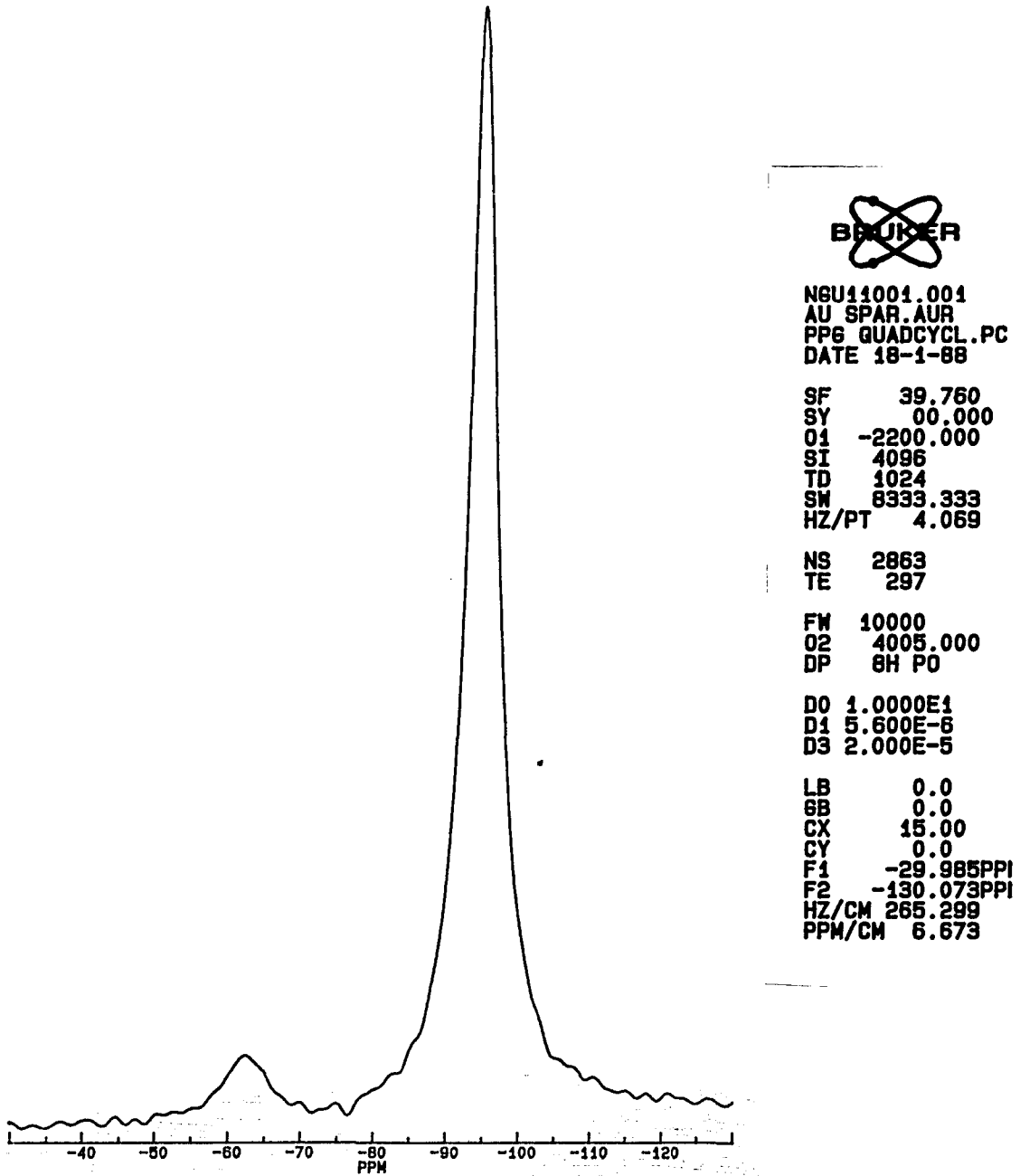


Fig 8

NMR-spektrum av residualprодукtet

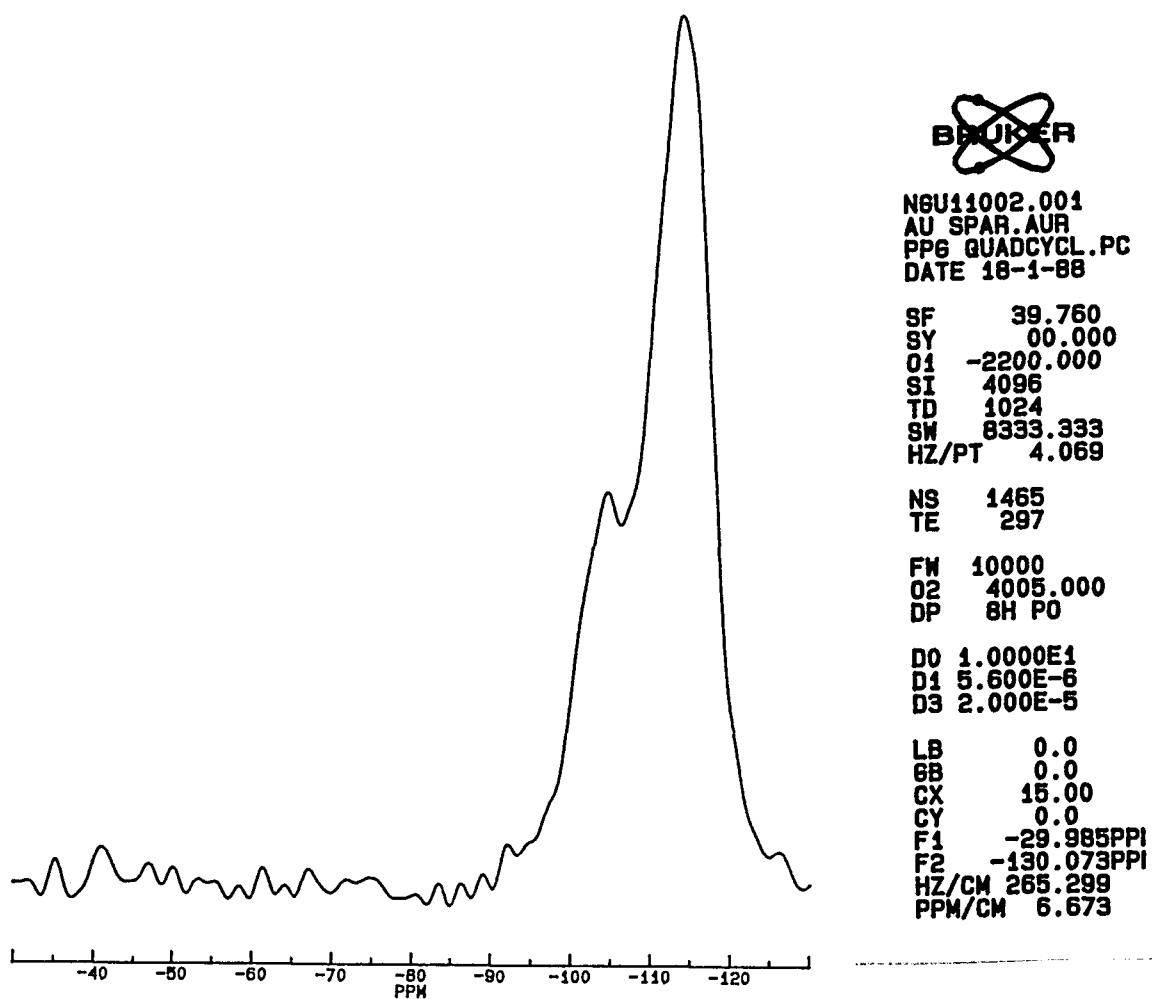


Fig 9

Forsøk mht. ionebyttereffekt av utlutet materiale

A

1g residuum etter utlutingen ble overført til en kolonne (Fig 10). Residuet ble oppslemmet med 1N HCl og vasket med ionebyttet vann før to prøveløsninger etter tur ble kjørt gjennom massen. Prøveløsningene var nøytrale løsninger av CuSO_4 , ZnSO_4 og PbSO_4 . (Tabell 11) viser analyseresultatet av blindprøve og de to prøveløsningene etter passering gjennom residuet i kolonnen.

B

Residuet ble rystet i henholdsvis en 1/4 time og 1 time med Cu-Zn-Pb-løsning. Analyseresultatet av blindprøve og prøveløsninger etter rysting og filtrering er vist i (Tabell 12).

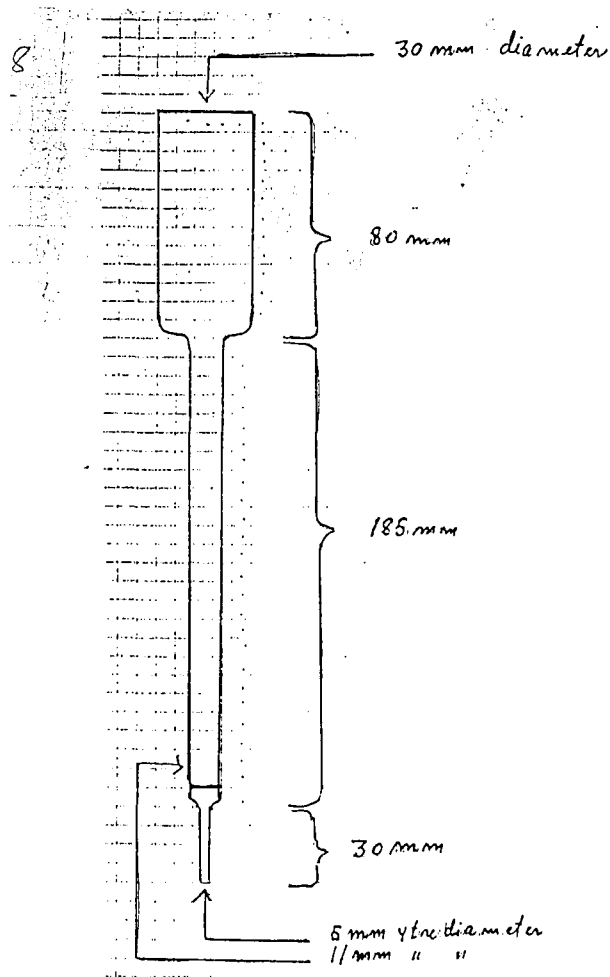


Fig 10

Konklusjon

1. Utluting av 6 serpentinittprøver i 6N saltsyre viser gjennomsnitt (X) fra 31.9 % utluting etter 1/4 time til 57.36 % utluting etter 5 timer. Etter 2 timer (den mulige aktuelle behandlingstid) er utlutingen 49.6 % (Se tabell 4).
2. Utluting av 6 serpentinittprøver ved forskjellige syrekonsentrasjoner under ellers like forhold gir tilnærmet optimale betingelser for 6 N saltsyre (Se Tabell 5).
3. Utluting av 6 serpentinittprøver med 3N saltsyre og varierende syrevolum vise at reaksjonshastighetene er tilnærmet like (Tabell 6).
4. Utbyttet pr. minutt i gitte tidsintervaller avtar meget sterkt. I foreliggende eks. er utlutingshastigheten i tidsintervaller (1 - 2 timer) bare 4.5 % av utlutingshastigheten i tidsintervallet (0 - 1/4 timer).
5. Diffraktometeropptak av frisk og utlutet serpentin (Fig 6 og 7) og NMR-opptak (Fig 8 og 9) bekrefter at det er storeforandringer i krystallstrukturen.
6. Tabeller:
 1. Prøvemateriale for utlutingsforsøk
 2. XRF-analyser av hovedkomponenter i utgangsmaterialet
 3. XRF-analyser av sporelementer i utgangsmaterialet
 4. Utluting i % ved forskjellige tider
 5. Utluting i % ved forskjellige syrekonsentrasjoner
 6. Utluting i % i 3N saltsyre men med forskjellige syremengder
 7. Utluting i gitte tidsintervaller
 8. ICP-analyse av løsning etter syrebehandling (2 timer)
 9. ICP-analyse av løsning etter syrebehandling ved forskjellige tider
 10. ICP-analyse av løsning etter behandling med forskjellige syremengder (samme konsentrasjon)
 11. ICP-analyse av løsning som har passert residuet i kolonne. Løsningen var tilsatt Cu, Ni og Pb
 12. ICP-analyse av løsning som var rystet med residuet. Rystingens varighet var 1/4 og 1 time. Løsningen var tilsatt Cu, Ni og Pb

Referanser

- Bakke, S., 1986: Magnesittmineralisering i serpentinit fra Raudbergfeltet, Vik i Sogn. Norwegian Talc A/S Rapport 85.223.
- Barkey, H., 1987: Privat meddelelse.
- Graff, P.R. og Røste, J.R., 1985: Utluting av silikatmineraler. NGU-rapport nr. 85.105.
- Trønnes, R., 1987: Privat meddelelse.

Tabell 1
(Prøvematerialet)

Prøvenr.	Borhull	Dybde	Bergartstype
1	1c	289.4	Serpentinitt med 20-25% magnesitt
2	1c	291.0	" " 10-15% "
3	1c	318.7	" " 15-20% "
4	4	261.0	" " 15-20" "
5	6	337.4	" uten "
6	7	221.0	Serpentinisert dunit (60-70% serp.)

Tabell 2

	1	2	3	4	5	6
SiO ₂	33.31 %	36.33 %	34.96 %	32.36 %	42.19 %	37.45 %
Al ₂ O ₃	.19 %	.43 %	.32 %	.25 %	.55 %	.30 %
Fe ₂ O ₃	5.93 %	6.36 %	5.47 %	8.66 %	6.82 %	8.84 %
TiO ₂	< .01 %	< .01 %	< .01 %	< .01 %	< .01 %	< .01 %
MgO	38.88 %	37.89 %	38.46 %	38.07 %	37.15 %	43.73 %
CaO	.06 %	.04 %	.06 %	.22 %	.02 %	.05 %
Na ₂ O	< .1 %	< .1 %	< .1 %	.2 %	< .1 %	< .1 %
K ₂ O	< .01 %	< .01 %	< .01 %	< .01 %	< .01 %	< .01 %
MnO	.11 %	.10 %	.12 %	.12 %	.10 %	.11 %
P ₂ O ₅	< .01 %	< .01 %	< .01 %	< .01 %	< .01 %	< .01 %
Cl, tap	20.16 %	16.48 %	18.61 %	18.50 %	11.28 %	7.48 %
Sum	98.64 %	97.63 %	98.00 %	98.38 %	98.11 %	97.96 %

Tabell 3

	1	2	3	4	5	6
Nb	< 5 ppm	< 5 ppm	< 5 ppm	< 5 ppm	< 5 ppm	< 5 ppm
Zr	9 ppm	8 ppm	6 ppm	13 ppm	8 ppm	7 ppm
Y	< 5 ppm	< 5 ppm	< 5 ppm	< 5 ppm	< 5 ppm	< 5 ppm
Sr	< 5 ppm	< 5 ppm	< 5 ppm	< 5 ppm	< 5 ppm	< 5 ppm
Rb	< 5 ppm	< 5 ppm	< 5 ppm	< 5 ppm	< 5 ppm	< 5 ppm
Zn	20 ppm	28 ppm	36 ppm	29 ppm	5 ppm	5 ppm
Cu	11 ppm	8 ppm	9 ppm	22 ppm	45 ppm	30 ppm
Ni	.17 %	.16 %	.18 %	.27 %	.18 %	.21 %
Cr	.14 %	.36 %	.19 %	.39 %	.22 %	.28 %
V	7 ppm	24 ppm	19 ppm	21 ppm	25 ppm	18 ppm
Ba	< 10 ppm	< 10 ppm	< 10 ppm	< 10 ppm	< 10 ppm	< 10 ppm
Sn	< 10 ppm	< 10 ppm	< 10 ppm	< 10 ppm	< 10 ppm	< 10 ppm
Mo	< 5 ppm	< 5 ppm	< 5 ppm	< 5 ppm	< 10 ppm	< 10 ppm
U	< 10 ppm	< 10 ppm	< 10 ppm	< 5 ppm	< 5 ppm	< 5 ppm
Th	< 10 ppm	< 10 ppm	< 10 ppm	< 10 ppm	< 10 ppm	< 10 ppm
Pb	< 10 ppm	< 10 ppm	< 10 ppm	< 10 ppm	< 10 ppm	< 10 ppm
Co	87 ppm	72 ppm	88 ppm	10 ppm	10 ppm	10 ppm
Ce	< 10 ppm	< 10 ppm	< 10 ppm	92 ppm	92 ppm	134 ppm
La	< 10 ppm	< 10 ppm	< 10 ppm	< 10 ppm	< 10 ppm	< 10 ppm
Sc	< 5 ppm	10 ppm	6 ppm	5 ppm	6 ppm	5 ppm

Tabell 4
Utluting i 6 N HCl mht. tid

Tid	P r ø v e n u m m e r						\bar{X}
	1	2	3	4	5	6	
1/4 t	34,2%	27,4%	31,8%	36,4%	16,8%	44,8%	31,9%
1/2 "	38,6	32,4	36,0	41,2	22,8	47,2	36,3
1 "	44,8	39,2	42,0	47,8	31,8	51,0	42,7
1 1/2 "	47,2	42,8	45,2	51,4	36,4	52,8	45,9
2 "	51,2	47,4	49,0	54,6	40,8	54,8	49,6
3 "	55,6	51,8	53,0	58,0	46,4	57,0	53,6
4 "	58,0	54,4	55,2	60,2	49,2	57,0	53,6
5 "	60,0	55,8	57,2	61,2	51,4	58,6	57,3
6 "					52,4		

Tabell 5
Utluting mht. syrekonsentrasjon

C HCl	P r ø v e n u m m e r						\bar{X}
	1	2	3	4	5	6	
3,0 N	40,0%	35,6%	37,0%	43,2%	25,0%	47,0%	37,9%
4,5 "	45,4	42,8	42,4	49,8	32,0	51,0	43,9
5,5 "	50,4	46,0					
6,0 "	50,0	47,2	46,8	53,6	37,2	54,4	48,2
6,5 "	50,6	46,4					
8,0 "	49,8	46,4	46,4	53,6	38,4	54,8	48,

Tabell 6
Utluting i 3N HCl mht. syremengde

Syre- mengde	P r ø v e n u m m e r						\bar{X}
	1	2	3	4	5	6	
40 ml	40,0%	35,6%	37,0%	43,2%	25,0%	47,0%	37,9%
80 "	40,6	36,8	37,6	44,6	24,6	49,0	38,8
120 "	41,2	36,6	37,8	45,0	24,8	50,6	38,3

Tabell 7
Utluting av 6 serpentinitter i gitte tidsintervaller

Tidsin- terval	P r ø v e n u m m e r						\bar{X}
	1	2	3	4	5	6	
0-1/4 t	2,280%	1,826%	2,120%	2,121%	1,120%	2,936%	2,126%
1/4-1/2 "	0,293	0,333	0,280	0,320	0,400	0,160	0,273
1/2- 1 "	0,206	0,226	0,200	0,229	0,300	0,126	0,213
1- 2 "	0,106	0,136	0,116	0,113	0,150	0,067	0,096
2- 3 "	0,073	0,073	0,066	0,056	0,093	0,046	0,067
3- 4 "	0,040	0,043	0,036	0,036	0,046	0,013	0,035
4- 5 "	0,033	0,023	0,033	0,016	0,036	0,015	0,025

	1-6N-40	2-6N-40	3-6N-40	4-6N-40	5-6N-40	6-6N-40	1-3N-40	2-3N-40	3-3N-40	4-3N-40
Si	480.5 ppm	541.0 ppm	521.3 ppm	588.8 ppm	601.5 ppm	.11 %	762.3 ppm	788.5 ppm	798.5 ppm	829.0 ppm
Al	350.5 ppm	.14 %	908.0 ppm	269.0 ppm	.19 %	224.0 ppm	205.7 ppm	.11 %	487.3 ppm	165.8 ppm
Fe	3.01 %	3.35 %	2.89 %	5.20 %	3.27 %	5.69 %	2.44 %	2.76 %	2.31 %	4.67 %
Ti	2.3 ppm	5.4 ppm	39.5 ppm	13.7 ppm	25.4 ppm	7.1 ppm	1.6 ppm	23.3 ppm	5.1 ppm	8.6 ppm
Mg	18.61 %	18.66 %	17.80 %	19.42 %	16.22 %	25.63 %	14.22 %	13.66 %	13.54 %	14.47 %
Ca	246.9 ppm	156.5 ppm	367.5 ppm	.13 %	40.4 ppm	178.8 ppm	246.2 ppm	166.1 ppm	314.5 ppm	.12 %
Na	35.2 ppm	47.0 ppm	51.9 ppm	33.1 ppm	23.4 ppm	19.6 ppm	17.5 ppm	21.9 ppm	16.6 ppm	20.6 ppm
K	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm
Mn	688.8 ppm	596.3 ppm	769.0 ppm	748.8 ppm	488.0 ppm	752.0 ppm	649.0 ppm	540.0 ppm	714.3 ppm	701.3 ppm
P	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm
Cu	16.0 ppm	11.0 ppm	14.6 ppm	18.5 ppm	12.9 ppm	4.5 ppm	13.1 ppm	9.4 ppm	10.2 ppm	17.3 ppm
Zn	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	5.7 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm
Pb	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm
Ni	.17 %	.17 %	.15 %	.23 %	.16 %	.19 %	.15 %	.14 %	.12 %	.18 %
Co	76.9 ppm	55.3 ppm	68.7 ppm	68.5 ppm	69.7 ppm	118.4 ppm	55.1 ppm	46.2 ppm	58.9 ppm	60.9 ppm
V	14.7 ppm	23.1 ppm	22.2 ppm	25.9 ppm	23.4 ppm	23.3 ppm	11.7 ppm	18.3 ppm	16.5 ppm	21.5 ppm
Mo	20.0 ppm	21.7 ppm	19.4 ppm	24.2 ppm	18.8 ppm	28.1 ppm	15.3 ppm	15.8 ppm	13.8 ppm	19.1 ppm
Cd	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm
Cr	427.8 ppm	.13 %	781.7 ppm	872.3 ppm	.12 %	610.3 ppm	341.5 ppm	988.5 ppm	588.0 ppm	719.5 ppm
Ba	< .8 ppm	< .8 ppm	.9 ppm	< .8 ppm	1.2 ppm	< .8 ppm	< .8 ppm	.9 ppm	1.5 ppm	3.0 ppm
Sr	< .3 ppm	.3 ppm	1.7 ppm	4.2 ppm	< .3 ppm	.4 ppm	< .3 ppm	.5 ppm	1.0 ppm	4.1 ppm
Zr	3.9 ppm	3.5 ppm	3.4 ppm	4.4 ppm	3.3 ppm	4.4 ppm	2.1 ppm	2.4 ppm	2.0 ppm	3.2 ppm
Ag	2.4 ppm	2.4 ppm	2.7 ppm	3.1 ppm	2.8 ppm	3.8 ppm	1.6 ppm	1.8 ppm	1.8 ppm	2.4 ppm
B	21.8 ppm	21.7 ppm	23.1 ppm	24.5 ppm	14.0 ppm	68.6 ppm	12.0 ppm	10.9 ppm	10.9 ppm	16.4 ppm
Be	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm
Li	< .5 ppm	< .5 ppm	.9 ppm	< .5 ppm	< .5 ppm	< .5 ppm	< .5 ppm	.8 ppm	< .5 ppm	< .5 ppm
Sc	1.7 ppm	4.9 ppm	2.6 ppm	2.1 ppm	4.3 ppm	3.3 ppm	.8 ppm	3.0 ppm	1.7 ppm	1.3 ppm
Ce	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm
La	5.7 ppm	5.7 ppm	5.2 ppm	12.3 ppm	5.0 ppm	15.9 ppm	2.9 ppm	2.5 ppm	< 2.5 ppm	9.3 ppm

	5-3N-40	6-3N-40	1-3N-80	2-3N-80	3-3N-80	4-3N-80	5-3N-80	6-3N-80	1-3N-120	2-3N-120
Si	879.5 ppm	.39 %	.14 %	.14 %	.14 %	.15 %	.15 %	.66 %	.19 %	.19 %
Al	.12 %	108.4 ppm	222.4 ppm	898.8 ppm	504.5 ppm	171.3 ppm	.12 %	125.1 ppm	213.4 ppm	890.8 ppm
Fe	2.44 %	5.42 %	2.47 %	2.79 %	2.30 %	4.75 %	2.44 %	5.62 %	2.46 %	2.76 %
Ti	15.5 ppm	5.4 ppm	6.6 ppm	4.2 ppm	6.7 ppm	9.6 ppm	17.0 ppm	6.0 ppm	1.9 ppm	12.2 ppm
Mg	10.75 %	22.35 %	14.32 %	14.02 %	13.56 %	14.82 %	10.72 %	22.99 %	14.27 %	13.84 %
Ca	22.3 ppm	179.8 ppm	249.2 ppm	152.9 ppm	317.8 ppm	.12 %	27.0 ppm	174.7 ppm	243.7 ppm	179.4 ppm
Na	17.1 ppm	19.0 ppm	16.6 ppm	14.0 ppm	17.7 ppm	19.7 ppm	17.3 ppm	13.7 ppm	14.8 ppm	14.0 ppm
K	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm
Mn	322.8 ppm	732.0 ppm	657.3 ppm	549.5 ppm	719.3 ppm	709.8 ppm	323.8 ppm	746.3 ppm	647.3 ppm	547.0 ppm
P	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm
Cu	10.6 ppm	5.6 ppm	15.7 ppm	9.8 ppm	10.9 ppm	17.6 ppm	10.0 ppm	4.6 ppm	13.9 ppm	10.1 ppm
Zn	2.9 ppm	<.3 ppm	<.3 ppm	<.3 ppm	<.3 ppm	<.3 ppm	2.0 ppm	<.3 ppm	<.3 ppm	<.3 ppm
Pb	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm
Ni	.13 %	.18 %	.14 %	.14 %	.12 %	.19 %	.13 %	.19 %	.14 %	.14 %
Co	44.5 ppm	112.6 ppm	58.0 ppm	46.3 ppm	55.8 ppm	58.9 ppm	46.8 ppm	116.1 ppm	53.1 ppm	45.2 ppm
V	17.1 ppm	20.2 ppm	12.4 ppm	18.9 ppm	16.4 ppm	22.5 ppm	17.9 ppm	21.3 ppm	12.0 ppm	18.8 ppm
Mo	13.9 ppm	25.7 ppm	16.1 ppm	17.0 ppm	15.6 ppm	20.3 ppm	14.5 ppm	26.9 ppm	15.9 ppm	16.2 ppm
Cd	<2.5 ppm	<2.5 ppm	<2.5 ppm	<2.5 ppm	<2.5 ppm	<2.5 ppm	<2.5 ppm	<2.5 ppm	<2.5 ppm	<2.5 ppm
Cr	884.3 ppm	348.0 ppm	349.8 ppm	.10 %	594.5 ppm	744.5 ppm	887.0 ppm	398.5 ppm	349.3 ppm	.10 %
Ba	<.8 ppm	<.8 ppm	<.8 ppm	<.8 ppm	<.8 ppm	<.8 ppm	<.8 ppm	<.8 ppm	<.8 ppm	2.3 ppm
Sr	<.3 ppm	.5 ppm	.3 ppm	<.3 ppm	1.0 ppm	4.2 ppm	<.3 ppm	.4 ppm	<.3 ppm	.5 ppm
Zr	2.2 ppm	3.8 ppm	3.1 ppm	2.6 ppm	2.3 ppm	3.6 ppm	2.4 ppm	4.1 ppm	2.6 ppm	2.3 ppm
Ag	1.3 ppm	3.3 ppm	2.4 ppm	2.2 ppm	1.6 ppm	2.7 ppm	2.0 ppm	3.5 ppm	2.5 ppm	2.6 ppm
B	6.7 ppm	67.3 ppm	10.8 ppm	9.4 ppm	10.5 ppm	12.6 ppm	8.2 ppm	64.4 ppm	9.9 ppm	6.8 ppm
Be	<.3 ppm	<.3 ppm	<.3 ppm	<.3 ppm	<.3 ppm	<.3 ppm	<.3 ppm	<.3 ppm	<.3 ppm	<.3 ppm
Li	<.5 ppm	<.5 ppm	<.5 ppm	<.5 ppm	.8 ppm	<.5 ppm	<.5 ppm	<.5 ppm	<.5 ppm	<.5 ppm
Sc	2.8 ppm	2.9 ppm	.7 ppm	3.1 ppm	1.7 ppm	1.4 ppm	2.6 ppm	3.1 ppm	.9 ppm	2.4 ppm
Ce	<7.5 ppm	<7.5 ppm	<7.5 ppm	<7.5 ppm	<7.5 ppm	<7.5 ppm	<7.5 ppm	<7.5 ppm	<7.5 ppm	9.7 ppm
La	<2.5 ppm	12.4 ppm	<2.5 ppm	<2.5 ppm	2.7 ppm	8.8 ppm	<2.5 ppm	13.5 ppm	<2.5 ppm	2.9 ppm

Tabell 8 (fortsett)

3-3N-120 4-3N-120 5-3N-120 6-3N-120 1-4.5-40 2-4.5-40 3-4.5-40 4-4.5-40 5-4.5-40 6-4.5-40

Si	.18 %	.18 %	.19 %	1.22 %	575.5 ppm	627.2 ppm	659.5 ppm	657.8 ppm	635.0 ppm	.13 %
Al	501.3 ppm	186.2 ppm	.12 %	151.0 ppm	304.3 ppm	678.3 ppm	271.8 ppm	.12 %	.17 %	182.8 ppm
Fe	2.29 %	4.78 %	2.42 %	5.54 %	2.80 %	2.63 %	5.11 %	3.12 %	2.99 %	5.72 %
Ti	2.3 ppm	11.4 ppm	15.9 ppm	16.4 ppm	10.4 ppm	2.8 ppm	46.0 ppm	5.6 ppm	19.8 ppm	7.1 ppm
Mg	13.53 %	15.01 %	10.69 %	22.84 %	16.66 %	15.87 %	17.34 %	16.47 %	14.27 %	24.12 %
Ca	317.5 ppm	.13 %	26.3 ppm	194.3 ppm	258.3 ppm	318.8 ppm	.13 %	152.9 ppm	29.4 ppm	175.1 ppm
Na	17.3 ppm	19.4 ppm	18.1 ppm	18.0 ppm	15.5 ppm	15.6 ppm	20.8 ppm	10.3 ppm	16.9 ppm	15.0 ppm
K	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm
Mn	714.5 ppm	709.8 ppm	323.0 ppm	730.5 ppm	678.3 ppm	745.8 ppm	736.0 ppm	578.3 ppm	424.0 ppm	749.0 ppm
P	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm
Cu	9.6 ppm	19.2 ppm	10.5 ppm	5.8 ppm	15.1 ppm	10.6 ppm	26.2 ppm	11.0 ppm	12.4 ppm	4.9 ppm
Zn	< .3 ppm	< .3 ppm	.4 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	3.3 ppm	< .3 ppm
Pb	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm
Ni	.12 %	.19 %	.13 %	.18 %	.16 %	.14 %	.21 %	.16 %	.15 %	.19 %
Co	56.2 ppm	59.9 ppm	43.4 ppm	115.5 ppm	61.4 ppm	62.1 ppm	66.2 ppm	52.9 ppm	56.3 ppm	117.5 ppm
V	16.4 ppm	22.5 ppm	17.2 ppm	21.3 ppm	13.8 ppm	18.9 ppm	26.0 ppm	21.8 ppm	21.4 ppm	23.1 ppm
Mo	15.8 ppm	20.3 ppm	14.0 ppm	26.5 ppm	18.4 ppm	17.9 ppm	23.2 ppm	19.1 ppm	17.2 ppm	29.3 ppm
Cd	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm
Cr	591.5 ppm	750.3 ppm	880.8 ppm	400.3 ppm	398.8 ppm	698.8 ppm	832.5 ppm	.12 %	.11 %	534.0 ppm
Ba	< .8 ppm	.8 ppm	< .8 ppm	.9 ppm	.9 ppm	< .8 ppm	1.6 ppm	< .8 ppm	< .8 ppm	< .8 ppm
Sr	1.0 ppm	4.3 ppm	< .3 ppm	1.0 ppm	.4 ppm	1.0 ppm	5.1 ppm	< .3 ppm	< .3 ppm	.5 ppm
Zr	2.3 ppm	3.5 ppm	2.4 ppm	4.4 ppm	2.8 ppm	2.4 ppm	4.2 ppm	2.9 ppm	2.3 ppm	4.6 ppm
Ag	1.8 ppm	2.6 ppm	1.9 ppm	3.4 ppm	2.8 ppm	1.9 ppm	3.0 ppm	2.5 ppm	1.7 ppm	3.9 ppm
B	10.1 ppm	13.5 ppm	7.0 ppm	65.4 ppm	10.8 ppm	11.5 ppm	15.4 ppm	8.6 ppm	6.8 ppm	65.8 ppm
Re	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm
Li	.9 ppm	< .5 ppm	< .5 ppm	< .5 ppm	< .5 ppm	.9 ppm	< .5 ppm	< .5 ppm	< .5 ppm	< .5 ppm
Sc	1.7 ppm	1.4 ppm	3.0 ppm	2.9 ppm	.9 ppm	2.0 ppm	1.8 ppm	3.9 ppm	3.6 ppm	2.9 ppm
Ce	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	7.8 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm
La	< 2.5 ppm	7.9 ppm	< 2.5 ppm	14.0 ppm	2.7 ppm	3.6 ppm	10.7 ppm	3.3 ppm	< 2.5 ppm	14.2 ppm

	1-8N-40	2-8N-40	3-8N-40	4-8N-40	5-8N-40	6-8N-40
Si	429.3 ppm	545.5 ppm	463.3 ppm	490.3 ppm	519.3 ppm	.13 %
Al	361.5 ppm	.14 %	850.3 ppm	290.8 ppm	.20 %	244.5 ppm
Fe	3.04 %	3.39 %	2.88 %	5.30 %	3.40 %	5.80 %
Ti	2.2 ppm	5.9 ppm	5.8 ppm	24.4 ppm	67.0 ppm	7.9 ppm
Mg	18.49 %	18.39 %	17.81 %	19.38 %	16.67 %	25.95 %
Ca	244.7 ppm	154.6 ppm	325.3 ppm	.13 %	63.5 ppm	180.5 ppm
Na	15.1 ppm	12.8 ppm	17.5 ppm	19.3 ppm	17.3 ppm	15.6 ppm
K	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm
Mn	693.0 ppm	602.0 ppm	772.7 ppm	756.8 ppm	506.5 ppm	764.5 ppm
P	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm
Cu	16.9 ppm	10.8 ppm	17.6 ppm	21.8 ppm	19.1 ppm	5.3 ppm
Zn	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	6.2 ppm	< .3 ppm
Pb	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm
Ni	.17 %	.17 %	.15 %	.23 %	.17 %	.20 %
Co	74.0 ppm	57.5 ppm	69.4 ppm	72.8 ppm	62.0 ppm	127.7 ppm
V	15.1 ppm	24.1 ppm	21.2 ppm	26.3 ppm	25.0 ppm	24.3 ppm
Mo	21.5 ppm	21.5 ppm	19.8 ppm	25.4 ppm	20.7 ppm	29.5 ppm
Cd	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm
Cr	429.5 ppm	.13 %	786.8 ppm	894.8 ppm	.12 %	633.0 ppm
Ba	< .8 ppm	< .8 ppm	< .8 ppm	3.1 ppm	1.7 ppm	< .8 ppm
Sr	< .3 ppm	< .3 ppm	1.0 ppm	4.4 ppm	.8 ppm	.5 ppm
Zr	3.0 ppm	3.3 ppm	2.7 ppm	4.6 ppm	3.1 ppm	4.6 ppm
Ag	2.4 ppm	3.2 ppm	2.5 ppm	3.5 ppm	2.6 ppm	3.9 ppm
B	12.2 ppm	11.0 ppm	14.5 ppm	18.0 ppm	12.1 ppm	68.1 ppm
Be	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm
Li	< .5 ppm	< .5 ppm	.9 ppm	< .5 ppm	< .5 ppm	< .5 ppm
Sc	1.4 ppm	5.0 ppm	2.3 ppm	2.2 ppm	4.4 ppm	3.5 ppm
Ce	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm
La	4.7 ppm	4.8 ppm	3.9 ppm	12.1 ppm	6.2 ppm	14.5 ppm

Tabell 8 (fortsett)

1-15MIN 2-15MIN 3-15MIN 4-15MIN 5-15MIN 6-15MIN 1-30MIN 2-30MIN 3-30MIN 4-30MIN

Si	455.5 ppm	593.5 ppm	605.0 ppm	663.0 ppm	489.3 ppm	.21 %	473.5 ppm	589.0 ppm	546.5 ppm	616.3 ppm
Al	112.9 ppm	476.3 ppm	295.0 ppm	90.6 ppm	826.5 ppm	39.1 ppm	172.0 ppm	707.8 ppm	448.3 ppm	132.5 ppm
Fe	2.00 %	2.14 %	1.98 %	4.13 %	1.89 %	5.57 %	2.34 %	2.52 %	2.26 %	4.26 %
Ti	1.9 ppm	3.4 ppm	2.0 ppm	7.2 ppm	12.5 ppm	5.6 ppm	1.8 ppm	3.7 ppm	2.4 ppm	7.7 ppm
Mg	11.61 %	9.64 %	11.05 %	11.62 %	7.32 %	21.65 %	13.66 %	12.30 %	13.05 %	13.69 %
Ca	242.8 ppm	163.6 ppm	254.5 ppm	.12 %	19.8 ppm	163.9 ppm	247.2 ppm	160.4 ppm	280.8 ppm	.11 %
Na	< 5.0 ppm	44.6 ppm	< 5.0 ppm	< 5.0 ppm	< 5.0 ppm	72.8 ppm	< 5.0 ppm	28.1 ppm	227.5 ppm	< 5.0 ppm
K	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	206.7 ppm	<62.5 ppm
Mn	624.8 ppm	493.5 ppm	682.5 ppm	684.5 ppm	217.4 ppm	737.0 ppm	648.8 ppm	523.0 ppm	707.8 ppm	690.3 ppm
P	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm
Cu	17.0 ppm	9.1 ppm	10.1 ppm	16.9 ppm	10.4 ppm	4.8 ppm	14.9 ppm	9.3 ppm	11.2 ppm	17.6 ppm
Zn	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	1.0 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm
Pb	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm
Ni	944.5 ppm	930.3 ppm	915.5 ppm	.13 %	978.3 ppm	.17 %	.13 %	.13 %	.11 %	.16 %
Co	37.9 ppm	31.0 ppm	43.0 ppm	41.1 ppm	32.7 ppm	109.0 ppm	50.5 ppm	40.1 ppm	53.7 ppm	52.8 ppm
V	8.1 ppm	12.0 ppm	12.4 ppm	17.0 ppm	11.9 ppm	18.2 ppm	9.4 ppm	14.9 ppm	14.5 ppm	18.3 ppm
Mo	11.8 ppm	10.7 ppm	12.7 ppm	15.8 ppm	9.3 ppm	24.3 ppm	14.7 ppm	13.3 ppm	13.4 ppm	17.7 ppm
Cd	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm
Cr	280.8 ppm	785.5 ppm	528.3 ppm	725.5 ppm	703.3 ppm	460.0 ppm	325.0 ppm	932.5 ppm	608.0 ppm	747.0 ppm
Ba	1.0 ppm	.8 ppm	.8 ppm	.8 ppm	.9 ppm	.8 ppm	.8 ppm	.8 ppm	.8 ppm	.9 ppm
Sr	.3 ppm	.3 ppm	.8 ppm	3.8 ppm	< .3 ppm	.4 ppm	< .3 ppm	.3 ppm	1.0 ppm	3.8 ppm
Zr	1.0 ppm	1.0 ppm	1.0 ppm	2.0 ppm	.9 ppm	2.9 ppm	1.6 ppm	1.4 ppm	1.4 ppm	2.3 ppm
Ag	< 1.3 ppm	< 1.3 ppm	< 1.3 ppm	< 1.3 ppm	< 1.3 ppm	2.1 ppm	< 1.3 ppm	< 1.3 ppm	< 1.3 ppm	< 1.3 ppm
B	13.1 ppm	13.1 ppm	14.9 ppm	14.6 ppm	12.4 ppm	68.2 ppm	18.5 ppm	16.5 ppm	20.5 ppm	17.8 ppm
Be	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm
Li	< .5 ppm	< .5 ppm	1.0 ppm	< .5 ppm	< .5 ppm	< .5 ppm	< .5 ppm	< .5 ppm	.6 ppm	< .5 ppm
Sc	.7 ppm	2.0 ppm	1.1 ppm	1.1 ppm	2.0 ppm	2.4 ppm	1.0 ppm	2.6 ppm	1.5 ppm	1.5 ppm
Ce	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm
La	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	3.1 ppm	< 2.5 ppm	10.3 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	2.8 ppm

Tabel 11 9

Tabell 9 (fortsett)

	3-90MIN	4-90MIN	5-90MIN	6-90MIN	1-120MIN	2-120MIN	3-120MIN	4-120MIN	5-120MIN	6-120MIN
Si	496.0 ppm	549.5 ppm	612.0 ppm	.12 %	510.0 ppm	604.0 ppm	496.5 ppm	562.5 ppm	645.2 ppm	.11 %
Al	785.3 ppm	235.7 ppm	.19 %	196.2 ppm	368.8 ppm	.14 %	904.5 ppm	275.3 ppm	.22 %	228.9 ppm
Fe	2.82 %	4.73 %	3.34 %	5.71 %	3.13 %	3.42 %	2.99 %	4.85 %	3.64 %	5.70 %
Ti	3.4 ppm	9.3 ppm	21.2 ppm	7.1 ppm	2.2 ppm	5.7 ppm	3.6 ppm	10.2 ppm	22.3 ppm	7.2 ppm
Mg	17.28 %	18.57 %	16.17 %	25.50 %	19.38 %	18.82 %	18.76 %	20.07 %	18.16 %	26.38 %
Ca	279.8 ppm	.12 %	34.7 ppm	166.5 ppm	251.5 ppm	156.7 ppm	274.5 ppm	.12 %	29.1 ppm	158.3 ppm
Na	114.5 ppm	< 5.0 ppm	< 5.0 ppm	< 5.0 ppm	< 5.0 ppm	< 5.0 ppm	51.0 ppm	< 5.0 ppm	< 5.0 ppm	< 5.0 ppm
K	90.4 ppm	< 62.5 ppm	< 62.5 ppm	< 62.5 ppm	< 62.5 ppm	< 62.5 ppm	< 62.5 ppm	< 62.5 ppm	< 62.5 ppm	< 62.5 ppm
Mn	763.5 ppm	736.3 ppm	486.3 ppm	762.8 ppm	706.8 ppm	605.5 ppm	772.5 ppm	747.3 ppm	548.8 ppm	759.5 ppm
P	< 25.0 ppm	< 25.0 ppm	< 25.0 ppm	< 25.0 ppm	< 25.0 ppm	< 25.0 ppm	< 25.0 ppm	< 25.0 ppm	< 25.0 ppm	< 25.0 ppm
Cu	11.6 ppm	19.4 ppm	12.7 ppm	4.9 ppm	15.8 ppm	10.3 ppm	11.1 ppm	18.5 ppm	12.8 ppm	4.9 ppm
Zn	< .3 ppm	< .3 ppm	1.4 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	6.4 ppm	< .3 ppm
Pb	< 12.5 ppm	< 12.5 ppm	< 12.5 ppm	< 12.5 ppm	< 12.5 ppm	< 12.5 ppm	< 12.5 ppm	< 12.5 ppm	< 12.5 ppm	< 12.5 ppm
Ni	.15 %	.22 %	.16 %	.19 %	.18 %	.17 %	.15 %	.23 %	.17 %	.19 %
Co	71.8 ppm	67.0 ppm	62.0 ppm	116.4 ppm	70.6 ppm	62.3 ppm	66.4 ppm	71.9 ppm	64.6 ppm	117.3 ppm
V	18.5 ppm	21.7 ppm	22.5 ppm	21.5 ppm	14.1 ppm	22.3 ppm	19.1 ppm	22.2 ppm	24.0 ppm	21.2 ppm
Mo	17.8 ppm	21.4 ppm	17.6 ppm	28.1 ppm	20.8 ppm	21.4 ppm	20.8 ppm	23.6 ppm	21.4 ppm	28.6 ppm
Cd	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm
Cr	771.0 ppm	840.3 ppm	.12 %	549.0 ppm	435.0 ppm	.13 %	823.0 ppm	865.2 ppm	.13 %	562.8 ppm
Ba	1.0 ppm	.9 ppm	1.0 ppm	.9 ppm	.8 ppm	.9 ppm	1.6 ppm	.9 ppm	.9 ppm	1.0 ppm
Sr	1.0 ppm	3.8 ppm	< .3 ppm	.3 ppm	.4 ppm	.5 ppm	1.0 ppm	3.9 ppm	< .3 ppm	.3 ppm
Zr	2.1 ppm	3.6 ppm	2.2 ppm	3.3 ppm	2.2 ppm	2.3 ppm	8.4 ppm	3.5 ppm	2.7 ppm	3.4 ppm
Ag	1.6 ppm	1.9 ppm	1.5 ppm	3.1 ppm	1.8 ppm	1.7 ppm	1.5 ppm	2.6 ppm	1.5 ppm	2.8 ppm
B	24.2 ppm	23.8 ppm	17.5 ppm	72.6 ppm	23.0 ppm	20.8 ppm	25.2 ppm	23.5 ppm	19.4 ppm	72.2 ppm
Be	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm
Li	1.0 ppm	< .5 ppm	< .5 ppm	.5 ppm	.5 ppm	< .5 ppm	1.0 ppm	< .5 ppm	< .5 ppm	< .5 ppm
Sc	2.4 ppm	2.0 ppm	4.2 ppm	3.4 ppm	1.9 ppm	5.2 ppm	2.9 ppm	2.2 ppm	5.2 ppm	3.5 ppm
Ce	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm
La	< 2.5 ppm	7.9 ppm	< 2.5 ppm	10.2 ppm	< 2.5 ppm	3.8 ppm	3.0 ppm	6.0 ppm	2.8 ppm	12.7 ppm

5-240MIN 6-240MIN 1-300MIN 2-300MIN 3-300MIN 4-300MIN 5-300MIN 6-300MIN 5-360MIN 1-5.5N

Si	387.0 ppm	618.3 ppm	460.3 ppm	582.0 ppm	484.2 ppm	526.0 ppm	528.0 ppm	924.3 ppm	489.5 ppm	520.5 ppm
Al	.26 %	303.5 ppm	508.7 ppm	.19 %	.12 %	358.5 ppm	.27 %	321.3 ppm	.28 %	368.5 ppm
Fe	4.20 %	5.75 %	3.65 %	4.01 %	3.49 %	5.22 %	4.34 %	5.81 %	4.41 %	3.12 %
Ti	25.6 ppm	8.3 ppm	2.6 ppm	6.7 ppm	4.7 ppm	10.9 ppm	26.8 ppm	8.8 ppm	27.3 ppm	2.6 ppm
Mg	21.89 %	27.78 %	23.32 %	23.22 %	22.90 %	23.48 %	22.80 %	28.15 %	23.33 %	18.79 %
Ca	40.3 ppm	171.7 ppm	254.2 ppm	165.0 ppm	275.5 ppm	.12 %	38.9 ppm	171.7 ppm	39.3 ppm	263.5 ppm
Na	< 5.0 ppm	< 5.0 ppm	< 5.0 ppm	< 5.0 ppm	< 5.0 ppm	< 5.0 ppm	< 5.0 ppm	< 5.0 ppm	7.9 ppm	31.0 ppm
K	< 62.5 ppm	< 62.5 ppm	< 62.5 ppm	< 62.5 ppm	< 62.5 ppm	< 62.5 ppm	< 62.5 ppm	< 62.5 ppm	< 62.5 ppm	< 62.5 ppm
Mn	659.8 ppm	768.8 ppm	747.3 ppm	664.0 ppm	827.5 ppm	781.5 ppm	689.0 ppm	776.8 ppm	703.8 ppm	708.0 ppm
P	< 25.0 ppm	< 25.0 ppm	< 25.0 ppm	< 25.0 ppm	< 25.0 ppm	< 25.0 ppm	< 25.0 ppm	< 25.0 ppm	< 25.0 ppm	< 25.0 ppm
Cu	13.3 ppm	6.3 ppm	17.2 ppm	11.4 ppm	12.4 ppm	19.4 ppm	13.1 ppm	5.5 ppm	13.2 ppm	16.8 ppm
Zn	9.9 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	9.3 ppm	< .3 ppm	9.1 ppm	< .3 ppm
Pb	< 12.5 ppm	< 12.5 ppm	< 12.5 ppm	< 12.5 ppm	< 12.5 ppm	< 12.5 ppm	< 12.5 ppm	< 12.5 ppm	< 12.5 ppm	< 12.5 ppm
Ni	.18 %	.19 %	.19 %	.19 %	.17 %	.26 %	.19 %	.20 %	.19 %	.17 %
Co	71.5 ppm	121.1 ppm	76.8 ppm	67.7 ppm	93.5 ppm	87.2 ppm	74.1 ppm	123.1 ppm	74.2 ppm	67.5 ppm
V	29.0 ppm	22.3 ppm	16.9 ppm	26.3 ppm	23.7 ppm	25.4 ppm	30.5 ppm	23.3 ppm	31.0 ppm	14.6 ppm
Mo	25.6 ppm	30.5 ppm	25.9 ppm	24.6 ppm	23.7 ppm	26.5 ppm	24.2 ppm	32.3 ppm	25.6 ppm	20.2 ppm
Cd	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm
Cr	.15 %	601.0 ppm	522.3 ppm	.16 %	998.5 ppm	954.8 ppm	.15 %	622.5 ppm	.15 %	438.5 ppm
Ba	1.1 ppm	1.0 ppm	.9 ppm	.9 ppm	1.1 ppm	.9 ppm	1.0 ppm	1.0 ppm	1.0 ppm	.9 ppm
Sr	< .3 ppm	.4 ppm	.4 ppm	.5 ppm	1.0 ppm	3.9 ppm	< .3 ppm	.3 ppm	.3 ppm	< .3 ppm
Zr	3.2 ppm	3.6 ppm	2.8 ppm	3.0 ppm	2.5 ppm	3.6 ppm	3.8 ppm	3.8 ppm	5.0 ppm	2.5 ppm
Ag	2.8 ppm	3.4 ppm	2.3 ppm	2.4 ppm	2.3 ppm	3.0 ppm	3.0 ppm	3.6 ppm	3.0 ppm	2.3 ppm
B	27.4 ppm	72.3 ppm	37.7 ppm	28.3 ppm	34.4 ppm	35.2 ppm	29.1 ppm	76.4 ppm	34.8 ppm	21.2 ppm
Be	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm
Li	< .5 ppm	.5 ppm	.5 ppm	< .5 ppm	1.0 ppm	< .5 ppm	< .5 ppm	< .5 ppm	< .5 ppm	.6 ppm
Sc	5.8 ppm	3.9 ppm	1.8 ppm	6.6 ppm	3.5 ppm	2.9 ppm	6.2 ppm	4.0 ppm	6.2 ppm	2.0 ppm
Ce	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm
La	6.1 ppm	13.1 ppm	5.3 ppm	6.0 ppm	3.8 ppm	9.4 ppm	7.0 ppm	13.1 ppm	7.0 ppm	< 2.5 ppm

Tabell 9 (fortsett)

	5-30MIN	6-30MIN	1-60MIN	2-60MIN	3-60MIN	4-60MIN	5-60MIN	6-60MIN	1-90MIN	2-90MIN
Si	579.0 ppm	.14 %	545.3 ppm	647.3 ppm	590.3 ppm	646.8 ppm	630.0 ppm	.11 %	434.5 ppm	576.3 ppm
Al	.11 %	89.0 ppm	269.5 ppm	.10 %	663.8 ppm	208.0 ppm	.17 %	161.4 ppm	312.7 ppm	.12 %
Fe	2.36 %	5.62 %	2.71 %	2.95 %	2.66 %	4.60 %	3.02 %	5.67 %	2.92 %	3.18 %
Ti	15.1 ppm	5.8 ppm	6.0 ppm	6.8 ppm	3.3 ppm	9.2 ppm	19.4 ppm	6.2 ppm	2.4 ppm	5.6 ppm
Mg	10.05 %	22.87 %	16.15 %	15.41 %	15.88 %	16.93 %	14.19 %	24.42 %	17.73 %	16.96 %
Ca	21.5 ppm	178.4 ppm	289.5 ppm	175.1 ppm	269.5 ppm	.12 %	36.0 ppm	171.3 ppm	250.3 ppm	157.1 ppm
Na	< 5.0 ppm	61.9 ppm	12.8 ppm	81.5 ppm	< 5.0 ppm	< 5.0 ppm	9.0 ppm	25.5 ppm	< 5.0 ppm	< 5.0 ppm
K	< 62.5 ppm	64.1 ppm	< 62.5 ppm	86.2 ppm	< 62.5 ppm	< 62.5 ppm	< 62.5 ppm	< 62.5 ppm	< 62.5 ppm	< 62.5 ppm
Mn	298.3 ppm	747.3 ppm	668.8 ppm	565.8 ppm	748.8 ppm	728.3 ppm	422.3 ppm	754.5 ppm	687.0 ppm	583.5 ppm
P	< 25.0 ppm	< 25.0 ppm	< 25.0 ppm	< 25.0 ppm	< 25.0 ppm	< 25.0 ppm	< 25.0 ppm	< 25.0 ppm	< 25.0 ppm	< 25.0 ppm
Cu	10.6 ppm	4.8 ppm	16.6 ppm	9.7 ppm	10.4 ppm	18.3 ppm	11.9 ppm	5.9 ppm	15.9 ppm	10.2 ppm
Zn	.9 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	2.9 ppm	< .3 ppm	< .3 ppm	< .3 ppm
Pb	< 12.5 ppm	< 12.5 ppm	< 12.5 ppm	< 12.5 ppm	< 12.5 ppm	< 12.5 ppm	< 12.5 ppm	< 12.5 ppm	< 12.5 ppm	< 12.5 ppm
Ni	.12 %	.18 %	.15 %	.15 %	.14 %	.20 %	.15 %	.19 %	.16 %	.16 %
Co	39.2 ppm	113.1 ppm	58.6 ppm	48.7 ppm	59.8 ppm	64.9 ppm	51.6 ppm	116.2 ppm	63.9 ppm	52.9 ppm
V	14.8 ppm	19.0 ppm	11.5 ppm	18.5 ppm	17.4 ppm	21.0 ppm	20.1 ppm	21.0 ppm	12.4 ppm	19.3 ppm
Mo	12.5 ppm	26.9 ppm	17.0 ppm	17.8 ppm	17.5 ppm	21.8 ppm	16.5 ppm	29.0 ppm	18.8 ppm	19.0 ppm
Cd	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm
Cr	859.8 ppm	498.8 ppm	373.8 ppm	.11 %	721.8 ppm	819.3 ppm	.11 %	335.5 ppm	406.5 ppm	.12 %
Ba	.6 ppm	.9 ppm	1.0 ppm	1.0 ppm	1.0 ppm	.9 ppm	1.0 ppm	1.0 ppm	1.0 ppm	1.0 ppm
Sr	< .3 ppm	.5 ppm	.6 ppm	.3 ppm	.8 ppm	3.8 ppm	< .3 ppm	.4 ppm	.4 ppm	< .3 ppm
Zr	1.4 ppm	3.5 ppm	1.3 ppm	1.7 ppm	1.6 ppm	2.8 ppm	2.0 ppm	3.2 ppm	1.7 ppm	2.0 ppm
Ag	< 1.3 ppm	2.6 ppm	1.3 ppm	1.3 ppm	1.5 ppm	1.7 ppm	< 1.3 ppm	2.9 ppm	1.5 ppm	1.4 ppm
B	13.0 ppm	68.9 ppm	18.3 ppm	17.2 ppm	20.6 ppm	19.8 ppm	16.6 ppm	71.1 ppm	21.1 ppm	17.7 ppm
Be	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm
Li	< .5 ppm	< .5 ppm	< .5 ppm	< .5 ppm	.6 ppm	< .5 ppm	< .5 ppm	< .5 ppm	.6 ppm	< .5 ppm
Sc	2.7 ppm	2.9 ppm	.9 ppm	3.7 ppm	2.2 ppm	1.7 ppm	3.5 ppm	3.3 ppm	1.5 ppm	4.3 ppm
Ce	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm
La	< 2.5 ppm	9.2 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	5.8 ppm	< 2.5 ppm	10.8 ppm	< 2.5 ppm	< 2.5 ppm

Tabel 9 (fortsett)

1-180MIN 2-180MIN 3-180MIN 4-180MIN 5-180MIN 6-180MIN 1-240MIN 2-240MIN 3-240MIN 4-240MIN

Si	480.0 ppm	599.3 ppm	496.0 ppm	554.8 ppm	604.3 ppm	.13 %	452.8 ppm	606.5 ppm	477.3 ppm	532.3 ppm
Al	430.8 ppm	.16 %	.11 %	316.8 ppm	.25 %	284.5 ppm	482.0 ppm	.18 %	.12 %	340.3 ppm
Fe	3.37 %	3.71 %	3.28 %	5.06 %	3.98 %	5.83 %	3.57 %	3.88 %	3.39 %	5.16 %
Ti	2.5 ppm	5.8 ppm	4.7 ppm	10.8 ppm	25.3 ppm	7.8 ppm	2.5 ppm	6.2 ppm	4.7 ppm	10.9 ppm
Mg	21.38 %	20.98 %	21.13 %	22.19 %	20.44 %	27.63 %	22.72 %	22.30 %	22.04 %	23.07 %
Ca	255.8 ppm	184.0 ppm	287.0 ppm	.12 %	32.3 ppm	181.5 ppm	265.8 ppm	164.0 ppm	282.5 ppm	.12 %
Na	10.2 ppm	239.4 ppm	59.9 ppm	< 5.0 ppm	< 5.0 ppm	< 5.0 ppm	< 5.0 ppm	< 5.0 ppm	< 5.0 ppm	< 5.0 ppm
K	< 62.5 ppm	212.3 ppm	79.8 ppm	< 62.5 ppm	< 62.5 ppm	< 62.5 ppm	< 62.5 ppm	< 62.5 ppm	< 62.5 ppm	< 62.5 ppm
Mn	724.0 ppm	634.5 ppm	817.0 ppm	770.8 ppm	615.3 ppm	779.5 ppm	743.5 ppm	649.3 ppm	819.0 ppm	778.8 ppm
P	< 25.0 ppm	< 25.0 ppm	< 25.0 ppm	< 25.0 ppm	< 25.0 ppm	< 25.0 ppm	< 25.0 ppm	< 25.0 ppm	< 25.0 ppm	< 25.0 ppm
Cu	16.5 ppm	12.3 ppm	11.9 ppm	18.8 ppm	12.9 ppm	5.4 ppm	16.6 ppm	10.9 ppm	11.4 ppm	18.7 ppm
Zn	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	5.7 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm
Pb	< 12.5 ppm	< 12.5 ppm	< 12.5 ppm	< 12.5 ppm	< 12.5 ppm	< 12.5 ppm	< 12.5 ppm	< 12.5 ppm	< 12.5 ppm	< 12.5 ppm
Ni	.18 %	.18 %	.17 %	.25 %	.18 %	.20 %	.19 %	.19 %	.17 %	.25 %
Co	73.6 ppm	61.8 ppm	85.9 ppm	78.4 ppm	70.8 ppm	128.0 ppm	76.6 ppm	64.6 ppm	84.2 ppm	84.4 ppm
V	15.1 ppm	24.2 ppm	22.7 ppm	24.5 ppm	27.3 ppm	22.8 ppm	16.6 ppm	25.6 ppm	23.2 ppm	24.8 ppm
Mo	21.4 ppm	22.6 ppm	22.3 ppm	25.7 ppm	23.6 ppm	30.7 ppm	23.2 ppm	25.2 ppm	23.7 ppm	26.3 ppm
Cd	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm
Cr	473.8 ppm	.15 %	930.8 ppm	912.3 ppm	.14 %	604.5 ppm	506.8 ppm	.16 %	963.0 ppm	939.0 ppm
Ba	1.6 ppm	1.2 ppm	1.2 ppm	.9 ppm	.9 ppm	1.0 ppm	1.0 ppm	1.0 ppm	1.1 ppm	1.1 ppm
Sr	< .3 ppm	.3 ppm	.8 ppm	3.9 ppm	< .3 ppm	.5 ppm	< .3 ppm	.3 ppm	.9 ppm	3.9 ppm
Zr	2.6 ppm	2.7 ppm	2.8 ppm	3.4 ppm	2.8 ppm	3.9 ppm	2.6 ppm	2.6 ppm	2.6 ppm	3.5 ppm
Ag	2.3 ppm	2.2 ppm	2.8 ppm	2.7 ppm	2.2 ppm	3.6 ppm	2.5 ppm	2.1 ppm	2.6 ppm	2.8 ppm
B	28.7 ppm	25.1 ppm	29.5 ppm	28.3 ppm	24.8 ppm	75.1 ppm	34.0 ppm	24.8 ppm	31.3 ppm	30.5 ppm
Be	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm
Li	< .5 ppm	< .5 ppm	1.0 ppm	< .5 ppm	< .5 ppm	.5 ppm	.5 ppm	< .5 ppm	1.0 ppm	< .5 ppm
Sc	1.9 ppm	5.8 ppm	3.0 ppm	2.6 ppm	5.6 ppm	3.9 ppm	1.7 ppm	6.2 ppm	3.5 ppm	3.0 ppm
Ce	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm
La	5.0 ppm	4.3 ppm	3.5 ppm	8.6 ppm	4.9 ppm	10.7 ppm	4.1 ppm	4.7 ppm	3.9 ppm	10.8 ppm

	1-6.5N	2-5.5N	2-6.5N
Si	561.0 ppm	635.5 ppm	647.3 ppm
Al	383.2 ppm	.14 %	.14 %
Fe	3.17 %	3.41 %	3.44 %
Ti	2.3 ppm	6.0 ppm	5.9 ppm
Mg	19.31 %	18.36 %	18.47 %
Ca	257.5 ppm	174.6 ppm	167.0 ppm
Na	18.0 ppm	42.0 ppm	< 5.0 ppm
K	< 62.5 ppm	< 62.5 ppm	< 62.5 ppm
Mn	713.0 ppm	602.3 ppm	609.0 ppm
P	< 25.0 ppm	< 25.0 ppm	< 25.0 ppm
Cu	18.6 ppm	10.3 ppm	12.6 ppm
Zn	< .3 ppm	< .3 ppm	< .3 ppm
Pb	< 12.5 ppm	< 12.5 ppm	< 12.5 ppm
Ni	.18 %	.17 %	.17 %
Co	75.0 ppm	56.4 ppm	57.5 ppm
V	14.7 ppm	22.1 ppm	22.9 ppm
Mo	21.9 ppm	21.7 ppm	20.8 ppm
Cd	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm
Cr	440.2 ppm	.13 %	.14 %
Ba	.8 ppm	.9 ppm	1.0 ppm
Sr	.4 ppm	.3 ppm	< .3 ppm
Zr	2.6 ppm	2.3 ppm	2.5 ppm
Ag	2.1 ppm	1.9 ppm	2.3 ppm
B	19.4 ppm	16.9 ppm	17.7 ppm
Be	< .3 ppm	< .3 ppm	< .3 ppm
Li	.5 ppm	< .5 ppm	< .5 ppm
Sc	1.7 ppm	4.9 ppm	5.3 ppm
Ce	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm
La	< 2.5 ppm	3.1 ppm	4.4 ppm

Tabell 9 (fortsett)

	1-6N-40	2-6N-40	3-6N-40	4-6N-40	5-6N-40	6-6N-40	1-3N-40	2-3N-40	3-3N-40	4-3N-40
Si	480.5 ppm	541.0 ppm	521.3 ppm	588.8 ppm	601.5 ppm	.11 %	762.3 ppm	788.5 ppm	798.5 ppm	829.0 ppm
Al	350.5 ppm	.14 %	908.0 ppm	269.0 ppm	.19 %	224.0 ppm	205.7 ppm	.11 %	487.3 ppm	165.8 ppm
Fe	3.01 %	3.35 %	2.89 %	5.20 %	3.27 %	5.69 %	2.44 %	2.76 %	2.31 %	4.67 %
Ti	2.3 ppm	5.4 ppm	39.5 ppm	13.7 ppm	25.4 ppm	7.1 ppm	1.6 ppm	23.3 ppm	5.1 ppm	8.6 ppm
Mg	18.61 %	18.66 %	17.80 %	19.42 %	16.22 %	25.63 %	14.22 %	13.66 %	13.54 %	14.47 %
Ca	246.9 ppm	156.5 ppm	367.5 ppm	.13 %	40.4 ppm	178.8 ppm	246.2 ppm	166.1 ppm	314.5 ppm	.12 %
Na	35.2 ppm	47.0 ppm	51.9 ppm	33.1 ppm	23.4 ppm	19.6 ppm	17.5 ppm	21.9 ppm	16.6 ppm	20.6 ppm
K	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm
Mn	688.8 ppm	596.3 ppm	769.0 ppm	748.8 ppm	488.0 ppm	752.0 ppm	649.0 ppm	540.0 ppm	714.3 ppm	701.3 ppm
P	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm
Cu	16.0 ppm	11.0 ppm	14.6 ppm	18.5 ppm	12.9 ppm	4.5 ppm	13.1 ppm	9.4 ppm	10.2 ppm	17.3 ppm
Zn	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	5.7 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm
Pb	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm
Ni	.17 %	.17 %	.15 %	.23 %	.16 %	.19 %	.15 %	.14 %	.12 %	.18 %
Co	76.9 ppm	55.3 ppm	68.7 ppm	68.5 ppm	69.7 ppm	118.4 ppm	55.1 ppm	46.2 ppm	58.9 ppm	60.9 ppm
V	14.7 ppm	23.1 ppm	22.2 ppm	25.9 ppm	23.4 ppm	23.3 ppm	11.7 ppm	18.3 ppm	16.5 ppm	21.5 ppm
Mo	20.0 ppm	21.7 ppm	19.4 ppm	24.2 ppm	18.8 ppm	28.1 ppm	15.3 ppm	15.8 ppm	13.8 ppm	19.1 ppm
Cd	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm
Cr	427.8 ppm	.13 %	781.7 ppm	872.3 ppm	.12 %	610.3 ppm	341.5 ppm	988.5 ppm	588.0 ppm	719.5 ppm
Ba	< .8 ppm	< .8 ppm	.9 ppm	< .8 ppm	1.2 ppm	< .8 ppm	< .8 ppm	.9 ppm	1.5 ppm	3.0 ppm
Sr	< .3 ppm	.3 ppm	1.7 ppm	4.2 ppm	< .3 ppm	.4 ppm	< .3 ppm	.5 ppm	1.0 ppm	4.1 ppm
Zr	3.9 ppm	3.5 ppm	3.4 ppm	4.4 ppm	3.3 ppm	4.4 ppm	2.1 ppm	2.4 ppm	2.0 ppm	3.2 ppm
Ag	2.4 ppm	2.4 ppm	2.7 ppm	3.1 ppm	2.8 ppm	3.8 ppm	1.6 ppm	1.8 ppm	1.8 ppm	2.4 ppm
B	21.8 ppm	21.7 ppm	23.1 ppm	24.5 ppm	14.0 ppm	68.6 ppm	12.0 ppm	10.9 ppm	10.9 ppm	16.4 ppm
Be	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm
Li	< .5 ppm	< .5 ppm	.9 ppm	< .5 ppm	< .5 ppm	< .5 ppm	< .5 ppm	< .5 ppm	.8 ppm	< .5 ppm
Sc	1.7 ppm	4.9 ppm	2.6 ppm	2.1 ppm	4.3 ppm	3.3 ppm	.8 ppm	3.0 ppm	1.7 ppm	1.3 ppm
Ce	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm
La	5.7 ppm	5.7 ppm	5.2 ppm	12.3 ppm	5.0 ppm	15.9 ppm	2.9 ppm	2.5 ppm	< 2.5 ppm	9.3 ppm

Tabel 1 10

	5-3N-40	6-3N-40	1-3N-80	2-3N-80	3-3N-80	4-3N-80	5-3N-80	6-3N-80	1-3N-120	2-3N-120
Si	879.5 ppm	.39 %	.14 %	.14 %	.14 %	.15 %	.15 %	.66 %	.19 %	.19 %
Al	.12 %	108.4 ppm	222.4 ppm	898.8 ppm	504.5 ppm	171.3 ppm	.12 %	125.1 ppm	213.4 ppm	890.8 ppm
Fe	2.44 %	5.42 %	2.47 %	2.79 %	2.30 %	4.75 %	2.44 %	5.62 %	2.46 %	2.76 %
Ti	15.5 ppm	5.4 ppm	6.6 ppm	4.2 ppm	6.7 ppm	9.6 ppm	17.0 ppm	6.0 ppm	1.9 ppm	12.2 ppm
Mg	10.75 %	22.35 %	14.32 %	14.02 %	13.56 %	14.82 %	10.72 %	22.99 %	14.27 %	13.84 %
Ca	22.3 ppm	179.8 ppm	249.2 ppm	152.9 ppm	317.8 ppm	.12 %	27.0 ppm	174.7 ppm	243.7 ppm	179.4 ppm
Na	17.1 ppm	19.0 ppm	16.6 ppm	14.0 ppm	17.7 ppm	19.7 ppm	17.3 ppm	13.7 ppm	14.8 ppm	14.0 ppm
K	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm
Mn	322.8 ppm	732.0 ppm	657.3 ppm	549.5 ppm	719.3 ppm	709.8 ppm	323.8 ppm	746.3 ppm	647.3 ppm	547.0 ppm
P	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm
Cu	10.6 ppm	5.6 ppm	15.7 ppm	9.8 ppm	10.9 ppm	17.6 ppm	10.0 ppm	4.6 ppm	13.9 ppm	10.1 ppm
Zn	2.9 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	2.0 ppm	< .3 ppm	< .3 ppm	< .3 ppm
Pb	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm
Ni	.13 %	.18 %	.14 %	.14 %	.12 %	.19 %	.13 %	.19 %	.14 %	.14 %
Co	44.5 ppm	112.6 ppm	58.0 ppm	46.3 ppm	55.8 ppm	58.9 ppm	46.8 ppm	116.1 ppm	53.1 ppm	45.2 ppm
V	17.1 ppm	20.2 ppm	12.4 ppm	18.9 ppm	16.4 ppm	22.5 ppm	17.9 ppm	21.3 ppm	12.0 ppm	18.8 ppm
Mo	13.9 ppm	25.7 ppm	16.1 ppm	17.0 ppm	15.6 ppm	20.3 ppm	14.5 ppm	26.9 ppm	15.9 ppm	16.2 ppm
Cd	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm
Cr	884.3 ppm	348.0 ppm	349.0 ppm	.10 %	594.5 ppm	744.5 ppm	887.0 ppm	398.5 ppm	349.3 ppm	.10 %
Ba	< .8 ppm	< .8 ppm	< .8 ppm	< .8 ppm	< .8 ppm	< .8 ppm	< .8 ppm	< .8 ppm	< .8 ppm	2.3 ppm
Sr	< .3 ppm	.5 ppm	.3 ppm	< .3 ppm	1.0 ppm	4.2 ppm	< .3 ppm	.4 ppm	< .3 ppm	.5 ppm
Zr	2.2 ppm	3.8 ppm	3.1 ppm	2.6 ppm	2.3 ppm	3.6 ppm	2.4 ppm	4.1 ppm	2.6 ppm	2.3 ppm
Ag	1.3 ppm	3.3 ppm	2.4 ppm	2.2 ppm	1.6 ppm	2.7 ppm	2.0 ppm	3.5 ppm	2.5 ppm	2.6 ppm
B	6.7 ppm	67.3 ppm	10.8 ppm	9.4 ppm	10.5 ppm	12.6 ppm	8.2 ppm	64.4 ppm	9.9 ppm	6.8 ppm
Be	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm
Li	< .5 ppm	< .5 ppm	< .5 ppm	< .5 ppm	.8 ppm	< .5 ppm	< .5 ppm	< .5 ppm	< .5 ppm	< .5 ppm
Sc	2.8 ppm	2.9 ppm	.7 ppm	3.1 ppm	1.7 ppm	1.4 ppm	2.6 ppm	3.1 ppm	.9 ppm	2.4 ppm
Ce	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	9.7 ppm
La	< 2.5 ppm	12.4 ppm	< 2.5 ppm	< 2.5 ppm	2.7 ppm	8.8 ppm	< 2.5 ppm	13.5 ppm	< 2.5 ppm	2.9 ppm

Tabell 10 (fortsett)

3-3N-120 4-3N-120 5-3N-120 6-3N-120 1-4.5-40 2-4.5-40 3-4.5-40 4-4.5-40 5-4.5-40 6-4.5-40

Si	.18 %	.18 %	.19 %	1.22 %	575.5 ppm	627.2 ppm	659.5 ppm	657.8 ppm	635.0 ppm	.13 %
Al	501.3 ppm	186.2 ppm	.12 %	151.0 ppm	304.3 ppm	678.3 ppm	271.8 ppm	.12 %	.17 %	182.8 ppm
Fe	2.29 %	4.78 %	2.42 %	5.54 %	2.80 %	2.63 %	5.11 %	3.12 %	2.99 %	5.72 %
Ti	2.3 ppm	11.4 ppm	15.9 ppm	16.4 ppm	10.4 ppm	2.8 ppm	46.0 ppm	5.6 ppm	19.8 ppm	7.1 ppm
Mg	13.53 %	15.01 %	10.69 %	22.84 %	16.66 %	15.87 %	17.34 %	16.47 %	14.27 %	24.12 %
Ca	317.5 ppm	.13 %	26.3 ppm	194.3 ppm	258.3 ppm	318.8 ppm	.13 %	152.9 ppm	29.4 ppm	175.1 ppm
Na	17.3 ppm	19.4 ppm	18.1 ppm	18.0 ppm	15.5 ppm	15.6 ppm	20.8 ppm	10.3 ppm	16.9 ppm	15.0 ppm
K	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm
Mn	714.5 ppm	709.8 ppm	323.0 ppm	730.5 ppm	678.3 ppm	745.8 ppm	736.0 ppm	678.3 ppm	424.0 ppm	749.0 ppm
P	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm
Cu	9.6 ppm	19.2 ppm	10.5 ppm	5.8 ppm	15.1 ppm	10.6 ppm	26.2 ppm	11.0 ppm	12.4 ppm	4.9 ppm
Zn	< .3 ppm	< .3 ppm	.4 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	3.3 ppm	< .3 ppm
Pb	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm
Ni	.12 %	.19 %	.13 %	.18 %	.16 %	.14 %	.21 %	.16 %	.15 %	.19 %
Co	56.2 ppm	59.9 ppm	43.4 ppm	115.5 ppm	61.4 ppm	62.1 ppm	66.2 ppm	52.9 ppm	56.3 ppm	117.5 ppm
V	16.4 ppm	22.5 ppm	17.2 ppm	21.3 ppm	13.8 ppm	18.9 ppm	26.0 ppm	21.8 ppm	21.4 ppm	23.1 ppm
Mo	15.8 ppm	20.3 ppm	14.0 ppm	26.5 ppm	18.4 ppm	17.9 ppm	23.2 ppm	19.1 ppm	17.2 ppm	29.3 ppm
Cd	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm
Cr	591.5 ppm	750.3 ppm	880.8 ppm	400.3 ppm	398.8 ppm	698.8 ppm	832.5 ppm	.12 %	.11 %	534.0 ppm
Ba	< .8 ppm	.8 ppm	< .8 ppm	.9 ppm	.9 ppm	< .8 ppm	1.6 ppm	< .8 ppm	< .8 ppm	< .8 ppm
Sr	1.0 ppm	4.3 ppm	< .3 ppm	1.0 ppm	.4 ppm	1.0 ppm	5.1 ppm	< .3 ppm	< .3 ppm	.5 ppm
Zr	2.3 ppm	3.5 ppm	2.4 ppm	4.4 ppm	2.8 ppm	2.4 ppm	4.2 ppm	2.9 ppm	2.3 ppm	4.6 ppm
Ag	1.8 ppm	2.6 ppm	1.9 ppm	3.4 ppm	2.8 ppm	1.9 ppm	3.0 ppm	2.5 ppm	1.7 ppm	3.9 ppm
B	10.1 ppm	13.5 ppm	7.0 ppm	65.4 ppm	10.8 ppm	11.5 ppm	15.4 ppm	8.6 ppm	6.8 ppm	65.8 ppm
Be	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm
Li	.9 ppm	< .5 ppm	< .5 ppm	< .5 ppm	< .5 ppm	.9 ppm	< .5 ppm	< .5 ppm	< .5 ppm	< .5 ppm
Sc	1.7 ppm	1.4 ppm	3.0 ppm	2.9 ppm	.9 ppm	2.0 ppm	1.8 ppm	3.9 ppm	3.6 ppm	2.9 ppm
Ce	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	7.8 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm
La	< 2.5 ppm	7.9 ppm	< 2.5 ppm	14.0 ppm	2.7 ppm	3.6 ppm	10.7 ppm	3.3 ppm	< 2.5 ppm	14.2 ppm

Tabell 10 (fortsett)

	1-8N-40	2-8N-40	3-8N-40	4-8N-40	5-8N-40	6-8N-40
Si	429.3 ppm	545.5 ppm	463.3 ppm	490.3 ppm	519.3 ppm	.13 %
Al	361.5 ppm	.14 %	850.3 ppm	290.8 ppm	.20 %	244.5 ppm
Fe	3.04 %	3.39 %	2.88 %	5.30 %	3.40 %	5.80 %
Ti	2.2 ppm	5.9 ppm	5.8 ppm	24.4 ppm	67.0 ppm	7.9 ppm
Mg	18.49 %	18.39 %	17.81 %	19.38 %	16.67 %	25.95 %
Ca	244.7 ppm	154.6 ppm	325.3 ppm	.13 %	63.5 ppm	180.5 ppm
Na	15.1 ppm	12.8 ppm	17.5 ppm	19.3 ppm	17.3 ppm	15.6 ppm
K	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm	<62.5 ppm
Mn	693.0 ppm	602.0 ppm	772.7 ppm	756.8 ppm	506.5 ppm	764.5 ppm
P	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm	<25.0 ppm
Cu	16.9 ppm	10.8 ppm	17.6 ppm	21.8 ppm	19.1 ppm	5.3 ppm
Zn	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	6.2 ppm	< .3 ppm
Pb	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm	<12.5 ppm
Ni	.17 %	.17 %	.15 %	.23 %	.17 %	.20 %
Co	74.0 ppm	57.5 ppm	69.4 ppm	72.8 ppm	62.0 ppm	127.7 ppm
V	15.1 ppm	24.1 ppm	21.2 ppm	26.3 ppm	25.0 ppm	24.3 ppm
Mo	21.5 ppm	21.5 ppm	19.8 ppm	25.4 ppm	20.7 ppm	29.5 ppm
Cd	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm	< 2.5 ppm
Cr	429.5 ppm	.13 %	786.8 ppm	894.8 ppm	.12 %	633.0 ppm
Ba	< .8 ppm	< .8 ppm	< .8 ppm	3.1 ppm	1.7 ppm	< .8 ppm
Sr	< .3 ppm	< .3 ppm	1.0 ppm	4.4 ppm	.8 ppm	.5 ppm
Zr	3.0 ppm	3.3 ppm	2.7 ppm	4.6 ppm	3.1 ppm	4.6 ppm
Ag	2.4 ppm	3.2 ppm	2.5 ppm	3.5 ppm	2.6 ppm	3.9 ppm
B	12.2 ppm	11.0 ppm	14.5 ppm	18.0 ppm	12.1 ppm	68.1 ppm
Be	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm	< .3 ppm
Li	< .5 ppm	< .5 ppm	.9 ppm	< .5 ppm	< .5 ppm	< .5 ppm
Sc	1.4 ppm	5.0 ppm	2.3 ppm	2.2 ppm	4.4 ppm	3.5 ppm
Ce	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm	< 7.5 ppm
La	4.7 ppm	4.8 ppm	3.9 ppm	12.1 ppm	6.2 ppm	14.5 ppm

Tabel 10 (fortsett)

Tabell 11

	Blind- prøve	1	2
Si	<300.0 ppb	42.62 ppm	35.77 ppm
Al	<100.0 ppb	<100.0 ppb	<100.0 ppb
Fe	< 10. ppb	11. ppb	< 10. ppb
Ti	< 4.0 ppb	< 4.0 ppb	< 4.0 ppb
Mg	< 70. ppb	1.65 ppm	1.63 ppm
Ca	< 20. ppb	< 20. ppb	< 20. ppb
Na	73. ppb	400. ppb	97. ppb
K	<500.0 ppb	<500.0 ppb	<500.0 ppb
Mn	< 50. ppb	< 50. ppb	< 50. ppb
Cu	42.65 ppm	38.99 ppm	38.62 ppm
Zn	64.89 ppm	62.51 ppm	62.15 ppm
Pb	100. ppb	92. ppb	91. ppb
Ni	5.59 ppm	5.41 ppm	5.38 ppm
Co	< 20. ppb	< 20. ppb	< 20. ppb
V	< 7.0 ppb	< 7.0 ppb	< 7.0 ppb
Mo	12. ppb	12. ppb	13. ppb
Cd	< 6.0 ppb	< 6.0 ppb	< 6.0 ppb
Ba	< 25. ppb	< 25. ppb	< 25. ppb
Be	< 1.0 ppb	< 1.0 ppb	< 1.0 ppb
Sr	< 1.0 ppb	< 1.0 ppb	< 1.0 ppb
Li	< 5.0 ppb	< 5.0 ppb	< 5.0 ppb

Tabell 12

	Blind- prøve	1	2
Si	<300.0 ppb	3.10 ppm	11.16 ppm
Al	<100.0 ppb	<100.0 ppb	<100.0 ppb
Fe	32. ppb	24. ppb	19. ppb
Ti	< 4.0 ppb	< 4.0 ppb	< 4.0 ppb
Mg	< 70. ppb	6.43 ppm	7.33 ppm
Ca	129. ppb	286. ppb	312. ppb
Na	82. ppb	1.20 ppm	870. ppb
K	<500.0 ppb	1.63 ppm	630.1 ppb
Mn	< 50. ppb	< 50. ppb	< 50. ppb
Cu	62.56 ppm	24.34 ppm	72.81 ppm
Zn	118.7 ppm	116.6 ppm	114.8 ppm
Pb	214. ppb	176. ppb	195. ppb
Ni	10.65 ppm	10.64 ppm	10.56 ppm
Co	< 20. ppb	23. ppb	30. ppb
V	< 7.0 ppb	< 7.0 ppb	< 7.0 ppb
Mo	27. ppb	27. ppb	27. ppb
Cd	12.2 ppb	< 6.0 ppb	8.4 ppb
Ba	< 25. ppb	28. ppb	< 25. ppb
Be	< 1.0 ppb	1.7 ppb	1.7 ppb
Sr	< 1.0 ppb	1.3 ppb	1.4 ppb
Li	< 5.0 ppb	< 5.0 ppb	< 5.0 ppb