X-RAY DIFFRACTION CLAY MINERALOGY ANALYSIS

WELL SAMPLES - 23 NORTH SLOPE WELLS

January 28, 1983

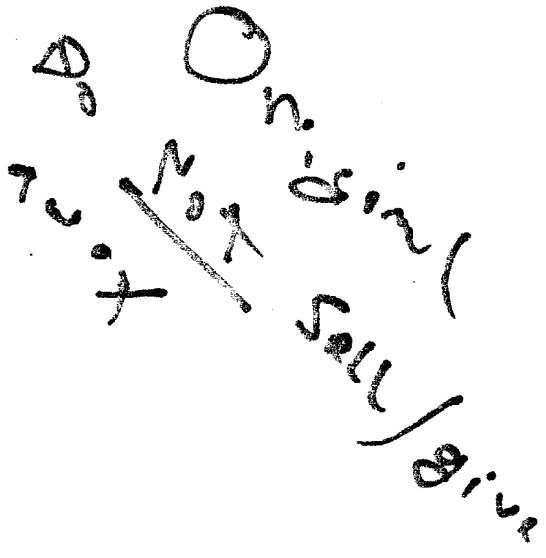
TABLE	SAMPLE SET #	OPERATOR	WELL NAME	INTERVAL	# OF PAGES
01	138	ARCO	Susie Unit #1	8010-13230	10
02	264	GULF	Coleville Delta St. #1	3070-7640	12
03	336	BP	Niakuk #1	7040-10750	13
04	204	ARCO	Toolik Federal #1	6500-10760	11
05	231	ARCO	Toolik Federal #2	5040-8500	10
06	271	MOBIL	Kuparuk 7-11-12	5100-7660	10
07	226	BP	Prudhoe Bay Unit 19-10-15	6410-8860	9
08	285	ARCO	West Sak River #1	4120-7410	10
09	262	ARCO	North Prudhoe Bay St. #1	6800-9570	11
10	275	MOBIL	West Staines St. 18-9-23	10020-13321	12
11	221	ARCO	N. W. Eileen St. #1	4510-6960	11
12	283	PLACID	Beechey Point #1	5860-9100	11
13	277	MOBIL	Mikkleson Bay St. 13-9-19	10634-11751	9
14	200	BP	Put River #1	6280-8680	10
15	370	ARCO	N.G.I. #7	6720-8172	7
16	375	ARCO	Prudhoe Bay Unit 9-6	7200-9250	9
17	270	PLACID	Prudhoe Bay St. #1	5700-8830	11
18	230	BP	Prudhoe Bay Unit J-1	5690-8010	9
19	235	BP	Sag Delta 31-10-16	7460-9745	13
20	348	EXXON	Alaska State A-1	10219-14185	10
21	319	CITIES	Gwydyr Bay St. A-1	6330-11880	15
22	326	ARCO	East Bay St. #1	7530-9480	11
23	302	MOBIL	Echooka Unit #1	7090-13005	13

X-RAY DIFFRACTION CLAY MINERALOGY ANALYSIS

WELL SAMPLES - 23 NORTH SLOPE WELLS

January 28, 1983

TABLE	SAMPLE SET #	OPERATOR	WELL NAME	INTERVAL	# OF PAGES
01	138	ARCO	Susie Unit #1	8010-13230	10
02	264	GULF	Coleville Delta St. #1	3070-7640	12
03	336	BP	Niakuk #1	7040-10750	13
04	204	ARCO	Toolik Federal #1	6500-10760	11
05	231	ARCO	Toolik Federal #2	5040-8500	10
06	271	MOBIL	Kuparuk 7-11-12	5100-7660	10
07	226	BP	Prudhoe Bay Unit 19-10-15	6410-8860	9
08	285	ARCO	West Sak River #1	4120-7410	10
09	262	ARCO	North Prudhoe Bay St. #1	6800-9570	11
10	275	MOBIL	West Staines St. 18-9-23	10020-13321	12
11	221	ARCO	N. W. Eileen St. #1	4510-6960	11
12	283	PLACID	Beechey Point #1	5860-9100	11
13	277	MOBIL	Mikkleson Bay St. 13-9-19	10634-11751	9
14	200	BP	Put River #1	6280-8680	10
15	370	ARCO	N.G.I. #7	6720-8172	7
16	375	ARCO	Prudhoe Bay Unit 9-6	7200-9250	9
17	270	PLACID	Prudhoe Bay St. #1	5700-8830	11
18	230	BP	Prudhoe Bay Unit J-1	5690-8010	9
19	235	BP	Sag Delta 31-10-16	7460-9745	13
20	348	EXXON	Alaska State A-1	10219-14185	10
21	319	CITIES	Gwydyr Bay St. A-1	6330-11880	15
22	326	ARCO	East Bay St. #1	7530-9480	11
23	302	MOBIL	Echooka Unit #1	7090-13005	13



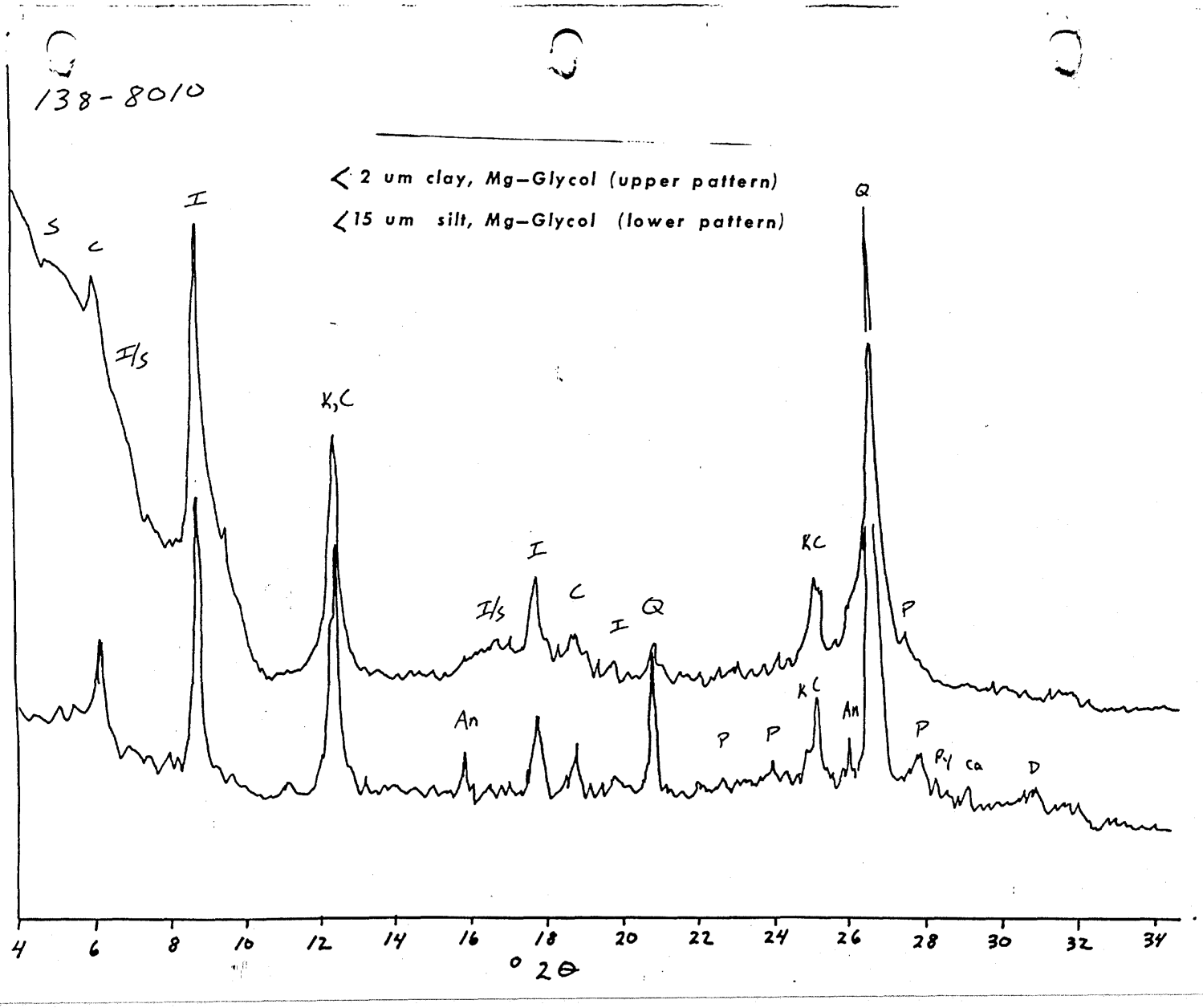
CLAY MINERALOGY OF SAMPLES TAKEN FROM ALASKA STATE REPOSITORY, NOVEMBER, 1982.

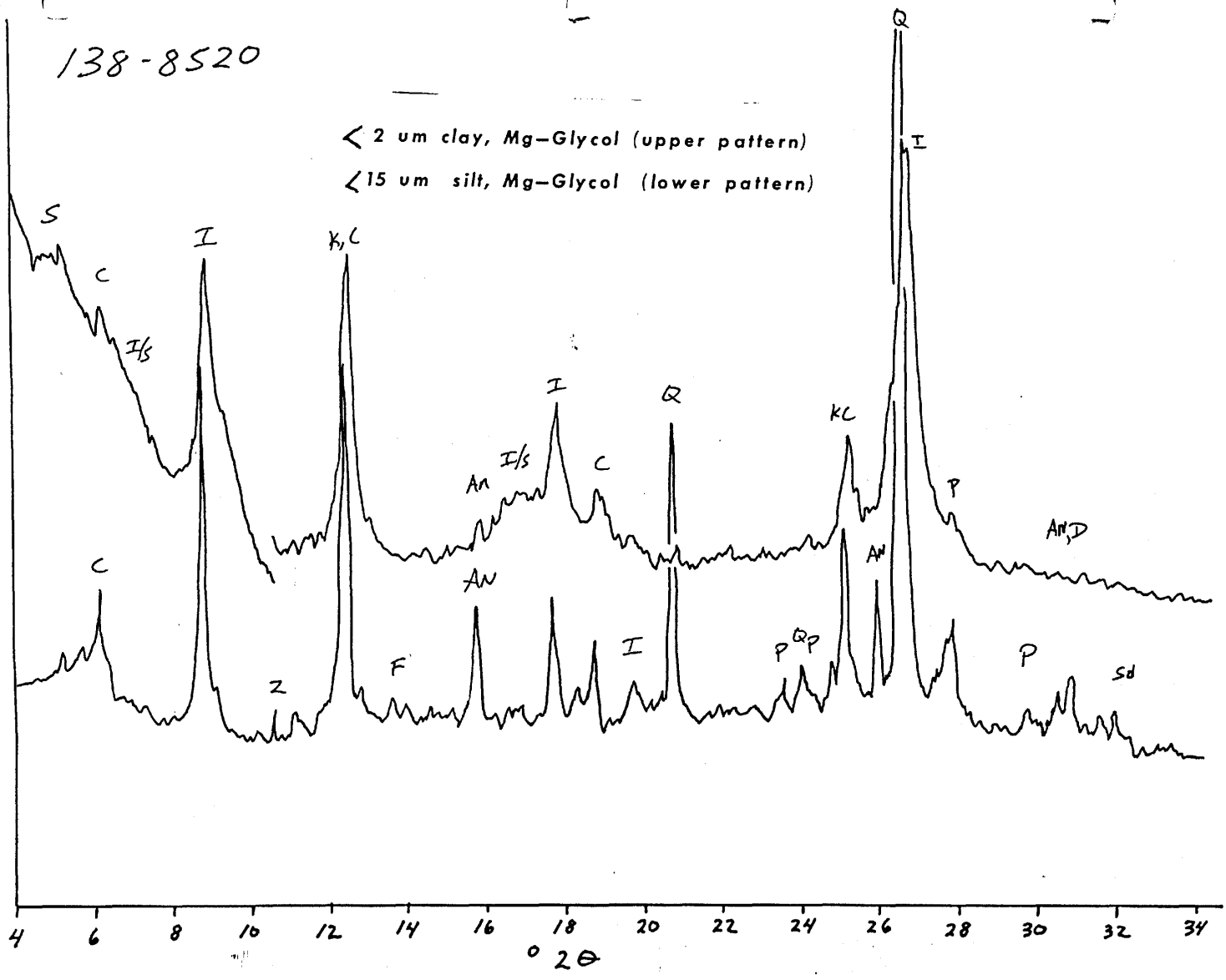
Table 1. Clay mineralogy of samples from Arco Susie Unit #1 well.

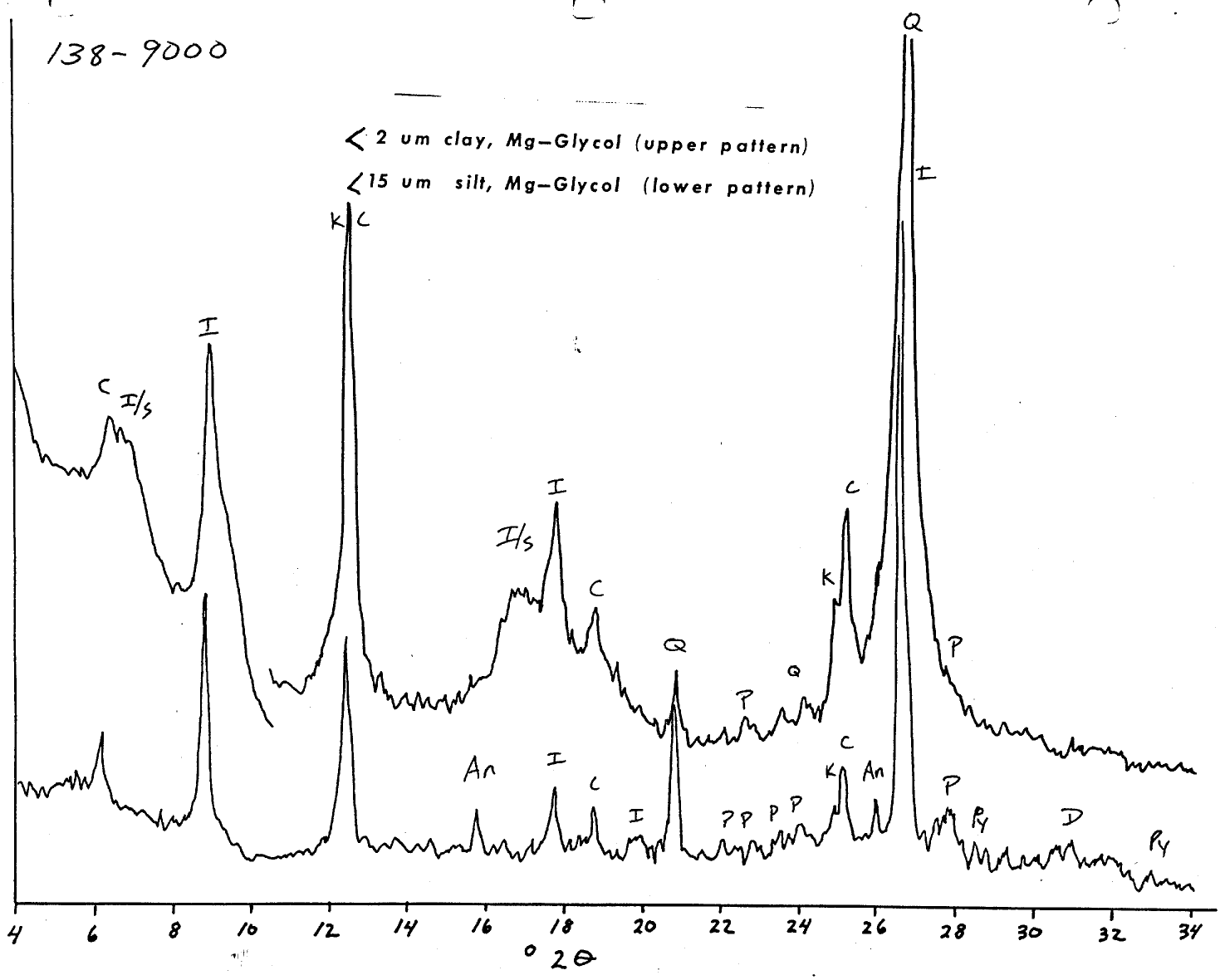
ARCO SUSIE UNIT #1

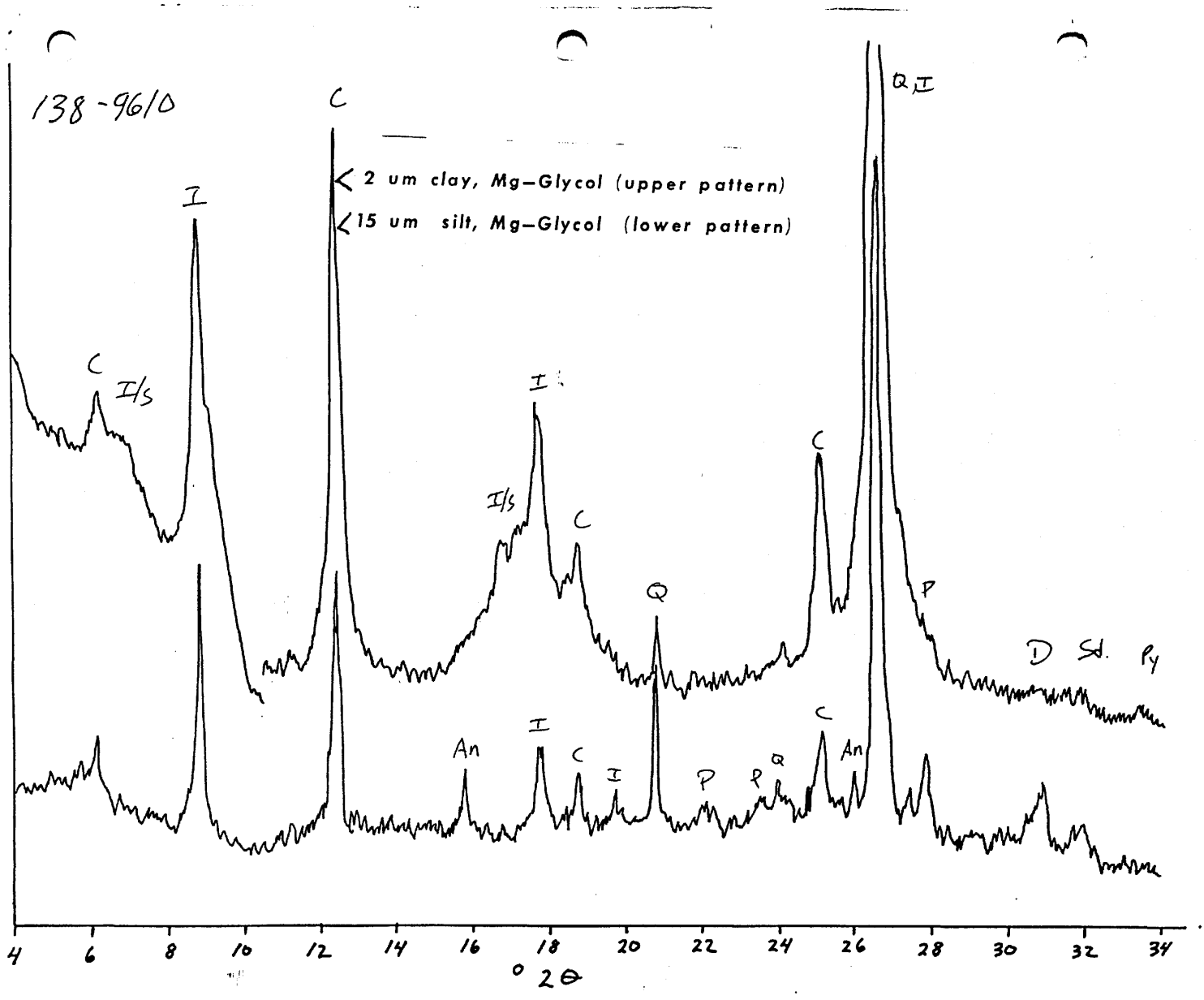
DEPTH FEET	STYPE	SMECTITE	CHLORITE	MIXED LAYER I/S	ILLITE	KAOLINITE	OTHER
8010	C	-	MOD	MOD	MAJ	-	Q2
8010-S	C	-	MOD	-	MOD	MIN	Q3,P1,AN1,D1,PY1
8520	C	TR	MOD	MOD	MAJ	-	Q1,P,SMEC = DM
8520-S	C	-	MOD	-	MOD	MIN	Q3,D1,AN2,P1,SID
9000	C	-	MOD	MOD	MOD	MOD	Q2,P1,D?
9000-S	C	-	MIN	-	MOD	-	Q3,AN1,P1,KS,D1,PY1
9610	C	-	MOD	MOD	MAJ	-	Q2,P1,PY1
9610-S	C	-	MOD	-	MOD	-	Q3,AN1,P1,D1,SID1
10440	C	-	MOD	MOD	MAJ	-	Q2,P1,PY1
10440-S	C	-	MIN	-	MIN	-	Q3,P2,PY2,D1
11400	C	-	MAJ	MOD	MAJ	-	Q2,P1,KALKBERG I/S
11400-S	C	-	MAJ	-	MAJ	-	Q3,P2,D1,PY1,KS?
12300	C	-	MOD	MOD	MAJ	-	Q2,P
12300-S	C	-	MAJ	-	MAJ	-	Q3,P2,CA,D,PY1
12800	C	-	MOD	MOD	MAJ	-	Q2,P1,PY1
12800-S	C	-	MIN	-	MOD	-	Q3,P2,D2,PY2
13230	C	-	MOD	MOD	MAJ	MOD	Q1,KAOLINITE?
13230-S	C	-	MIN	-	MOD	MIN	Q2,P1,D

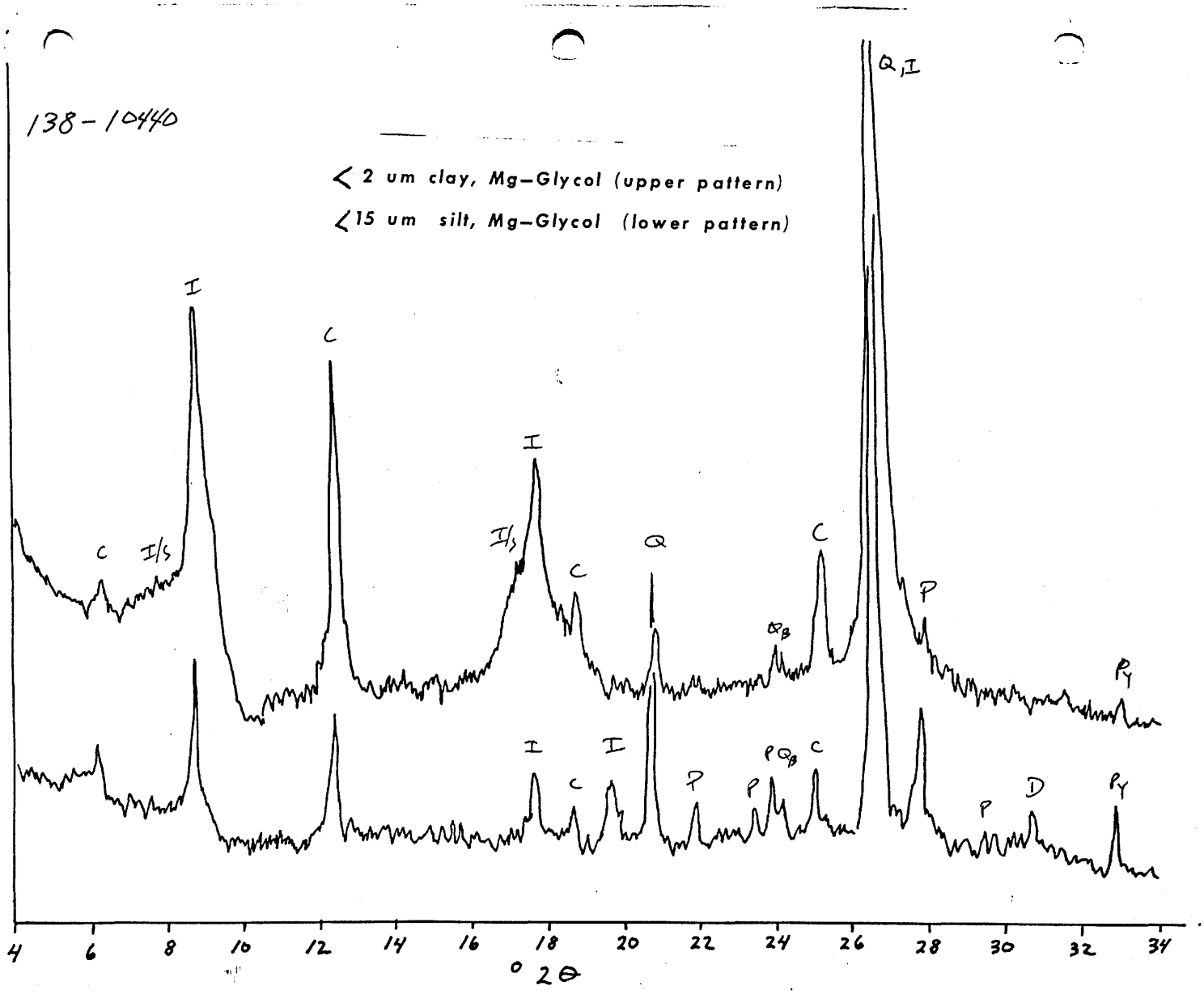
Definitions: TR = less than 3%, MIN = 3 - 12%, MOD = 13 - 35%, MAJ = >35%. Other mineral abbreviations: Q = quartz, P = plagioclase, KS = k-spar, AN = analcime, HC =heulandite-clinoptilolite, CA = calcite, D = dolomite, AP = apatite, SID = siderite, PY = pyrite, BA = barite. 1 = weak, 2 = moderate, 3 = strong, nothing = trace. MDM = mostly drill mud, BK.SH. = black shale, GR. = gray, SIS. = siltstone, TUFF. = tuffaceous, ANK = ankerite. Also: STYPE = sample type, C = cuttings, CC = core, SW = sidewall, S = silt.

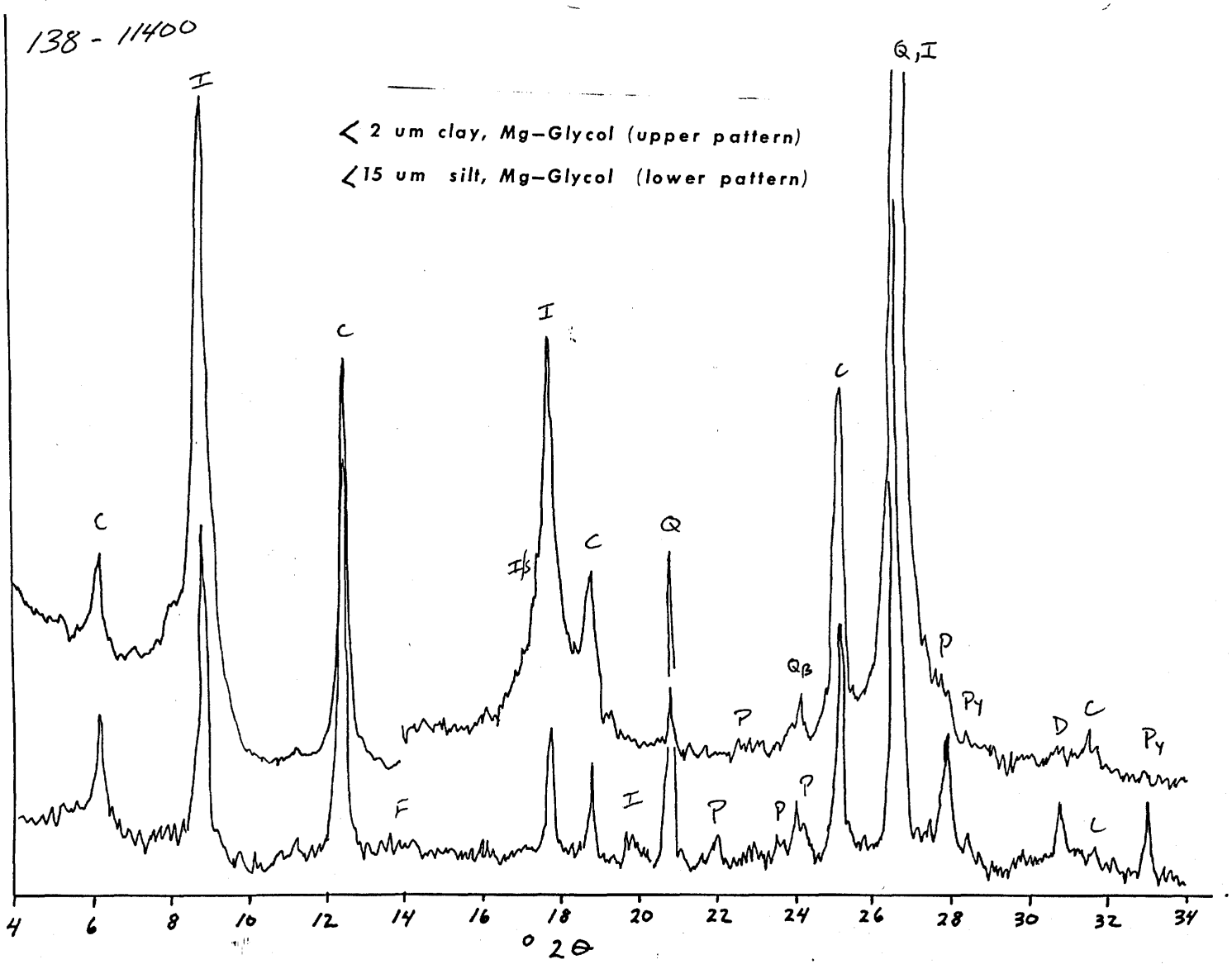

138-8010
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
C
I
I/S
K,C
I
C
I/S
I
Q
KC
P
An
P
P
KC
Am
P
Py
Ca
D
Q
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


138-8520
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
C
I/S
I
K,C
An
I/S
I
C
Q
KC
Q
I
P
An,D
C
An
Z
F
I
Q
P
P
P
An
Sd
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


138-9000
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
C I/s
I
K C
I/s
I
C
Q
P
Q
K
C
Q
I
P
An
I
C
I
P P P P
K
C
An
P
Py
D
Py
4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34
° 2θ


138-9610
2 um clay, Mg-Glycol (upper pattern)
15 um silt, Mg-Glycol (lower pattern)
C
I
C
I/s
I
I/s
C
Q
C
Q,I
P
D
Sd.
Py
An
I
C
I
P
P
Q
C
An
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

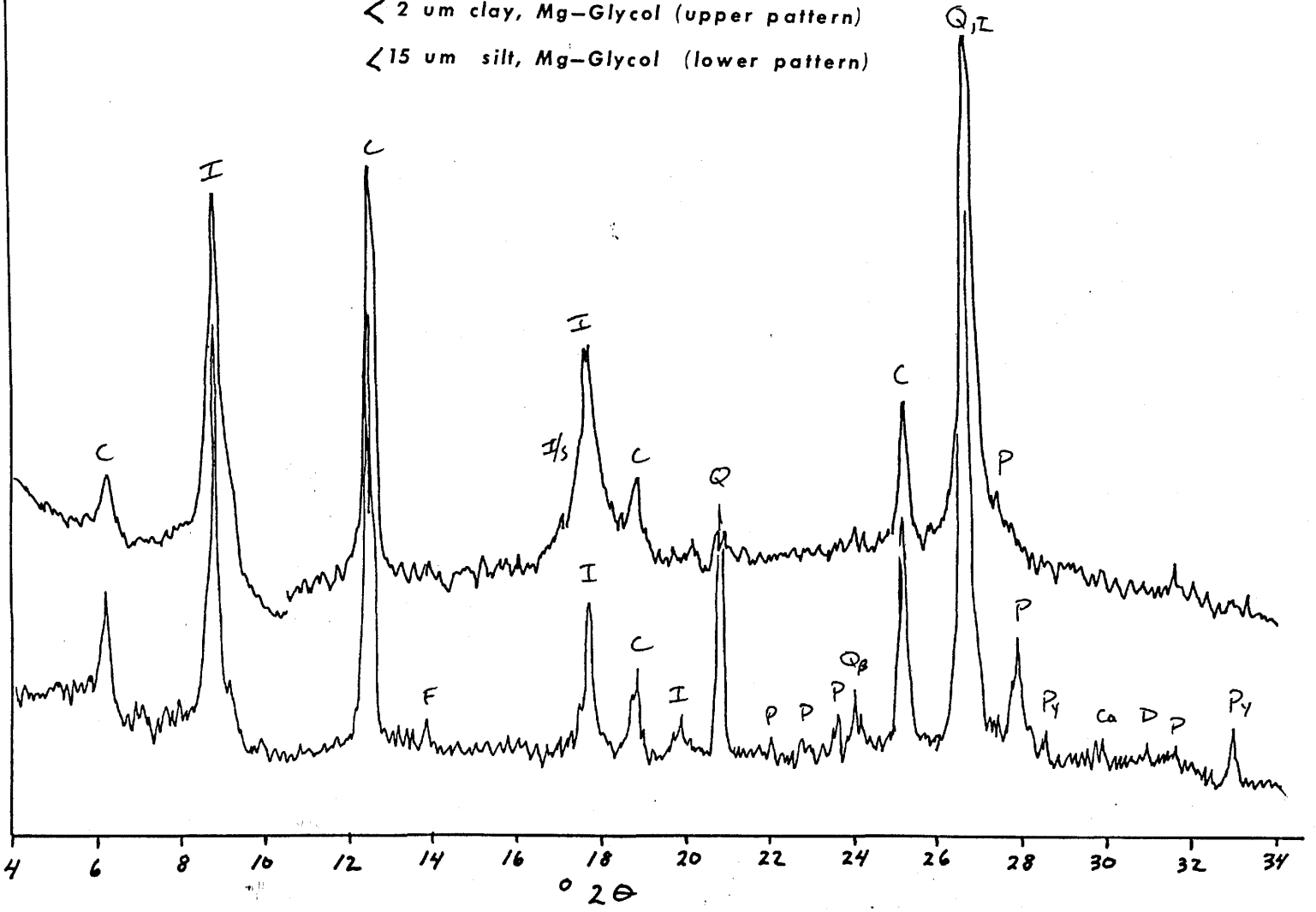

138-10440
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
Q,I
I
C
I
I/S
C
I/S
C
Q
C
P
Qβ
Py
I
I
C
P
P
PQβ
C
P
D
Py
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

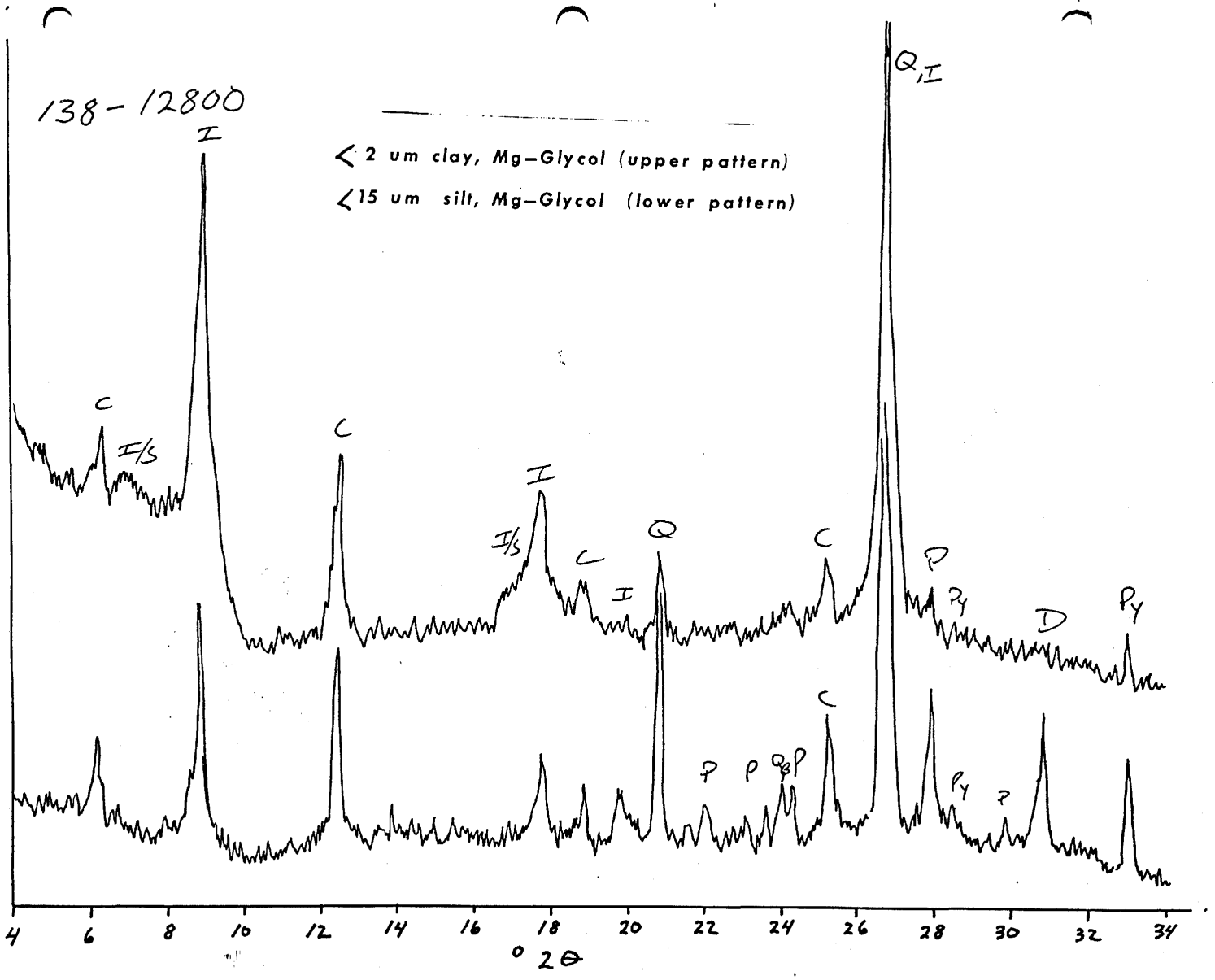

138 - 11400
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
I
C
C
I
I/S
C
Q
P
Qβ
C
Q,I
P
Pγ
D
C
Pγ
F
I
P
P
P
C
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

138-12300

< 2 um clay, Mg–Glycol (upper pattern)

< 15 um silt, Mg–Glycol (lower pattern)




138-12800
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
I
C
I/S
C
I
I/S
I
C
I
Q
C
Q,I
P
Py
D
Py
C
P
P
Q
P
Py
?
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

138-13230

< 2 um clay, Mg–Glycol (upper pattern)

< 15 um silt, Mg–Glycol (lower pattern)

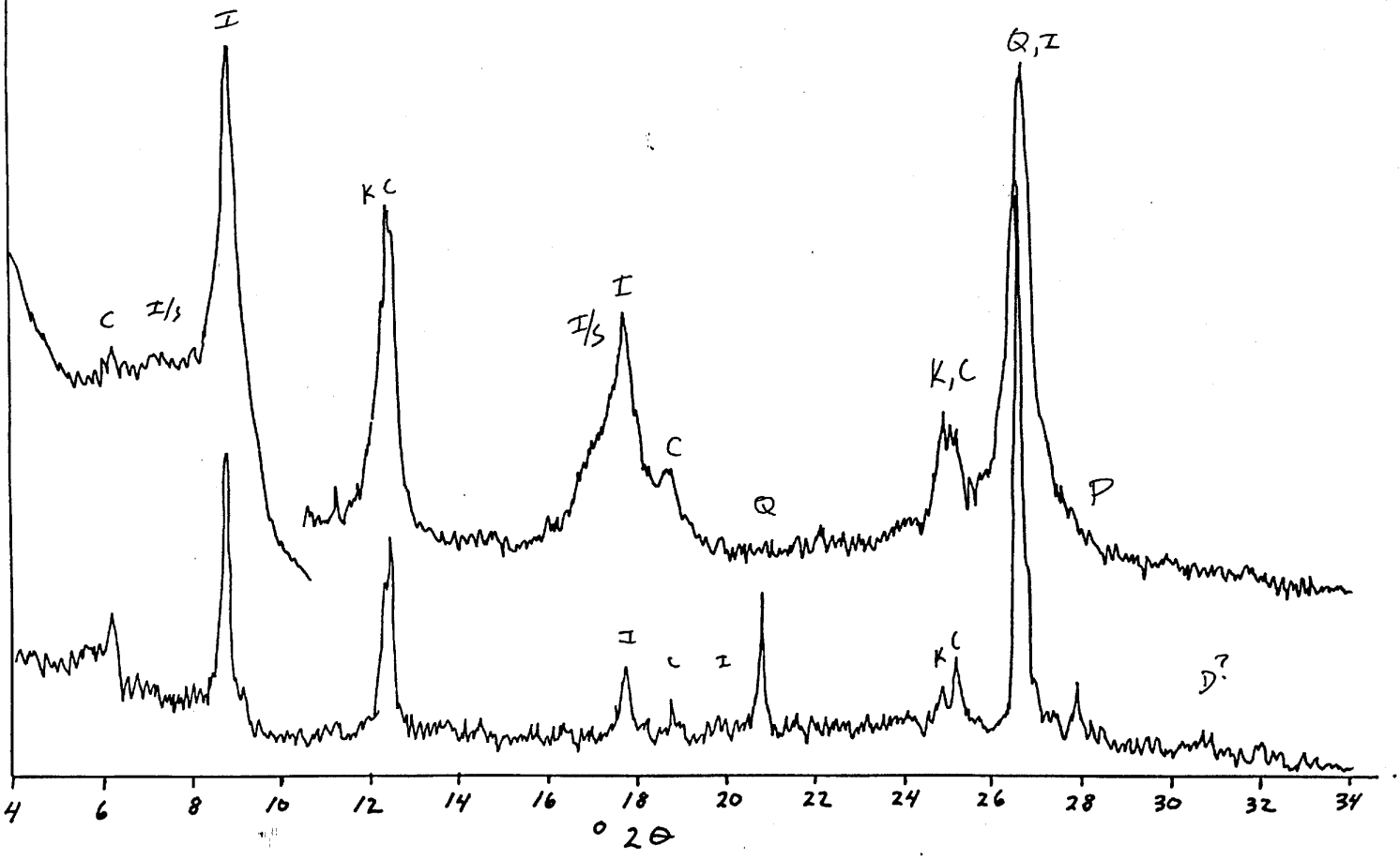


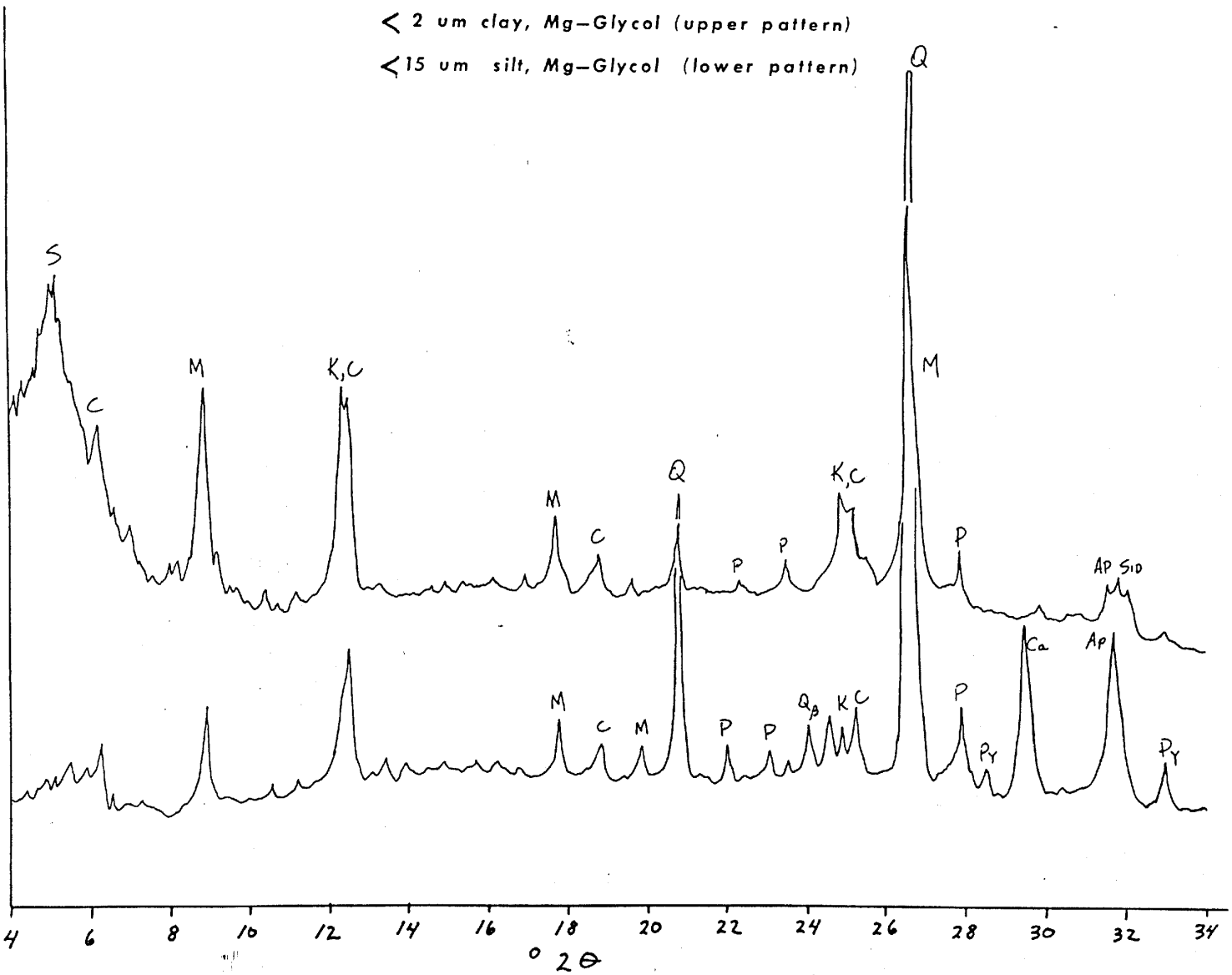
Table 3: Clay mineralogy of samples from BP Niakuk #1 well.

BP NIAKUK #1

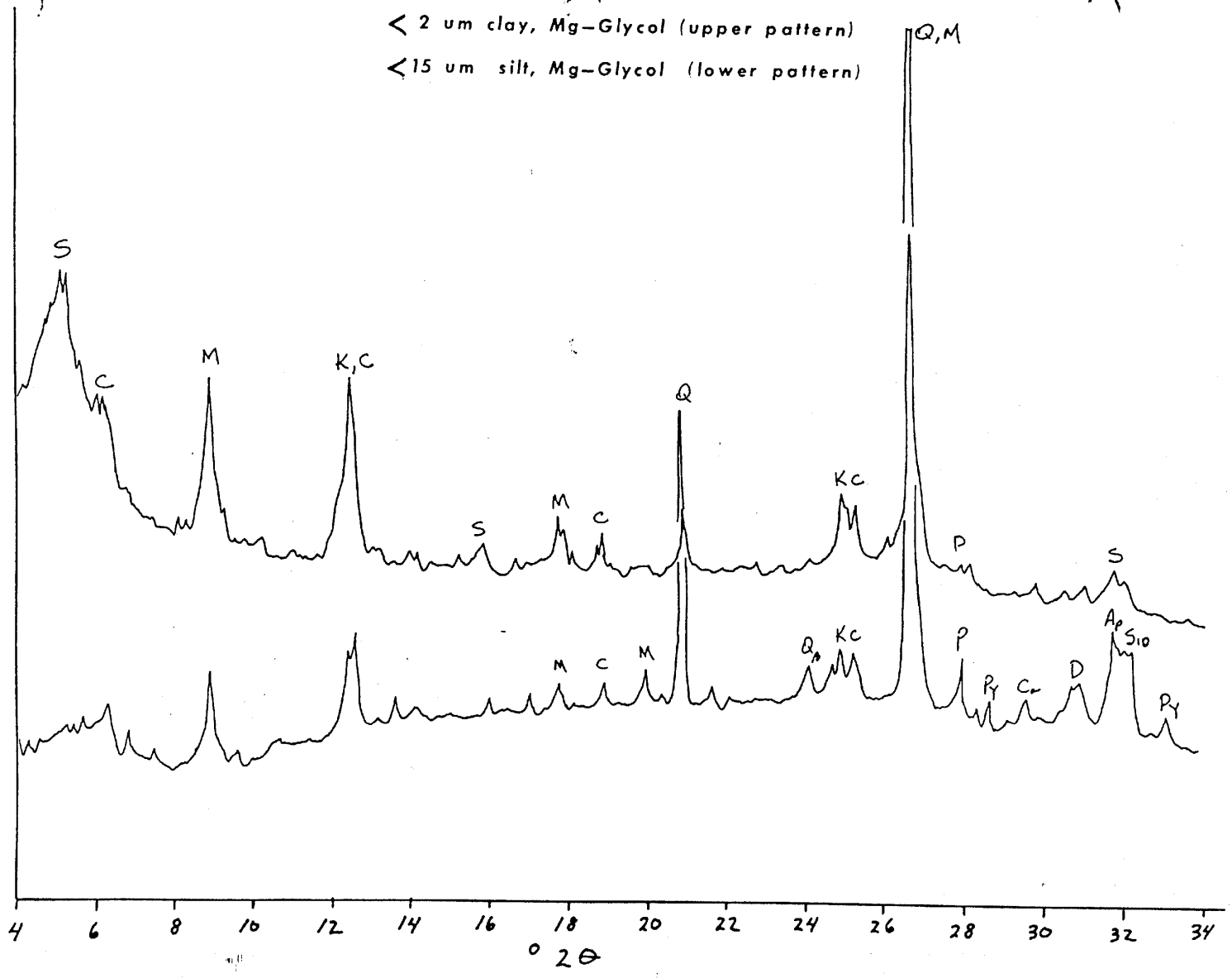
DEPTH FEET	STYPE	SMECTITE	CHLORITE	MIXED LAYER I/S	ILLITE	KAOLINITE	OTHER
7040	C	MOD	MOD	-	MOD	MOD	Q2,P1,AP,SID,MDM,COAL,BULK
7040-S	C	-	MIN	-	MIN	MIN	Q3,CA2,AP2,PY1
7520	C	MOD	MOD	-	MOD	MOD	Q1,AN,SID,MDM,BULKXRD,COAL
7520-S	C	-	MIN	-	MIN	MIN	Q3,P1,D1,AP1,SID1,PY
8060	C	MAJ	MOD	-	MOD	MOD	Q1,P,MDM,COAL
8060-S	C	TR	MOD	-	MOD	TR	Q2,AN,P1,AP1
8580	C	MAJ	MIN	-	MOD	MIN	Q2,P?,PY,TUFF.BK/GR.SH.DM.
8580-S	C	MIN	MOD	-	MOD	MIN	Q2,AN?,P1,SID.
9040	C	MAJ	MIN	TR	MOD	MIN	Q1,PY,TUFF.BK.SH.
9040-S	C	MIN	MIN	-	MOD	MIN	Q2,P,PY
9260	C	MAJ	TR	MOD	MOD	MIN	Q2,P,PY1,TUFF.BK.SH.
9260-S	C	TR	-	-	MIN	MIN	Q2,P,D,PY1
9360	C	-	-	MOD	MAJ	MOD	Q1,PY1,D,TUFF.BK.SH.
9360-S	C	-	-	-	MIN	MIN	Q2,P1,D1,PY1
9500	C	-	-	MOD	MOD	MAJ	Q1,CA1,PY1,BULK,BK.SH.
9500-S	C	-	-	-	MIN	MIN	Q3,P1,CA1,PY1
9680	C	MAJ	TR	MOD	MOD	MOD	Q1,TAR CONT.SIS.
9680-S	C	MIN	MIN	-	MOD	MIN	Q2,P,PY1
9960	C	MAJ	MIN	-	MOD	MOD	Q2,P,PY1,TAR CONT.SIS,DM?
9960-S	C	MIN	MOD	-	MOD	MIN	Q3,P1,CA,D,PY1
10460	C	-	-	MOD	MAJ	MAJ	Q1,BK.SH.
10460-S	C	-	-	-	MOD	MOD	Q3,D,PY
10750	C	-	-	MOD	MOD	MAJ	Q1,BK/GR.SH.
10750-S	C	-	TR	-	MAJ	MAJ	Q3,P,D1,SID,PY1

Definitions: TR = less than 3%, MIN = 3 - 12%, MOD = 13 - 35%, MAJ = >35%. Other mineral abbreviations: Q = quartz, P = plagioclase, KS = k-spar, AN = analcime, HC =heulandite-clinoptilolite, CA = calcite, D = dolomite, AP = apatite, SID = siderite, PY = pyrite, BA = barite. 1 = weak, 2 = moderate, 3 = strong, nothing = trace. MDM = mostly drill mud, BK.SH. = black shale, GR. = gray, SIS. = siltstone, TUFF. = tuffaceous, ANK = ankerite. Also: STYPE = sample type, C = cuttings, CC = core, SW = side wall, S = silt.

436 - 7040


< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
S
C
M
K,C
M
C
Q
P
P
K,C
Q
M
P
AP
SID
Ca
Ap
P
M
C
M
P
P
Qβ
K
C
P
PY
PY
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

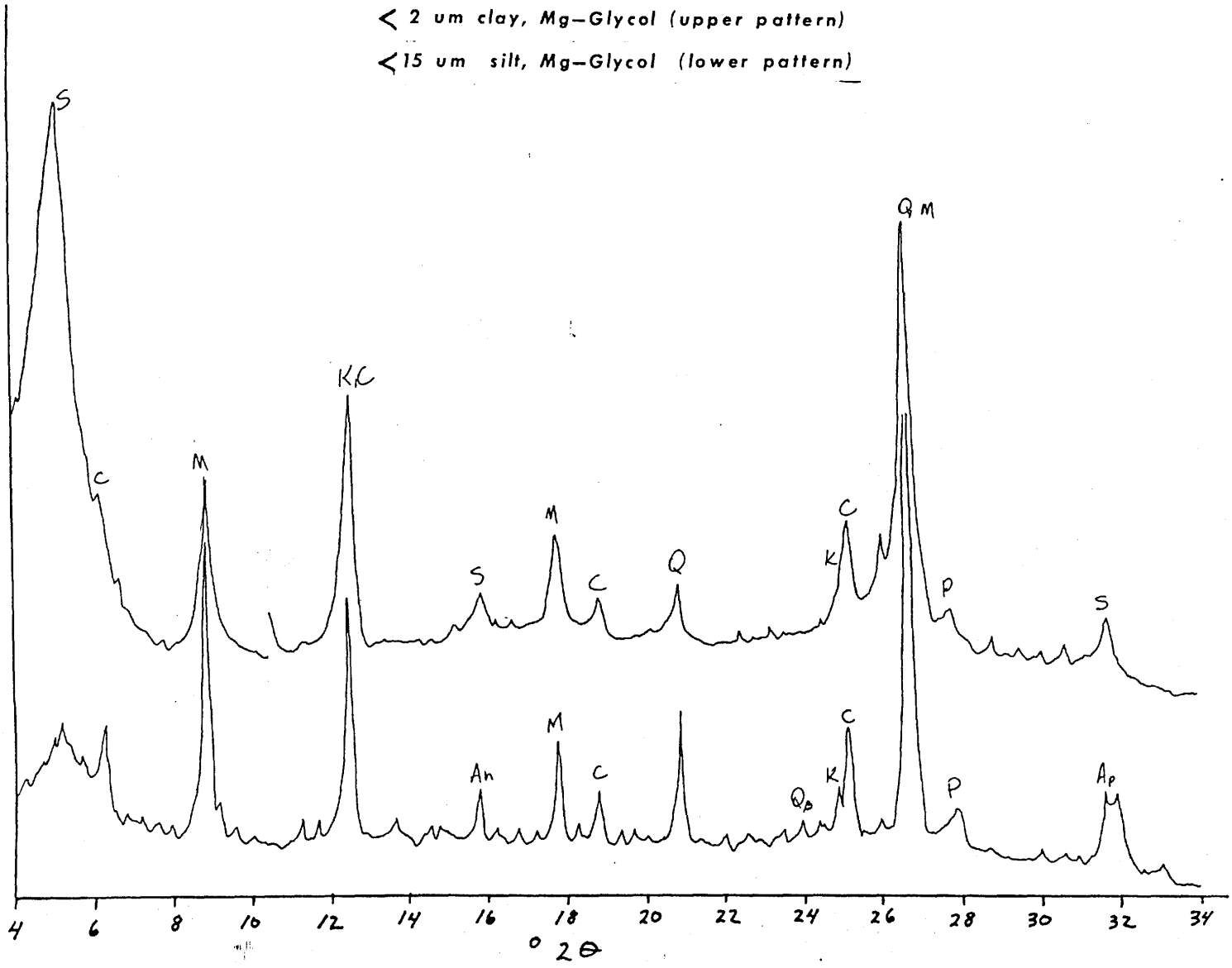
336-7520

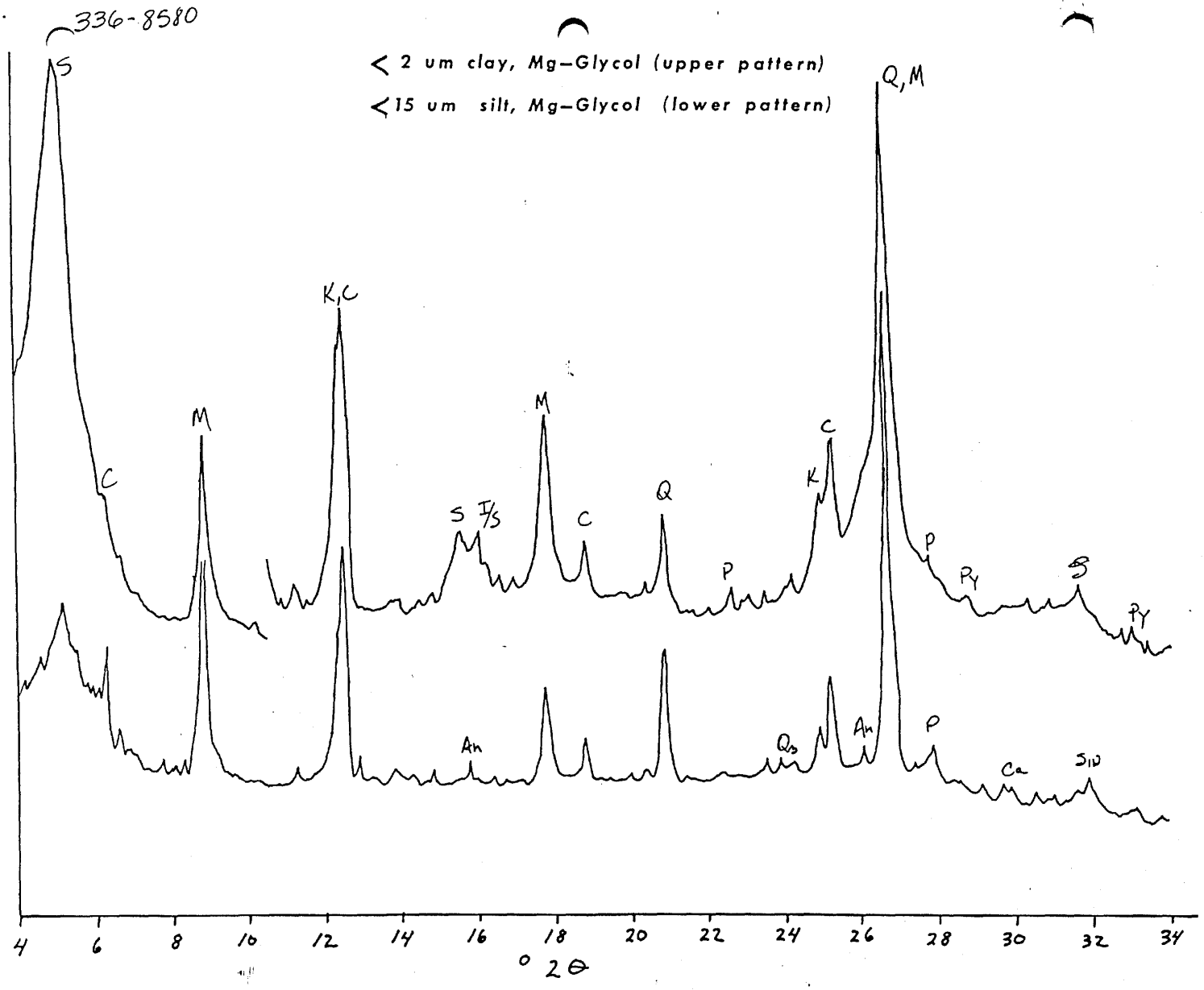

< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
S
C
M
K,C
S
M
C
Q
Q,M
Kc
P
S
M
C
M
Q
Kc
P
Py
Cc
D
Ap
S10
Py
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

336-8060

< 2 um clay, Mg–Glycol (upper pattern)

< 15 um silt, Mg–Glycol (lower pattern)

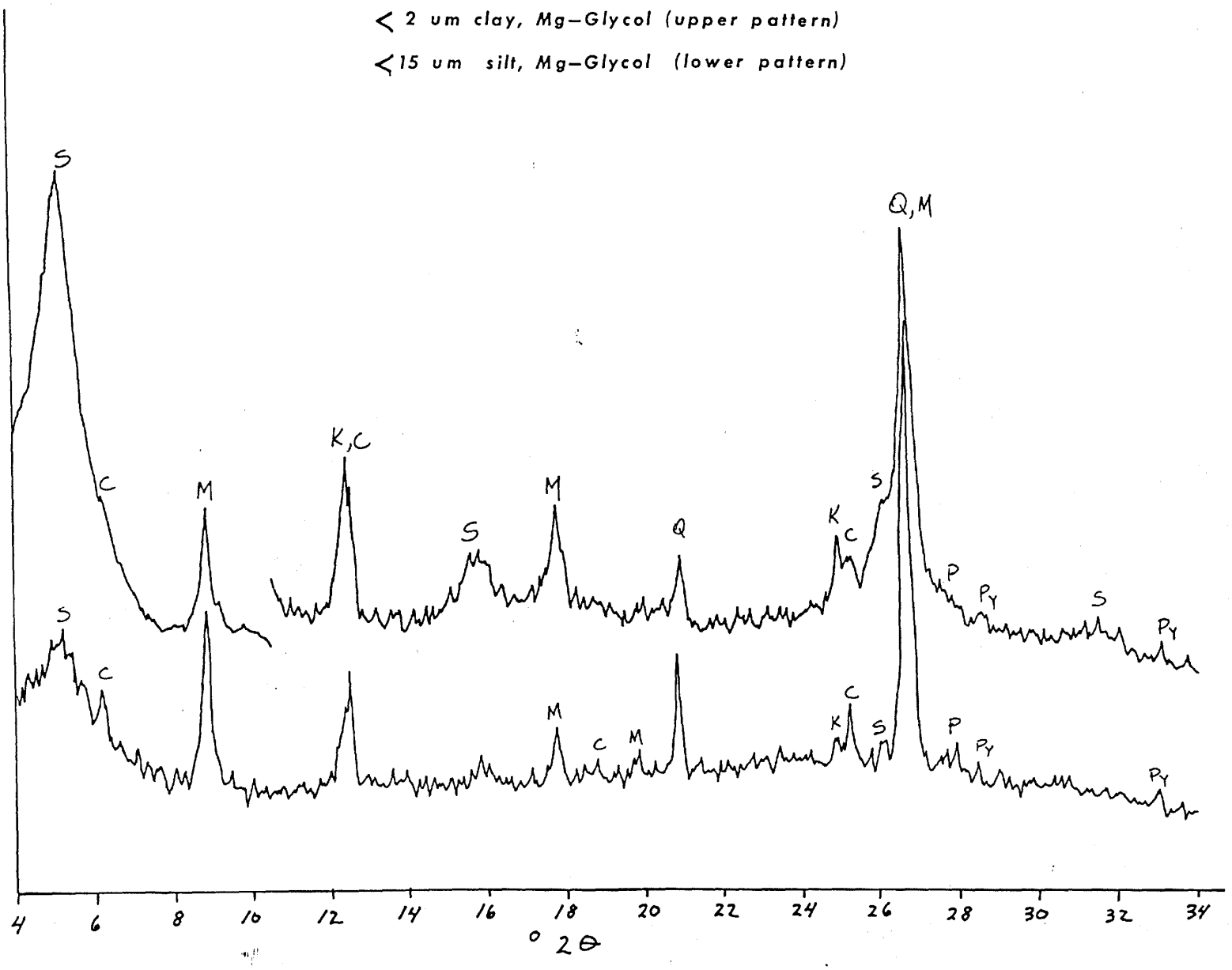



336-8580
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
C
M
K,C
S
I/S
M
C
Q
P
K
C
Q,M
P
Py
S
Py
An
Qs
An
P
Ca
Sid
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

P36-9040

< 2 um clay, Mg–Glycol (upper pattern)

< 15 um silt, Mg–Glycol (lower pattern)



336-9260

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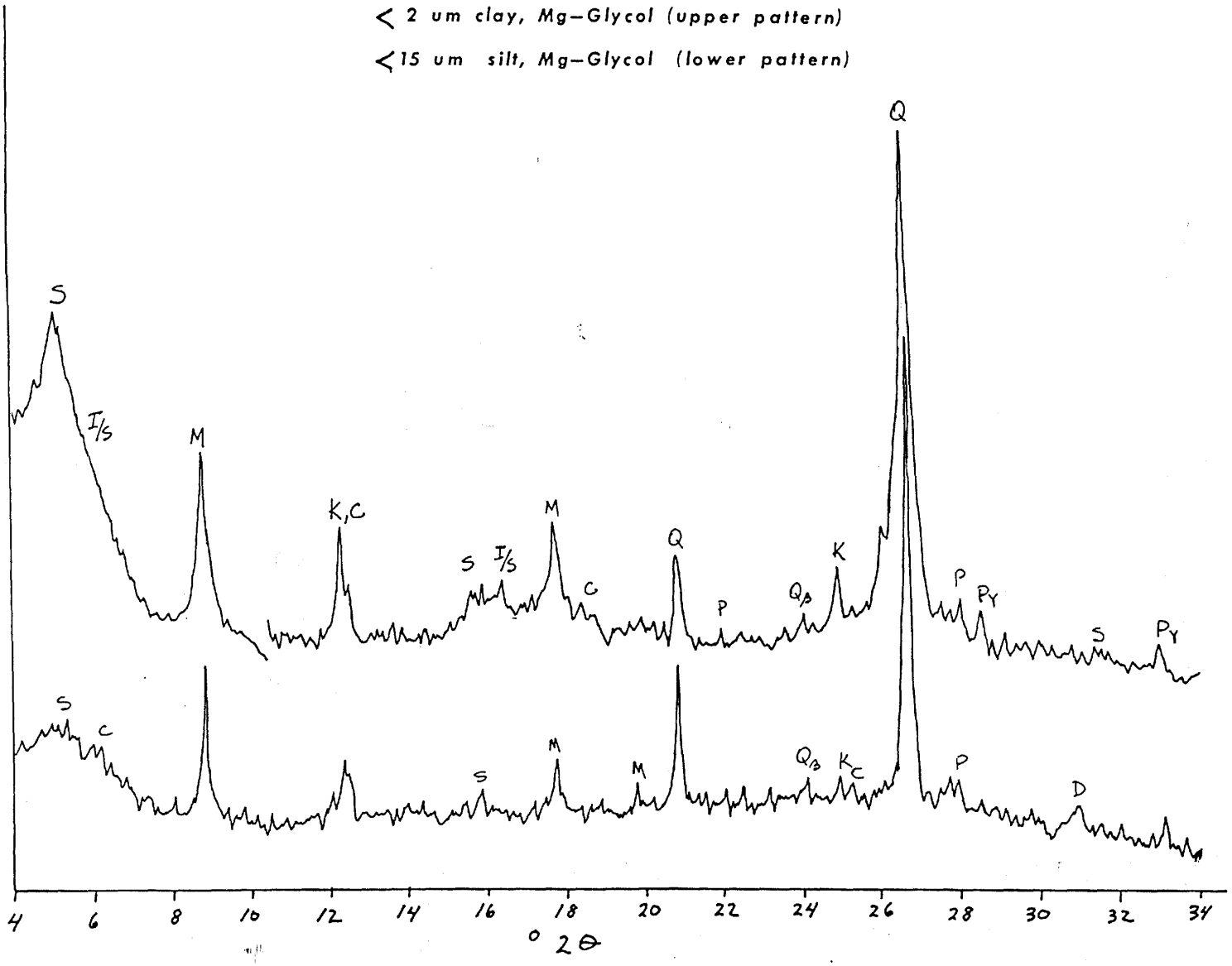
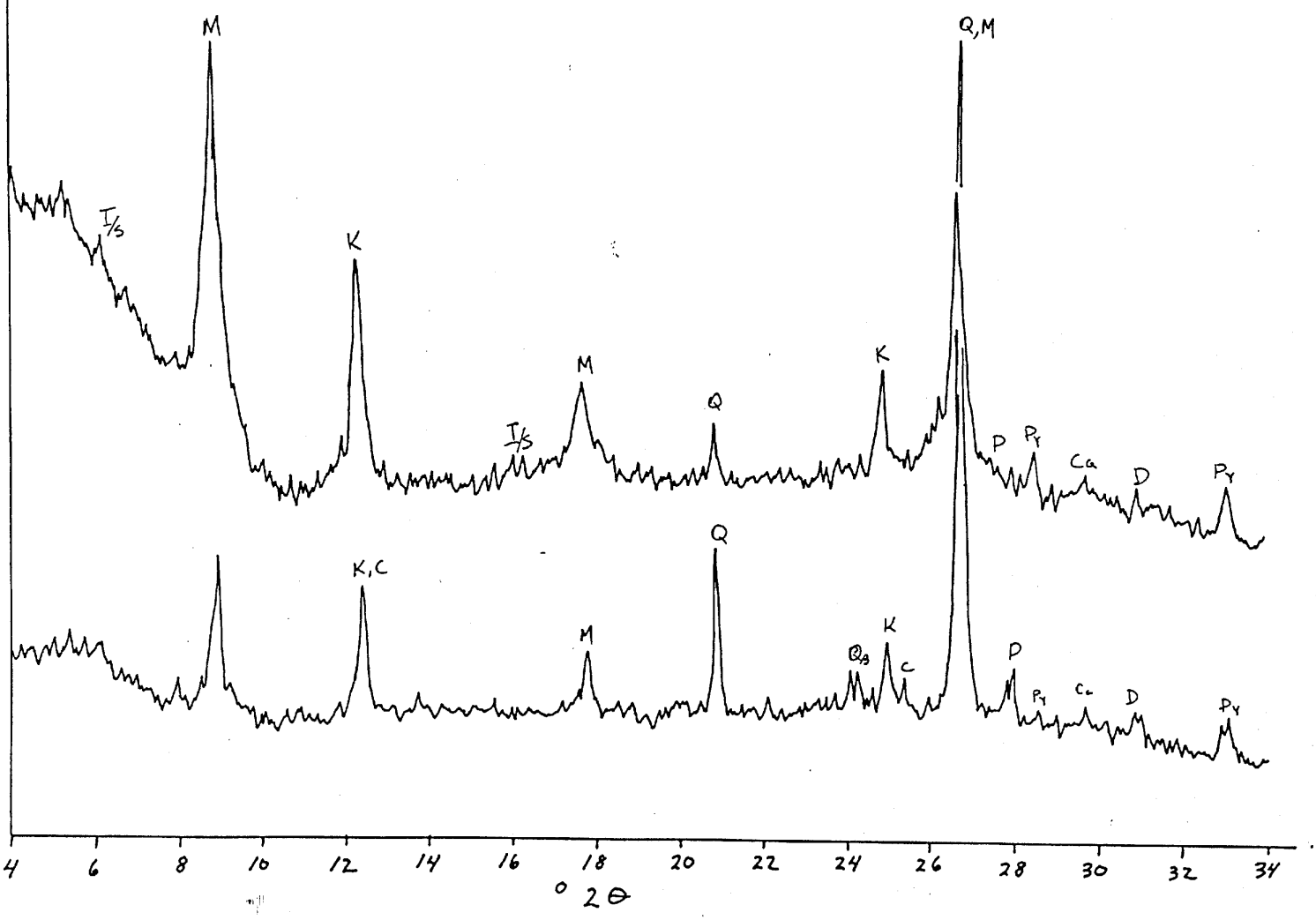
< 15 um silt, Mg–Glycol (lower pattern)



336 9360

< 2 um clay, Mg–Glycol (upper pattern)

< 15 um silt, Mg–Glycol (lower pattern)



36-9500

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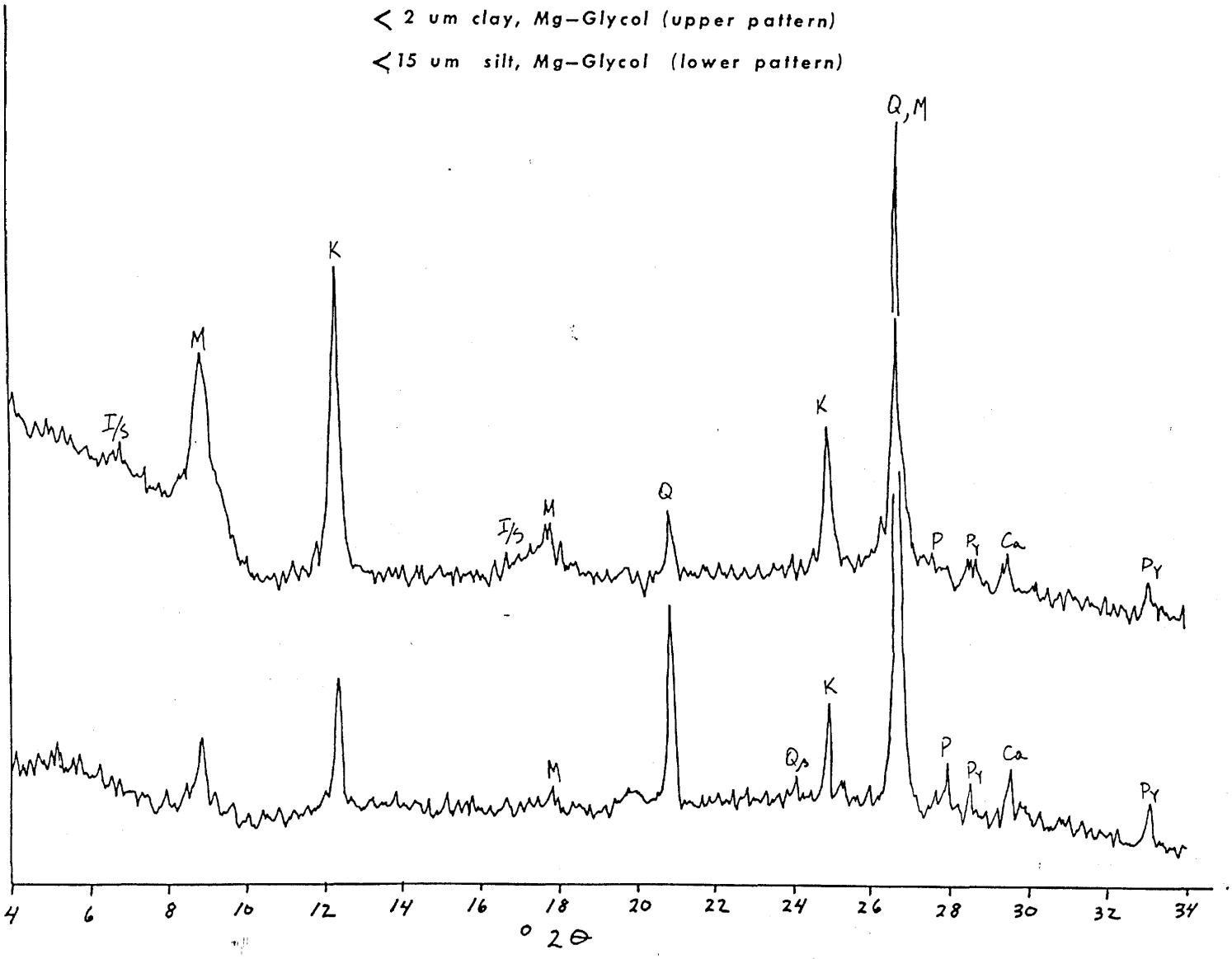
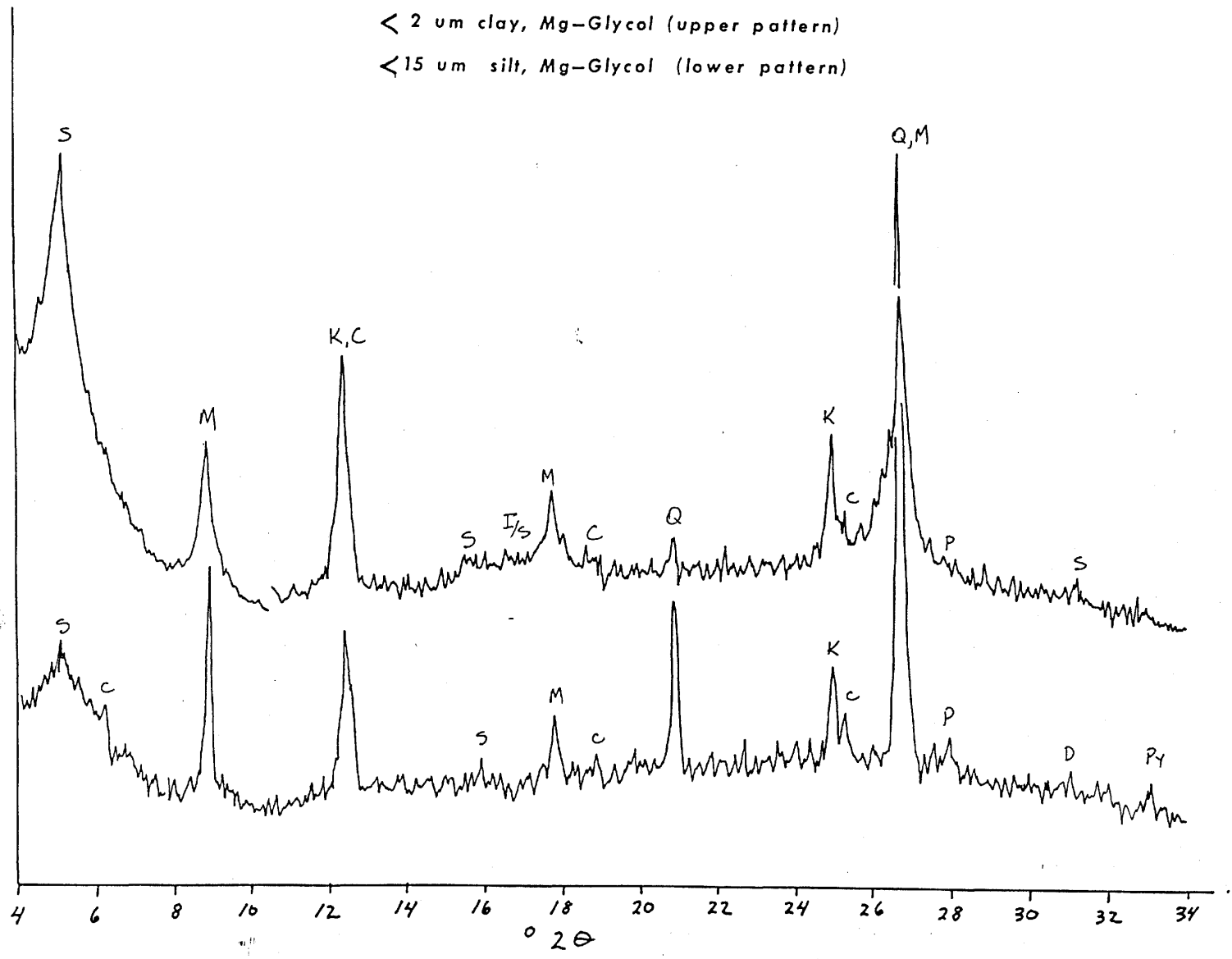
< 15 um silt, Mg–Glycol (lower pattern)



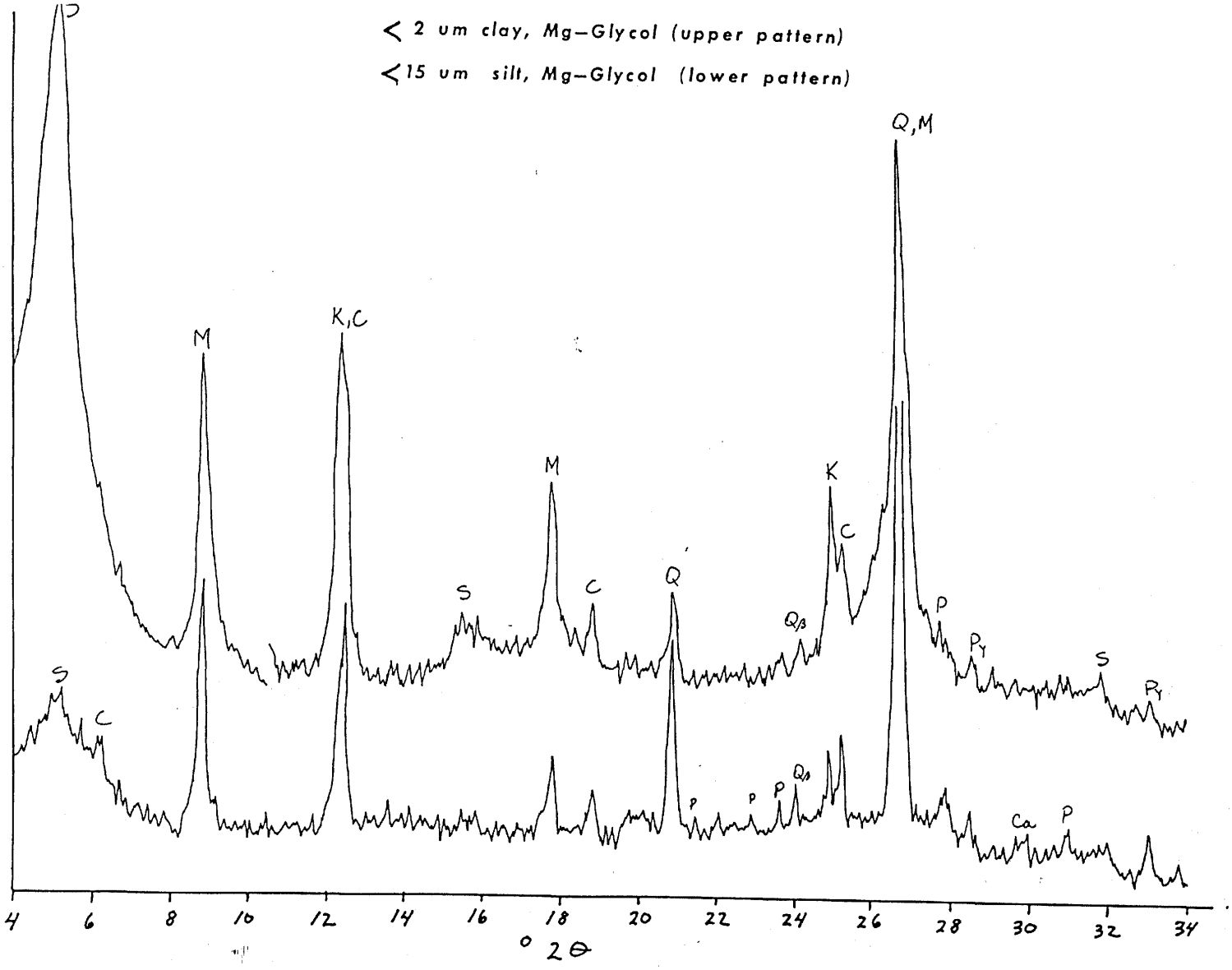
336-9680

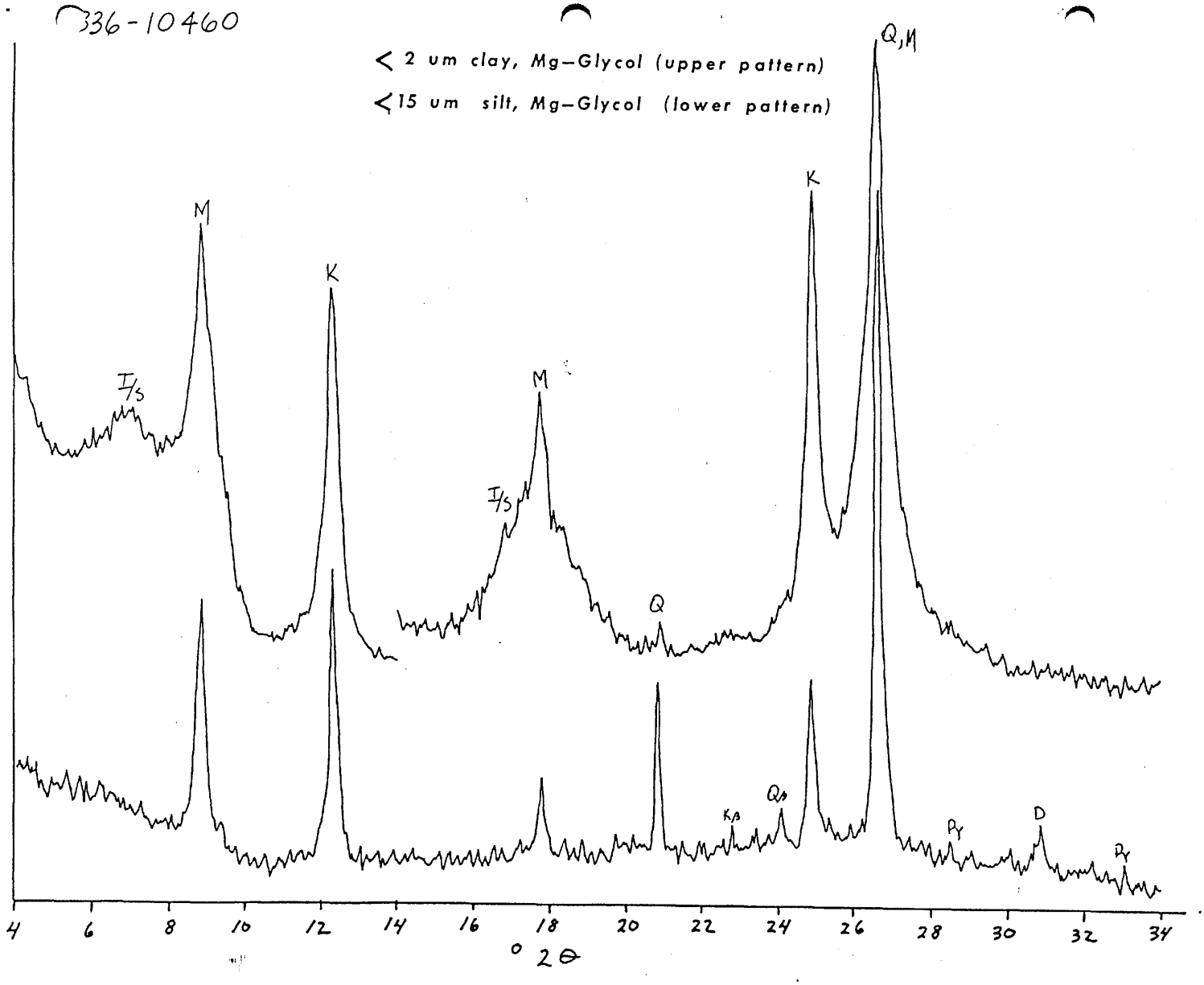

< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
M
K,C
S
I/s
M
C
Q
K
C
Q,M
P
S
S
C
S
M
C
K
C
P
D
Py
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

336-9960

< 2 um clay, Mg–Glycol (upper pattern)

< 15 um silt, Mg–Glycol (lower pattern)




336-10460
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
M
K
I/S
M
I/S
Q
K
Q,M
Ks
Qs
D
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

336-10750

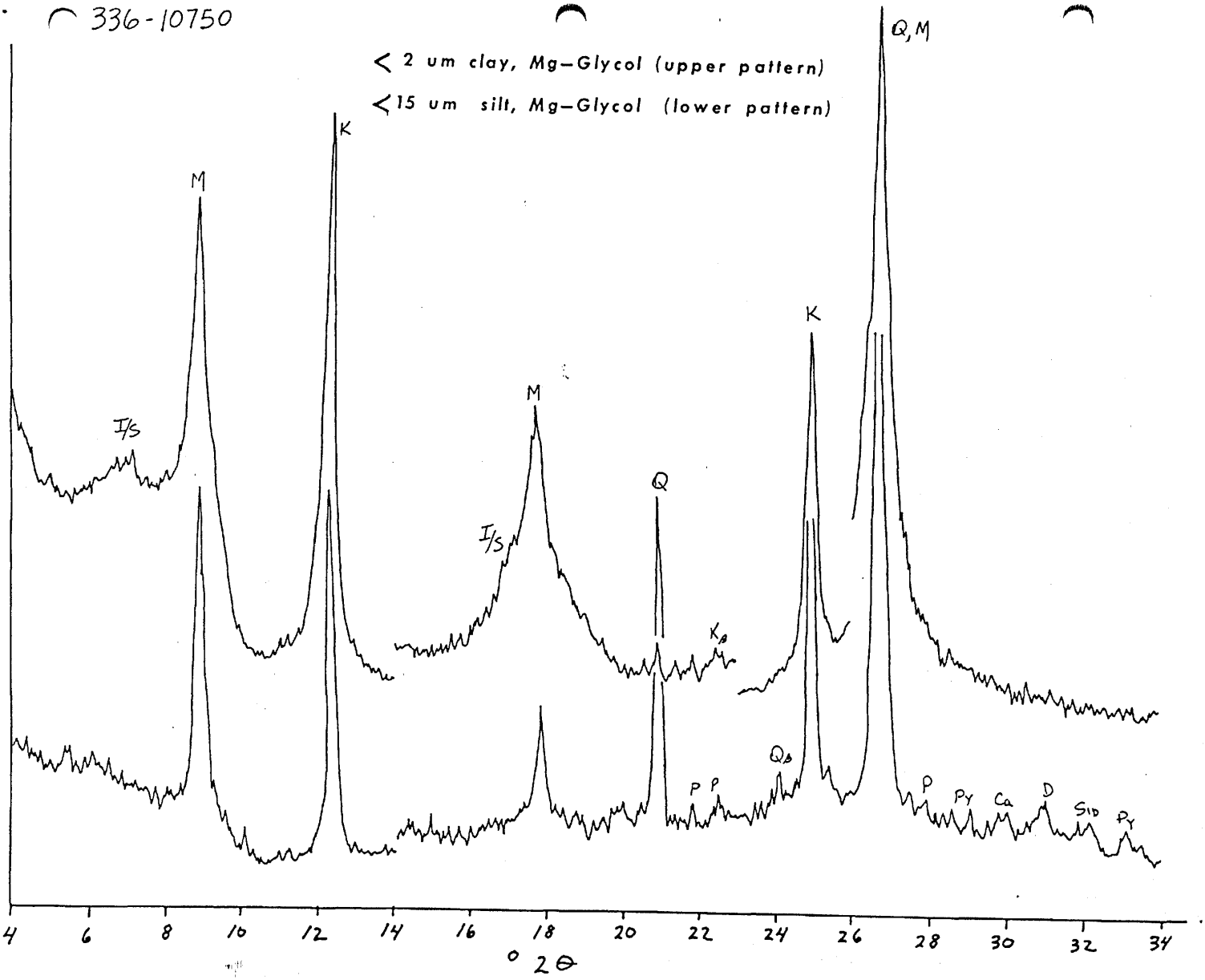

< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
Q,M
K
M
I/S
M
K
I/S
Q
Kβ
Qβ
P
P
P
Py
Ca
D
Sid
Py
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

Table 2: Clay mineralogy of samples from Gulf Coleville Delta St. #1 well.

GULF COLEVILLE DELTA STATE #1

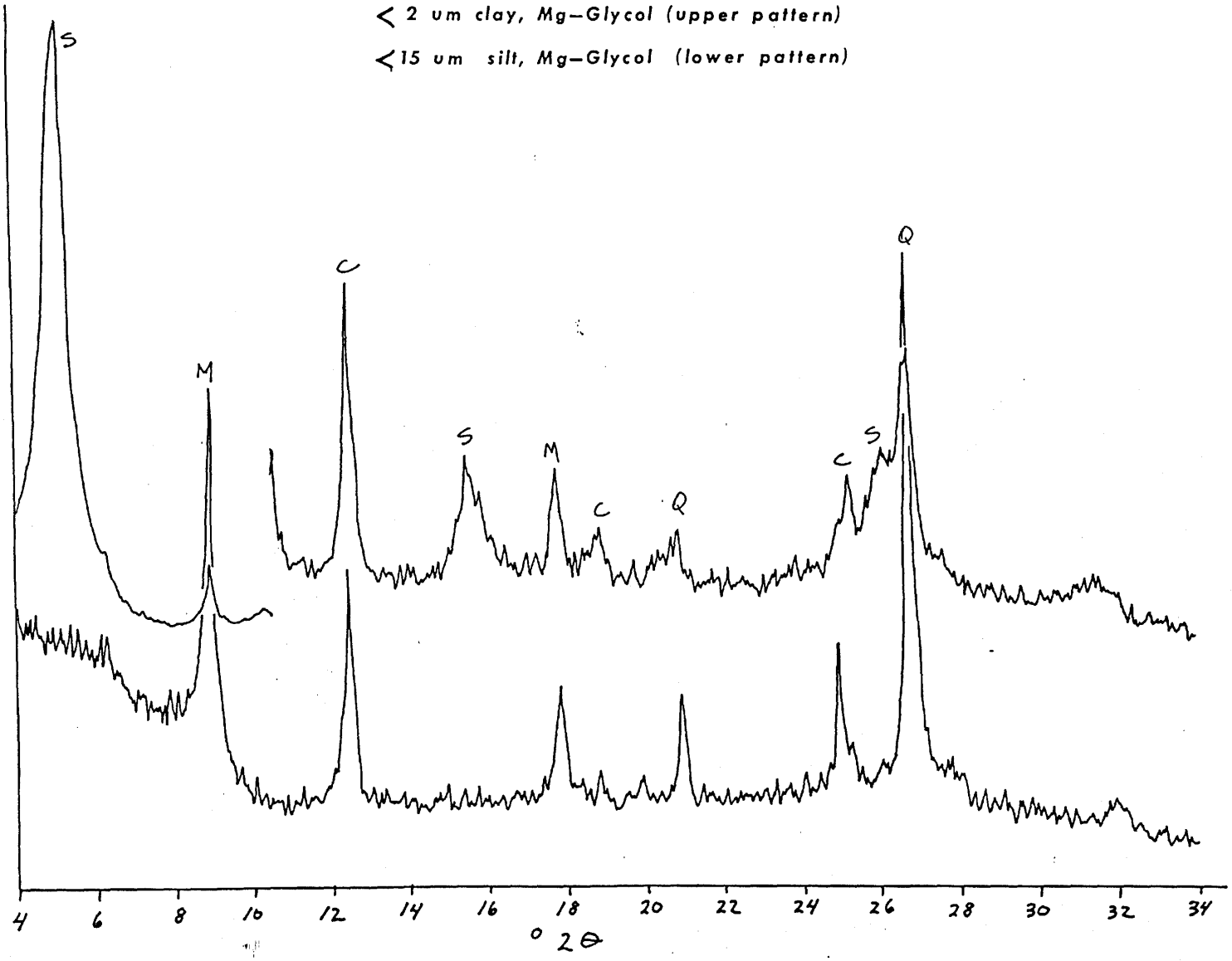
DEPTH FEET	STYPE	SMECTITE	CHLORITE	MIXED LAYER I/S	ILLITE	KAOLINITE	OTHER
3070	C	MAJ	MIN	-	MIN	TR	Q1,MDM,BULKXRD
3070-S	C	TR	MIN	-	MAJ	MOD	Q2,P,SID
4240	C	MAJ	MOD	-	MOD	MIN	Q2,P,AP,BARITE,MDM,BULKXRD
4240-S	C	MIN	MIN	-	MIN	MIN	Q3,P1,CA-MG,D,AP1,SID,PY1
4660	C	MAJ	MIN	-	MOD	MIN	Q2,P,CA,PY1,MDM,BULKXRD
4660-S	C	MIN	MIN	-	MOD	TR	Q2,P,CA,D,PY
5140	C	MAJ	MIN	-	MOD	MIN	Q1,P,CA,HC1,PY,MDM,BULKXRD
5140-S	C	MIN	MIN	-	MOD	TR	Q2,HC2,P1,PY
5800	C	MIN	MOD	MIN	MOD	MOD	Q2,P1,AP,SID,PY,BN.SIS.,DM.
5800-S	C	TR	MOD	-	MIN	MOD	Q3,P1,D1,AP1,PY1
6100	C	MOD	MOD	MOD	MOD	MOD	Q2,P,D,PY1,TUFF.BK.SH.
6100-S	C	TR	MIN	-	MIN	MIN	Q3,P1,D1,PY1
6240	C	MIN	MOD	MIN	MOD	MOD	Q2,P1,PY1,TUFF.DGR.SH.
6240-S	C	TR	MIN	-	MIN	MOD	Q3,P1,CA,PY1
6500	C	-	MOD	MOD	MOD	MAJ	Q2,P,PY1,BK.SH.
6500-S	C	-	MOD	-	MOD	MOD	Q3,P1,PY1
6860	C	TR	MOD	MOD	MOD	MAJ	Q1,P,PY1,MDM,BULKXRD,BK.SH.
6860-S	C	-	MIN	-	MOD	MOD	Q2,P
7380	C	MAJ	MIN	-	MOD	MIN	Q2,P1,MDM,BULKXRD
7380-S	C	TR	MOD	-	MAJ	MAJ	Q3,P1,PY1,AN1
7640	C	-	MIN	MOD	MOD	MOD	Q2,P,GR.SH.
7640-S	C	-	MIN	-	MOD	MIN	Q3

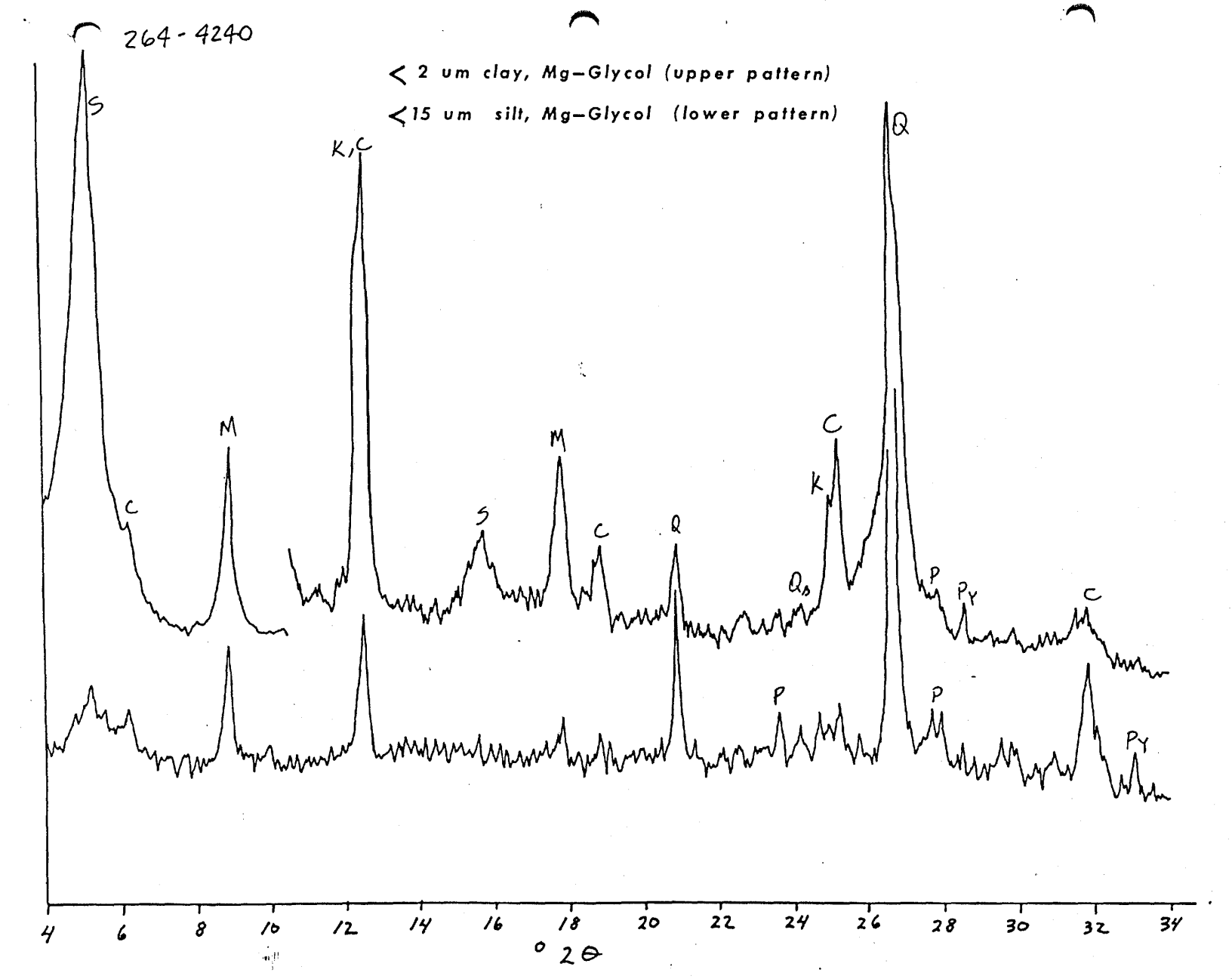
Definitions: TR = less than 3%, MIN = 3 - 12%, MOD = 13 - 35%, MAJ = >35%. Other mineral abbreviations: Q = quartz, P = plagioclase, KS = k-spar, AN = analcime, HC =heulandite-clinoptilolite, CA = calcite, D = dolomite, AP = apatite, SID = siderite, PY = pyrite, BA = barite. 1 = weak, 2 = moderate, 3 = strong, nothing = trace. MDM = mostly drill mud, BK.SH. = black shale, GR. = gray, SIS. = siltstone, TUFF. = tuffaceous, ANK = ankerite. Also: STYPE = sample type, C = cuttings, CC = core, SW = side wall, S = silt.

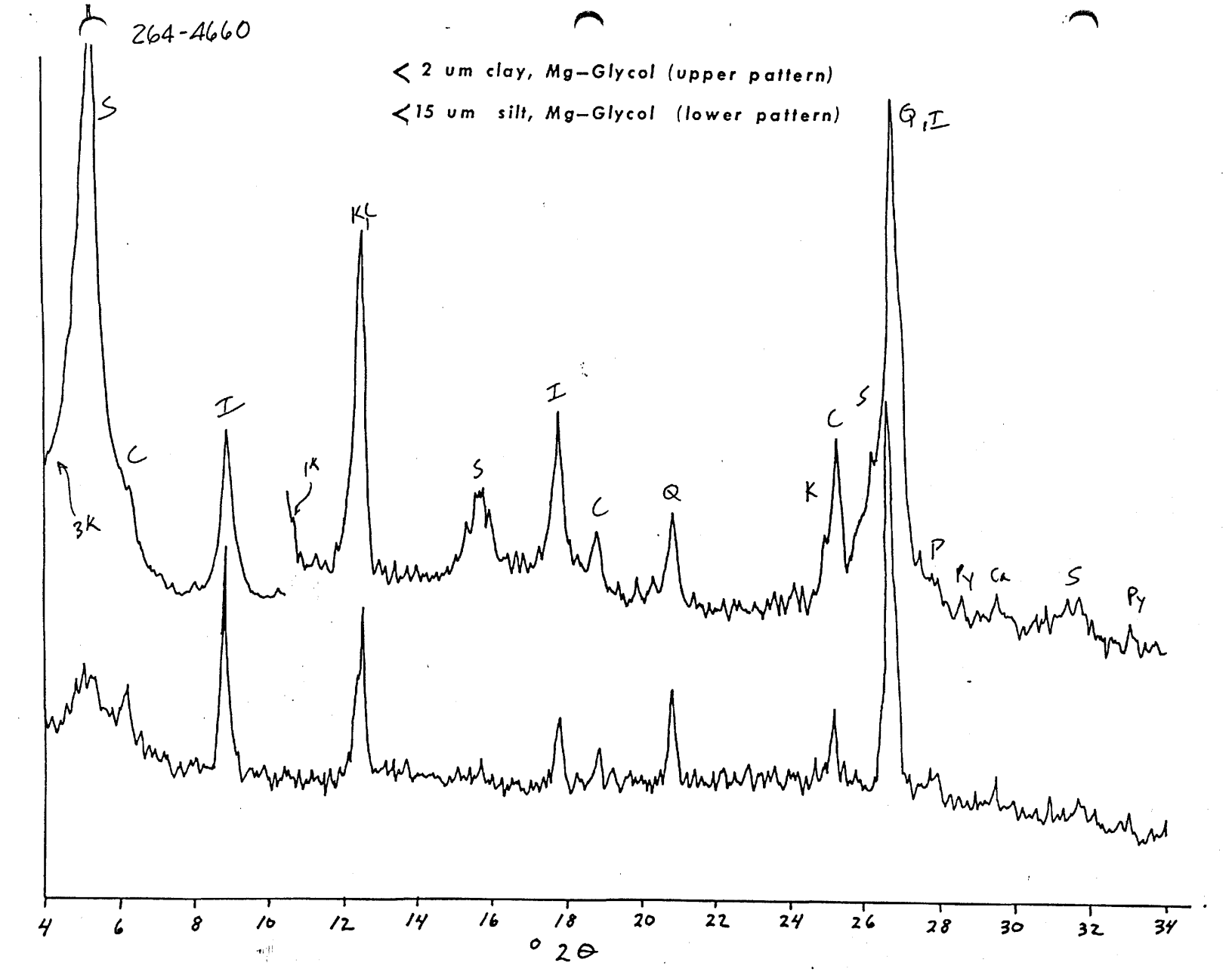
364-3070

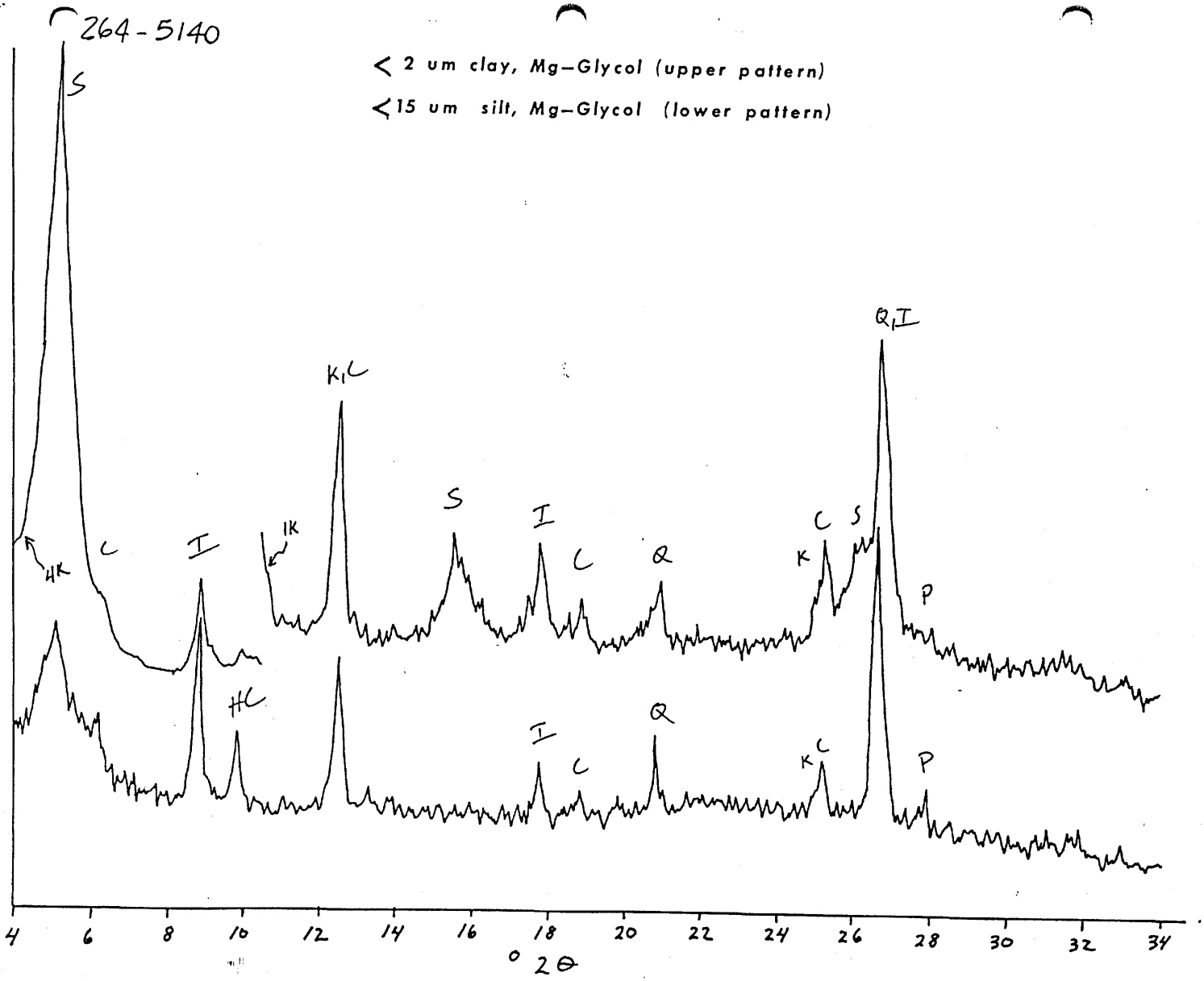
< 2 um clay, Mg–Glycol (upper pattern)

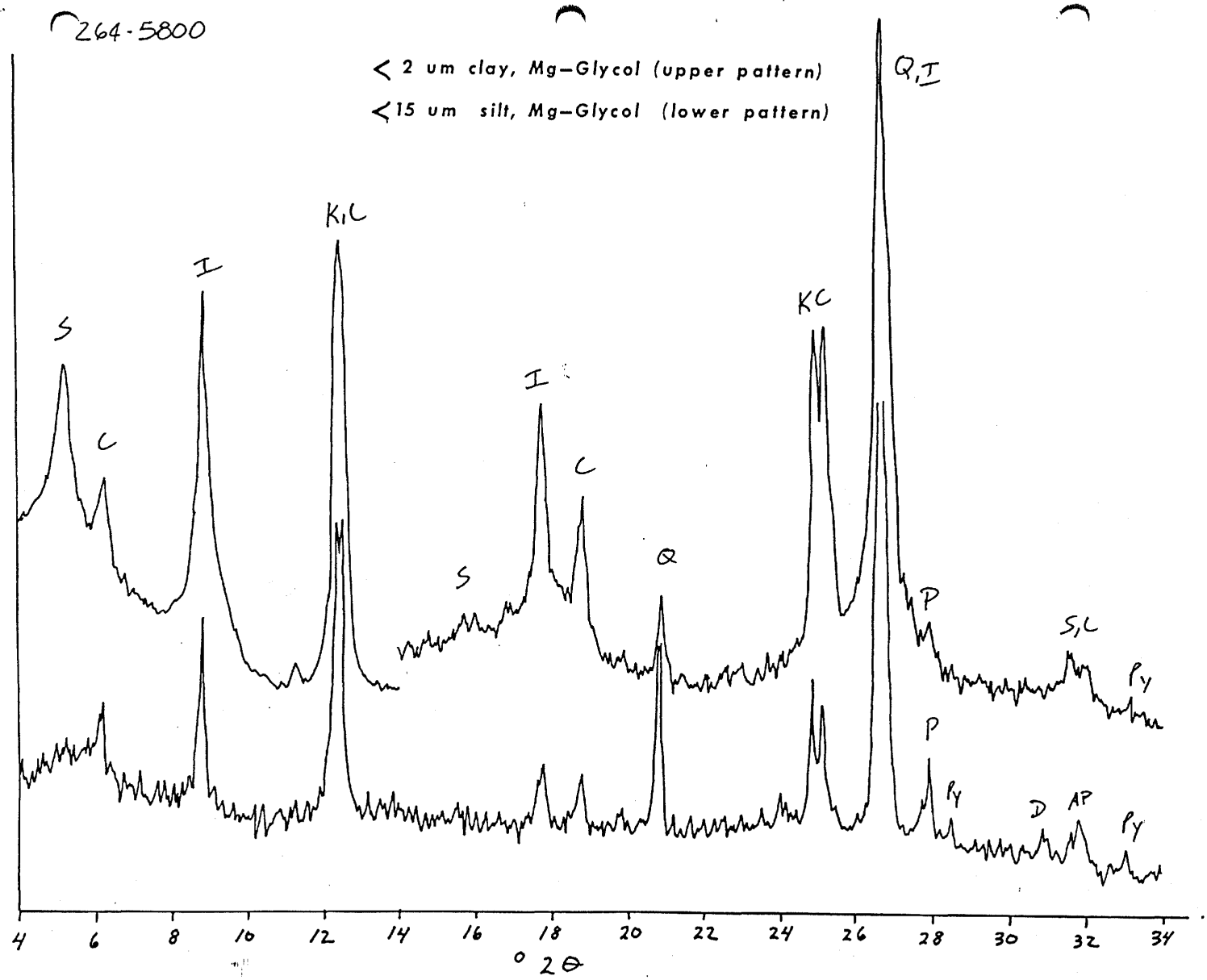
< 15 um silt, Mg–Glycol (lower pattern)




264-4240
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
K,C
Q
M
C
M
C
K
C
S
C
Q
Qs
P
Py
C
P
P
Py
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


264-4660
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
C
I
3K
1K
KC
S
I
C
Q
K
C
S
Q, I
P
Py
Ca
S
Py
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

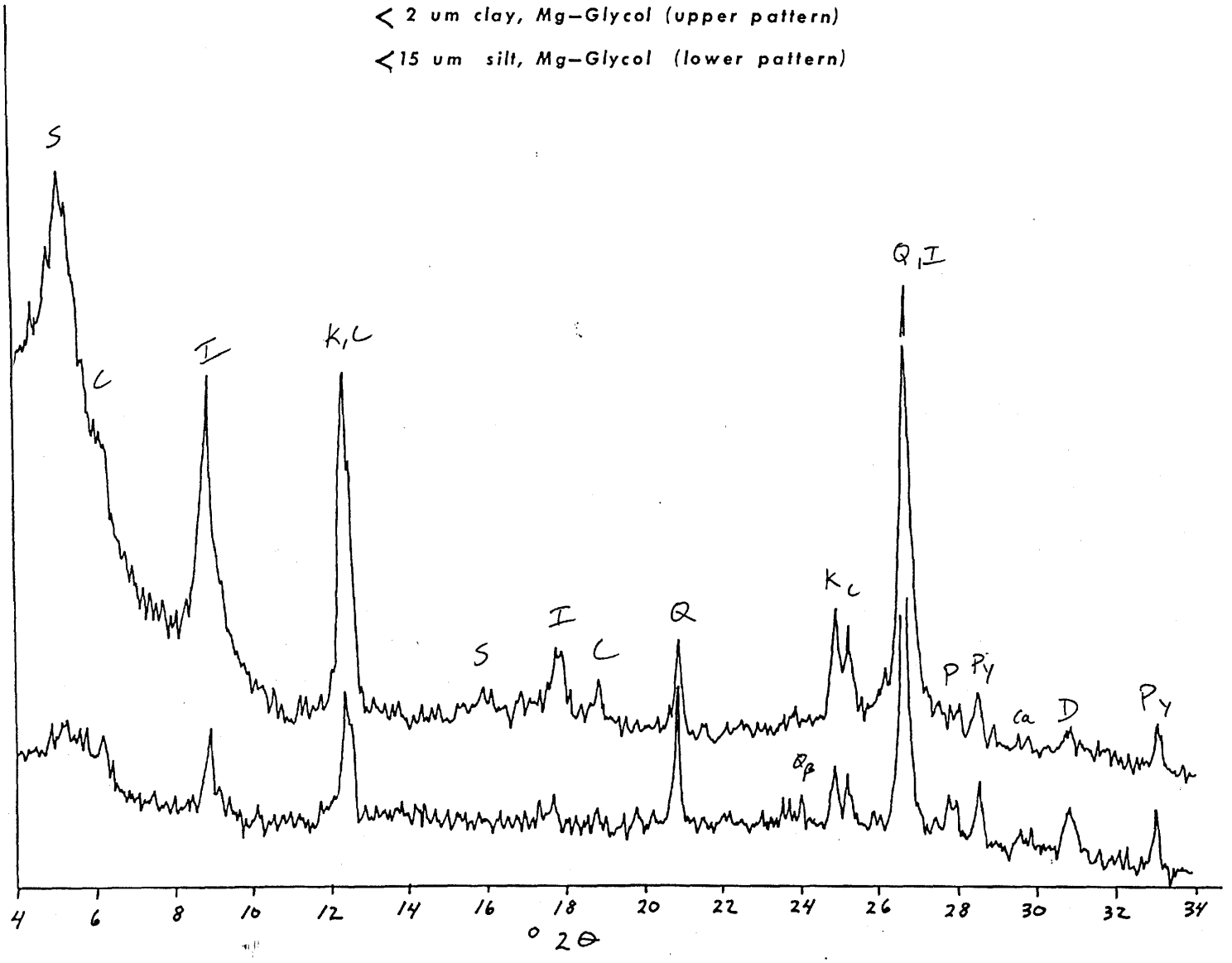

264-5140
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
4K
C
I
1K
K,C
S
I
C
Q
K
C
S
Q,I
P
HC
I
C
Q
K
C
P
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

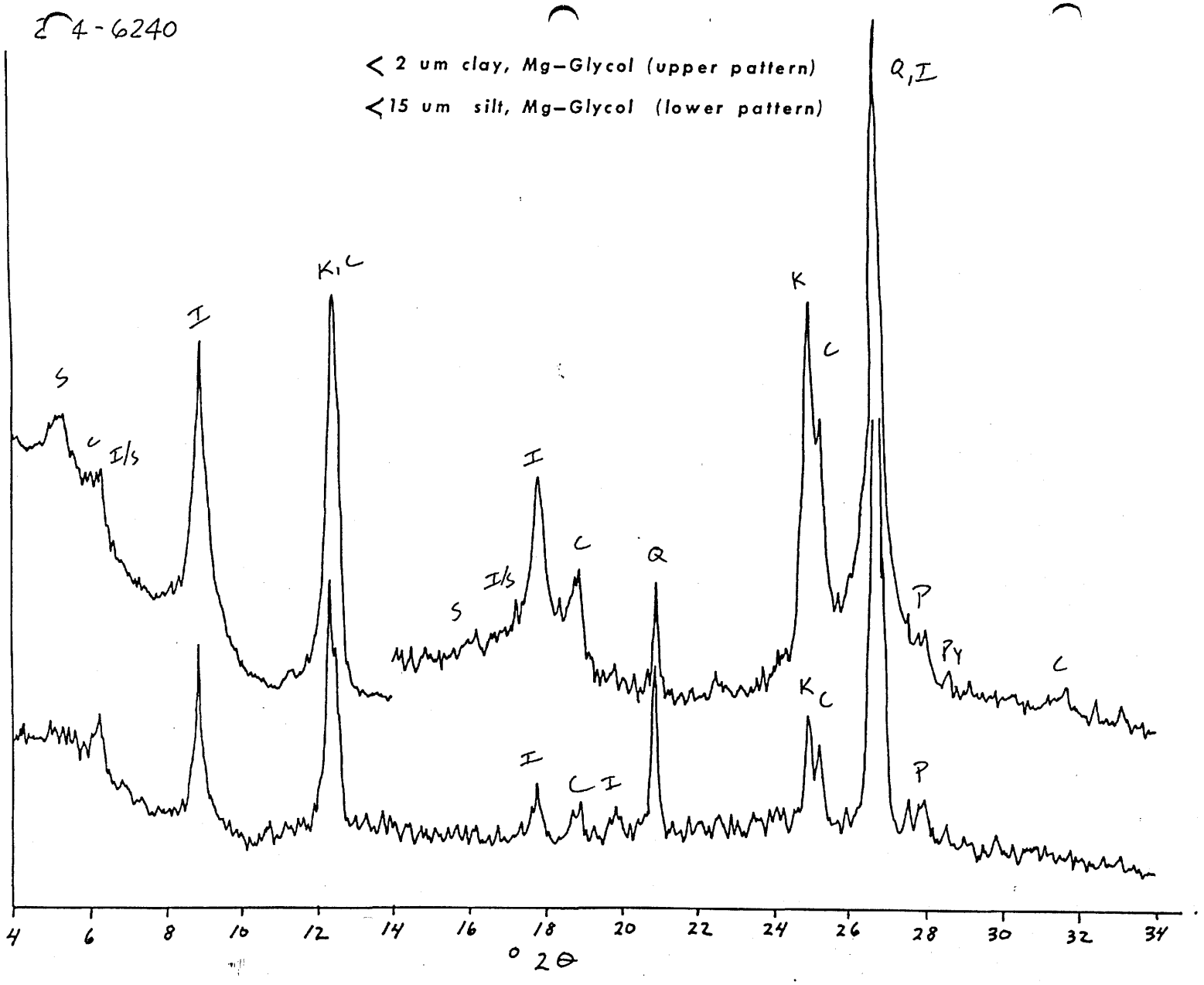

264-5800
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
C
I
K,C
S
I
C
Q
KC
Q,I
P
S,C
Py
P
Py
D
AP
Py
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

26-6100

< 2 um clay, Mg–Glycol (upper pattern)

< 15 um silt, Mg–Glycol (lower pattern)

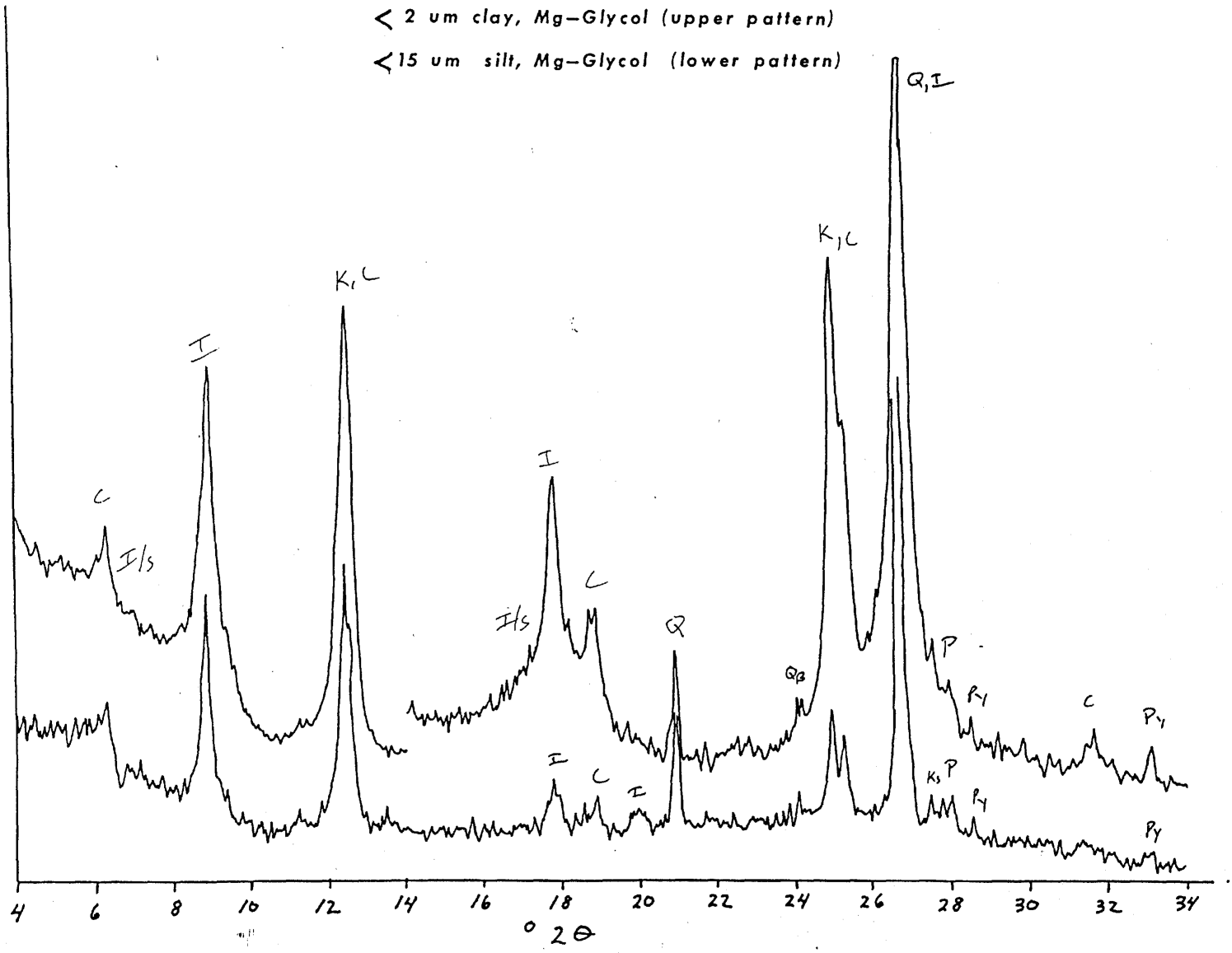



4-6240
< 2 um clay, Mg-Glycol (upper pattern)
<15 um silt, Mg-Glycol (lower pattern)
Q,I
K,C
I
S
C
I/S
K
C
I
C
Q
S
I/S
P
P
C
K
C
I
C I
P
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

264-6500

< 2 um clay, Mg–Glycol (upper pattern)

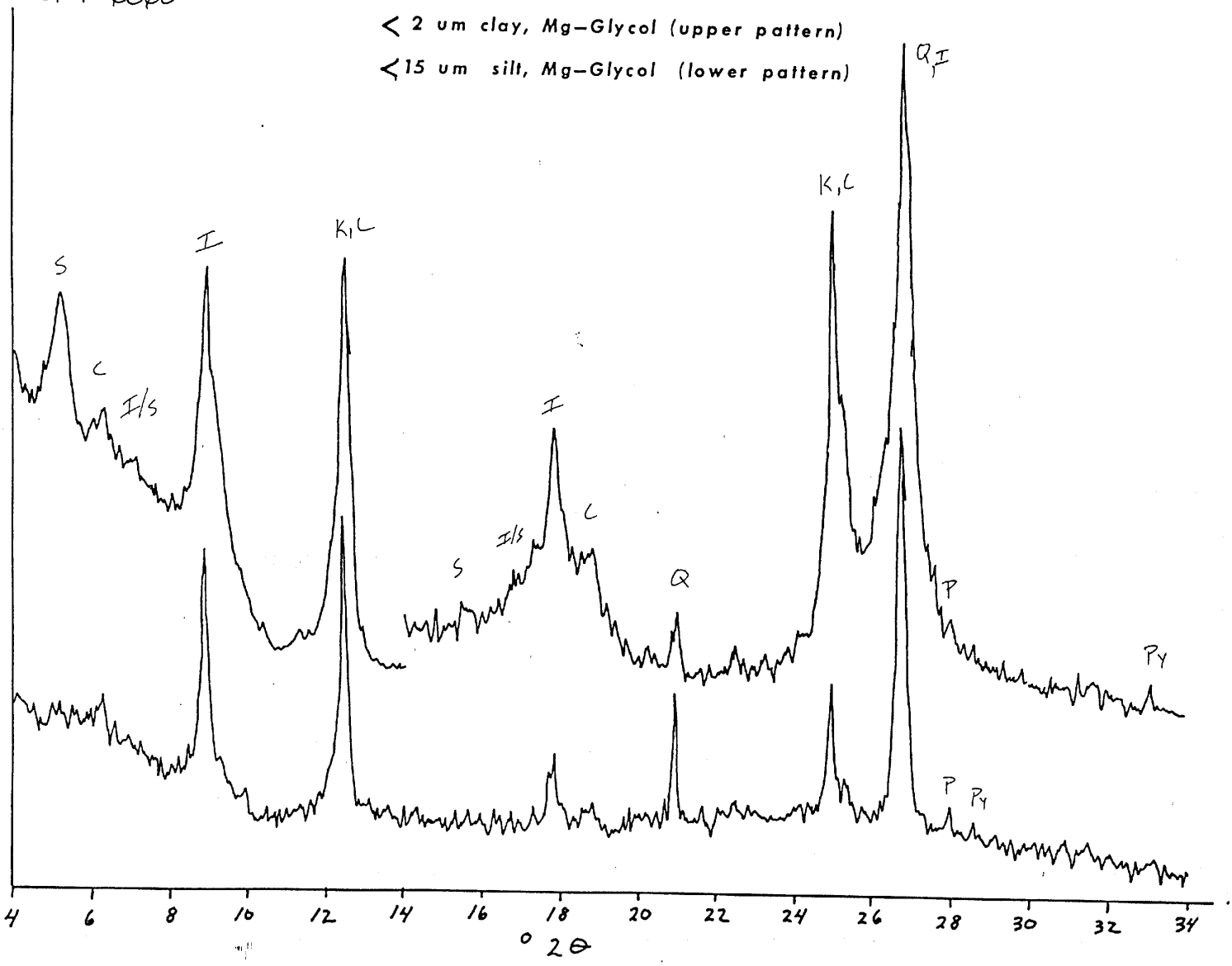
< 15 um silt, Mg–Glycol (lower pattern)



Zr 7-6860

< 2 um clay, Mg–Glycol (upper pattern)

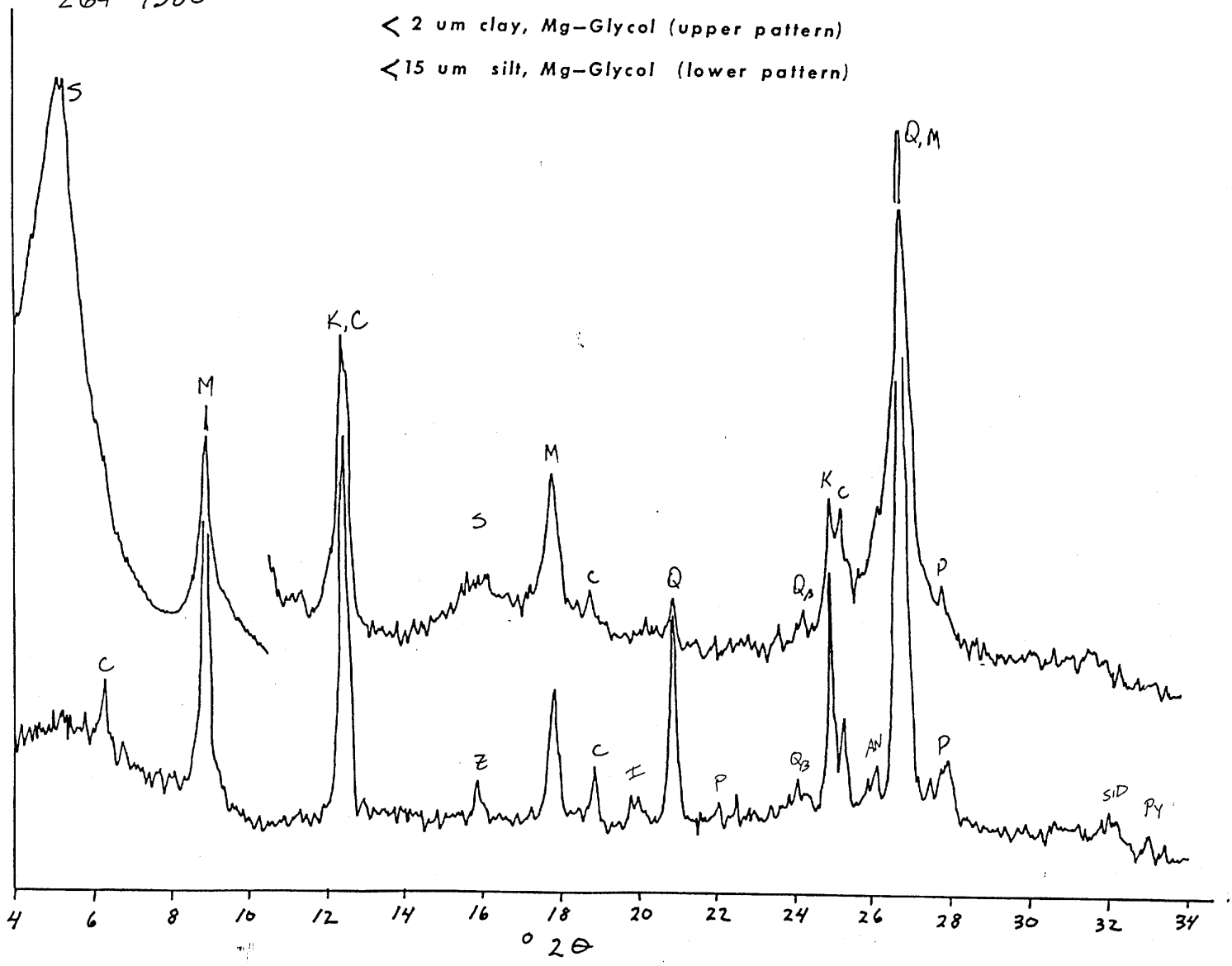
<15 um silt, Mg–Glycol (lower pattern)



264-7380

< 2 um clay, Mg–Glycol (upper pattern)

< 15 um silt, Mg–Glycol (lower pattern)



264-7640

< 2 um clay, Mg–Glycol (upper pattern)

< 15 um silt, Mg–Glycol (lower pattern)

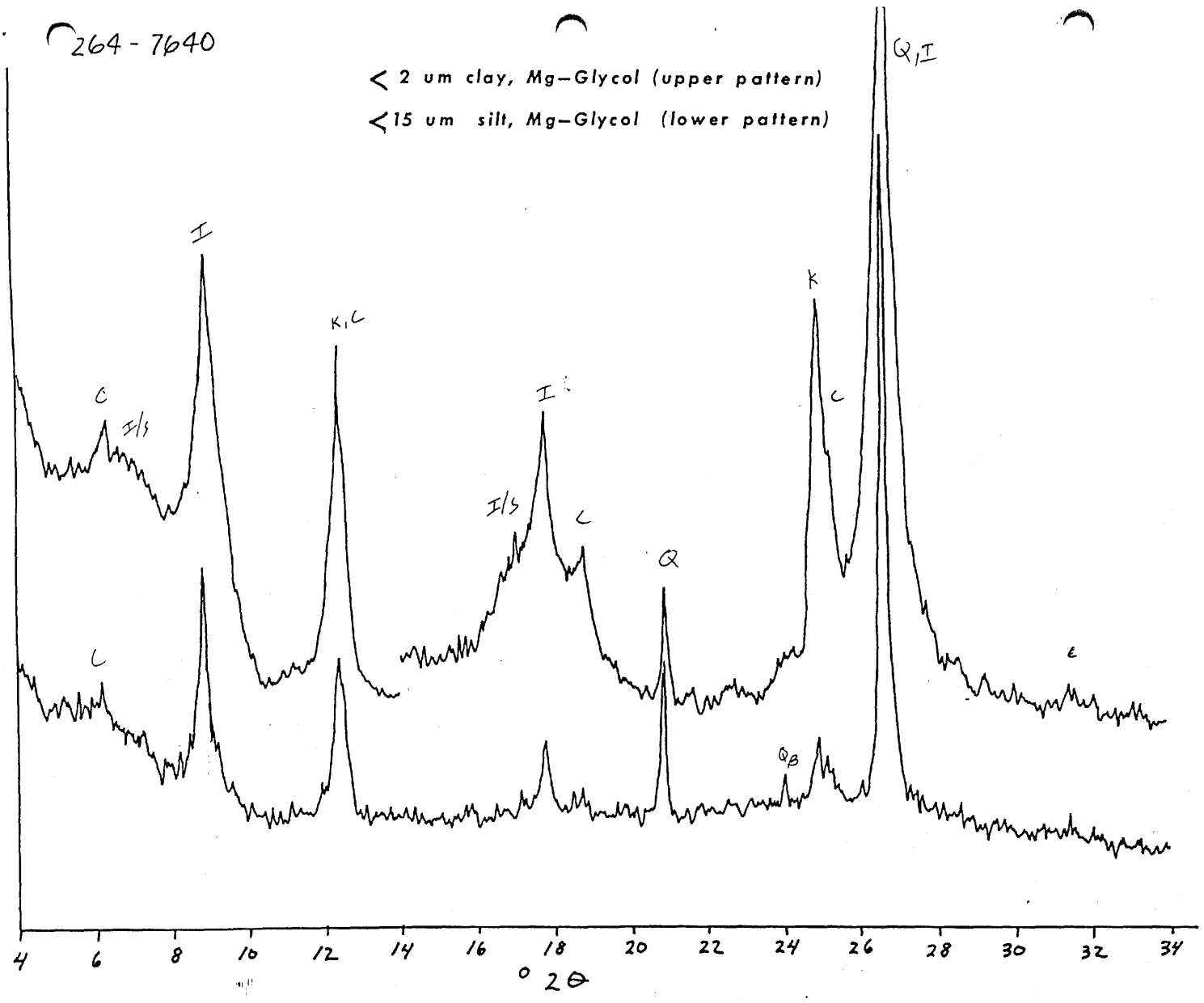


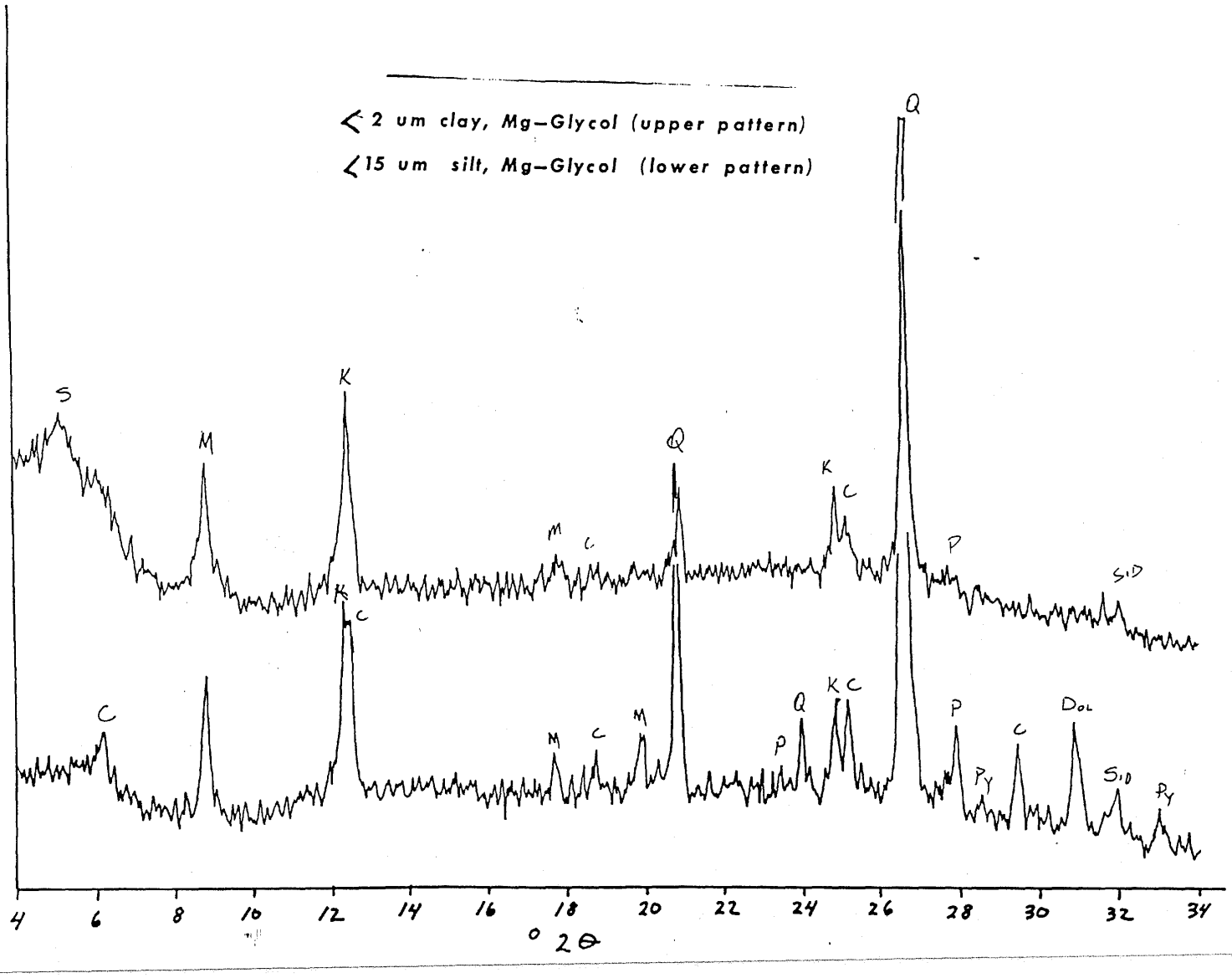
Table 4: Clay mineralogy of samples from Arco Toolik Federal #1 well.

ARCO TOOLIK FEDERAL #1

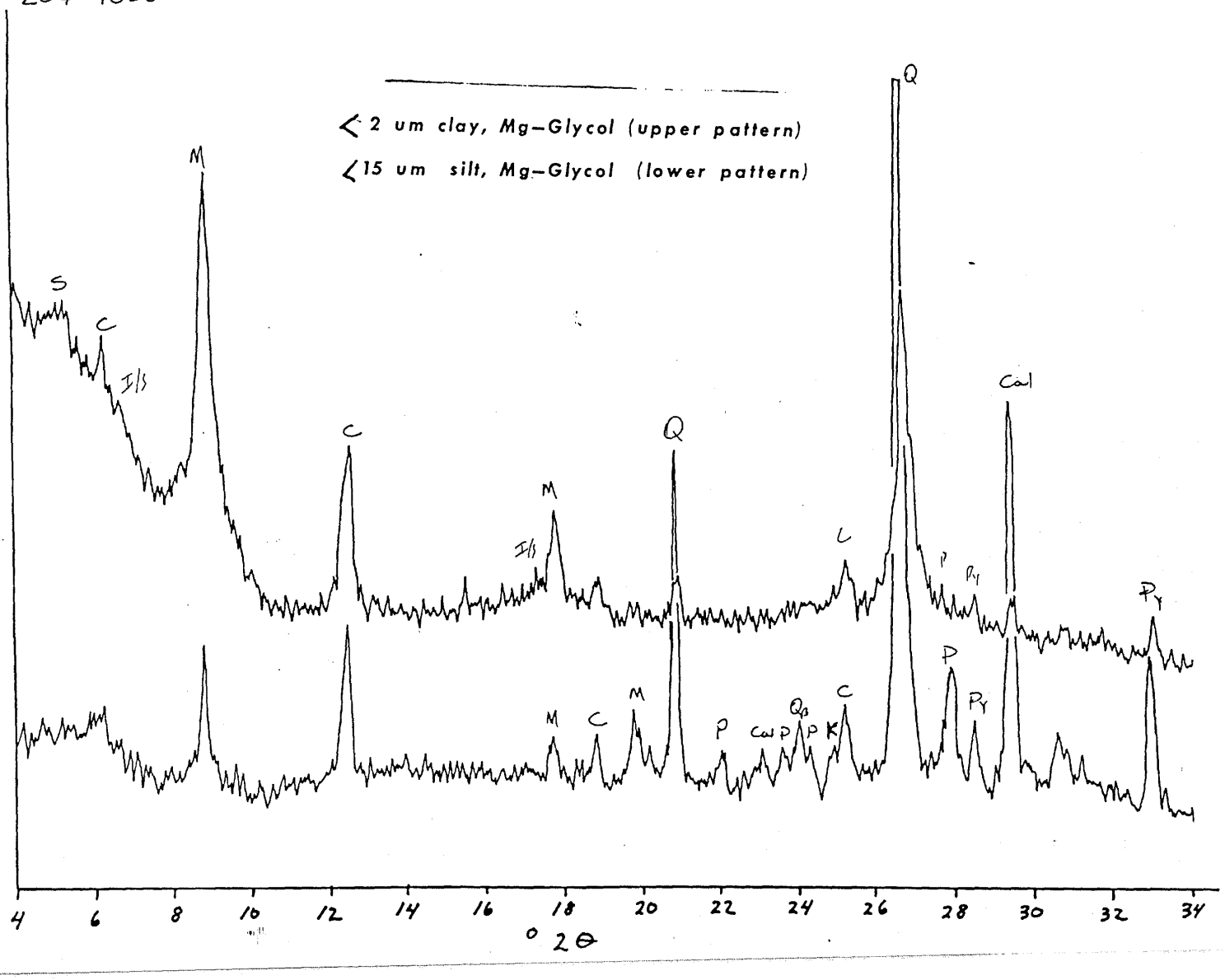
DEPTH FEET	STYPE	SMECTITE	CHLORITE	MIXED LAYER I/S	ILLITE	KAOLINITE	OTHER
6500	C	MOD	MOD	-	MOD	MAJ	Q2,SID,POOR PATTERN
6500-S	C	-	MAJ	-	MOD	MAJ	Q3,P1,CA1,D1,SID1,PY1
7830	C	MIN	MOD	MOD	MAJ	-	Q2,CA1,D1,PY1
7830-S	C	-	MAJ	-	MAJ	MOD	Q3,CA3,PY3,P2,D1
9030	C	MAJ	MOD	-	MOD	MIN	Q2,P1,ZEO?TUFFACEOUS
9030-S	C	MIN	MAJ	-	MAJ	MOD	Q3,AN2,P1,D1,PY1,SID?
9160	C	-	MOD	MOD	MOD	MOD	Q2,KS,P,PY
9150-S	C	-	MOD	-	MOD	MOD	Q3,P1,D1,PY1
9190	C	-	MOD	MOD	MOD	MOD	Q2,P,PY1
9190-S	C	-	MAJ	-	MOD	MOD	Q3,P1,D1,PY1
9200	C	-	MOD	MOD	MAJ	MOD	Q2,KS,P
9200-S	C	-	MAJ	-	MOD	MOD	Q3,P1,D1,PY1
9240	C	-	MOD	MOD	MOD	MOD	Q1,
9240-S	C	-	MOD	-	MOD	MAJ	Q3,P1,PY1,D
9250	C	-	MOD	MOD	MOD	MAJ	Q2,P,SID
9250-S	C	-	MOD	-	MOD	MAJ	Q2,P,PY1,SID1,D?
9550	C	-	MOD	MOD	MOD	MAJ	Q2
9550-S	C	-	MOD	MOD	MOD	MAJ	Q3,P1,D1,SID1,PY1
9960	C	-	MOD	MOD	MOD	MAJ	Q2,CA,PY
9960-S	C	-	MOD	-	MAJ	MAJ	Q3,P1,D1,PY1
10140	C	-	MOD	MOD	MOD	MAJ	Q2,P?,SID1,PY
10140-S	C	-	MOD	MOD	MAJ	MAJ	Q3,KS?,P,D1
10160	C	-	MOD	MOD	MOD	MAJ	Q2,CA1,P
10160-S	C	-	MOD	-	MAJ	MAJ	Q3,CA2,D1,SID1,P,PY1
10190	C	-	MOD	MOD	MOD	MOD	Q2
10190-S	C	-	MOD	-	MAJ	MAJ	Q3,P,D1,SID,PY1
10200	C	-	MOD	MOD	MOD	MAJ	Q2,D?
10200-S	C	-	MOD	MOD	MAJ	MAJ	Q3,P?,D
10220	C	-	MOD	MOD	MAJ	MOD	Q2
10220-S	C	-	MOD	MOD	MOD	MAJ	Q3,P?,D,PY
10760	C	-	MOD	MOD	MOD	MAJ	Q2,P,PY
10760-S	C	-	MAJ	MOD	MOD	MAJ	Q3,P,D1,PY1

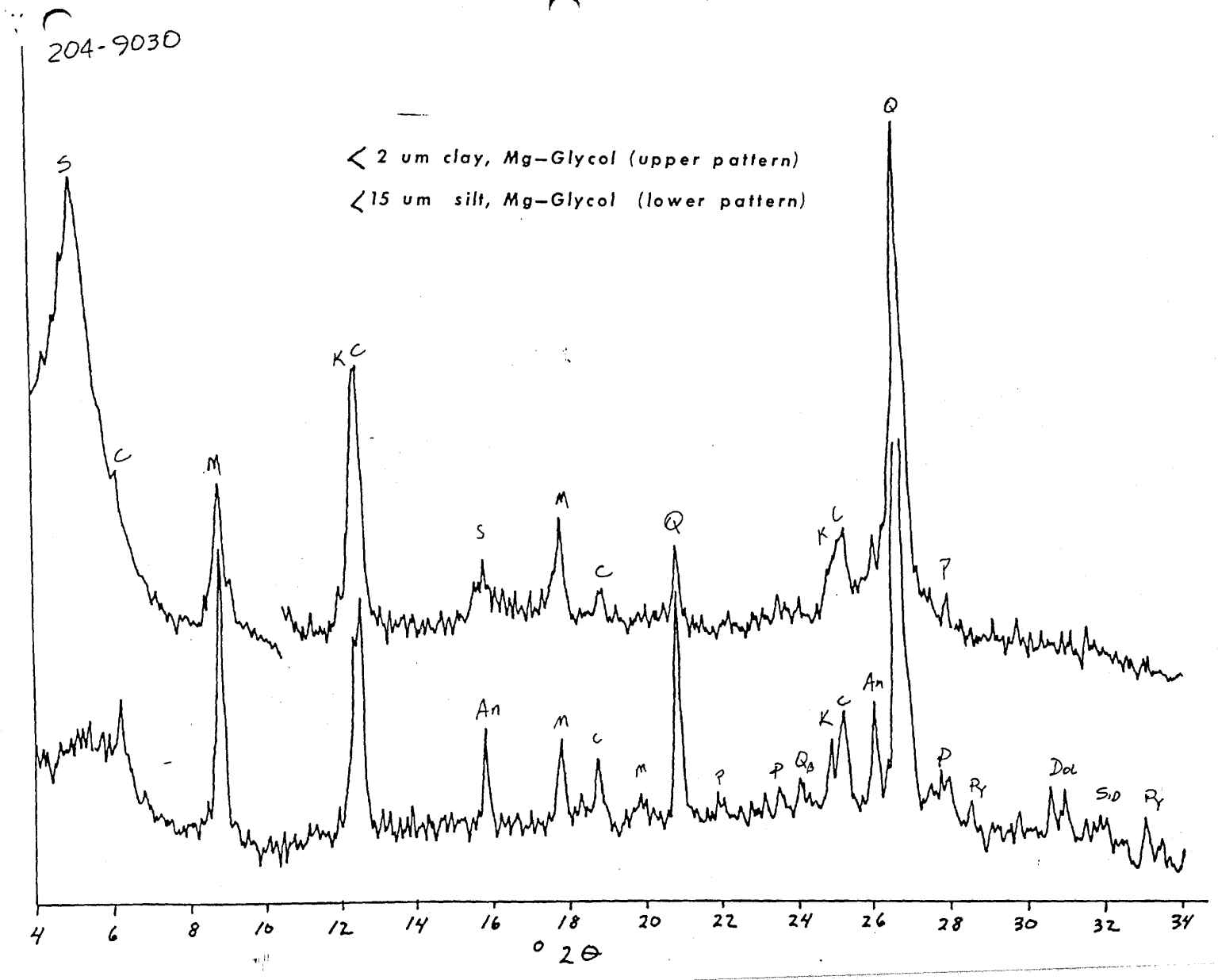
Definitions: TR = less than 3%, MIN = 3 - 12%, MOD = 13 - 35%, MAJ = >35%. Other mineral abbreviations: Q = quartz, P = plagioclase, KS = k-spar, AN = analcime, HC =heulandite-clinoptilolite, CA = calcite, D = dolomite, AP = apatite, SID = siderite, PY = pyrite, BA = barite. 1 = weak, 2 = moderate, 3 = strong, nothing = trace. MDM = mostly drill mud, BK.SH. = black shale, GR. = gray, SIS. = siltstone, TUFF. = tuffaceous, ANK = ankerite. Also: STYPE = sample type, C = cuttings, CC = core, SW = side wall, C = mill

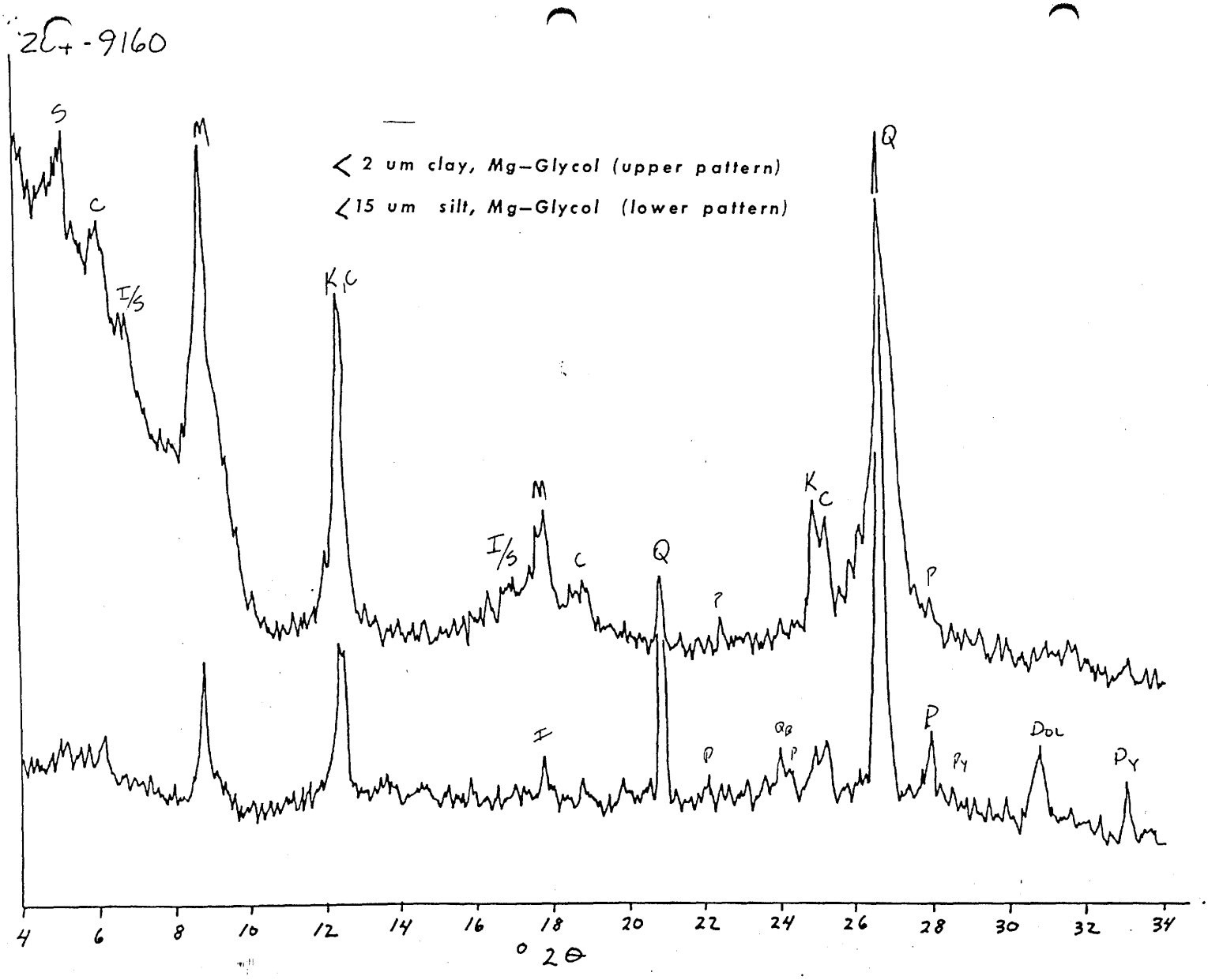
204-6500

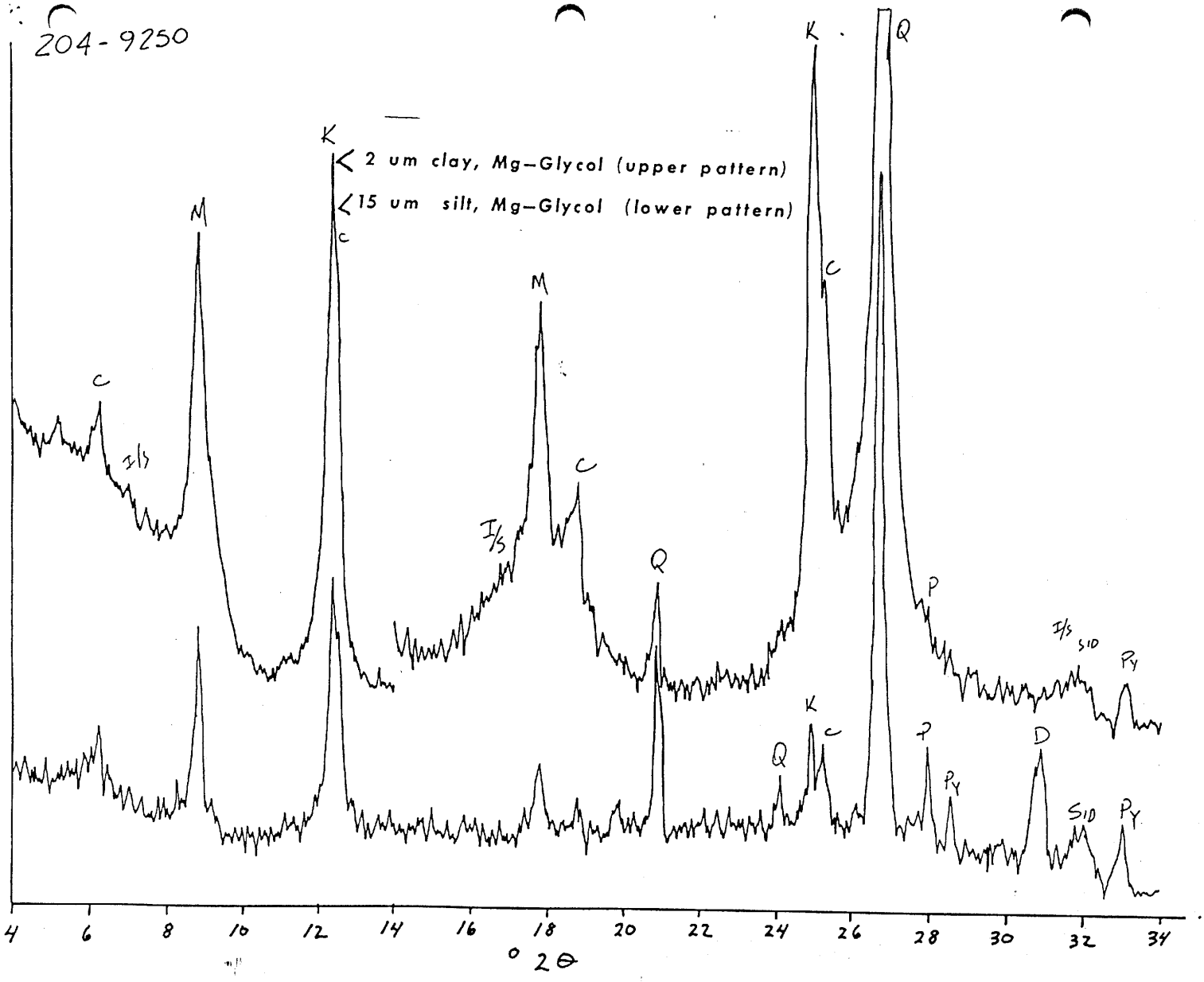

< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
S
M
K
C
Q
P
Py
Dol
Sid
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

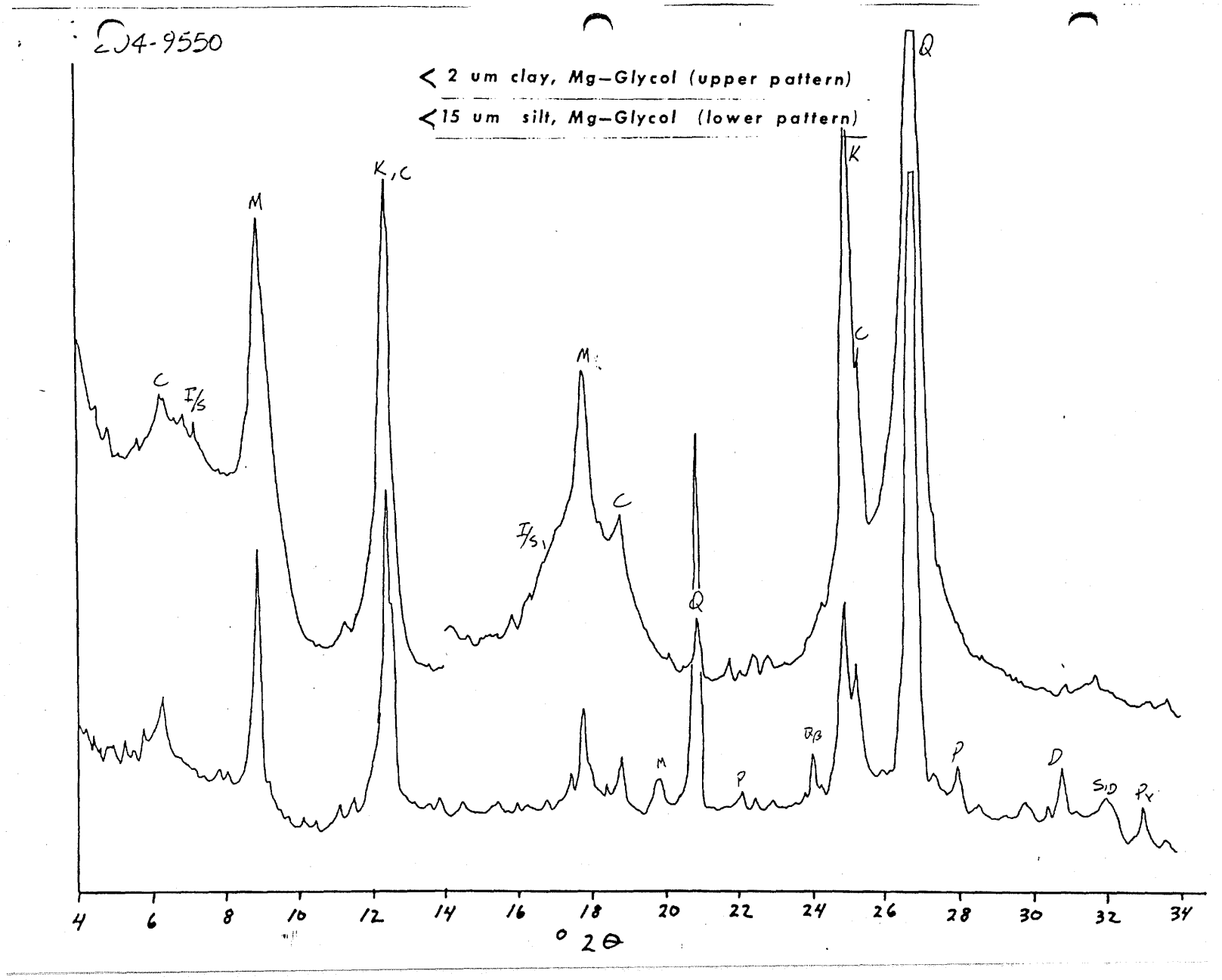
204-7830

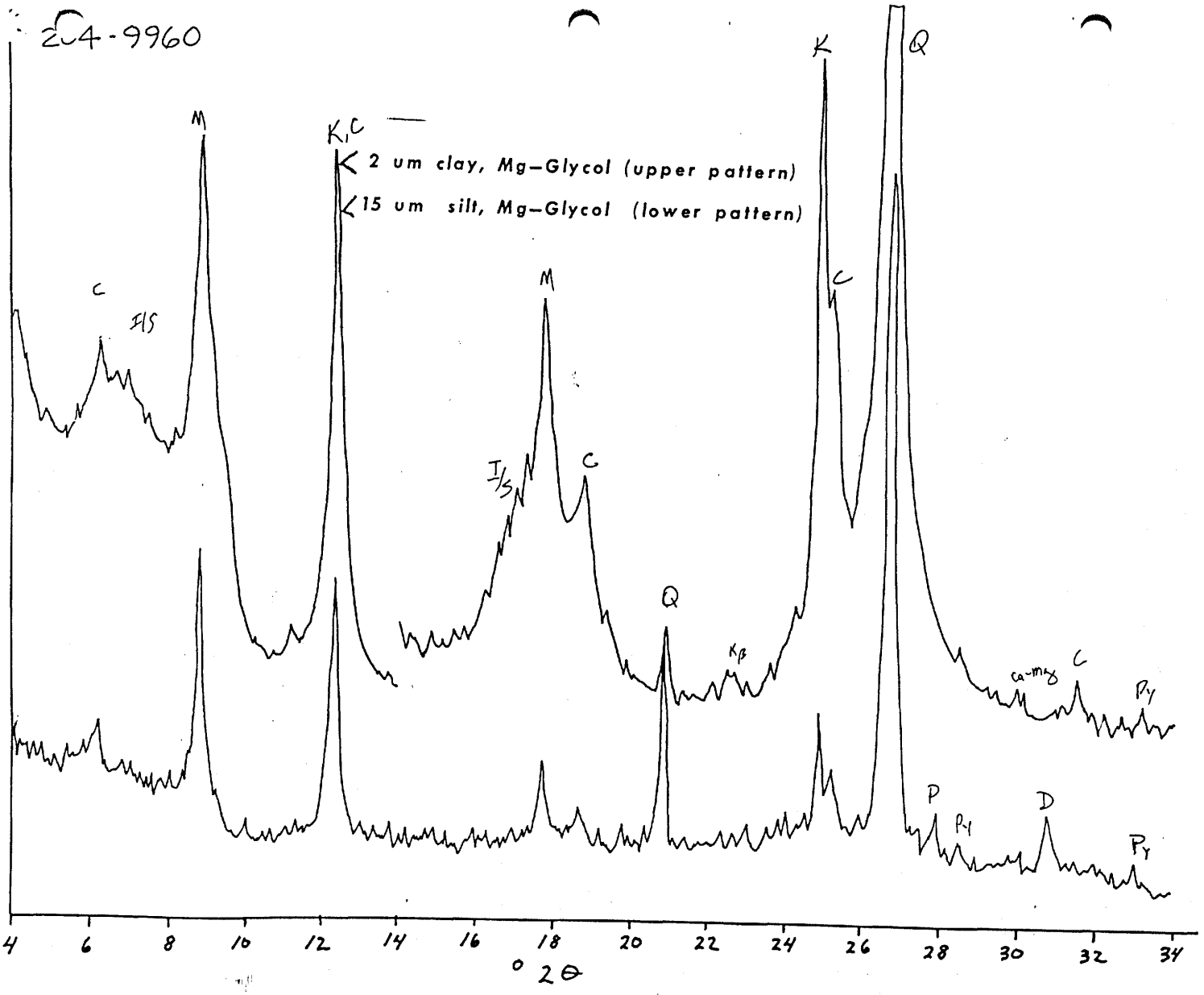

< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
S
C
I/S
M
C
M
I/S
Q
C
Q
P
Py
Cal
P
Py
Py
M
C
M
P
Cal
P
Qβ
P
K
C
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

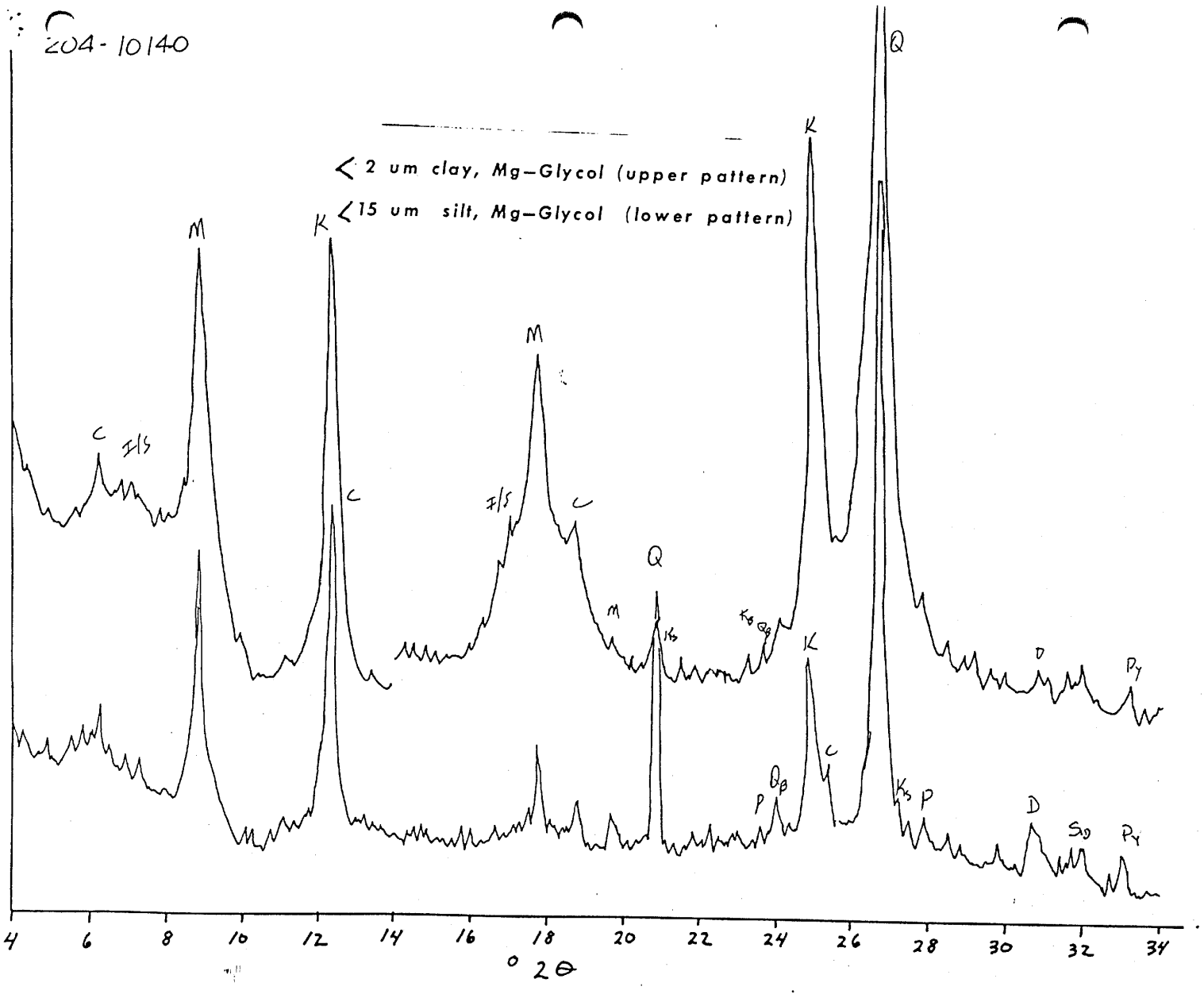

204-9030
< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
S
C
M
K C
S
m
C
Q
K C
Q
P
An
m
c
m
P
P
Q
K C
An
P
Ry
Dol
Sid
Ry
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

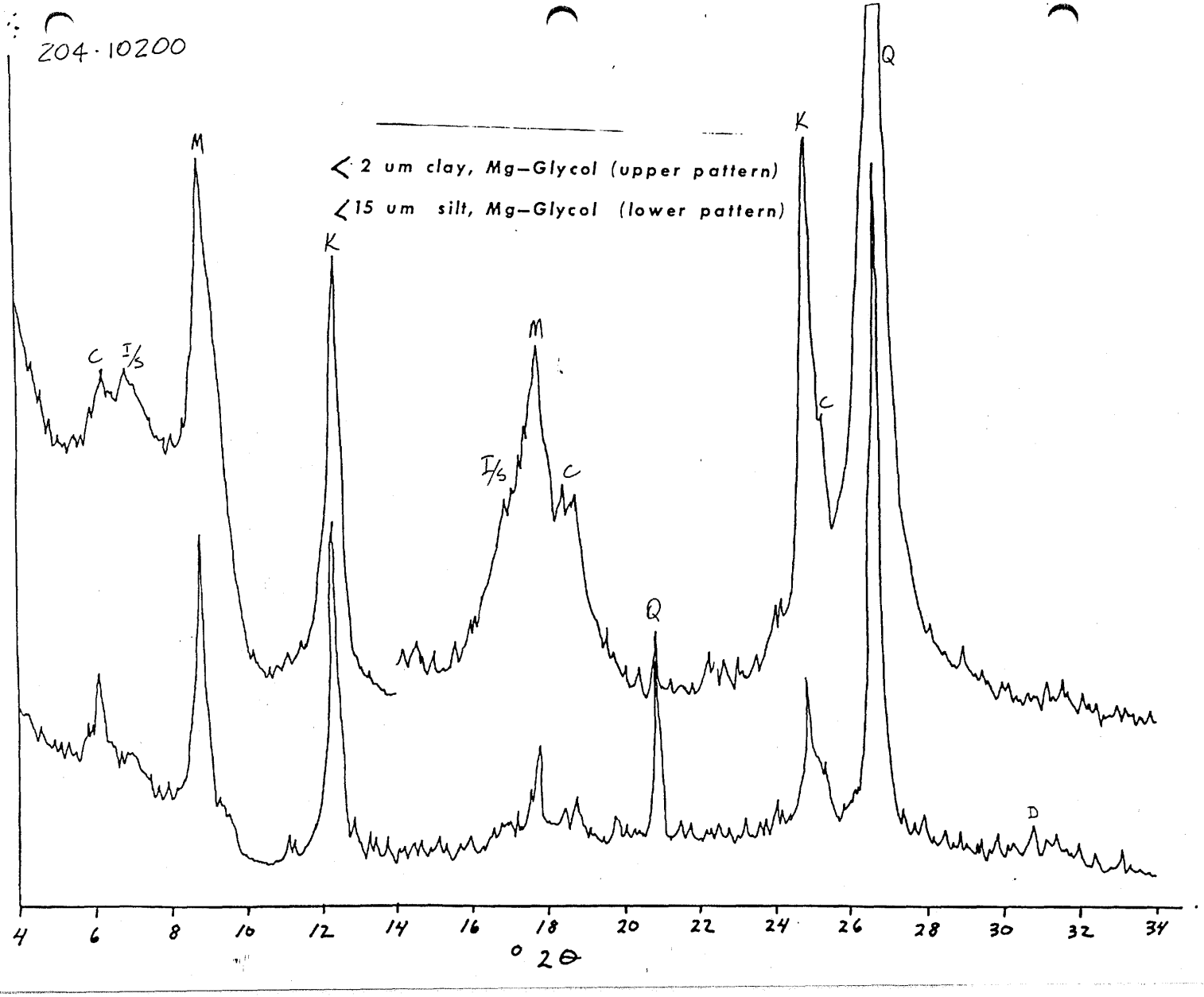

2C+-9160
< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
S
C
I/S
M
K,C
I/S
M
C
Q
K
C
Q
P
P
I
P
P
Dol
Py
Py
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


204-9250
2 um clay, Mg-Glycol (upper pattern)
15 um silt, Mg-Glycol (lower pattern)
K
M
C
I/S
Q
P
Py
D
S10
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


EJ4-9550
< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
K,C
M
C
I/S
M
I/S
C
Q
K
C
Q
M
P
B/β
P
D
S,D
P
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


204-9960
2 um clay, Mg-Glycol (upper pattern)
15 um silt, Mg-Glycol (lower pattern)
M
K,C
C
I/S
M
I/S
C
Q
Kβ
K
C
Q
ca-mg
C
Py
P
P-1
D
Py
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


204-10140
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
M
K
C
I/S
Q
D
P
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


204-10200
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
M
K
C
I/s
M
K
Q
I/s
C
C
Q
D
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

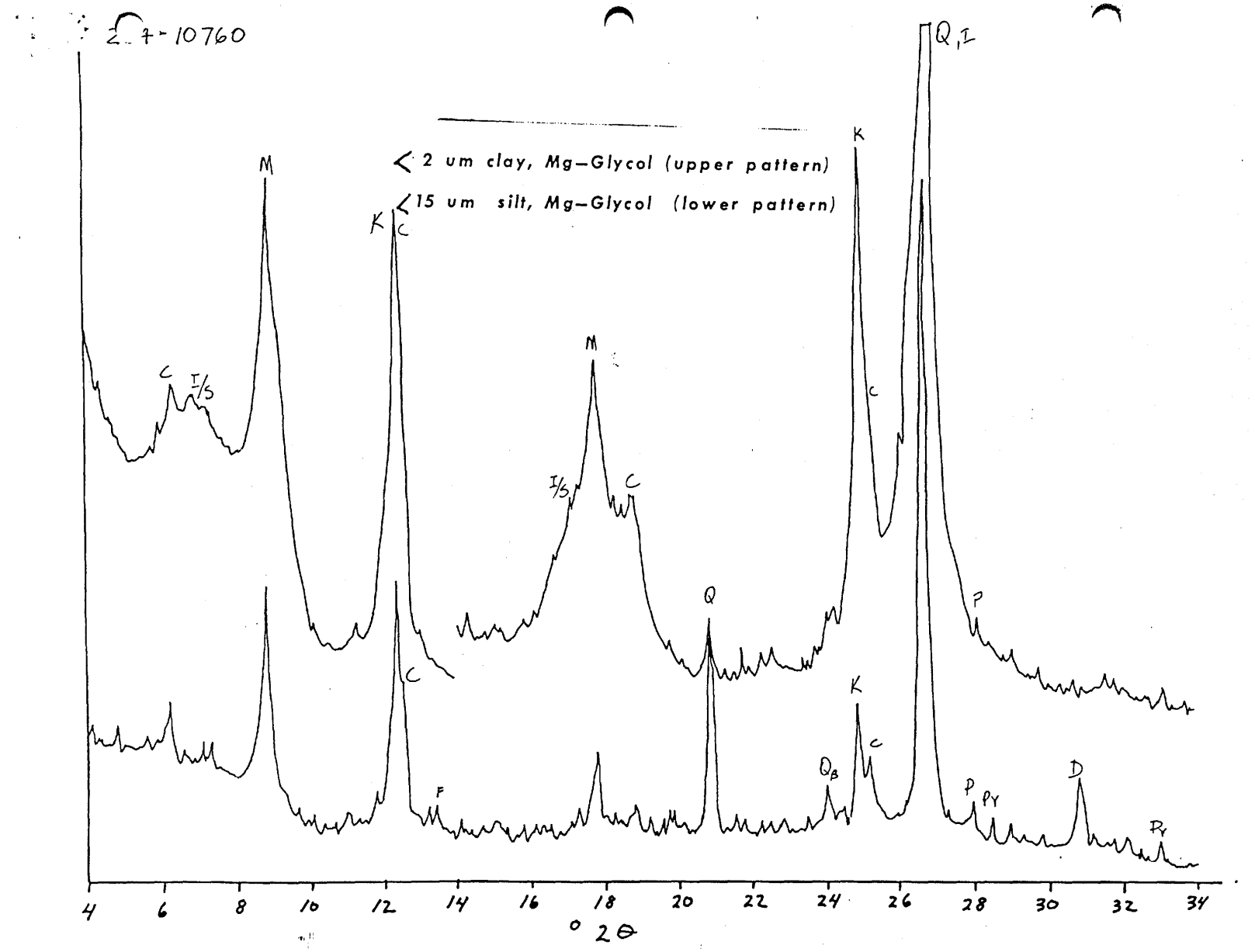
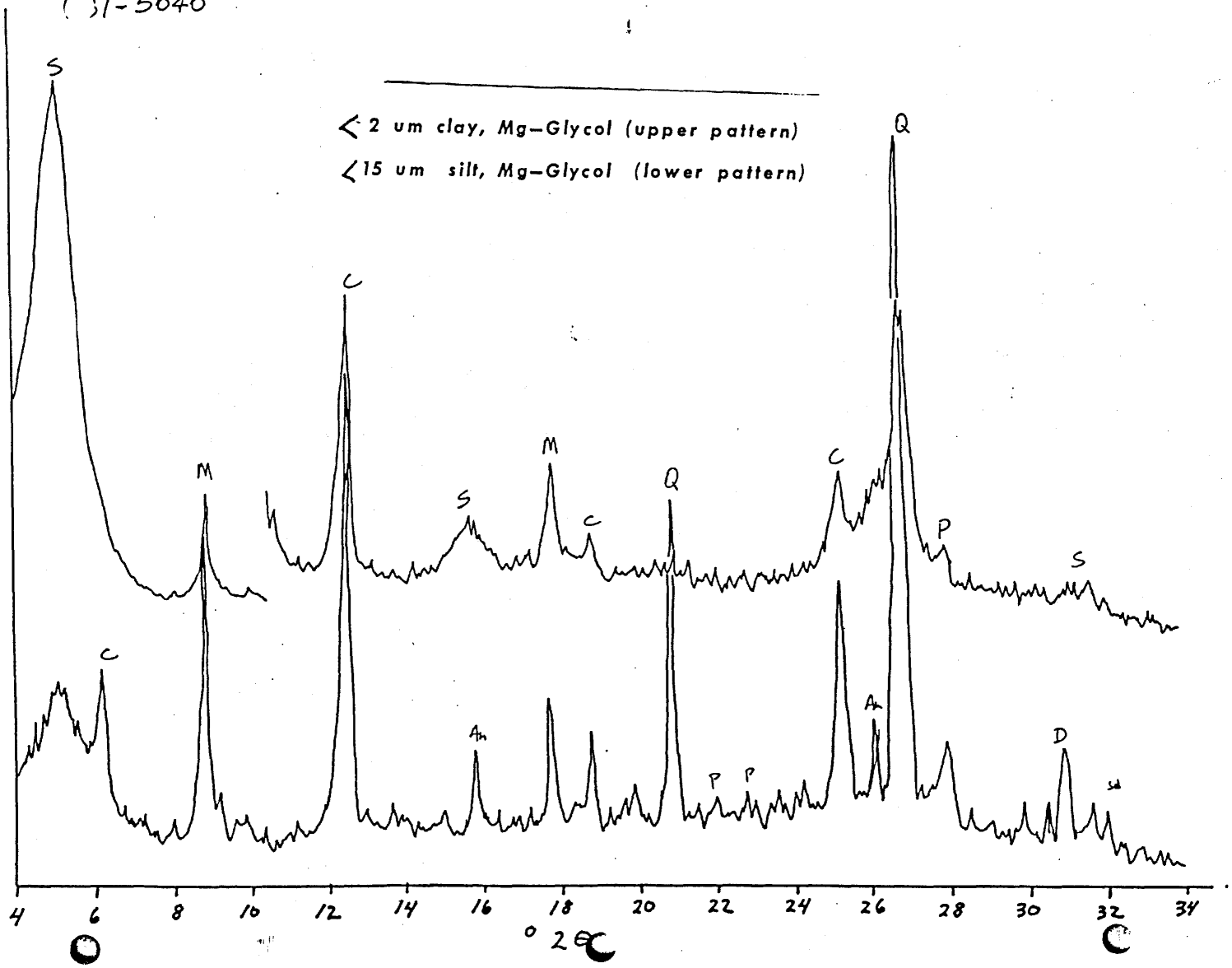

2-7-10760
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
M
K
C
I/S
Q
Q,I
P
Py
D
Dy
F
Qβ
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

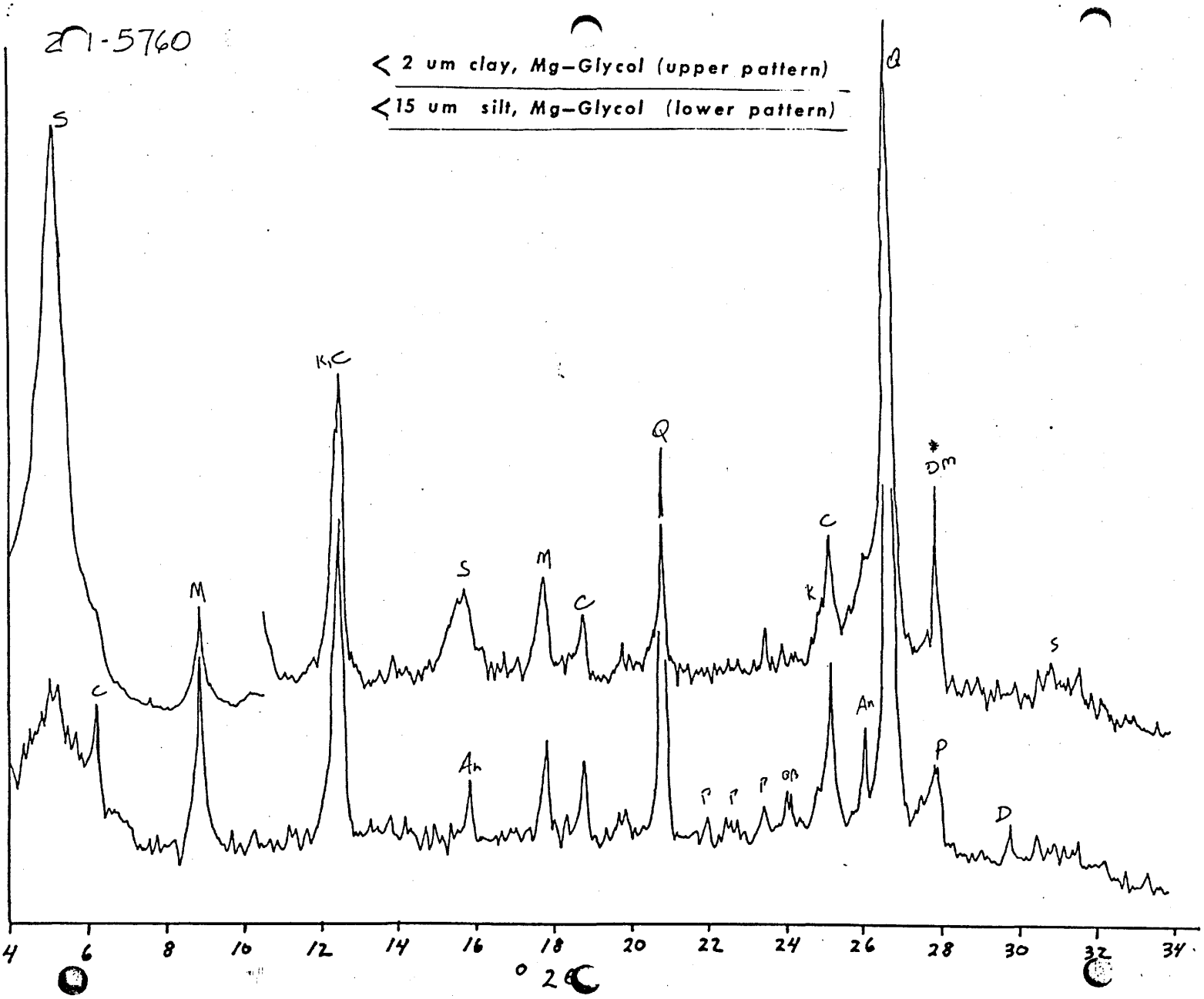
Table 5: Clay mineralogy of samples from Arco Toolik Federal #2 well.

ARCO TOOLIK FEDERAL #2

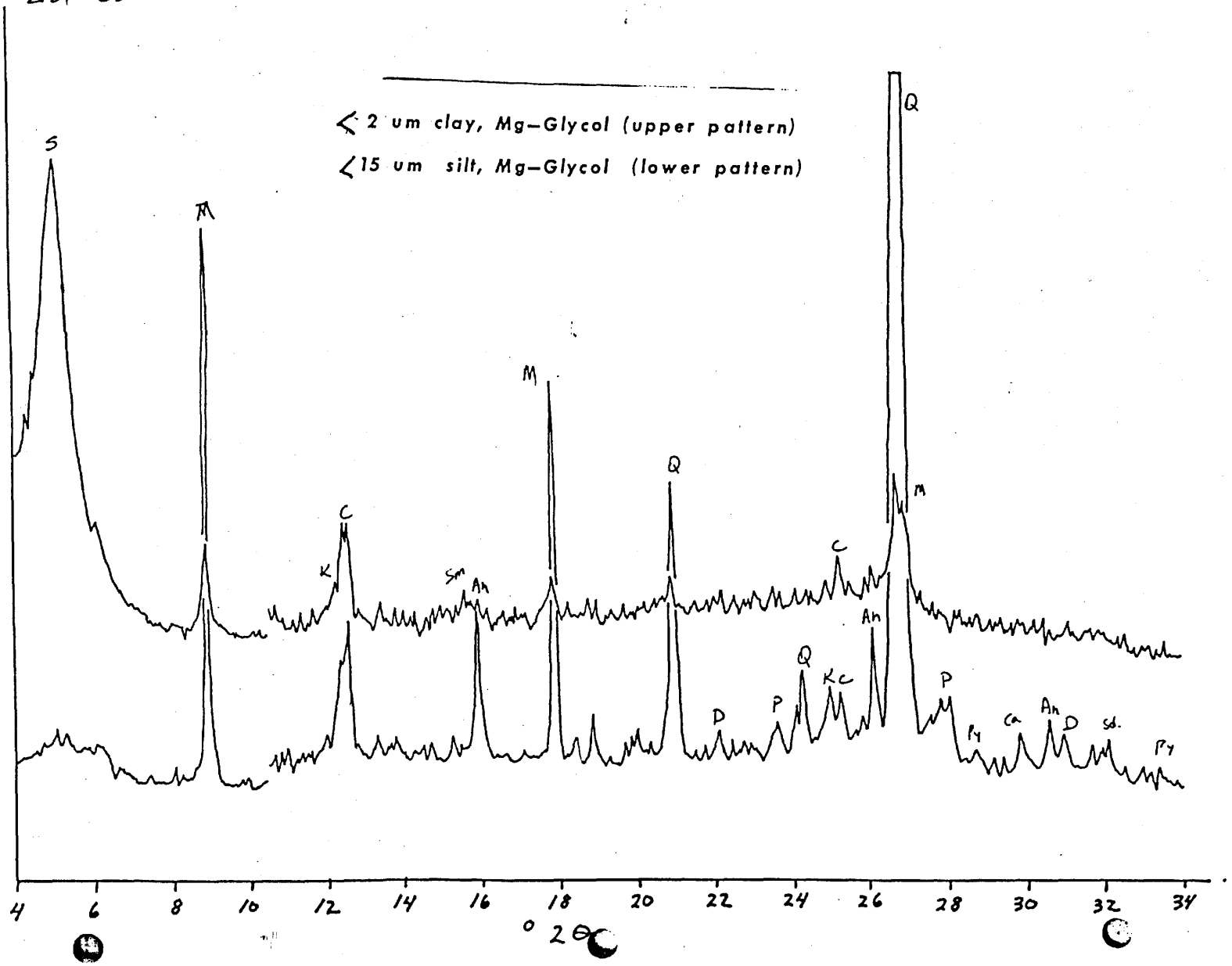
DEPTH FEET	STYPE	SMECTITE	CHLORITE	MIXED LAYER I/S	ILLITE	KAOLINITE	OTHER
5040	C	MAJ	MOD	-	MOD	-	Q1,P1,MDM
5040-S	C	MOD	MAJ	-	MOD	MOD	Q3,P1,AN2,D1
5760	C	MAJ	MOD	-	MOD	-	Q3,P1,MDM
5760-S	C	MOD	MAJ	-	MAJ	TR	Q3,D1,AN2,P1
6300	C	MAJ	MOD	-	MOD	MOD	Q1,MDM
6300-S	C	TR	MOD	-	MAJ	MOD	Q3,AN2,P1,D1,SID
6820	C	MAJ	MOD	MOD	MOD	MOD	Q2,P,TUFF.GR.SH.
6820-S	C	MOD	MOD	-	MOD	MOD	Q3,P1,D1
7450	C	MAJ	MOD	MOD	MOD	MOD	Q2,P,GR.SH.
7450-S	C	MOD	MAJ	-	MAJ	MOD	Q3,AN1,P1,PY1
7740	C	MAJ	MOD	MOD	MOD	MOD	Q2,P,DGR.SH.
7740-S	C	MOD	MOD	-	MAJ	MOD	Q2,P1,PY1
7840	C	MAJ	MOD	MOD	MOD	MOD	Q3,P1,DGR.SH
7840-S	C	MOD	MOD	-	MAJ	MAJ	Q3,P1,PY1,D
8100	C	MAJ	MOD	MOD	MOD	MOD	Q1
8100-S	C	MOD	MOD	-	MOD	MOD	Q2,P1
8500	C	MOD	MOD	MOD	MOD	MOD	Q2,CA,BK.SH.
8500-S	C	MOD	MOD	-	MOD	MAJ	Q3,P1,PY1,SID1

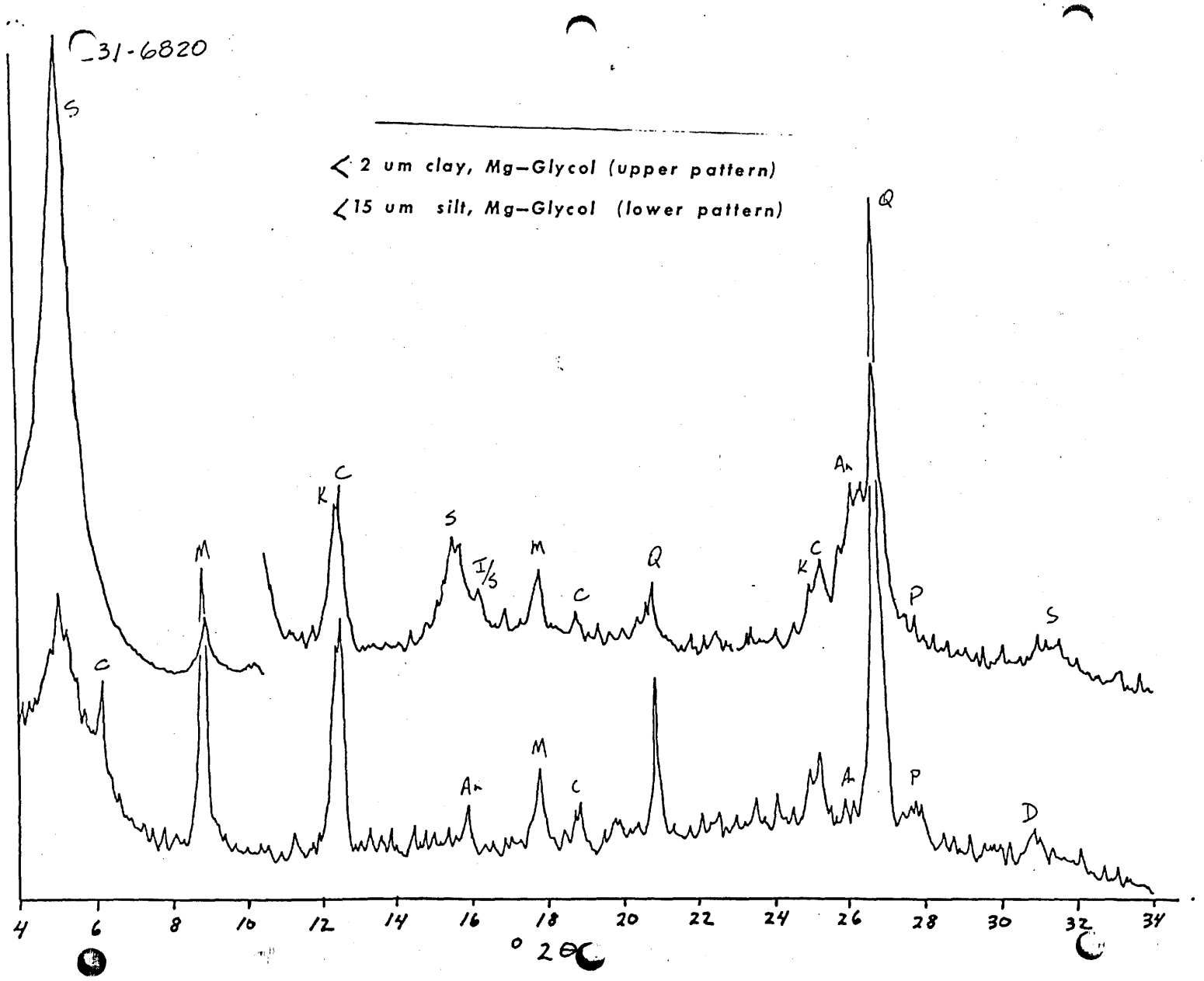
Definitions: TR = less than 3%, MIN = 3 - 12%, MOD = 13 - 35%, MAJ = >35%. Other mineral abbreviations: Q = quartz, P = plagioclase, KS = k-spar, AN = analcime, HC =heulandite-clinoptilolite, CA = calcite, D = dolomite, AP = apatite, SID = siderite, PY = pyrite, BA = barite. 1 = weak, 2 = moderate, 3 = strong, nothing = trace. MDM = mostly drill mud, BK.SH. = black shale, GR. = gray, SIS. = siltstone, TUFF. = tuffaceous.
Also: STYPE = sample type, C = cuttings, CC = core, SW = side wall, S = silt.

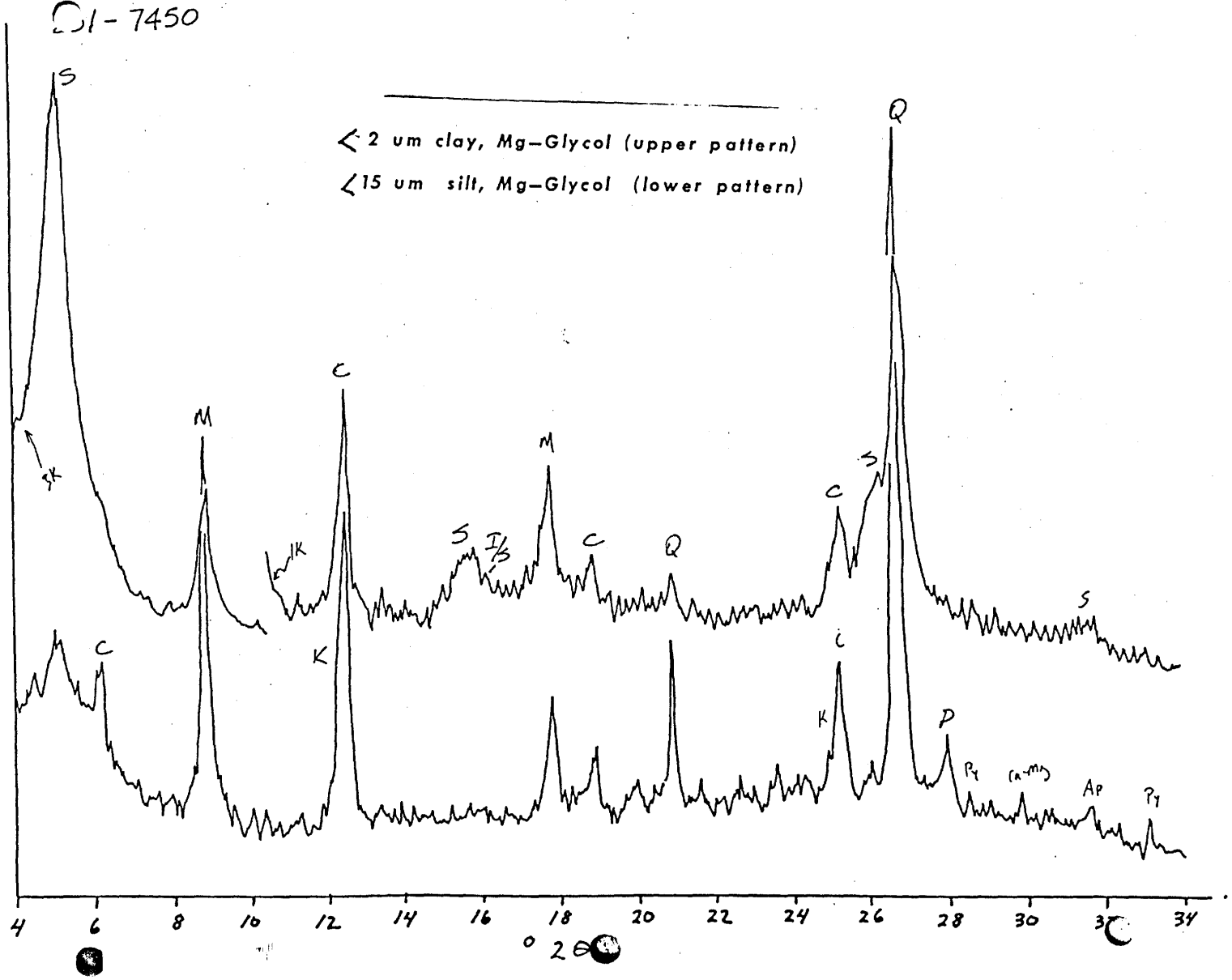

31-5040
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
M
C
S
M
C
Q
C
Q
P
S
C
Am
P
P
Am
D
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

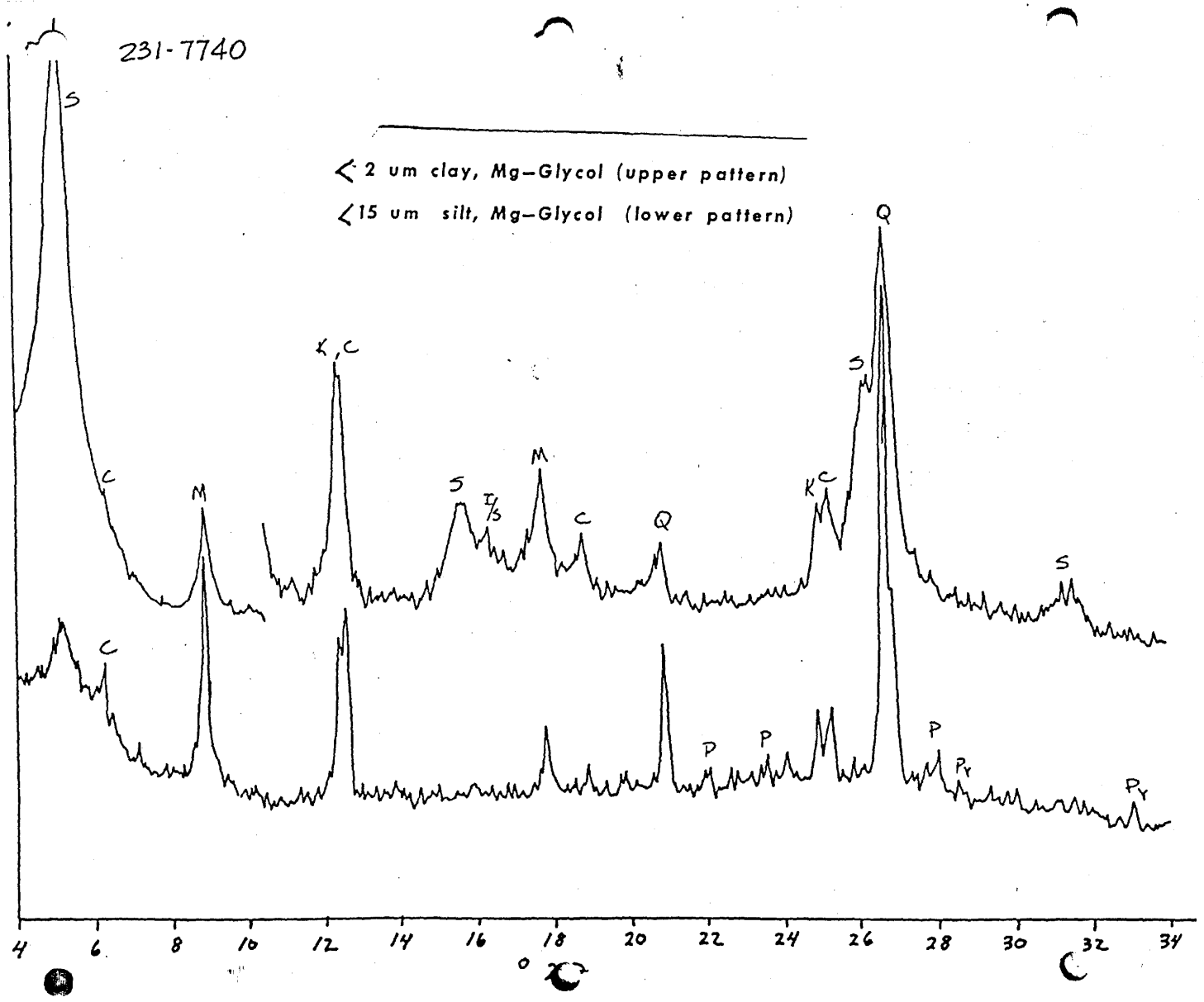

ZT1-5760
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
M
K,C
S
M
C
Q
K
C
Q
*
Dm
S
C
An
P
D
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

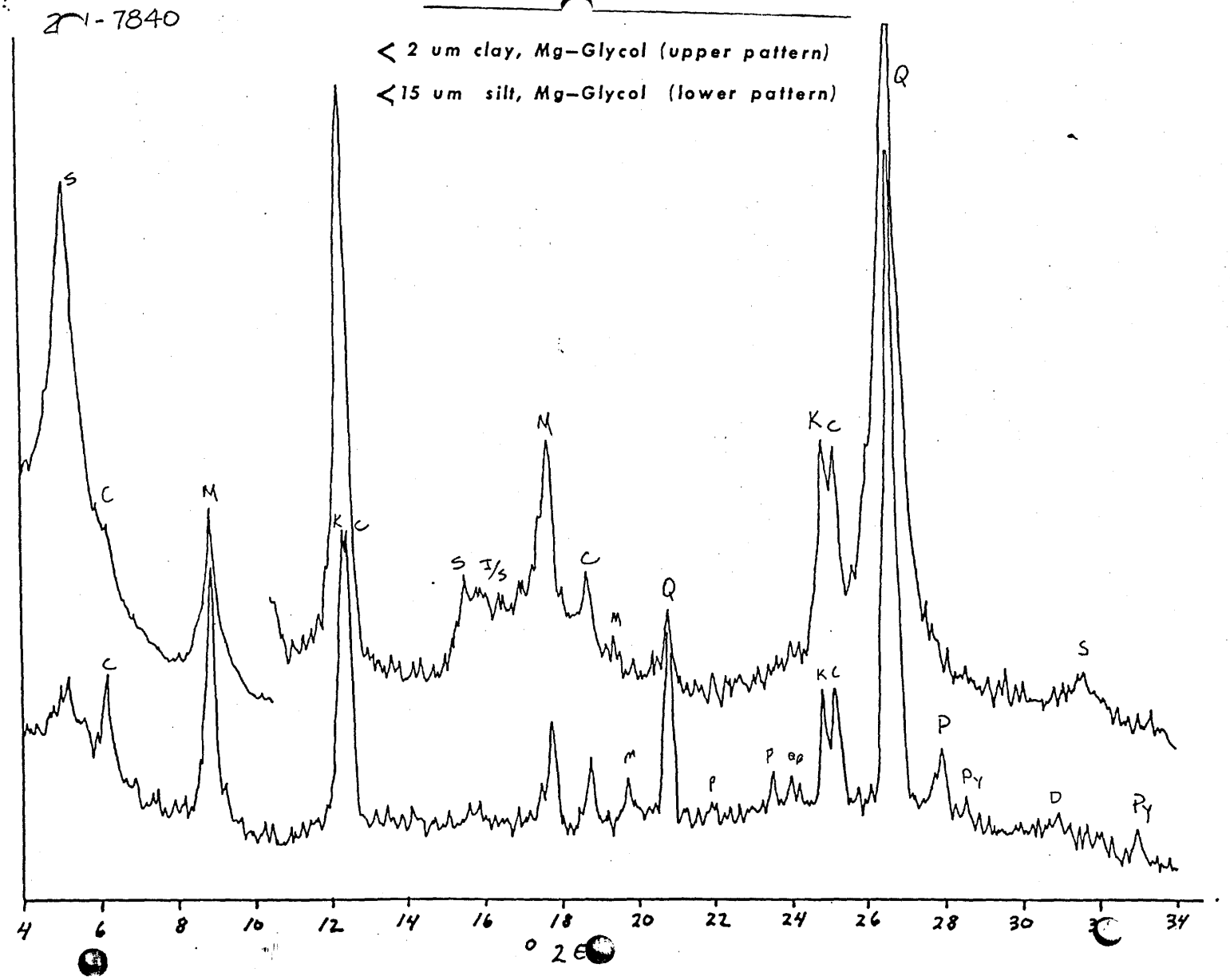
23 6300


< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
S
M
C
K
Sm
An
M
Q
D
P
Q
K C
An
C
Q
M
P
Py
Ca
An
D
Sd.
Py
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


31-6820
< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
S
K
C
M
S
I/S
M
C
Q
K
C
An
Q
P
S
C
An
M
C
An
P
D
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


DI-7450
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
M
C
K
Q
I/S
P
Py
Ap
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

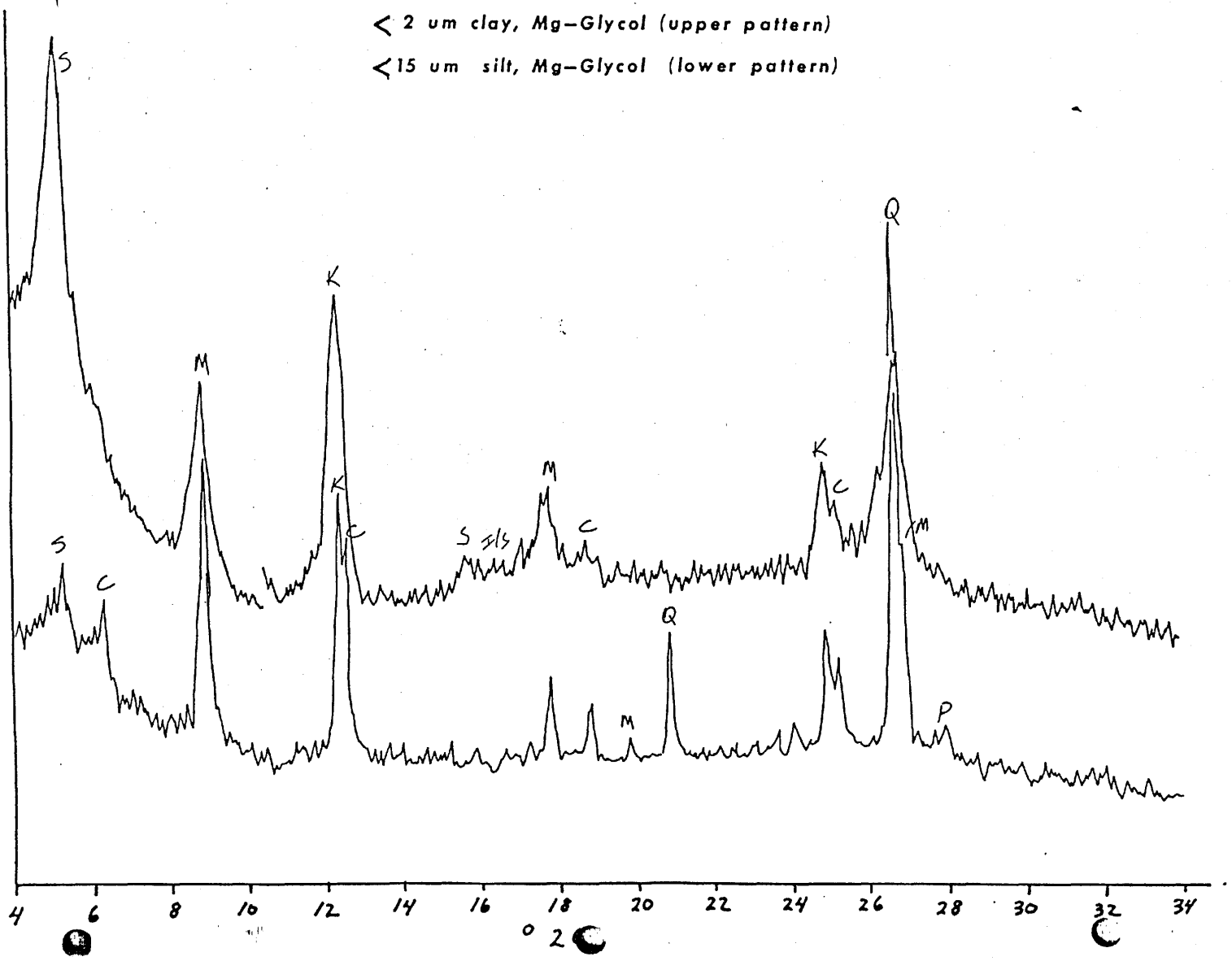

231-7740
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
C
M
K, C
S
I/S
M
C
Q
K
C
S
Q
S
C
P
P
P
Pr
Pr
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34


ZT-7840
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
C
M
K C
S I/S
M
C
m
Q
K C
Q
S
P
P
Py
D
Py
4 6 8 10 12 14 16 18 20 22 24 26 28 30 34
° 2θ

23-8100

< 2 um clay, Mg–Glycol (upper pattern)

< 15 um silt, Mg–Glycol (lower pattern)



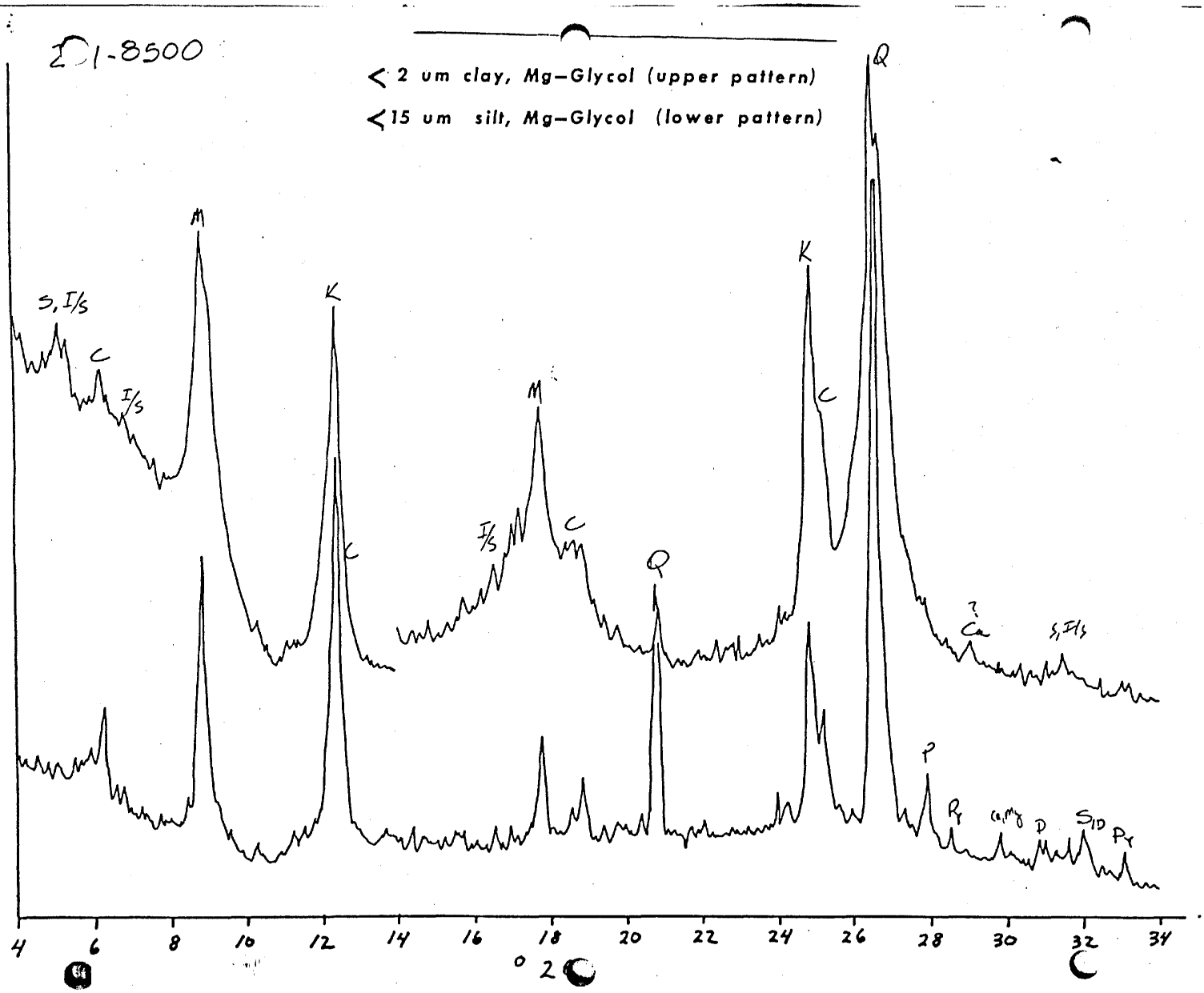

ID1-8500
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S, I/S
C
I/S
M
K
C
I/S
M
C
Q
K
C
Q
?
Ca
S, I/S
P
Pf
ca,mg
D
S,D
Pf
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

Table 6: Clay mineralogy of samples from Mobil Kuparuk St. 7-11-12 well.

MOBIL KUPARUK STATE 7-11-12

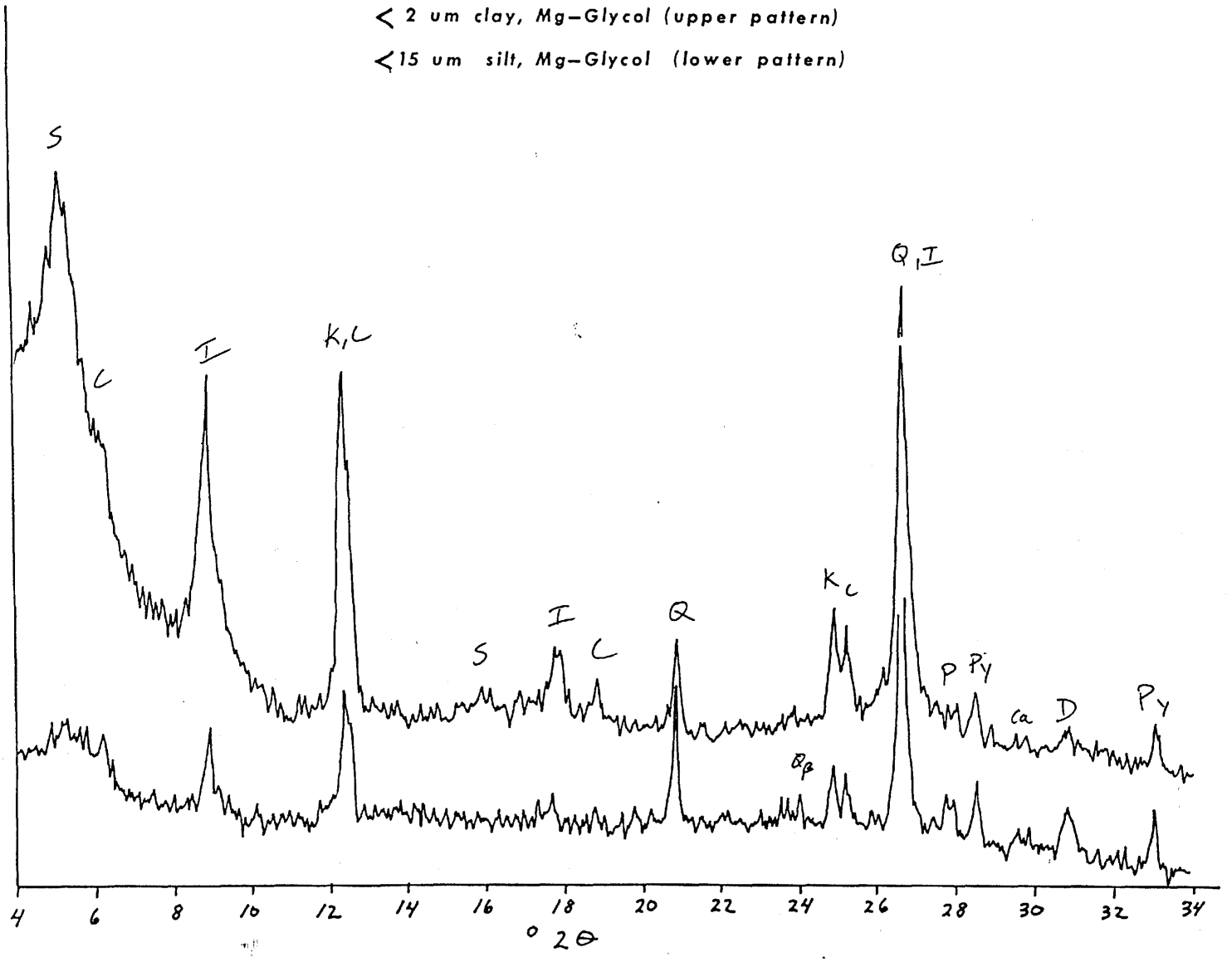
DEPTH FEET	STYPE	SMECTITE	CHLORITE	MIXED LAYER I/S	ILLITE	KAOLINITE	OTHER
5100	C	MIN	MOD	-	MOD	MOD	Q2,P,D,AP,HC1,MDM,BULKXRD
5100-S	C	-	-	-	MIN	MIN	Q3,P1,D1,AP2
5660	C	MAJ	MIN	-	MOD	MIN	Q2,HC,AN1,MDM,BULKXRD
5660-S	C	MIN	TR	-	MIN	MIN	Q3,AN2,P1,D1,AP2
6120	C	MAJ	-	-	MOD	MIN	Q2,P,PY1,TUFF.BK.SH.
6120-S	C	MIN	-	-	MIN	TR	Q3,AN1,P1,CA-MG,D,SID,PY1
6280	C	MOD	MIN	MOD	MOD	MOD	Q2,AN,PY1,TUFF.BK/GR.SH.
6280-S	C	MIN	TR	-	MIN	MIN	Q3,AN2,P,PY1
6520	C	MAJ	TR	-	MOD	MIN	Q2,P,PY1,TUFF.DGR.SH.
6520-S	C	MOD	-	-	MIN	MIN	Q3,P1,CA-MG,D,PY2
6620	C	MAJ	-	TR	MIN	MIN	Q1,TUFF.BK.SH.
6620-S	C	MIN	-	-	MIN	MIN	Q3,P1,CA-MG,D1,PY1
6820	C	-	TR	MIN	MOD	MAJ	Q2,BK.SH.
6820-S	C	PATTERN MISSING					MISSING
7400	C	MIN	MIN	MOD	MOD	MAJ	Q2,P,DM ADDITIVE CONT.
7400-S	C	-	MIN	-	MIN	MOD	Q3,P,SID1
7560	C	-	MIN	MOD	MOD	MAJ	Q2,TUFF.DGR.SH.
7660-S	C	-	MIN	-	MOD	MOD	Q3,P,D1,SID1,PY1

Definitions: TR = less than 3%, MIN = 3 - 12%, MOD = 13 - 35%, MAJ = >35%. Other mineral abbreviations: Q = quartz, P = plagioclase, KS = k-spar, AN = analcime, HC =heulandite-clinoptilolite, CA = calcite, D = dolomite, AP = apatite, SID = siderite, PY = pyrite, BA = barite. 1 = weak, 2 = moderate, 3 = strong, nothing = trace. MDM = mostly drill mud, BK.SH. = black shale, GR. = gray, SIS. = siltstone, TUFF. = tuffaceous, ANK = ankerite. Also: STYPE = sample type, C = cuttings, CC = core, SW = side wall, S = silt.

26-6100

< 2 um clay, Mg–Glycol (upper pattern)

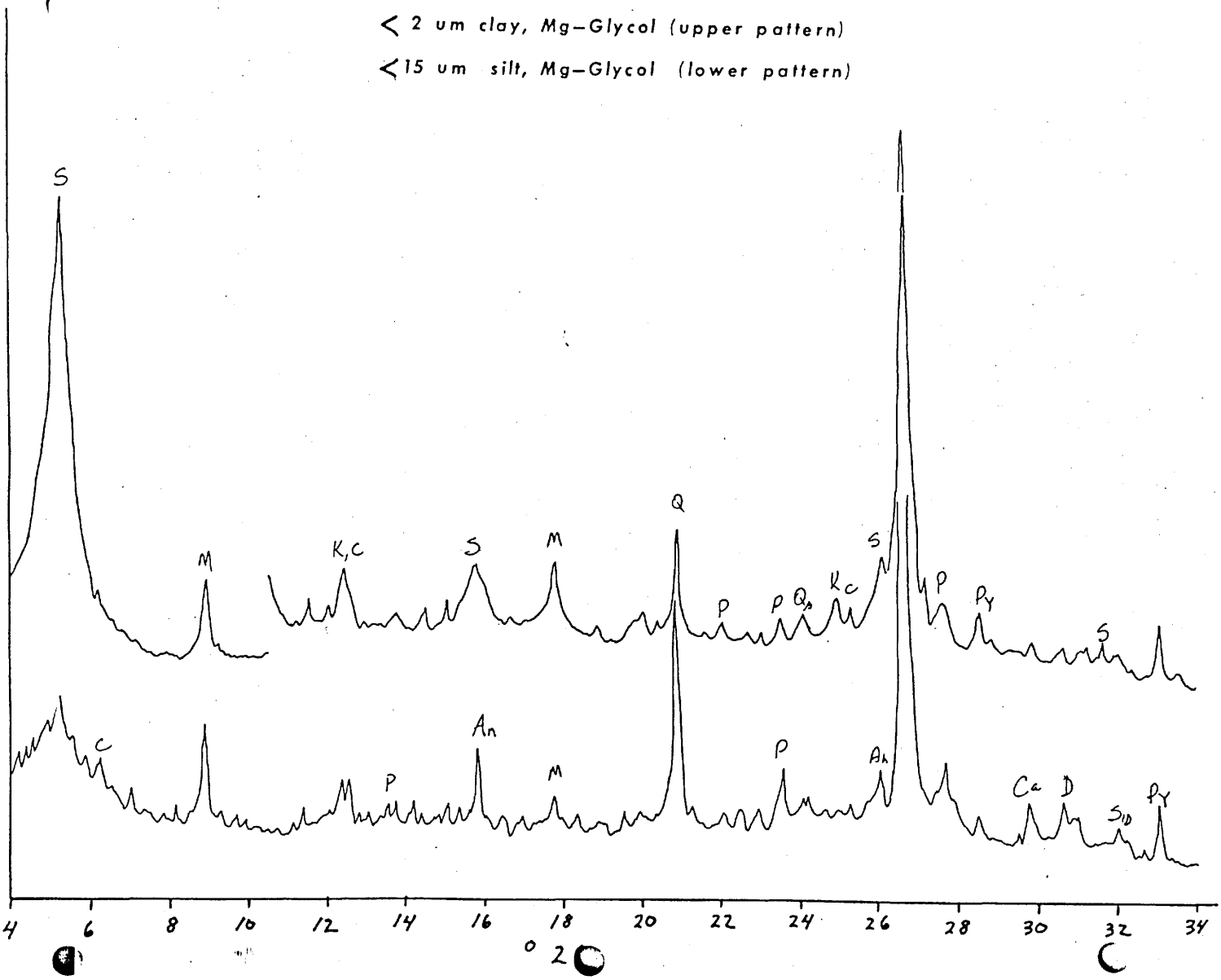
< 15 um silt, Mg–Glycol (lower pattern)



271-6120

< 2 um clay, Mg–Glycol (upper pattern)

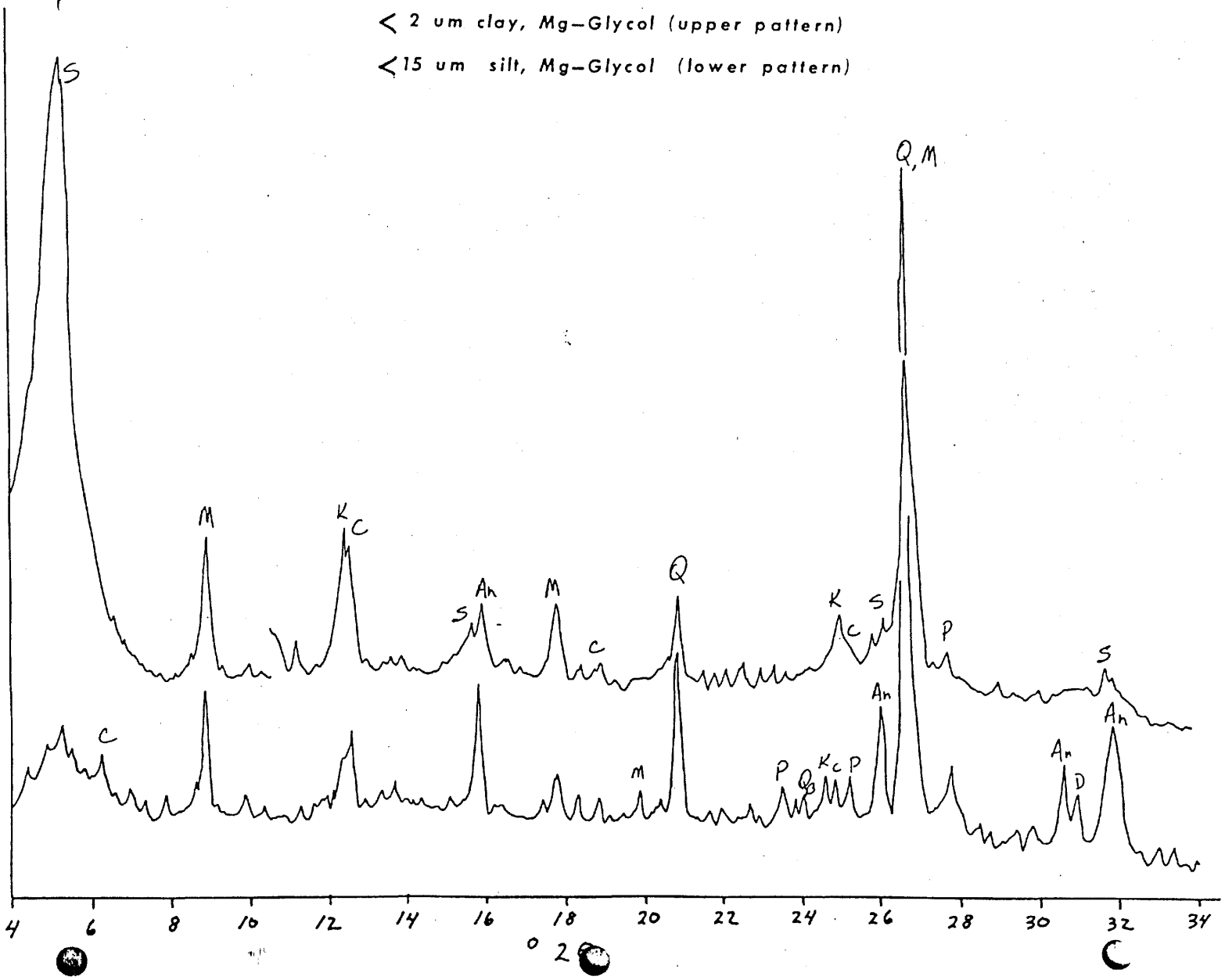
< 15 um silt, Mg–Glycol (lower pattern)



271-5660

< 2 um clay, Mg–Glycol (upper pattern)

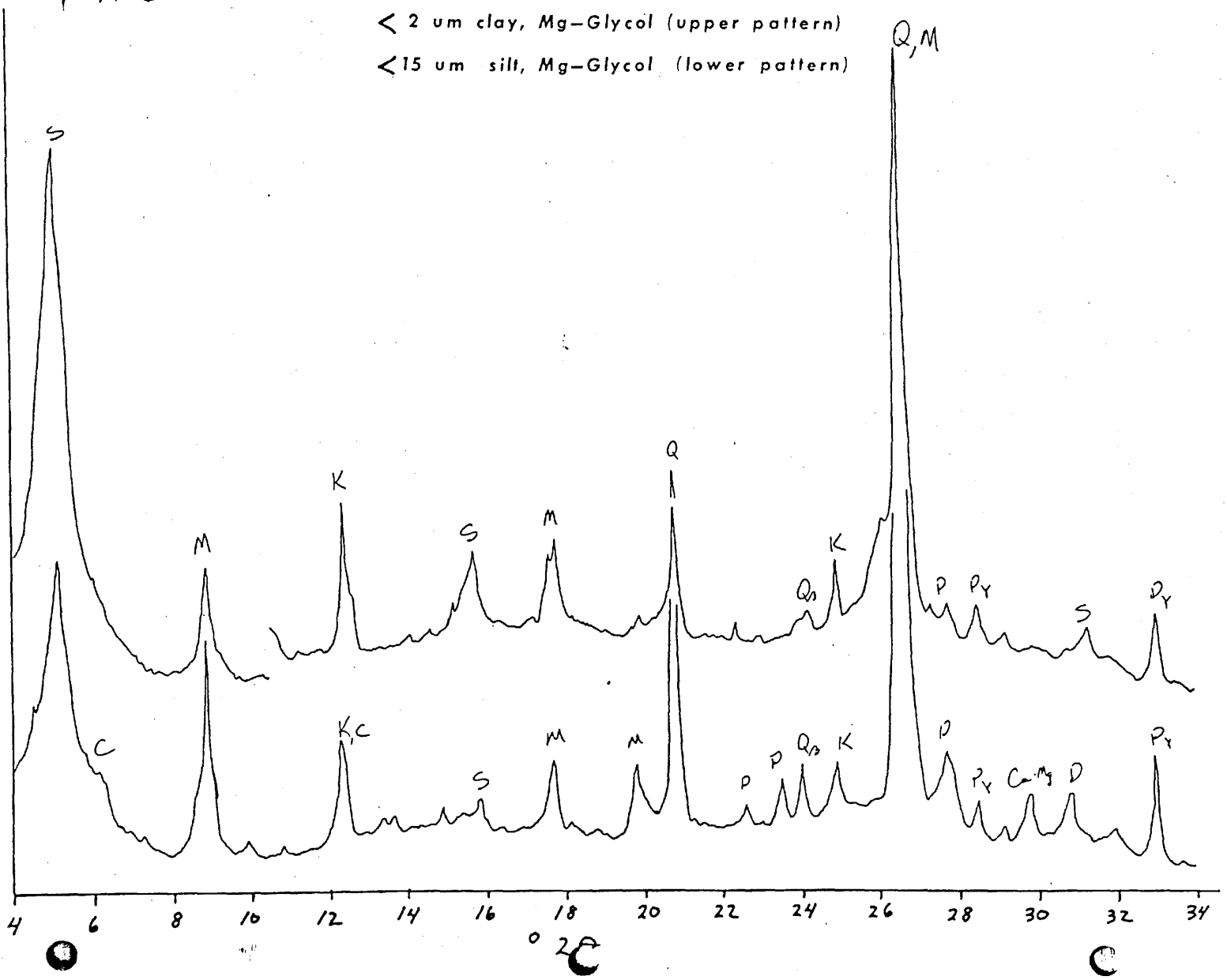
< 15 um silt, Mg–Glycol (lower pattern)

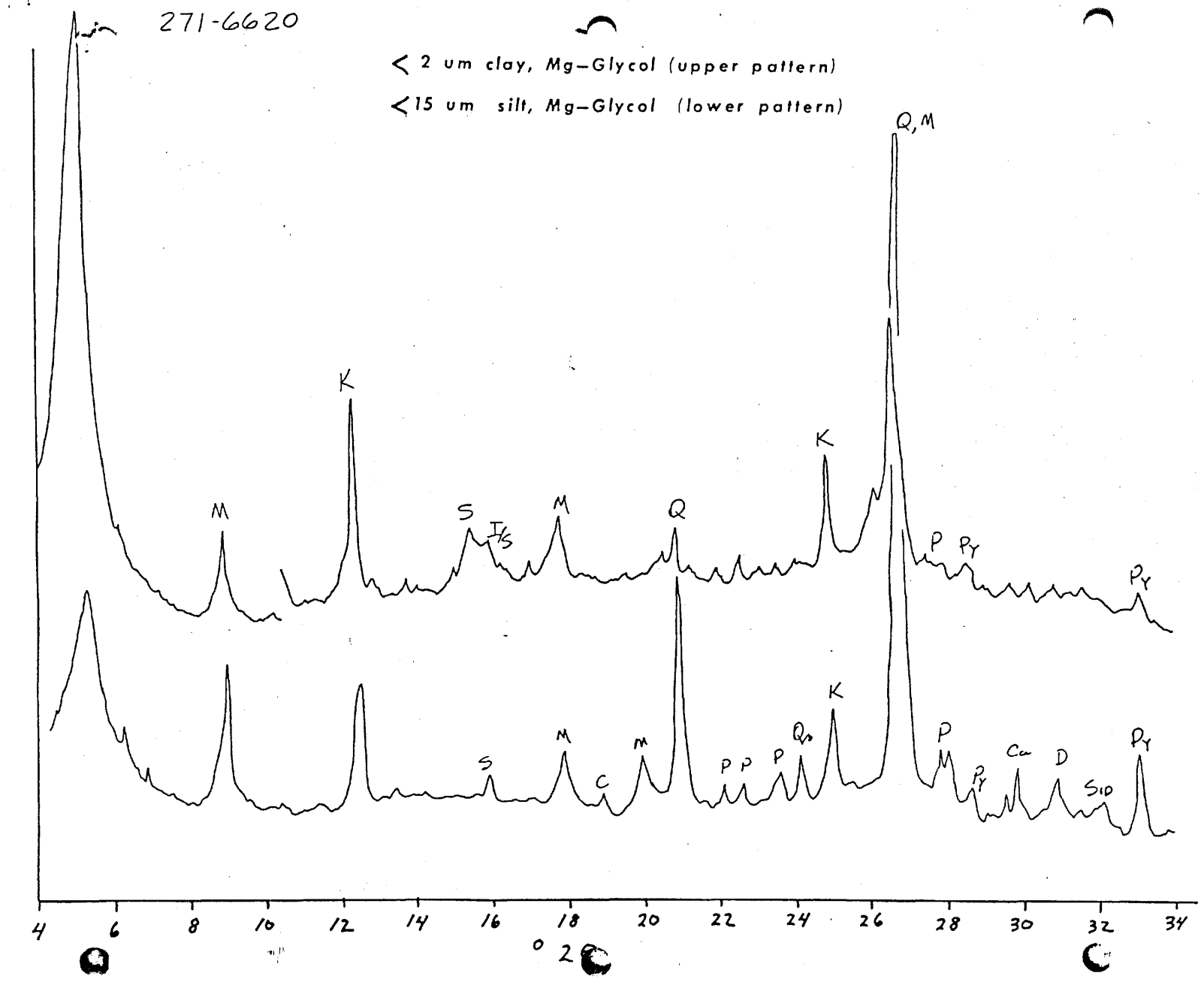


271-6520

< 2 um clay, Mg–Glycol (upper pattern)

< 15 um silt, Mg–Glycol (lower pattern)

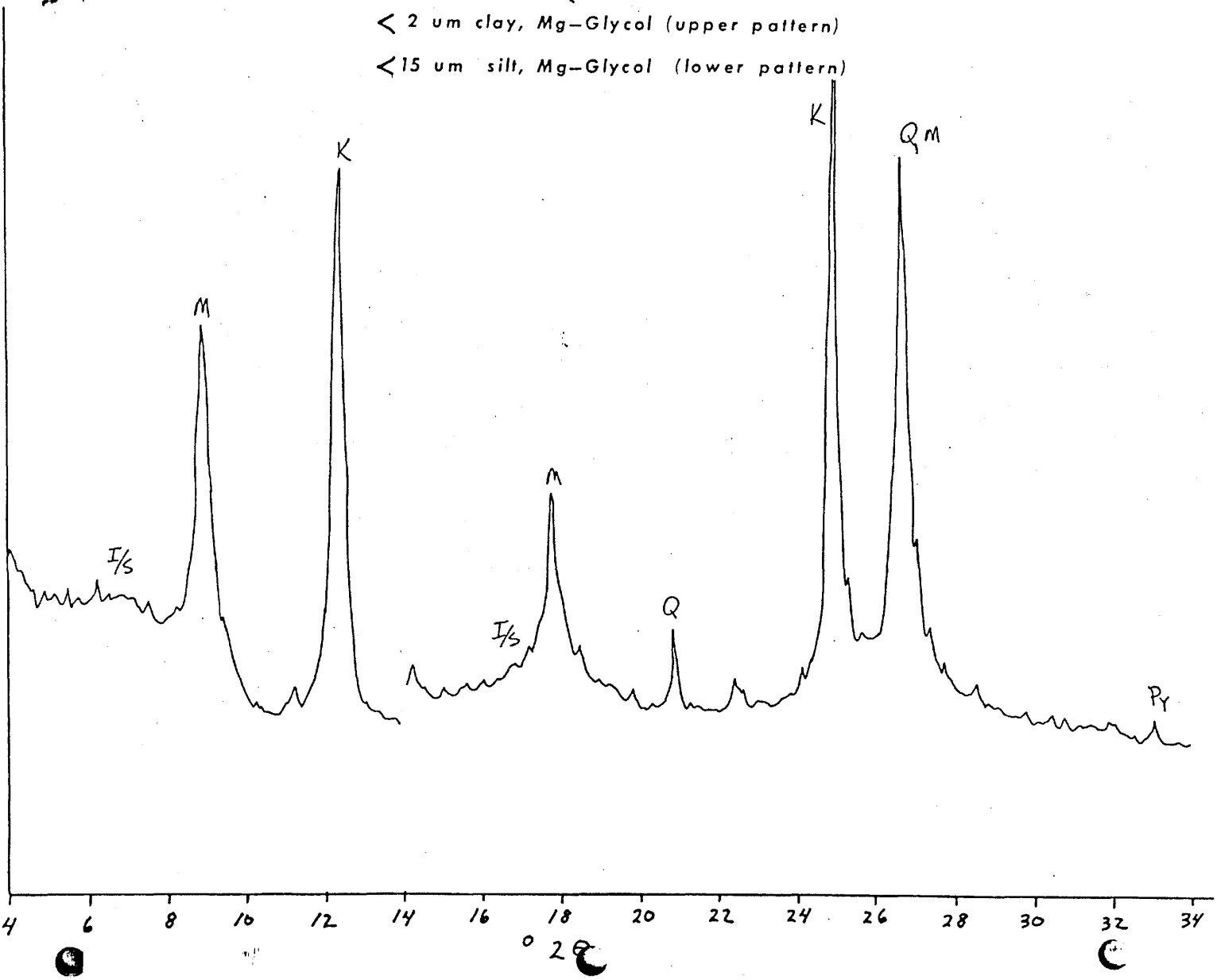



271-6620
< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
Q, M
K
M
S
I/S
M
Q
K
P
P
P
K
M
S
M
C
M
P
P
P
Q
K
P
P
Ca
D
S
P
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

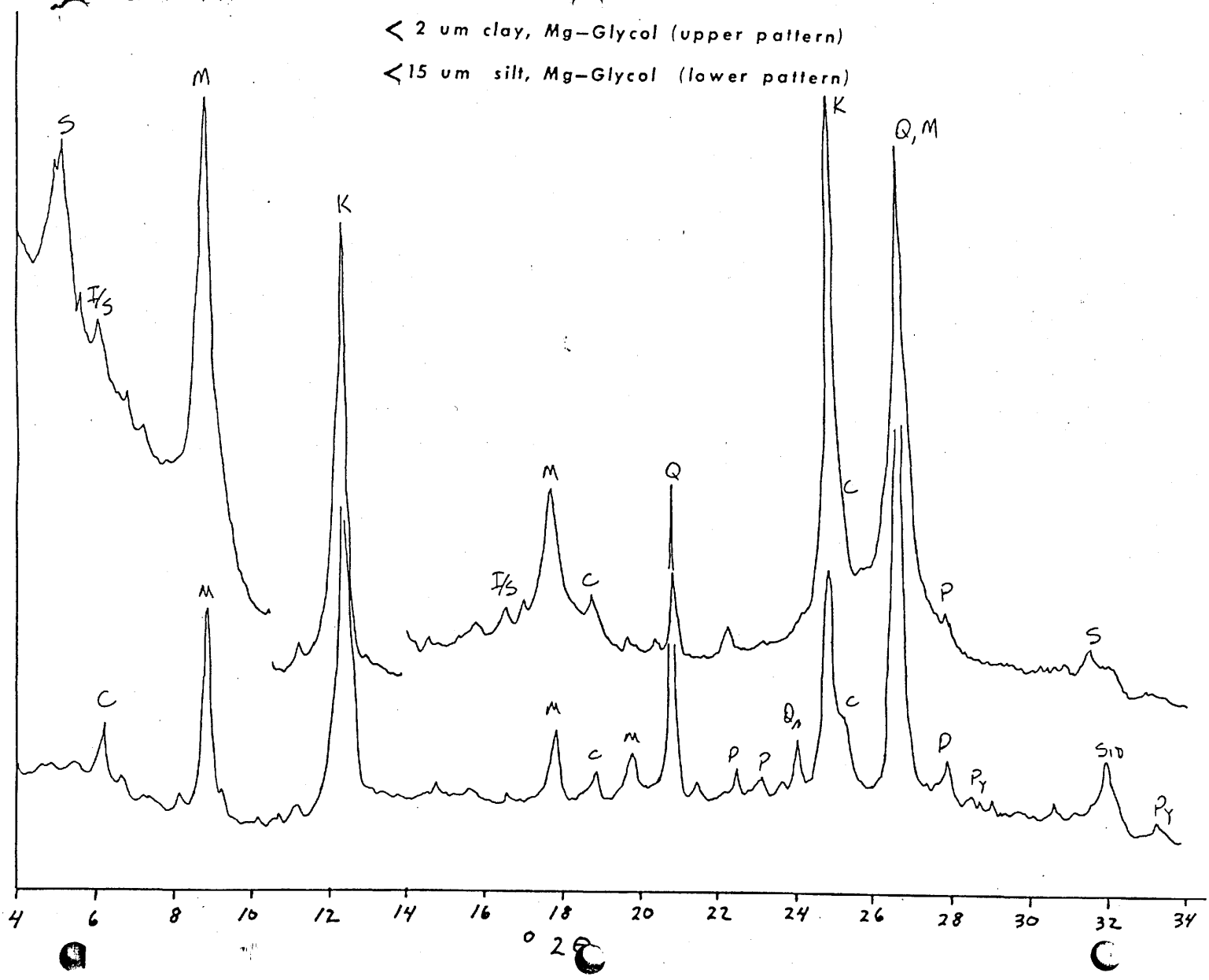
271-6820

< 2 um clay, Mg–Glycol (upper pattern)

< 15 um silt, Mg–Glycol (lower pattern)



271-7400


< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
S
M
I/S
K
M
Q
K
Q, M
C
P
S
C
M
M
C
M
Q
P
P
C
D
P
S10
P
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

271-7660

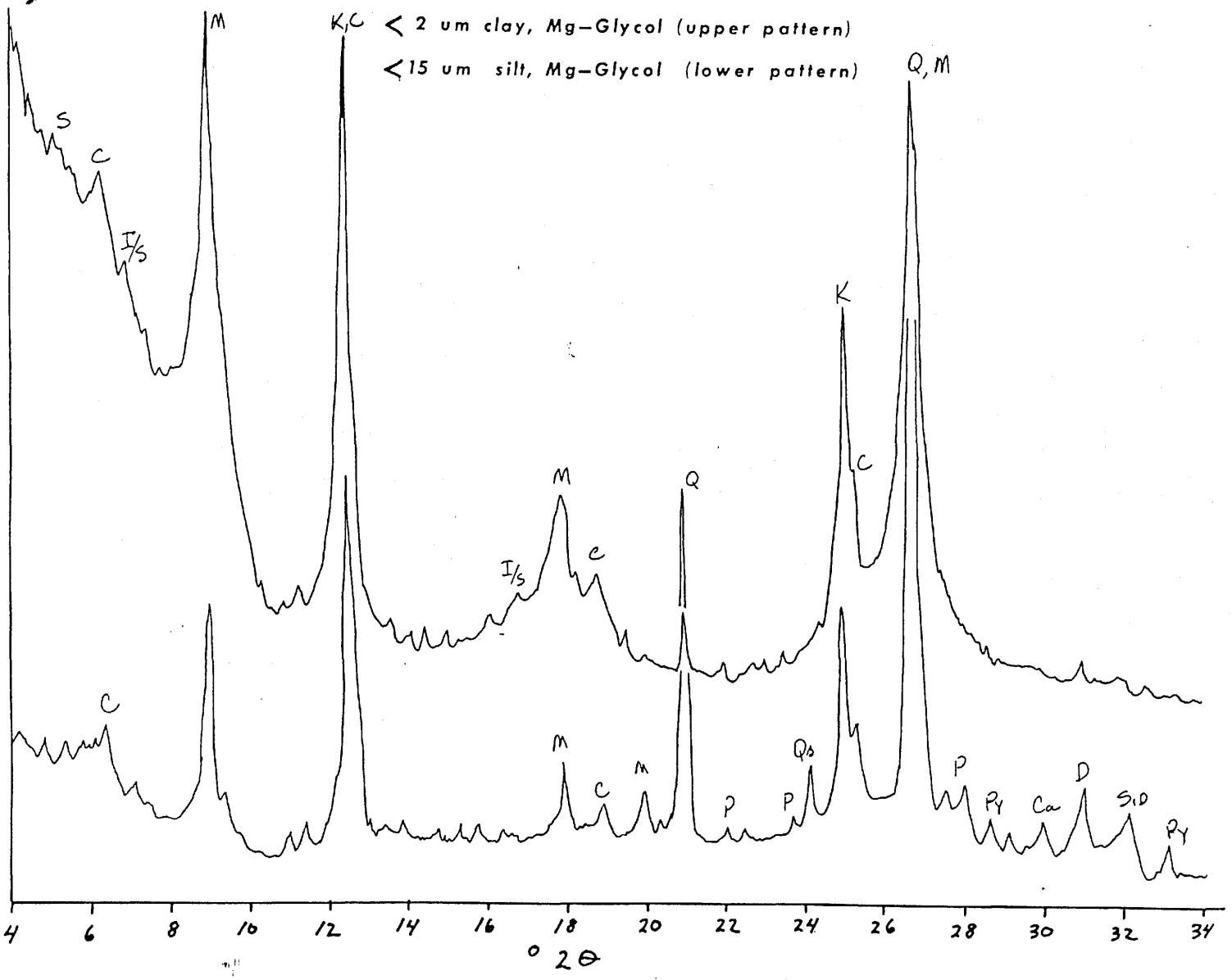
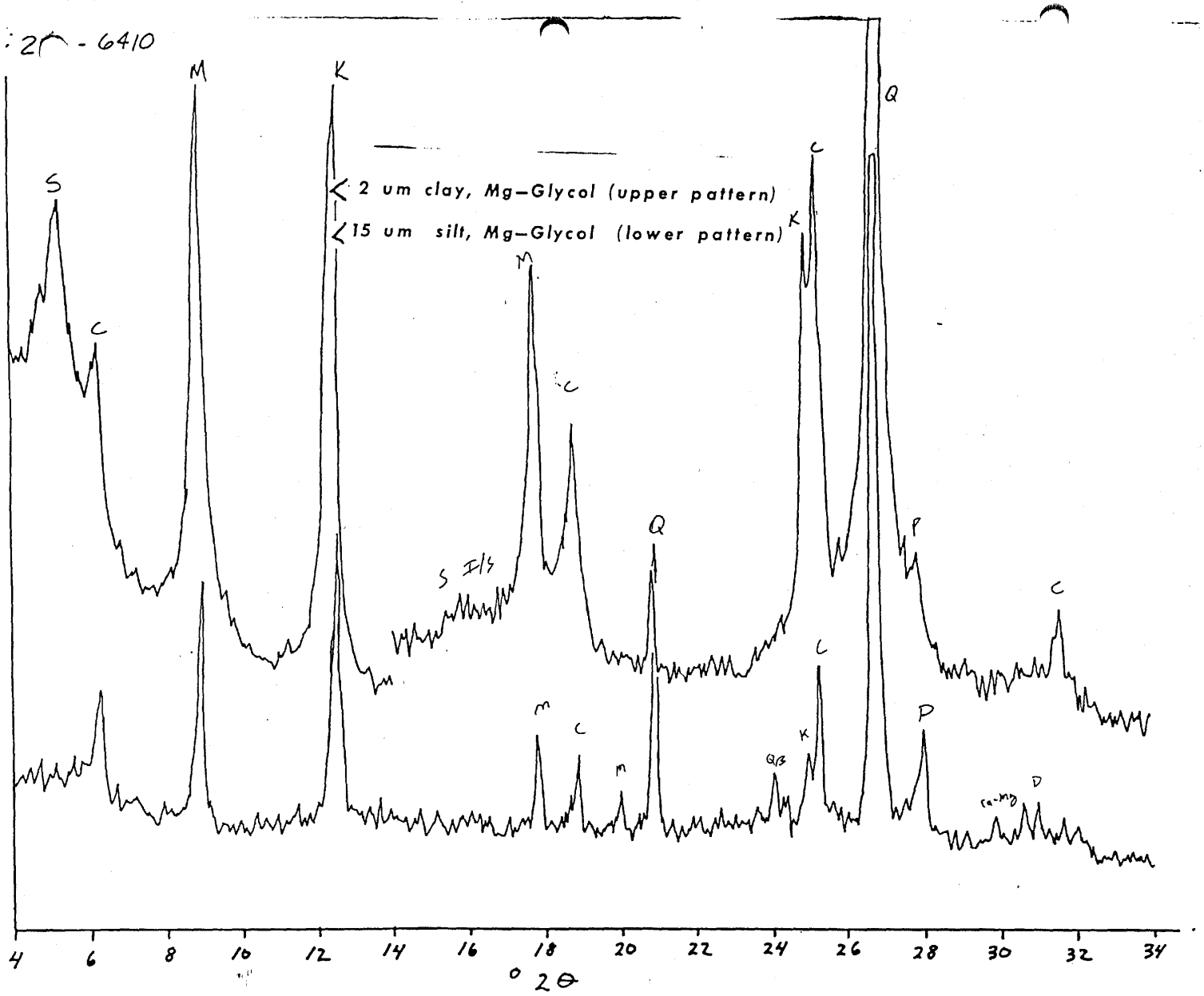

< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
M
K,C
Q,M
S
C
I/S
K
Q
P
D
Ca
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

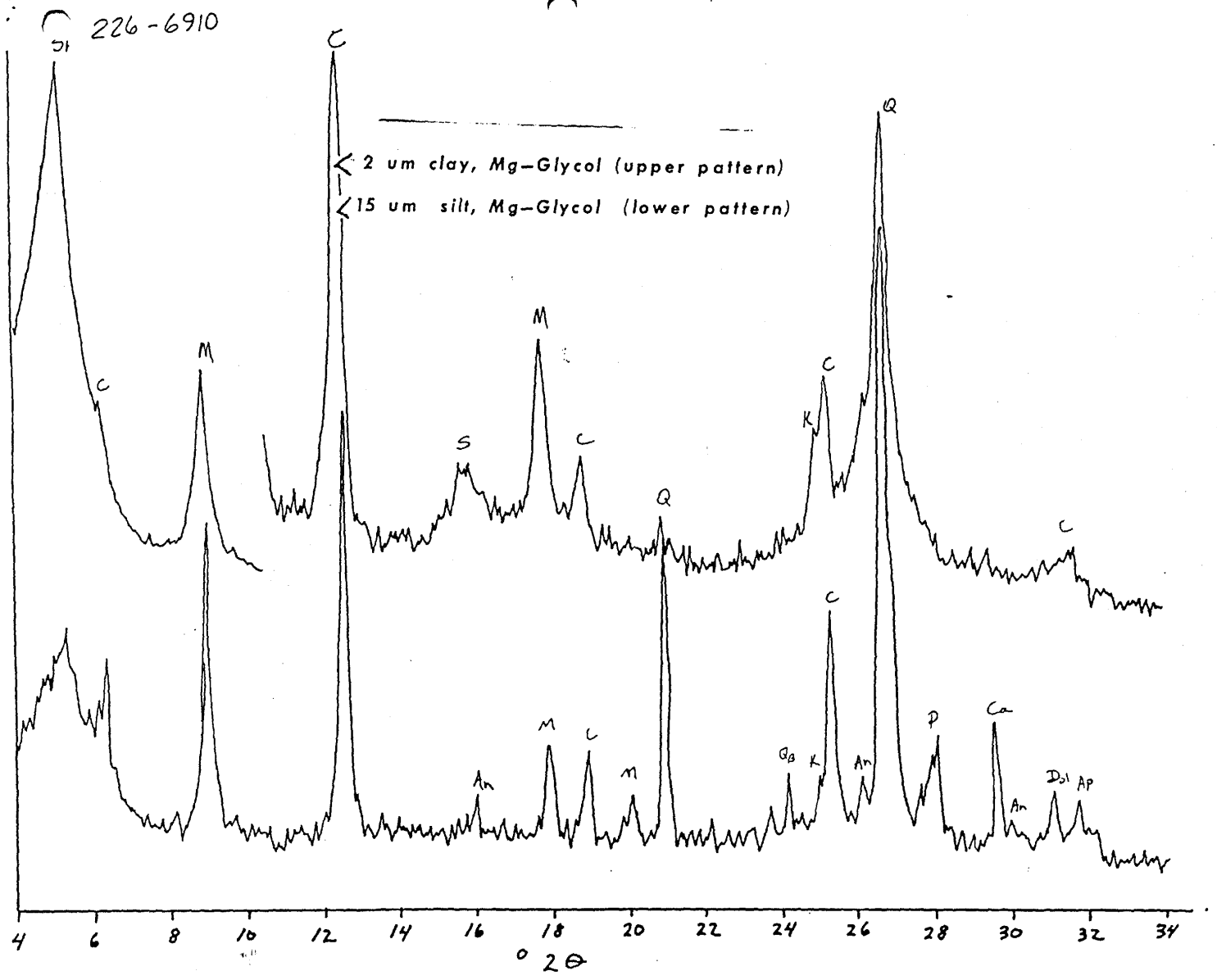
Table 7: Clay mineralogy of samples from BP Prudhoe Bay Unit 19-10-15 well.

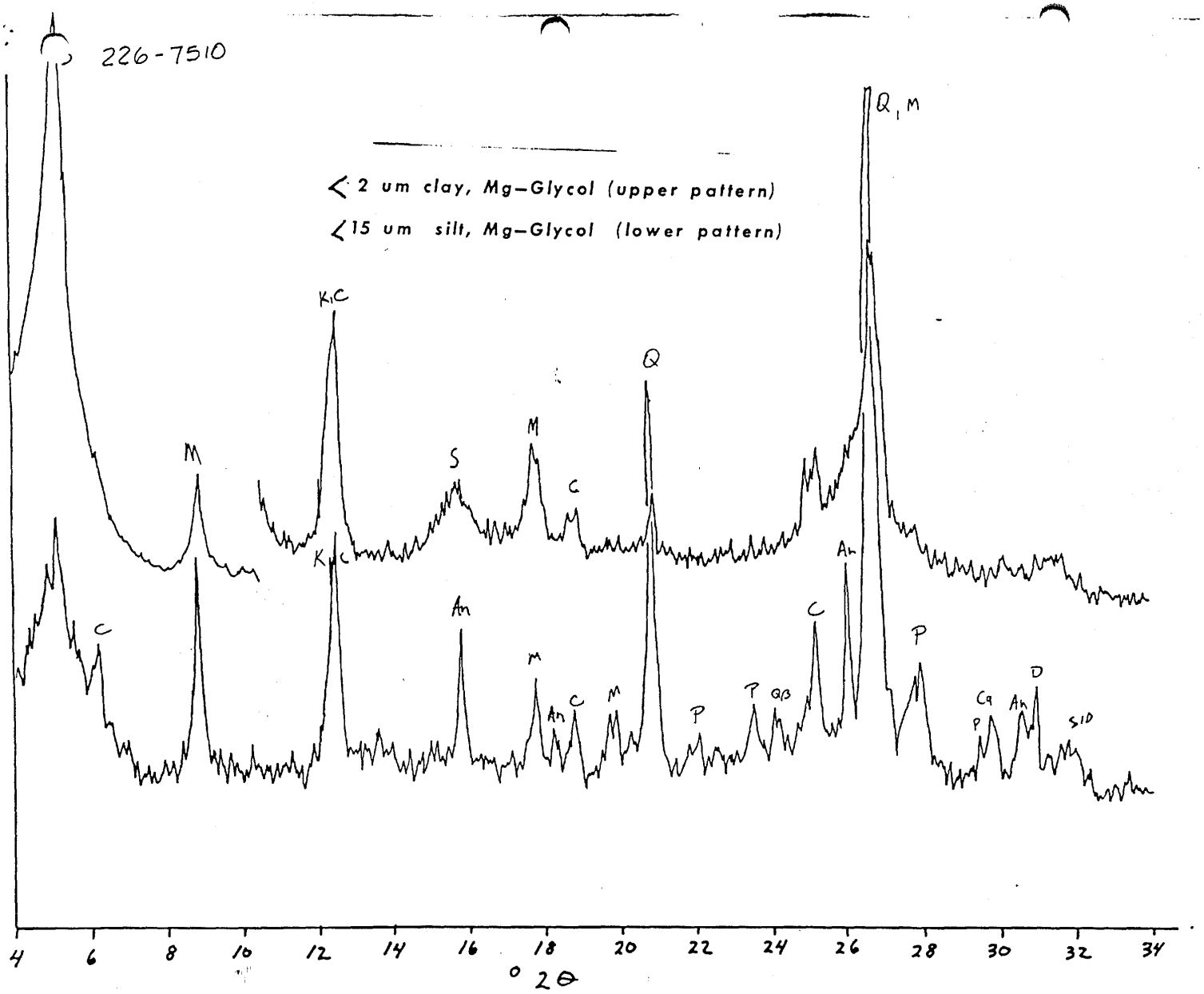
BP.PBU 19-10-15

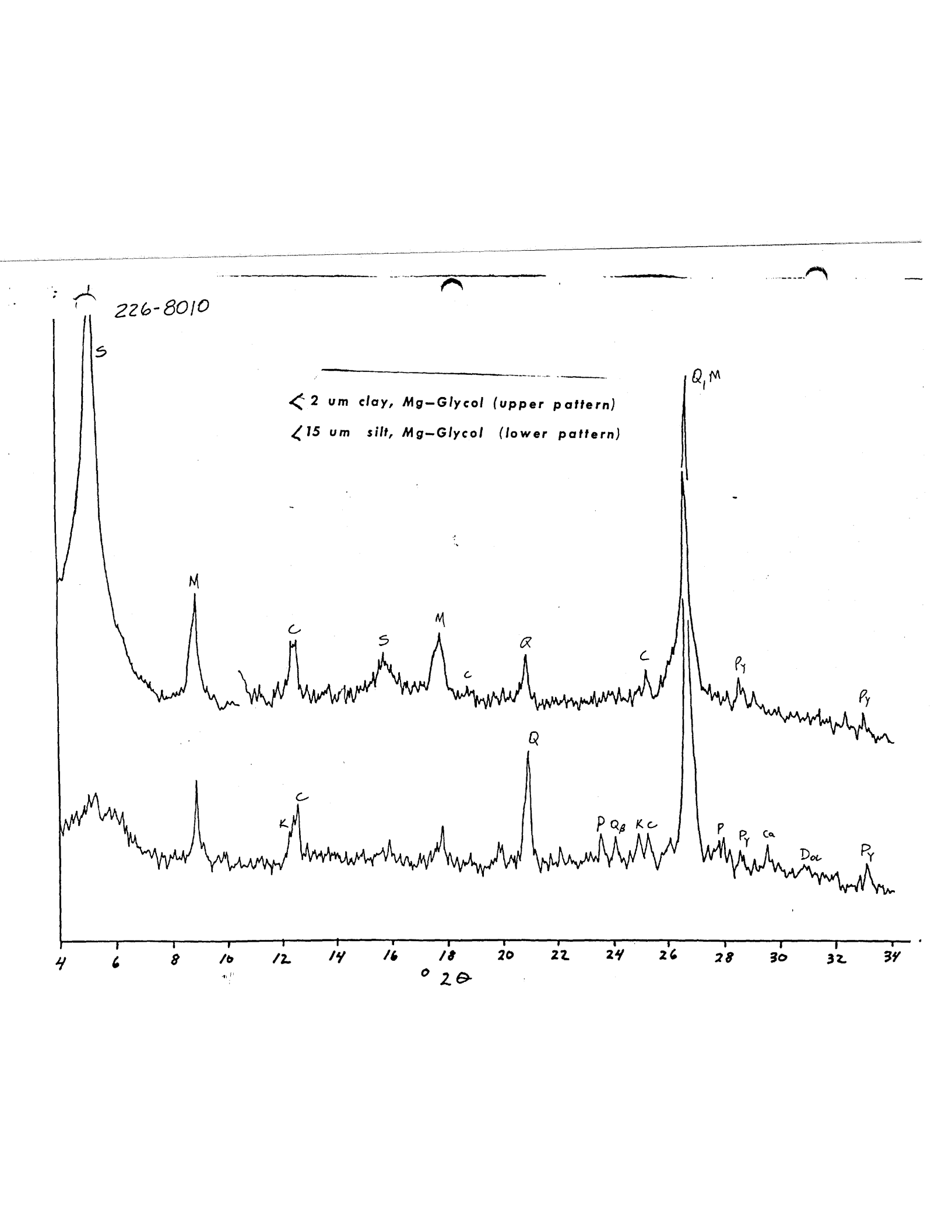
DEPTH FEET	STYPE	SMECTITE	CHLORITE	MIXED LAYER I/S	ILLITE	KAOLINITE	OTHER
6410	C	MOD	MOD	-	MOD	MOD	Q3,P1,MDM
6410 S	C	-	MOD	-	MIN	MIN	Q3,P2,D1,SID?
6910	C	MAJ	MOD	-	MOD	MIN	Q2,CA,MDM
6910 S	C	MIN	MOD	-	MOD	MIN	Q3,AN1,P2,CA2,D1
7510	C	MAJ	MIN	-	MOD	MIN	Q2,P,MDM
7510 S	C	MIN	MIN	-	MIN	MIN	Q3,AN2,P2,D1,SID?
8010	C	MAJ	MIN	MIN	MOD	-	Q2,CA1,PY,DK.GR.SH.
8010 S	C	MIN	MIN	-	MIN	MIN	Q3,P1,D1,PY1,K?
8250	C	MAJ	MIN	MIN	MOD	MIN	Q2,P1,CA?
8250 S	C	MIN	MIN	-	MOD	MIN	Q3,P1,D1,PY2
8340	C	MOD	-	MOD	MOD	MIN	Q2,C?
8340-S	C	MIN	MIN	-	MIN	MIN	Q2,P1,PY1,D?
8580	C	MOD	MIN	MID	MOD	MOD	Q1,DM OR TUFF
8580-S	C	-	-	-	MOD	MOD	Q3,P1,PY1,D1
8860	C	-	TR	MOD	MOD	MAJ	Q2,
8860-S	C	-	-	-	MOD	MAJ	Q3,D1,CA1

Definitions: TR = less than 3%, MIN = 3 - 12%, MOD = 13 - 35%, MAJ = >35%. Other mineral abbreviations: Q = quartz, P = plagioclase, KS = k-spar, AN = analcime, HC =heulandite-clinoptilolite, CA = calcite, D = dolomite, AP = apatite, SID = siderite, PY = pyrite, BA = barite. 1 = weak, 2 = moderate, 3 = strong, nothing = trace. MDM = mostly drill mud, BK.SH. = black shale, GR. = gray, SIS. = siltstone, TUFF. = tuffaceous, ANK = ankerite. Also: STYPE = sample type, C = cuttings, CC = core, SW = side wall, S = silt.

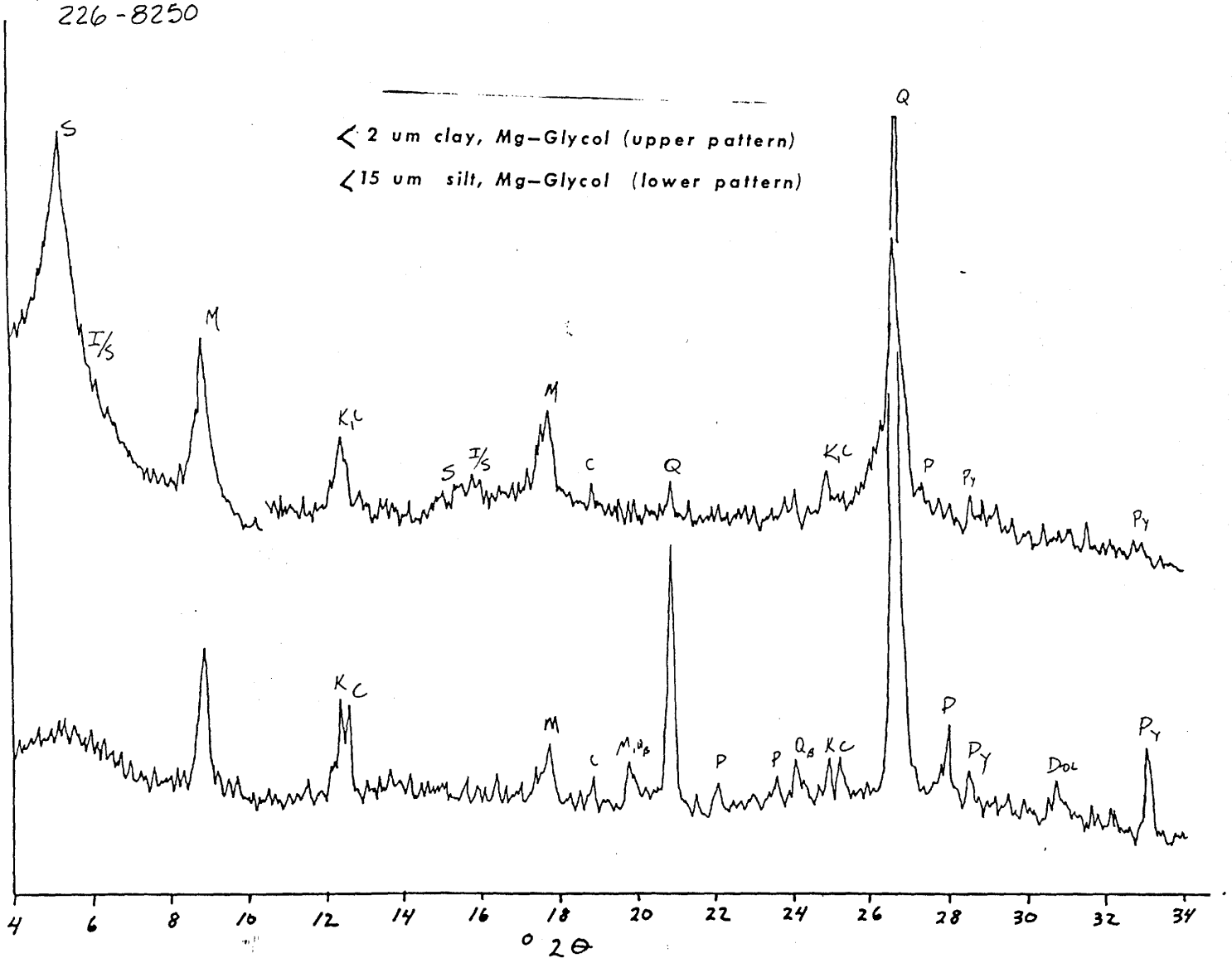

2P - 6410
M
K
Q
S
C
K
C
2 um clay, Mg–Glycol (upper pattern)
15 um silt, Mg–Glycol (lower pattern)
M
C
S I/S
Q
P
C
C
m
C
m
Q/β
K
C
P
ca-mg
D
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


226-6910
2 um clay, Mg-Glycol (upper pattern)
15 um silt, Mg-Glycol (lower pattern)
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2Θ

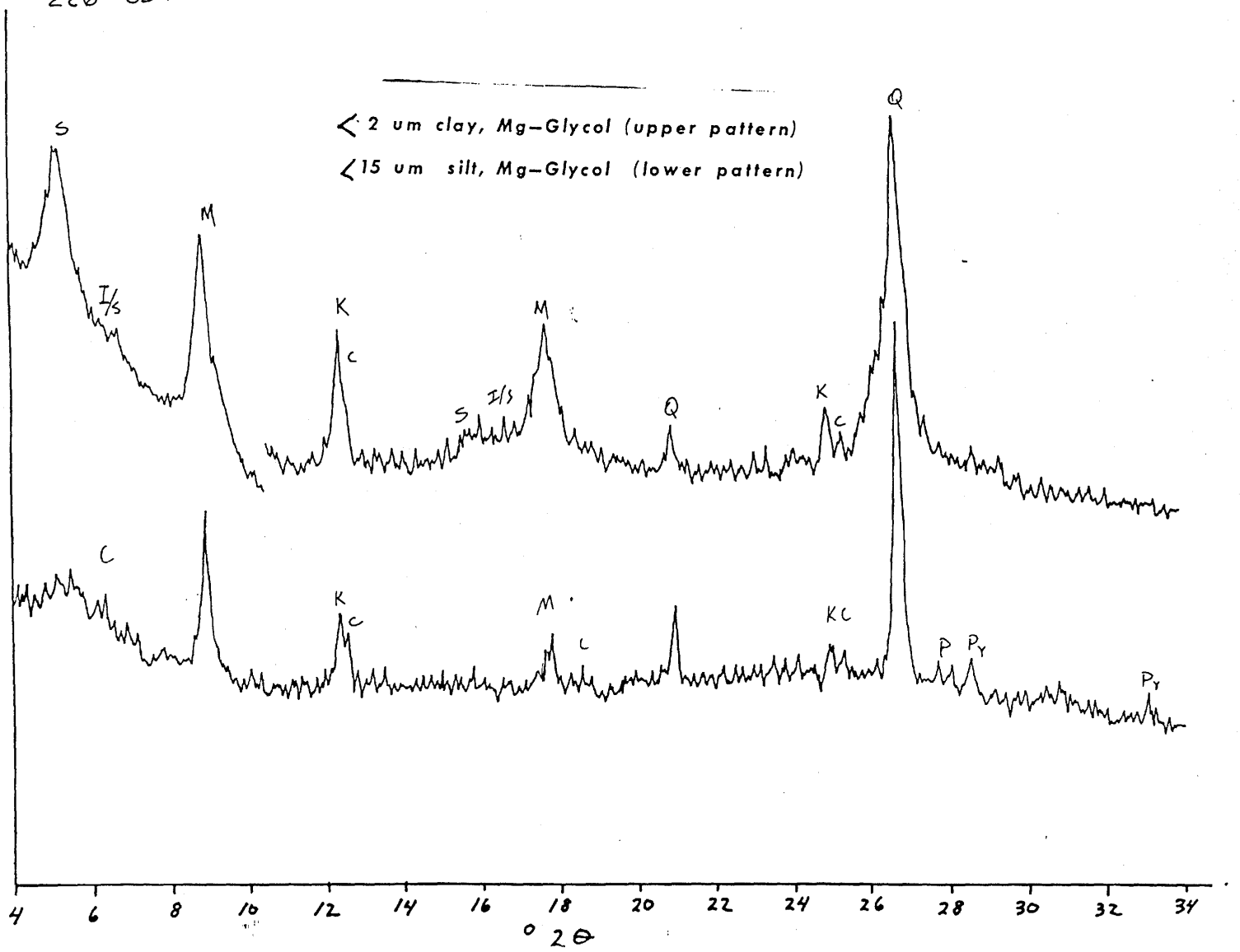

226-7510
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
Q, M
K,C
Q
M
S
M
C
K
C
An
C
M
M
An
C
M
P
P
Q/3
C
An
P
Cg
P
An
D
S,D
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


226-8010
< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
S
M
C
S
M
C
Q
C
Q, M
Py
Py
Q
K
C
P
Qβ
K
C
P
Py
Ca
Dol
Py
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

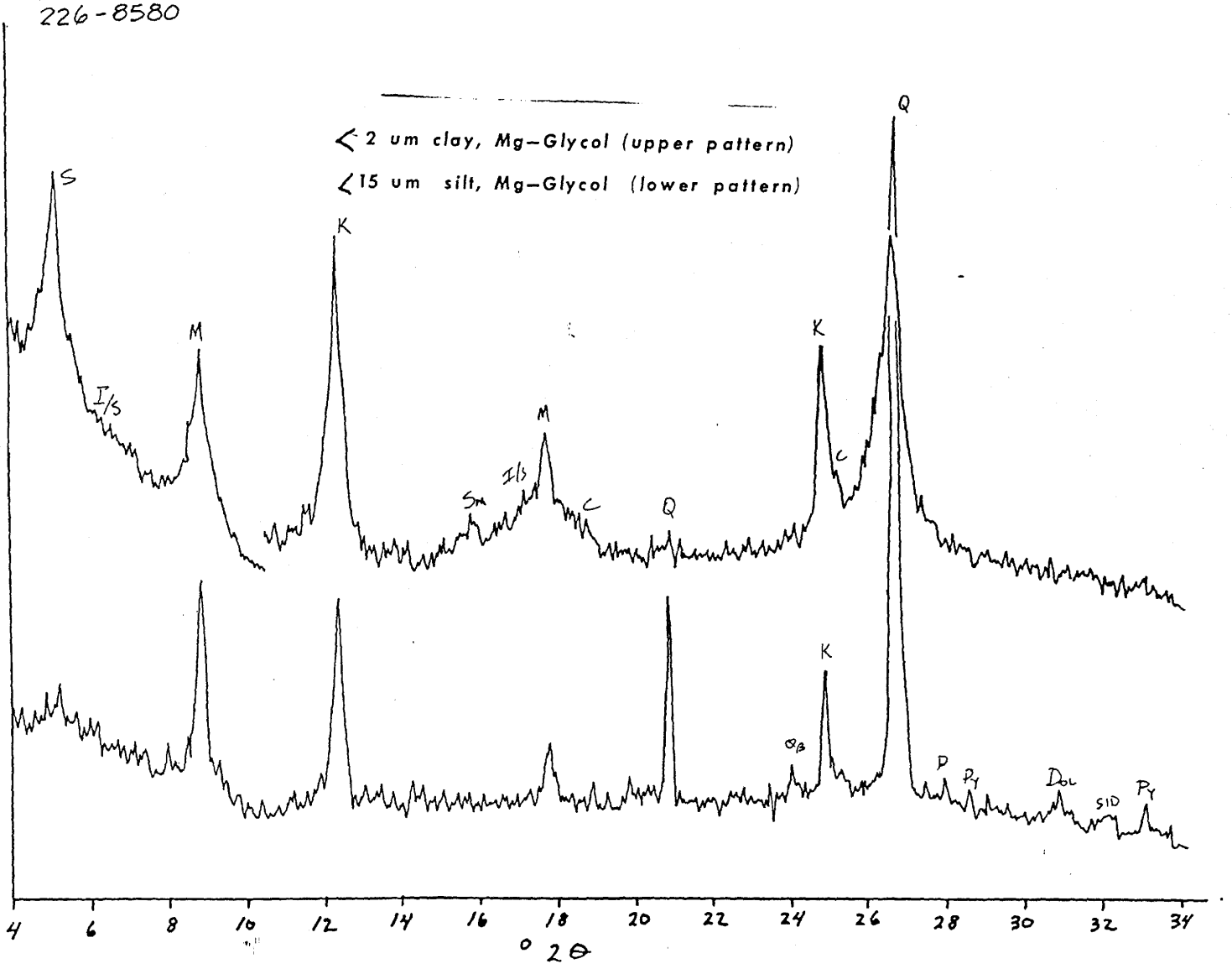
226-8250


< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
I/S
M
K,C
S
I/S
M
C
Q
K,C
Q
P
P
P
M
K C
M
C
M,Q
P
P
Q
K C
P
P
DOL
P
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

<226-8340


< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
S
I/S
M
K
C
Q
P
Py
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

226-8580


< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
S
I/S
M
K
Sm
I/S
M
C
Q
K
C
Q
K
Gib
P
Py
Dol
SID
Py
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

<2µ6-8860

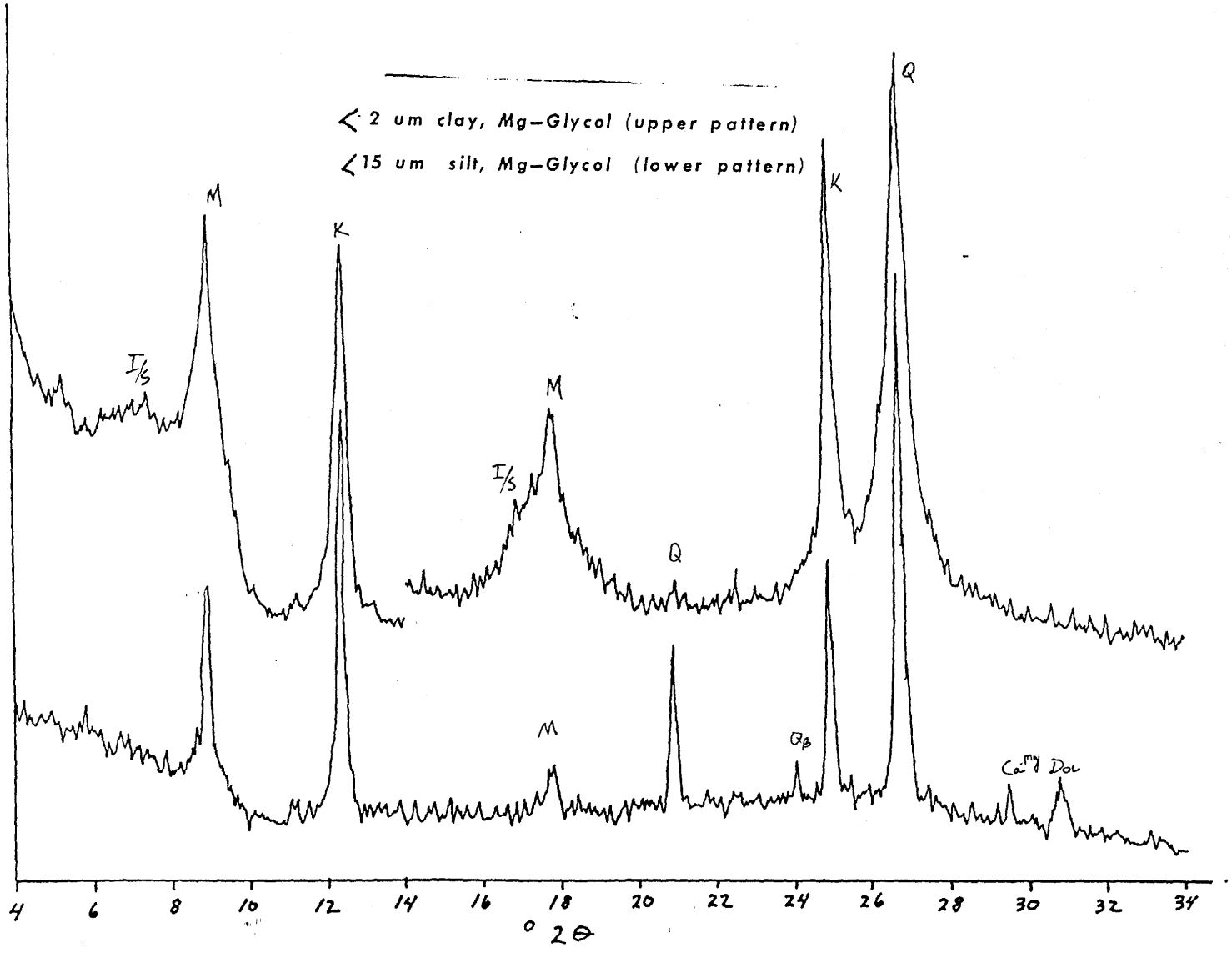

<2 um clay, Mg-Glycol (upper pattern)
<15 um silt, Mg-Glycol (lower pattern)
M
K
I/S
M
I/S
Q
K
Q
M
Gβ
Ca^Mg Dol
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

Table 8: Clay mineralogy of samples from Arco West Sak River #1 well.

ARCO WEST SAK RIVER #1

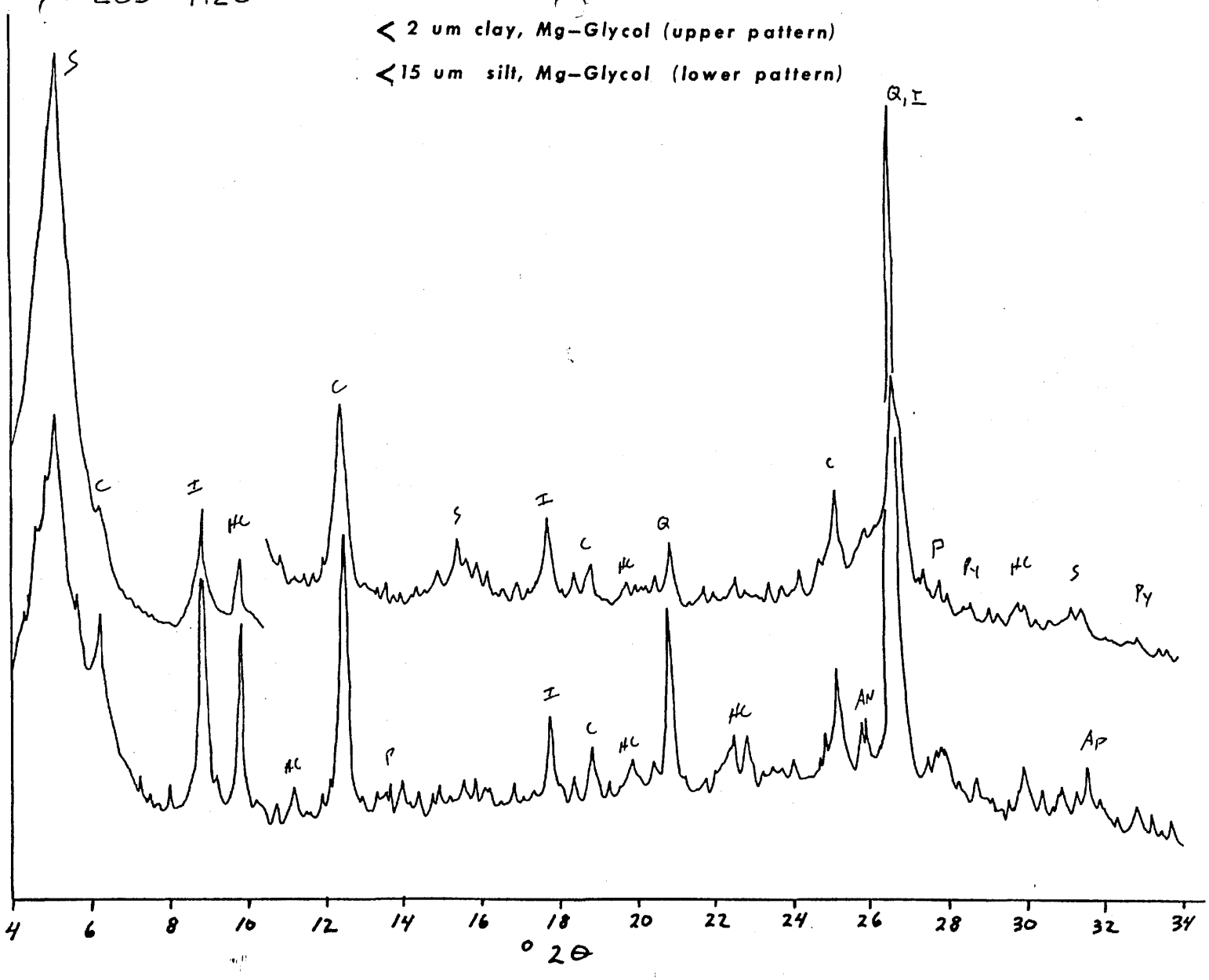
DEPTH FEET	STYPE	SMECTITE	CHLORITE	MIXED LAYER I/S	ILLITE	KAOLINITE	OTHER
4120	C	MAJ	MIN	-	MOD	-	Q1,HC2,P,MDM,BULK XRD
4120-S	C	MOD	MOD	-	MOD	-	Q3,HC2,P1,PY1
5220	C	MAJ	MIN	-	MOD	TR	Q1,HC1,P,MDM,BULK XRD
5220-S	C	MOD	MIN	-	MOD	MIN	Q3,HC1,P1,D,CA?
5740	C	MOD	MOD	MOD	MOD	MIN	Q2,P,PY1,MDM,TUFF.BULKXRD
5740-S	C	MIN	MIN	-	MOD	MIN	Q3,P2,AN1,PY1
6200	C	MOD	MOD	MIN	MOD	MOD	Q1,P,PY1,MDM,TUFF.DGR.SH.
6299-S	C	MIN	MIN		MIN	MIN	Q3,P1,D1,PY1
6565	CC	-	-	MOD	MOD	MAJ	Q1,BWNGR.BIOTUR.SISTN.
6565-S	CC	-	-	-	MOD	MAJ	Q3,P,KS,CA-MG,SID1
6740	C	MAJ	TR	MIN	MOD	MOD	Q1,DM CONT.DGR/BWN SISTN.
6740-S	C	MIN	MIN	-	MOD	MAJ	Q3,P,D,SID1,PY1
6855	CC	-	-	MOD	MOD	MAJ	Q2,P,AP?
6855-S	CC	-	TR	-	MOD	MAJ	Q3,P1,KS?,SID1,PY
7050	C	MOD	MIN	MOD	MOD	MAJ	Q1,P?,TUFF.BK.SH.DM.CONT.
7050-S	C	MIN	MIN	-	MIN	MOD	Q3,P1,CA-MG,SID1,PY1
7410	C	MIN	MIN	MOD	MOD	MAJ	Q1,P,CA,BK.SH.DM.CONT.
7410-S	C	-	MIN	-	MOD	MOD	Q3,P1,SID1,PY1

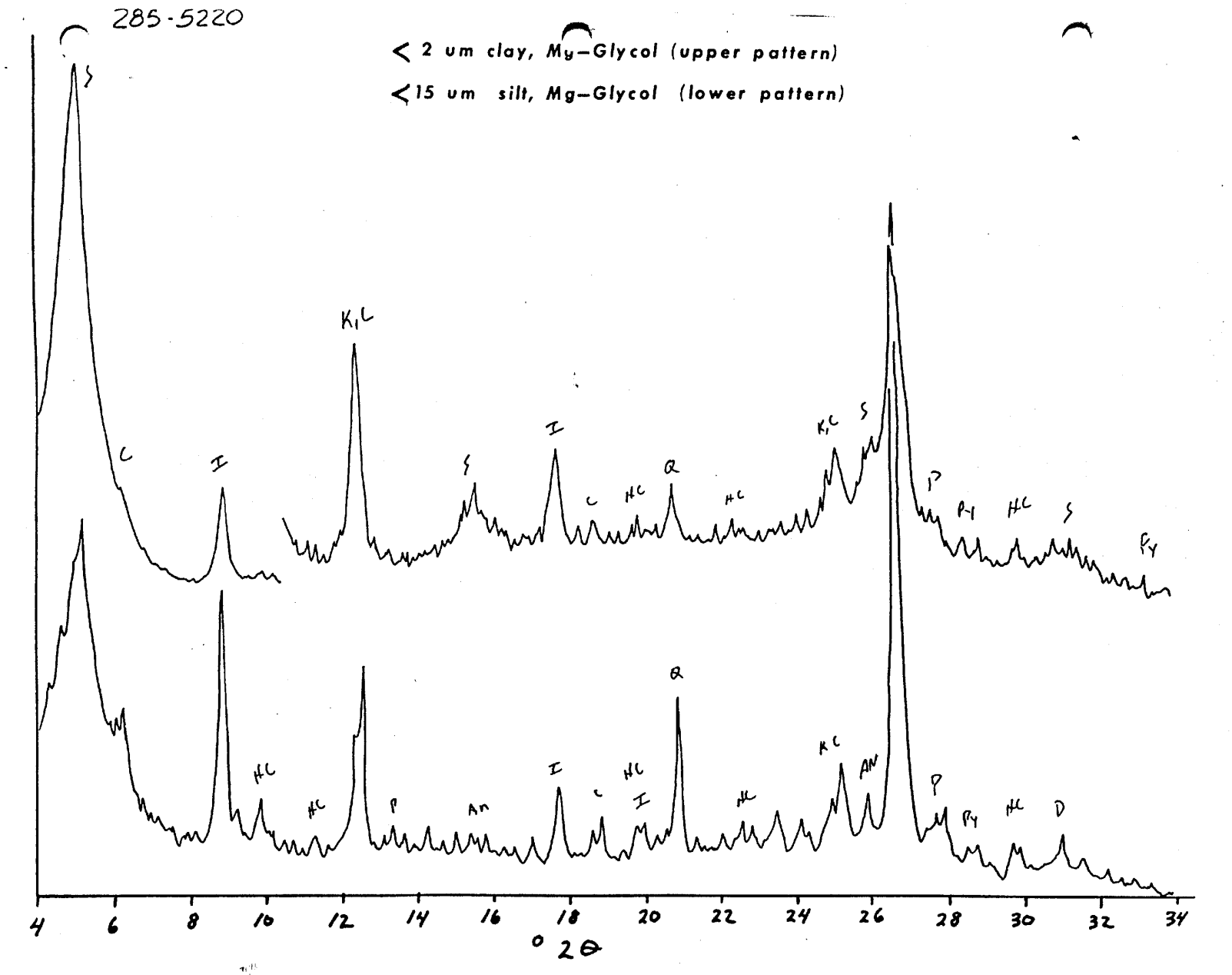
Definitions: TR = less than 3%, MIN = 3 - 12%, MOD = 13 - 35%, MAJ = >35%. Other mineral abbreviations: Q = quartz, P = plagioclase, KS = k-spar, AN = analcime, HC =heulandite-clinoptilolite, CA = calcite, D = dolomite, AP = apatite, SID = siderite, PY = pyrite, BA = barite. 1 = weak, 2 = moderate, 3 = strong, nothing = trace. MDM = mostly drill mud, BK.SH. = black shale, GR. = gray, SIS. = siltstone, TUFF. = tuffaceous, ANK = ankerite. Also: STYPE = sample type, C = cuttings, CC = core, SW = side wall, S = silt.

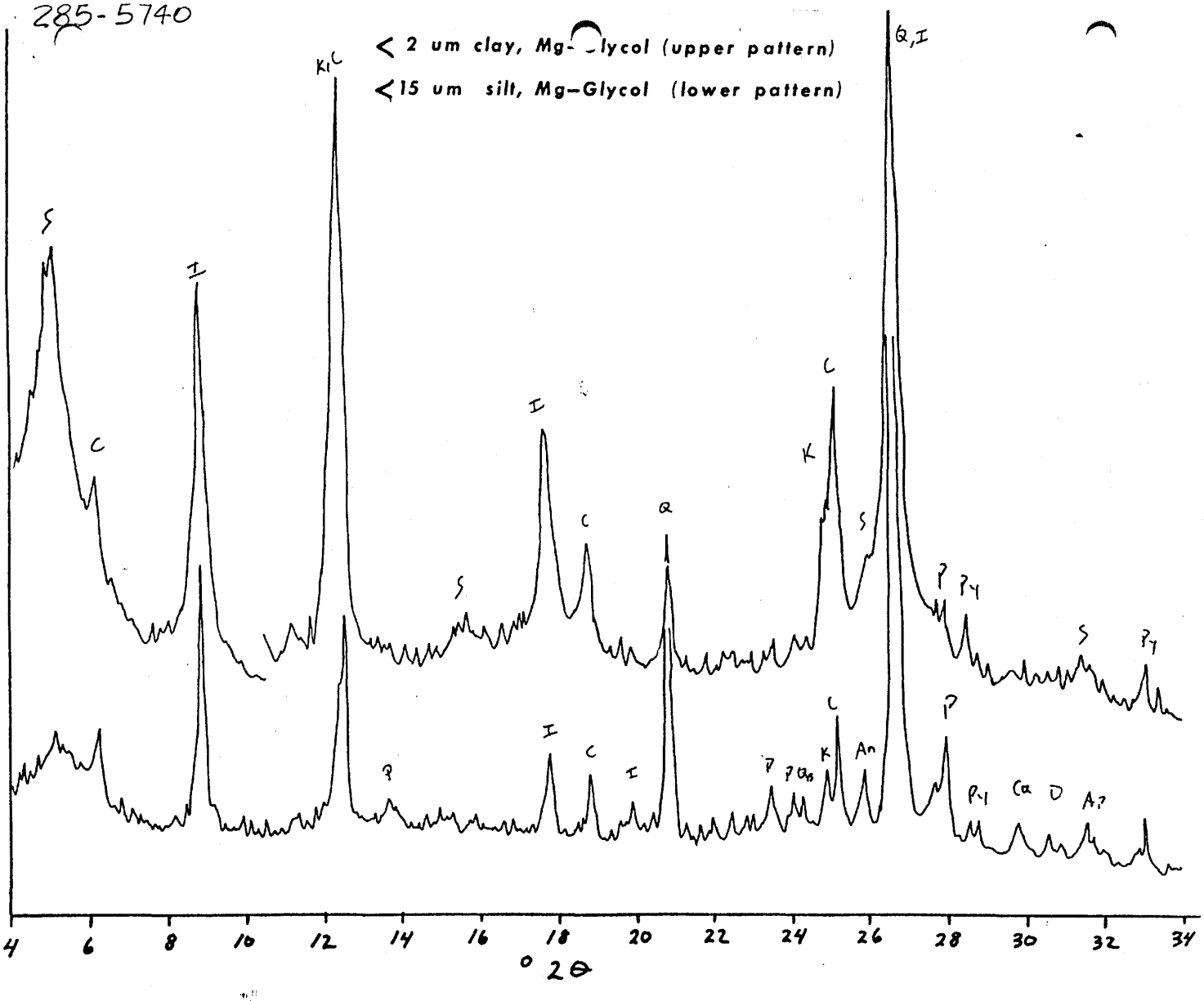
285-4120

< 2 um clay, Mg-Glycol (upper pattern)

< 15 um silt, Mg-Glycol (lower pattern)



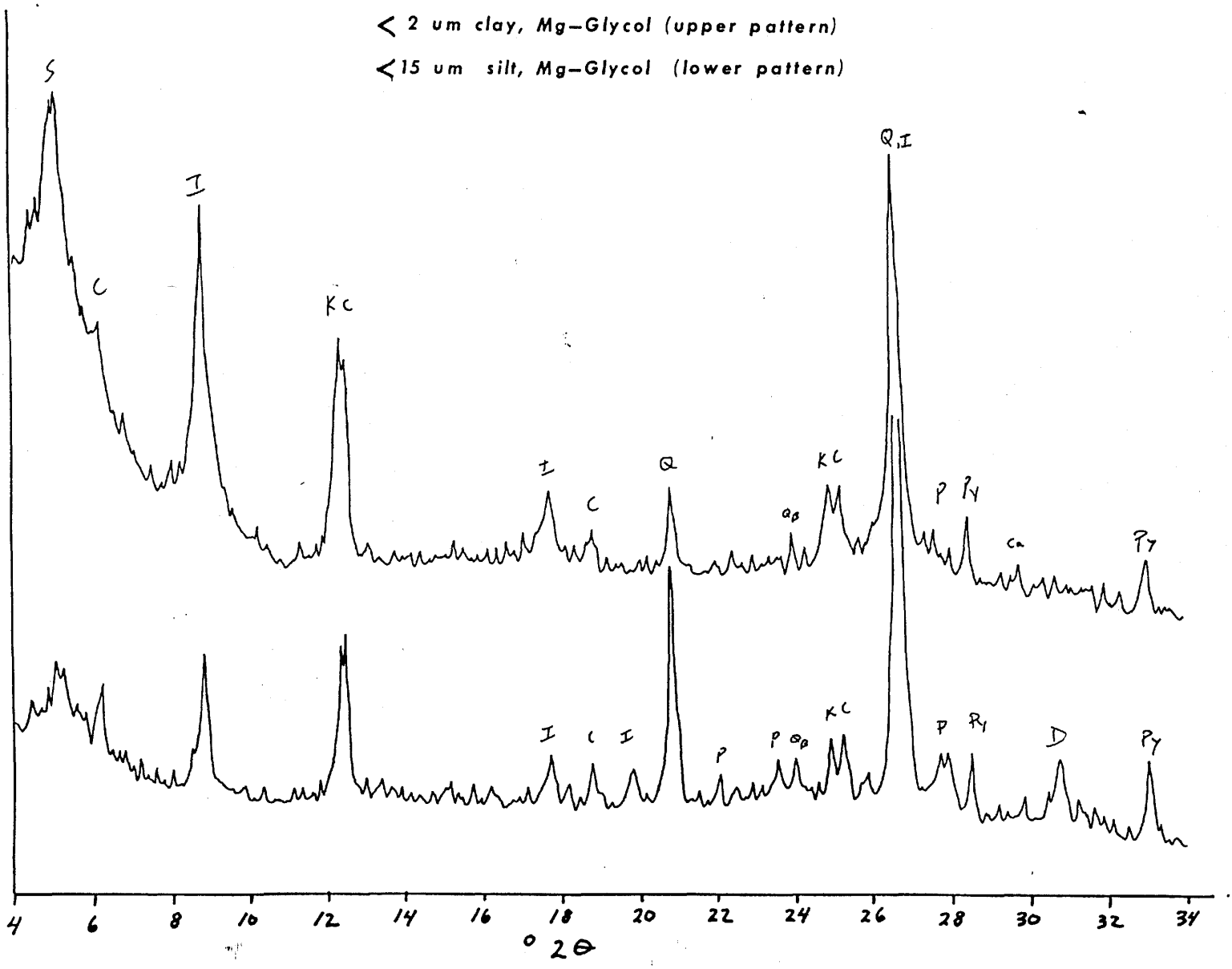

285-5220
< 2 um clay, My–Glycol (upper pattern)
<15 um silt, Mg–Glycol (lower pattern)
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

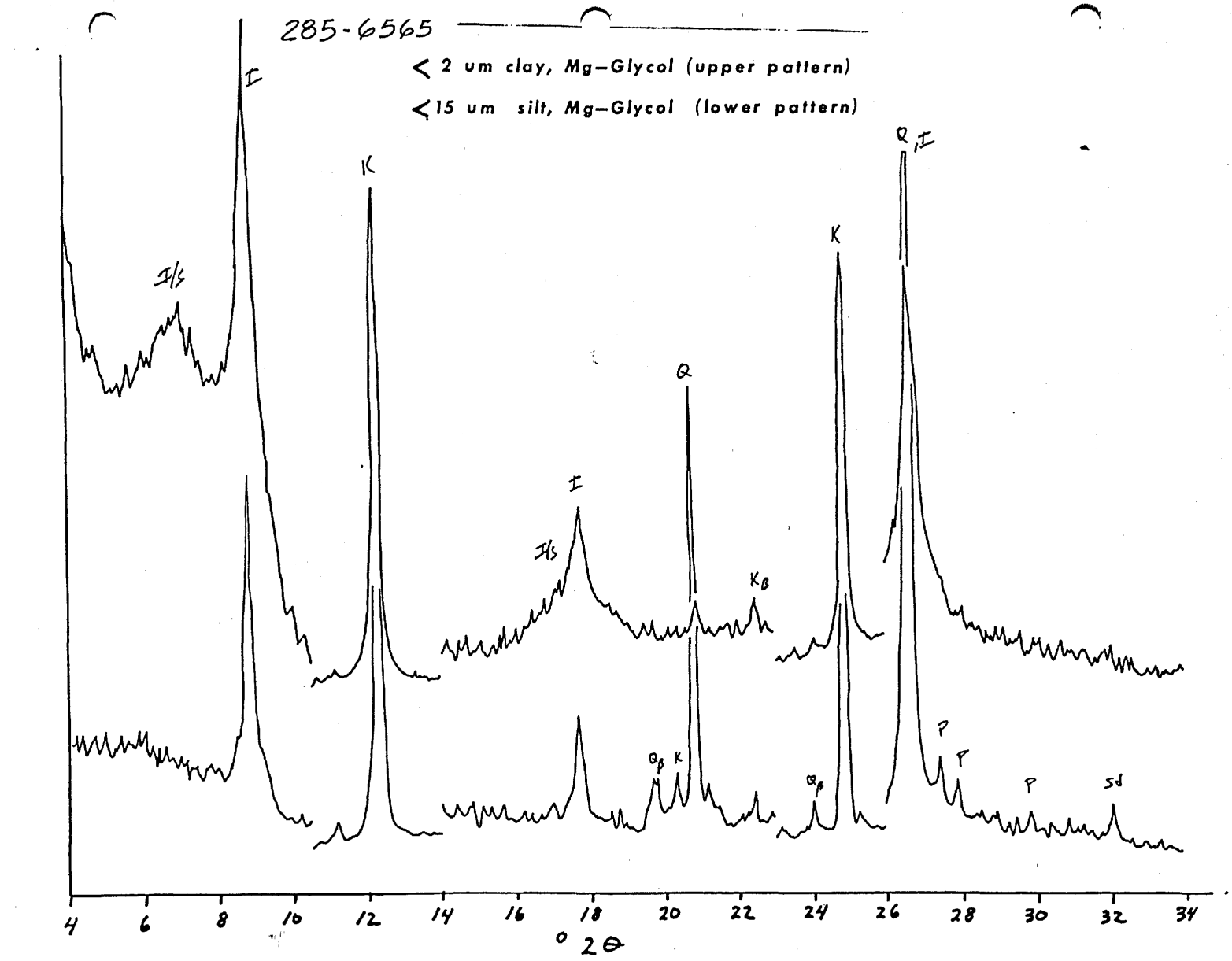

285-5740
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

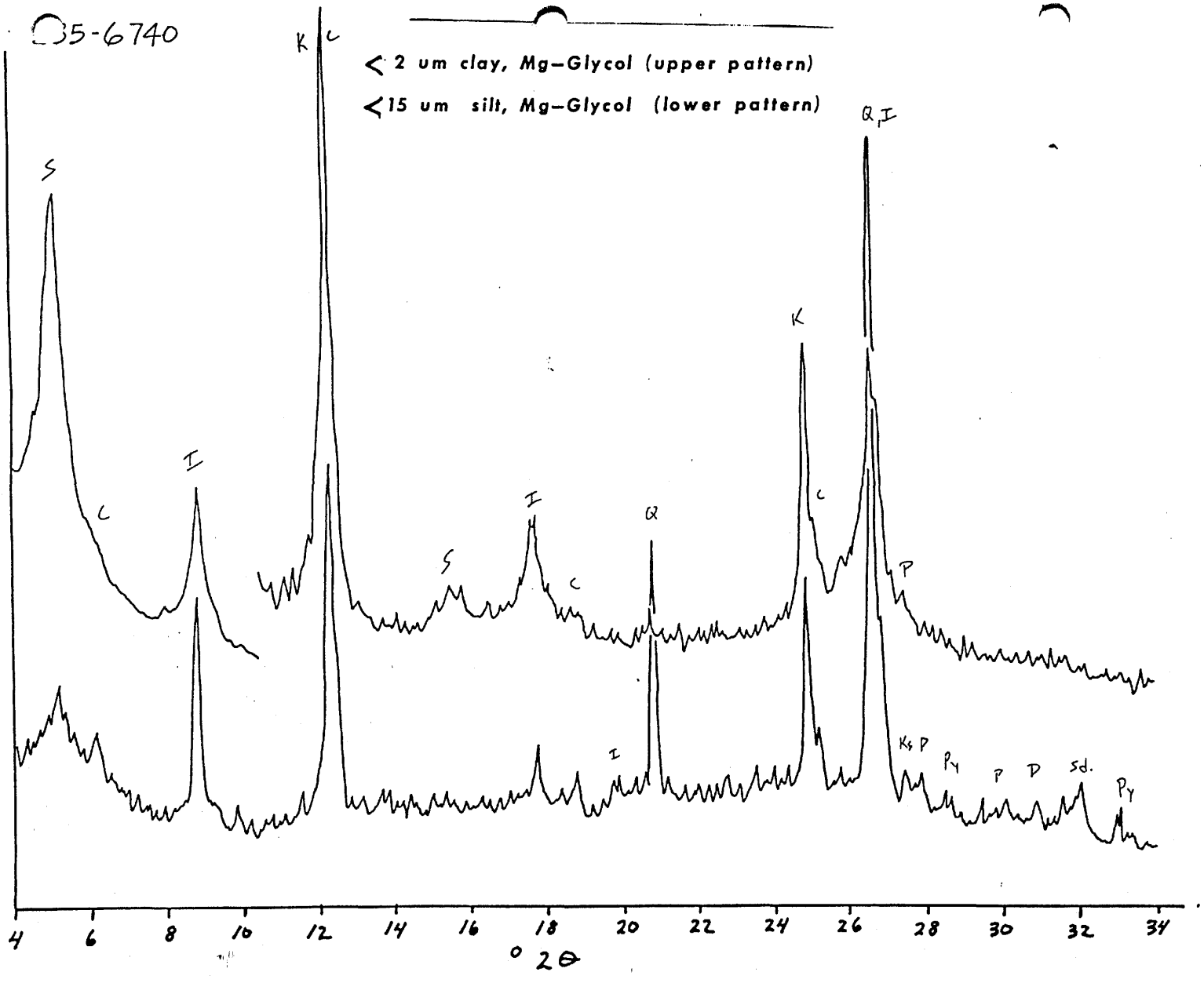
85-6200

< 2 um clay, Mg–Glycol (upper pattern)

< 15 um silt, Mg–Glycol (lower pattern)



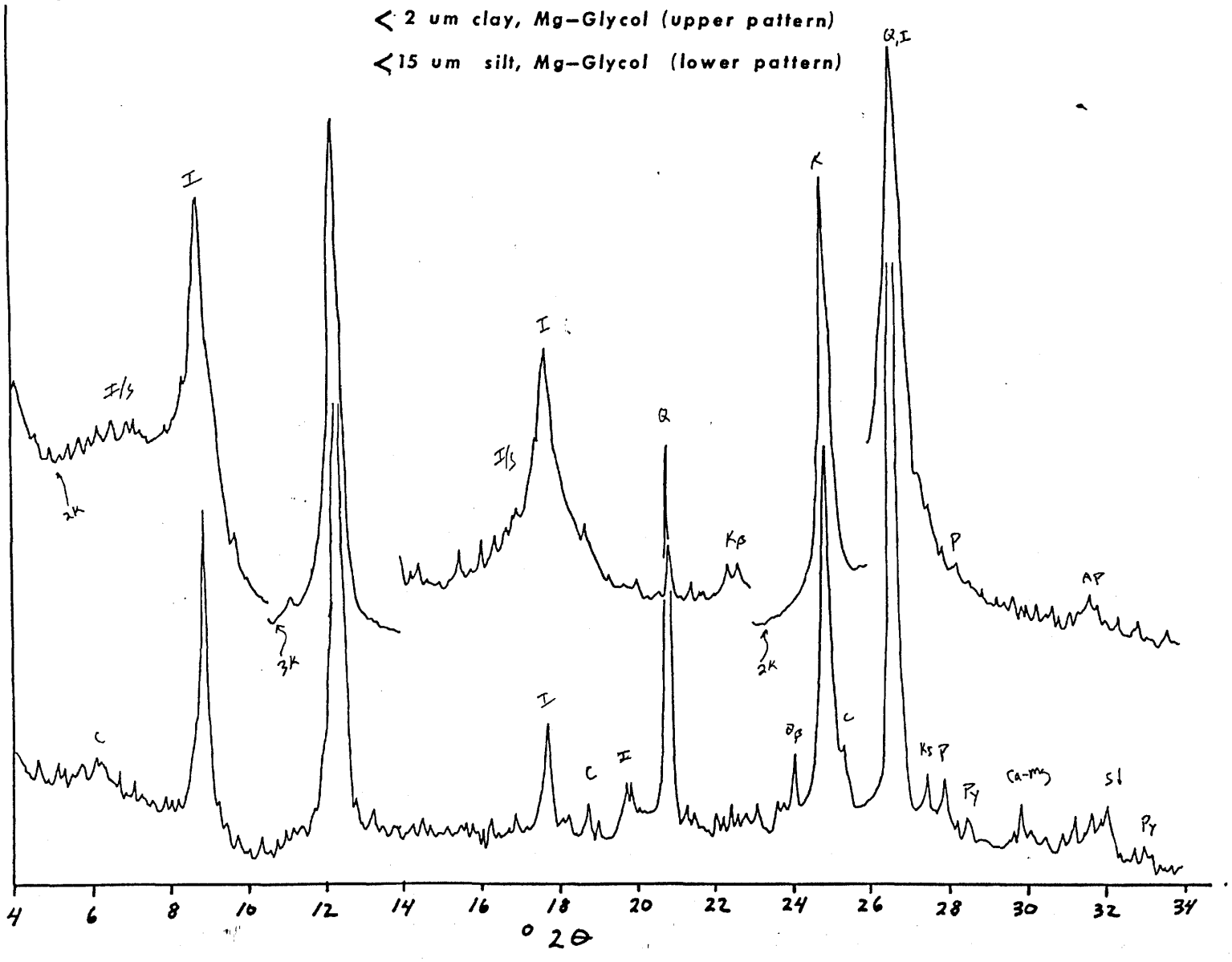

285-6565
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
I
K
I/S
Q
I
K
Q,I
Kβ
Qβ
P
sd
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


35-6740
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
I
C
K
C
S
I
C
Q
K
C
Q,I
P
K & P
P
P
P
Sd.
P
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

285-6855

< 2 um clay, Mg–Glycol (upper pattern)

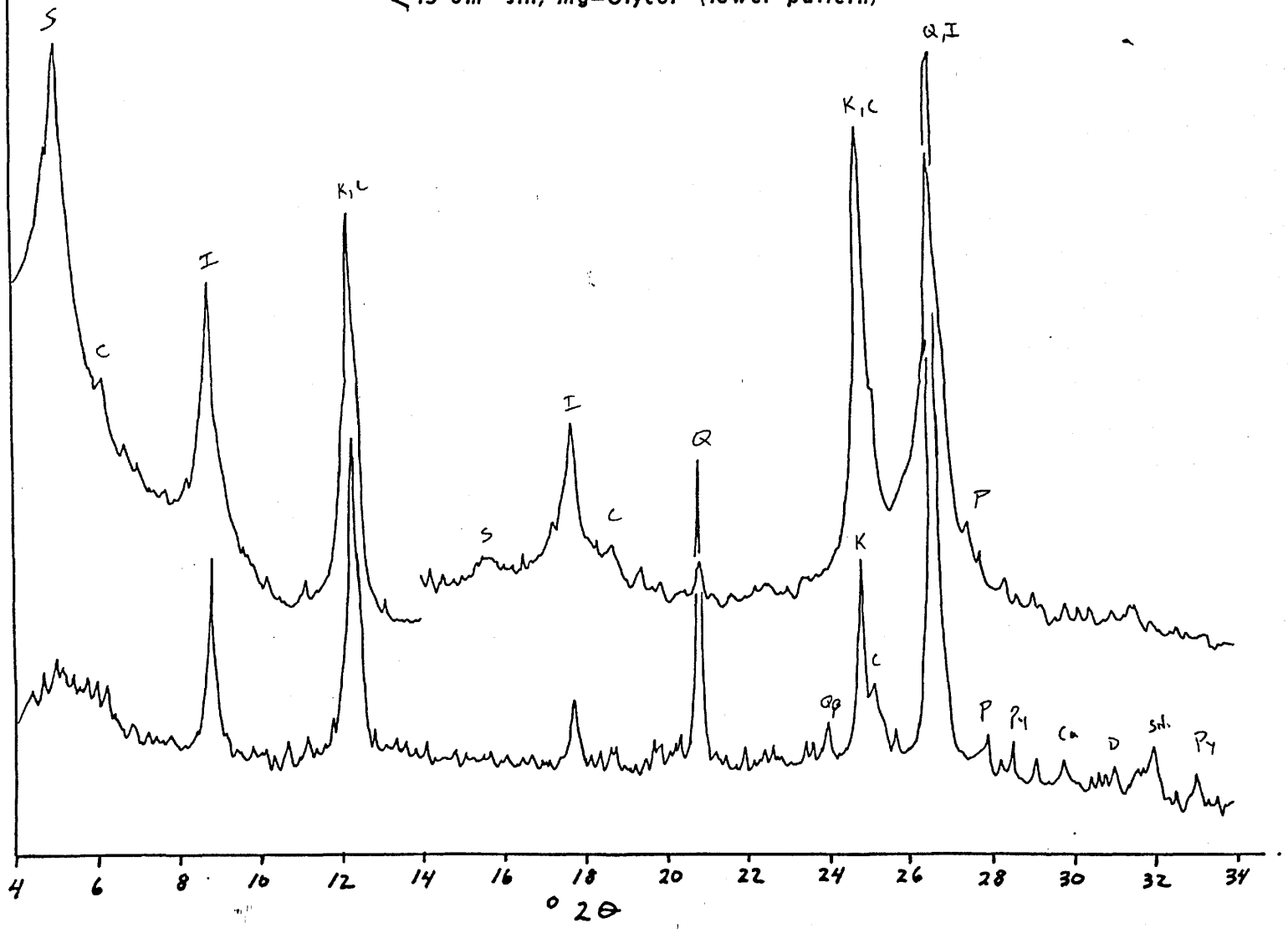
< 15 um silt, Mg–Glycol (lower pattern)



85-7050

< 2 um clay, Mg–Glycol (upper pattern)

< 15 um silt, Mg–Glycol (lower pattern)



35-7410

< 2 um clay, Mg–Glycol (upper pattern)

< 15 um silt, Mg–Glycol (lower pattern)

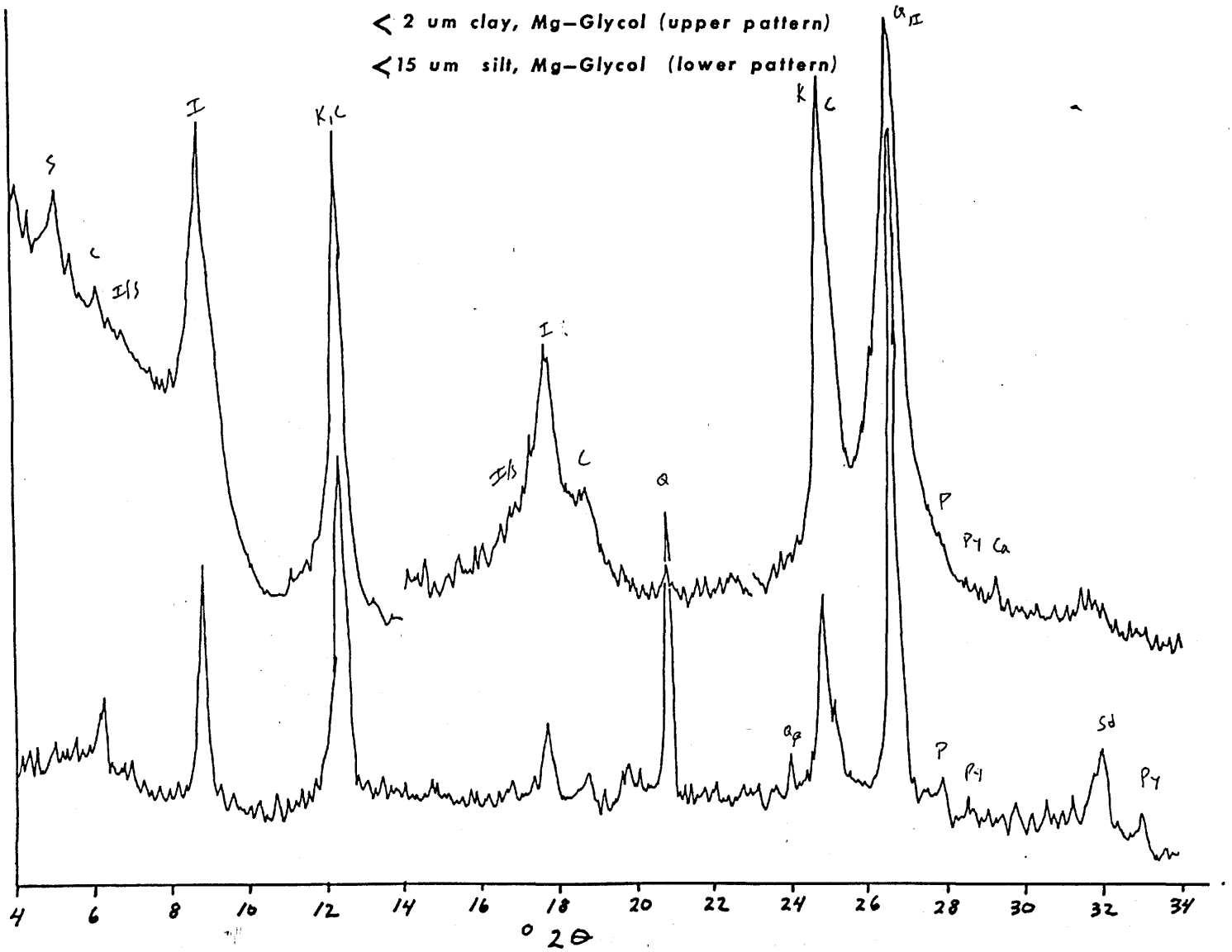


Table 9: Clay mineralogy of samples from Arco North Prudhoe Bay St. #1 well.

ARCO N. PRUDHOE BAY ST.#1

DEPTH FEET	STYPE	SMECTITE	CHLORITE	MIXED LAYER I/S	ILLITE	KAOLINITE	OTHER
6800	C	MAJ	-	MOD	MOD	MIN	MDM,BULK XRD,Q1,P1
6800-S	C	TR	MOD	-	MIN	MIN	Q3,P2,AP2
7380	C	MAJ	MIN	TR	MIN	-	Q,P,AP,MDM,POOR BULK XRD
7380-S	C	MIN	MOD	-	MOD	MIN	Q3,P1,AP1,SID1
7880	C	MOD	MOD	MIN	MOD	MOD	MDM,BULK XRD OF GARBAGE,Q1
7880-S	C	-	MOD	-	MOD	MIN	Q3,P2,D1,AP1,SID1,PY1
8020	C	MAJ	MIN	MOD	MOD	MOD	Q2,P1,BK/GR.SH.,WASHED
8020-S	C	TR	MIN	-	MOD	MIN	Q2,AN2,P1,D1,SID1,PY
8160	C	MOD	MOD	MIN	MOD	MOD	Q2,P1,DM CONT.,WASHED,DGR.SH.
8160-S	C	MIN	MIN	-	MIN	TR	Q2,HC1,CA2,D1,SID1,P1
8340	C	MOD	MIN	MOD	MOD	MOD	Q2,BK.SH.,WASHED,MINOR DM
8340-S	C	-	MIN	-	MOD	MIN	Q3,P1,D1,PY1
8640	C	MOD	TR	MOD	MOD	MOD	Q1,TUFF.
8640-S	C	MIN	MOD	-	MOD	TR	Q3,HC1,P2,AP2,PY1
9020	C	MIN	MIN	MOD	MOD	MAJ	Q1,DM CONT.
9020-S	C	-	TR	-	MOD	MAJ	Q3
9140	C	MIN	-	MOD	MOD	MAJ	Q1,DM CONT.SANDSTONE
9140-S	C	-	TR	-	MOD	MAJ	Q3,P1,D1,PY1
9570	C	MOD	MIN	MOD	MOD	MOD	Q1,DM CONTAM.
9570RECALC		-	MIN	MOD	MAJ	MOD	RECALC TO IGNORE DM
9570-S	C	-	MIN	MIN	MAJ	MOD	Q3,P1,D1,SID1

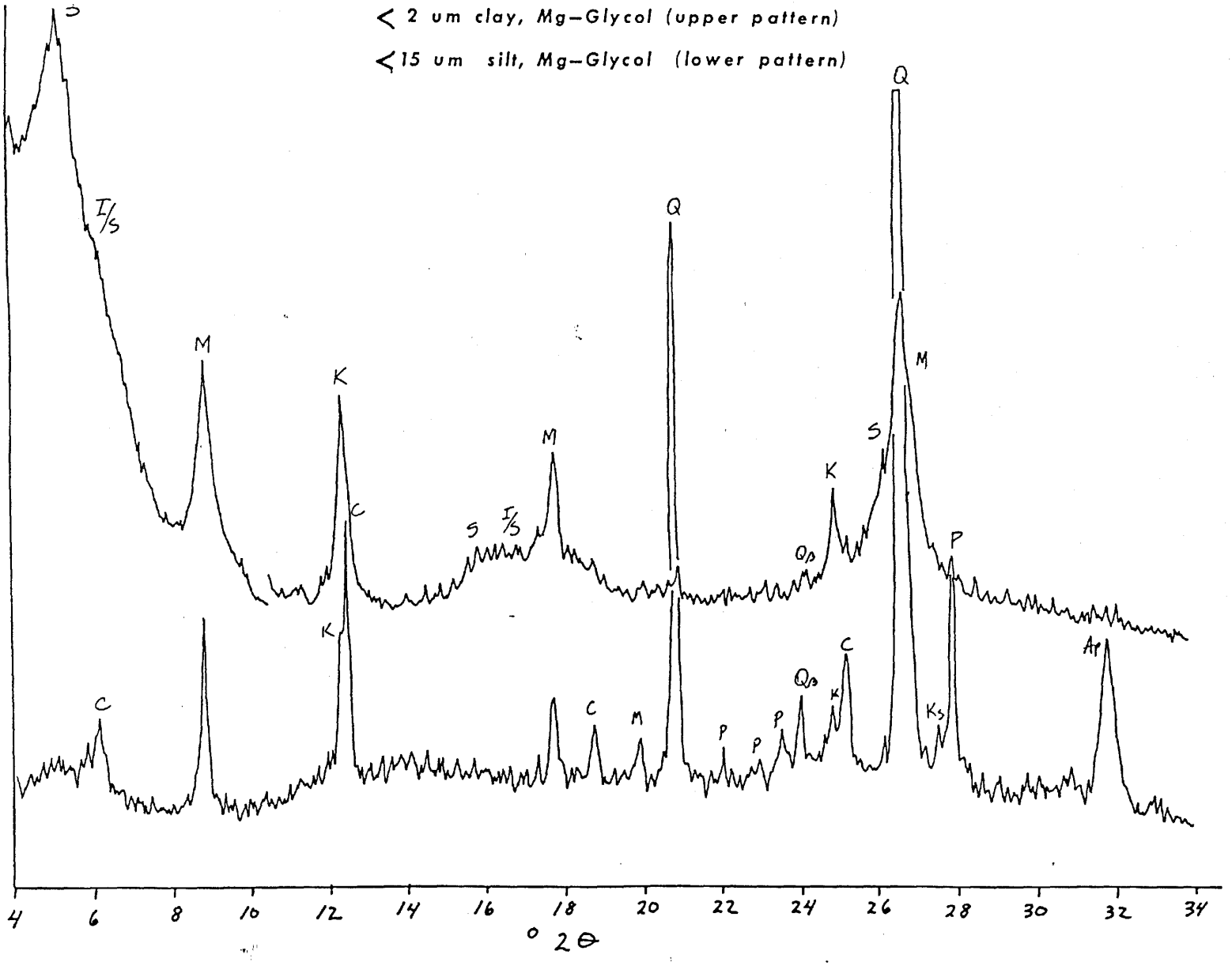
CUTTINGS MOSTLY SANDSTONE.

Definitions: TR = less than 3%, MIN = 3 - 12%, MOD = 13 - 35%, MAJ = >35%. Other mineral abbreviations: Q = quartz, P = plagioclase, KS = k-spar, AN = analcime, HC =heulandite-clinoptilolite, CA = calcite, D = dolomite, AP = apatite, SID = siderite, PY = pyrite, BA = barite. 1 = weak, 2 = moderate, 3 = strong, nothing = trace. MDM = mostly drill mud, BK.SH. = black shale, GR. = gray, SIS. = siltstone, TUFF. = tuffaceous, ANK = ankerite. Also: STYPE = sample type, C = cuttings, CC = core, SW = side wall, S = silt.

262-6800

< 2 um clay, Mg–Glycol (upper pattern)

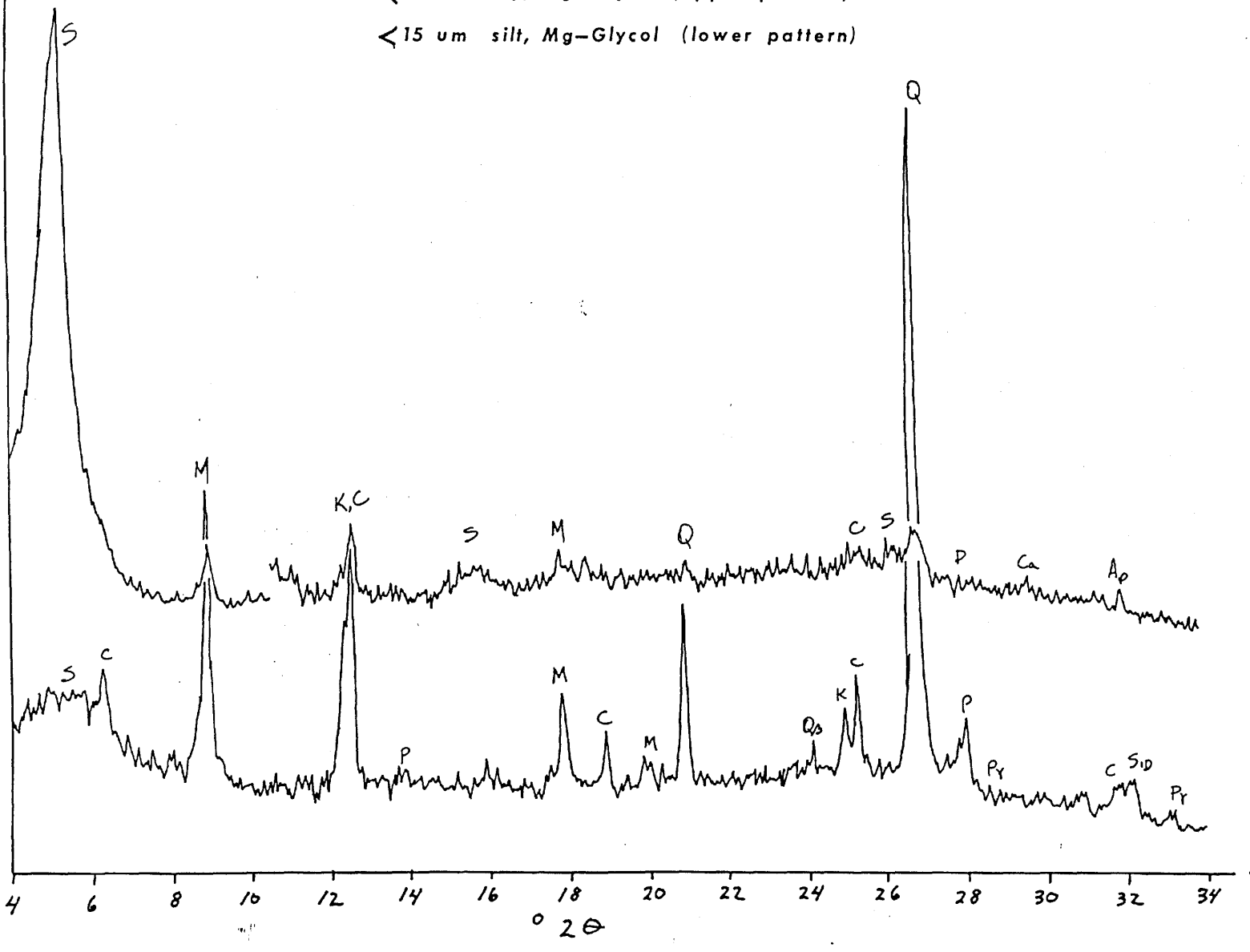
< 15 um silt, Mg–Glycol (lower pattern)



262-7380

< 2 um clay, Mg–Glycol (upper pattern)

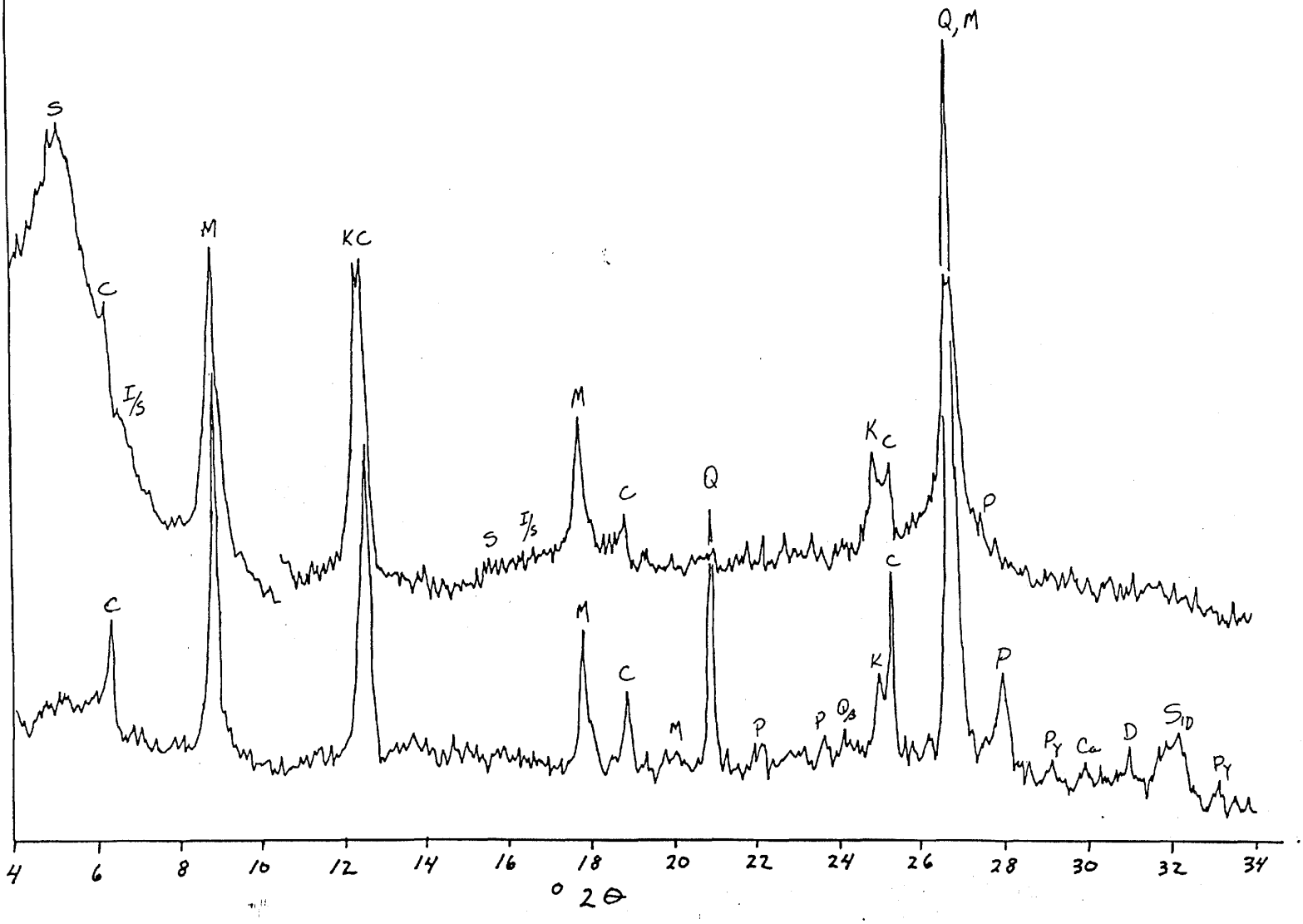
< 15 um silt, Mg–Glycol (lower pattern)



?62-7880

< 2 um clay, Mg–Glycol (upper pattern)

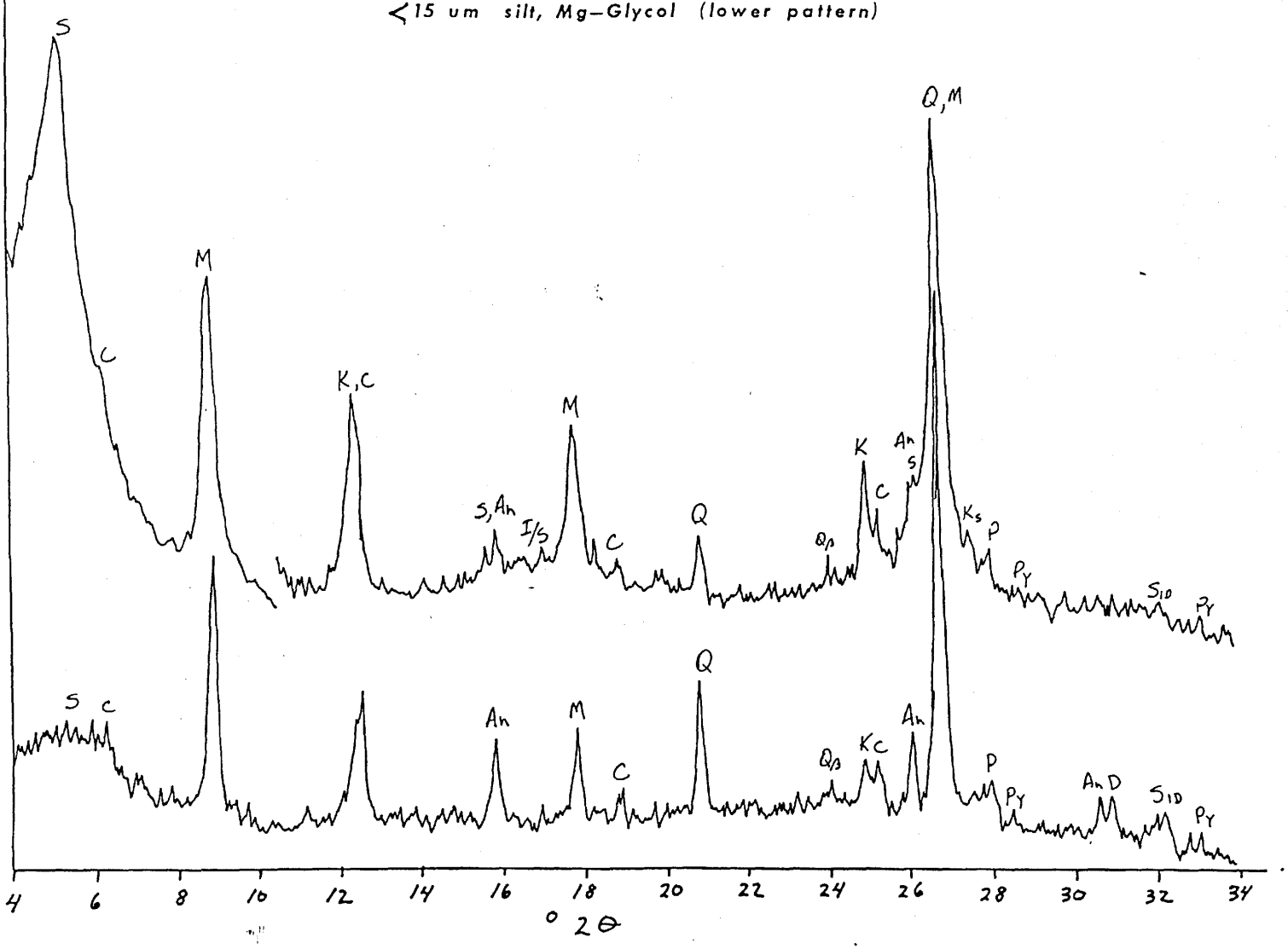
< 15 um silt, Mg–Glycol (lower pattern)

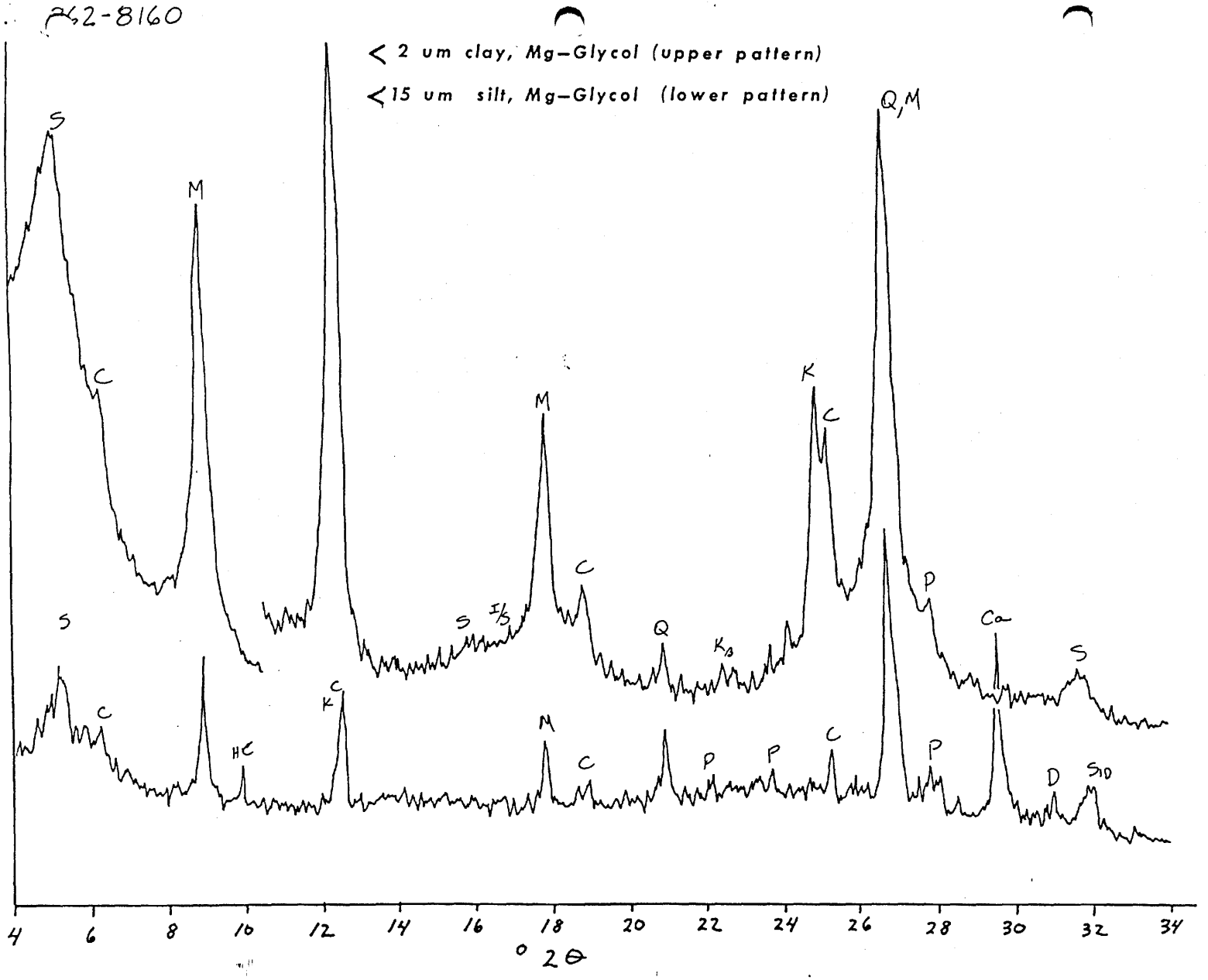


K2-8020

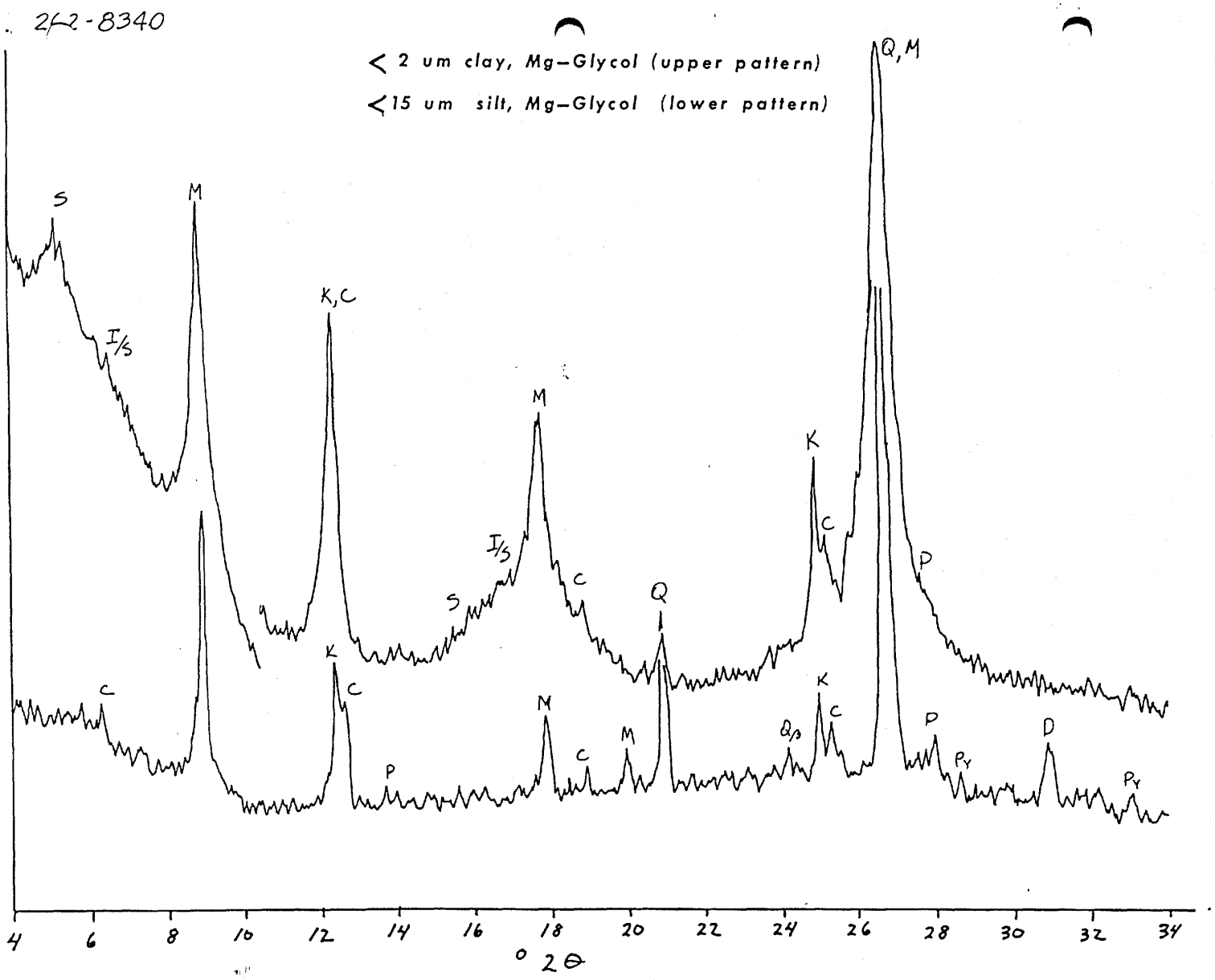
< 2 um clay, Mg–Glycol (upper pattern)

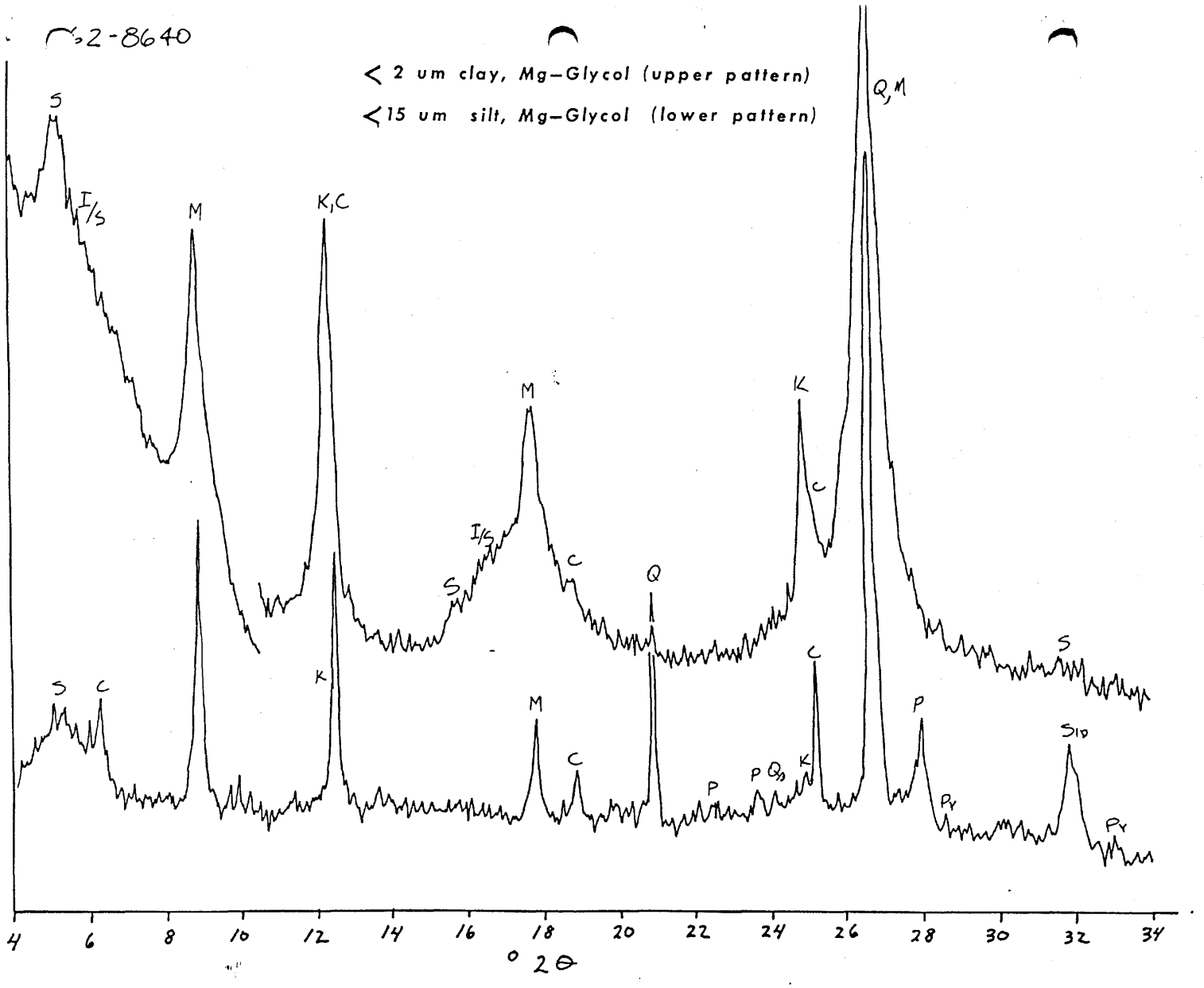
< 15 um silt, Mg–Glycol (lower pattern)



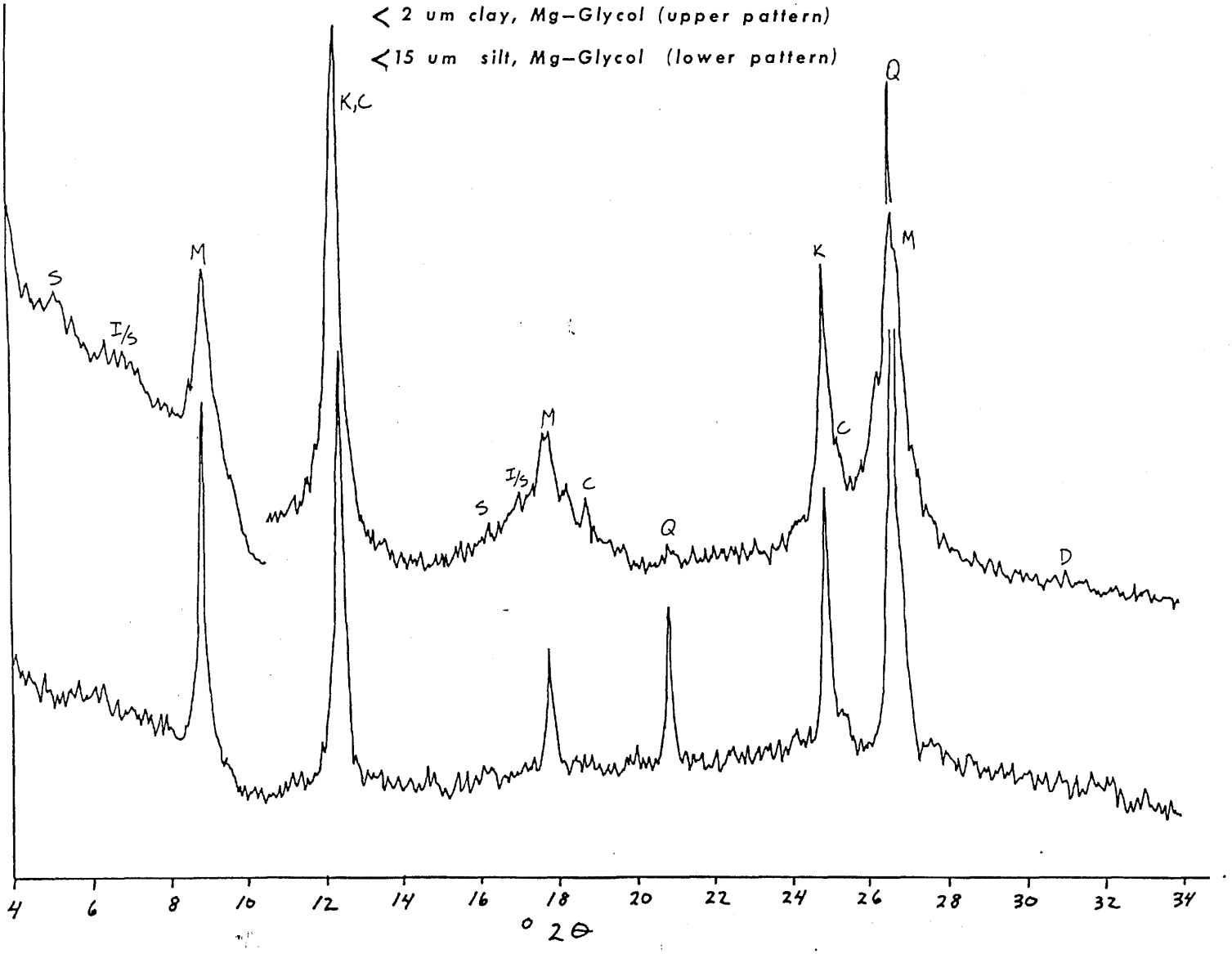

262-8160
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
C
M
K
Q,M
I/S
Q
P
Ca
D
HC
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

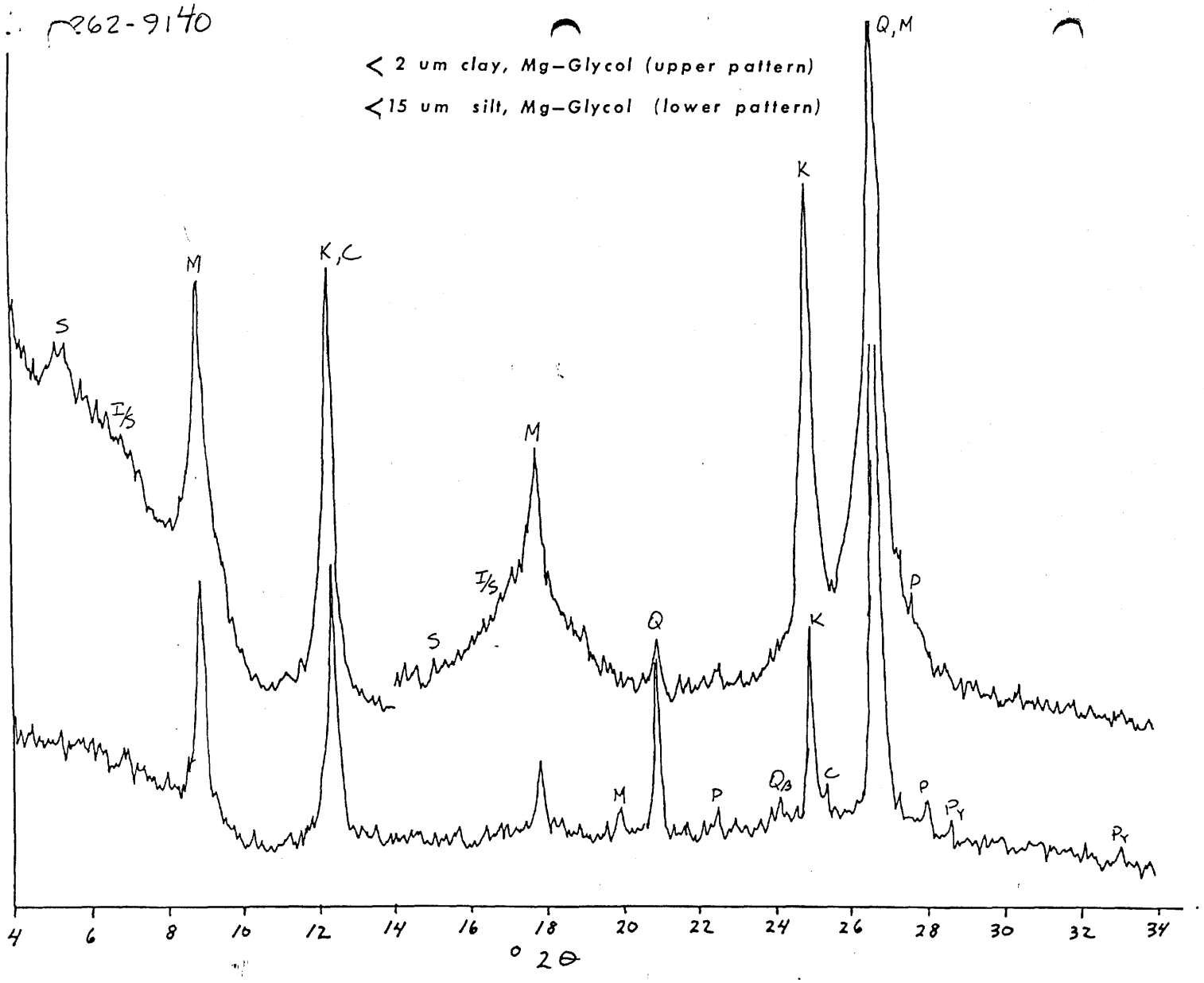
2F2-8340


< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
S
I/S
M
K,C
C
P
S
I/S
M
C
Q
K
C
Q,M
P
K
C
M
C
M
Q/S
K
C
P
P
D
P
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


82-8640
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
I/S
M
K,C
S
I/S
M
C
Q
K
C
Q,M
S
C
K
M
C
P
P Q
K
C
P
Pr
S
Pr
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

262-9020


< 2 um clay, Mg–Glycol (upper pattern)
<15 um silt, Mg–Glycol (lower pattern)
S
I/s
M
K,C
S
I/s
M
C
Q
K
C
Q
M
D
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


∴ ?62-9140
< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
Q,M
K
M
K,C
S
I/S
M
I/S
S
Q
K
P
C
Q/S
M
P
P
P
P
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

262-9570

< 2 um clay, Mg–Glycol (upper pattern)

< 15 um silt, Mg–Glycol (lower pattern)

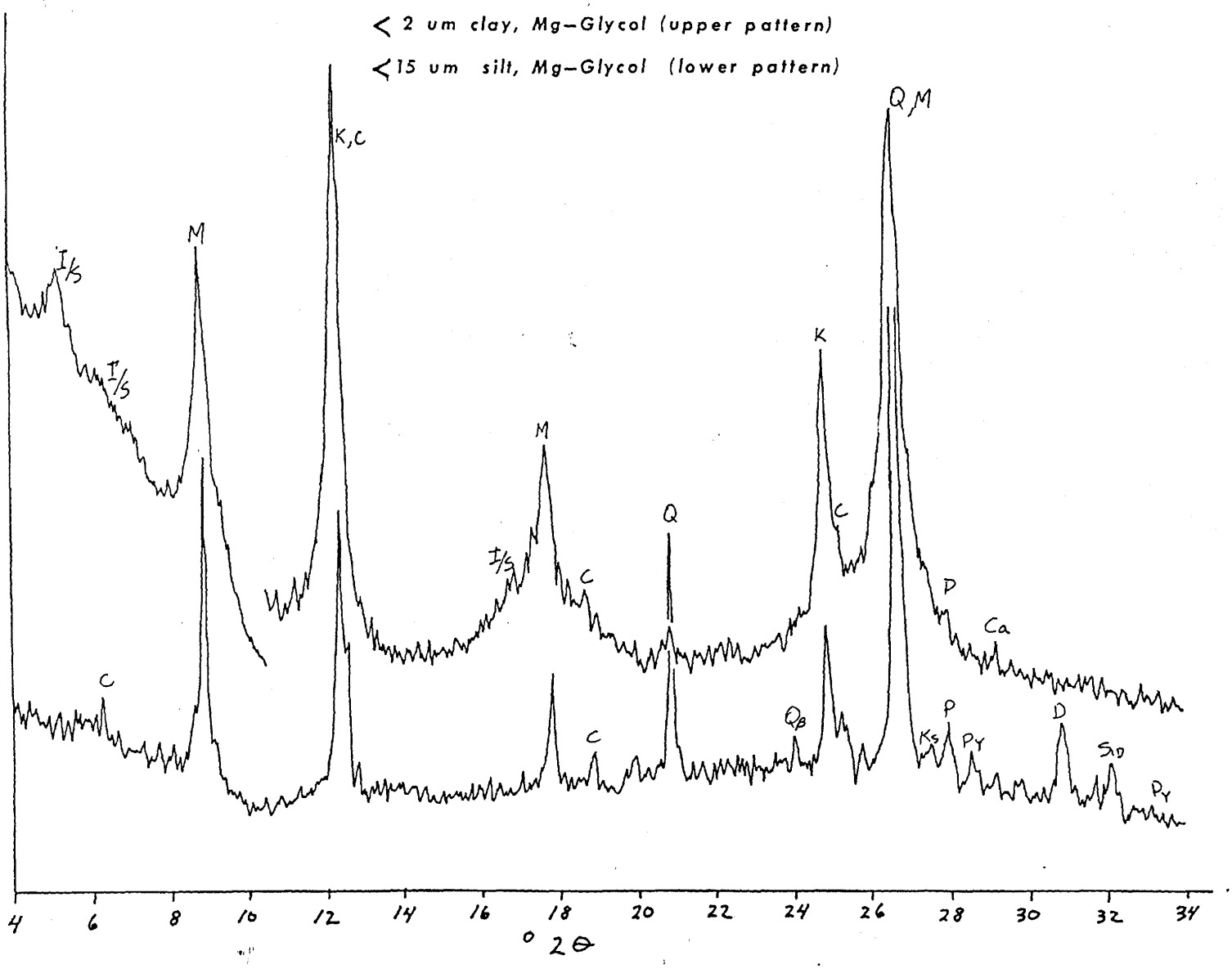


Table 10: Clay mineralogy of samples from Mobil West Staines St. 18-9-23 well.

MOBIL WEST STAINES ST. 18-9-23

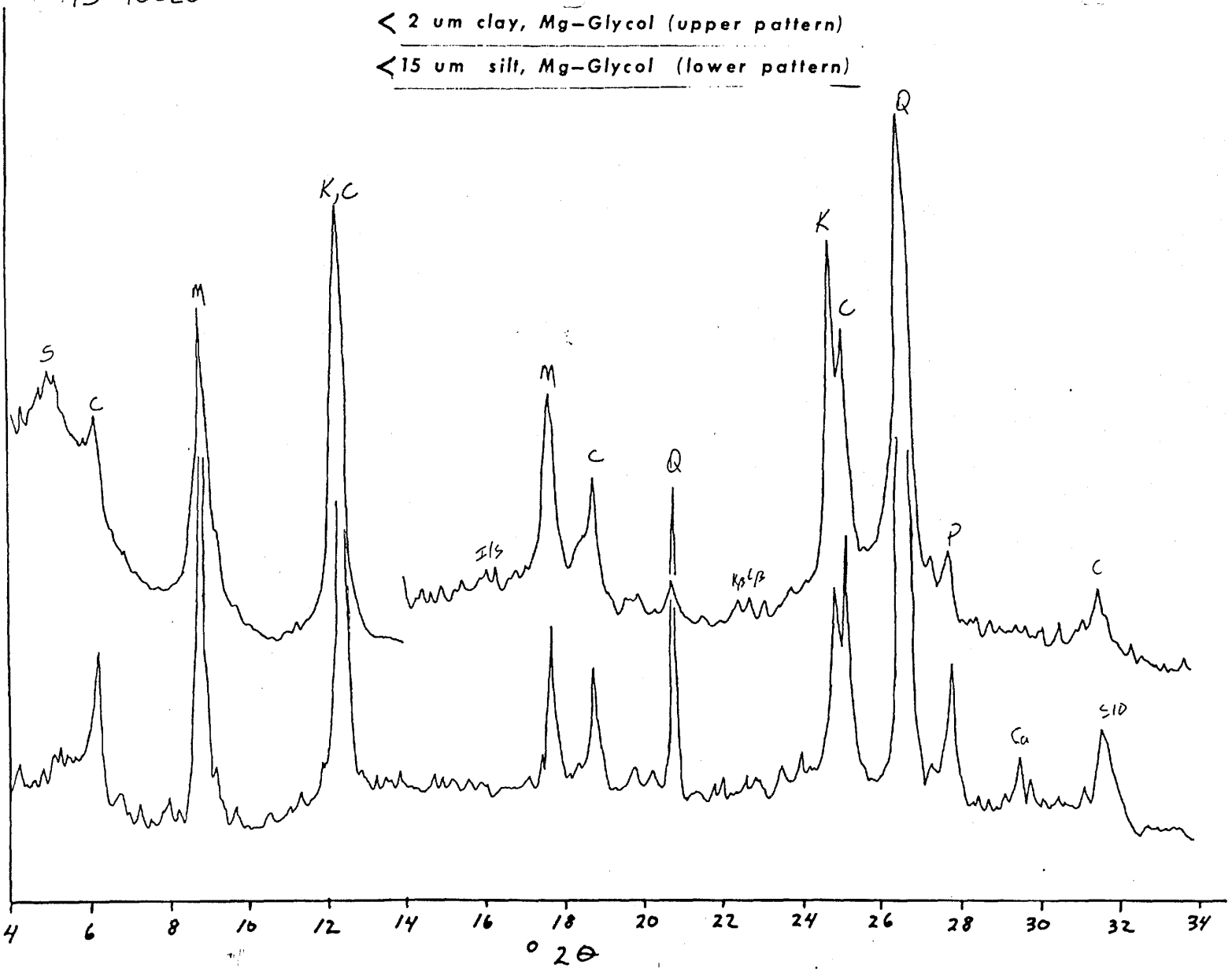
DEPTH FEET	STYPE	SMECTITE	CHLORITE	MIXED LAYER I/S	ILLITE	KAOLINITE	OTHER
10020	C	MIN	MOD	MIN	MOD	MOD	Q2,P1,D,PR?DGR.SH.SIS.
10020-S	C	-	MAJ	-	MOD	MOD	Q3,P2,CA-MG1
10574	CC	MIN	MOD	MIN	MOD	MOD	Q2,P,DGR/BK.SH
10574-S	CC	-	MAJ	-	MOD	MOD	Q3,P2
11190	C	-	MOD	MIN	MOD	MAJ	Q2,P1,BN/GR.SIS.
11190-S	C	-	MAJ	-	MOD	MOD	Q3,P2,D,PY,PR?
11550	C	-	MOD	MIN	MOD	MOD	Q2,P,BN/GR.SIS,DM CONT.
11550-S	C	-	MAJ	-	MOD	MAJ	Q3,P1,CA1
11730	CC	-	MAJ	MIN	MOD	MOD	Q2,P,DGR.SH.
11730-S	CC	-	MAJ	-	MOD	MIN	Q3,P2
11900	C	-	MOD	MIN	MOD	MAJ	Q2,P,KS,SIS,F.G.SS.DM.CONT.
11900-S	C	-	MOD	-	MAJ	MOD	Q3,P1
12400	C	-	MOD	MIN	MOD	MAJ	Q2,P,SID,DGR.SIS,DM.CONT.
12400-S	C	-	MOD	-	MAJ	MOD	Q3,P1,PR?
12540.6	CC	-	-	TR	MIN	-	Q3,AN2,P,PY2,BK.LAM.SIS/SH
12540.6S	CC	-	-	-	TR	-	Q3,AN3,P,PY2
12673	CC	-	-	-	MAJ	-	Q3,P1,CA,PY3 BK.SH.
12673-S	CC	-	-	-	MIN	-	Q3,P2,CA-MG,PY2,POOR XRD
12950	C	-	MOD	MIN	MOD	MOD	Q2,P1,BULK XRD,TUFF.?
12950-S	C	-	MOD	-	MOD	MOD	Q3,P1,D
13321	CC	-	-	-	MAJ	MOD	PR2,Q2,D1,PY1,SLATE
13321-S	CC	-	-	-	MAJ	MOD	PR2,Q2,D1,SID1,PY1

Definitions: TR = less than 3%, MIN = 3 - 12%, MOD = 13 - 35%, MAJ = >35%. Other mineral abbreviations: Q = quartz, P = plagioclase, KS = k-spar, AN = analcime, HC =heulandite-clinoptilolite, CA = calcite, D = dolomite, AP = apatite, SID = siderite, PY = pyrite, BA = barite. 1 = weak, 2 = moderate, 3 = strong, nothing = trace. MDM = mostly drill mud, BK.SH. = black shale, GR. = gray, SIS. = siltstone, TUFF. = tuffaceous, ANK = ankerite. Also: STYPE = sample type, C = cuttings, CC = core, SW = side wall, S = silt.

75-10020

< 2 um clay, Mg–Glycol (upper pattern)

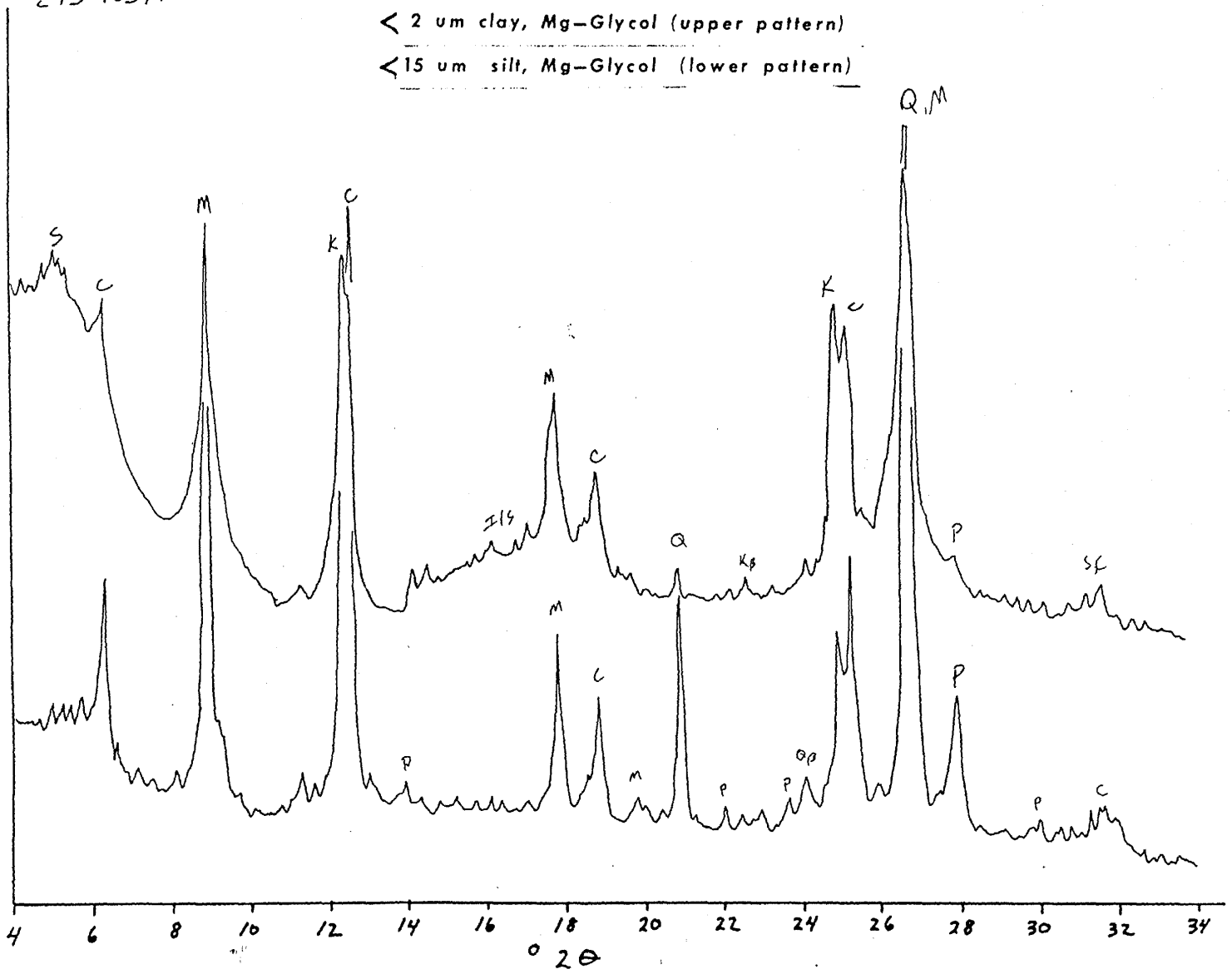
< 15 um silt, Mg–Glycol (lower pattern)



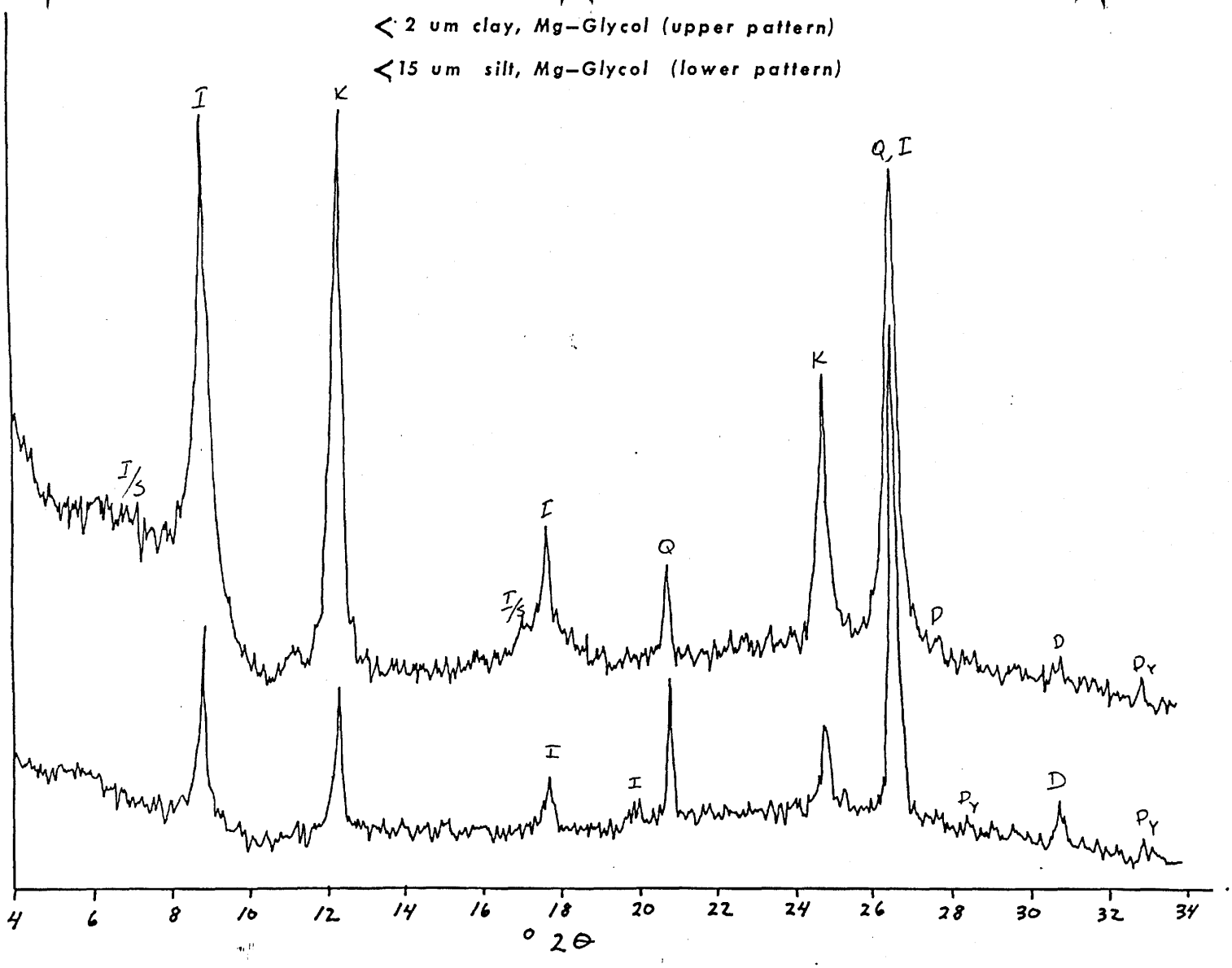
C.5-10574

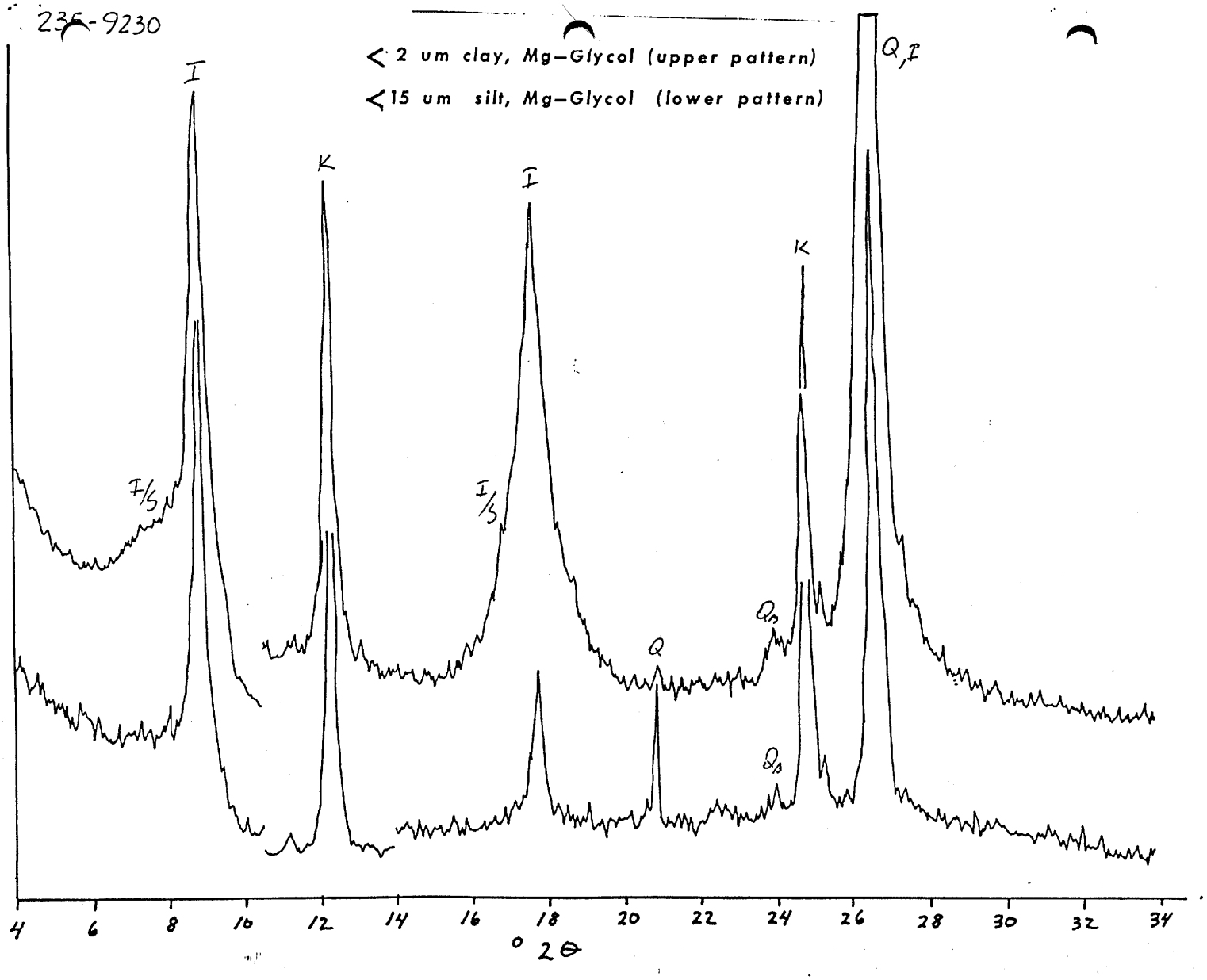
< 2 um clay, Mg–Glycol (upper pattern)

< 15 um silt, Mg–Glycol (lower pattern)



2-F 9120

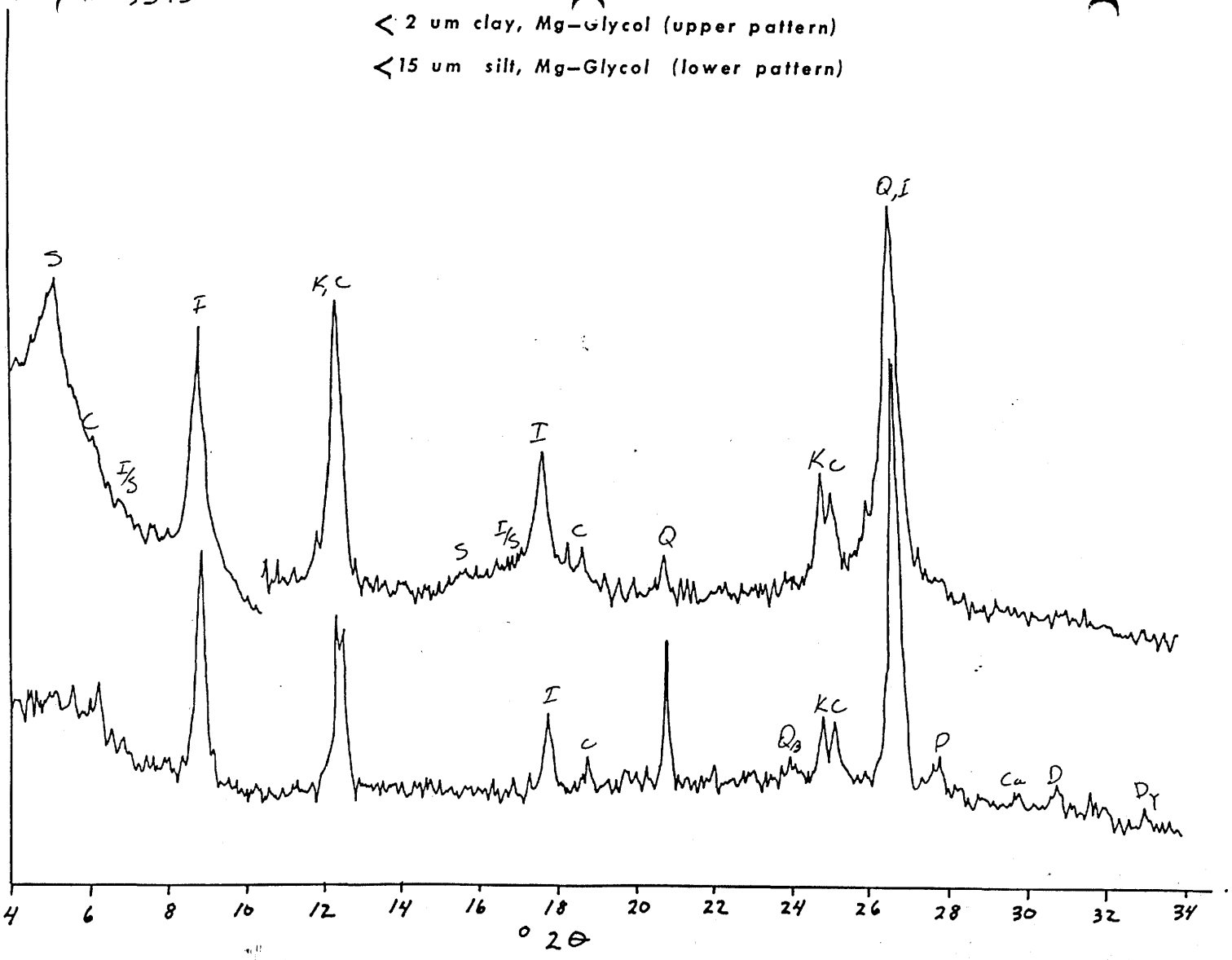

< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
I
K
Q, I
K
I/S
I
I/S
Q
D
D
D
I
I
I
D
D
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


236-9230
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
I
K
I
K
Q, I
I/S
I/S
Q
Q
Q
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

235-9375

< 2 um clay, Mg–Glycol (upper pattern)

< 15 um silt, Mg–Glycol (lower pattern)



235-9745

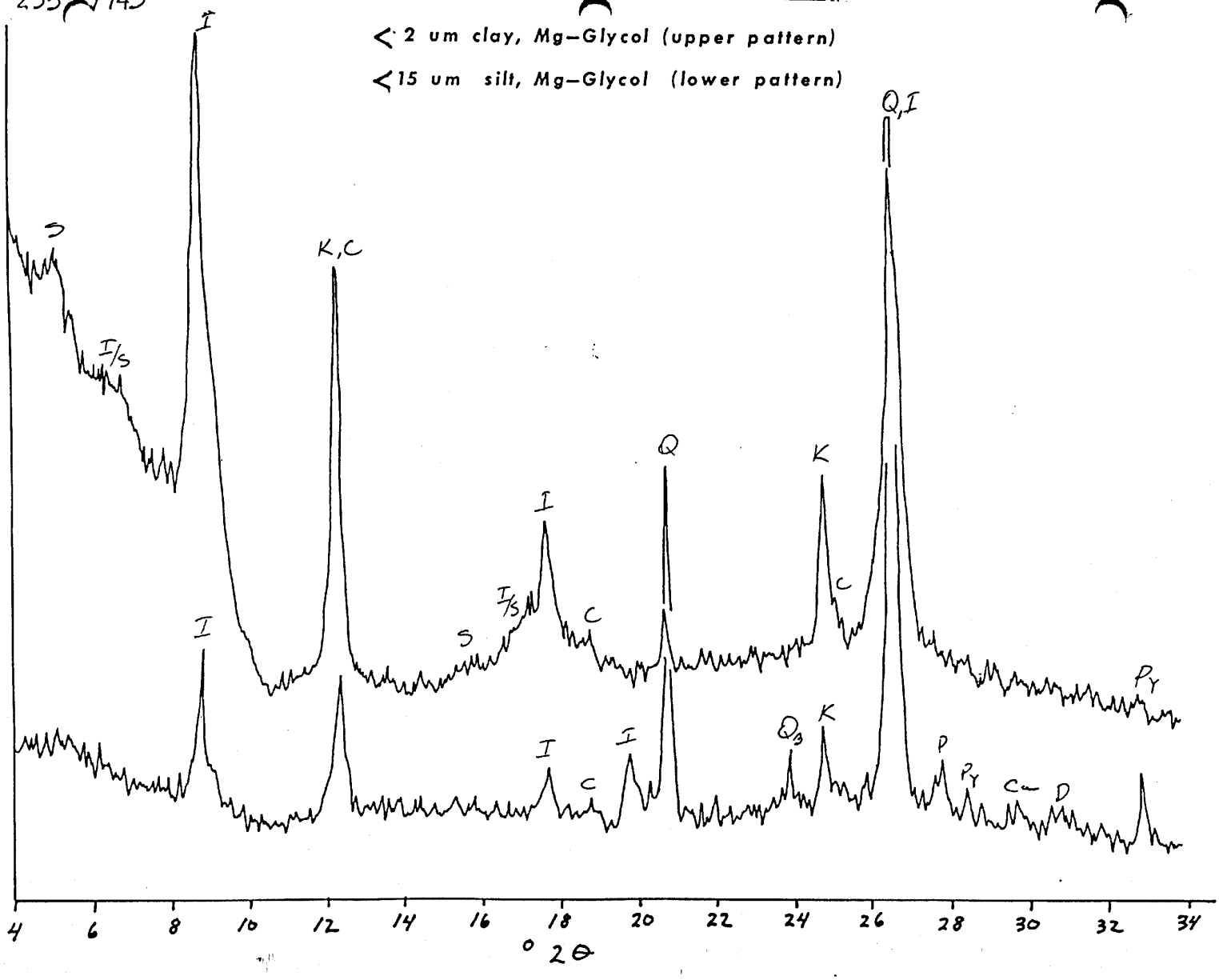
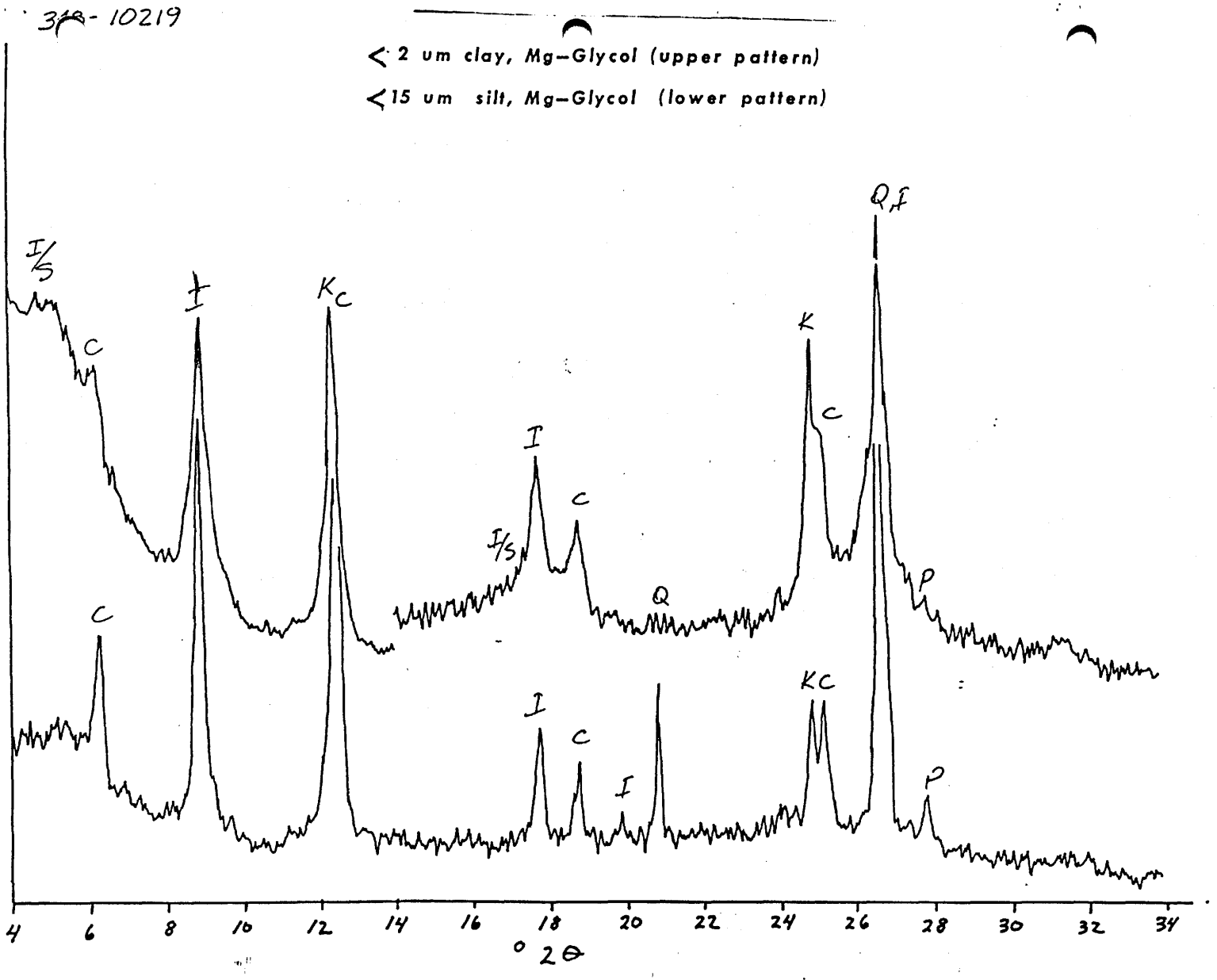

< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
I
I/S
K,C
Q,I
Q
K
C
P
Py
Q3
D
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

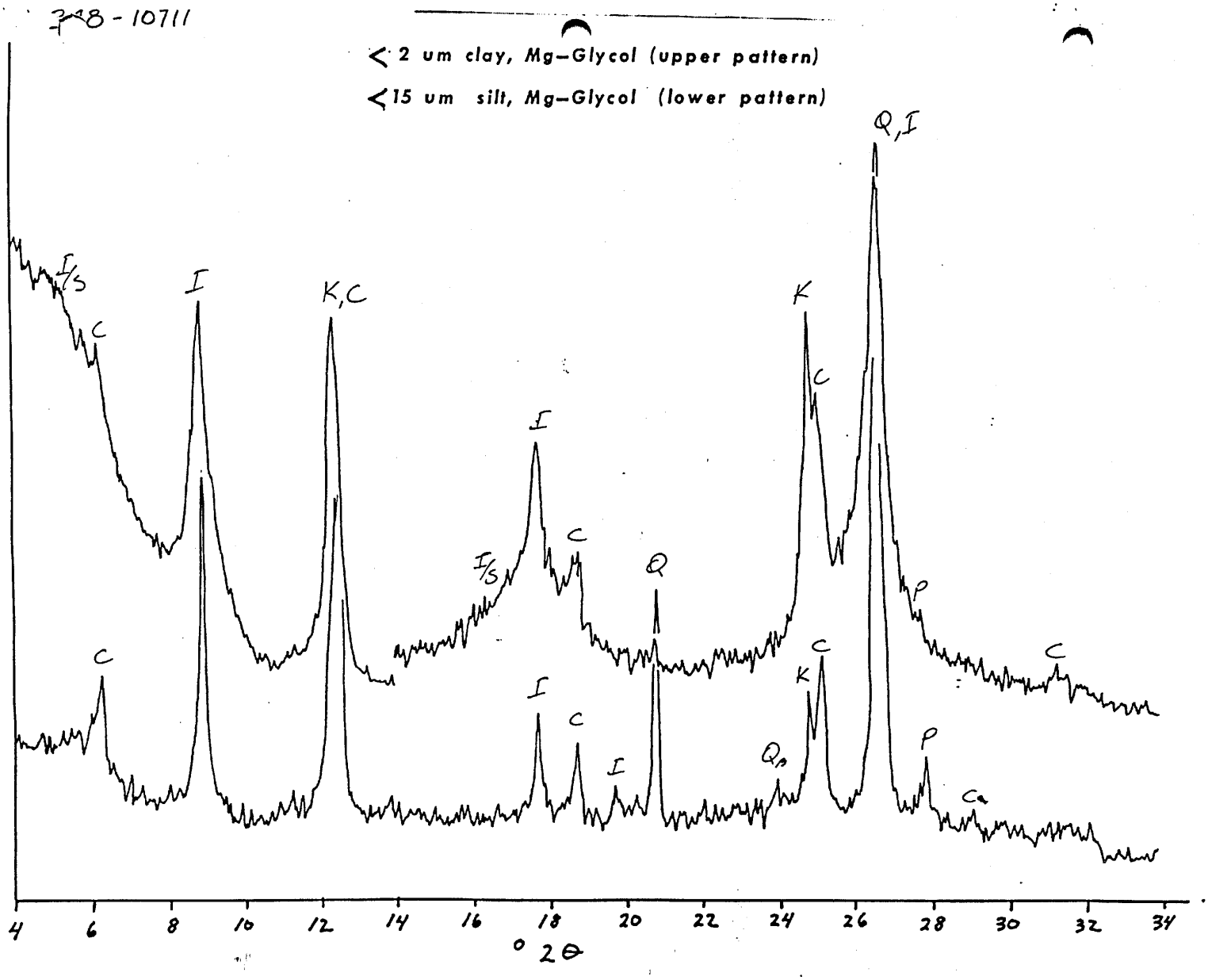
Table 20: Clay mineralogy of samples from Exxon Alaska State A-1 well.

EXXON ALASKA STATE A-1

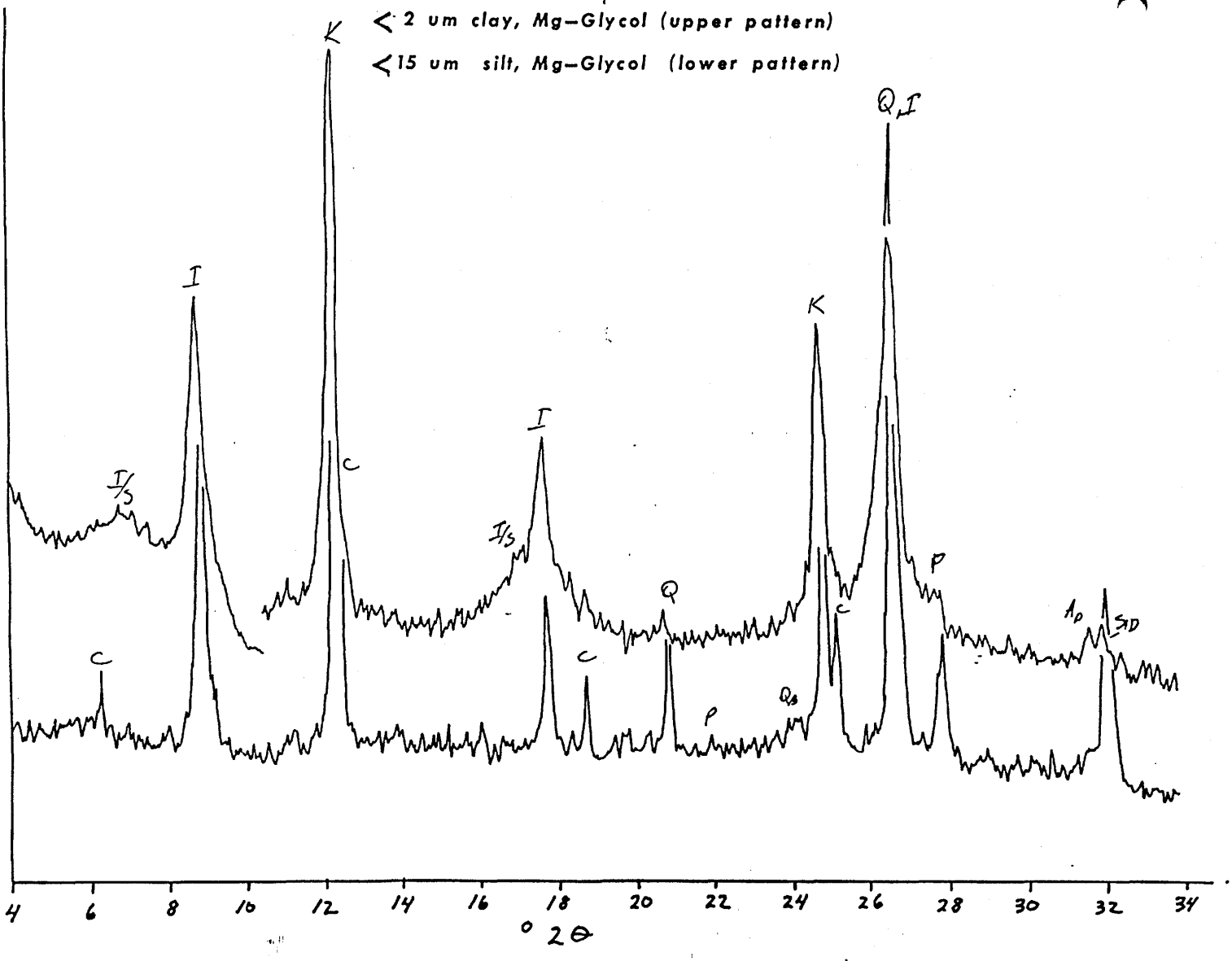
DEPTH FEET	STYPE	SMECTITE	CHLORITE	MIXED LAYER I/S	ILLITE	KAOLINITE	OTHER
10219	CC	-	MOD	MOD	MOD	MOD	Q1,P,DGR.SH.
10219-S	CC	-	MAJ	-	MAJ	MOD	Q2,P
10711	CC	-	MOD	MOD	MOD	MAJ	Q,P,DGR.LAM.SIS/SH
10711-S	CC	-	MAJ	-	MOD	MOD	Q3,P1,CA
12427	CC	-	-	MOD	MAJ	MAJ	Q1,P,AP,SID1,OILST.SIS/SS
12427-S	CC	-	MOD	-	MAJ	MAJ	Q3,P2,SID2
12568	CC	-	-	MOD	MAJ	MOD	Q,P,DGR.SH.
12568-S	CC	-	-	-	MAJ	MIN	Q3,P2,SID1,PA1
12753	CC	-	-	MOD	MAJ	MAJ	Q1,P,CA?,BK.SH.
12753-S	CC	-	-	-	MAJ	MOD	Q3,P1,PA
12960	C	TR	MIN	MOD	MAJ	MOD	Q,MIXED CUT.,DM.CONT.
12960-S	C	-	MIN	-	MAJ	MOD	Q3,KS,P,SID1,PY
13030	C	-	MOD	-	MAJ	MOD	L.S.ACID DISSOL,BK.SH.
13030-S	C	-	-	-	MOD	MAJ	Q3,D3,P,SID,PY
13200	C	-	-	-	MAJ	MIN	L.S.ACID DISSOL.Q1,PALYGOR.
13200-S	C	-	-	-	MAJ	MIN	Q3,PALYGORSKITE2
14185	CC	-	MOD	-	MAJ	-	Q1,P,CA1,HARD BK.SH.
14185-S	CC	-	MAJ	-	MAJ	-	Q2,P1,CA2

Definitions: TR = less than 3%, MIN = 3 - 12%, MOD = 13 - 35%, MAJ = >35%. Other mineral abbreviations: Q = quartz, P = plagioclase, KS = k-spar, AN = analcime, HC =heulandite-clinoptilolite, CA = calcite, D = dolomite, AP = apatite, SID = siderite, PY = pyrite, BA = barite. 1 = weak, 2 = moderate, 3 = strong, nothing = trace. MDM = mostly drill mud, BK.SH. = black shale, GR. = gray, SIS. = siltstone, TUFF. = tuffaceous, PA = paragonite. Also: STYPE = sample type, C = cuttings, CC = core, SW = side wall, S = silt.

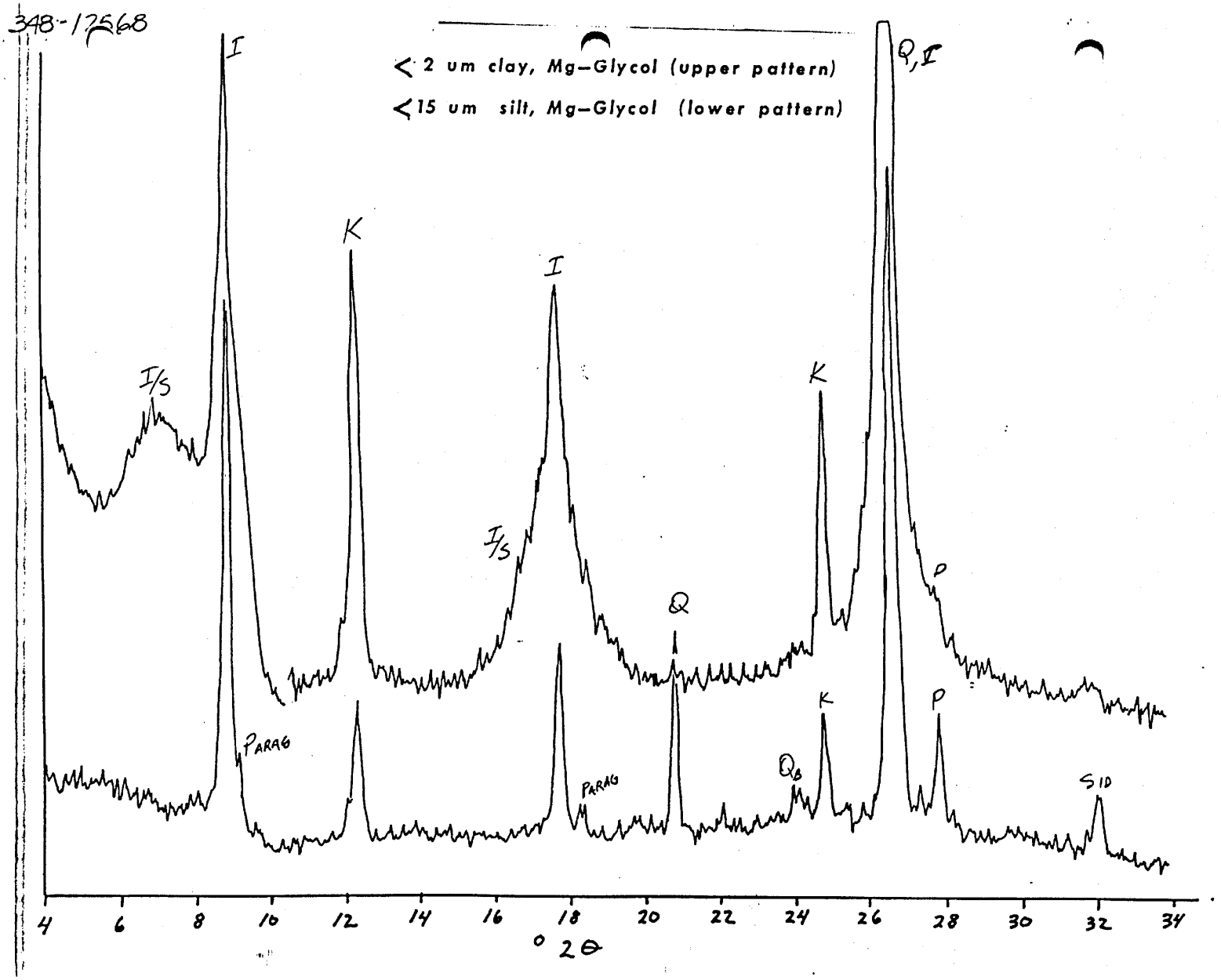

3A- 10219
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
I/S
C
I
Kc
I/S
I
c
Q
K
c
Q,I
P
C
I
c
I
Kc
P
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


3-8 - 10711
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
I/S
I
K,C
Q,I
K
C
I
I/S
C
Q
P
C
K
C
I
C
I
Q
P
Ca
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

348-2427


< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
K
I
I/S
C
Q, I
Q
P
1D
SD
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

348-17568


< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
I
K
I/S
I
I/S
K
Q, I
Q
P
PARAG
PARAG
Qs
K
P
SID
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

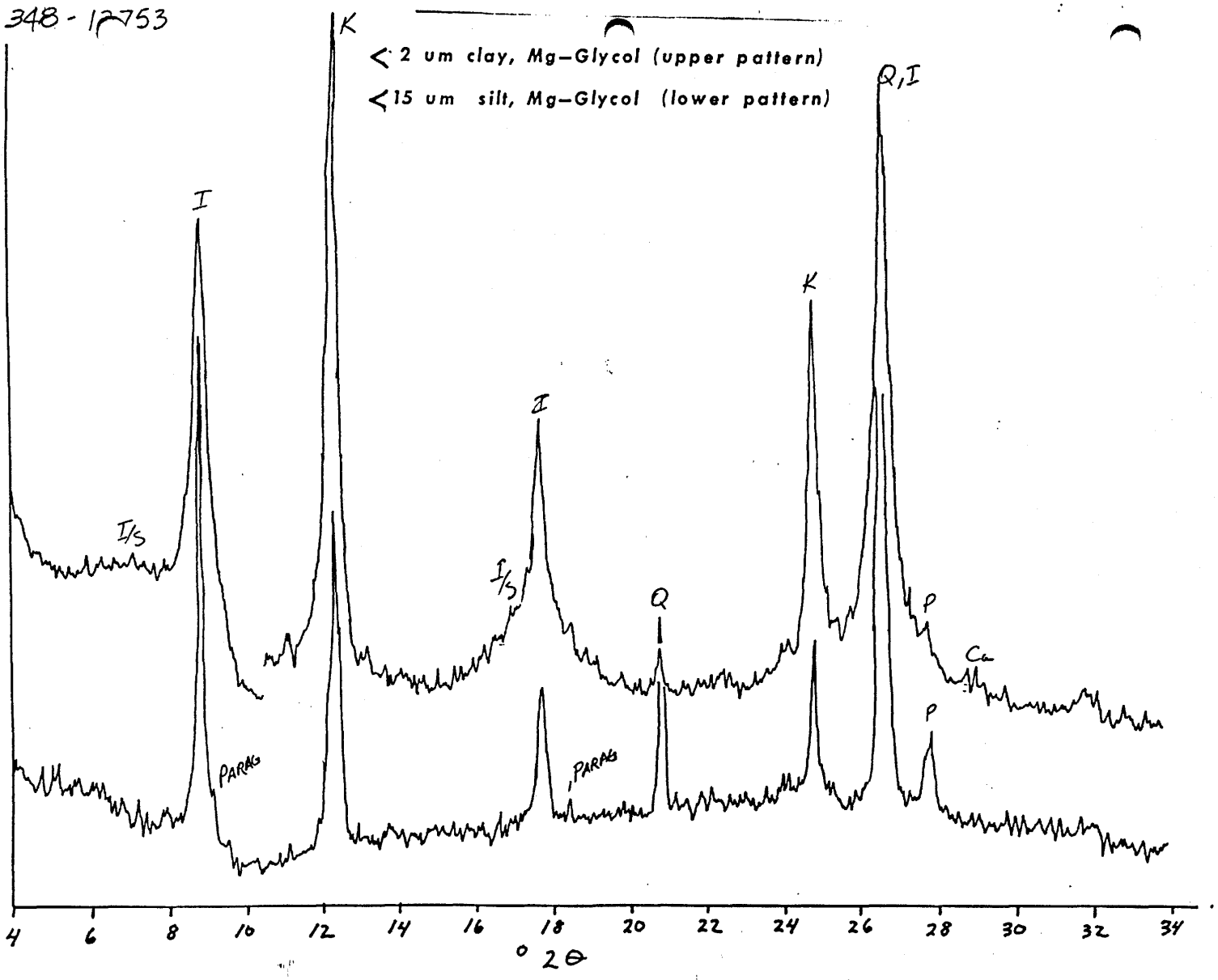
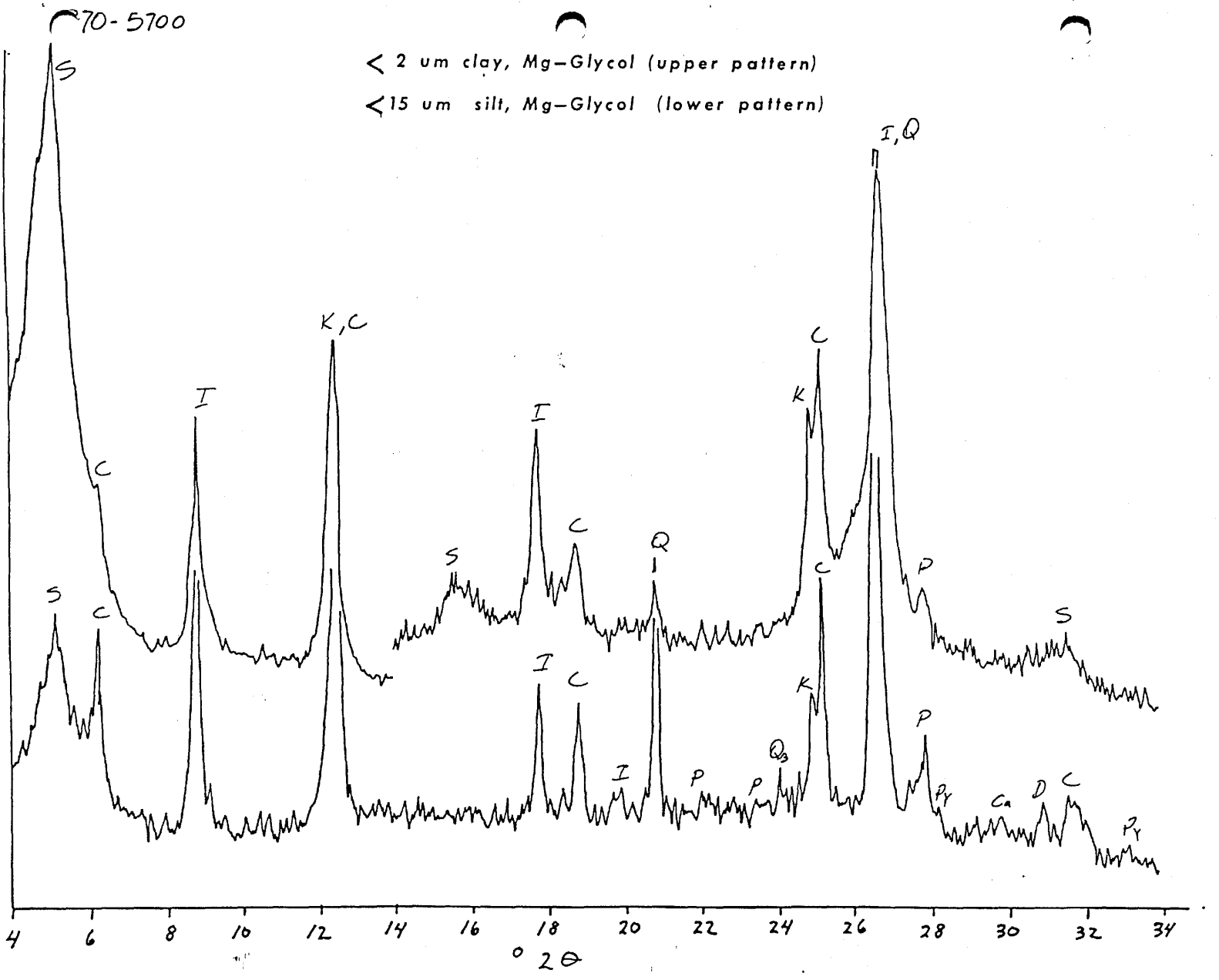

348 - 12753
< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
K
I
I/S
PARAG
I
I/S
Q
K
Q,I
P
Ca
P
PARAG
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

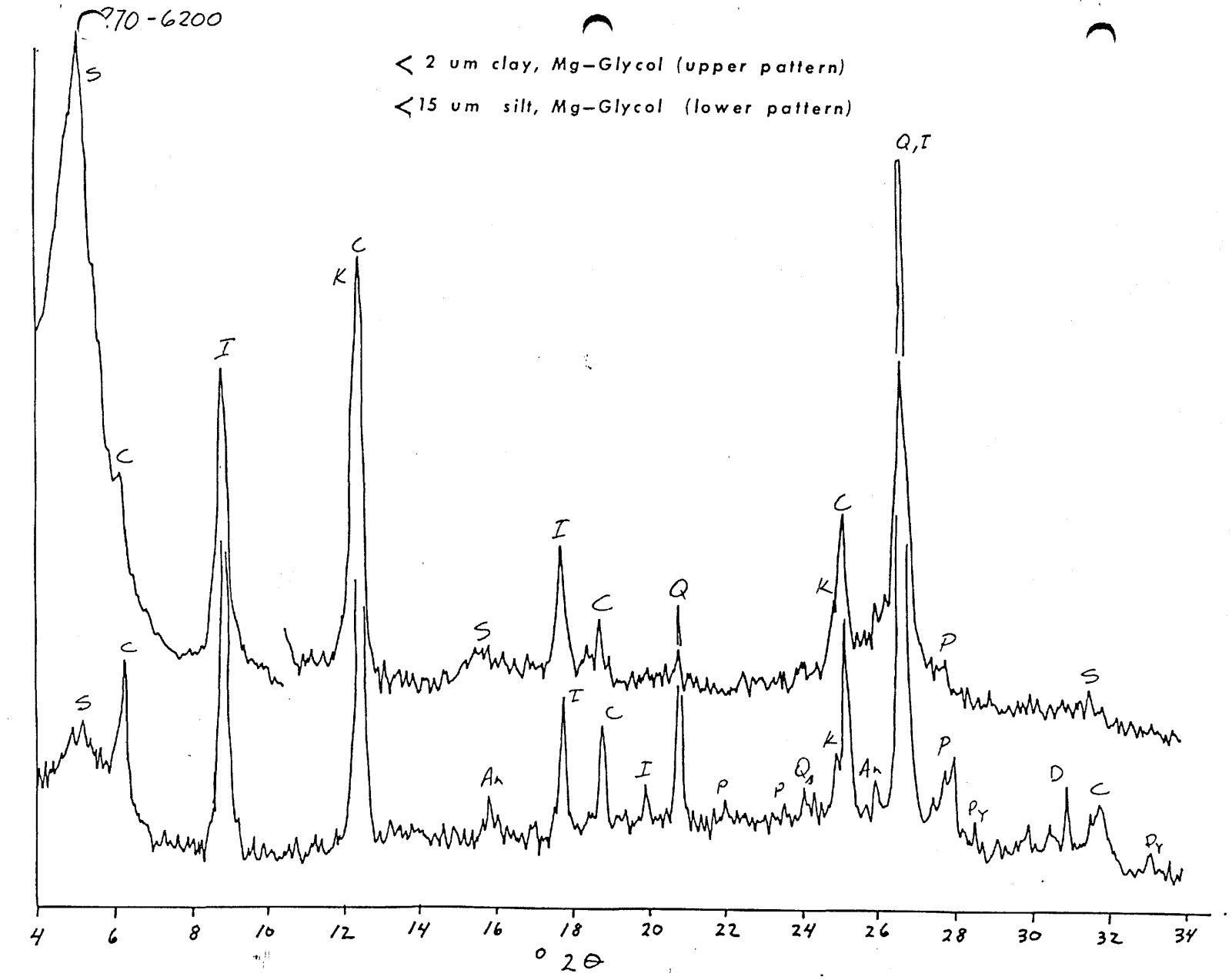
Table 17: Clay mineralogy of samples from Placid Prudhoe Bay St. #1 well.

PLACID P.B.ST. #1

DEPTH FEET	STYPE	SMECTITE	CHLORITE	MIXED LAYER I/S	ILLITE	KAOLINITE	OTHER
5700	C	MAJ	MOD	-	MOD	MOD	Q2,P1,MDM,BULKXRD
5700-S	C	MIN	MAJ	-	MAJ	MOD	Q3,P1,CA,D1,PY
6200	C	MAJ	MOD	-	MOD	MIN	Q1,P,MDM,BULKXRD
6200-S	C	MIN	MAJ	-	MAJ	TR	Q3,P1,D1,AN,PY
6680	C	MAJ	MIN	-	MIN	MIN	Q2,P,MDM,BULKXRD
6680-S	C	MOD	MOD	-	MOD	MIN	Q3,AN1,P1,D1,AP,PY
7240	C	MAJ	MIN	-	MOD	-	Q1,CA1,PY1,DGR.SH/SIS
7240-S	C	MIN	TR	-	MIN	-	Q2,AN,P1,PY,D,CA
7400	C	MAJ	TR	-	MIN	TR	Q1,BK/GR.SH/SIS,WASHED
7400-S	C	MIN	MIN	-	MIN	TR	Q3,P1,CA,D,PY
7480	C	MAJ	MIN	-	MOD	TR	Q3,P,CA1,PY1, SOO3 ASYM.
7480-S	C	MIN	MIN	-	MOD	-	Q3,P1,CA1,CA-MG,PY1,DGR.SH.
7640	C	MAJ	MIN	-	MOD	MIN	Q1,TUFF.BK.SH.
7640-S	C	MIN	MIN	-	MOD	TR	Q3,P,D,PY
7880	C	MAJ	MIN	MIN	MOD	MOD	Q1,TUFF.BK/GR.SH.
7880-S	C	MIN	MOD	-	MOD	MIN	Q2,P,D1,PY
8430	C	MIN	MIN	MOD	MOD	MAJ	Q1,P?,DGR.SH. DM
8430-S	C	-	MIN	-	MOD	MAJ	Q3,P,CA,D1,PY
8830	C	-	MIN	MOD	MAJ	MOD	Q1,BK.SH.
8830-S	C	-	MOD	-	MAJ	MAJ	Q3,D1,PY

Definitions: TR = less than 3%, MIN = 3 - 12%, MOD = 13 - 35%, MAJ = >35%. Other mineral abbreviations: Q = quartz, P = plagioclase, KS = k-spar, AN = analcime, HC =heulandite-clinoptilolite, CA = calcite, D = dolomite, AP = apatite, SID = siderite, PY = pyrite, BA = barite. 1 = weak, 2 = moderate, 3 = strong, nothing = trace. MDM = mostly drill mud, BK.SH. = black shale, GR. = gray, SIS. = siltstone, TUFF. = tuffaceous, ANK = ankerite. Also: STYPE = sample type, C = cuttings, CC = core, SW = side wall, S = silt.

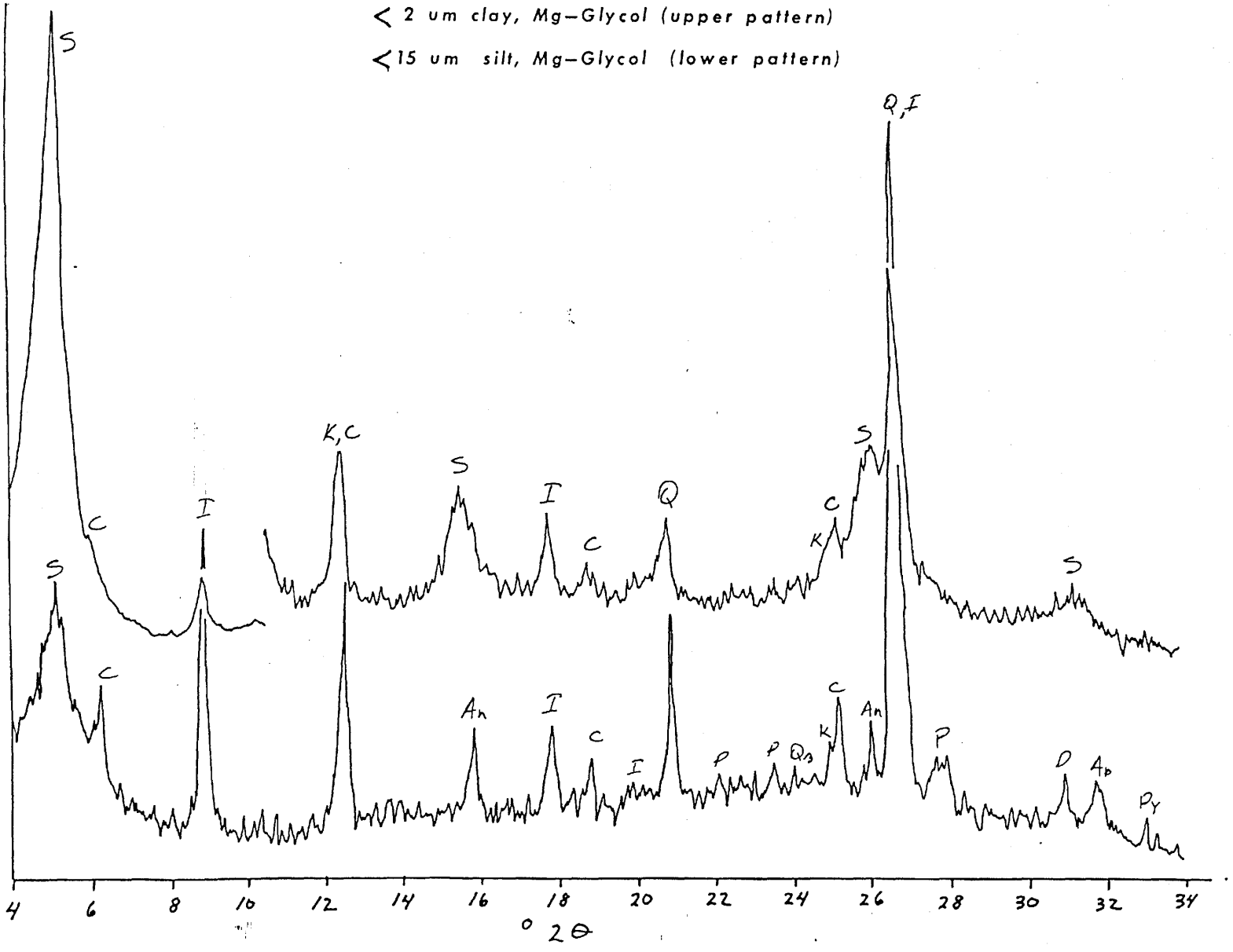

70-5700
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
C
I
K,C
S
I
C
Q
K
C
I,Q
P
S
S
C
I
C
I
P
P
Q3
K
C
P
Pr
Ca
D
C
Pr
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

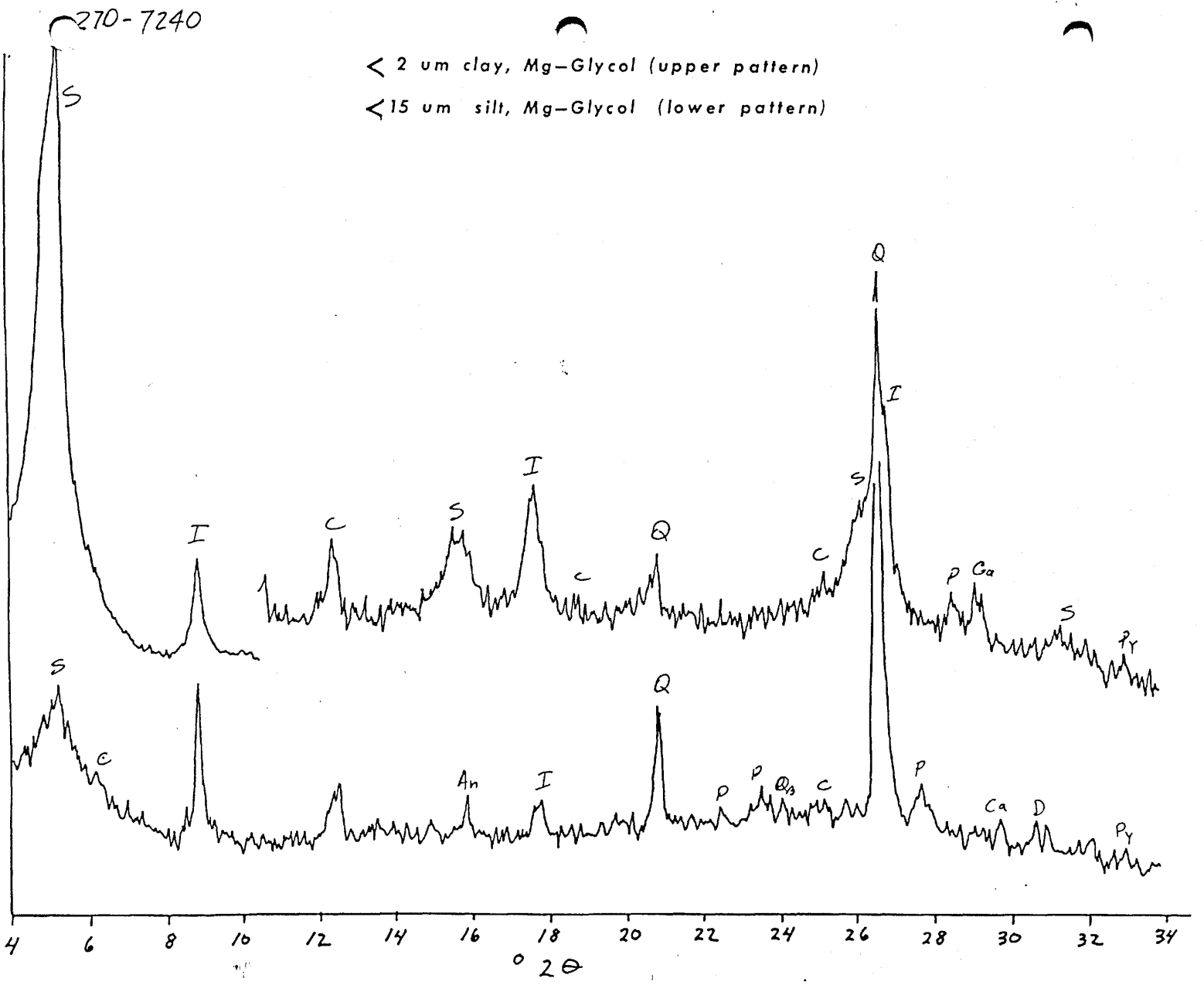

70-6200
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
C
I
K
C
S
I
C
Q
K
C
Q,I
P
S
S
C
I
C
Ar
I
P
P
Qs
K
Ar
P
D
C
Pr
Dr
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

70-6680

< 2 um clay, Mg–Glycol (upper pattern)

< 15 um silt, Mg–Glycol (lower pattern)

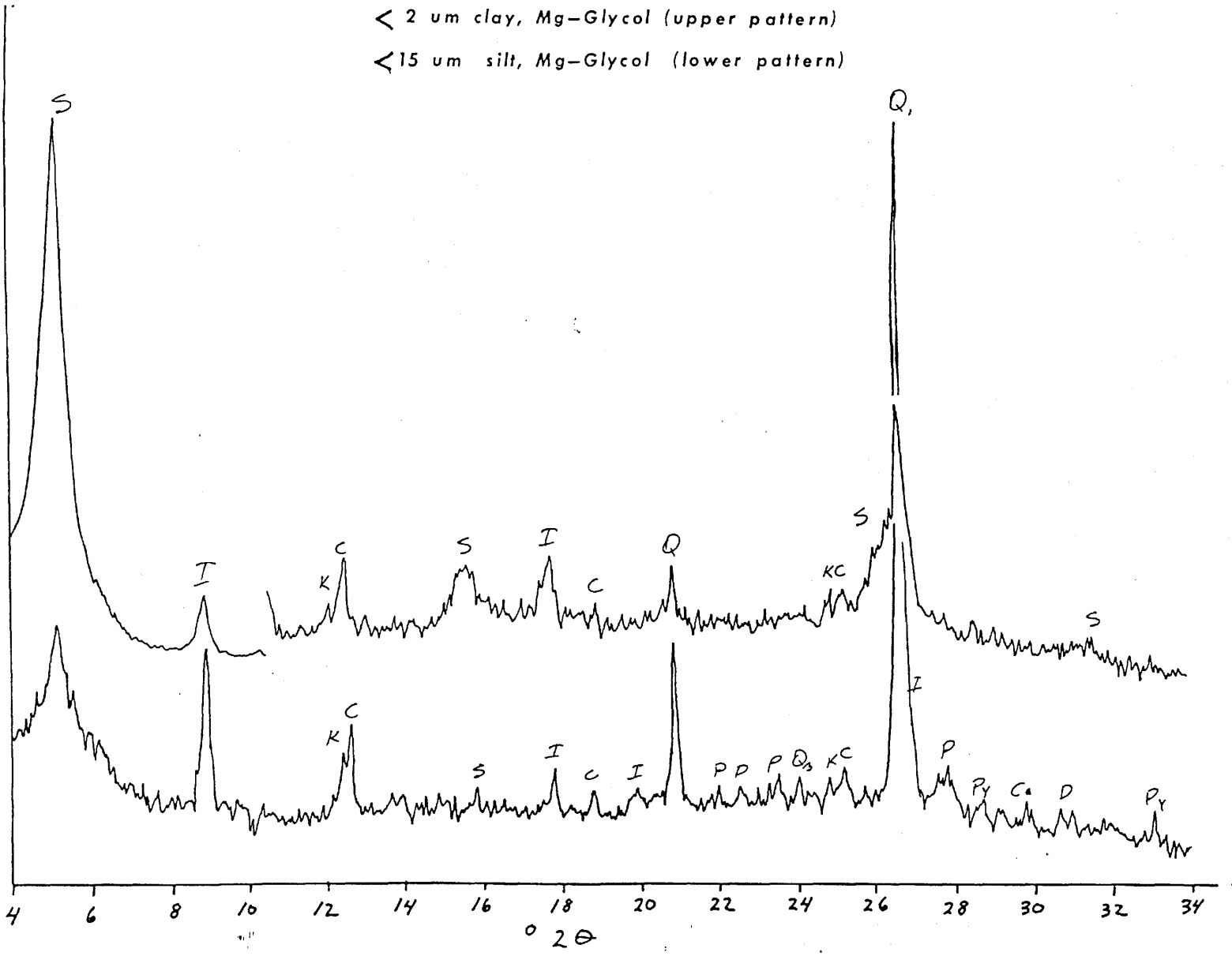


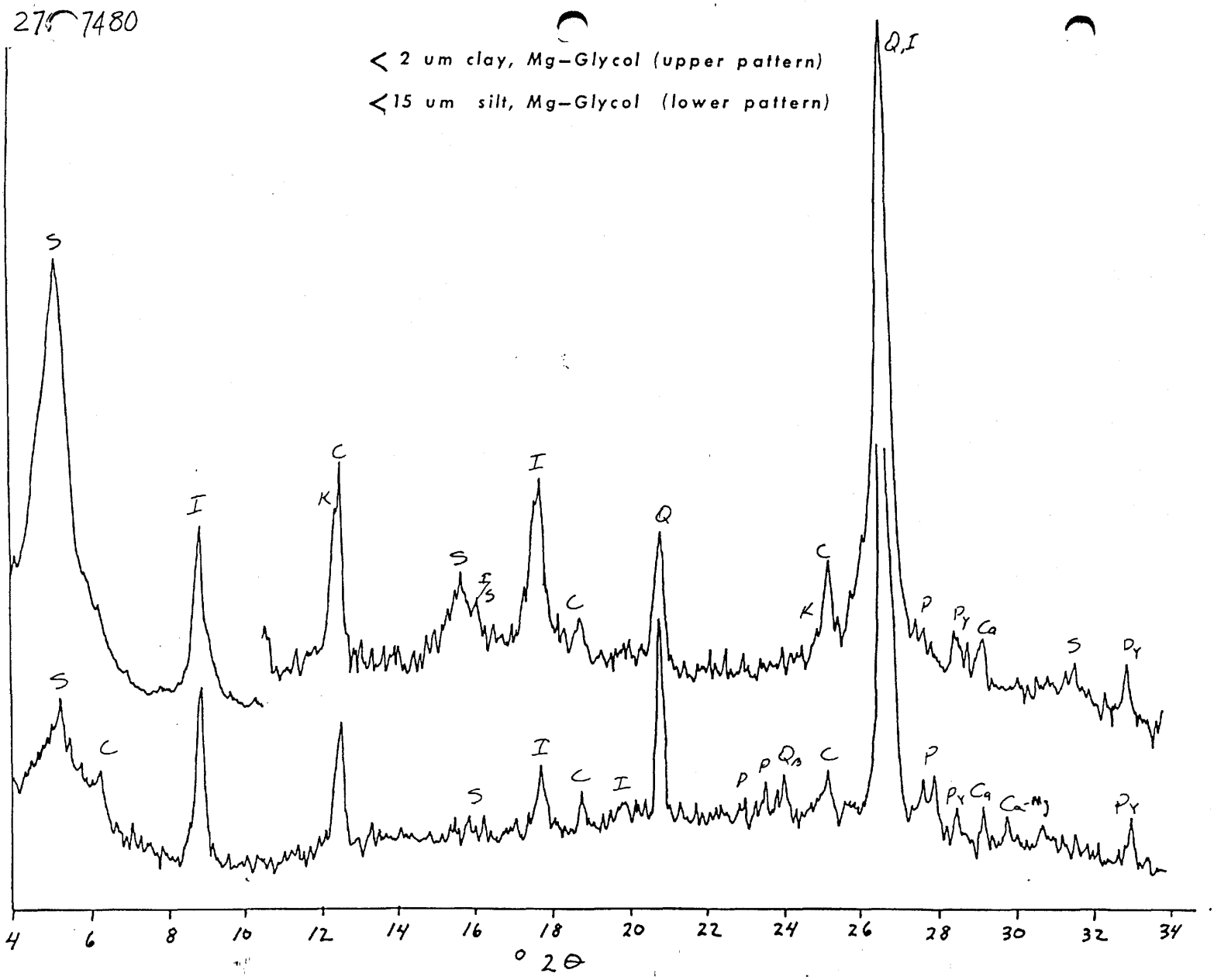

270-7240
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
I
C
S
I
C
Q
C
S
Q
I
P
Ca
S
Py
S
C
An
I
Q
P
P
Qz
C
P
Ca
D
Py
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

0-7400

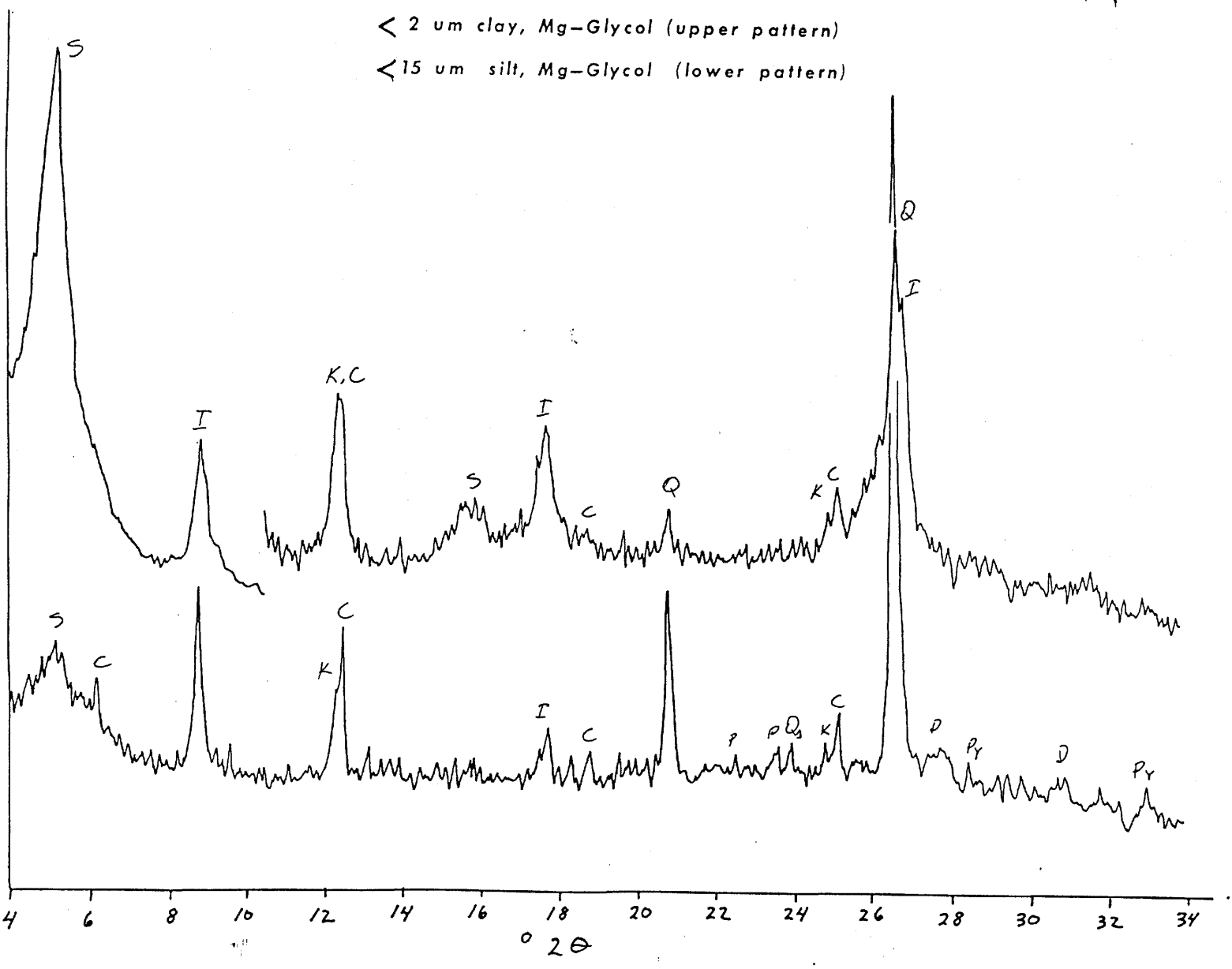
< 2 um clay, Mg–Glycol (upper pattern)

< 15 um silt, Mg–Glycol (lower pattern)




27-7480
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
I
C
K
S
F
S
I
C
Q
C
K
Q,I
P
P
Y
C
a
S
D
Y
S
C
S
I
C
I
P
P
Q
a
C
P
P
Y
C
a
C
a
-
M
g
D
Y
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

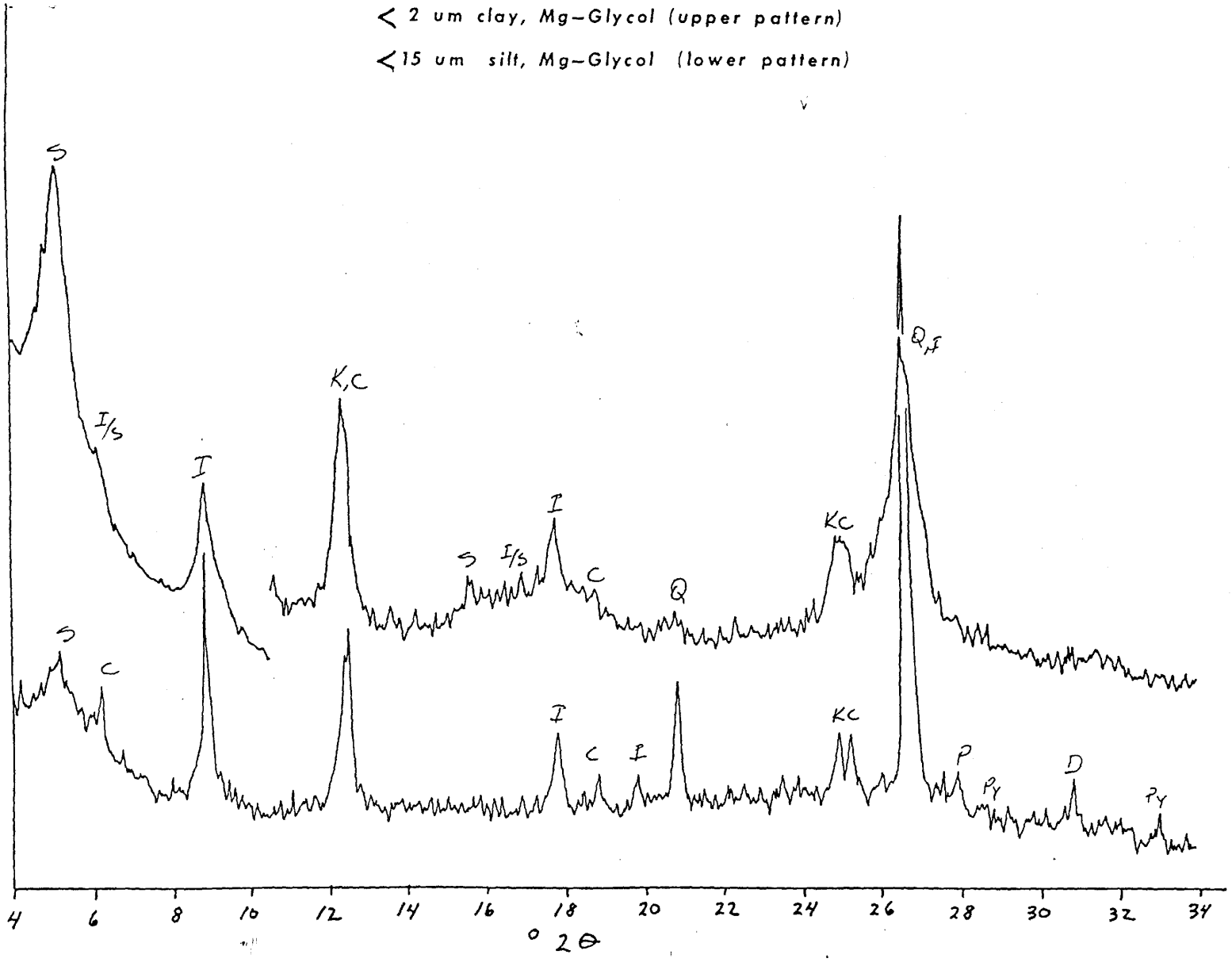
27[illegible]7640

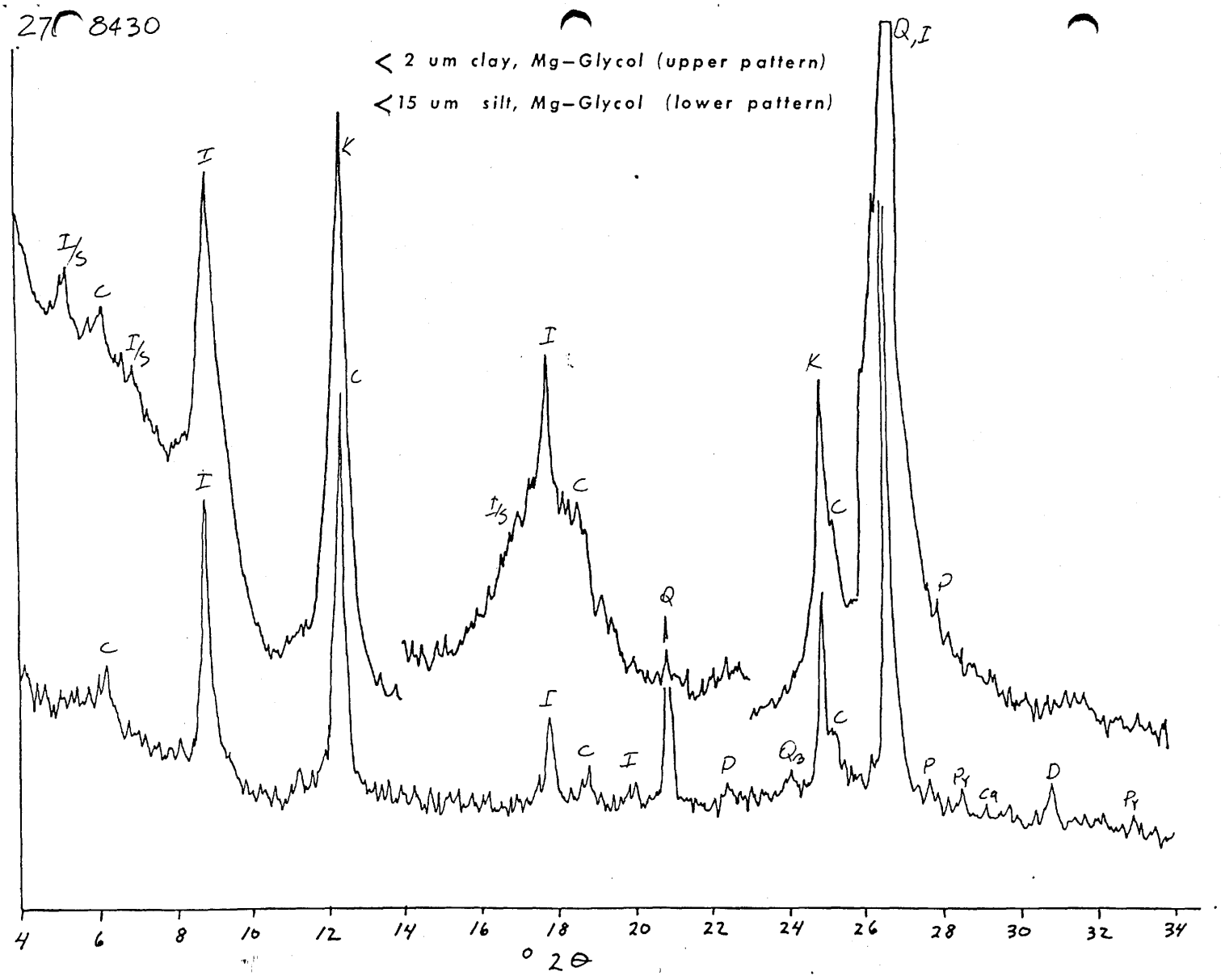

< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
I
K,C
S
I
C
Q
K
C
Q
I
S
C
C
K
I
C
P
P
Q
K
C
D
P
D
P
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

70-7880

< 2 um clay, Mg–Glycol (upper pattern)

< 15 um silt, Mg–Glycol (lower pattern)




27(8430
< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
I/S
C
I
K
Q,I
Q
P
D
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

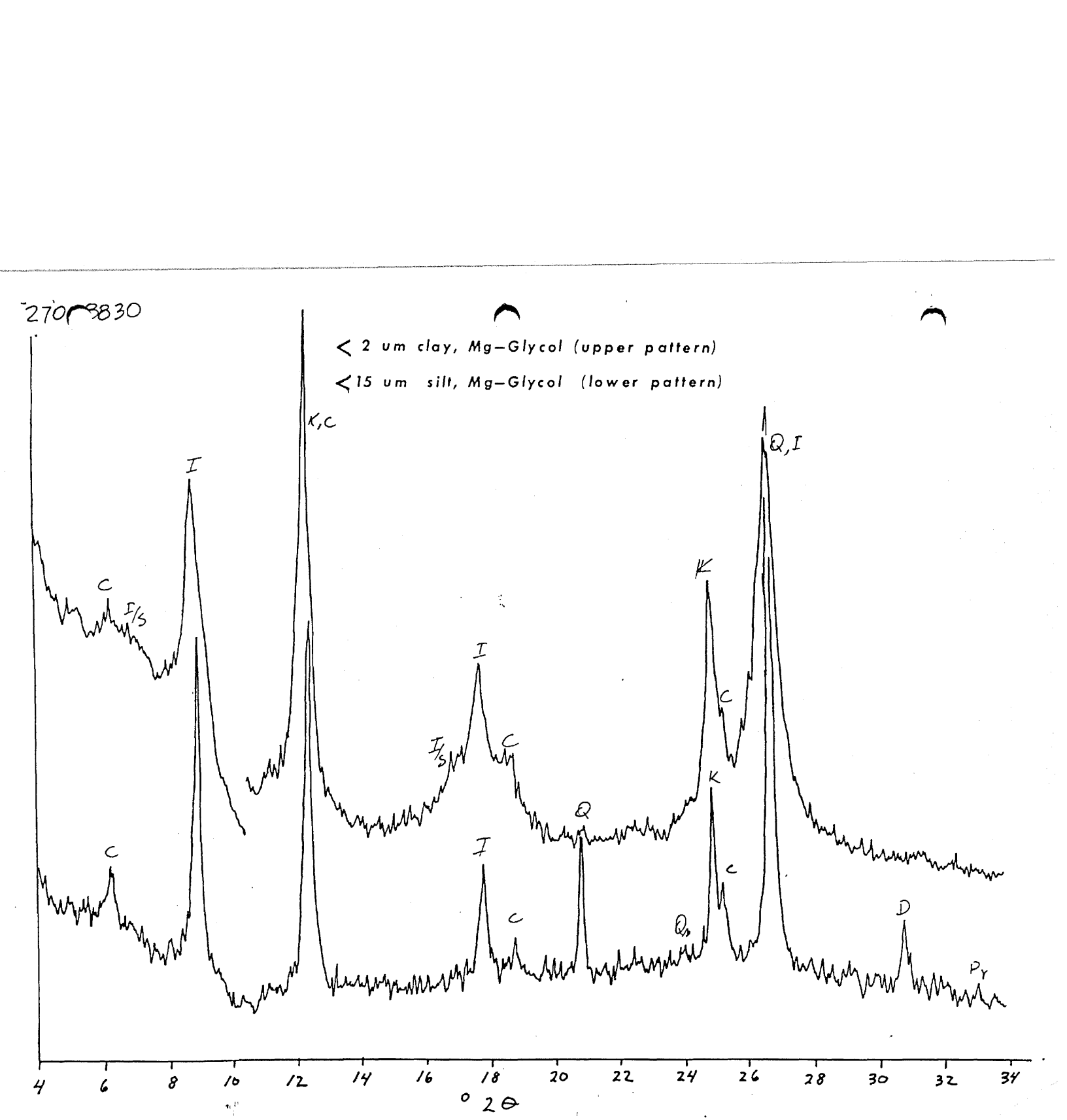
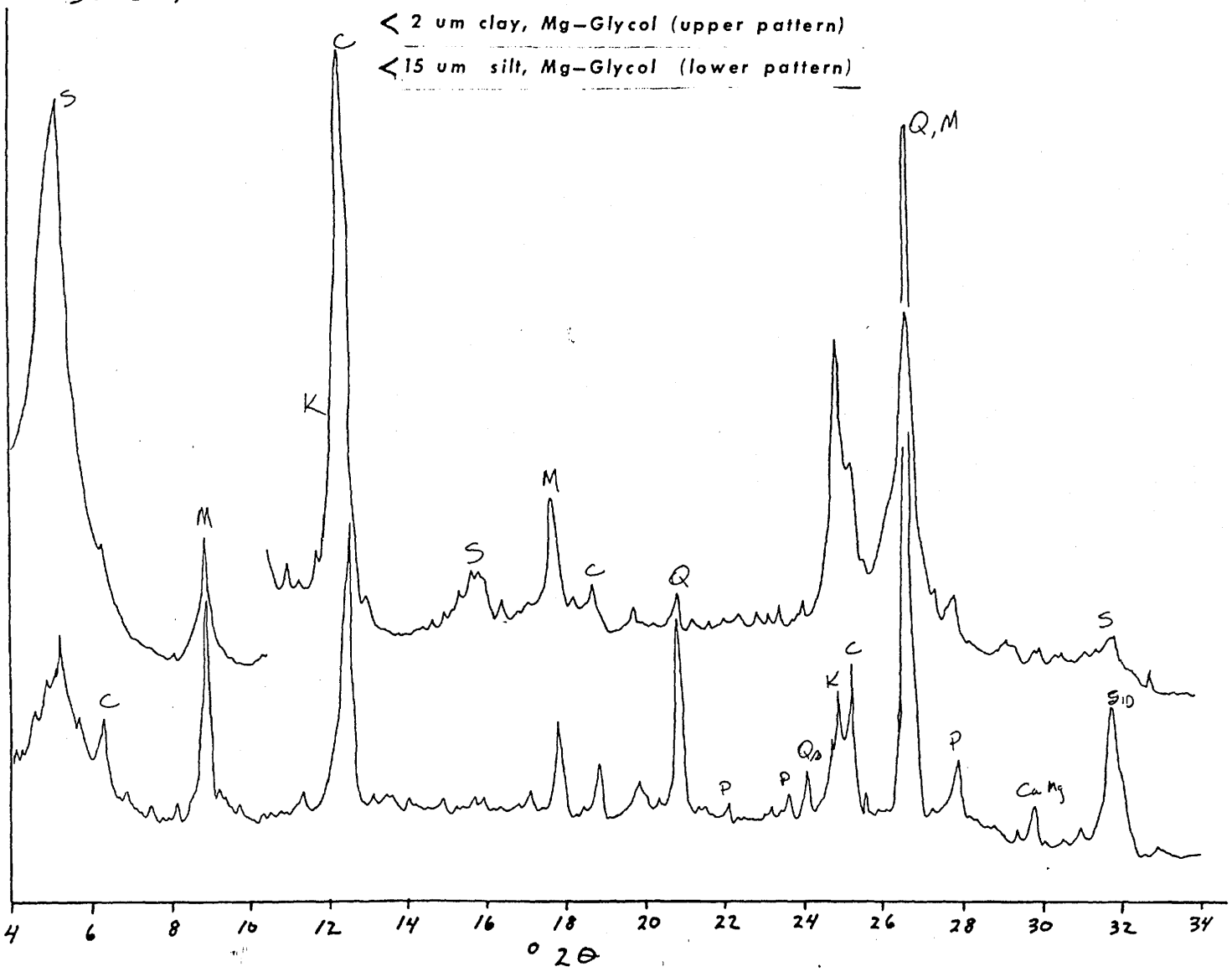

2708830
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
K,C
I
Q,I
C
I/S
K
I
C
I/S
C
Q
K
C
I
C
C
Q
K
C
D
Py
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

Table 18: Clay mineralogy of samples from BP Prudhoe Bay Unit J-1 well.

BP PBU J-1 DEPTH FEET	STYPE	SMECTITE	CHLORITE	MIXED LAYER I/S	ILLITE	KAOLINITE	OTHER
5690	C	MAJ	MIN	-	MOD	MOD	Q1,D,SID,MDM,BULKXRD
5690-S	C	MIN	MOD	-	MOD	MIN	Q3,P1,SID2,D1
6230	C	MAJ	TR	TR	MOD	MOD	Q1,P1,D1,MDM,BULKXRD
6230-S	C	MIN	-	-	MOD	MIN	Q3,AN1,P1,D1,AP1,SID2
6590	C	MAJ	TR	-	MIN	MIN	Q2,CA1,GR.SH
6590-S	C	MIN	-	-	MIN	MIN	Q3,AN1,P1,CA1,SID1
6920	C	MAJ	TR	MIN	MOD	MIN	Q2,CA1,DM.CONT.GR.SH.
6920-S	C	MIN	-	-	MIN	MIN	Q3,AN1,P1,D1,PY1
7190	C	MOD	MIN	MOD	MOD	MOD	Q2,GR.SH.
7190-S	C	TR	TR	-	MIN	MIN	Q3,P1,PY
7470	C	TR	MIN	MOD	MAJ	MOD	Q1,DGR.SH.
7470-S	C	-	MIN	-	MOD	MOD	Q3,P1,PY
7690	C	MAJ	TR	MOD	MOD	MOD	Q1,GR.SH.,DM.CONT.
7690-S	C	TR	MIN	-	MOD	MOD	Q3,P1,D1,PY1
8010	C	MOD	MIN	MOD	MOD	MOD	Q2,LT.GR.SH,TUFF.
8010-S	C	-	MIN	-	MOD	MAJ	Q3,P1,D1,SID

Definitions: TR = less than 3%, MIN = 3 - 12%, MOD = 13 - 35%, MAJ = >35%. Other mineral abbreviations: Q = quartz, P = plagioclase, KS = k-spar, AN = analcime, HC =heulandite-clinoptilolite, CA = calcite, D = dolomite, AP = apatite, SID = siderite, PY = pyrite, BA = barite. 1 = weak, 2 = moderate, 3 = strong, nothing = trace. MDM = mostly drill mud, BK.SH. = black shale, GR. = gray, SIS. = siltstone, TUFF. = tuffaceous, ANK = ankerite. Also: STYPE = sample type, C = cuttings, CC = core, SW = side wall, S = silt.

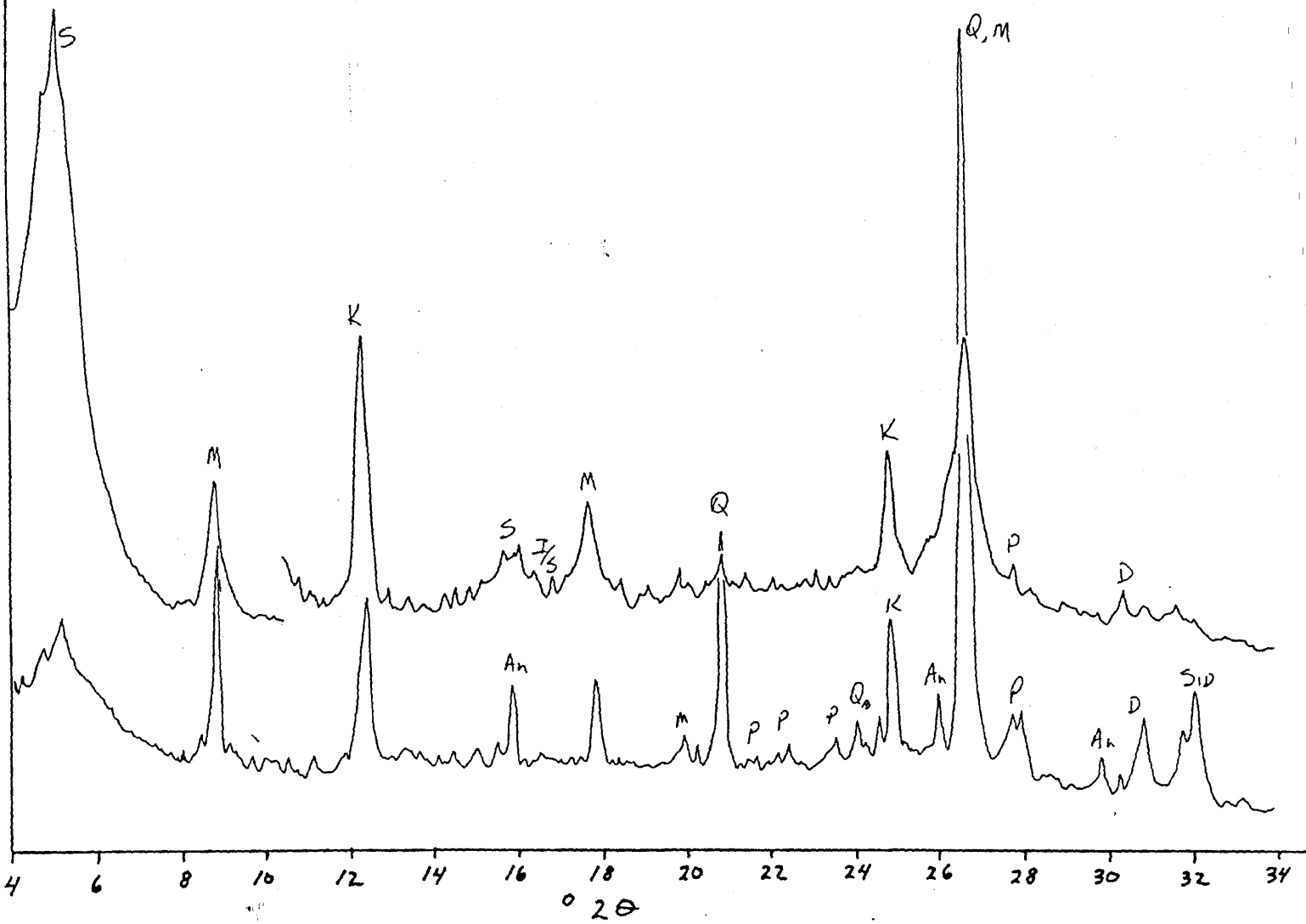
30-5690


< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
S
C
K
M
S
M
C
Q
Q,M
K
C
S
S,D
Q,D
P
P
P
Ca Mg
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

230-6230

< 2 um clay, Mg–Glycol (upper pattern)

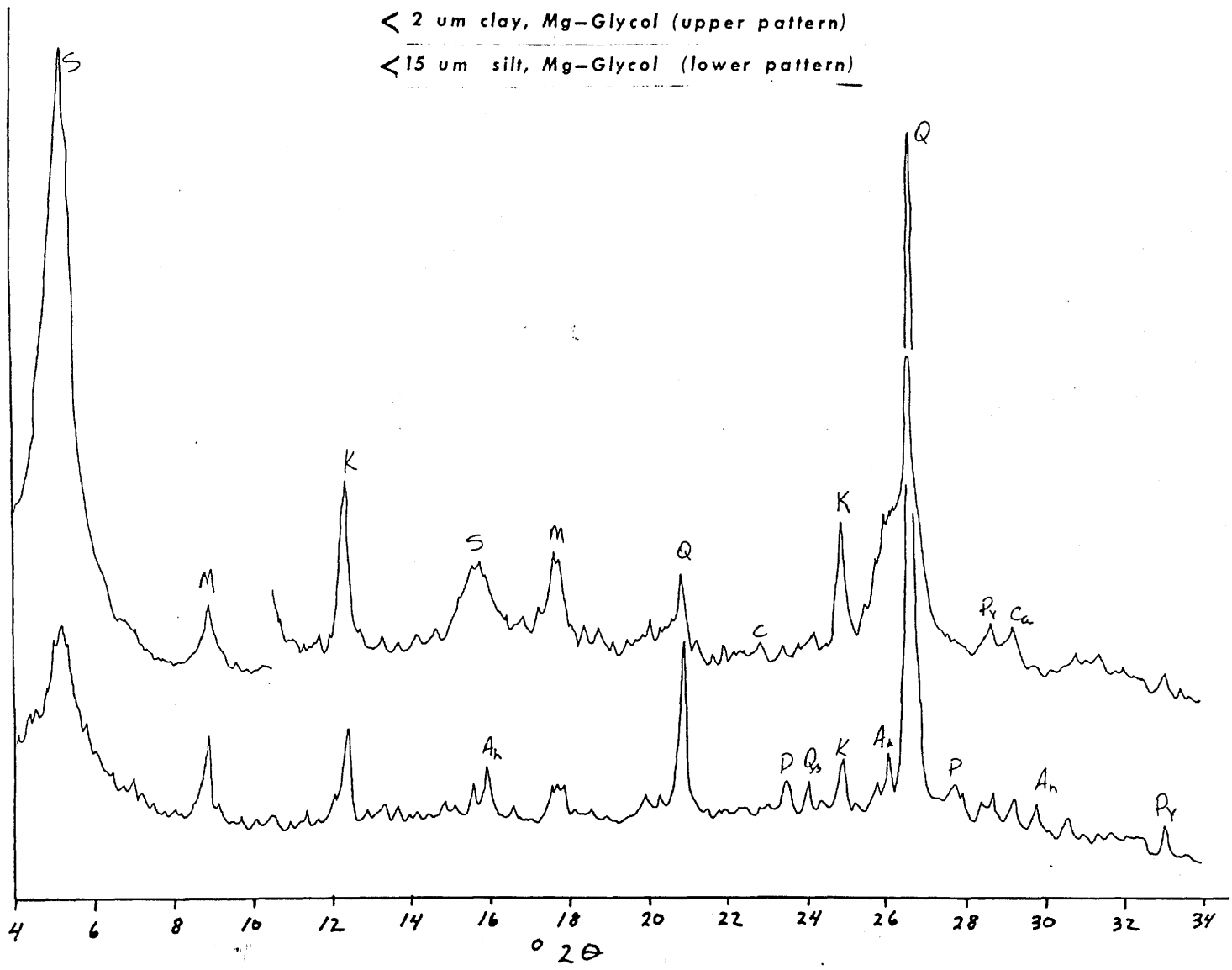
< 15 um silt, Mg–Glycol (lower pattern)



230-6590

< 2 um clay, Mg–Glycol (upper pattern)

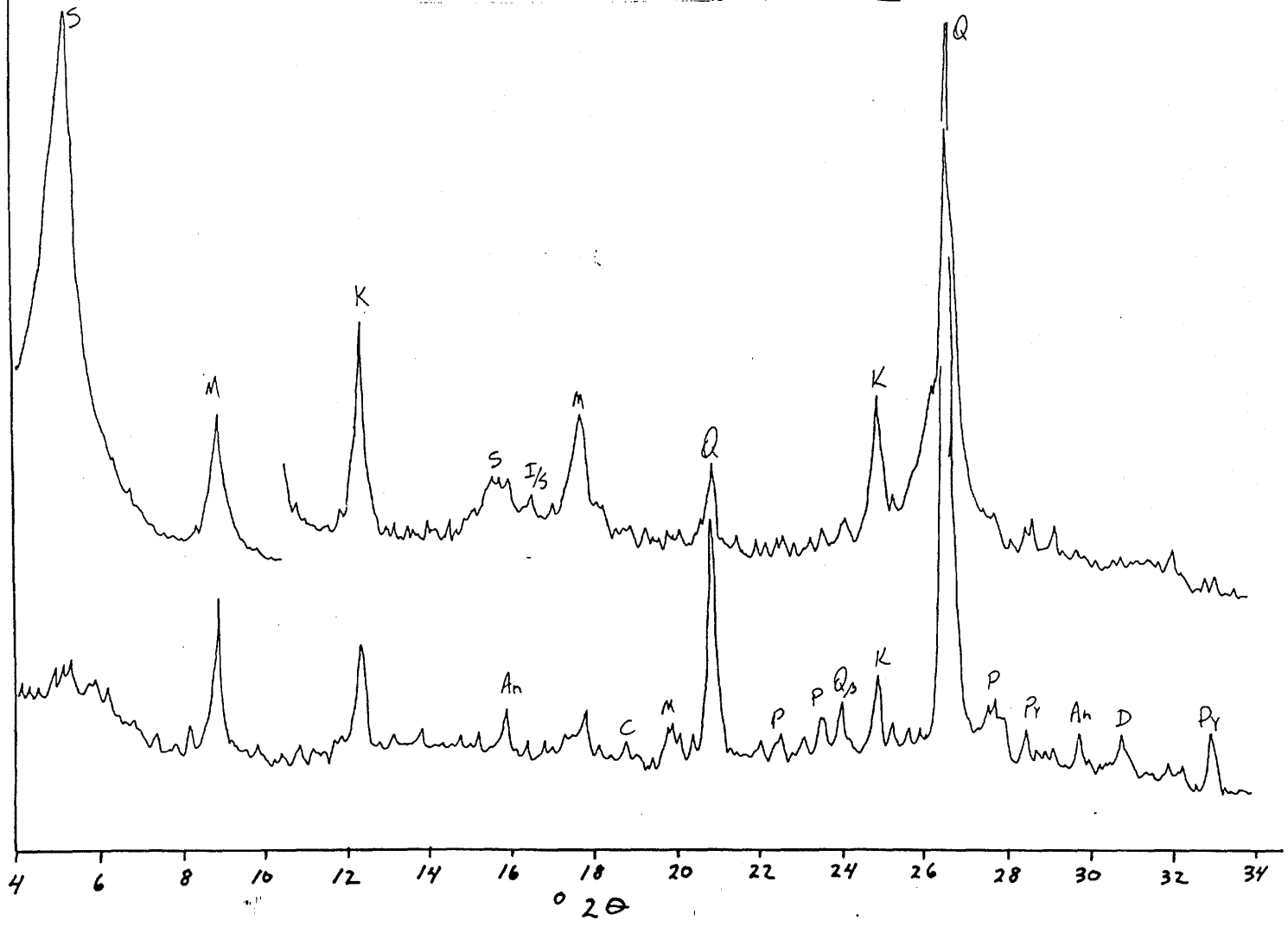
< 15 um silt, Mg–Glycol (lower pattern)



230-6920

< 2 um clay, Mg–Glycol (upper pattern)

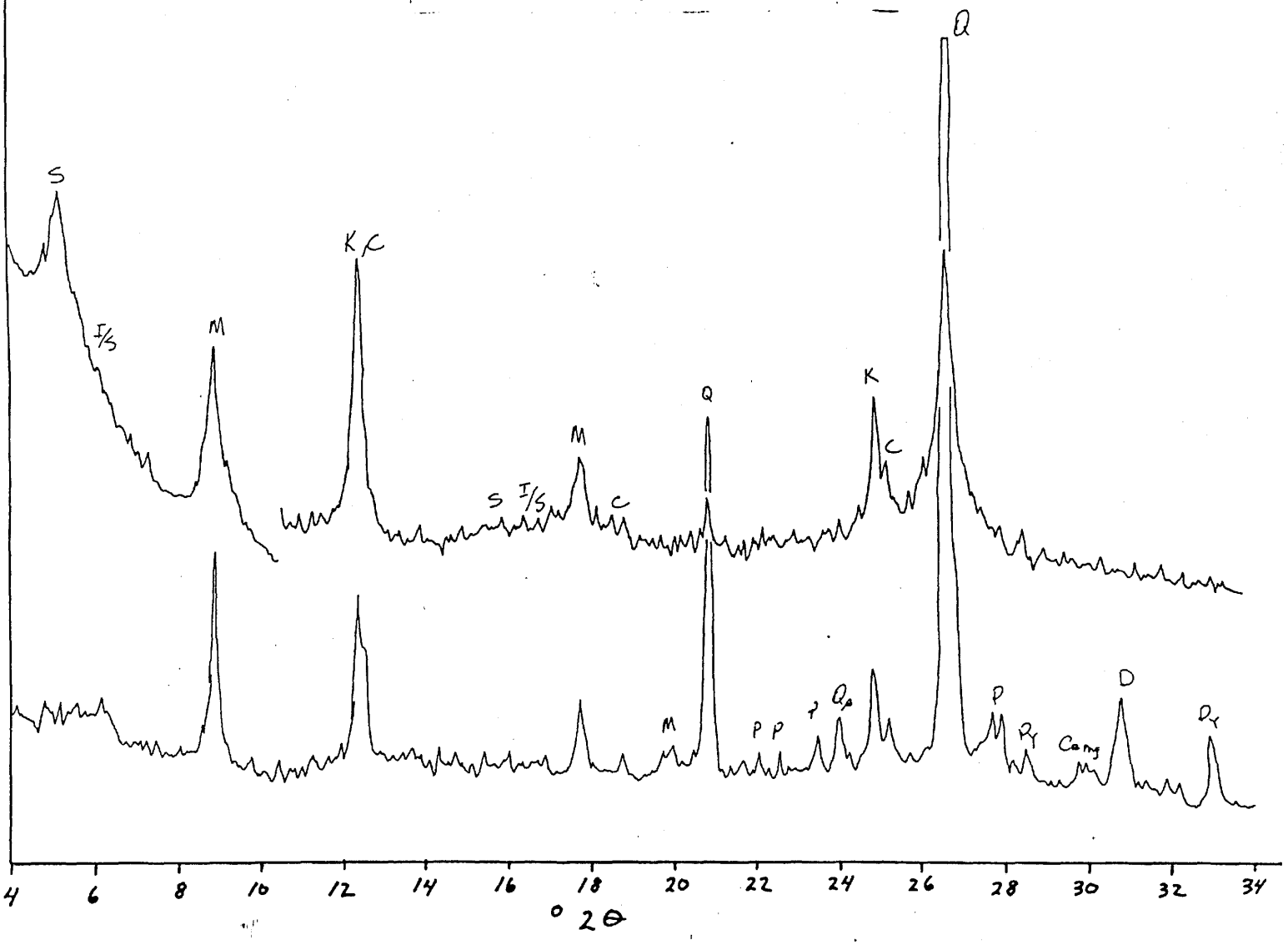
< 15 um silt, Mg–Glycol (lower pattern)



RO-7190

< 2 um clay, Mg–Glycol (upper pattern)

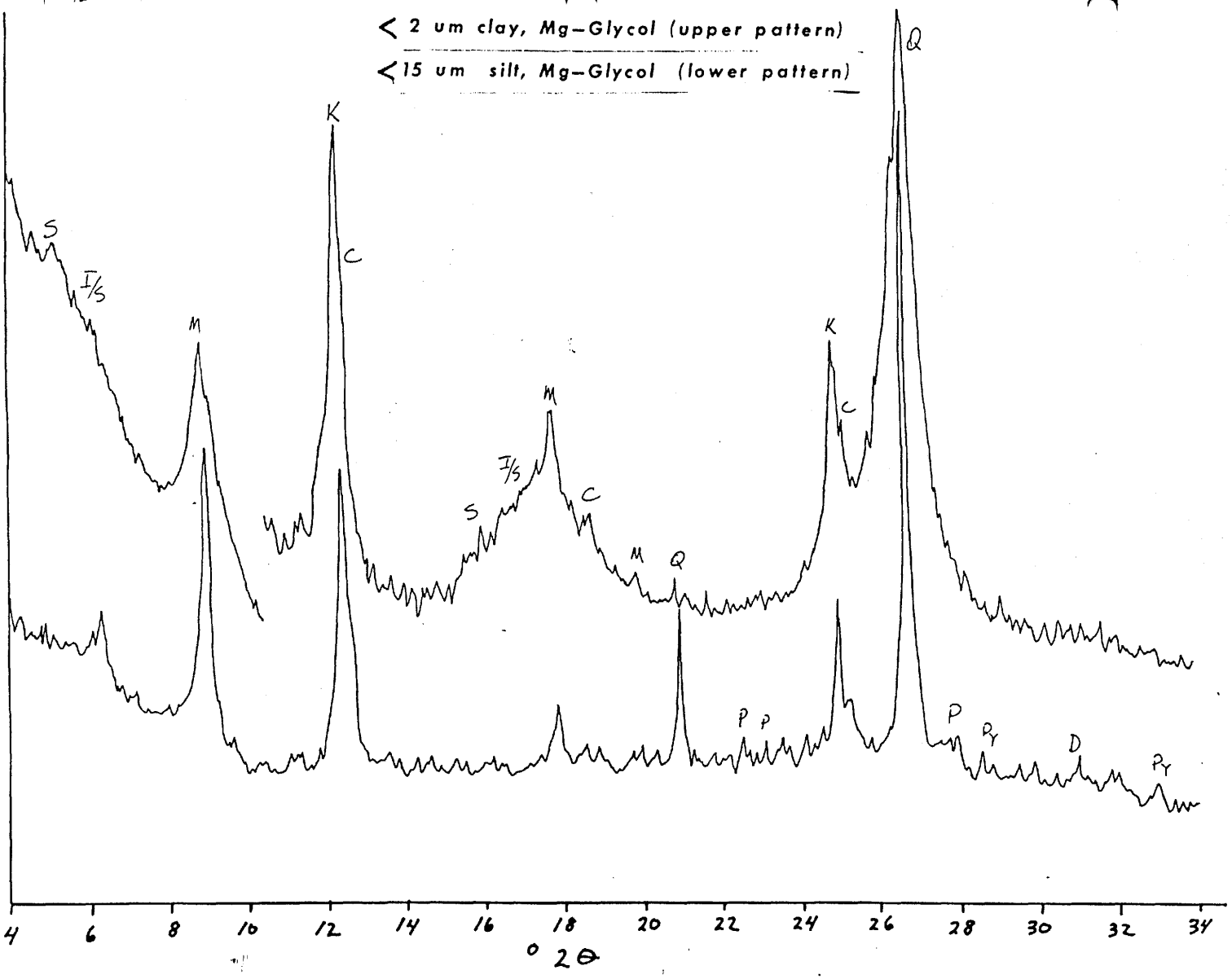
< 15 um silt, Mg–Glycol (lower pattern)



30-7470

< 2 um clay, Mg–Glycol (upper pattern)

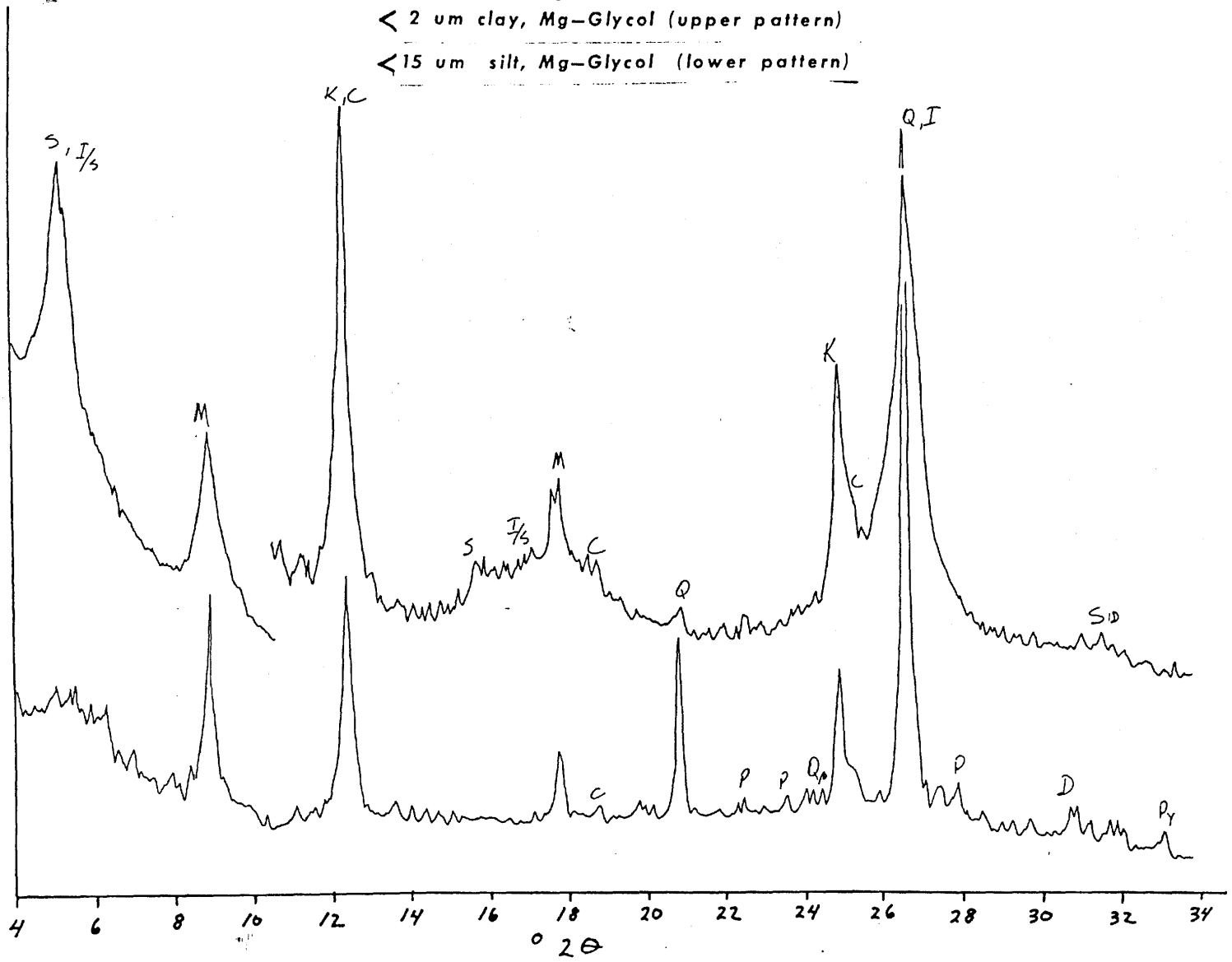
< 15 um silt, Mg–Glycol (lower pattern)



-7690

< 2 um clay, Mg–Glycol (upper pattern)

< 15 um silt, Mg–Glycol (lower pattern)



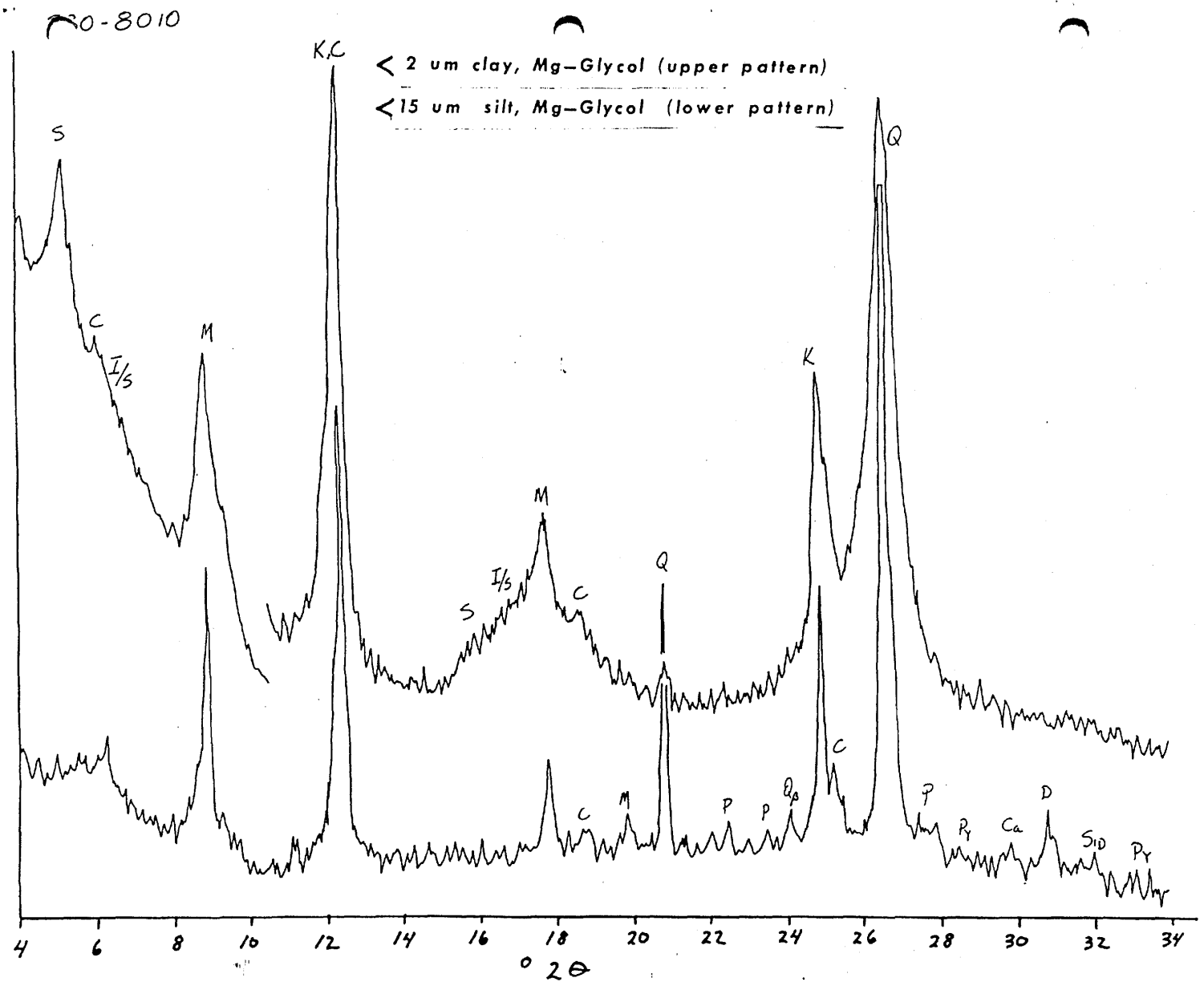
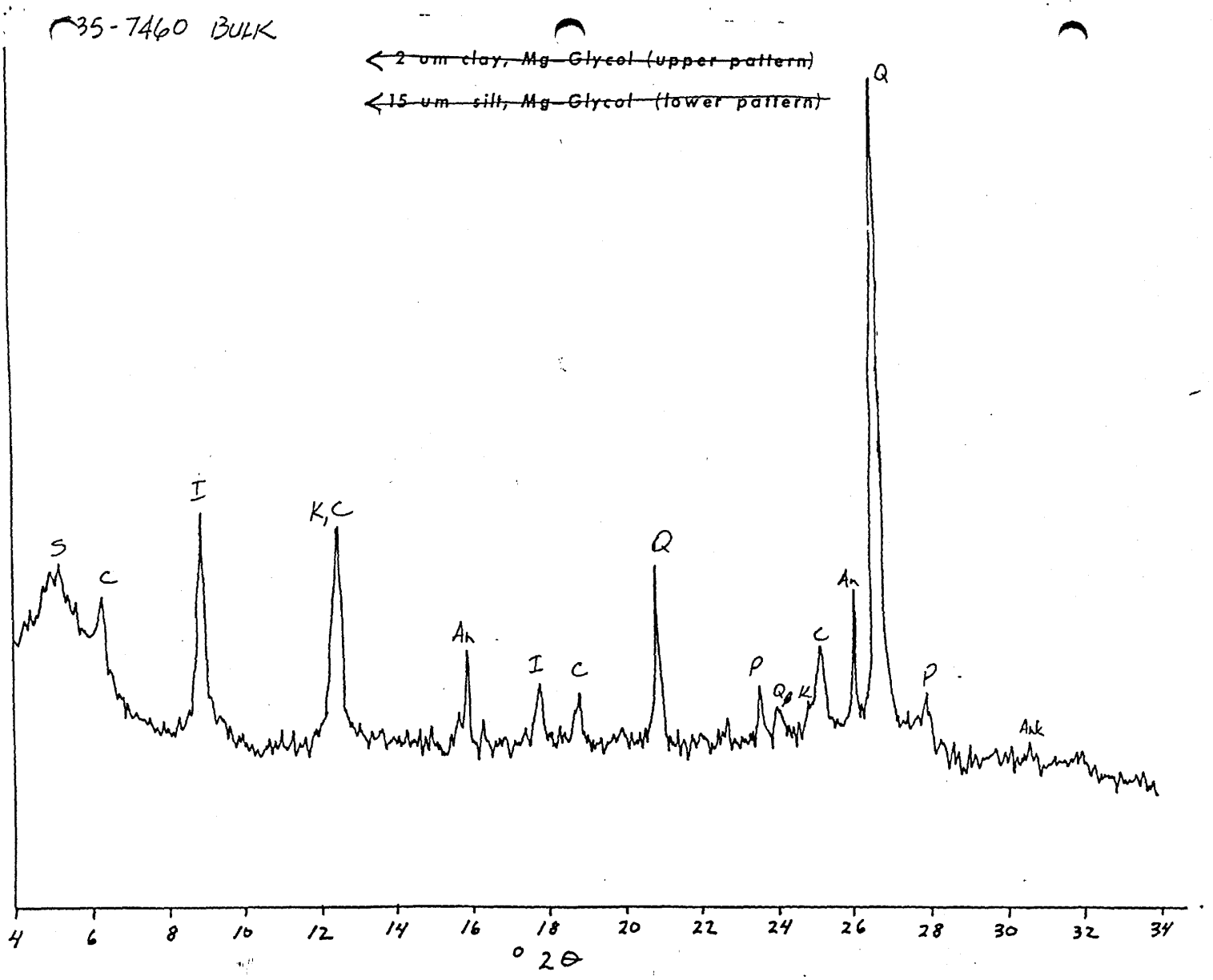

80-8010
< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
K,C
S
C
I/S
M
K
Q
P
Ca
D
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

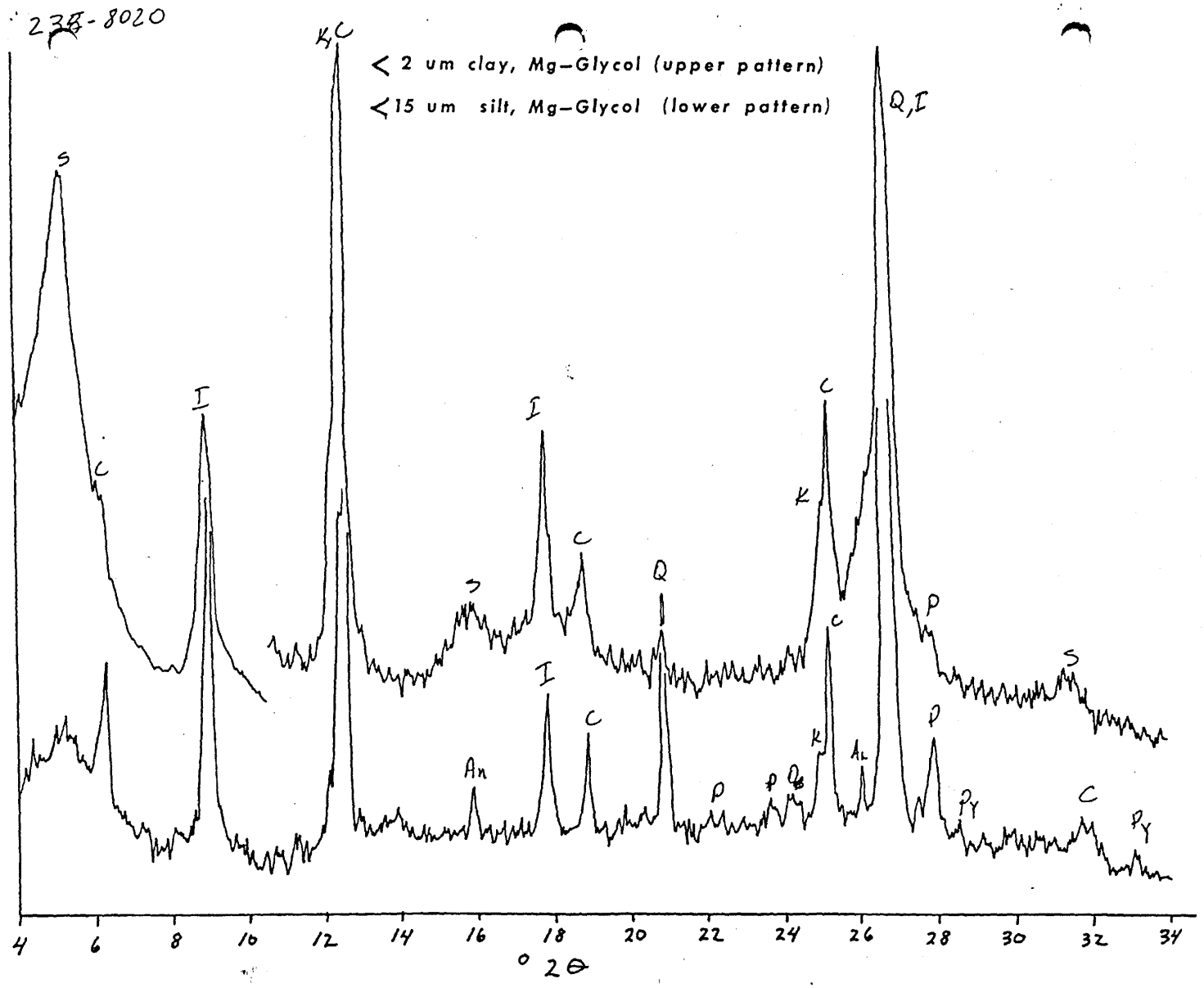
Table 19: Clay mineralogy of samples from BP Sag Delta 31-10-16 well.

BP SAG SELTA 31-10-16

DEPTH FEET	STYPE	SMECTITE	CHLORITE	MIXED LAYER I/S	ILLITE	KAOLINITE	OTHER
7460	C	MOD	MAJ	-	MAJ	MIN	Q3,AN2,P1,ANK,MDM,COALY
7460-S	C		MISSING				MISSING
8020	C	MAJ	MOD	-	MOD	MIN	Q1,P,MDM,COALY,GR.TUFF.SH.
8020-S	C	TR	MAJ	-	MAJ	MIN	Q3,AN1,P1,PY
8560	C	MAJ	MIN	-	MOD	MIN	Q1,P,GR/BWN MUDST.
8560-S	C	TR	MIN	-	MIN	MIN	Q2,P
8830	C	MOD	MOD	MOD	MAJ	MIN	Q1,P1,PY,DGR.TUFF.SH.
8830-S	C	-	MIN	-	MOD	TR	Q3,P,PY
8920	C	MOD	MIN	MOD	MAJ	-	Q1,PY,TUFF.BK.SH.
8920-S	C	-	MIN	-	MOD	-	Q2,P1,AP,PY
8954	CC	-	TR	MOD	MAJ	-	Q1,P,PY1,BK.SH.
8954-S	CC	-	-	-	MOD	-	Q3,P1,PY1,D1
8977	CC	-	-	MOD	MAJ	-	Q1,P,PY,CA,BK.SH.
8977-S	CC	-	TR	-	MOD	-	Q3,P1,PY,D1
9020	C	-	-	MAJ	MAJ	MOD	Q1 P,PY TUFF.BK.SH.
9020-S	C	-	-	-	MIN	TR	Q2,P1,PY1,ANK,D,CA
9120	C	-	-	MOD	MAJ	MAJ	Q2,P,D,PY,DGR.SH.
9120-S	C	-	-	-	MOD	MOD	Q2,D1,PY
9230	CC	-	-	MOD	MAJ	MOD	Q,TAN MUDST.
9230-S	CC	-	-	-	MAJ	MAJ	Q3,K = 2X I
9375	C	MOD	MOD	MOD	MAJ	MOD	Q1,BK.SH/SS, DM CONT.
9375-S	C	-	MIN	-	MOD	MIN	Q2,P,D,CA,PY
9745	C	MIN	TR	MOD	MAJ	MOD	Q1,TUFF.CARB.BK.SH.
9745-S	C	-	TR	-	MIN	MIN	Q3,P1,CA,D,PY1

Definitions: TR = less than 3%, MIN = 3 - 12%, MOD = 13 - 35%, MAJ = >35%. Other mineral abbreviations: Q = quartz, P = plagioclase, KS = k-spar, AN = analcime, HC =heulandite-clinoptilolite, CA = calcite, D = dolomite, AP = apatite, SID = siderite, PY = pyrite, BA = barite. 1 = weak, 2 = moderate, 3 = strong, nothing = trace. MDM = mostly drill mud, BK.SH. = black shale, GR. = gray, SIS. = siltstone, TUFF. = tuffaceous, ANK = ankerite. Also: STYPE = sample type, C = cuttings, CC = core, SW = side wall, S = silt.

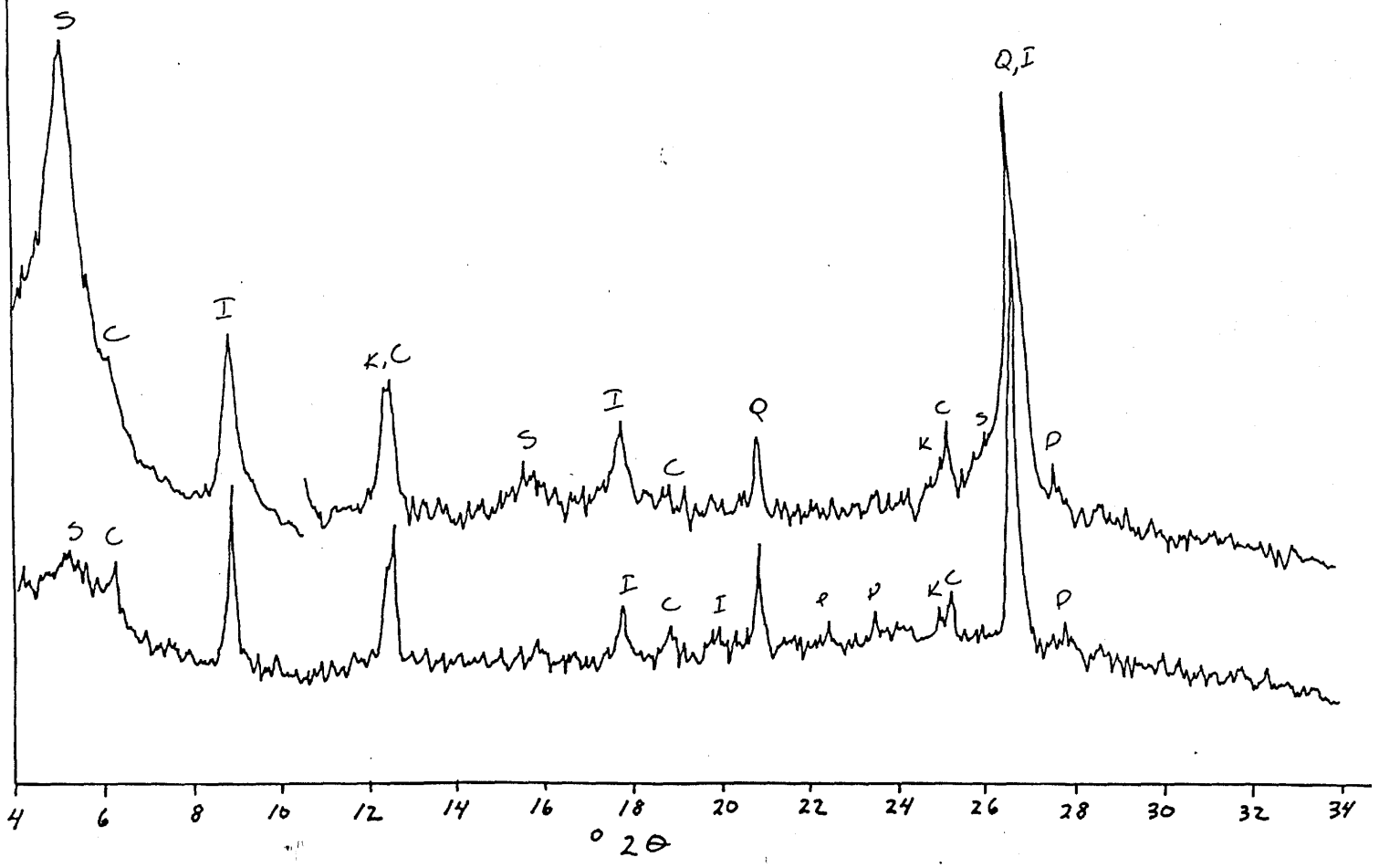

35-7460 BULK
2 um clay, Mg-Glycol (upper pattern)
15 um silt, Mg-Glycol (lower pattern)
S
C
I
K,C
An
I
C
Q
P
Q
K
C
An
Q
P
An
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


238-8020
< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
KC
Q,I
S
C
I
K
Q
P
An
Ab
AL
PY
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

35-8560

< 2 um clay, Mg–Glycol (upper pattern)

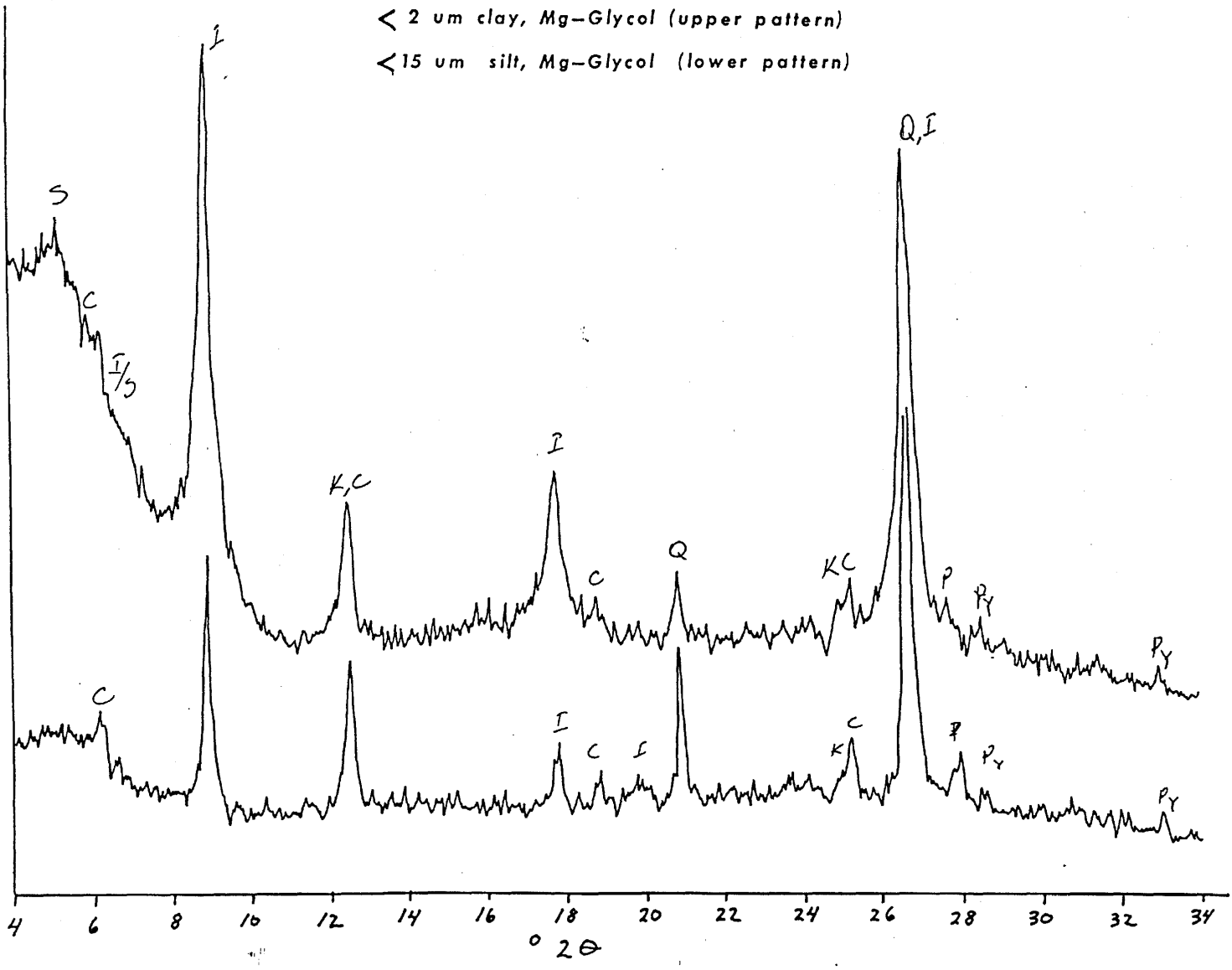
<15 um silt, Mg–Glycol (lower pattern)



235-8830

< 2 um clay, Mg–Glycol (upper pattern)

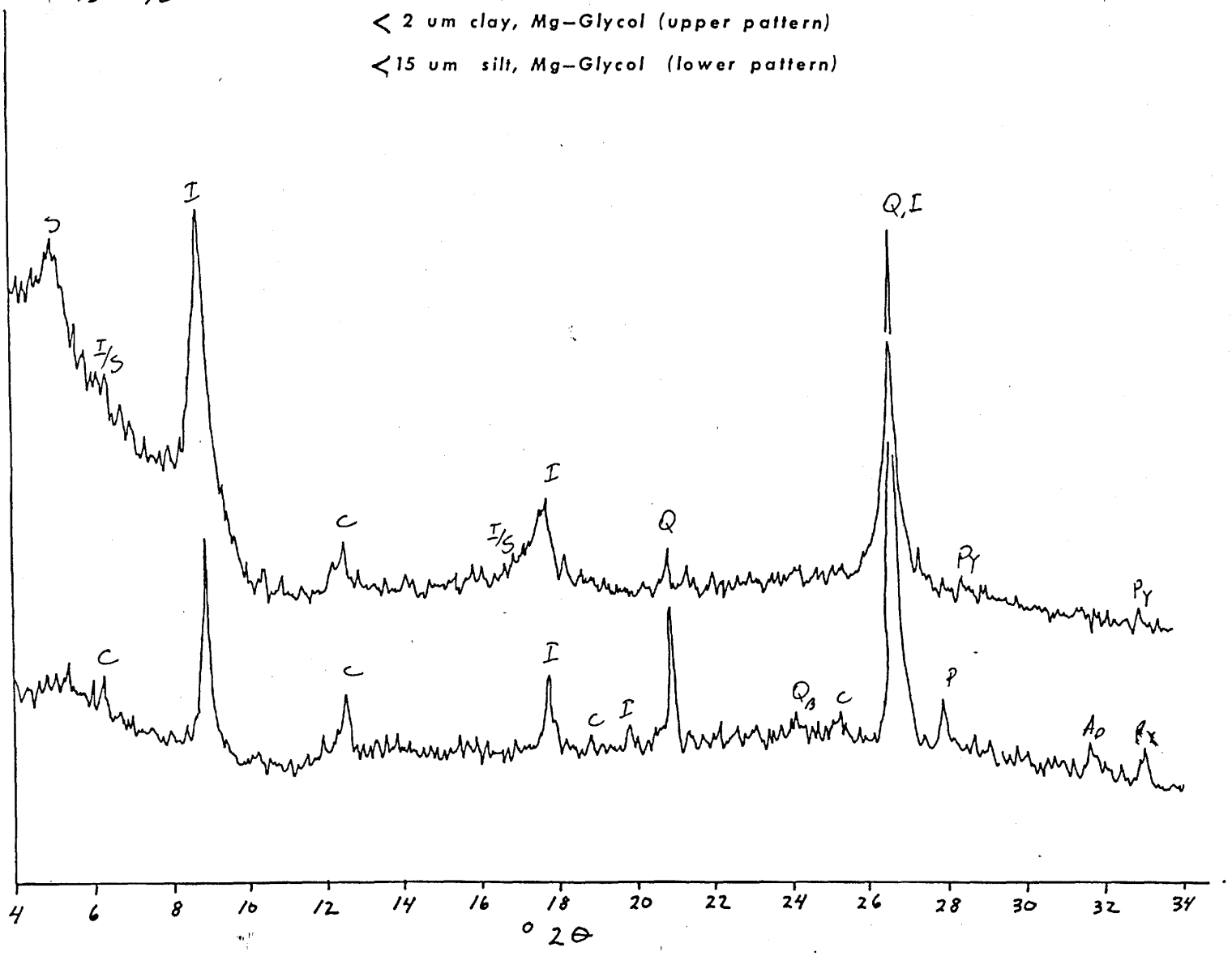
< 15 um silt, Mg–Glycol (lower pattern)



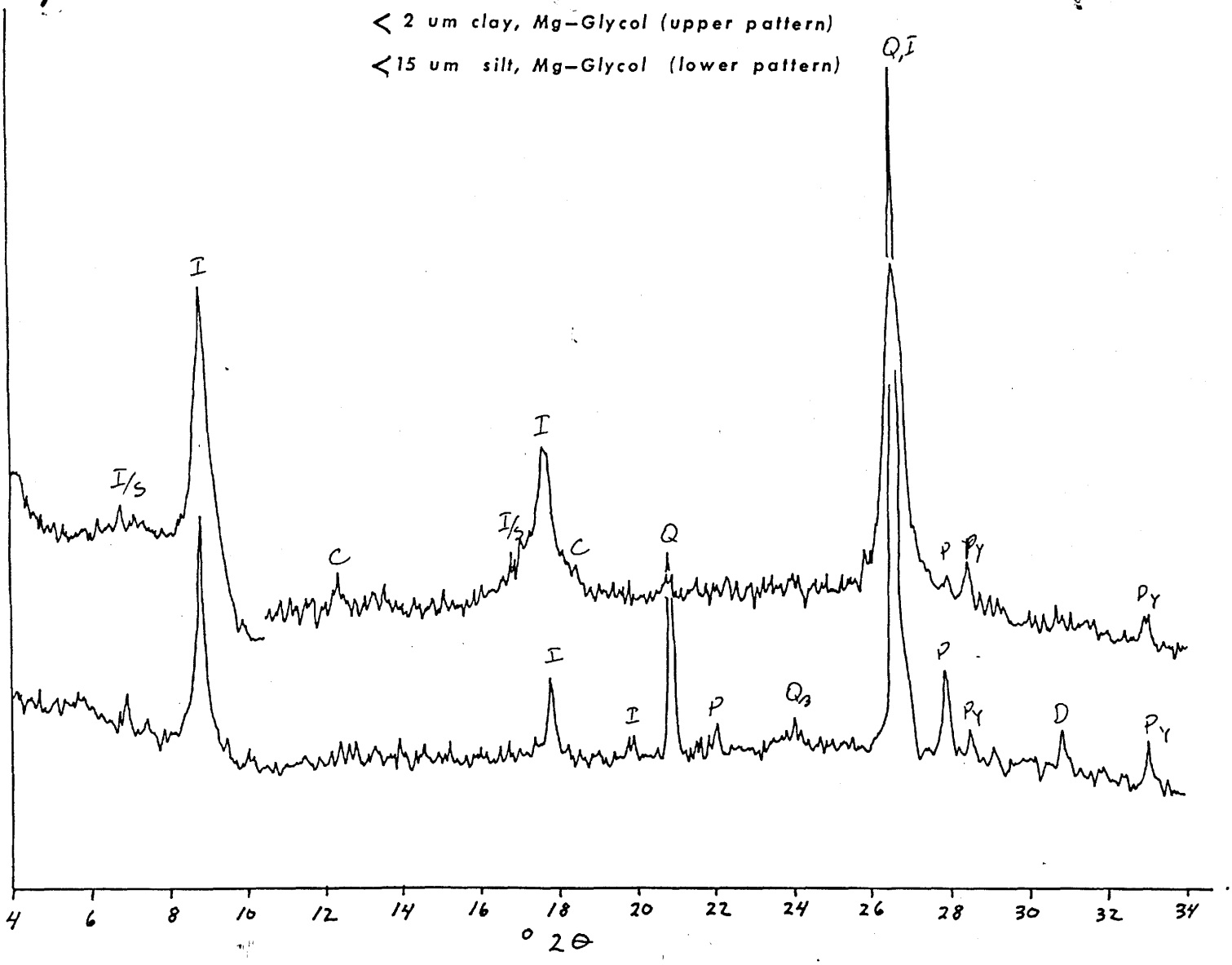
35-8920

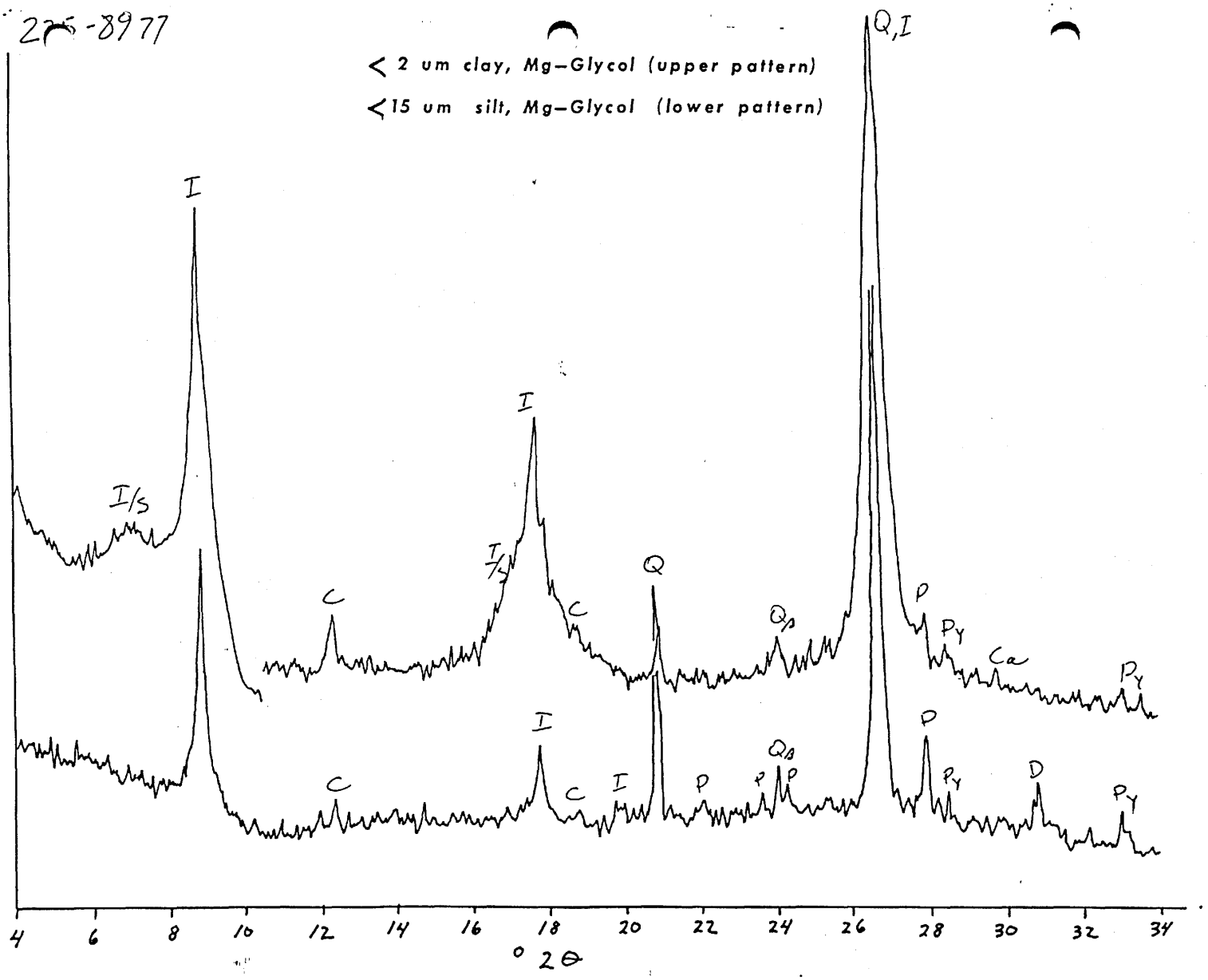
< 2 um clay, Mg–Glycol (upper pattern)

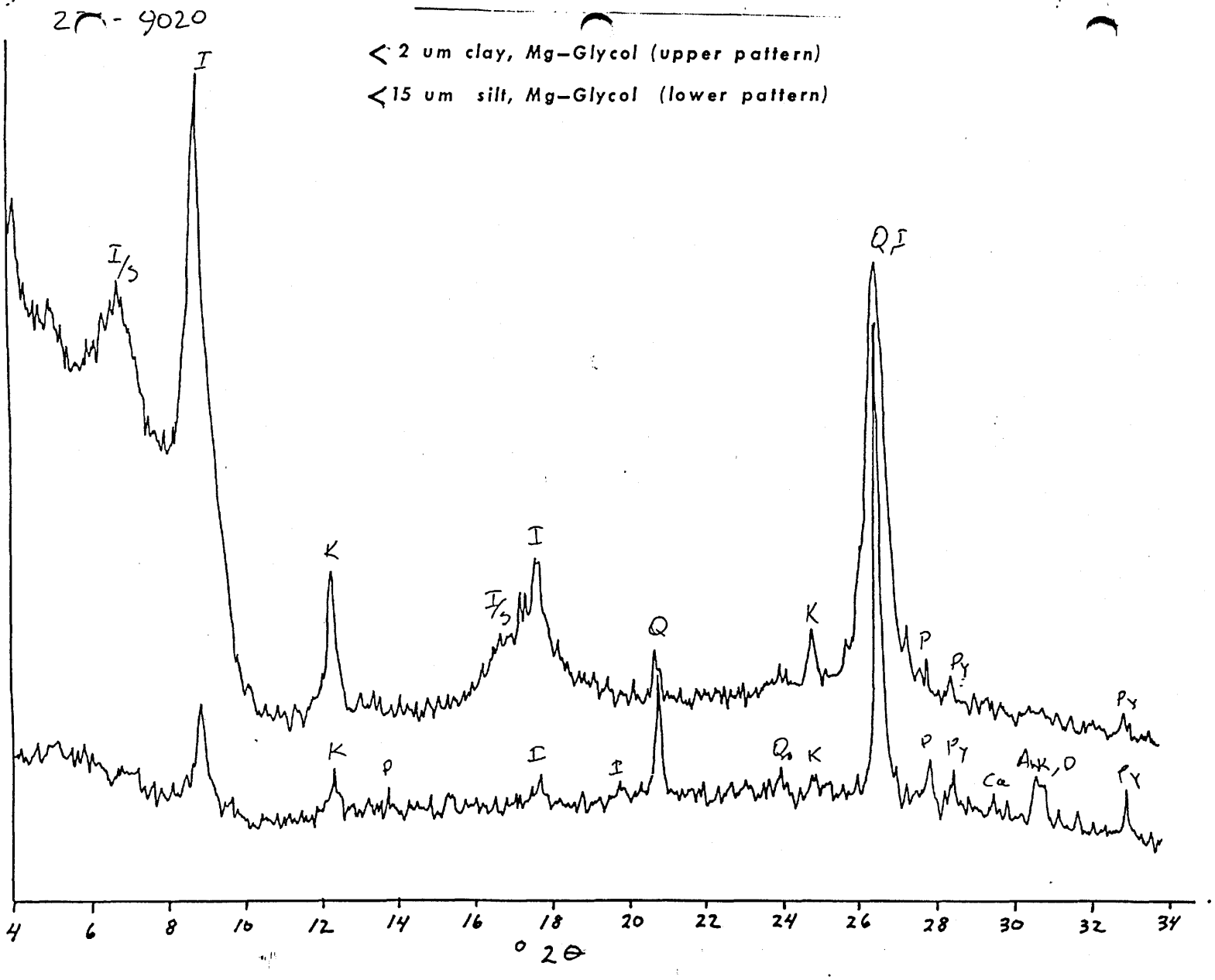
< 15 um silt, Mg–Glycol (lower pattern)

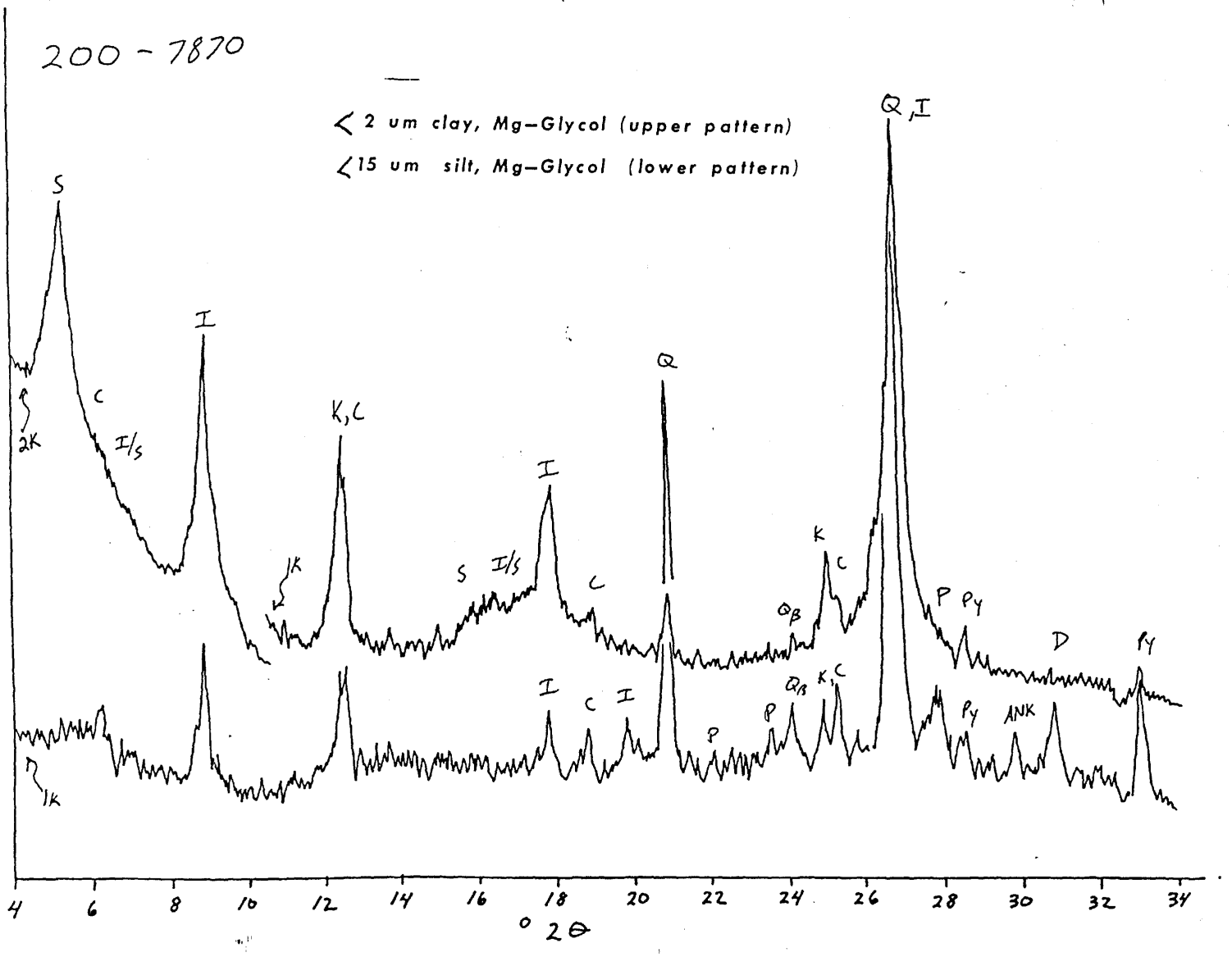


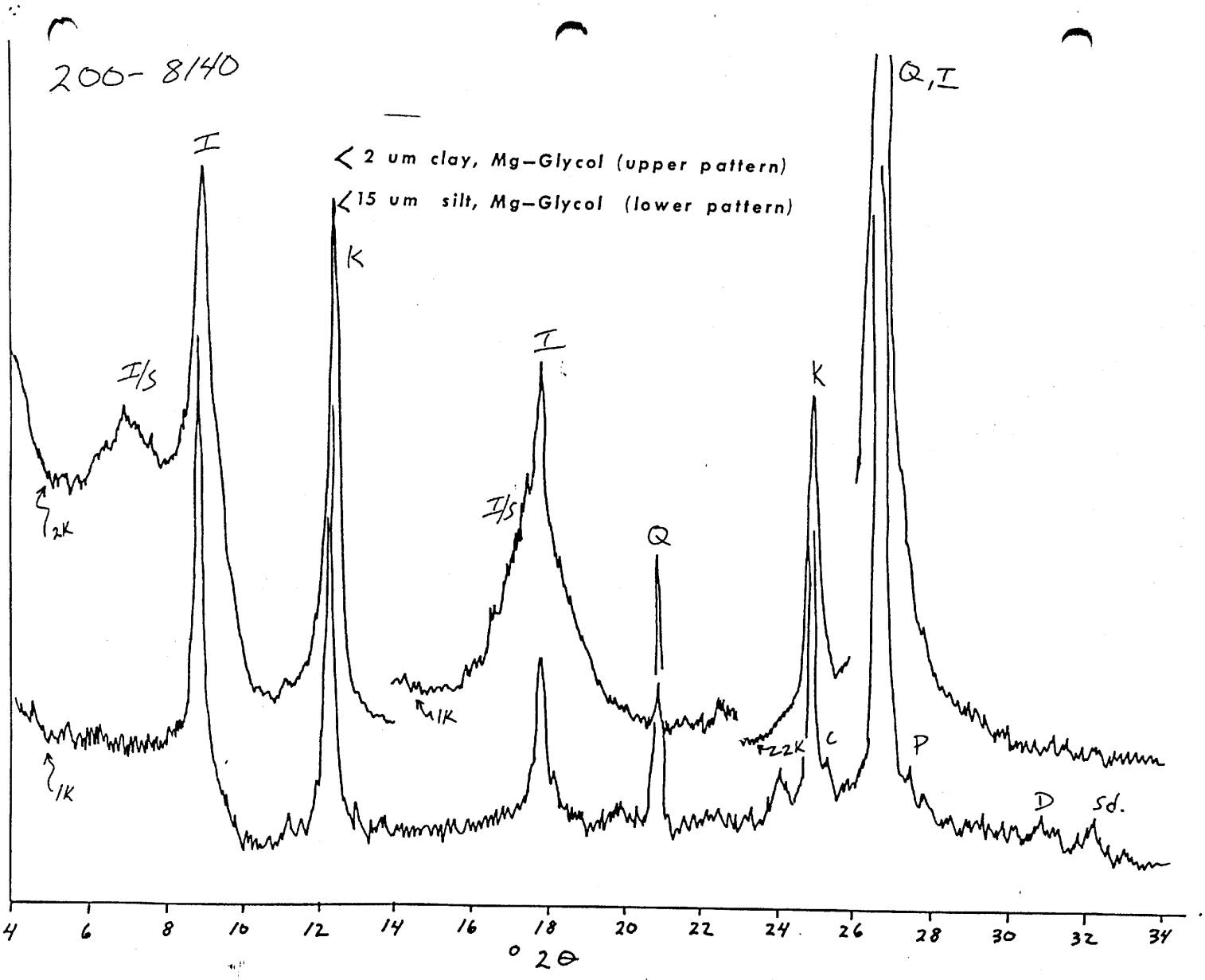
275-8954

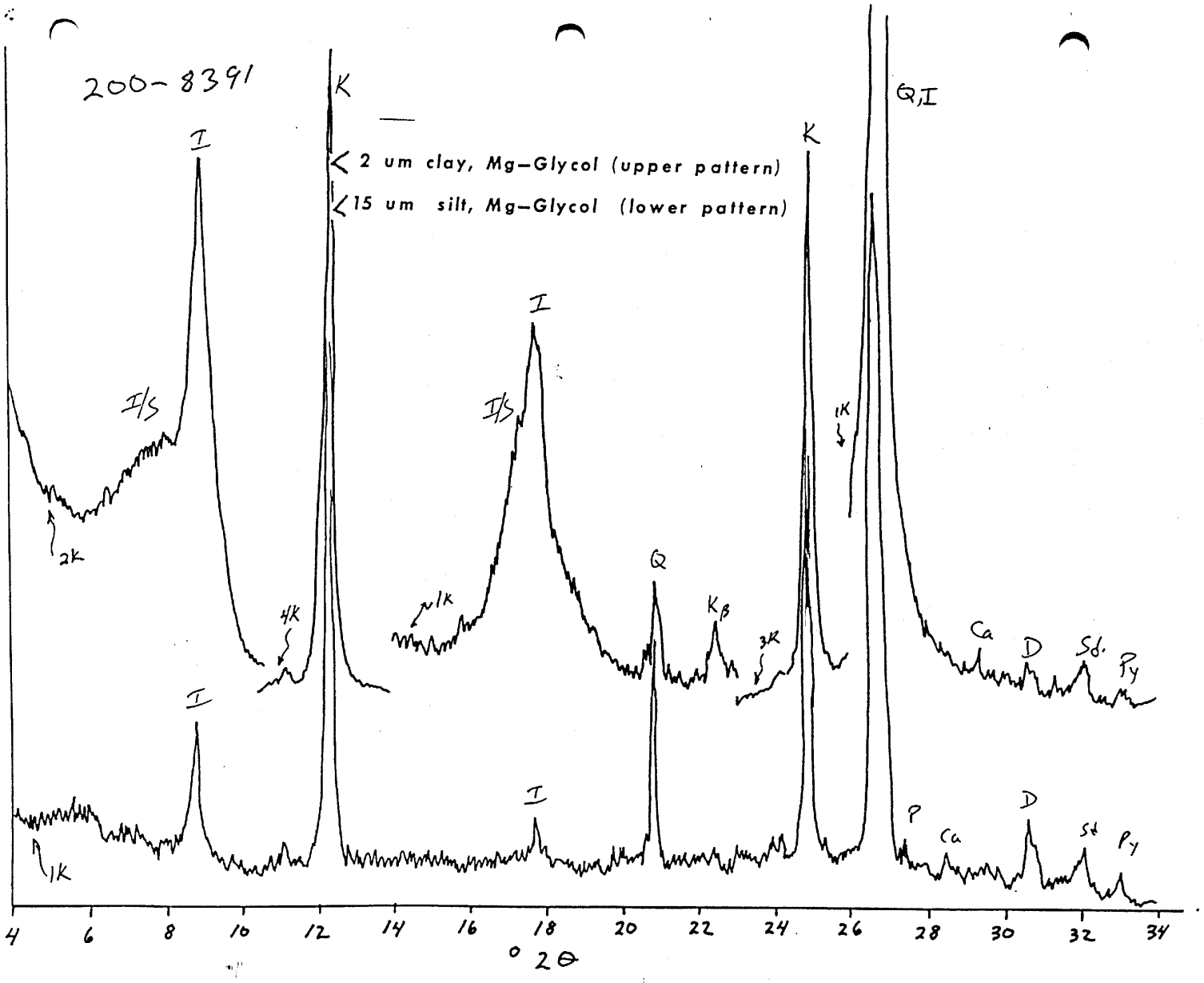

< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
Q,I
I
I/S
C
I
I/S
C
Q
P
Py
Py
I
I
P
Q/3
P
Py
D
Py
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


225-8977
< 2 um clay, Mg-Glycol (upper pattern)
<15 um silt, Mg-Glycol (lower pattern)
Q,I
I
I/S
C
I
I/S
C
Q
Qs
P
Py
Ca
Py
I
C
C
I
P
P
Qs
P
P
Py
D
Py
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2Θ


27-9020
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
I
I/S
K
I/S
I
Q
K
Q,I
P
Py
Py
K
P
I
I
Qo
K
P
Py
Ca
A,K,O
Py
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


200 - 7870
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
I
C
I/S
2K
1K
K,C
Q
Q,I
P
Py
D
ANK
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


200- 8140
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
I
K
I/S
I
I/S
Q
K
Q,I
2K
1K
1K
2K
C
P
D
Sd.
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


200-8391
K
I
2 um clay, Mg–Glycol (upper pattern)
15 um silt, Mg–Glycol (lower pattern)
I/S
2K
4K
1K
I
I/S
1K
Q
Kβ
3K
K
1K
Q,I
Ca
D
Sd.
Py
I
I
P
Ca
D
St
Py
1K
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

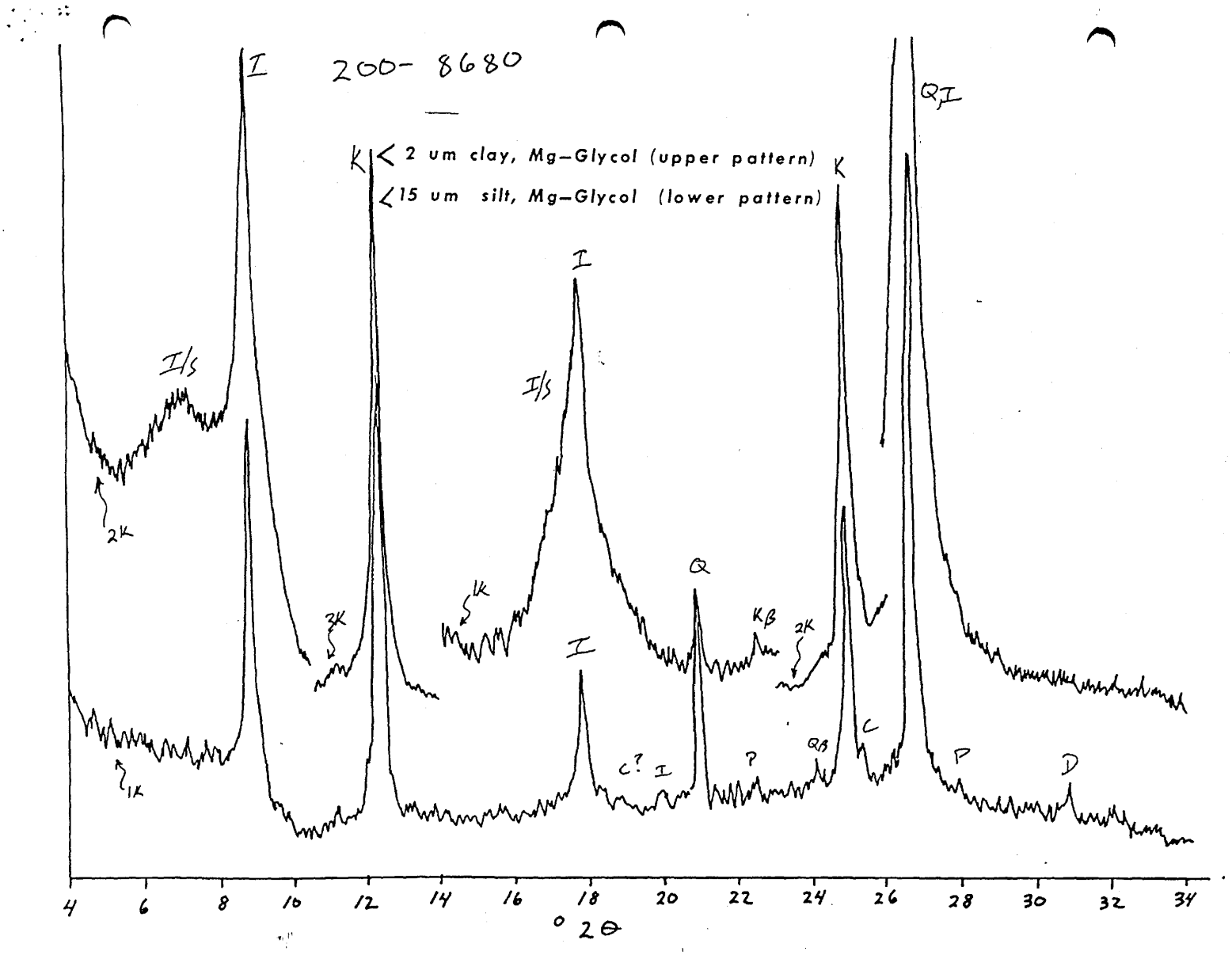

200- 8680
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
I
I/S
K
2K
1K
3K
Q
Kβ
QI
C
P
D
C?
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

Table 15: Clay mineralogy of samples from Arco N.G.I. #7 well.

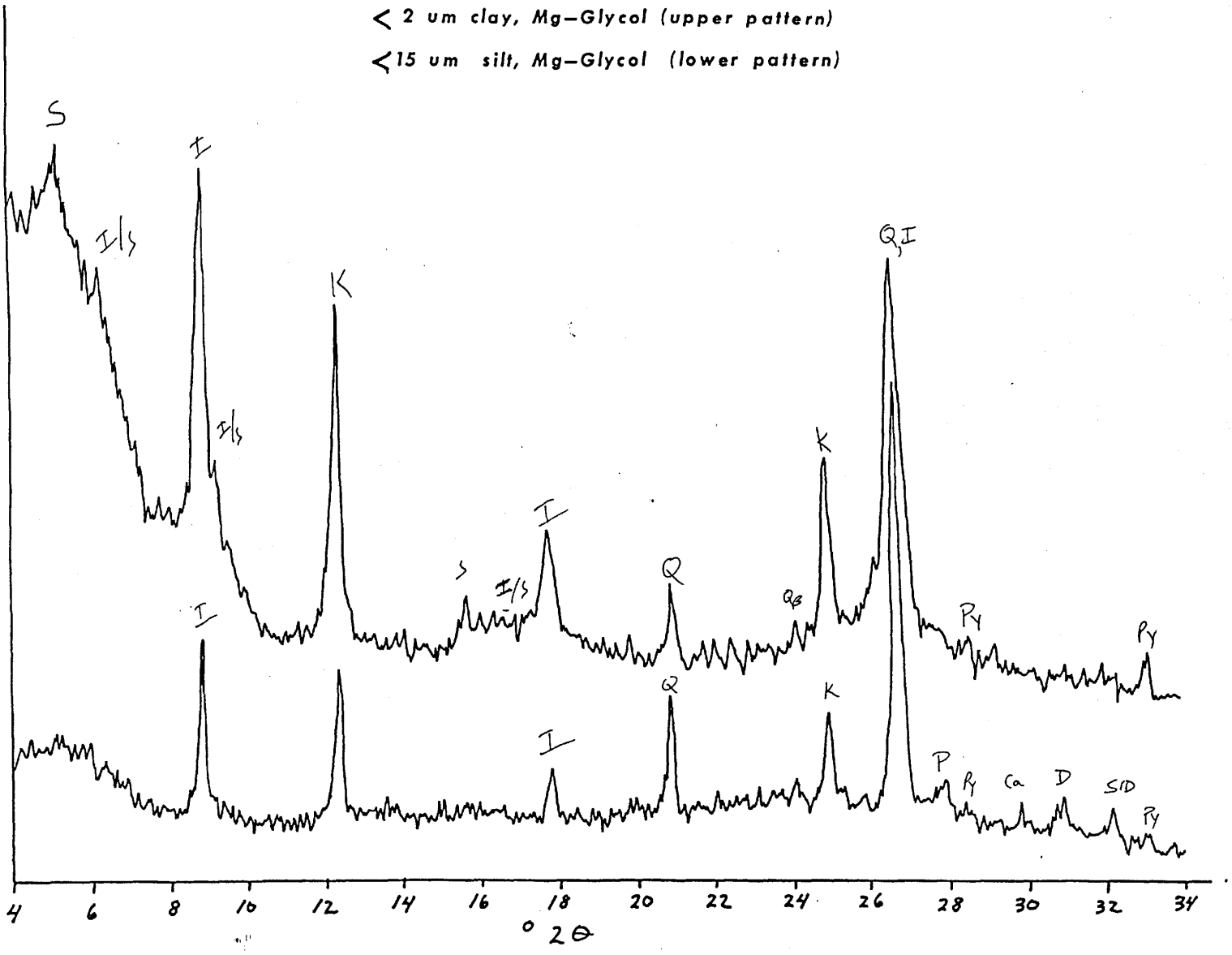
ARCO NGI #7 DEPTH FEET	STYPE	SMECTITE	CHLORITE	MIXED LAYER I/S	ILLITE	KAOLINITE	OTHER
6720	C	SAMPLE NOT RUN - ALL DRILL MUD, NO RESIDUE AFTER WASHING					
6720-S	C	AS ABOVE					
7410	C	MOD	-	MOD	MOD	MOD	Q2,P,PY1,G/BN.SIS.,DM.CONT.
7410-S	C	-	-	-	MIN	MIN	Q2,P1,D1,SID1,PY1
7700	C	MOD	-	MOD	MAJ	MOD	Q2,AN3,P,D1,SID,PY1,DM.CONT.
7700-S	C	-	-	-	MIN	MIN	Q3,AN2,P1,D1,SID1,PY1,BK.SH.
7820	C	-	-	MOD	MAJ	MOD	Q1,P,PY1,BK.SH.,WASHED
7820-S	C	-	-	-	MOD	MIN	Q3,P1,CA?D1,PY1
7880	C	-	-	MOD	MAJ	MOD	Q1,P,PY1,BK/GR.SH.,WASHED
7880-S	C	-	-	-	MOD	MIN	Q3,P1,CA,D,PY1
8050	C	-	-	MIN	MIN	MIN	Q1,ODD MATERIAL,MUD ADDITIVE
8050-S	C	-	-	-	TR	MIN	Q3,BA,MUD ADDITIVE
8172	CC	-	-	MOD	MOD	MAJ	Q1,P1,PY,BK.SH.
8172-S	CC	-	-	-	MIN	MAJ	Q3,PY2

Definitions: TR = less than 3%, MIN = 3 - 12%, MOD = 13 - 35%, MAJ = >35%. Other mineral abbreviations: Q = quartz, P = plagioclase, KS = k-spar, AN = analcime, HC =heulandite-clinoptilolite, CA = calcite, D = dolomite, AP = apatite, SID = siderite, PY = pyrite, BA = barite. 1 = weak, 2 = moderate, 3 = strong, nothing = trace. MDM = mostly drill mud, BK.SH. = black shale, GR. = gray, SIS. = siltstone, TUFF. = tuffaceous, ANK = ankerite. Also: STYPE = sample type, C = cuttings, CC = core, SW = side wall, S = silt.

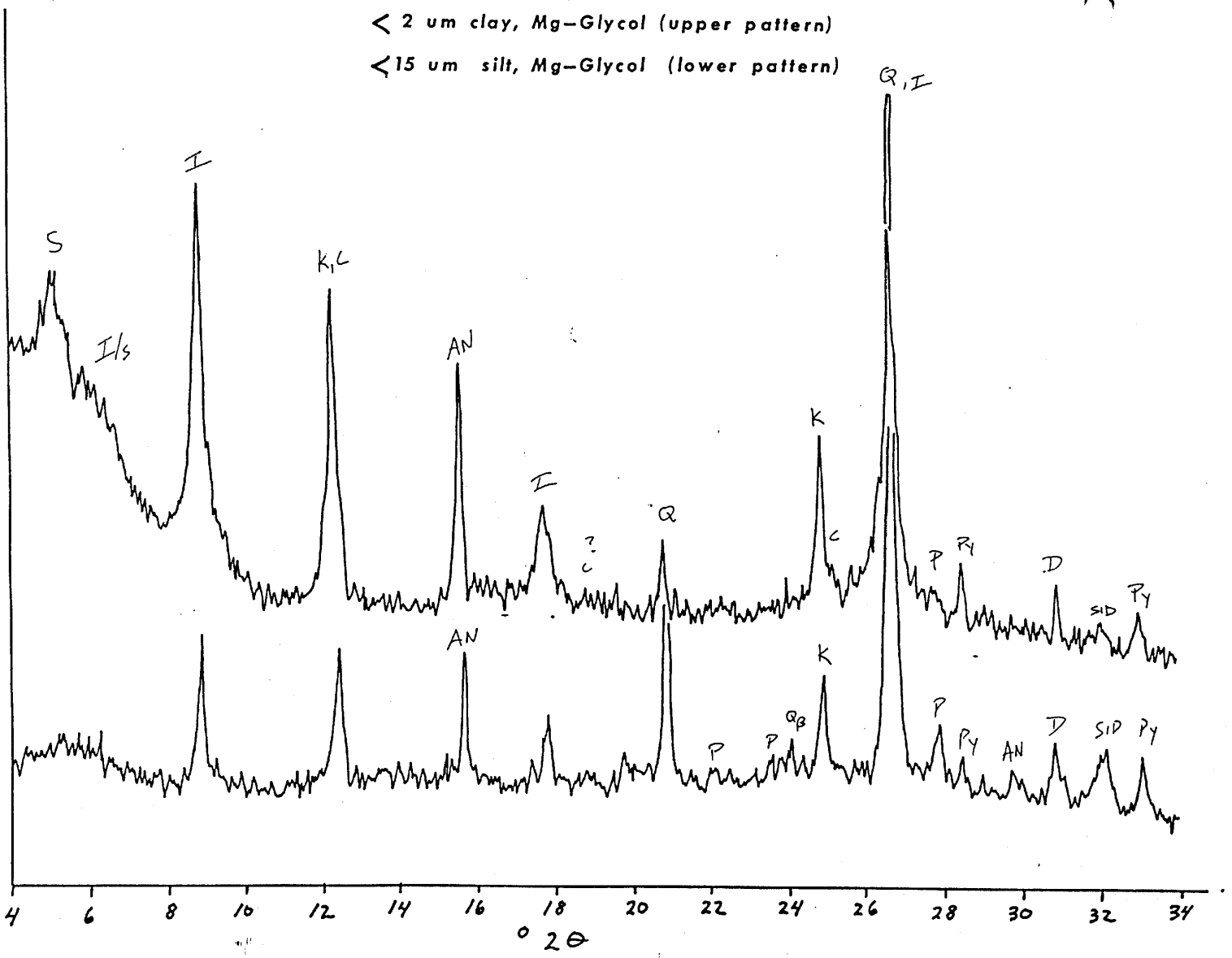
370-7410

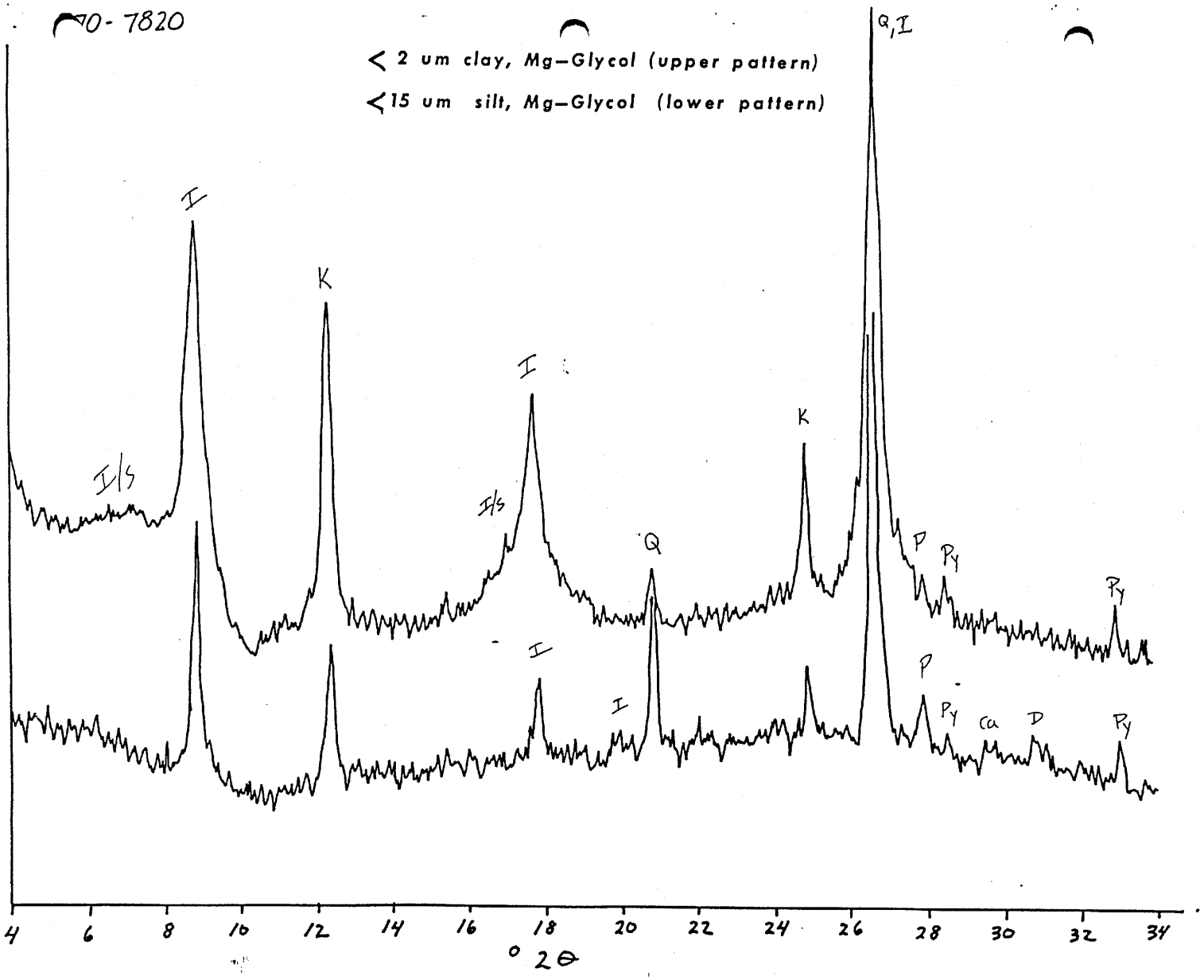
< 2 um clay, Mg–Glycol (upper pattern)

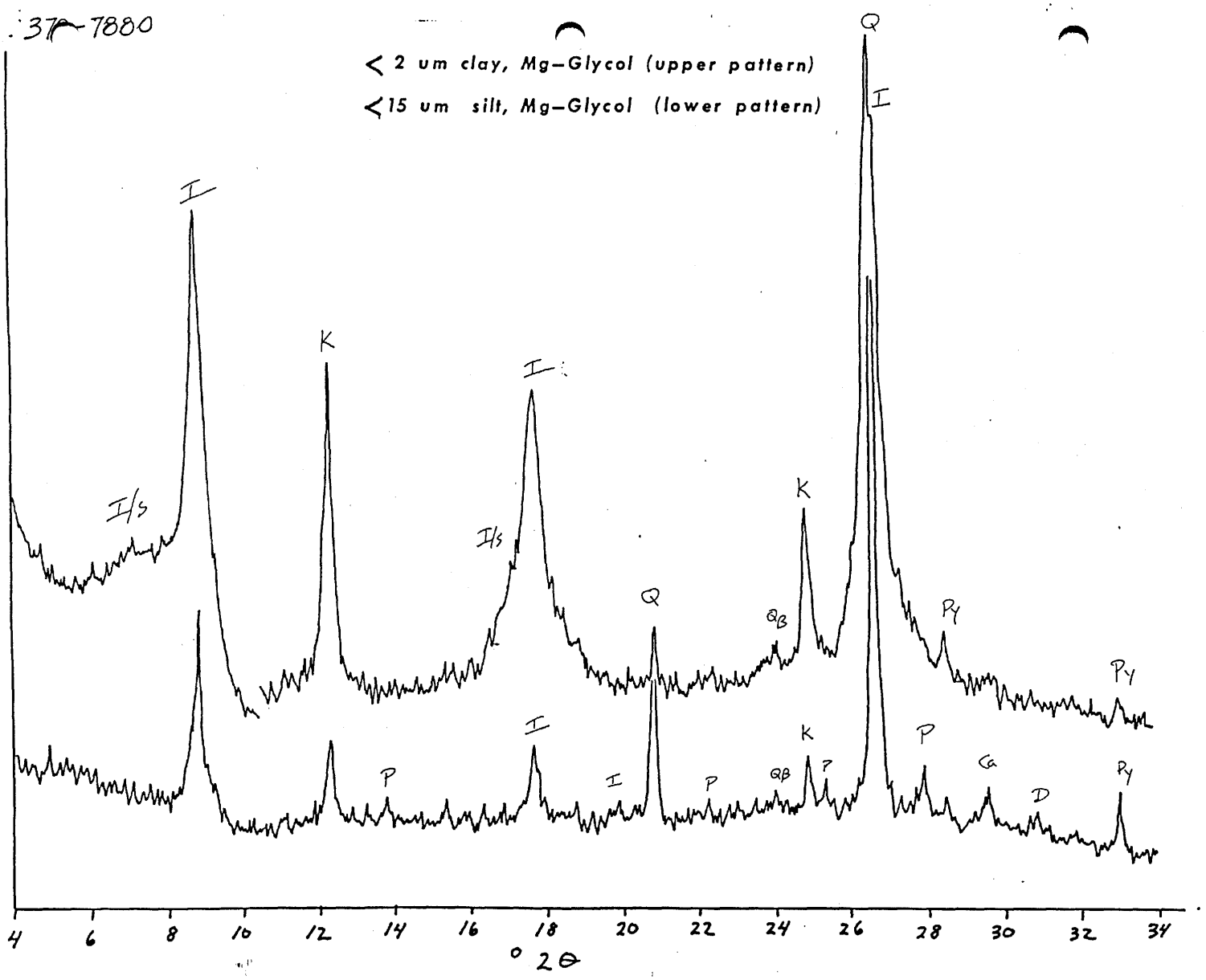
< 15 um silt, Mg–Glycol (lower pattern)



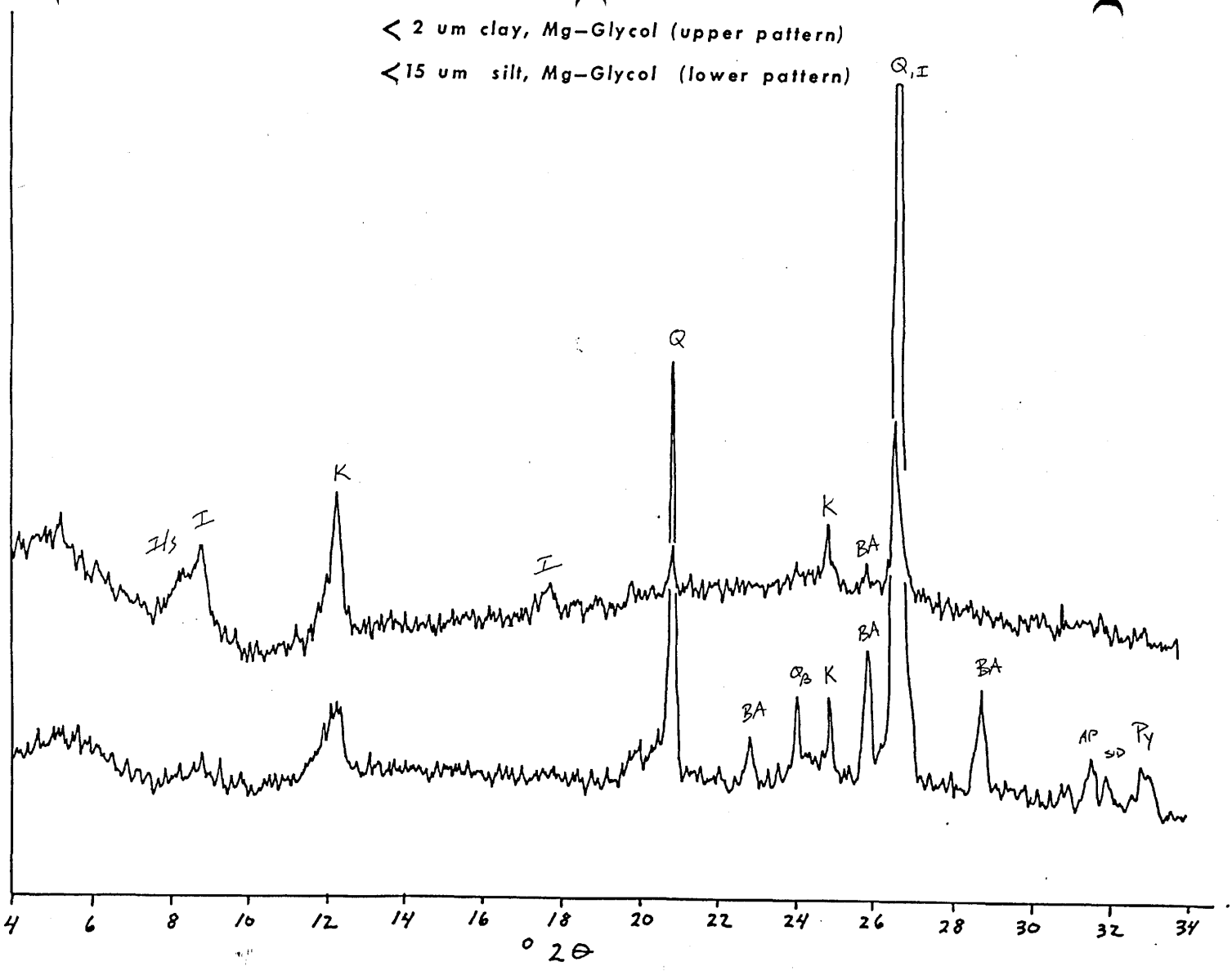
37A-7700


< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
I/s
I
K,C
AN
I
?
C
Q
K
C
Q,I
P
Py
D
SID
Py
AN
Qβ
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

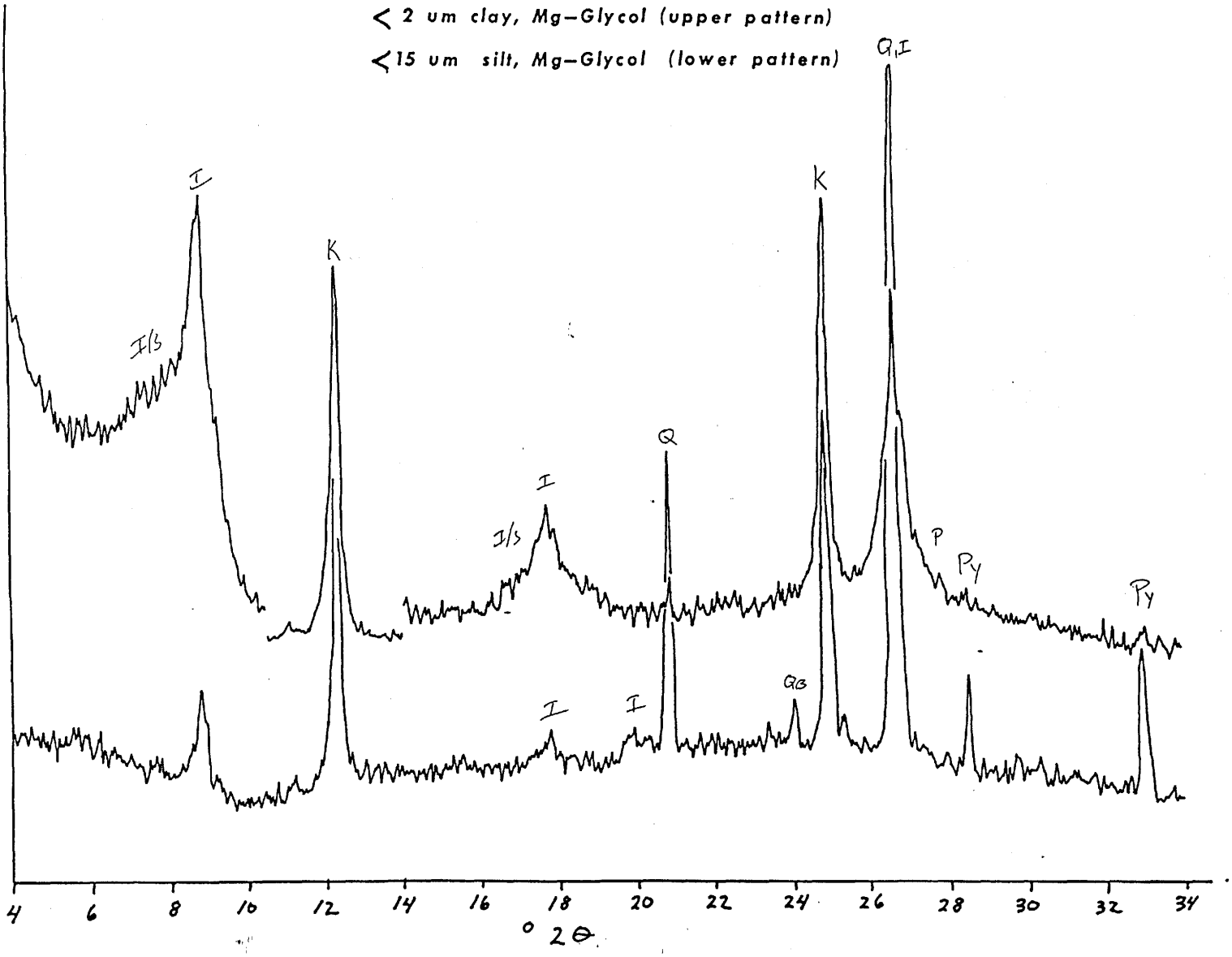

70-7820
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
I
K
I/S
I
I/S
Q
K
Q,I
P
Py
Py
I
I
P
Py
Ca
D
Py
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


37-7880
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
I
K
I/s
Q
Qβ
Py
P
G
D
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

37A-8050


< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
I/S
I
K
I
Q
Q,I
K
BA
BA
Qβ
K
BA
BA
AP
SD
Py
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

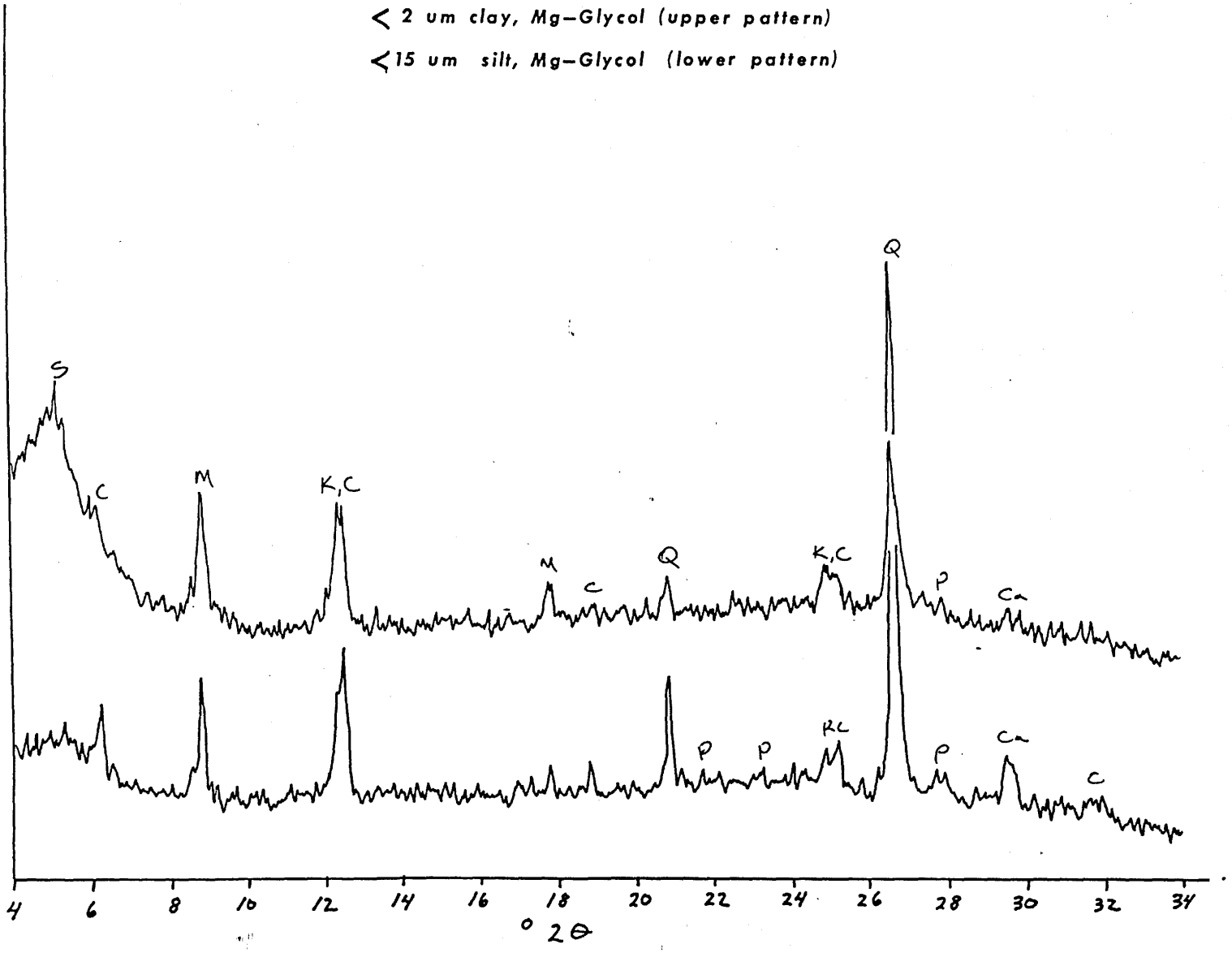
37-8172


< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
I
K
I/S
Q
I
I/S
K
Q,I
P
Py
Py
I
I
Q
G
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

3F - 7200

< 2 um clay, Mg–Glycol (upper pattern)

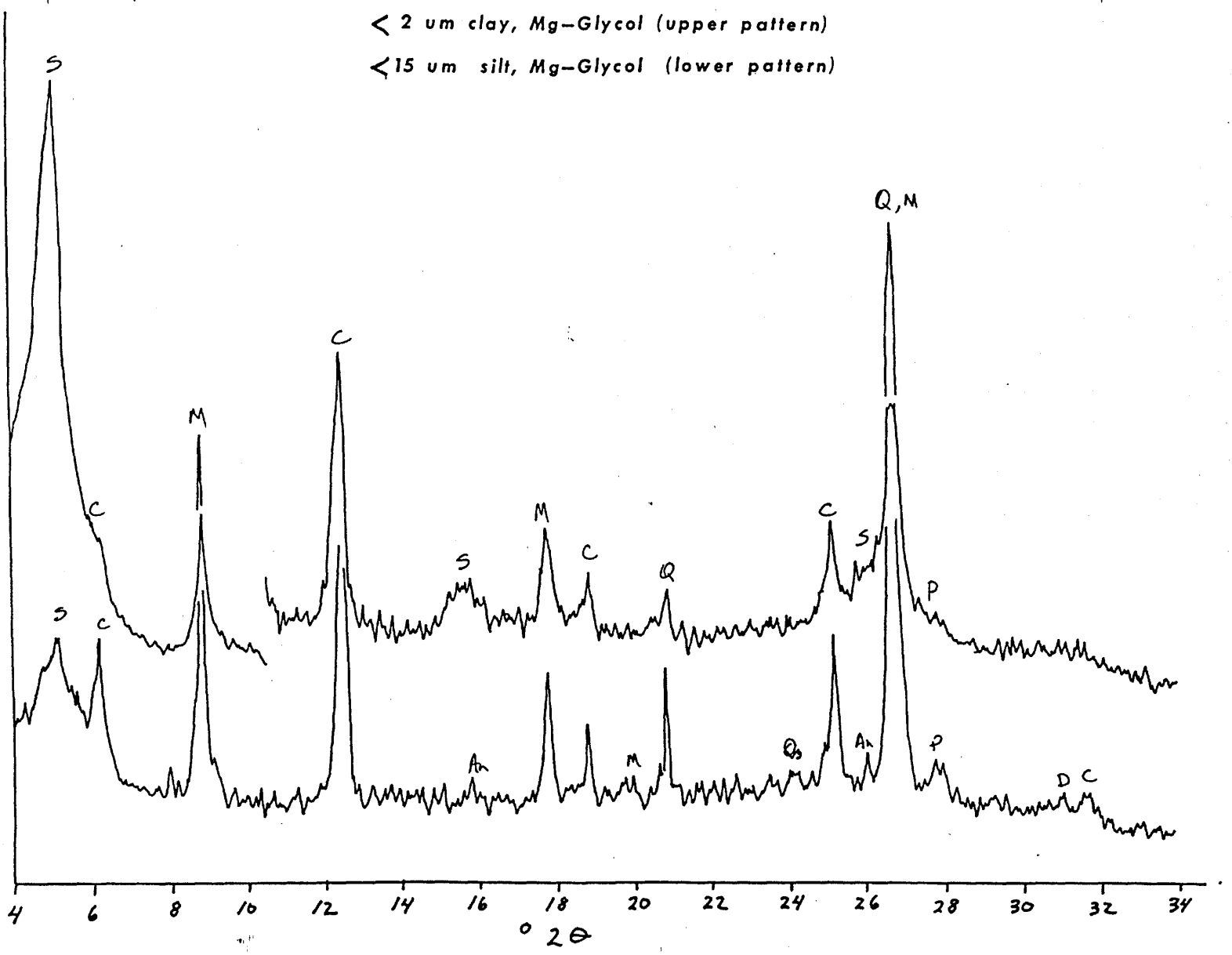
<15 um silt, Mg–Glycol (lower pattern)



375-7860

< 2 um clay, Mg–Glycol (upper pattern)

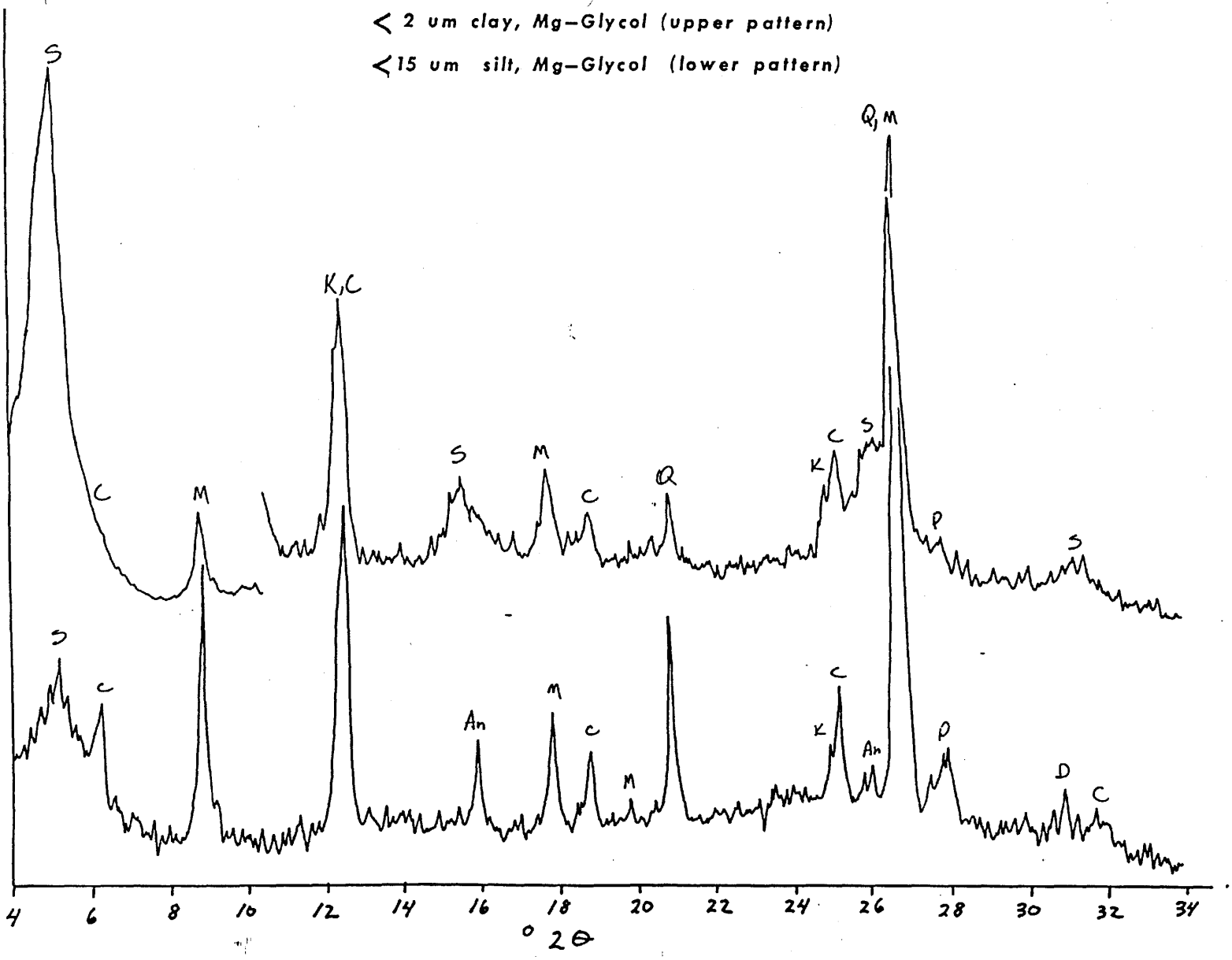
< 15 um silt, Mg–Glycol (lower pattern)

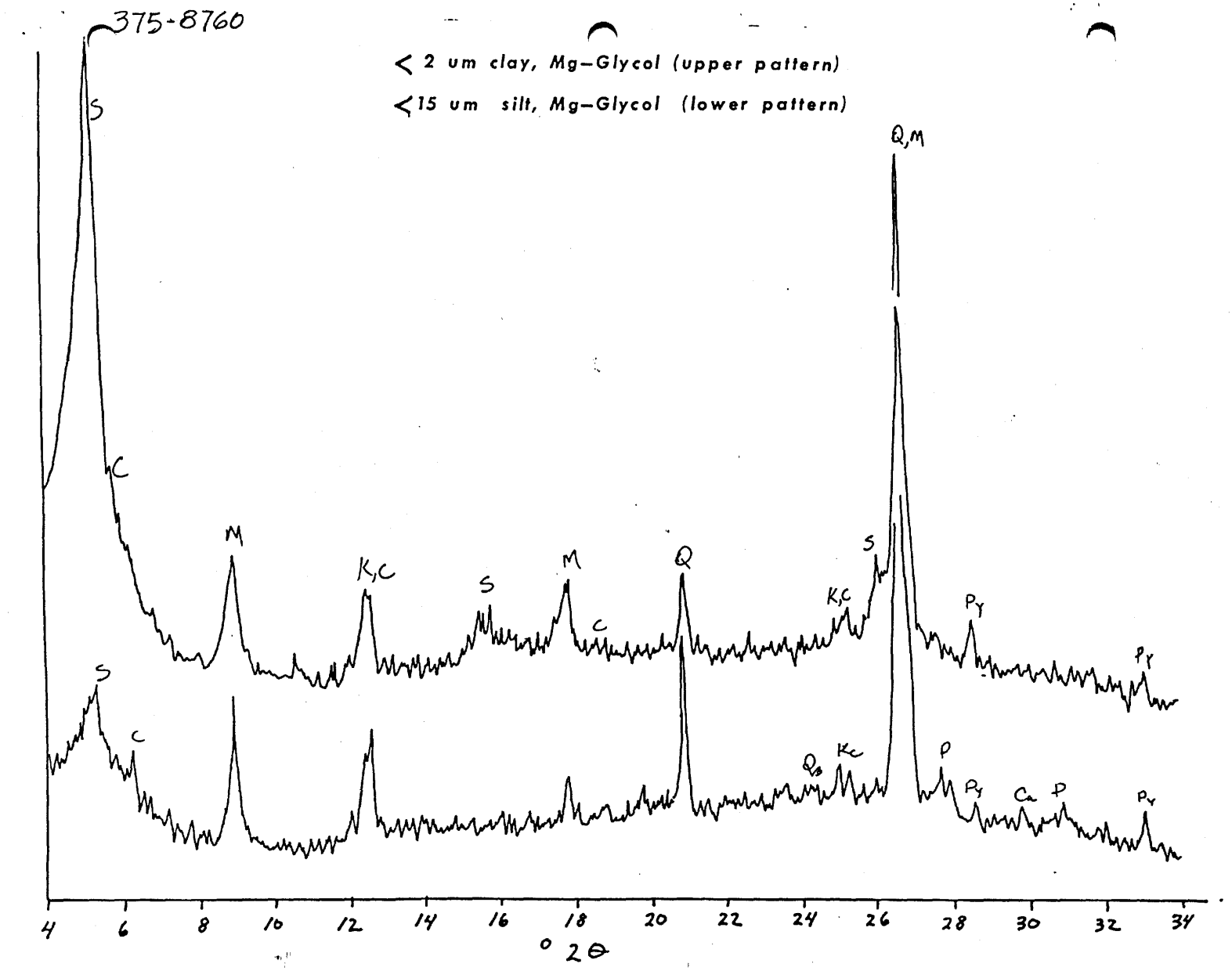


375 - 8340

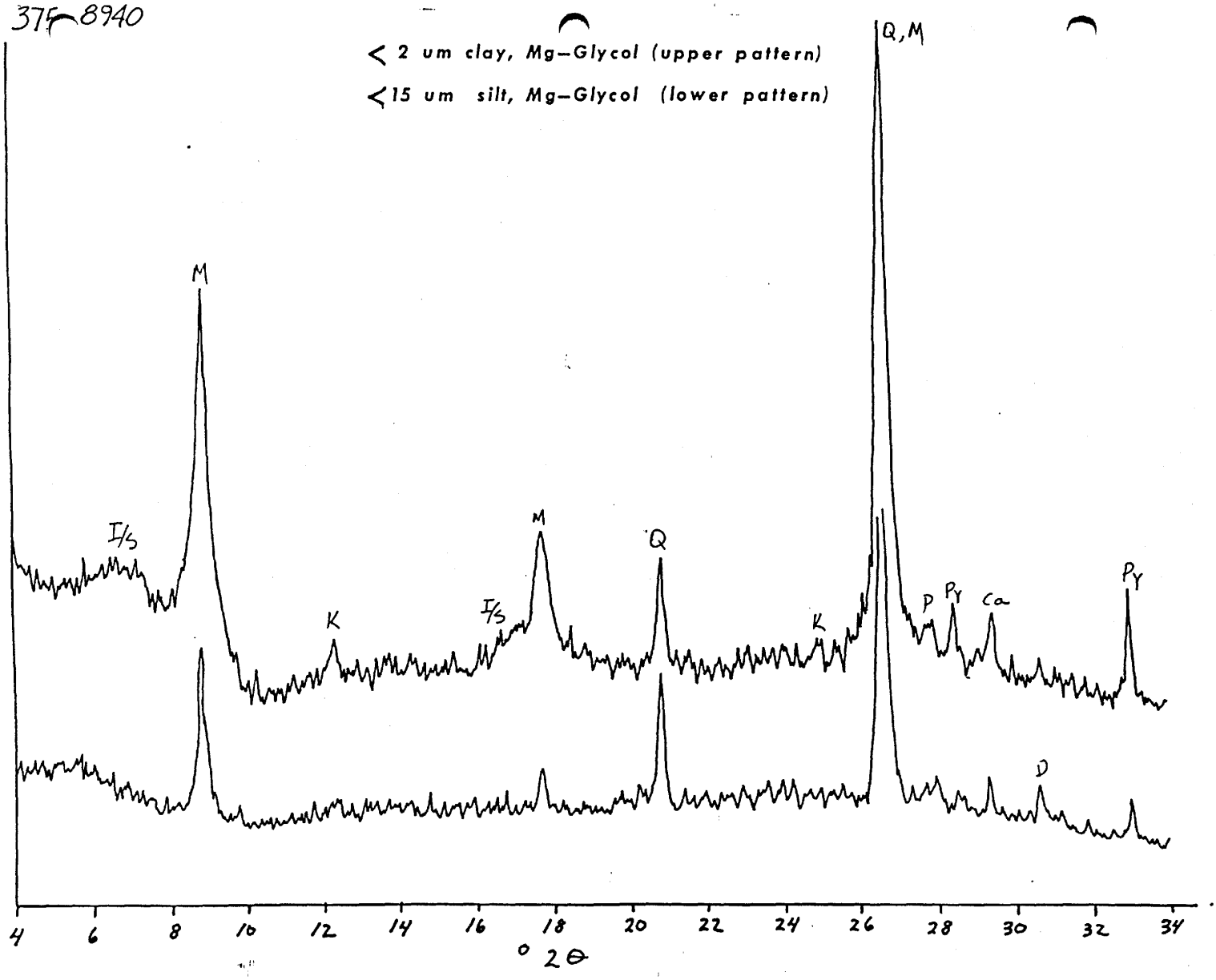
< 2 um clay, Mg–Glycol (upper pattern)

<15 um silt, Mg–Glycol (lower pattern)

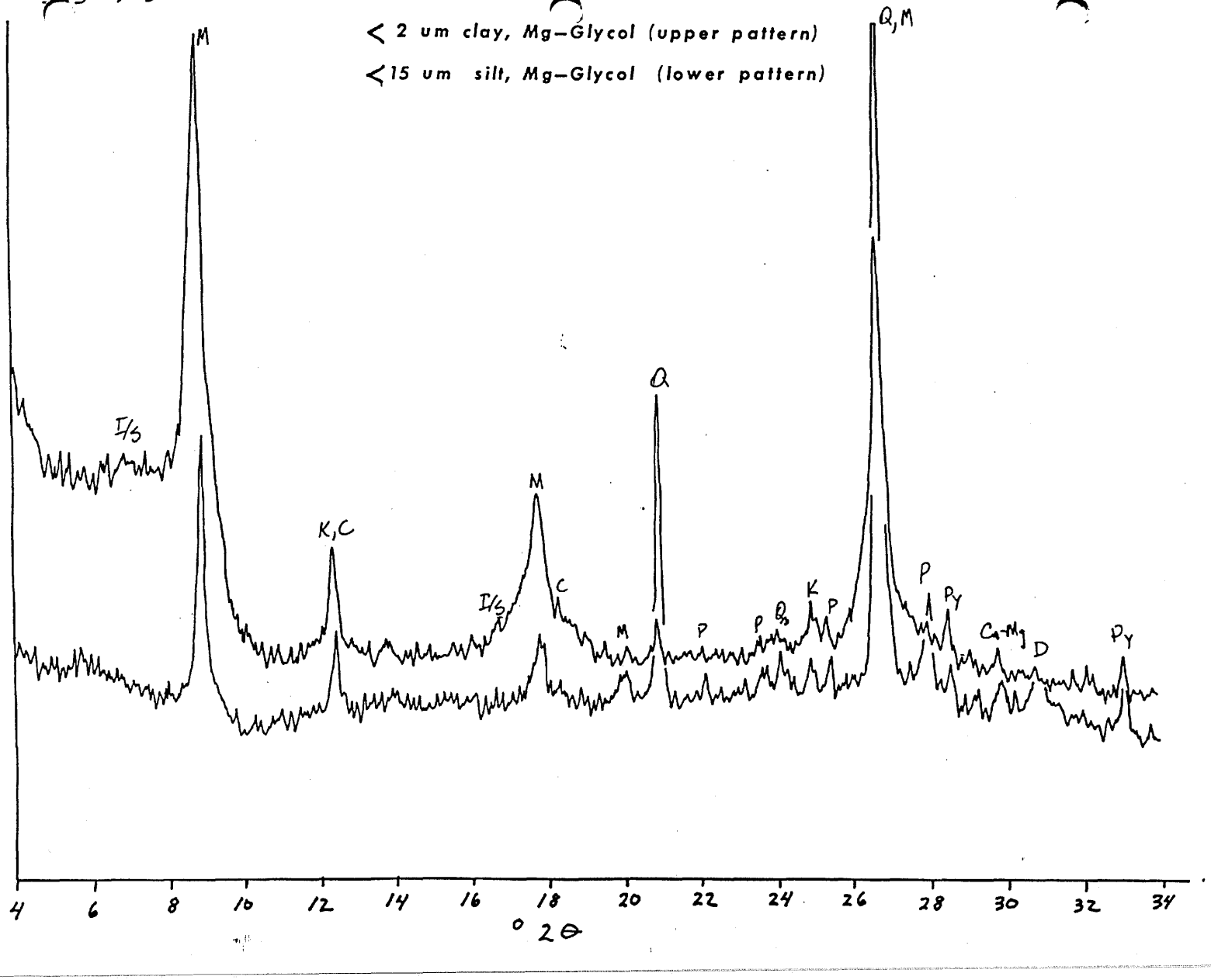



375-8760
< 2 um clay, Mg-Glycol (upper pattern)
<15 um silt, Mg-Glycol (lower pattern)
S
C
M
K,C
S
M
C
Q
K,C
S
Q,M
Py
Py
S
C
Qs
Kc
P
Py
Ca
P
Py
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

375-8940


< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
Q,M
M
I/S
K
I/S
M
Q
K
P
Py
Ca
Py
D
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

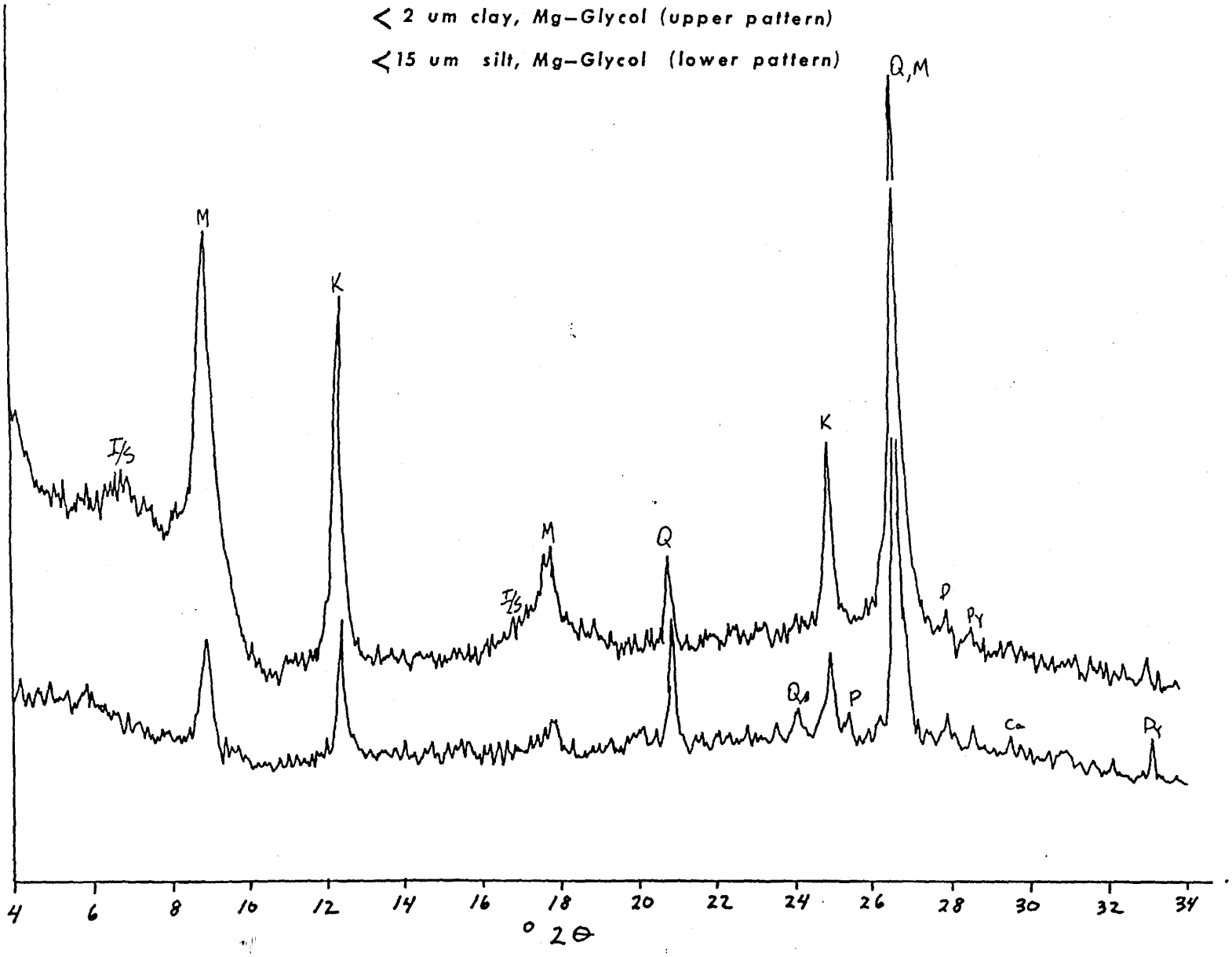
375-9030


< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
M
I/S
K,C
I/S
M
C
M
Q
P
P
Qss
K
P
Q,M
P
Py
Ca-Mg
D
Py
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

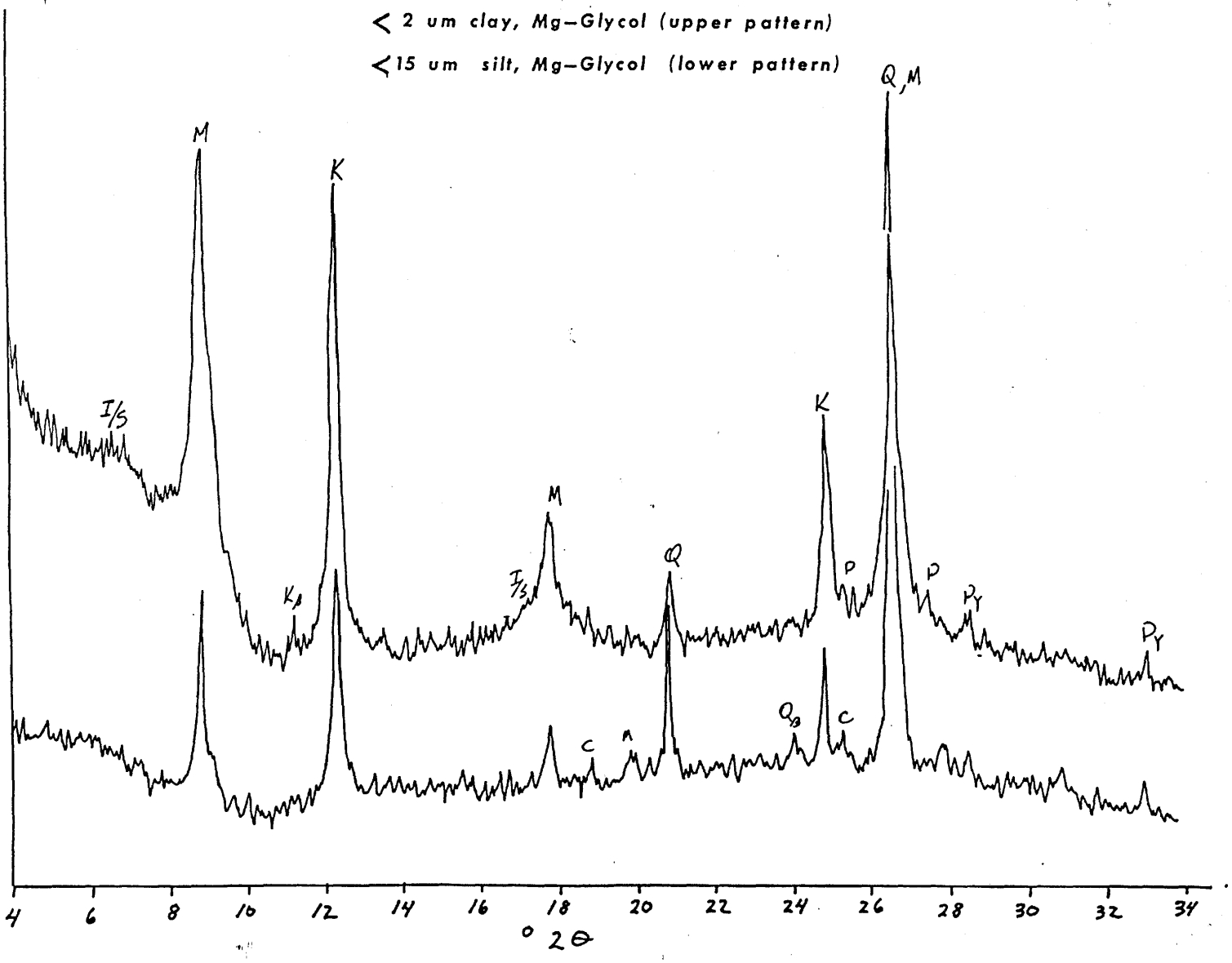
375-9130

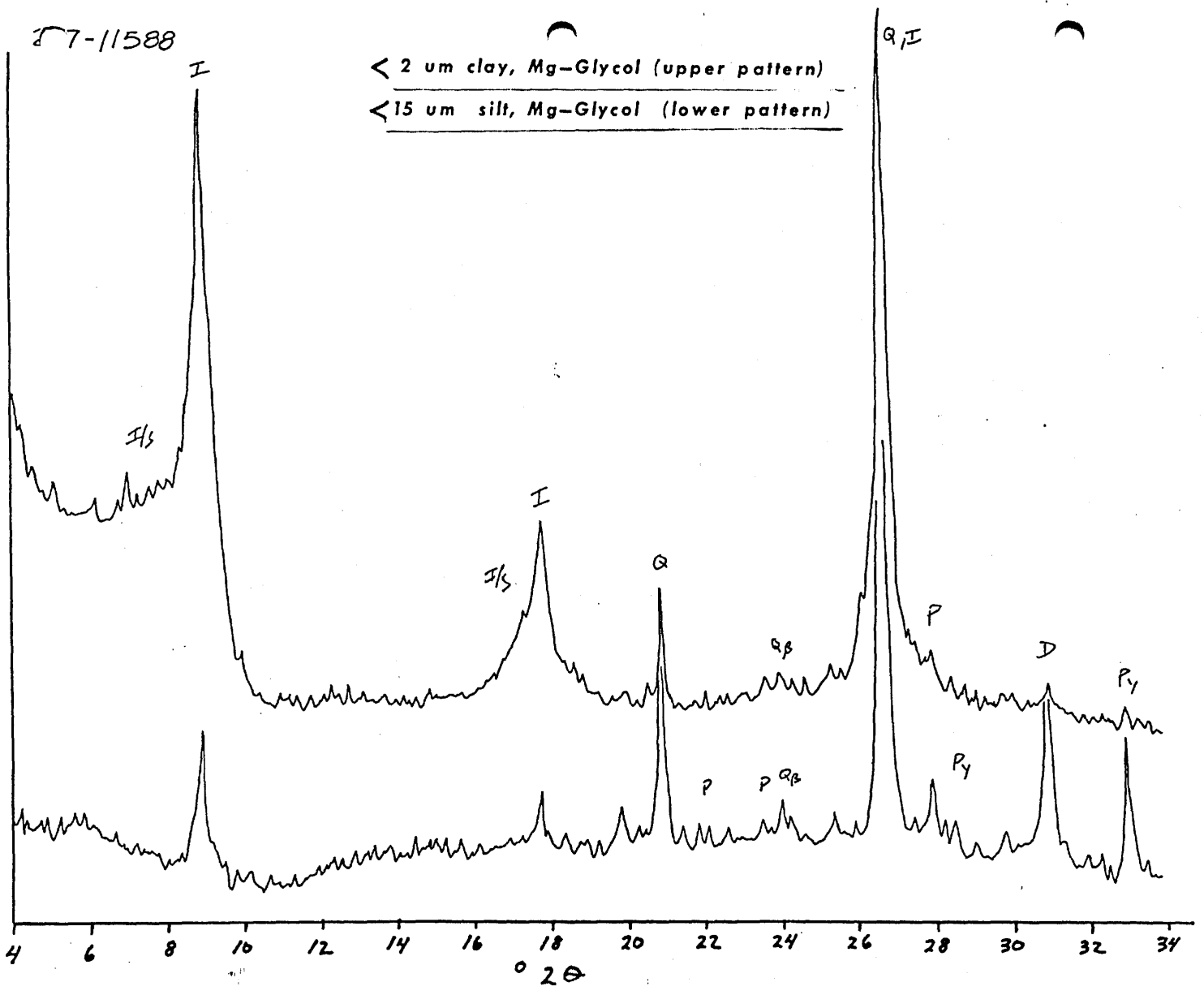
< 2 um clay, Mg–Glycol (upper pattern)

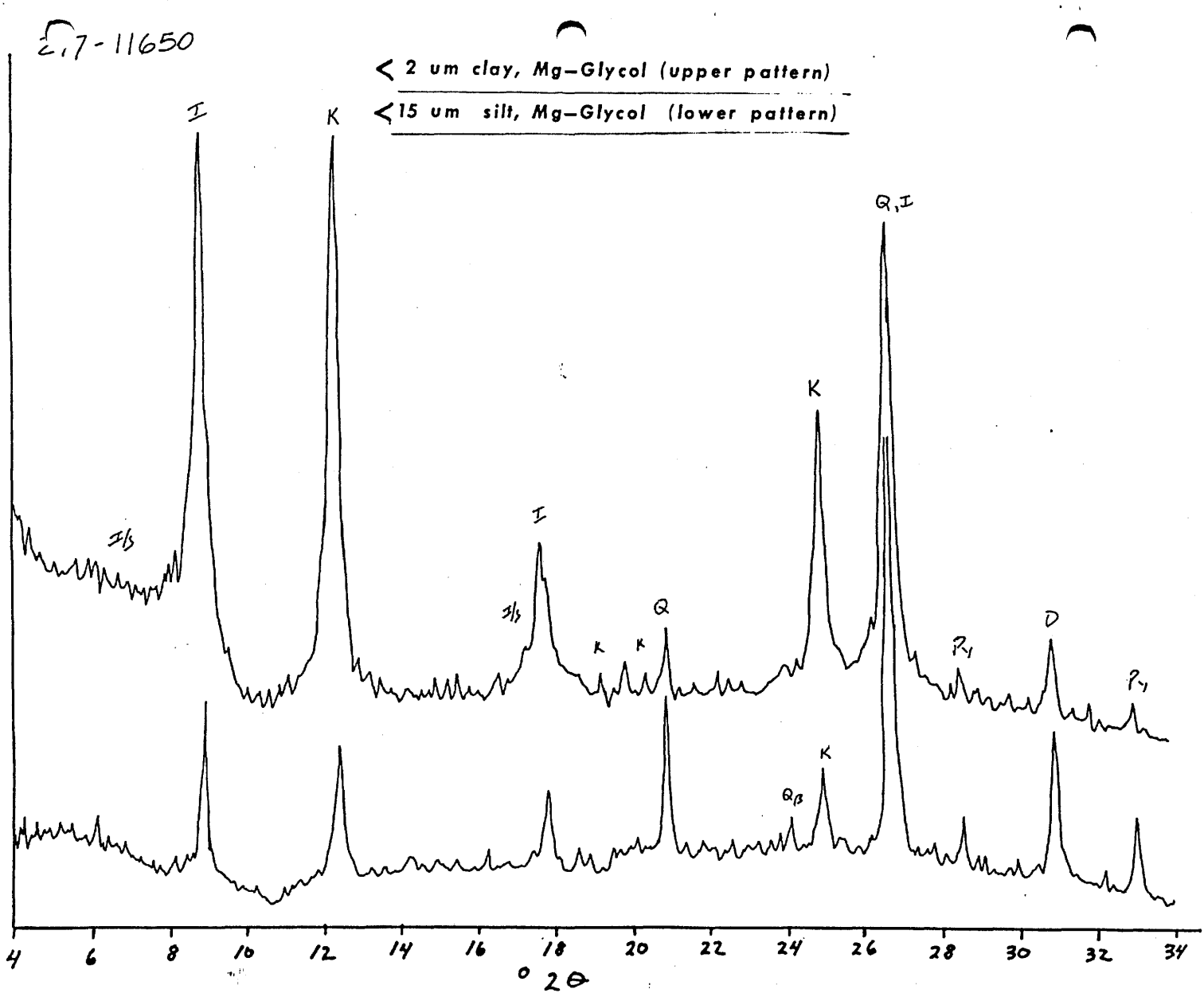
<15 um silt, Mg–Glycol (lower pattern)

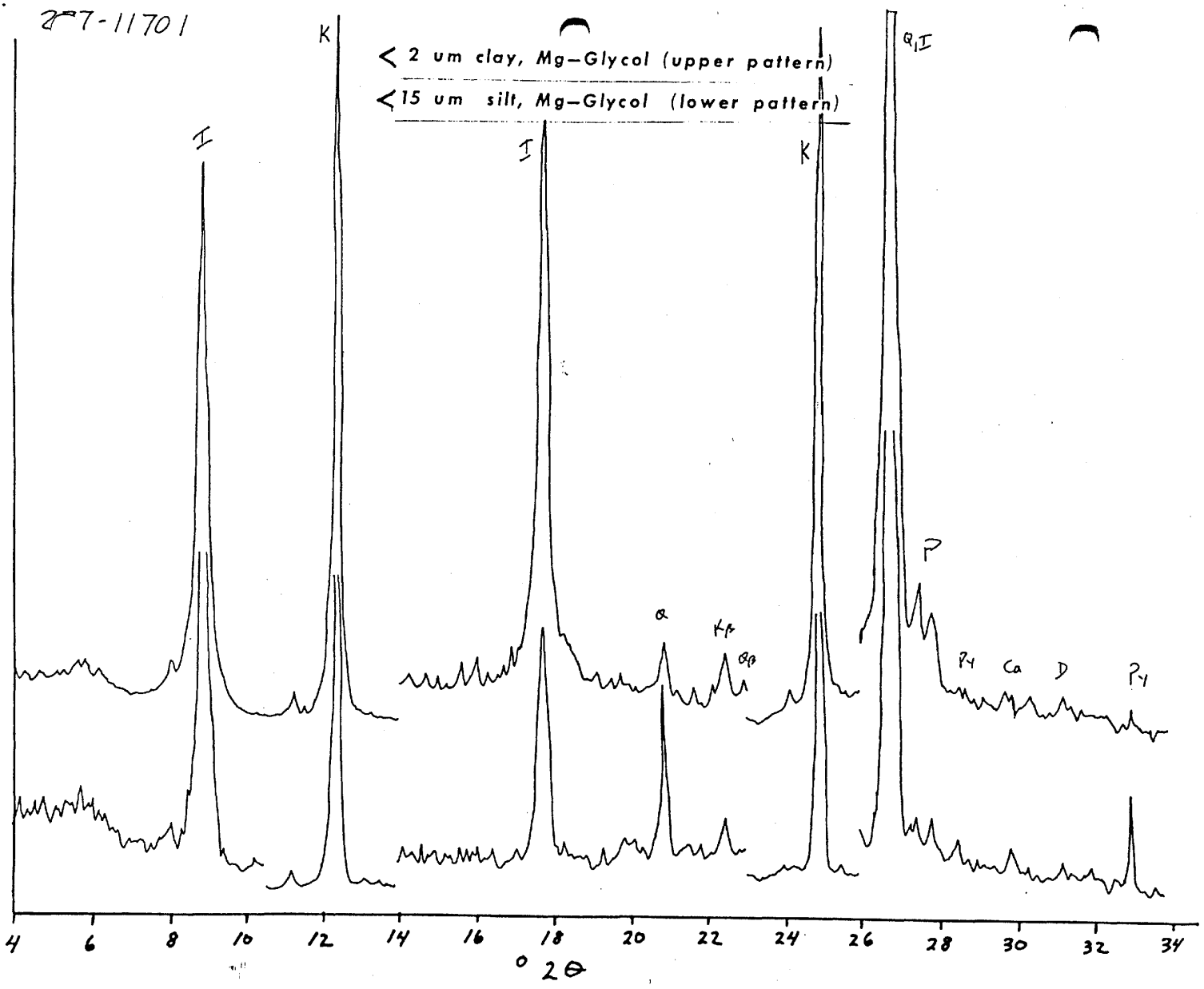


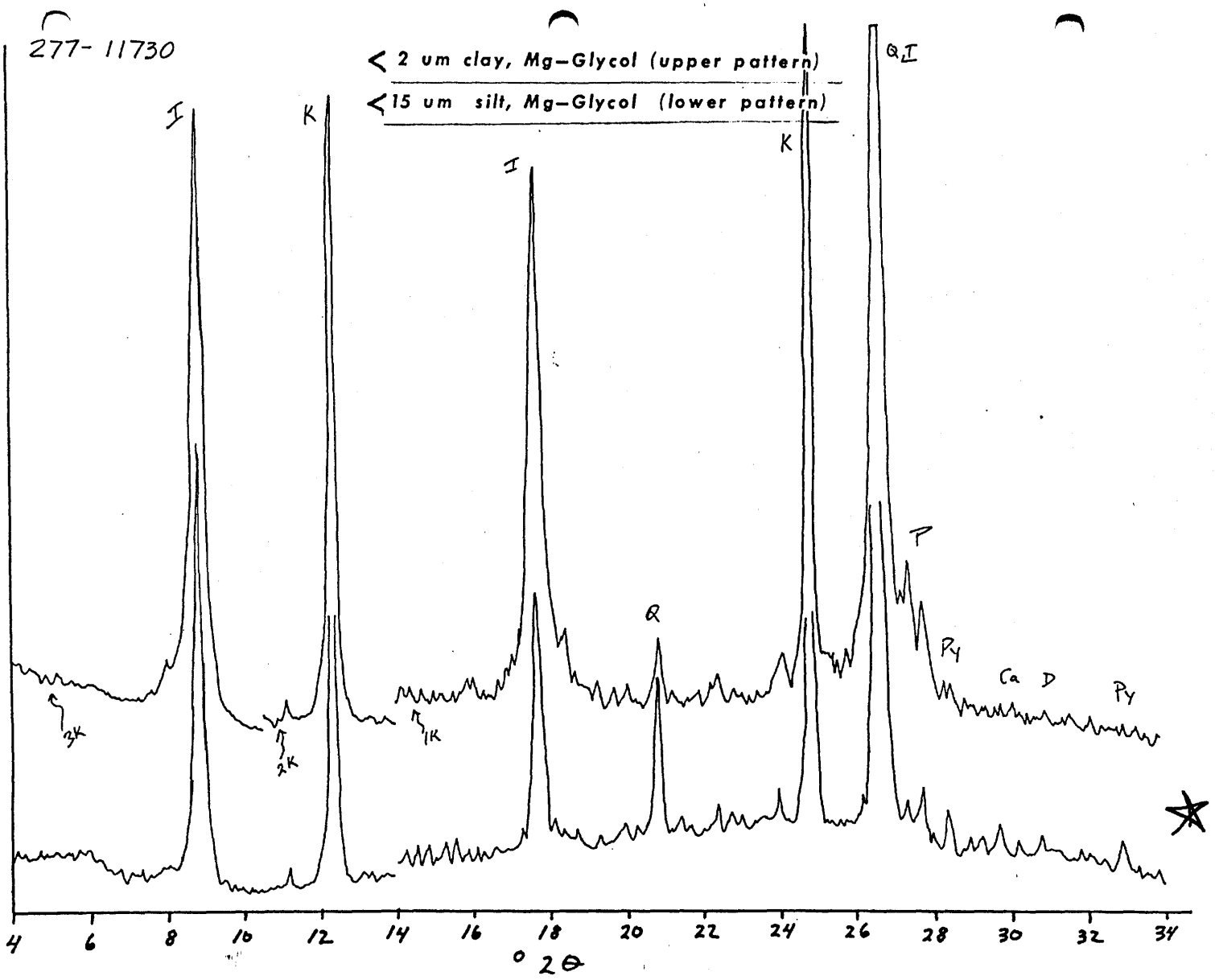
375-9250


< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
I/S
M
K
Kβ
I/S
M
Q
K
P
Q,M
P
Pγ
Pγ
Qβ
C
A
C
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


87-11588
< 2 um clay, Mg-Glycol (upper pattern)
<15 um silt, Mg-Glycol (lower pattern)
I
I/S
I
I/S
Q
Qβ
Q,I
P
D
Pγ
P
P
Qβ
Pγ
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


E,7-11650
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
I
K
Q,I
K
I
Q
D
I/S
I/S
K
K
P1
P1
Qβ
K
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


87-11701
< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
I
K
I
K
Q,I
P
α
Kβ
Qβ
P1
Ca
D
P1
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


277- 11730
< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
I
K
I
K
Q,I
Q
P
Py
Ca D
Py
3K
2K
1K
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

277-11751

< 2 um clay, Mg–Glycol (upper pattern)

< 15 um silt, Mg–Glycol (lower pattern)

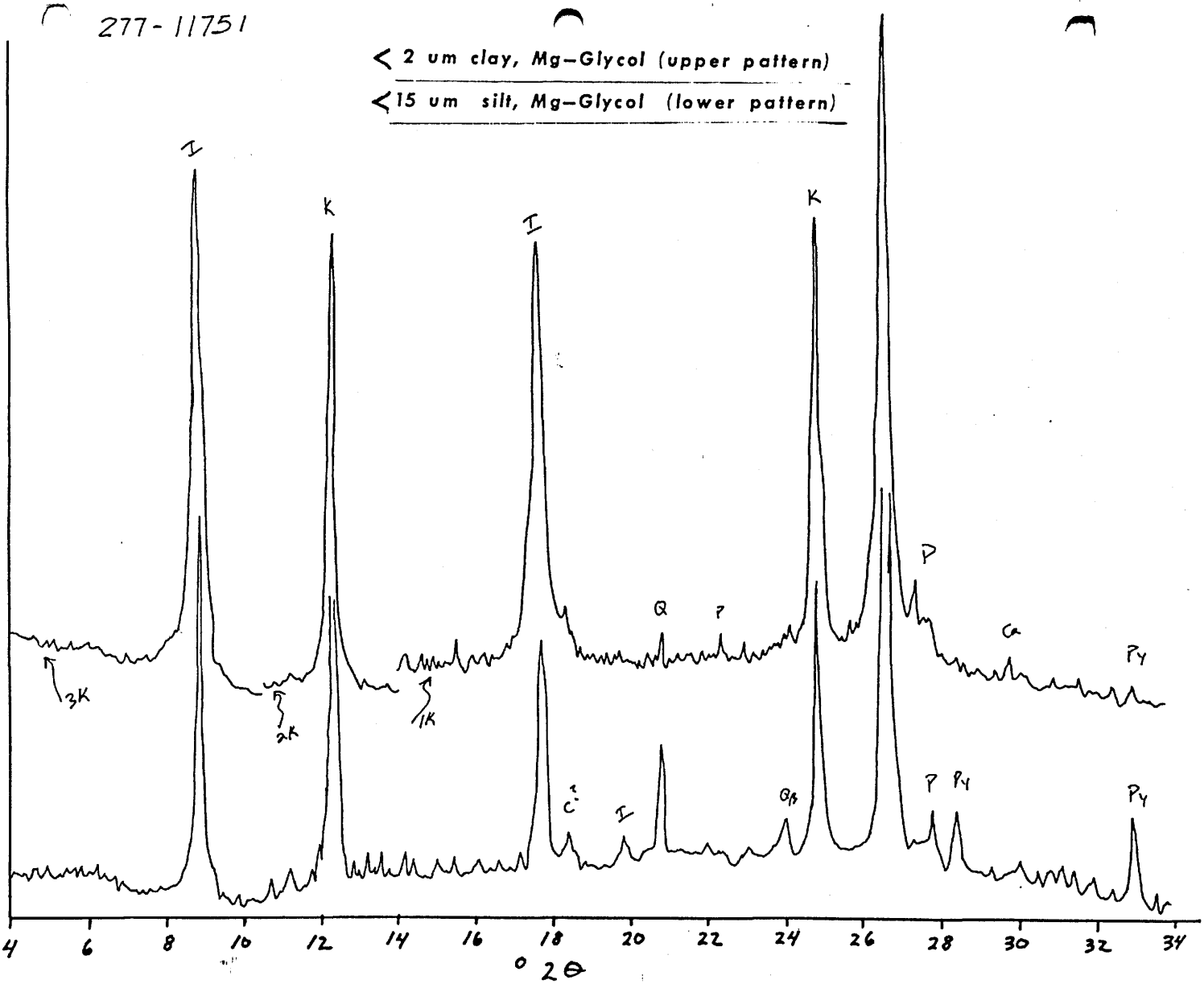
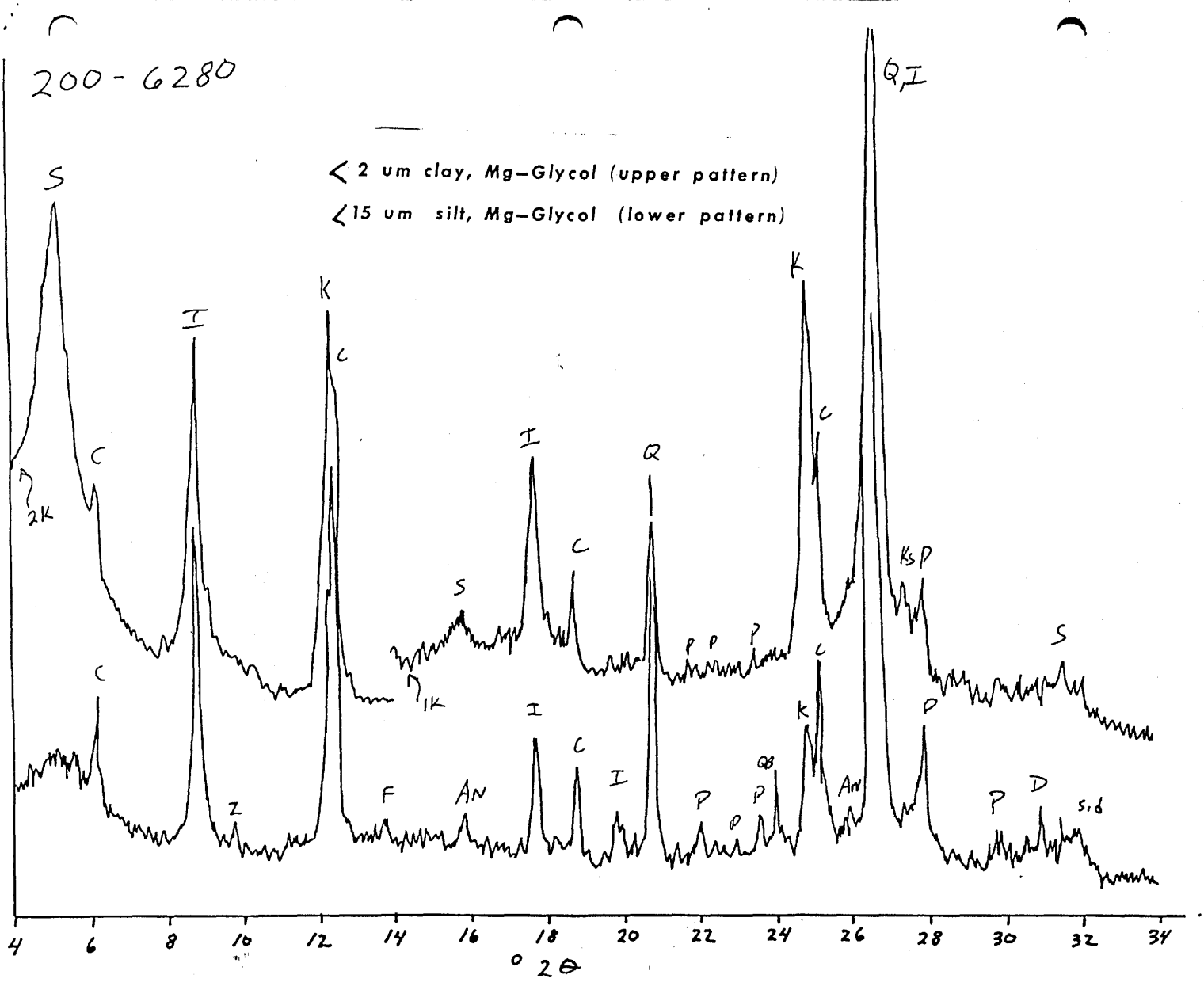


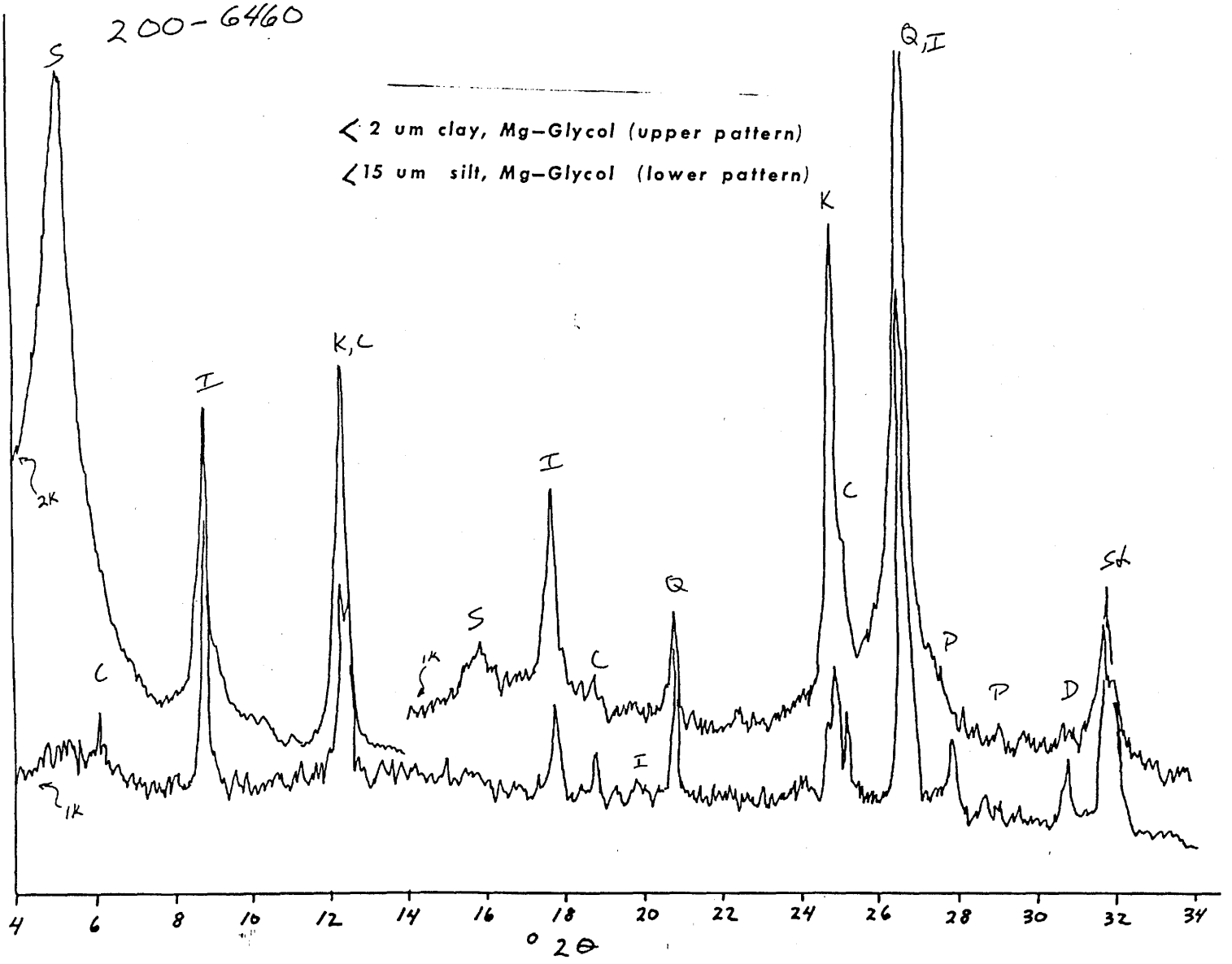
Table 14: Clay mineralogy of samples from BP Put River # 1 well.

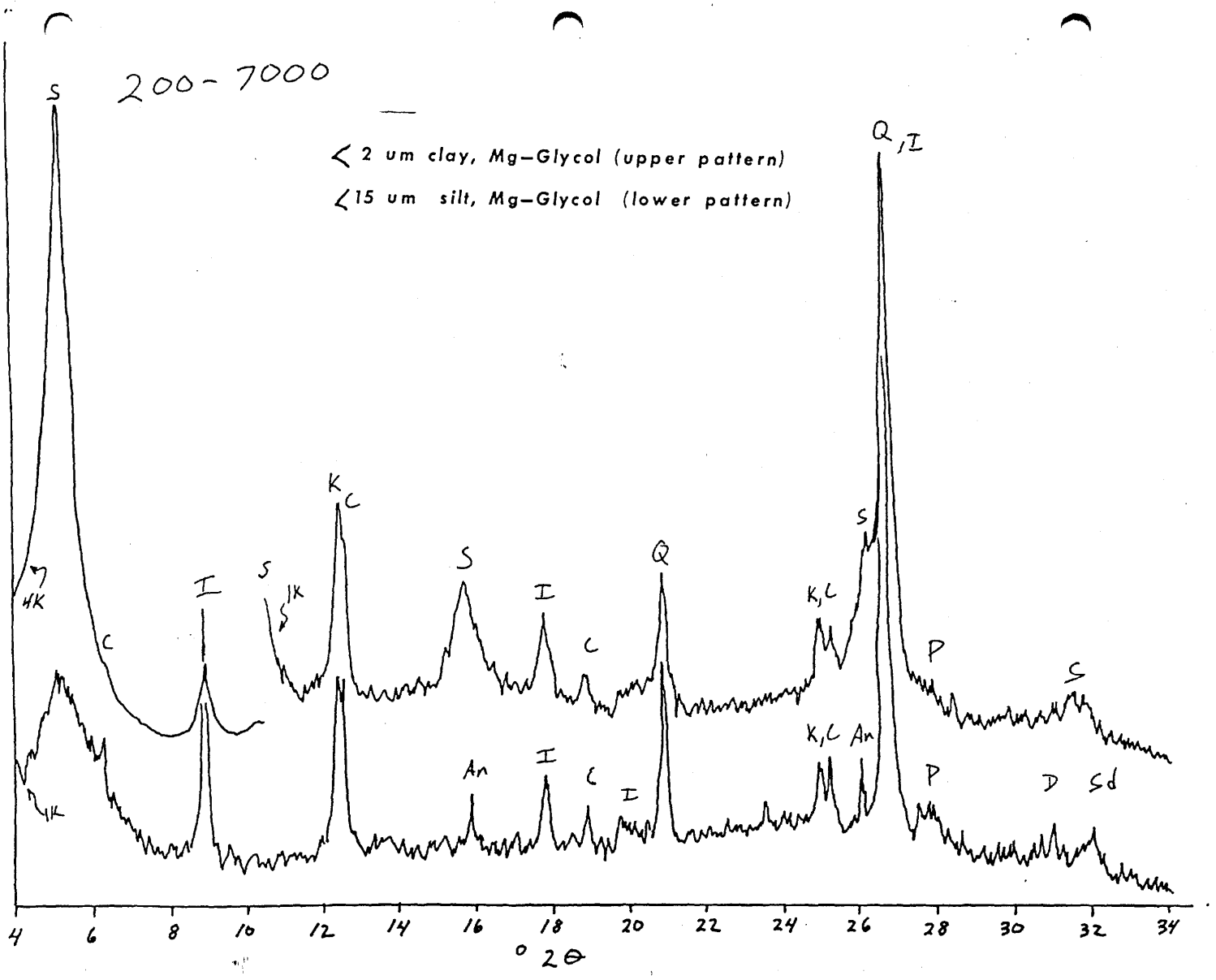
BP PUT RIVER NO 1

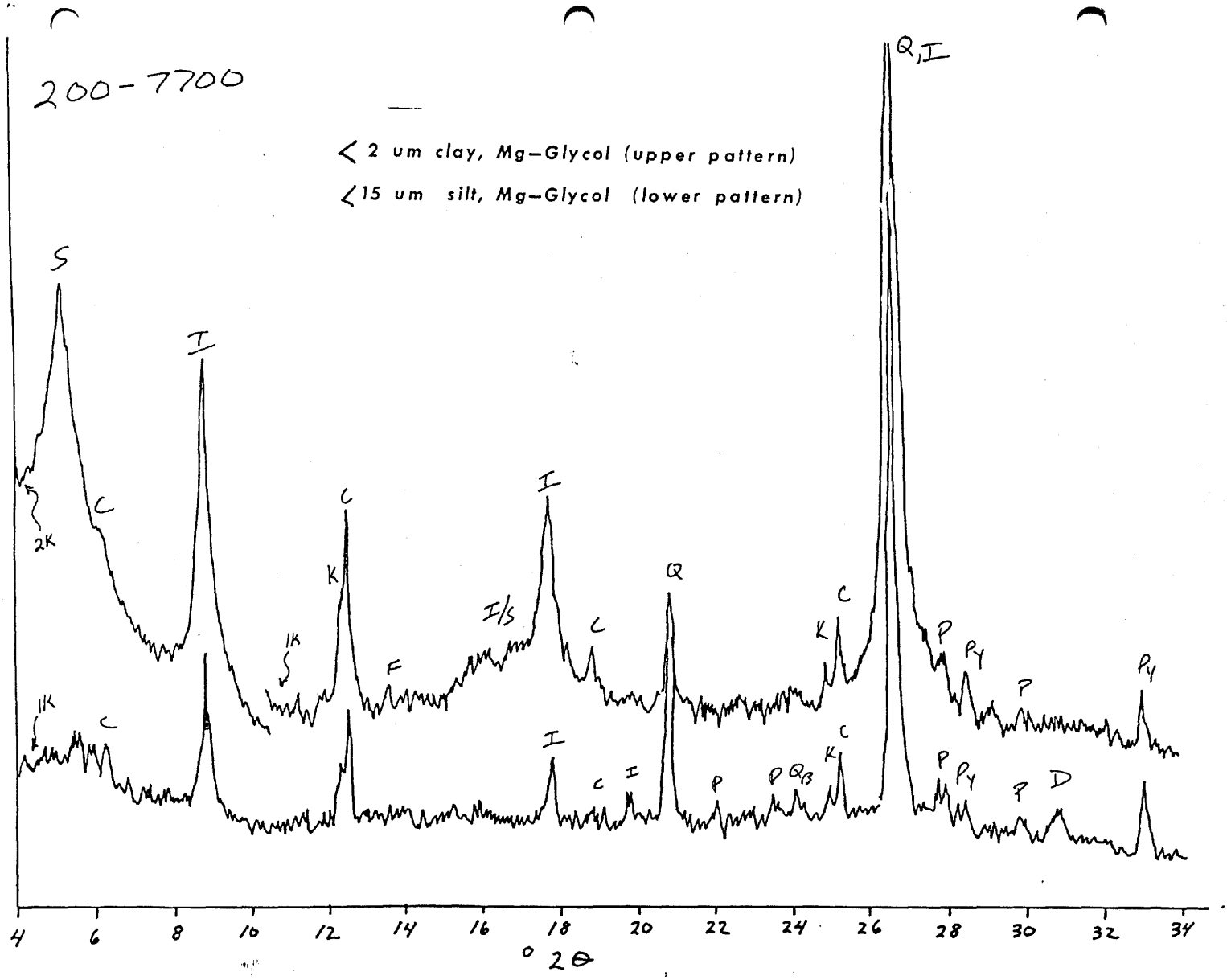
DEPTH FEET	STYPE	SMECTITE	CHLORITE	MIXED LAYER I/S	ILLITE	KAOLINITE	OTHER
6280	C	MOD	MOD	-	MOD	MOD	Q3,P1,KS,MDM,BULK XRD
6280-S	C	MIN	MOD	-	MOD	MOD	Q3,AN1,HC1,P2,KS,D1,SID1
6460	C	MOD	MIN	MOD	MOD	MOD	Q2,SID2,MDM,BULK XRD
6460-S	C	TR	MIN	-	MOD	MIN	Q3,P1,D1,SID3
7000	C	MAJ	MIN	-	MIN	MIN	Q3,DM CONT,TUFF.GR.SH.
7000-S	C	MIN	MIN	-	MOD	MIN	Q3,AN1,P,KS,D,SID1
7700	C	MOD	MIN	MOD	MAJ	MIN	Q3,P1,PY1
7700-S	C	MIN	MIN	-	MOD	TR	Q3,P1,D,PY1,CA-MG1
7790	C	MAJ	MIN	MIN	MOD	MIN	Q2,P1,PY2,TUFF.DK.SH.
7790-S	C	TR	MIN	-	MOD	MIN	Q3,P,PY2,D1,PA.?
7870	C	MOD	MIN	MOD	MOD	MOD	Q2,P,PY1,DM CONT.BK.SH.
7870-S	C	-	MOD	-	MOD	MOD	Q3,P1,PY2,D2
8140	C	-	TR	MOD	MAJ	MAJ	Q1,BWN.GR.SH.
8140-S	C	-	TR	-	MAJ	MAJ	Q3,P1,D,SID,PY1
8391	CC	-	-	MOD	MOD	MAJ	Q3.CA1.D1.SID1,PY1
8391-S	CC	-	-	-	MIN	MAJ	Q3,D1,SID1,PY1
8680	C	-	MIN	MOD	MOD	MAJ	Q3
8680-S	C	-	TR	-	MOD	MAJ	Q3,D,PY?

Definitions: TR = less than 3%, MIN = 3 - 12%, MOD = 13 - 35%, MAJ = >35%. Other mineral abbreviations: Q = quartz, P = plagioclase, KS = k-spar, AN = analcime, HC =heulandite-clinoptilolite, CA = calcite, D = dolomite, AP = apatite, SID = siderite, PY = pyrite, BA = barite. 1 = weak, 2 = moderate, 3 = strong, nothing = trace. MDM = mostly drill mud, BK.SH. = black shale, GR. = gray, SIS. = siltstone, TUFF. = tuffaceous, PA = paragonite. Also: STYPE = sample type, C = cuttings, CC = core, SW = side wall, S = silt.


200-6280
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
I
K
C
Q
Q,I
Ks
P
D
F
Z
AN
QB
2K
1K
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


200-6460
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
I
K,C
C
2K
1K
S
I
C
Q
I
K
C
Q,I
P
P
D
Sh
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


200-7000
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
4K
C
I
S
1K
K
C
S
I
C
Q
S
K,C
Q,I
P
S
An
D
Sd
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


200-7700
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
I
C
2K
1K
K
F
I/S
Q
P
Py
D
Q,I
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

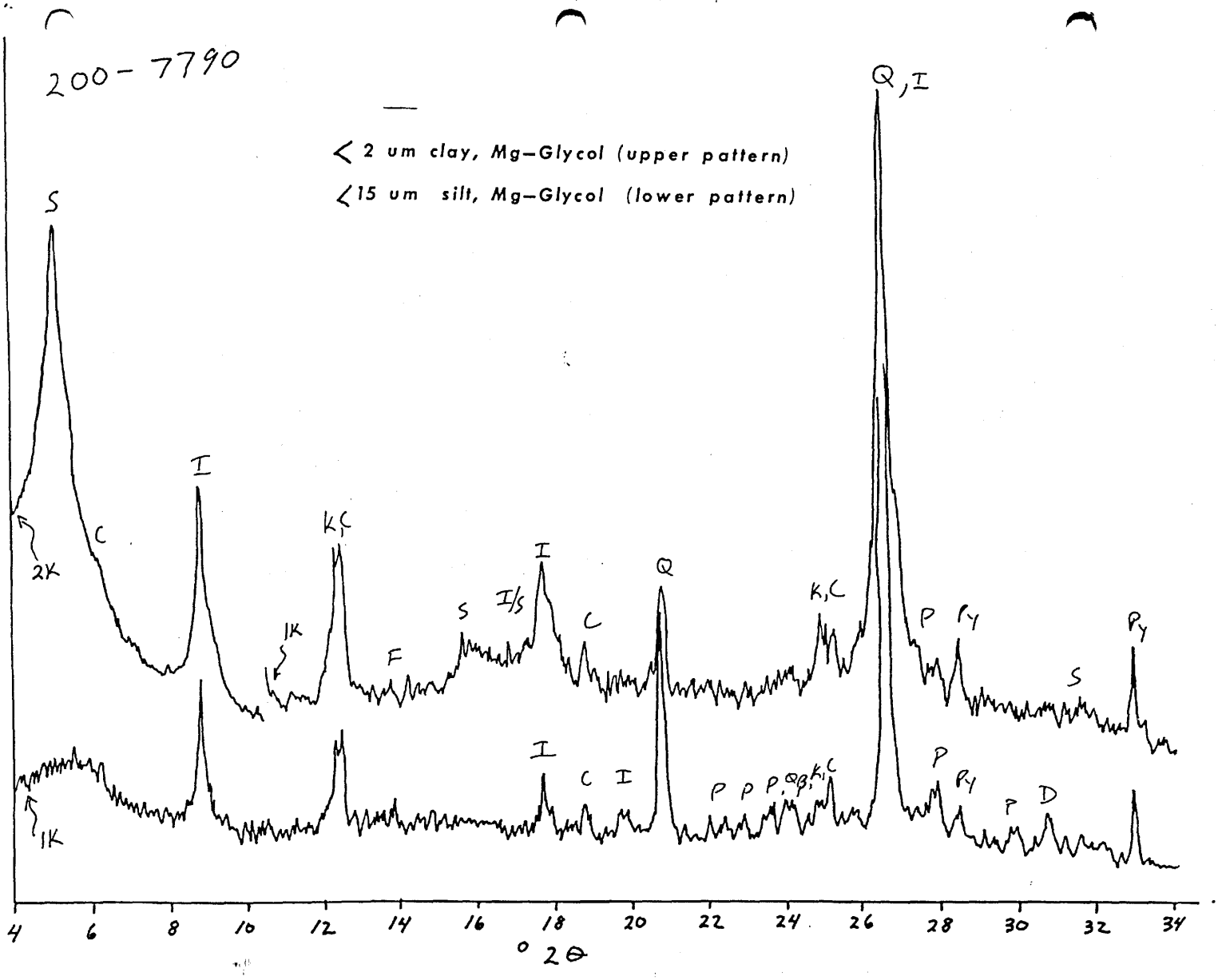

200-7790
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
2K
C
I
1K
K,C
F
S
I/S
I
C
Q
K,C
Q,I
P
Py
S
Py
1K
I
C
I
P
P
P,Qβ,K,C
P
Py
P
D
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

Table 12: Clay mineralogy of samples from Placid Beechey Point #1 well.

PLACID BEECHEY POINT #1

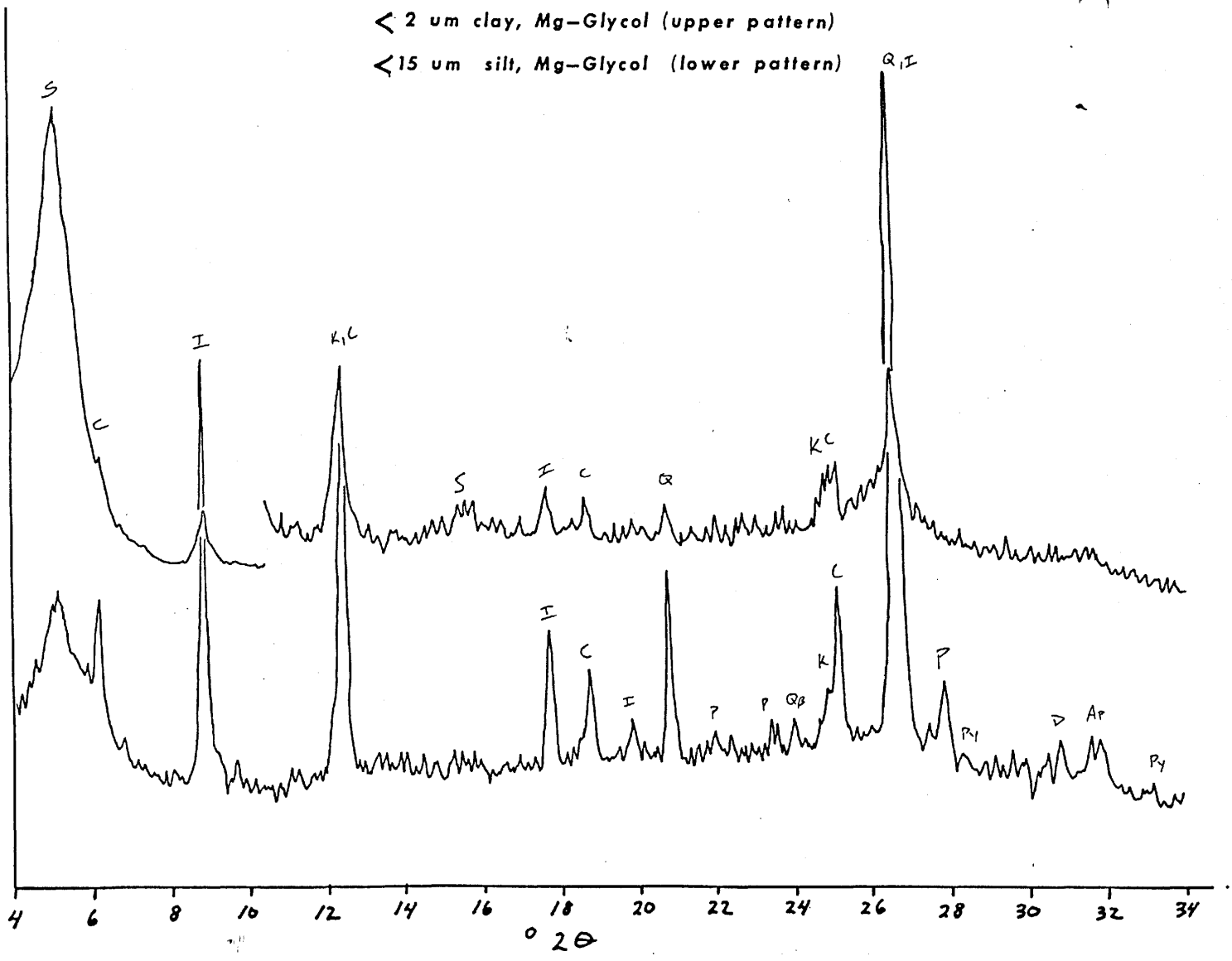
DEPTH FEET	STYPE	SMECTITE	CHLORITE	MIXED LAYER I/S	ILLITE	KAOLINITE	OTHER
5860	C	MAJ	MIN	-	MIN	MIN	Q1,MDM,BWN.SILTY MDSTN.
5860-S	C	MIN	MOD	-	MOD	MIN	Q3,P1,D,AP?
6430	C	MAJ	MOD	-	MOD	MIN	Q1,P,MDM,BWN.SI.MDSTN
6480-S	C	MIN	MOD	-	MOD	MIN	Q2,P,CA-MG?
7180	C	MAJ	MIN	TR	MOD	TR	Q1,P, ASYM S003,B.G.MDSTN
7180-S	C	MIN	MOD	-	MOD	MIN	Q3,P,AN1,D?,PY1
7620	C	MAJ	MOD	MOD	MOD	MOD	Q2,P,AN?,TUFF.DGR/BK.SH.
7620-S	C	MIN	MOD	-	MOD	MOD	Q3,P1,D,PY1
7800	C	MOD	MOD	MIN	MOD	MOD	Q1,P,CA-MG,PY,TUFF.DGR.SH.
7300-S	C	TR	MOD	-	MOD	MOD	Q3,P1,D1,SID1,PY1
7950	C	MOD	MOD	MIN	MOD	MOD	Q2,P,BK/GR.SH.(TUFF?)
7960-S	C	TR	MOD	-	MAJ	MOD	Q3,P1,AP,SID,PY1
8220	C	MAJ	MIN	MOD	MOD	MOD	Q1,DGR.SH.DM.CONT.
8220-S	C	MIN	MIN	-	MOD	MOD	Q2,P,SID1
8500	C	MIN	MOD	MOD	MOD	MOD	Q2,P,GR.SISTN/SH
8500-S	C	TR	MOD	-	MOD	MAJ	Q3,P1,SID1
8700	C	MOD	MIN	MIN	MOD	MAJ	Q2,TUFF.GR.SH.DM.CONT.
8700-S	C	TR	MIN	-	MOD	MAJ	Q2,P,SID
9100	C	MOD	MOD	MIN	MOD	MOD	Q1,CA,BK.SH.DM.CONT?
9100RECALC		-	MOD	MOD	MOD	MAJ	RECALC - SMECTITE
9100-S	C	TR	MIN	-	MOD	MOD	Q3,P,PY

Definitions: TR = less than 3%, MIN = 3 - 12%, MOD = 13 - 35%, MAJ = >35%. Other mineral abbreviations: Q = quartz, P = plagioclase, KS = k-spar, AN = analcime, HC =heulandite-clinoptilolite, CA = calcite, D = dolomite, AP = apatite, SID = siderite, PY = pyrite, BA = barite. 1 = weak, 2 = moderate, 3 = strong, nothing = trace. MDM = mostly drill mud, BK.SH. = black shale, GR. = gray, SIS. = siltstone, TUFF. = tuffaceous, ANK = ankerite. Also: STYPE = sample type, C = cuttings, CC = core, SW = side wall, S = silt.

3-5860

< 2 um clay, Mg–Glycol (upper pattern)

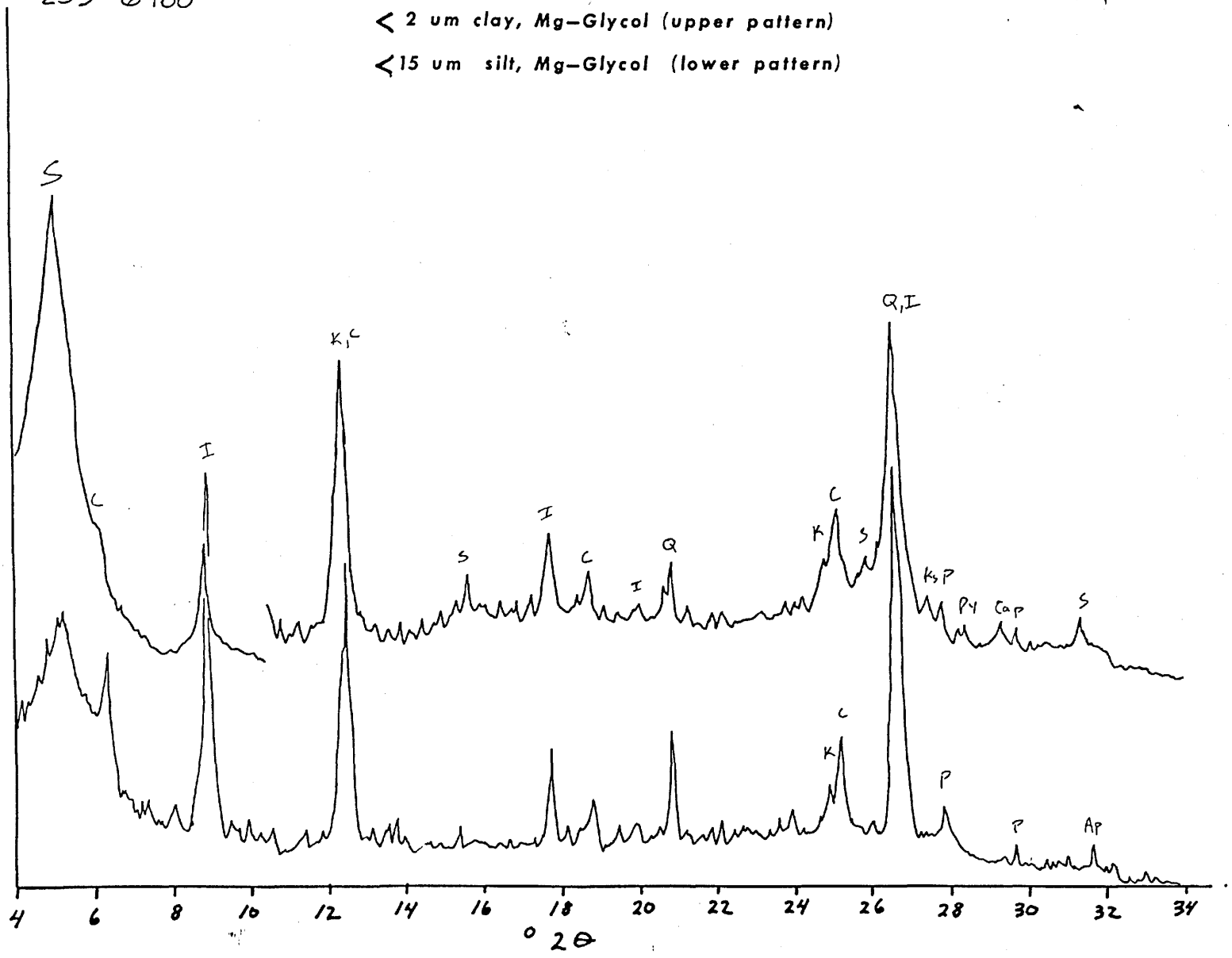
< 15 um silt, Mg–Glycol (lower pattern)

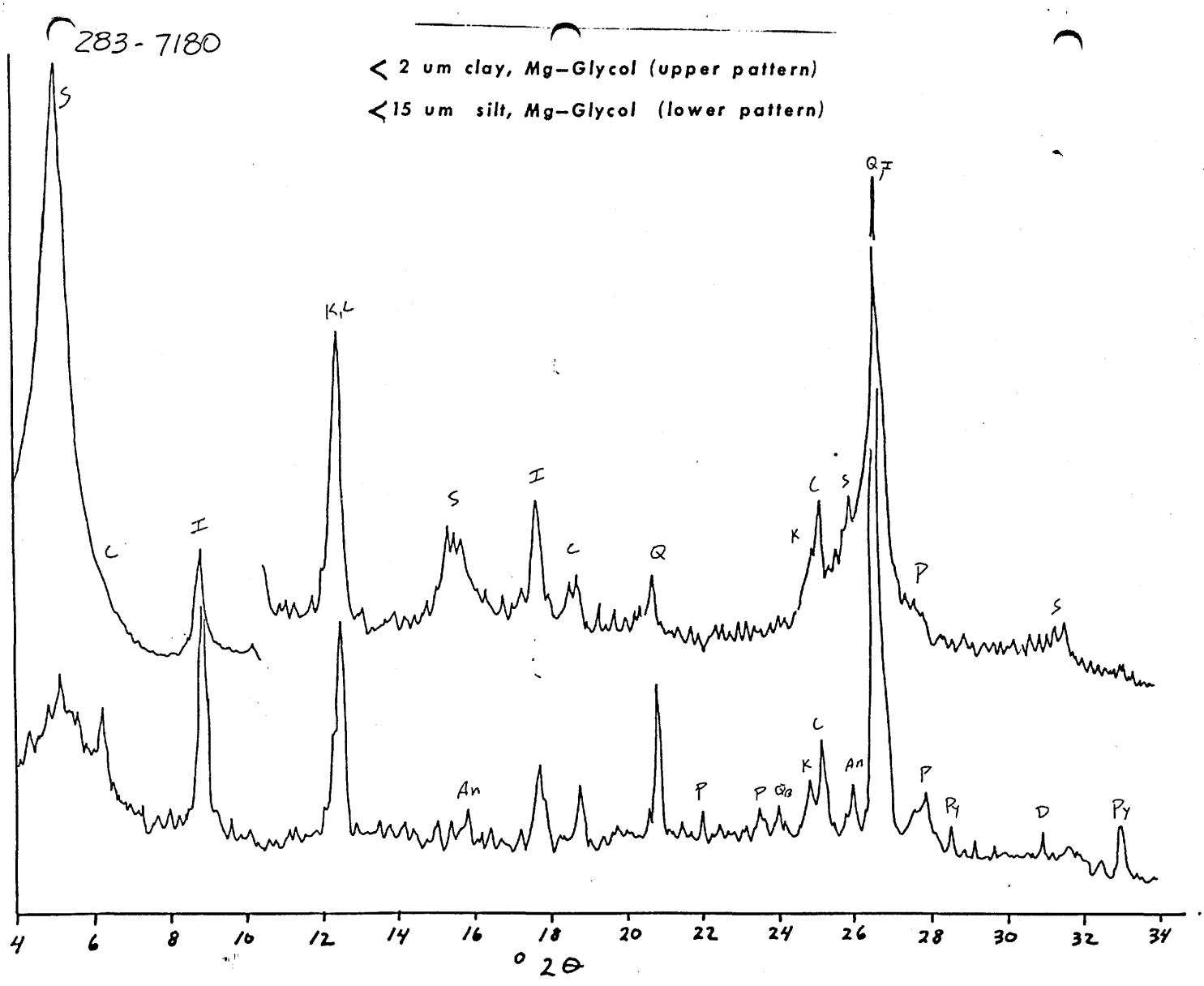


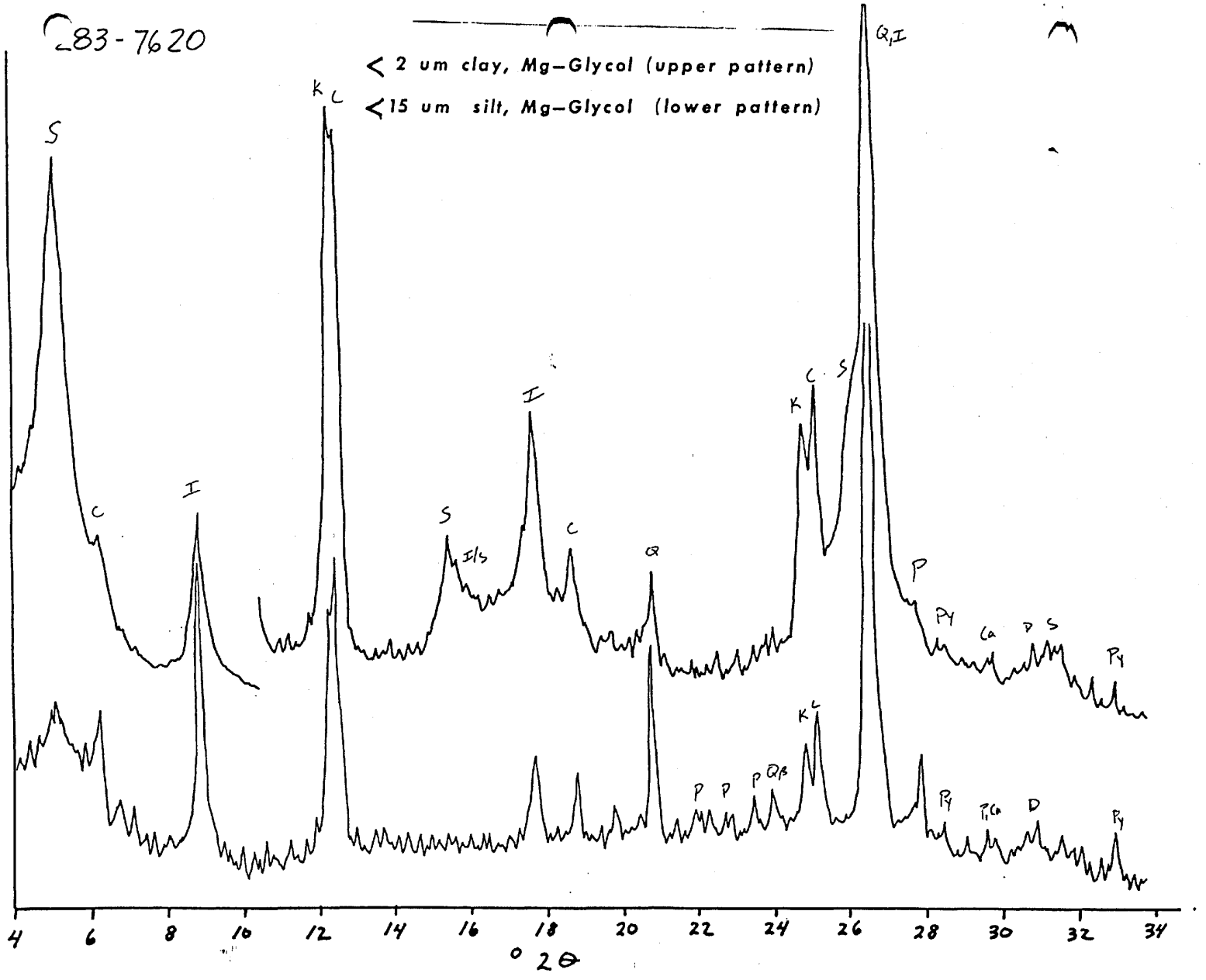
03-6480

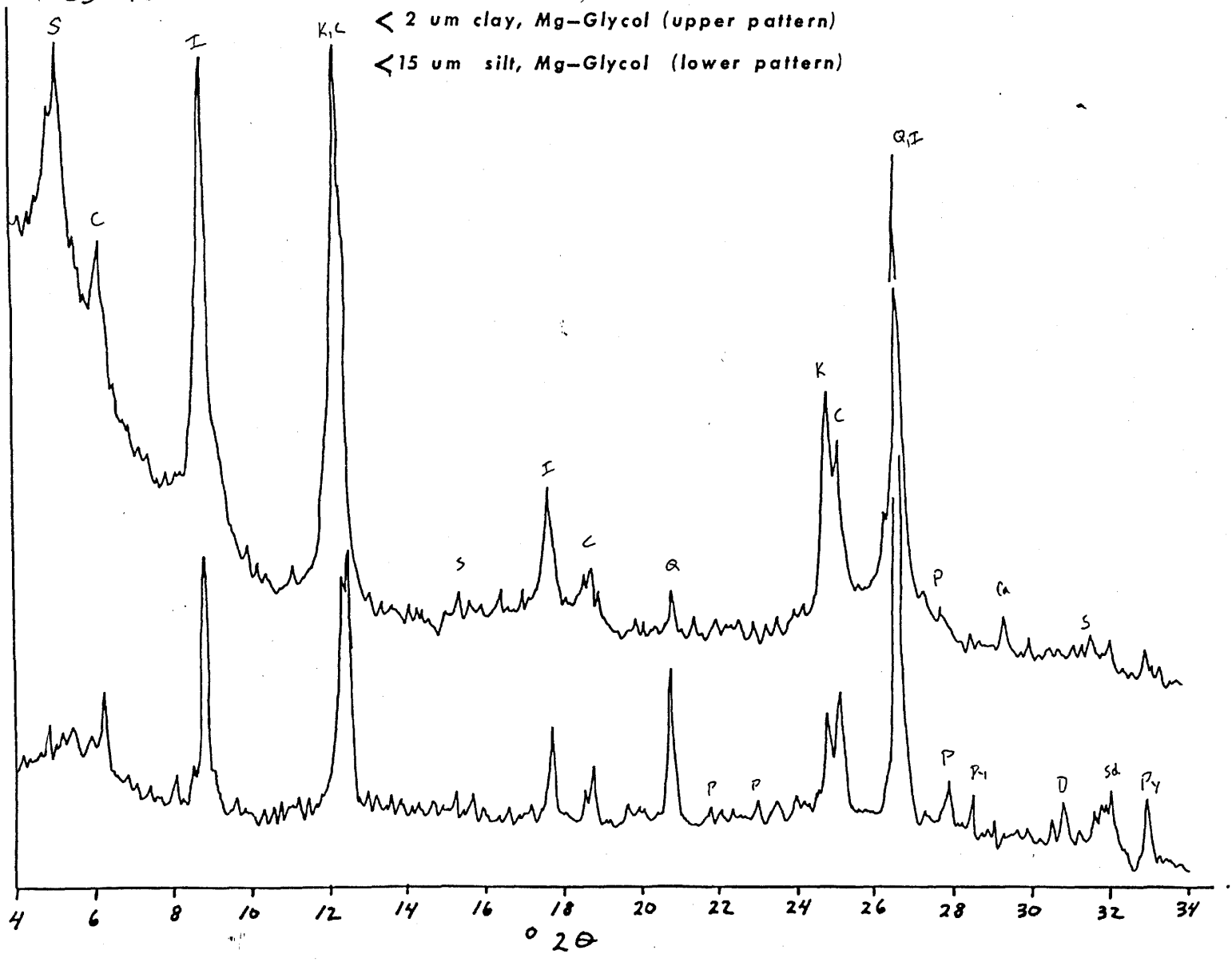
< 2 um clay, Mg–Glycol (upper pattern)

< 15 um silt, Mg–Glycol (lower pattern)




283-7180
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
C
I
K,L
S
I
C
Q
K
C
S
QI
P
S
An
P
P
Qtz
K
C
An
P
Py
D
Py
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

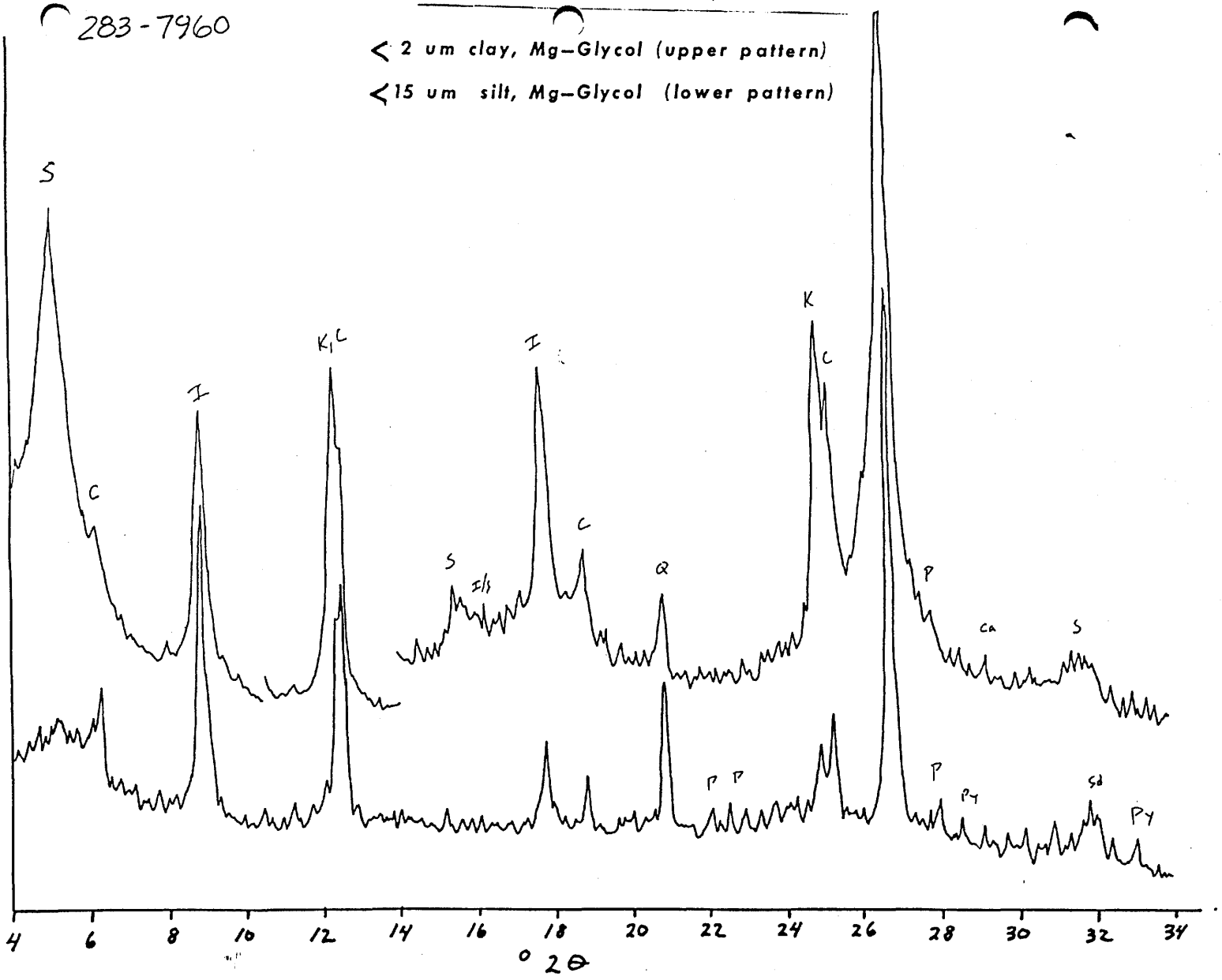

83-7620
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
C
I
K C
S
I/S
I
C
Q
K
C
S
Q,I
P
Py
Ca
D
S
Py
K C
P
P
P
Q/P
Py
T,Ca
D
Py
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


83 - 7800
< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
S
C
I
K,C
S
I
C
Q
K
C
Q,I
P
Ca
S
P
P
P
P
P
D
Sd
P
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

283-7960

< 2 um clay, Mg–Glycol (upper pattern)

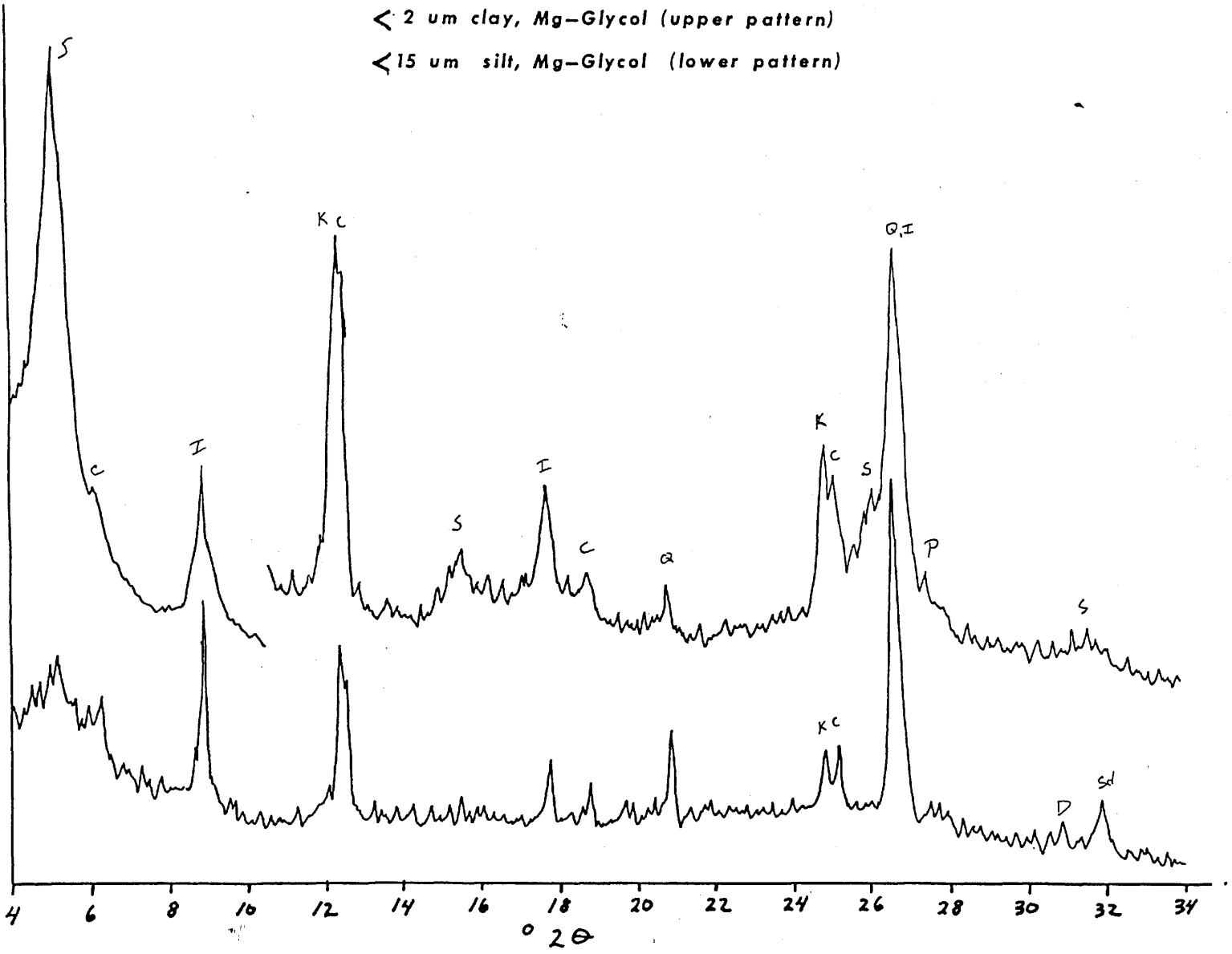
< 15 um silt, Mg–Glycol (lower pattern)

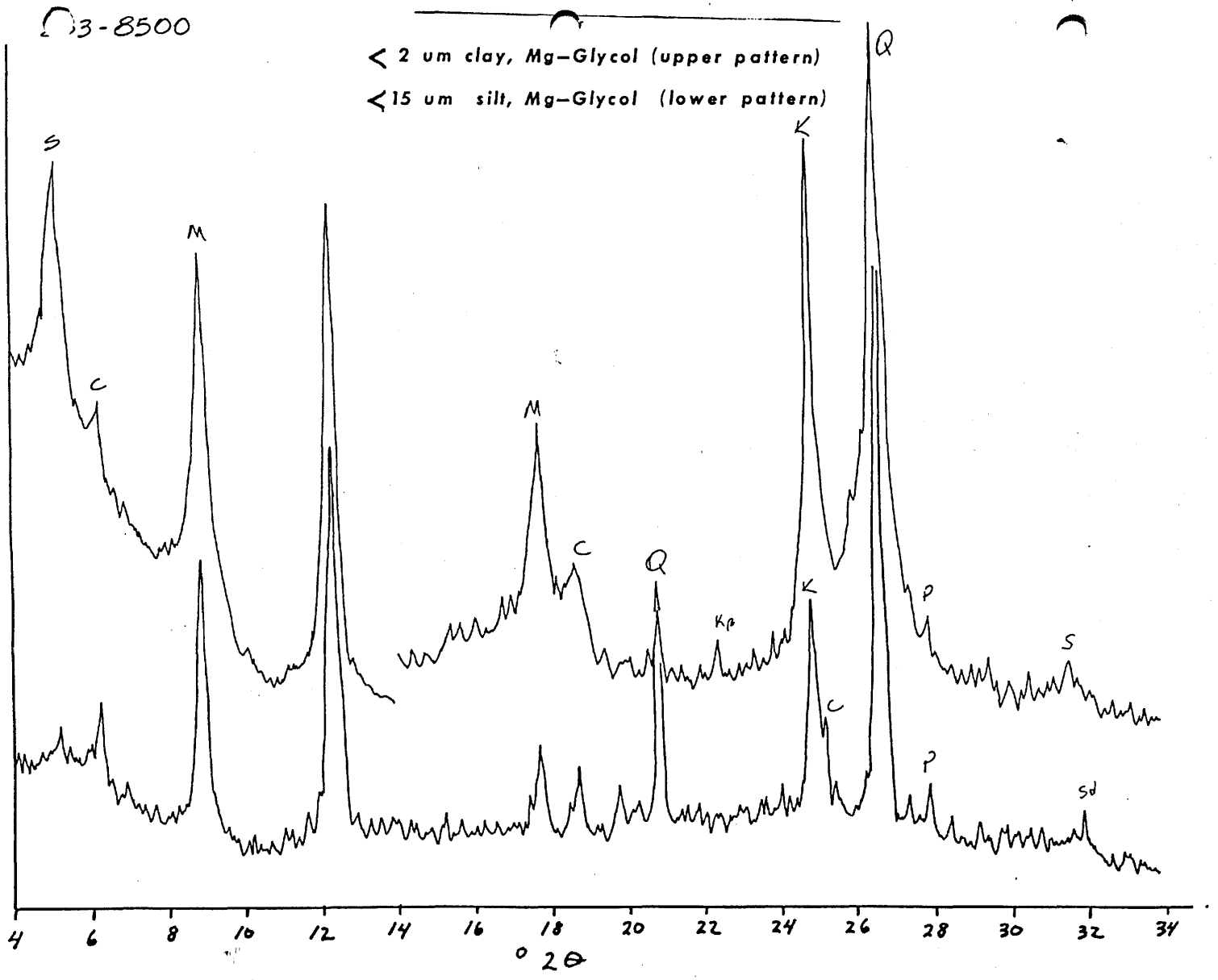


783-8220

< 2 um clay, Mg–Glycol (upper pattern)

< 15 um silt, Mg–Glycol (lower pattern)

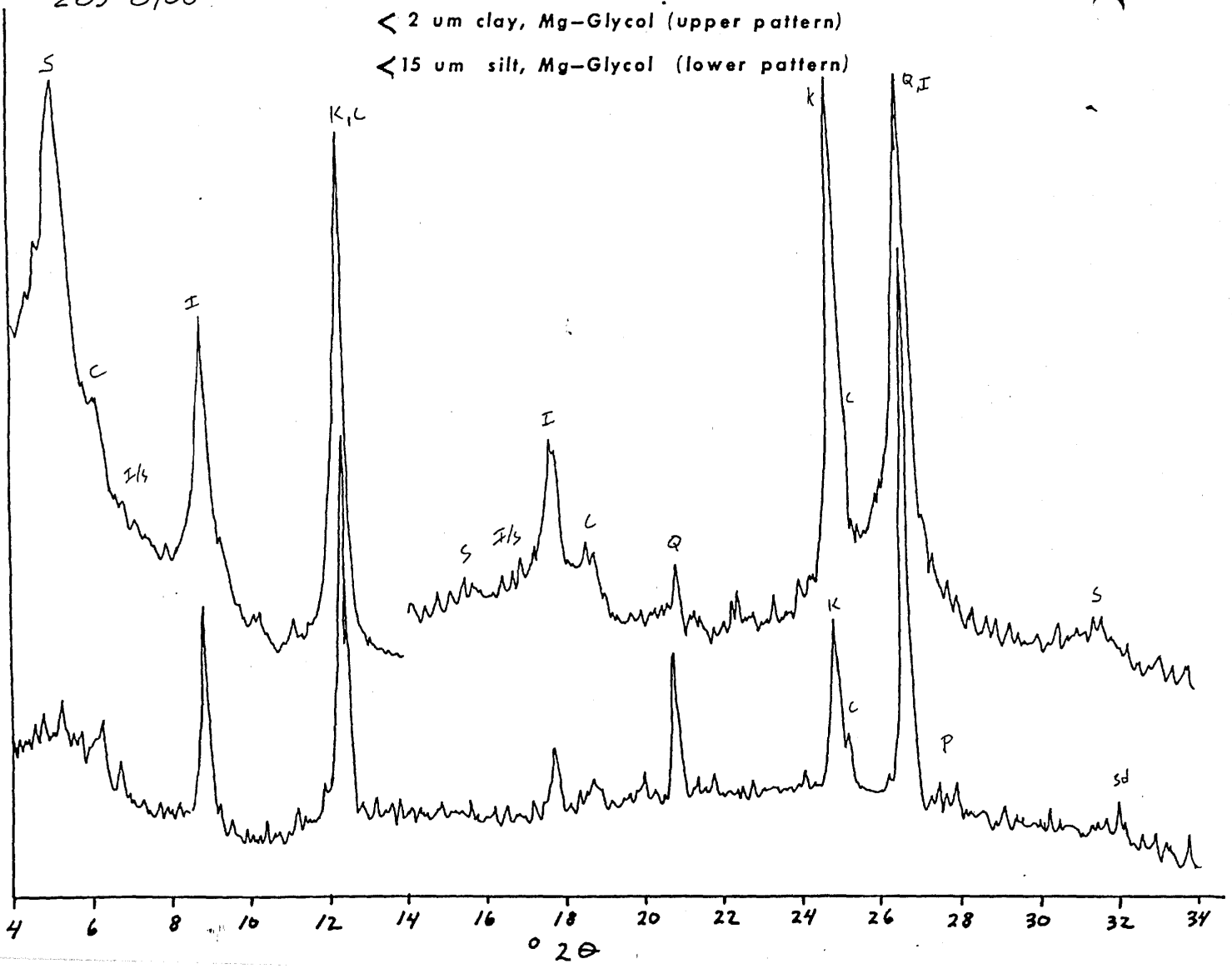



3-8500
< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
S
C
M
M
C
Q
Kp
K
K
C
Q
P
P
S
Sd
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

283-8700

< 2 um clay, Mg–Glycol (upper pattern)

< 15 um silt, Mg–Glycol (lower pattern)



283-9100

< 2 um clay, Mg–Glycol (upper pattern)

< 15 um silt, Mg–Glycol (lower pattern)

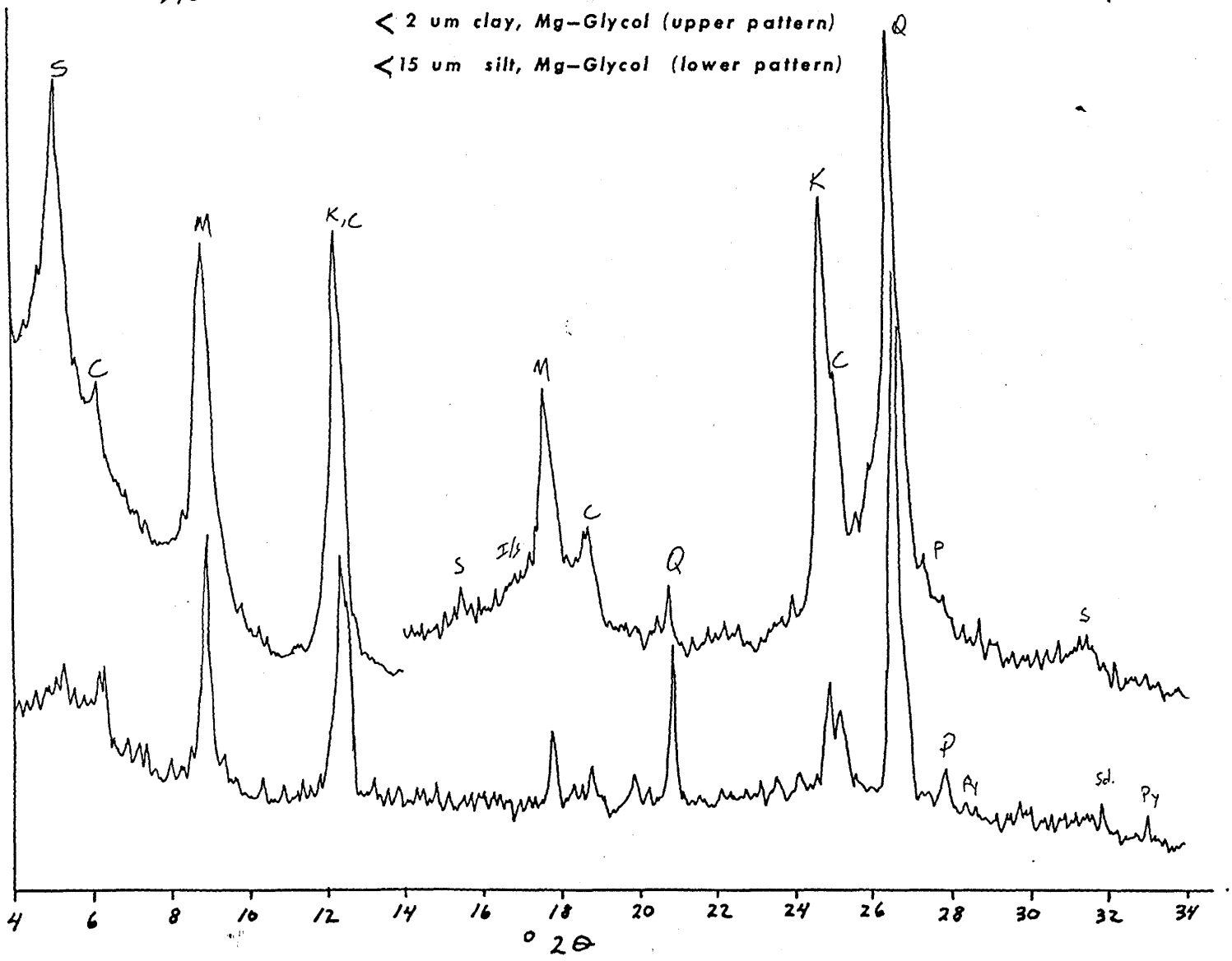


Table 13: Clay mineralogy of samples from Mobil Mikkleson Bay St. 13-9-19.

MOBIL MIKKLESON BAY ST. 13-9-19

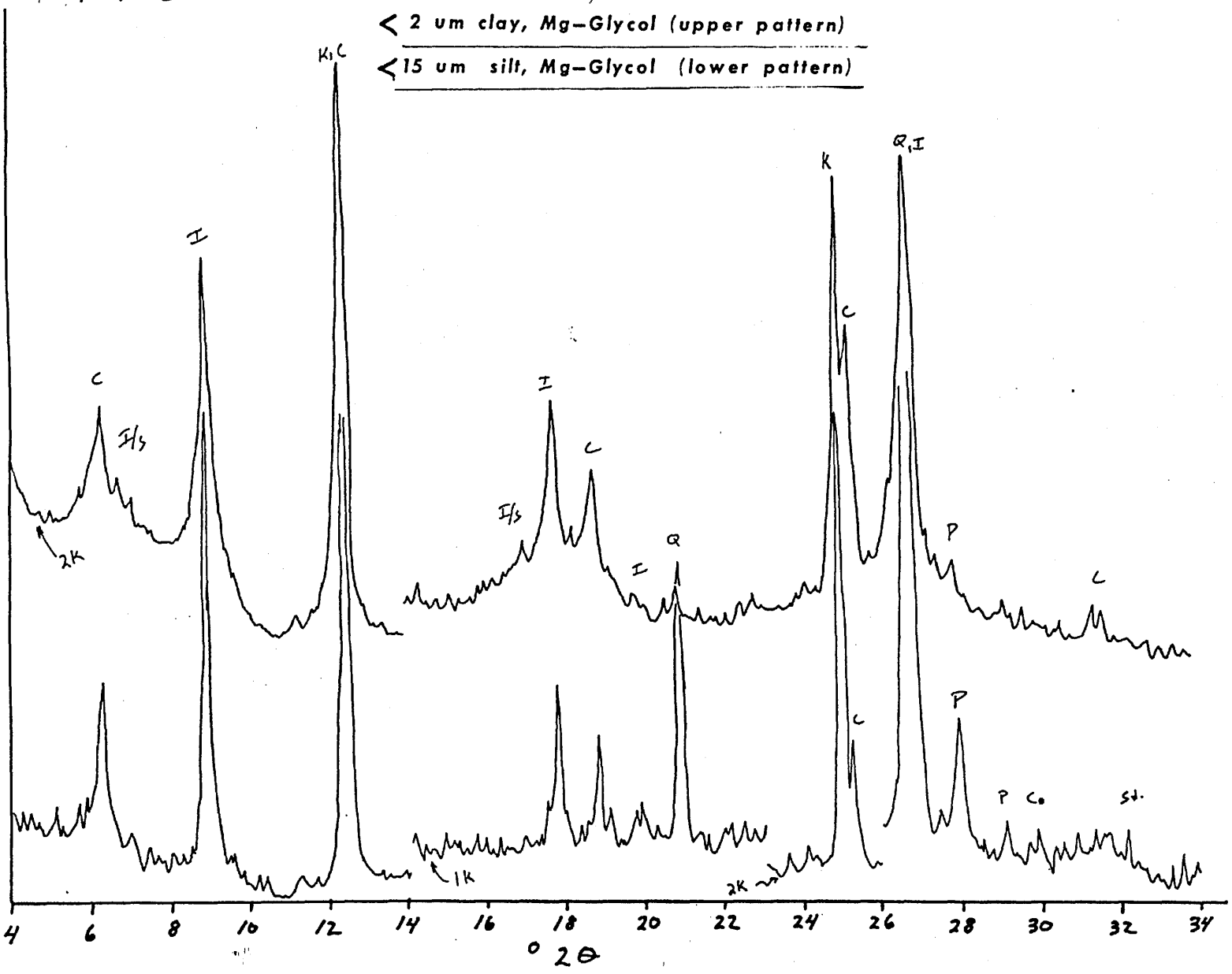
DEPTH FEET	STYPE	SMECTITE	CHLORITE	MIXED LAYER I/S	ILLITE	KAOLINITE	OTHER
10634	CC	-	MOD	MIN	MOD	MAJ	Q1,P,BN.LAM.SS/BK.SH.
10634-S	CC	-	MOD	-	MOD	MAJ	Q3,P2,CA
11160	CC	MIN	MIN	MIN	MOD	TR	Q3,P,P2,LAM.BK.SH/TUFF(?)
11160-S	CC	-	TR	-	MIN	TR	Q3,PY2
11569	CC	-	-	MAJ	MAJ	-	Q1,P,PY1,BK.SH.
11569-S	CC	-	-	-	MIN	-	Q2,P1,CA-ING,PY1
11588	CC	-	-	MAJ	MAJ	-	Q2,P,D,PY,BK.SH.
11588-S	CC	-	-	-	MIN	-	Q3 P1,D2,PY2
11650	CC	-	-	MOD	MAJ	MAJ	Q1,D1,PY1,BK.SH
11650-S	CC	-	-	-	MOD	MIN	Q2,D2,PY1
11701	CC	-	-	-	MAJ	MAJ	Q1,P,PA.,DGR.BN.SI.SS.
11701-S	CC	-	-	-	MOD	MAJ	Q3,P,D,PY1
11730	CC	-	-	-	MAJ	MAJ	Q1,P1,SI.SS.
11730-S	CC	-	-	-	MAJ	MAJ	Q3,P1
11751	CC	-	-	-	MAJ	MAJ	Q1,P,PA(?)FISSLE BK.SH.
11751-S	CC	-	-	-	MAJ	MAJ	Q2,P,PY2

Definitions: TR = less than 3%, MIN = 3 - 12%, MOD = 13 - 35%, MAJ = >35%. Other mineral abbreviations: Q = quartz, P = plagioclase, KS = k-spar, AN = analcime, HC =heulandite-clinoptilolite, CA = calcite, D = dolomite, AP = apatite, SID = siderite, PY = pyrite, BA = barite. 1 = weak, 2 = moderate, 3 = strong, nothing = trace. MDM = mostly drill mud, BK.SH. = black shale, GR. = gray, SIS. = siltstone, TUFF. = tuffaceous, PA = Paragonite. Also: STYPE = sample type, C = cuttings, CC = core, SW = side wall, S = silt.

77-10634

< 2 um clay, Mg–Glycol (upper pattern)

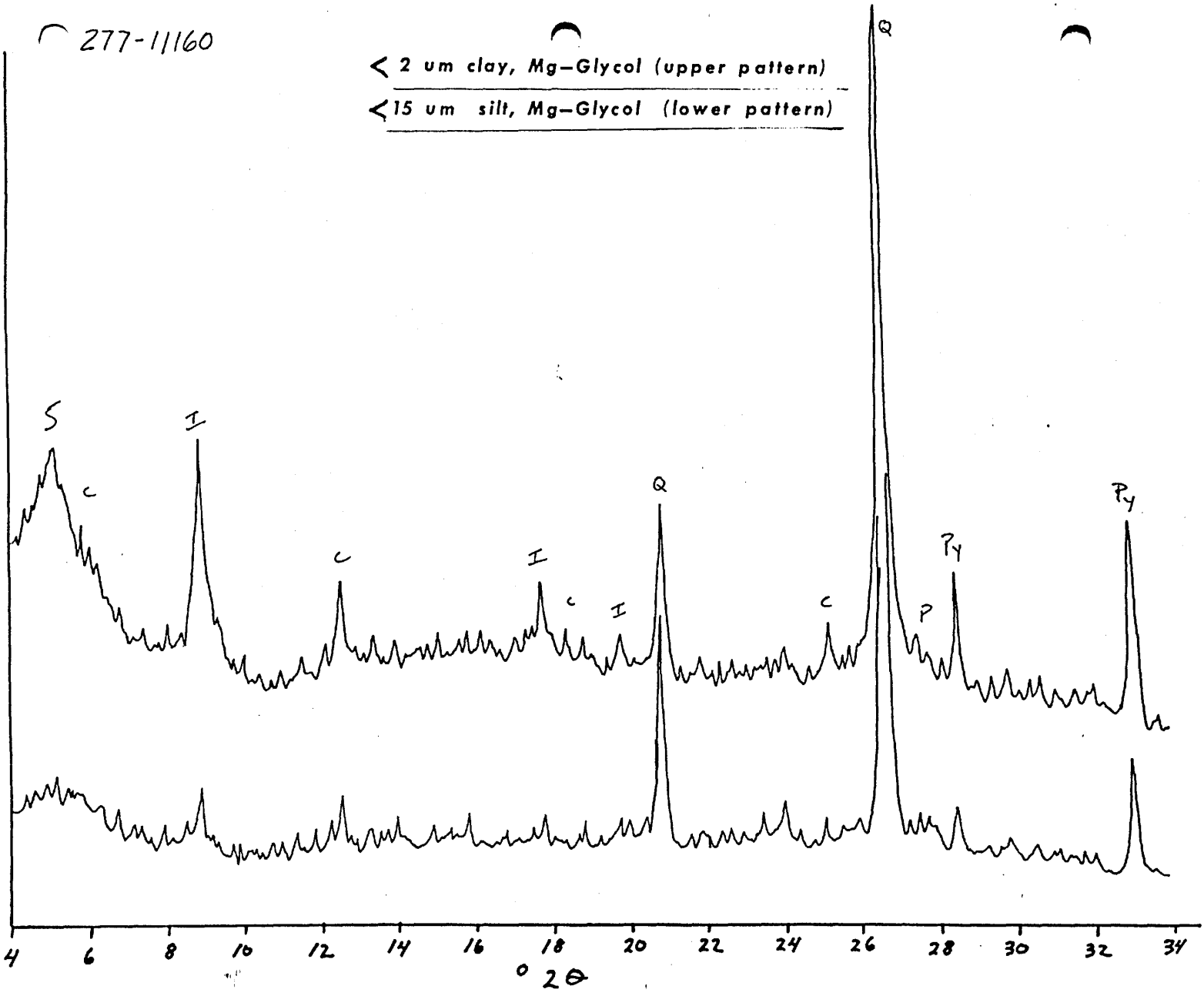
< 15 um silt, Mg–Glycol (lower pattern)

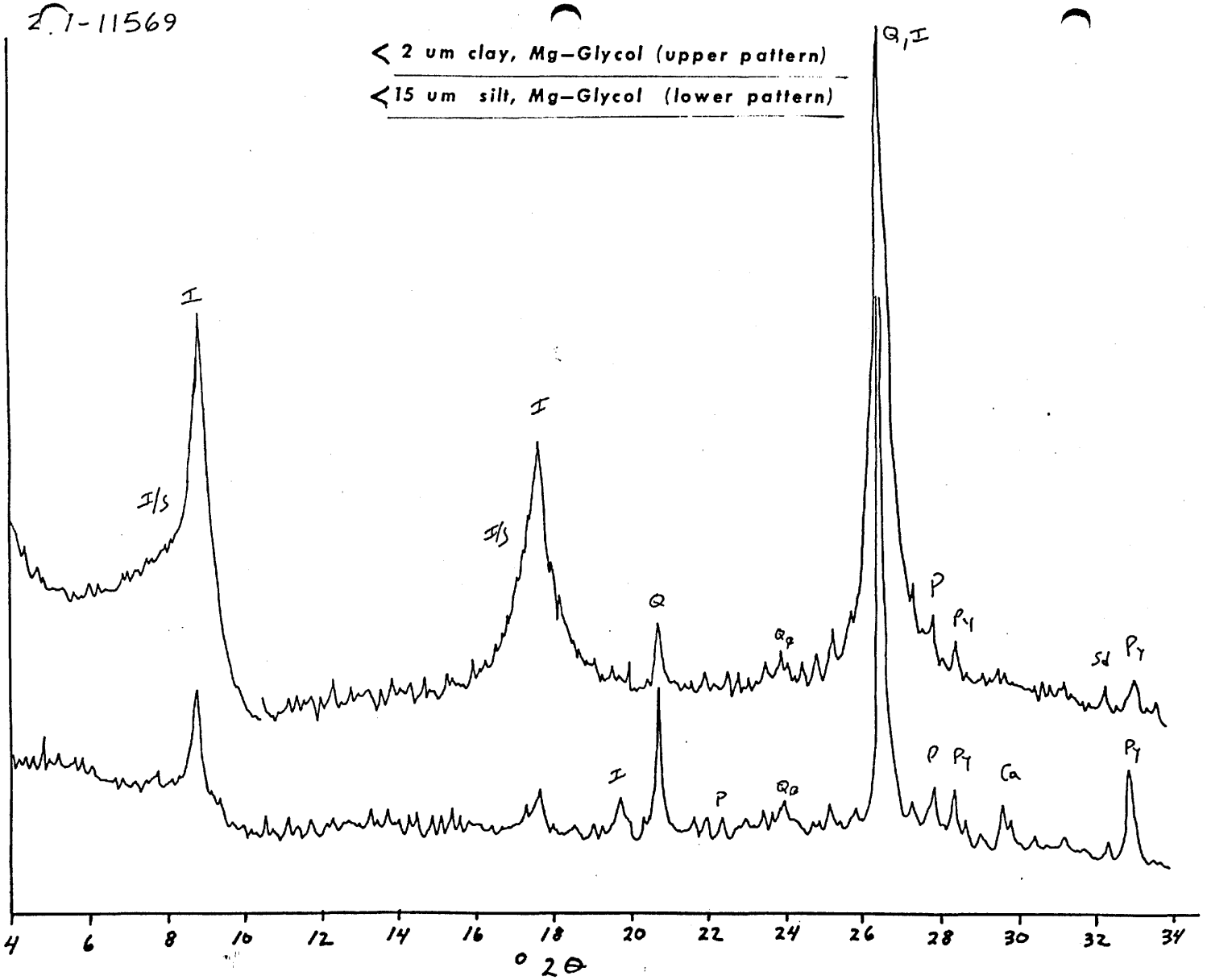


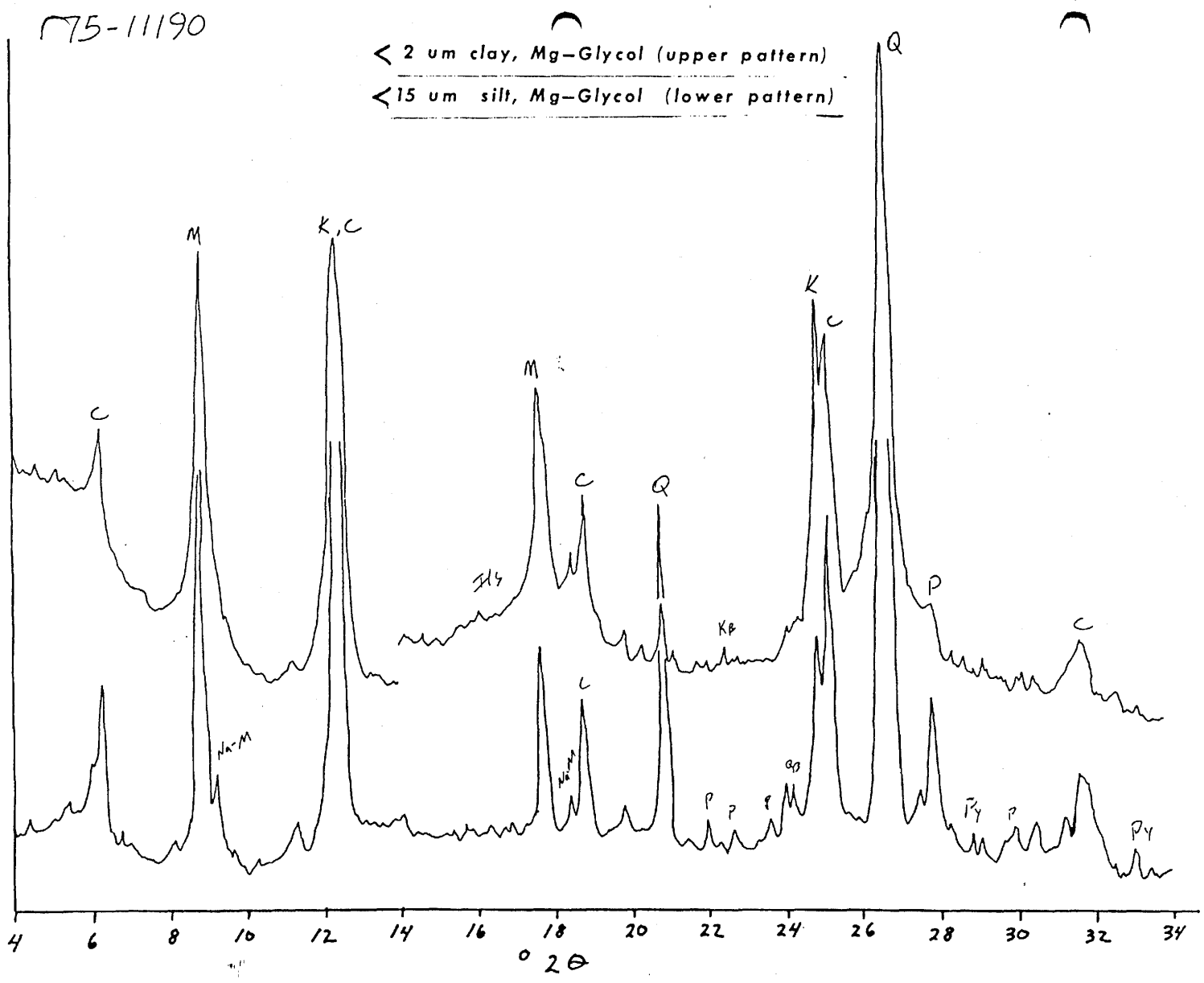
277-11160

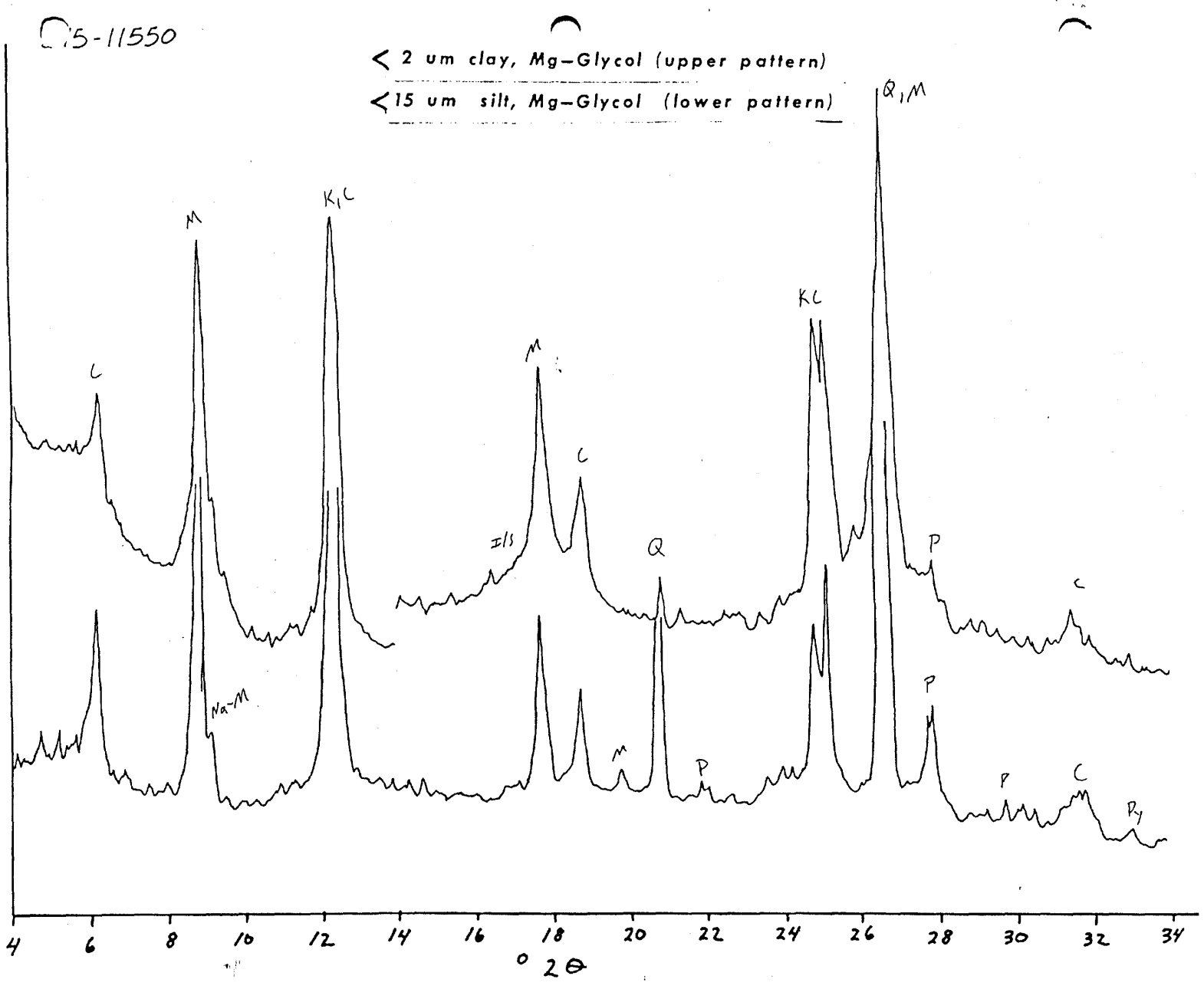
< 2 um clay, Mg–Glycol (upper pattern)

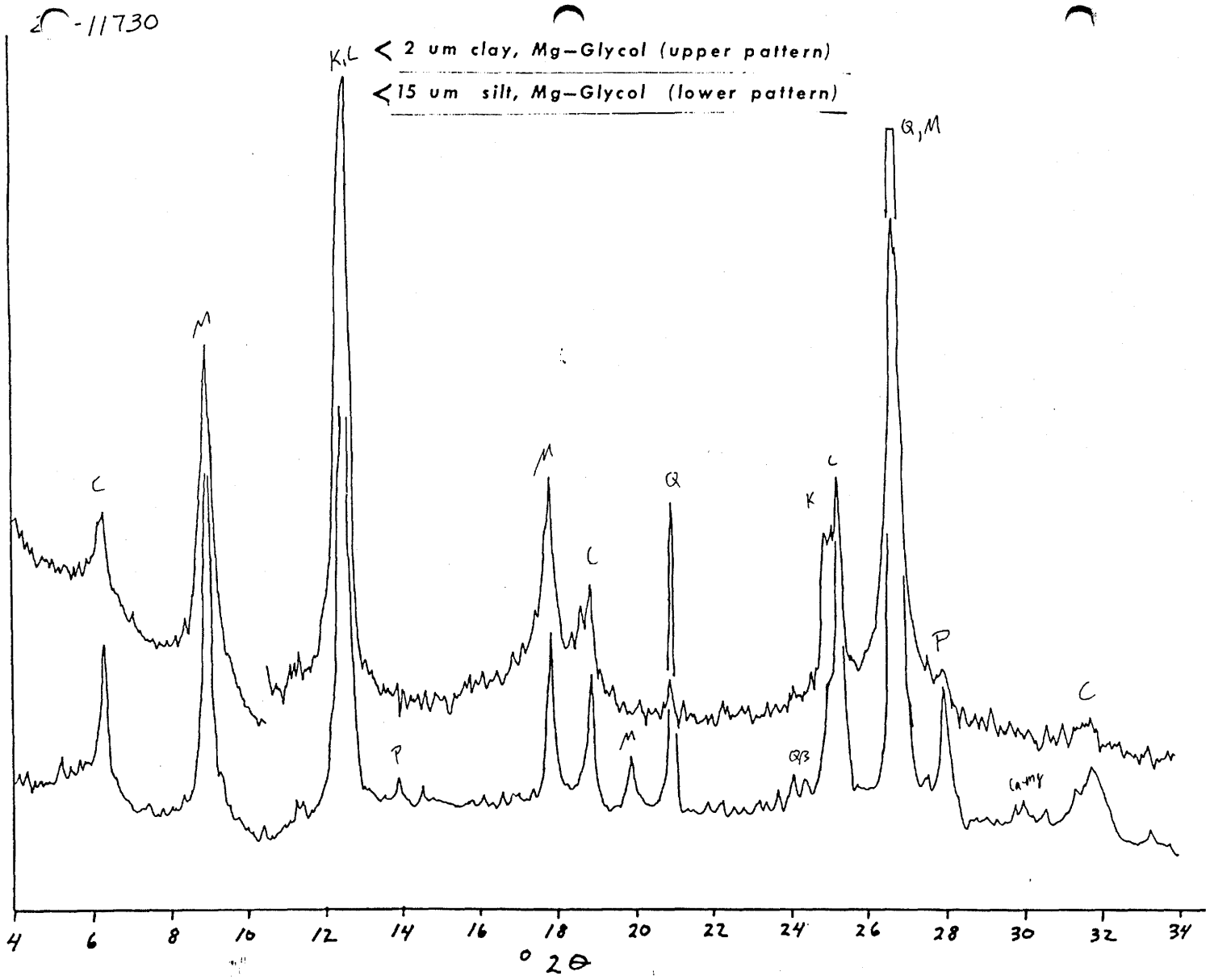
< 15 um silt, Mg–Glycol (lower pattern)

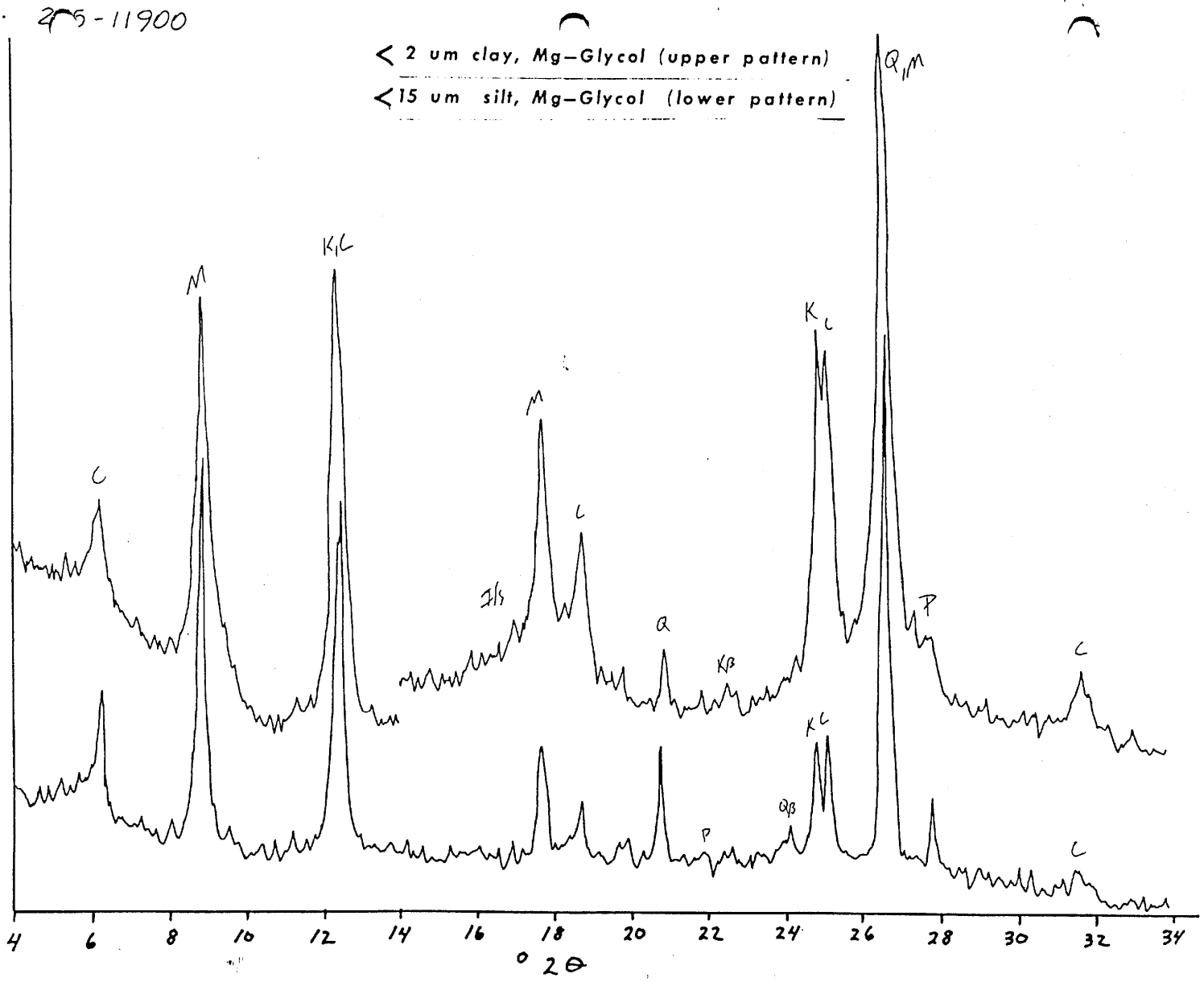



ZI-11569
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
Q,I
I
I/S
I
I/S
Q
Qa
P
Py
Sd
Py
I
P
Qa
P
Py
Ca
Py
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


75-11190
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
M
K,C
C
M
C
Q
K
C
Q
P
C
Ilt
Kβ
Na-M
Na-M
P
P
P
Qβ
Py
P
Py
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


C5-11550
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
Q,M
K,C
M
C
M
KC
C
I/S
Q
P
C
Na-M
M
P
P
P
C
Py
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

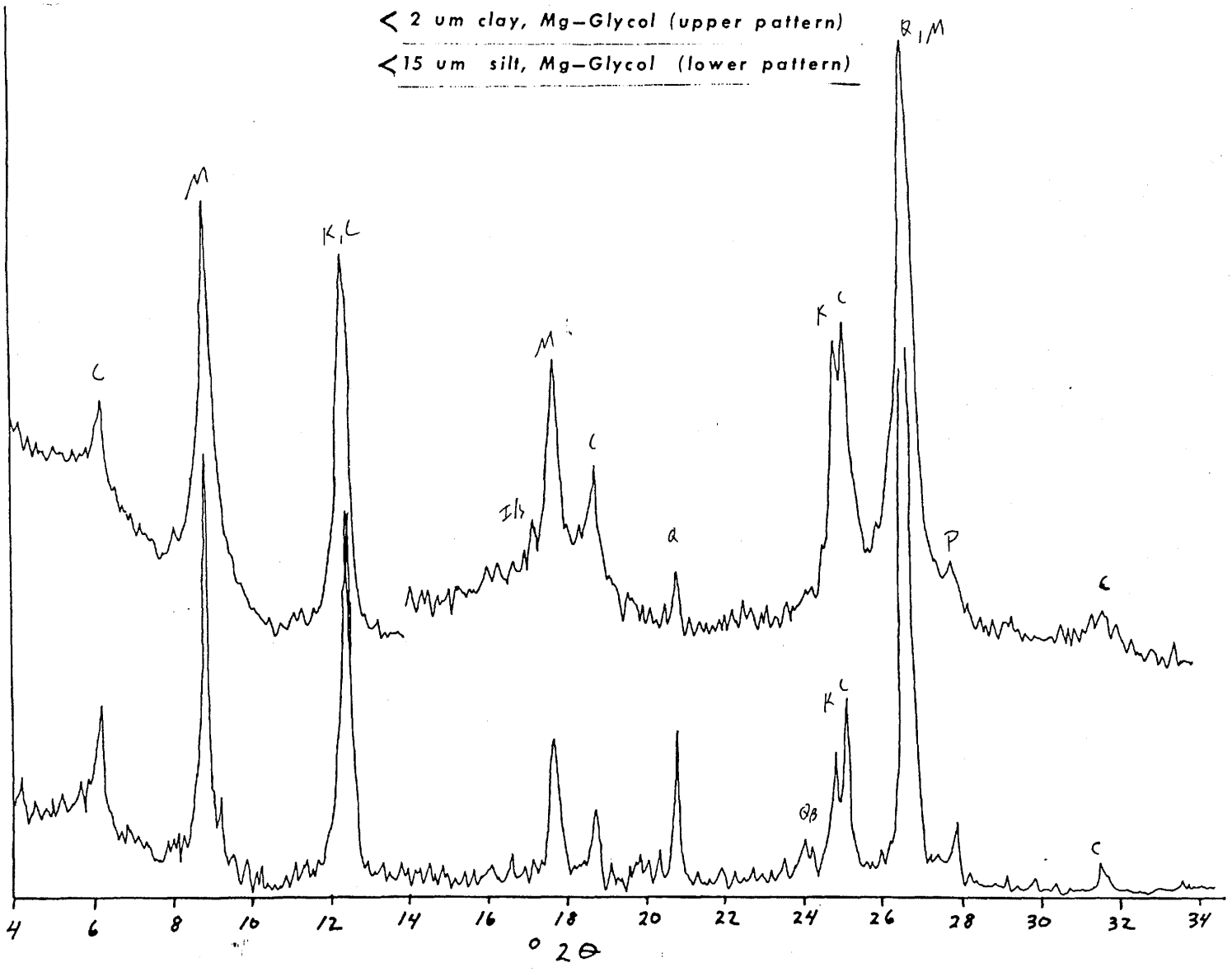

-11730
K,L < 2 um clay, Mg-Glycol (upper pattern)
<15 um silt, Mg-Glycol (lower pattern)
C
M
K,L
P
M
C
Q
M
K
C
Q,M
P
C
Q/3
Camp
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

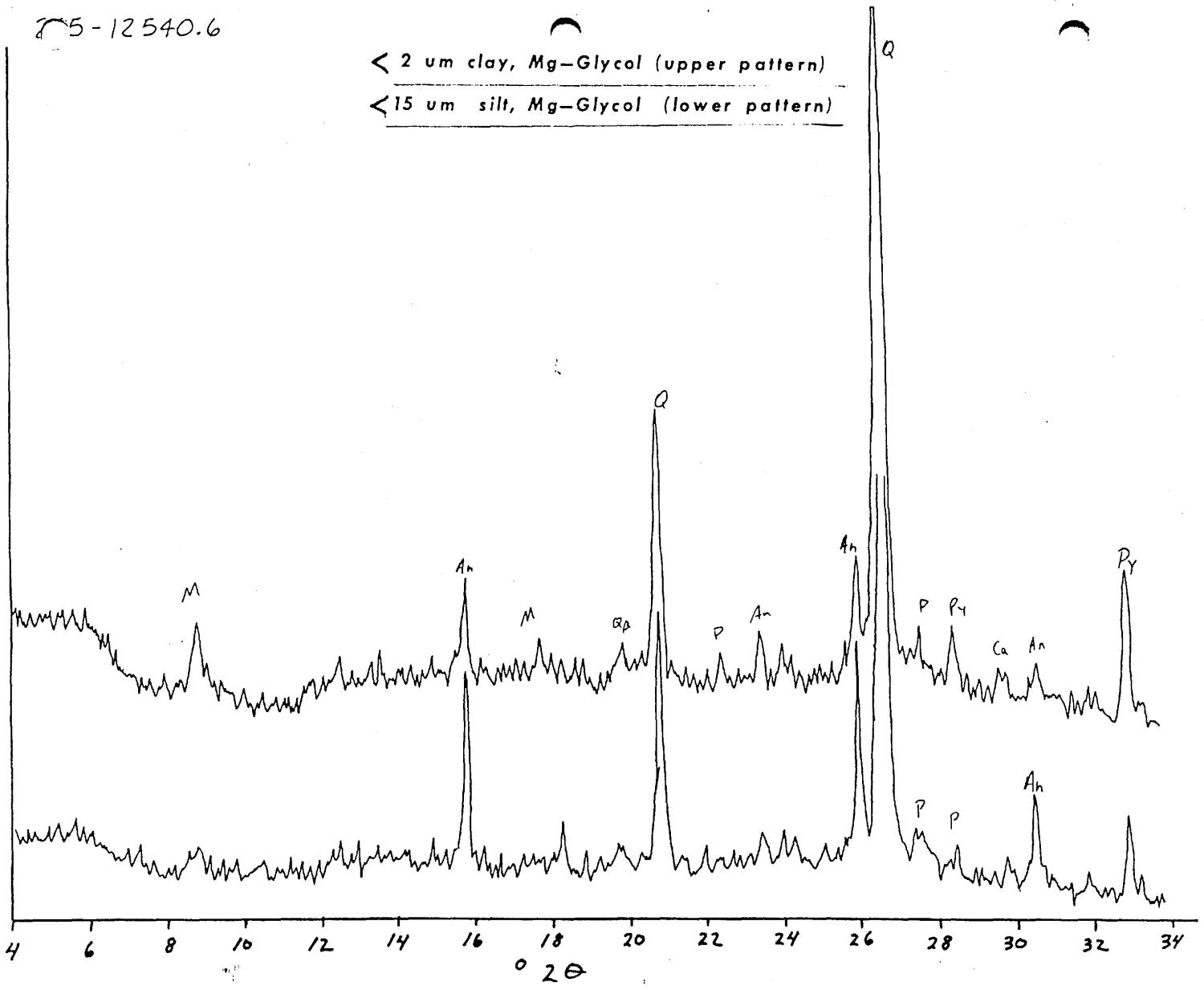

2 um clay, Mg–Glycol (upper pattern)
15 um silt, Mg–Glycol (lower pattern)
C
M
K,C
I/S
Q
Kβ
P
Qβ
Q,M
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

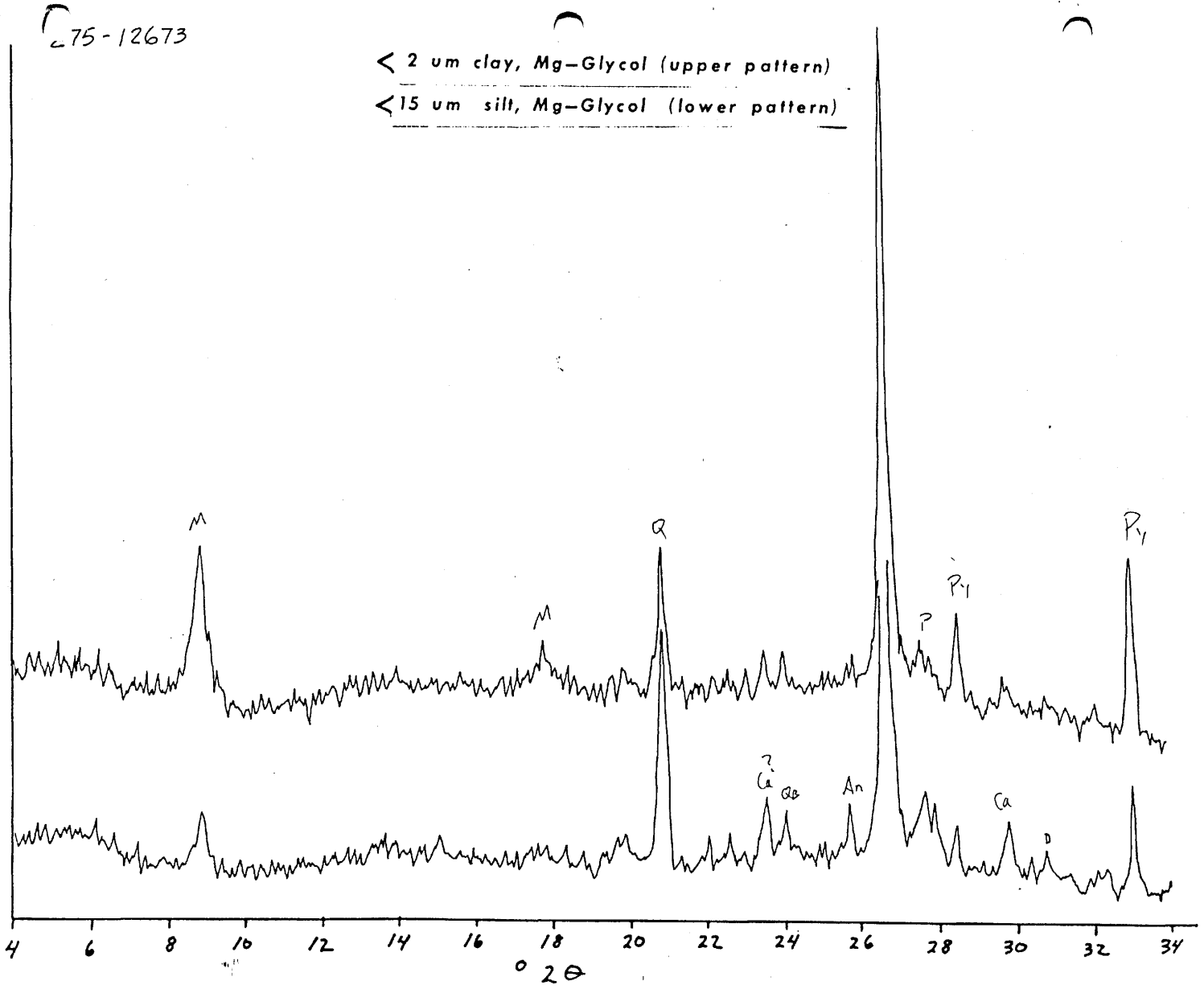
5-12400

< 2 um clay, Mg–Glycol (upper pattern)

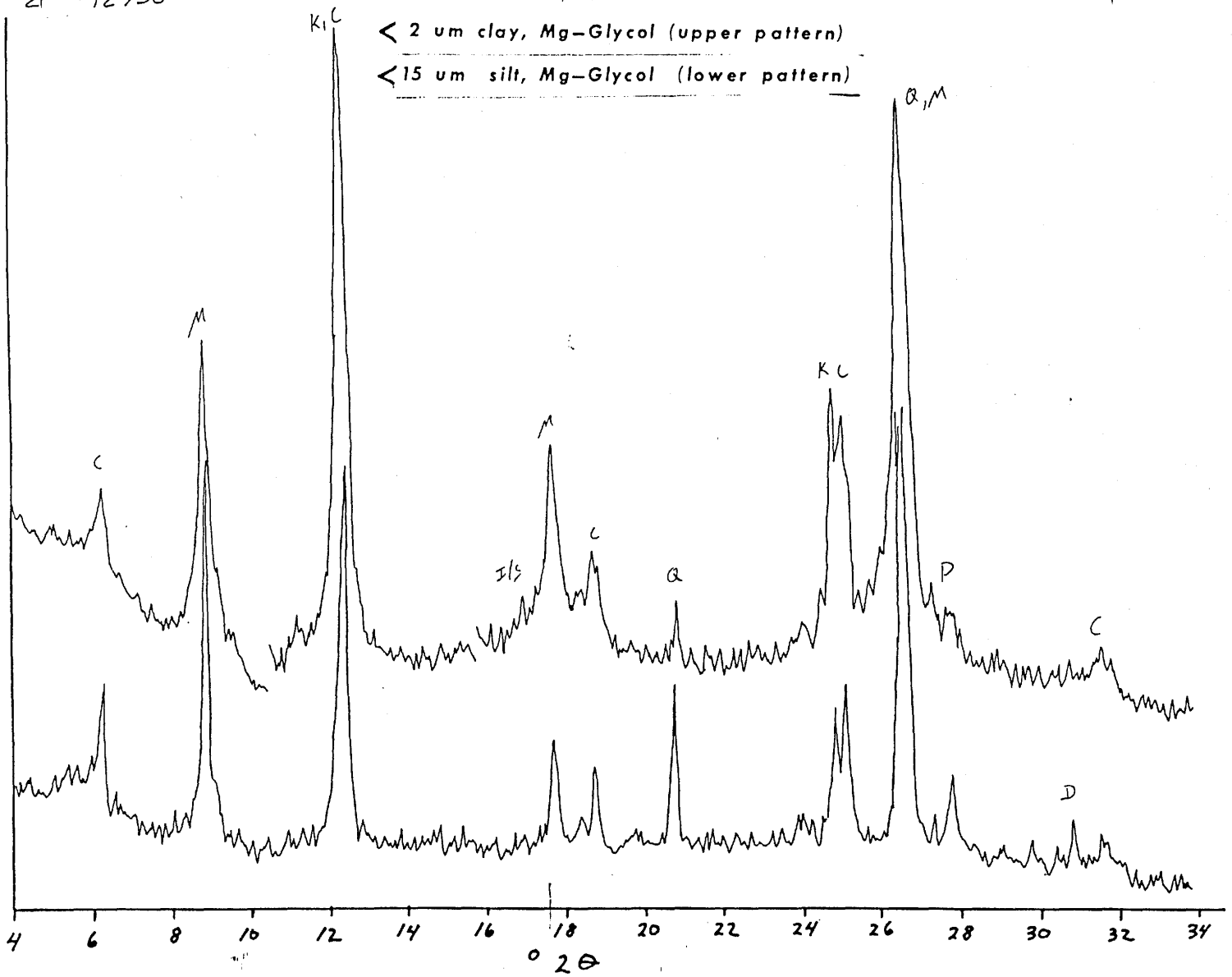
< 15 um silt, Mg–Glycol (lower pattern)




85-12540.6
< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
Q
An
M
Qz
P
Py
Ca
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


75-12673
< 2 um clay, Mg–Glycol (upper pattern)
<15 um silt, Mg–Glycol (lower pattern)
M
M
Q
P1
P
P1
P1
?
Ca
Qa
An
Ca
D
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

2C-12950


< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
K C
M
C
Il
M
C
Q
K C
Q, M
P
C
D
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

75-13321

< 2 um clay, Mg–Glycol (upper pattern)

< 15 um silt, Mg–Glycol (lower pattern)

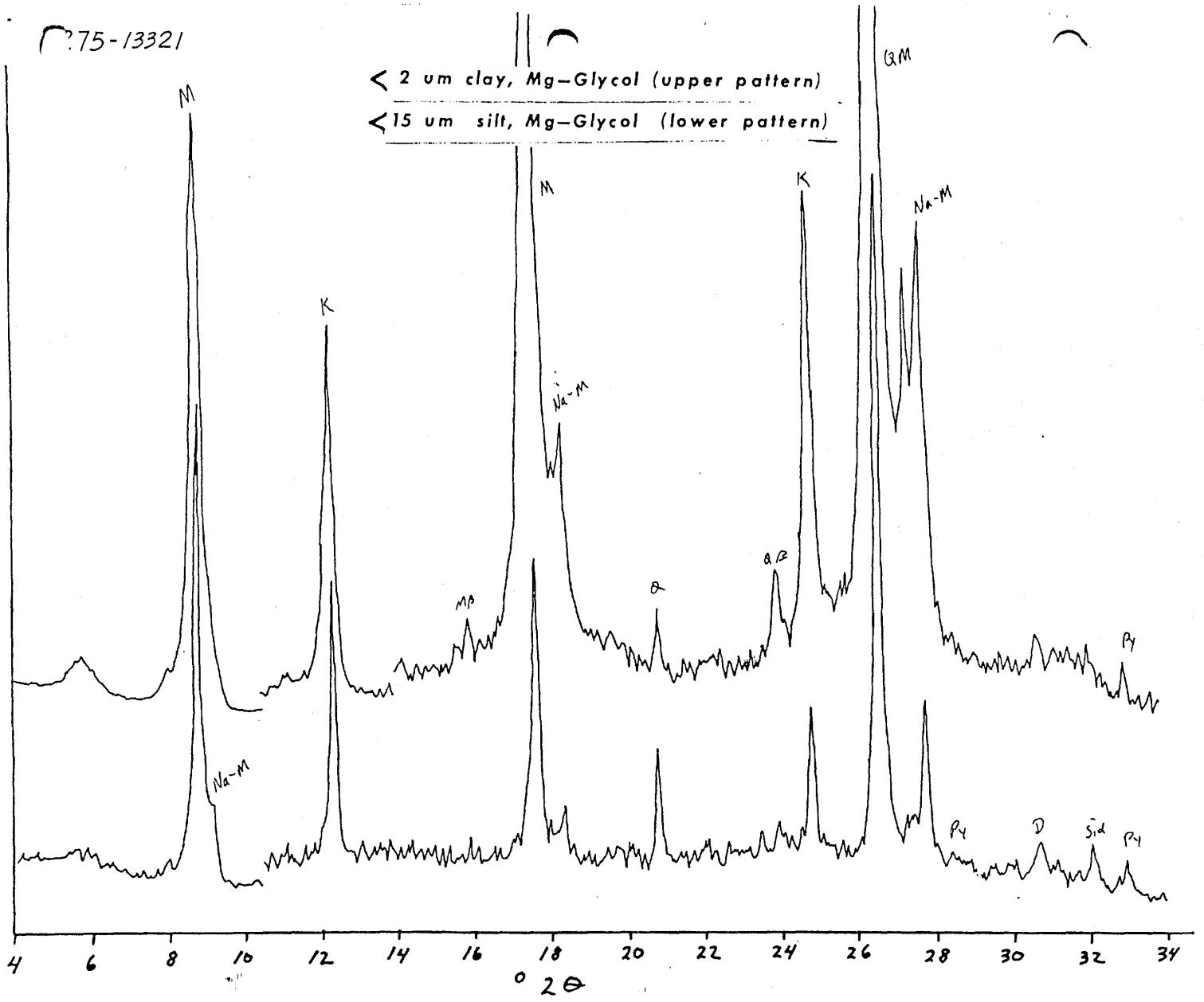


Table 11: Clay mineralogy of samples from Arco N. W. Eileen St. #1 well.

ARCO N W EILEEN ST. #1

DEPTH FEET	STYPE	SMECTITE	CHLORITE	MIXED LAYER I/S	ILLITE	KAOLINITE	OTHER
4510	C	MAJ	MIN	-	MOD	MOD	Q1,HC1,MDM
4510-S	C	MIN	MIN	-	MIN	MIN	Q2,H-C1,SID1,AP2,P1
5100	C	MAJ	MIN	-	MIN	TR	Q1,HC1,MDM,TUFFACEOUS
5100-S	C	MIN	MIN	-	MIN	TR	HC2,Q2,P1,D1,SID1,PY1
5610	C	MOD	TR	-	MIN	TR	Q2,CA2,PY1,MDM,BULK XRD
5610-S	C	MIN	-	-	TR	TR	Q2,P1,CA2,PY1,POOR XRD
6130	C	MAJ	MIN	-	MOD	MOD	Q1,PY1,TUFF.GR.SH.
6130-S	C	MIN	MIN	-	MIN	MIN	Q3,P1,CA1,D1,PY1
6320	C	MOD	MIN	MOD	MOD	MAJ	Q2,TUFF.GR.SH.
6320-S	C	-	MOD	-	MAJ	MAJ	Q3,P1,PY1,PY1
6580	C	MIN	TR	MIN	MOD	MAJ	Q2,TUFF.GR/BWN.SIS
6580-S	C	-	TR	-	MOD	MAJ	Q3,P1,D1,SID1,PY1
6646	CC	-	TR	MIN	MOD	MAJ	Q1,SID1GR.SH
6646-S	CC	-	-	-	MOD	MAJ	Q3,SID1,P
6803	CC	-	TR	MIN	MOD	MAJ	Q2,SID1,AP1,LAM/BWN.SIS.
6803-S	CC	-	-	-	TR	MIN	Q3,SID3
6820	C	TR	TR	MIN	MOD	MAJ	Q2,SID2,PY1,DM CONT.TUFF.
6820-S	C	-	MIN	-	MOD	MAJ	Q3,P1,SID3,PY1. BWN.SIS.
6960 *	C	-	TR	MOD	MOD	MAJ	Q2,PY1,DM CONT.= SMEC.
6960-S	C	-	MIN	-	MOD	MAJ	Q3,P1,SID1,PY1

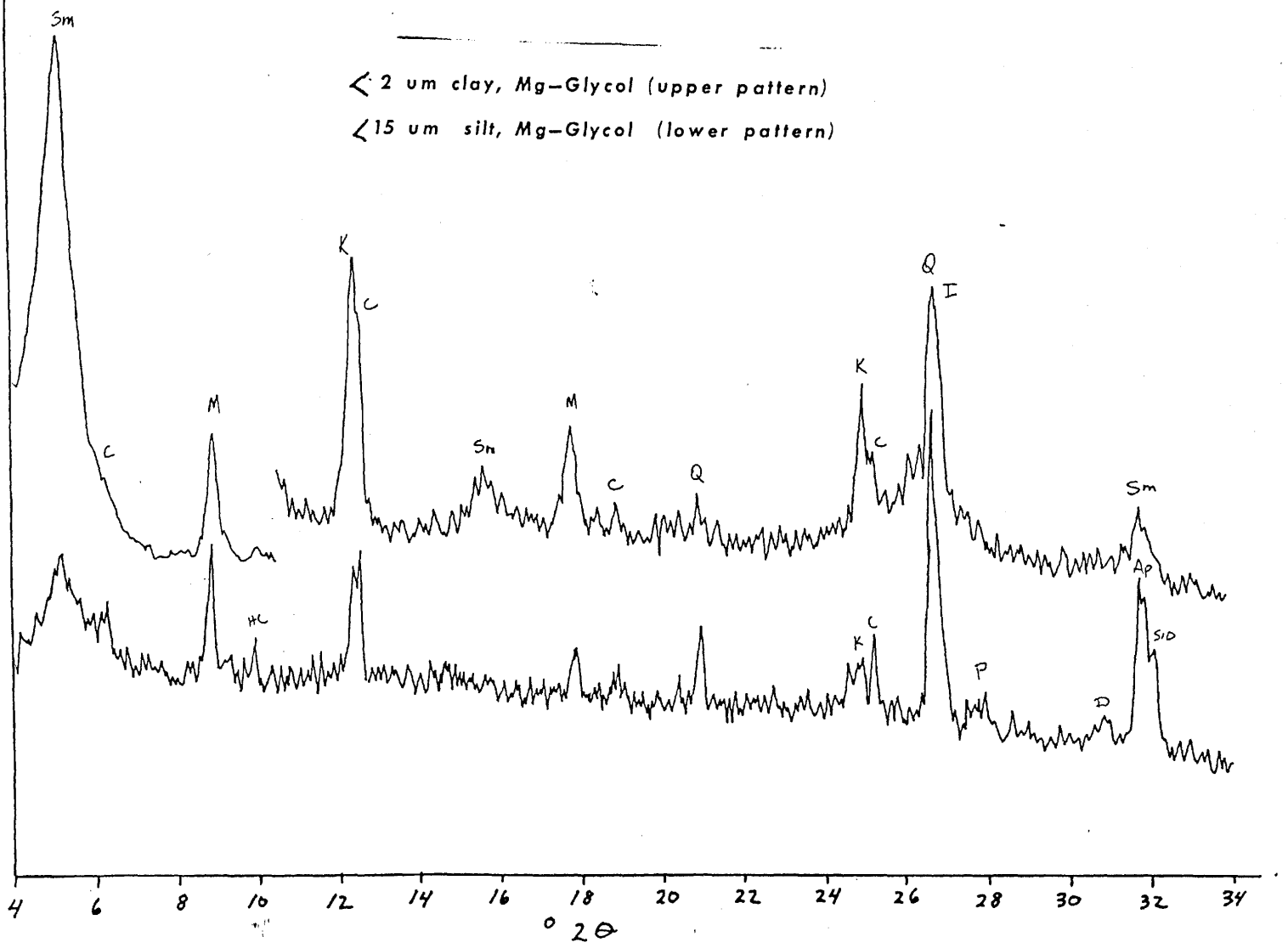
POOR PATTERN, PATTERN SHOWS MODERATE SMECTITE PEAK DUE TO DM CONT.

Definitions: TR = less than 3%, MIN = 3 - 12%, MOD = 13 - 35%, MAJ = >35%. Other mineral abbreviations: Q = quartz, P = plagioclase, KS = k-spar, AN = analcime, HC =heulandite-clinoptilolite, CA = calcite, D = dolomite, AP = apatite, SID = siderite, PY = pyrite, BA = barite. 1 = weak, 2 = moderate, 3 = strong, nothing = trace. MDM = mostly drill mud, BK.SH. = black shale, GR. = gray, SIS. = siltstone, TUFF. = tuffaceous, ANK = ankerite. Also: STYPE = sample type, C = cuttings, CC = core, SW = side wall, S = silt.

221- 4510

< 2 um clay, Mg–Glycol (upper pattern)

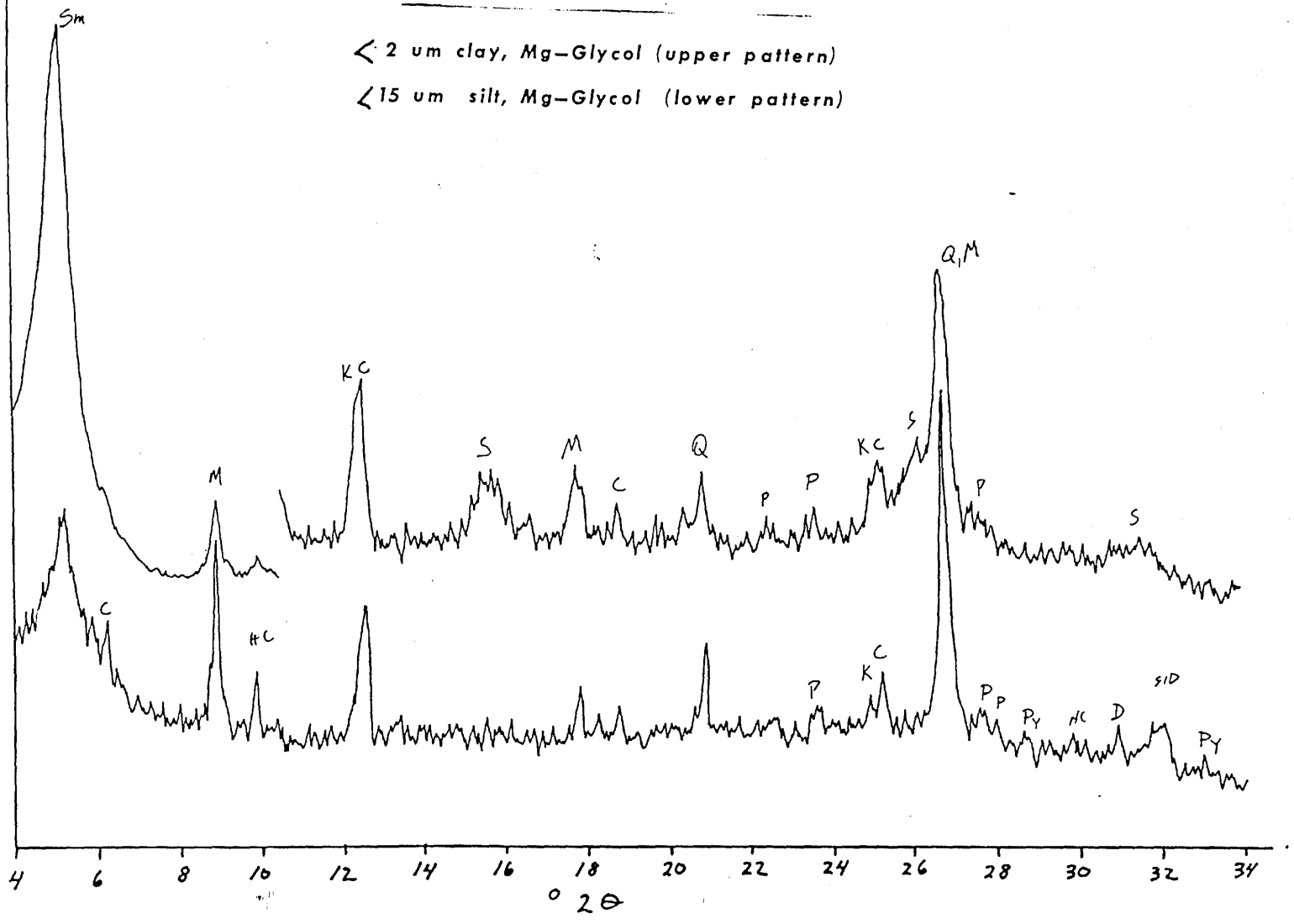
< 15 um silt, Mg–Glycol (lower pattern)



221-5100

< 2 um clay, Mg–Glycol (upper pattern)

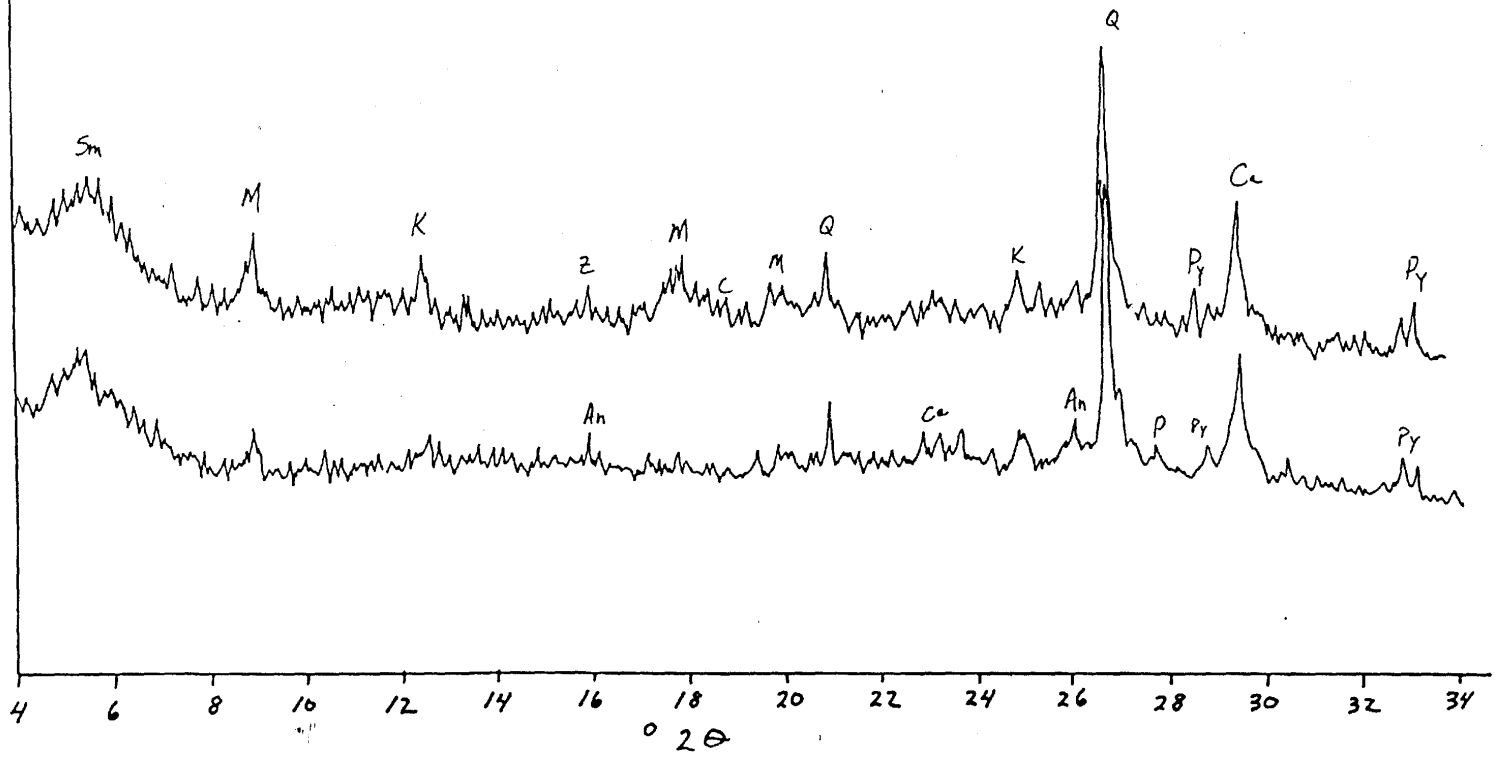
< 15 um silt, Mg–Glycol (lower pattern)

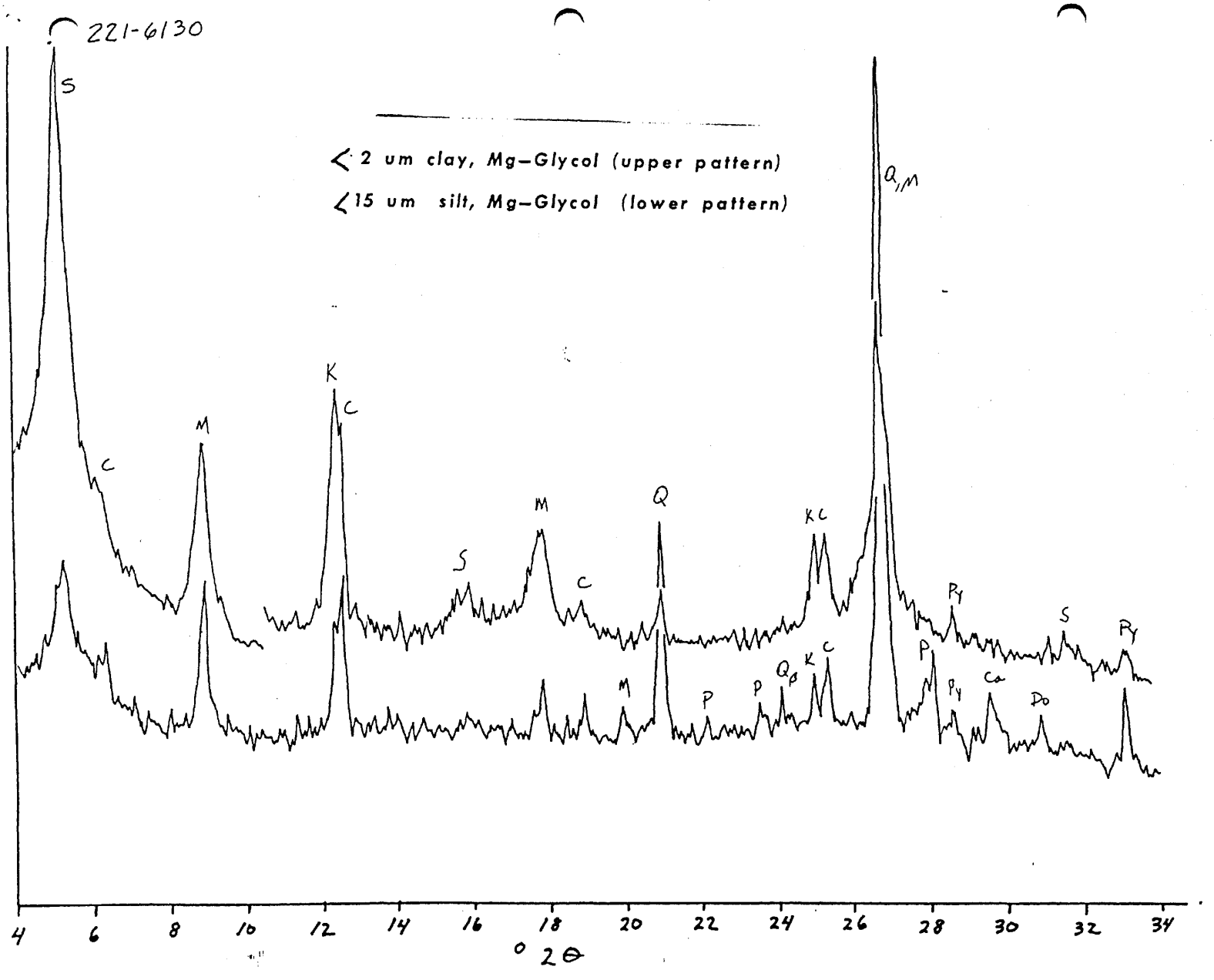


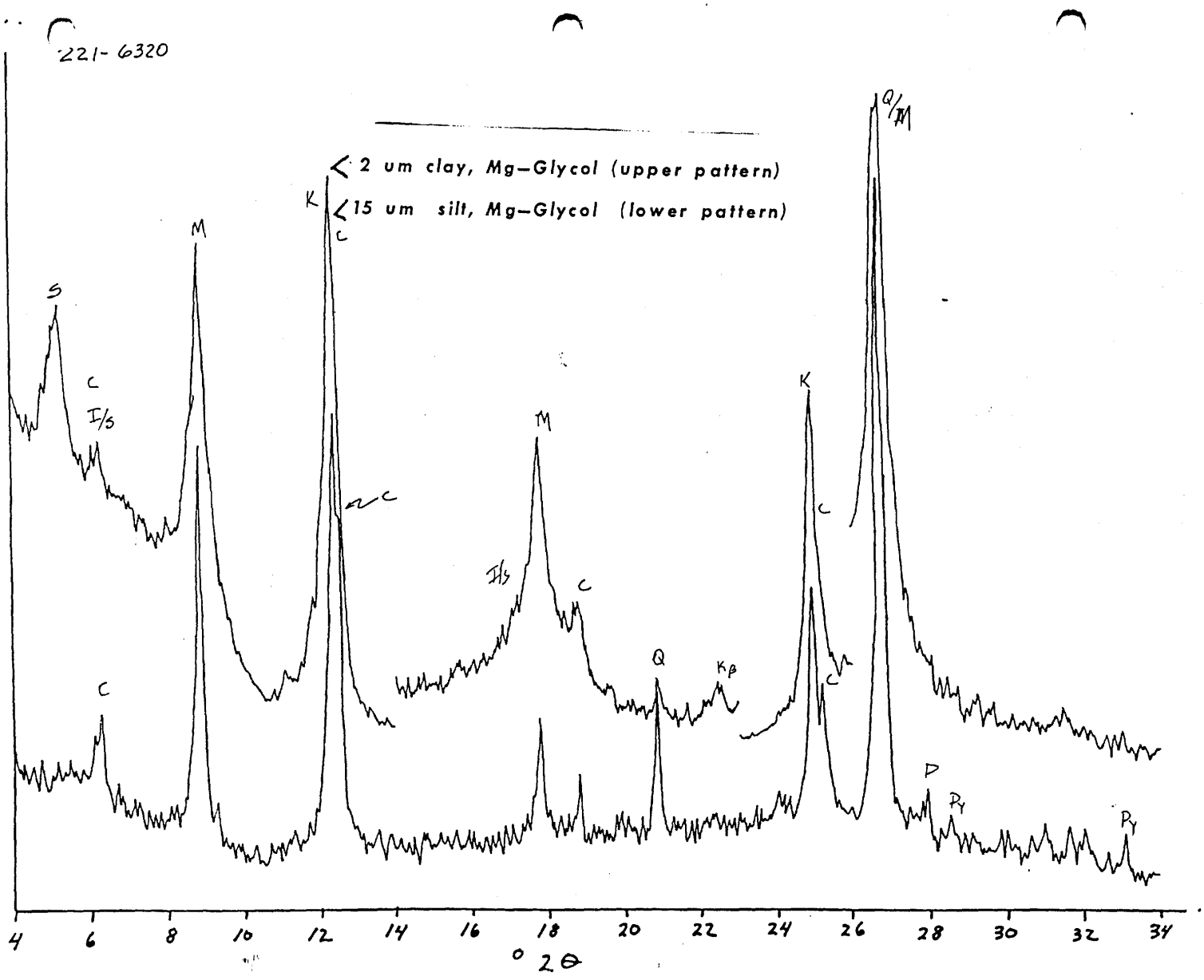
221-5610

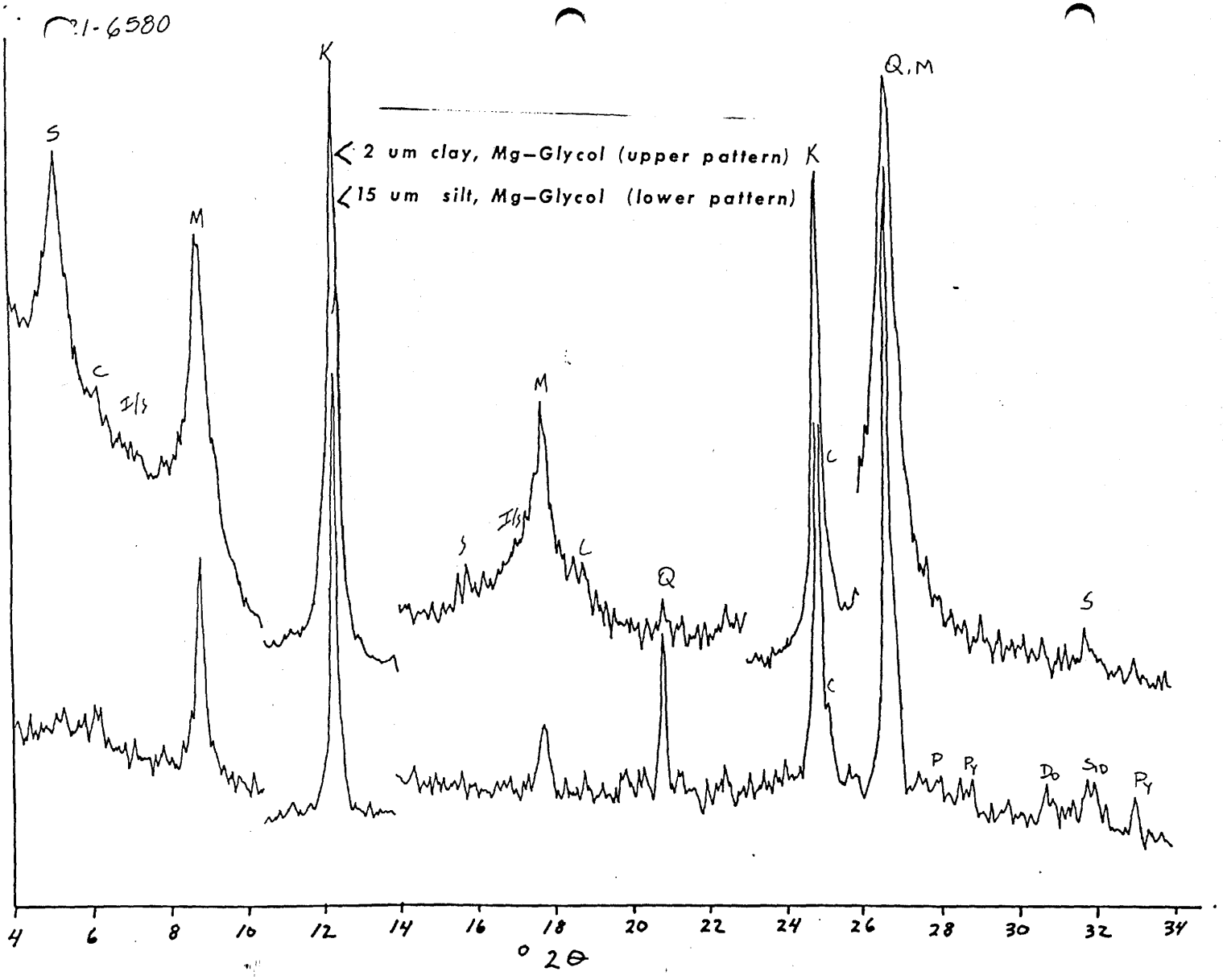
< 2 um clay, Mg–Glycol (upper pattern)

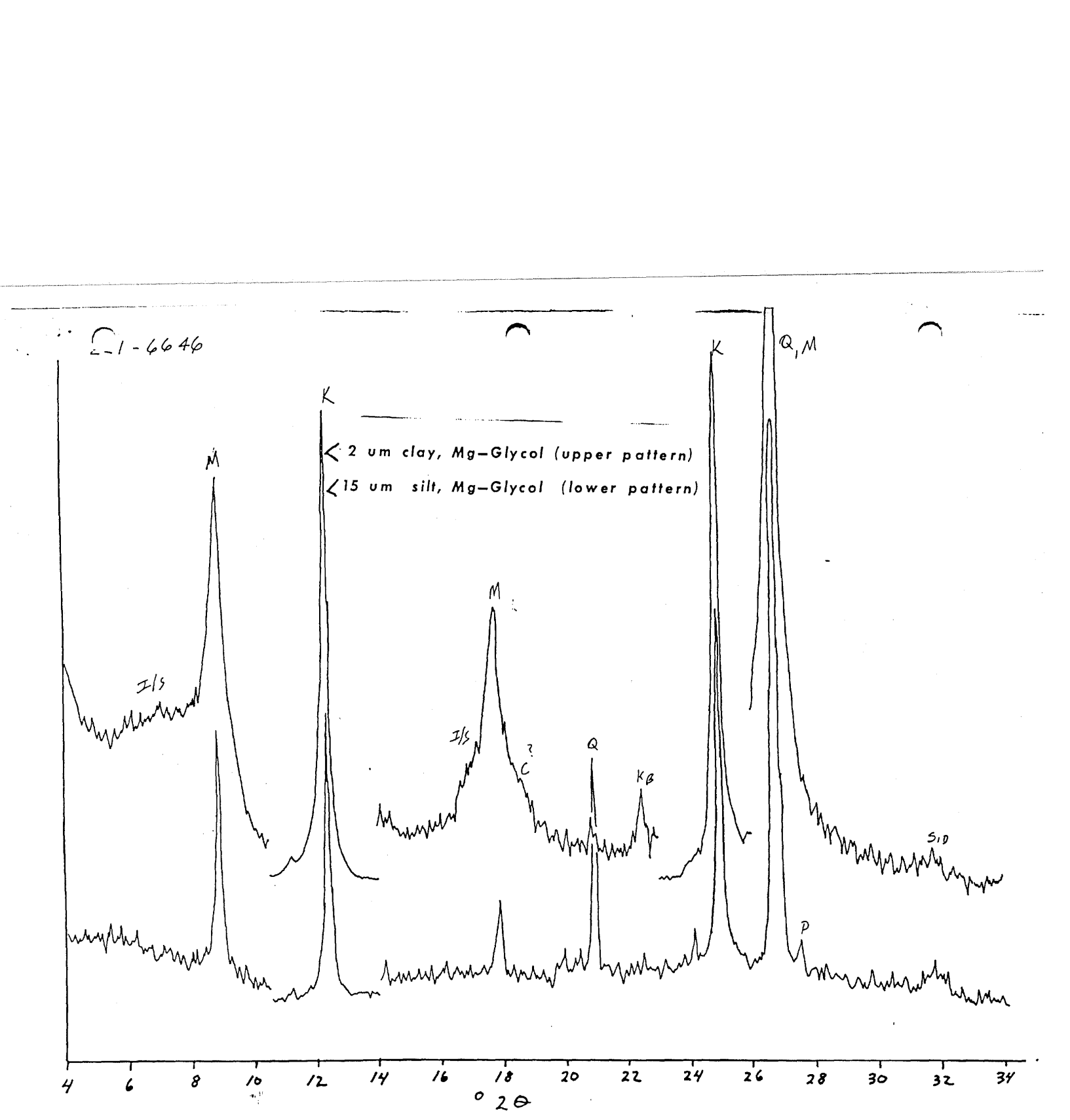
< 15 um silt, Mg–Glycol (lower pattern)

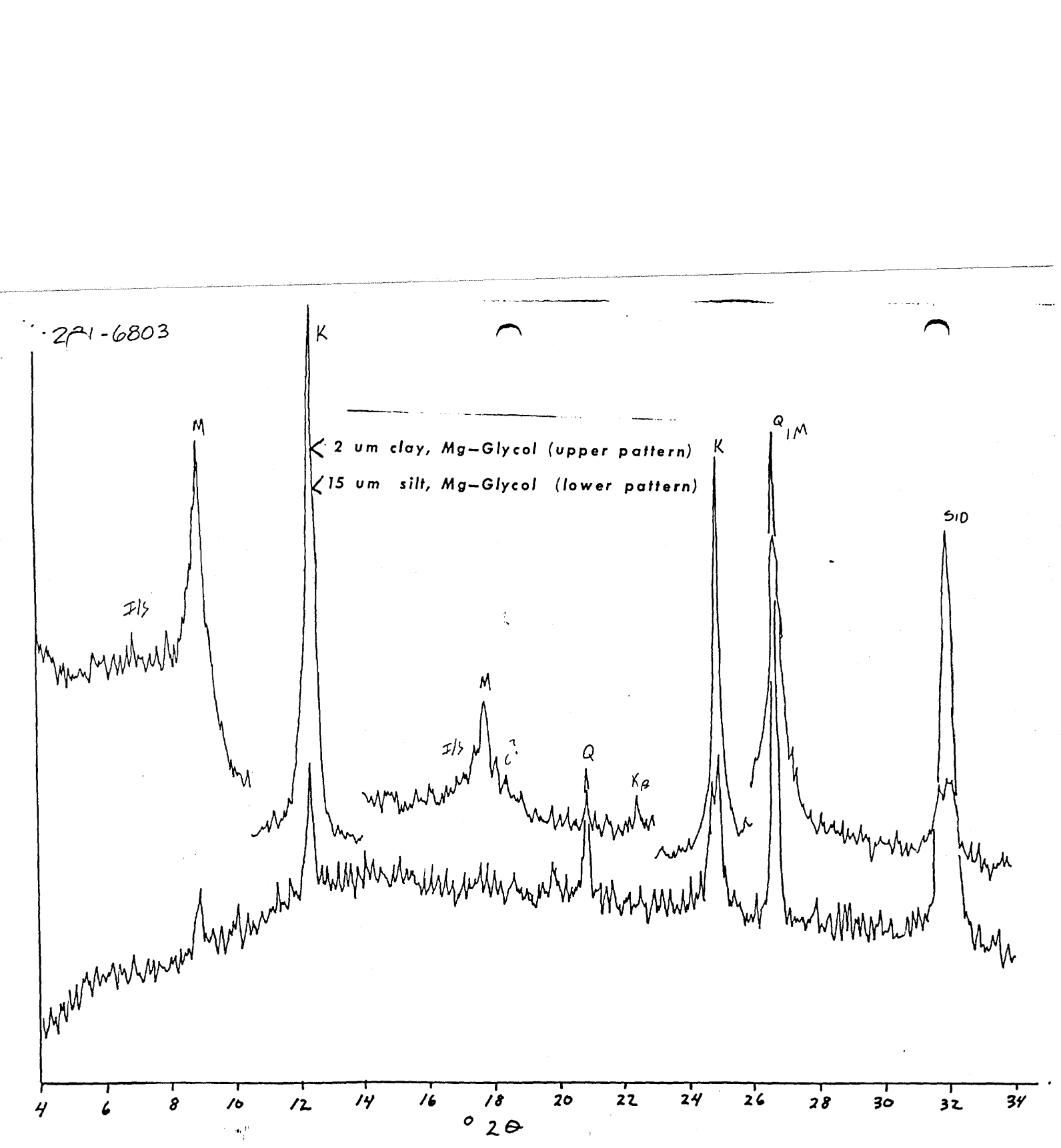


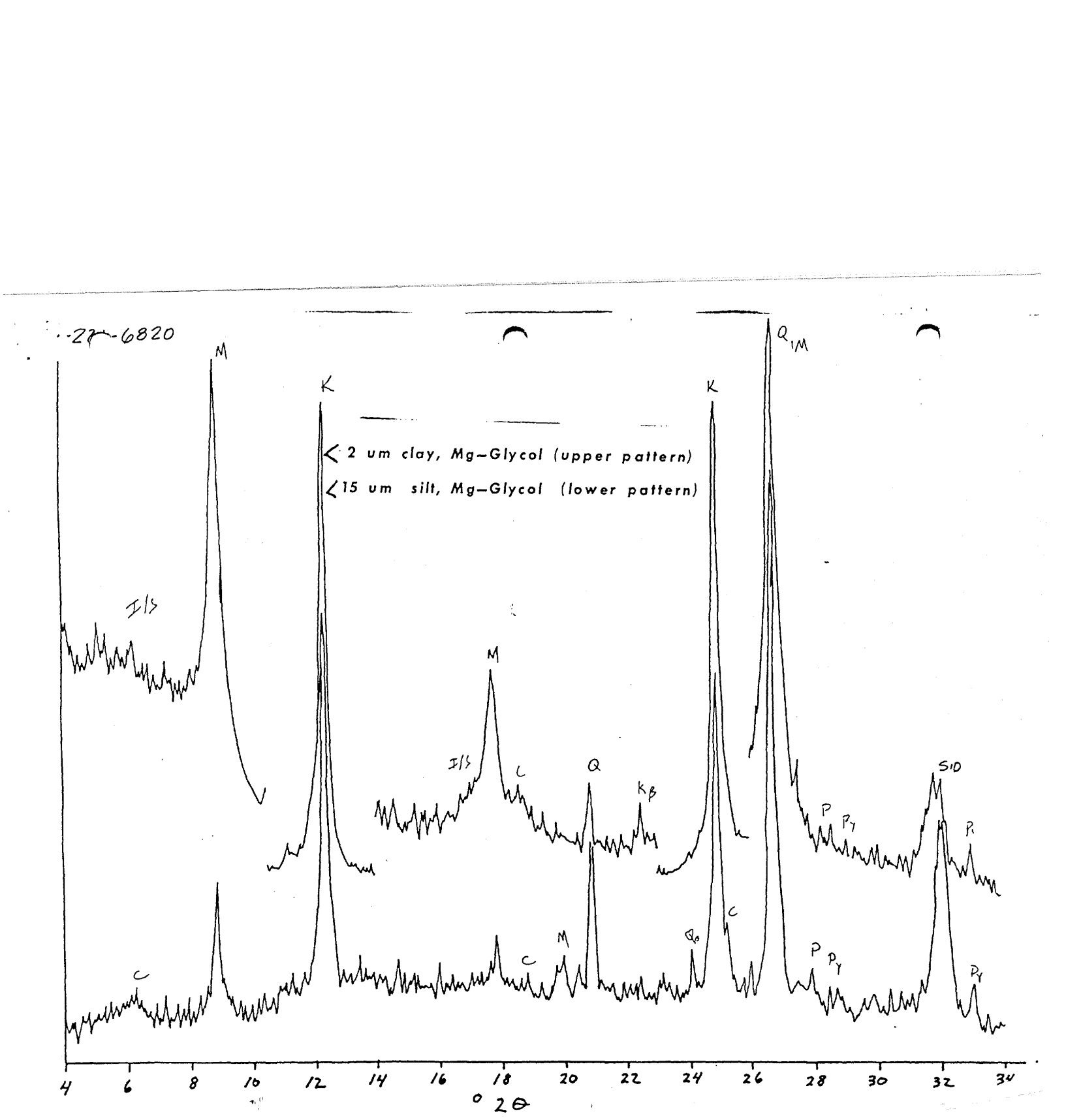

221-6130
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
C
M
K
C
S
M
C
Q
K C
Q,M
Py
S
Py
P
Py
Ca
Do
M
P
P
Qβ
K
C
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

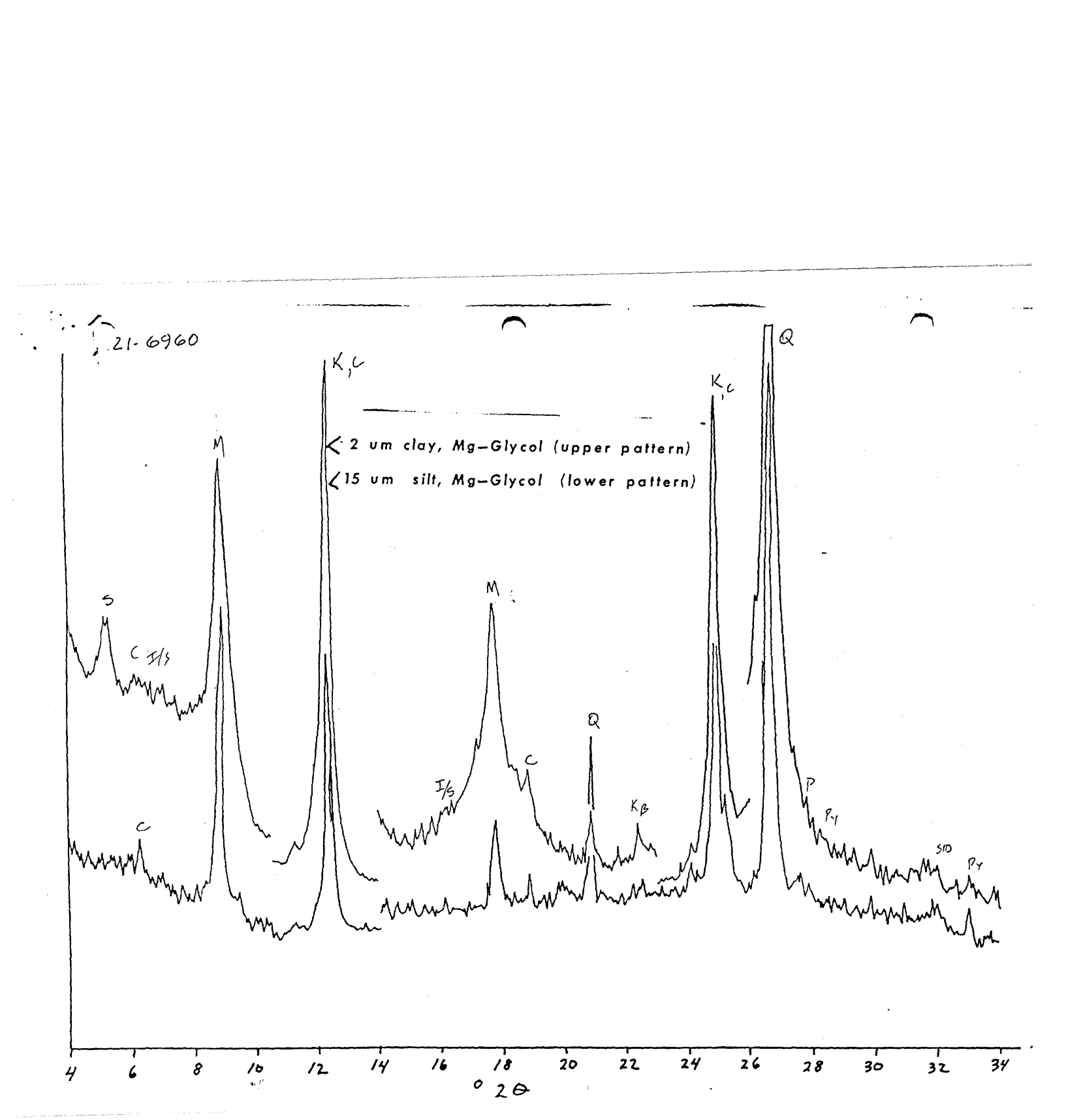

221-6320
2 um clay, Mg-Glycol (upper pattern)
15 um silt, Mg-Glycol (lower pattern)
S
C
I/S
M
K
C
C
I/S
M
C
Q
Kβ
K
C
C
Q/M
D
Dγ
Dγ
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


C1-6580
2 um clay, Mg–Glycol (upper pattern)
15 um silt, Mg–Glycol (lower pattern)
S
M
K
C
I/S
Q, M
Q
P
P_Y
D_O
S_O
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

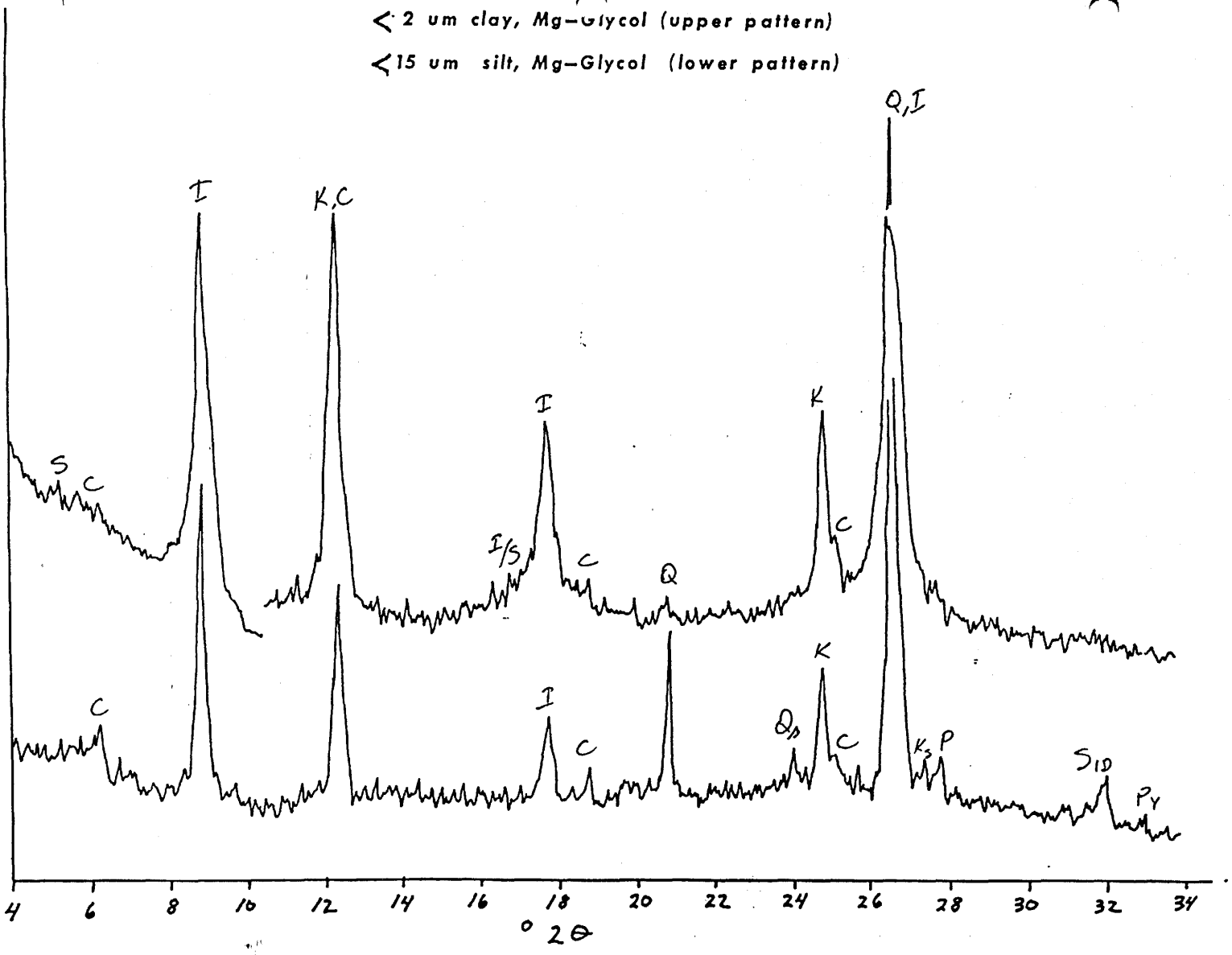

I-6646
K
M
2 um clay, Mg–Glycol (upper pattern)
15 um silt, Mg–Glycol (lower pattern)
I/S
M
I/S
C
?
Q
Kβ
K
Q, M
S, D
P
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


2R1-6803
K
M
2 um clay, Mg–Glycol (upper pattern)
15 um silt, Mg–Glycol (lower pattern)
I/S
M
I/S
C?
Q
K_β
K
Q_{1M}
SiO
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


-22-6820
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
M
K
I/S
C
Q
Kβ
Q1M
P
P1
S1O
Qo
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


21-6960
2 um clay, Mg-Glycol (upper pattern)
15 um silt, Mg-Glycol (lower pattern)
K,C
M
S
C I/S
C
I/S
M
C
Q
Kβ
K,C
Q
P
P-1
SID
P-1
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

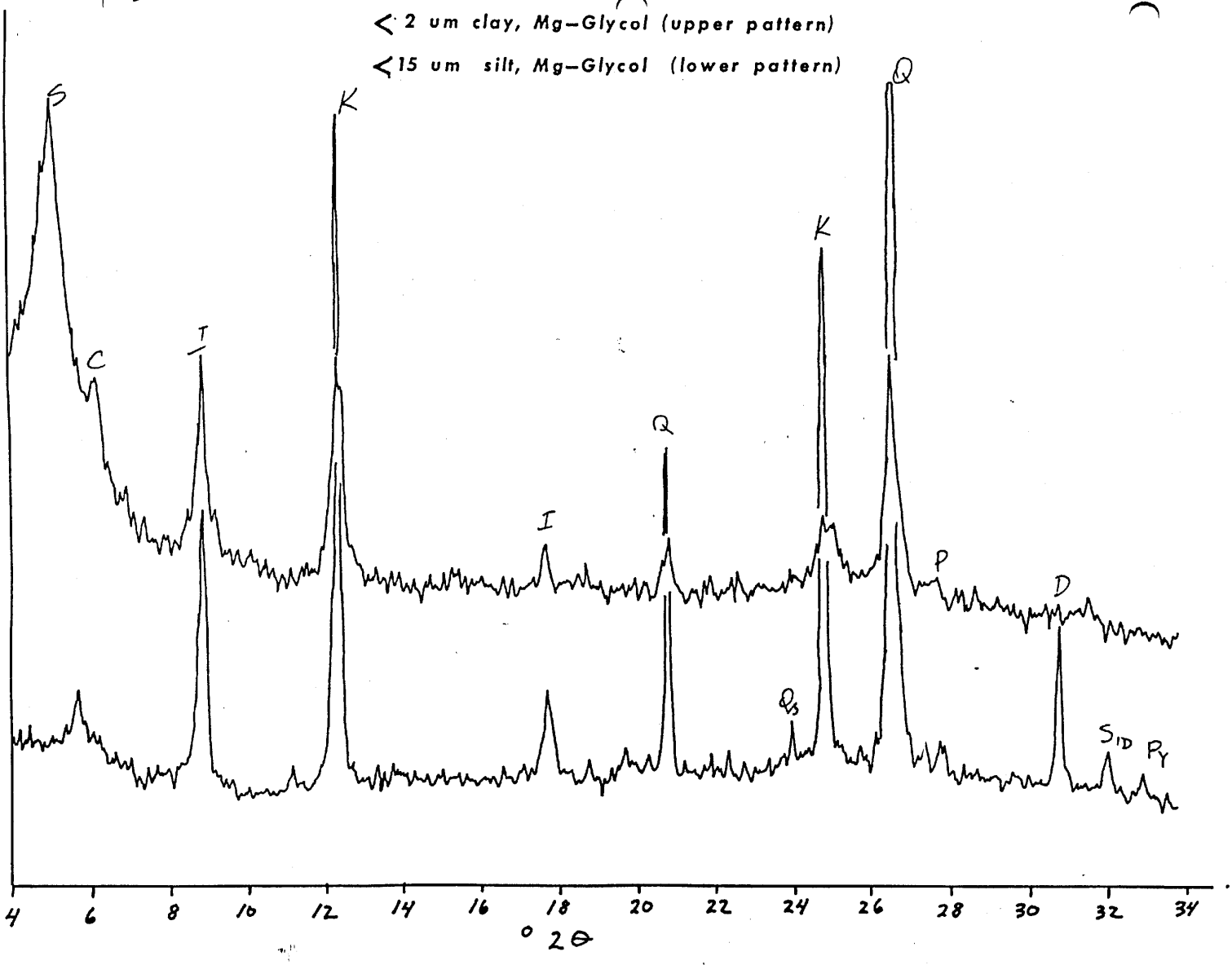
348-12960

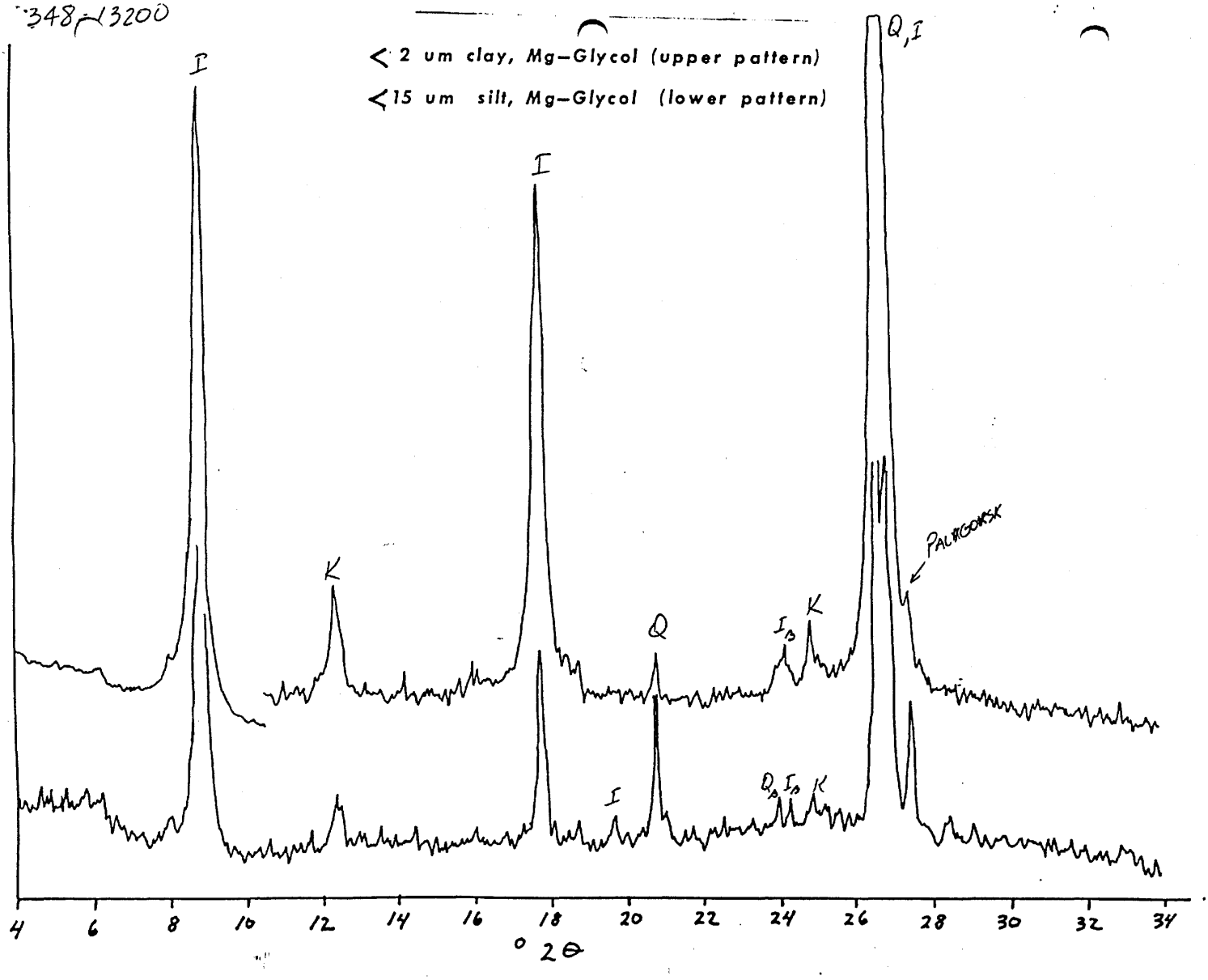

< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
Q,I
I
K,C
I
K
S
C
I/S
C
Q
C
C
K
I
C
Q/I
C
K₂
P
S/D
P/Y
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

3.48 ~3030

< 2 um clay, Mg–Glycol (upper pattern)

< 15 um silt, Mg–Glycol (lower pattern)




348-13200
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
I
I
Q, I
K
Q
I
K
I
Q
I
K
PALYGORSK
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

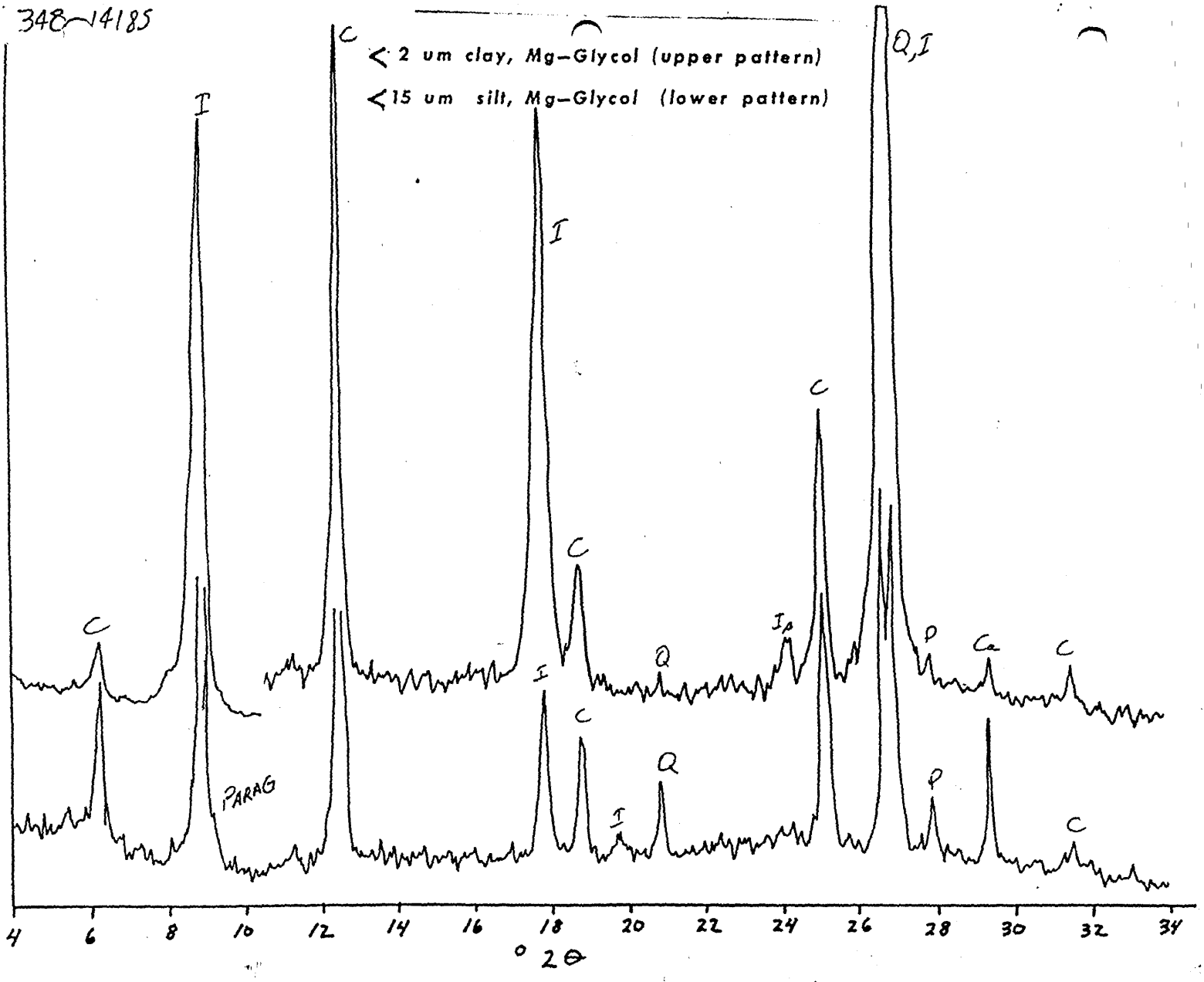
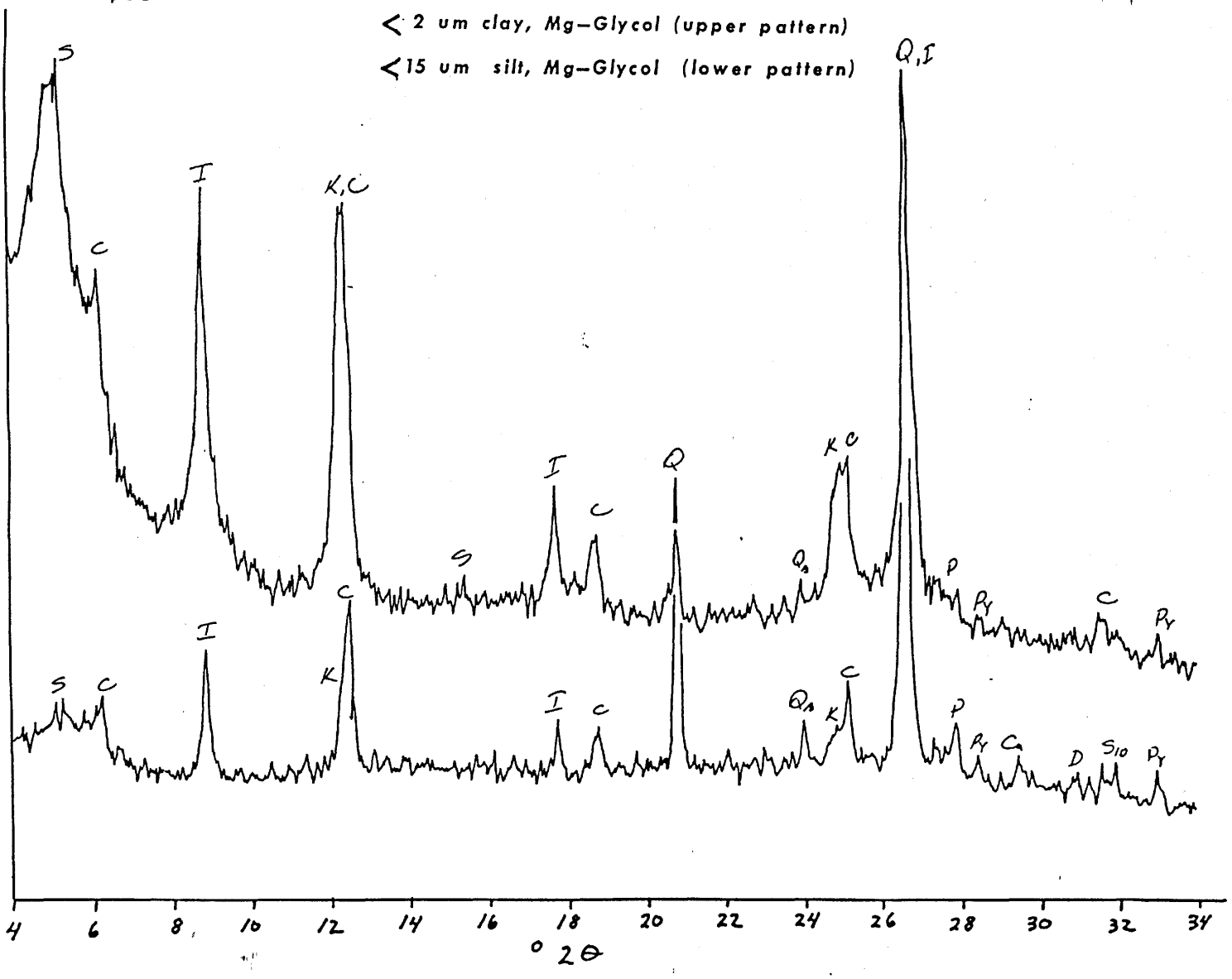

348-14185
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
C
I
C
I
C
Q
Ip
C
Q,I
P
Ca
C
C
I
C
Q
I
Q
P
C
PARAG
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

Table 21: Clay mineralogy of samples from Cities Gwydyr Bay St. #1 well.

CITIES GWYDYR BAY STATE #1

DEPTH FEET	STYPE	SMECTITE	CHLORITE	MIXED LAYER I/S	ILLITE	KAOLINITE	OTHER
6330	C	MOD	MOD	-	MOD	MOD	Q2,P,PY,MDM.BULKXRD
6330-S	C	TR	MIN	-	MIN	MIN	Q3,P,CA,D,SID,PY1
6840	C	MAJ	MIN	-	MOD	MIN	Q2,AN1,P,MDM,BULK.GR.MDST.
6840-S	C	MIN	MAJ	-	MAJ	-	Q3,AN3,P1,D,CA,
7410	C	MAJ	MOD	-	MOD	TR	Q2,AN1,P,MDM,BULKXRD
7410-S	C	MIN	MAJ	-	MAJ	MIN	Q2,AN1,P1
8010	C	MAJ	TR	-	MIN	-	Q1,TUFF.BK.SH.
8010-S	C	MOD	MIN	-	MIN	-	Q3,AN2,P1,CA?
8580	C	MAJ	MOD	-	MOD	MIN	Q1,P,PY,DGR/BK.SH.
8580-S	C	MIN	MIN	-	MIN	MIN	Q3,P1,PY1
8910	C	MAJ	MOD	MIN	MOD	MIN	Q1,P,TUFF.BK.SH.
8910-S	C	MIN	MIN	-	MIN	MIN	Q3,P1,PY1,CA,ANK.
9090	C	MOD	MOD	MIN	MOD	MOD	Q1,BK.SH.
9090-S	C	-	MOD	-	MOD	MIN	Q3,P1,CA,D,PY
9180	C	MAJ	MOD	MIN	MOD	MOD	Q1,CA,TUFF.BK.SH
9180-S	C	TR	MOD	-	MOD	MIN	Q2,P,PY
9300	C	MOD	MOD	MIN	MOD	MOD	Q2,P,TUFF.BK.SH..
9300-S	C	TR	MOD	-	MOD	MOD	Q3,P1,PY1
9540	C	MOD	MOD	MOD	MOD	MOD	Q1,P,PY,BK.SIS/SH.
9540-S	C	TR	MOD	-	MOD	MOD	Q3,P,KS,PY
9930	C	MIN	MOD	MOD	MOD	MAJ	Q1,P,BK.SH.DM.CONT.
9930-S	C	-	MIN	-	MOD	MOD	Q3,P,SID,PY
10440	C	-	MOD	MOD	MOD	MAJ	Q1,DGR.SIS/SH.
10440-S	C	-	MIN	-	MOD	MOD	Q3,P1,SID
10830	C	-	MOD	MOD	MOD	MAJ	Q1,PY,DGR.SH.
10830-S	C	-	MIN	-	MOD	MOD	Q3,P,D,PY,SID
11880	C	-	MOD	MOD	MOD	MOD	Q,BK.SH.
11880-S	C	-	TR	-	MIN	MIN	Q3

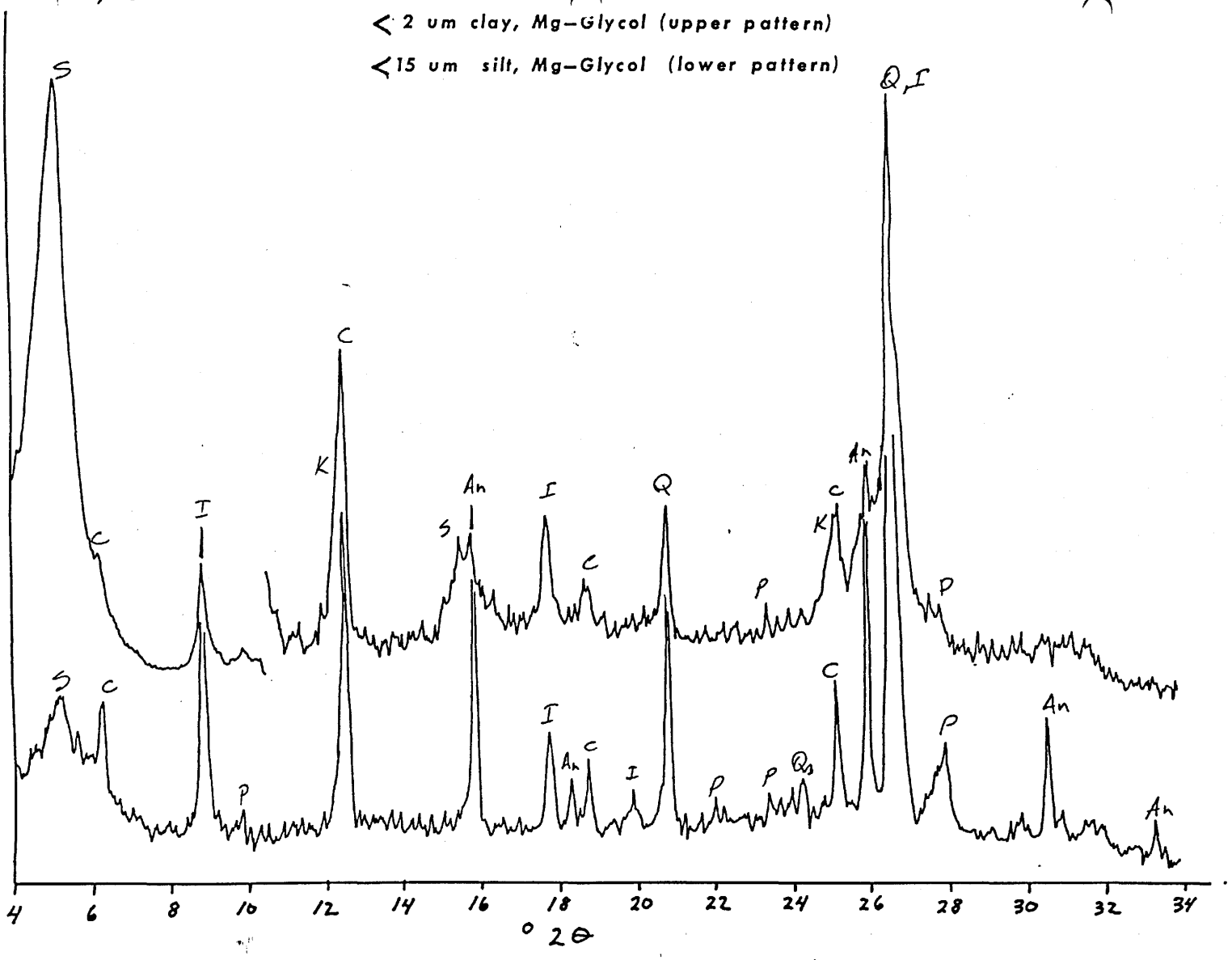
Definitions: TR = less than 3%, MIN = 3 - 12%, MOD = 13 - 35%, MAJ = >35%. Other mineral abbreviations: Q = quartz, P = plagioclase, KS = k-spar, AN = analcime, HC =heulandite-clinoptilolite, CA = calcite, D = dolomite, AP = apatite, SID = siderite, PY = pyrite, BA = barite. 1 = weak, 2 = moderate, 3 = strong, nothing = trace. MDM = mostly drill mud, BK.SH. = black shale, GR. = gray, SIS. = siltstone, TUFF. = tuffaceous, ANK = ankerite. Also: STYPE = sample type, C = cuttings, CC = core, SW = side wall, S = silt.


3r-6330
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
C
I
K,C
S
I
C
Q
Q,I
K C
P
Pr
C
Pr
S
C
I
K
C
I
C
Q,I
K
C
P
Pr
Ca
D
S10
Pr
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

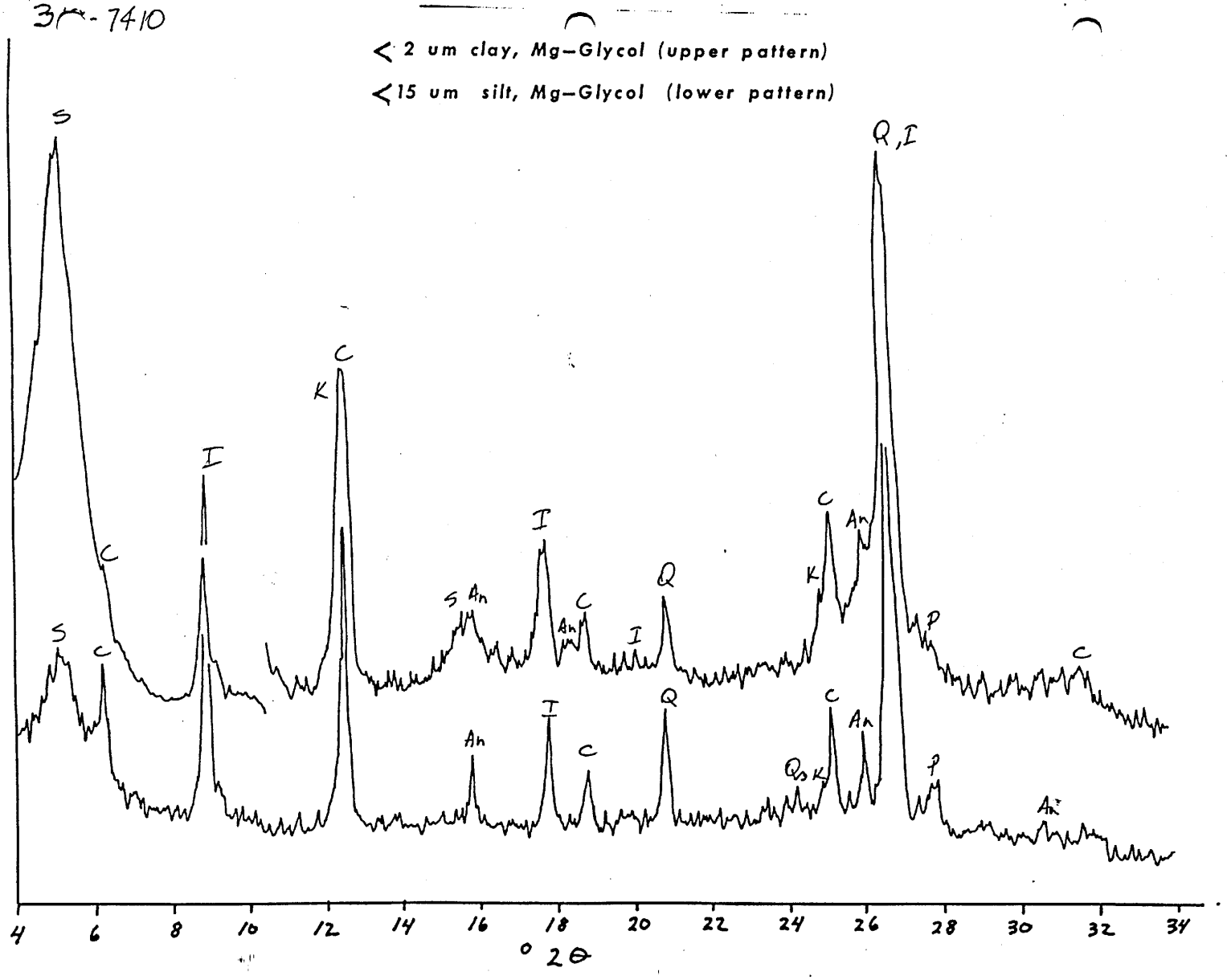
CG-6840

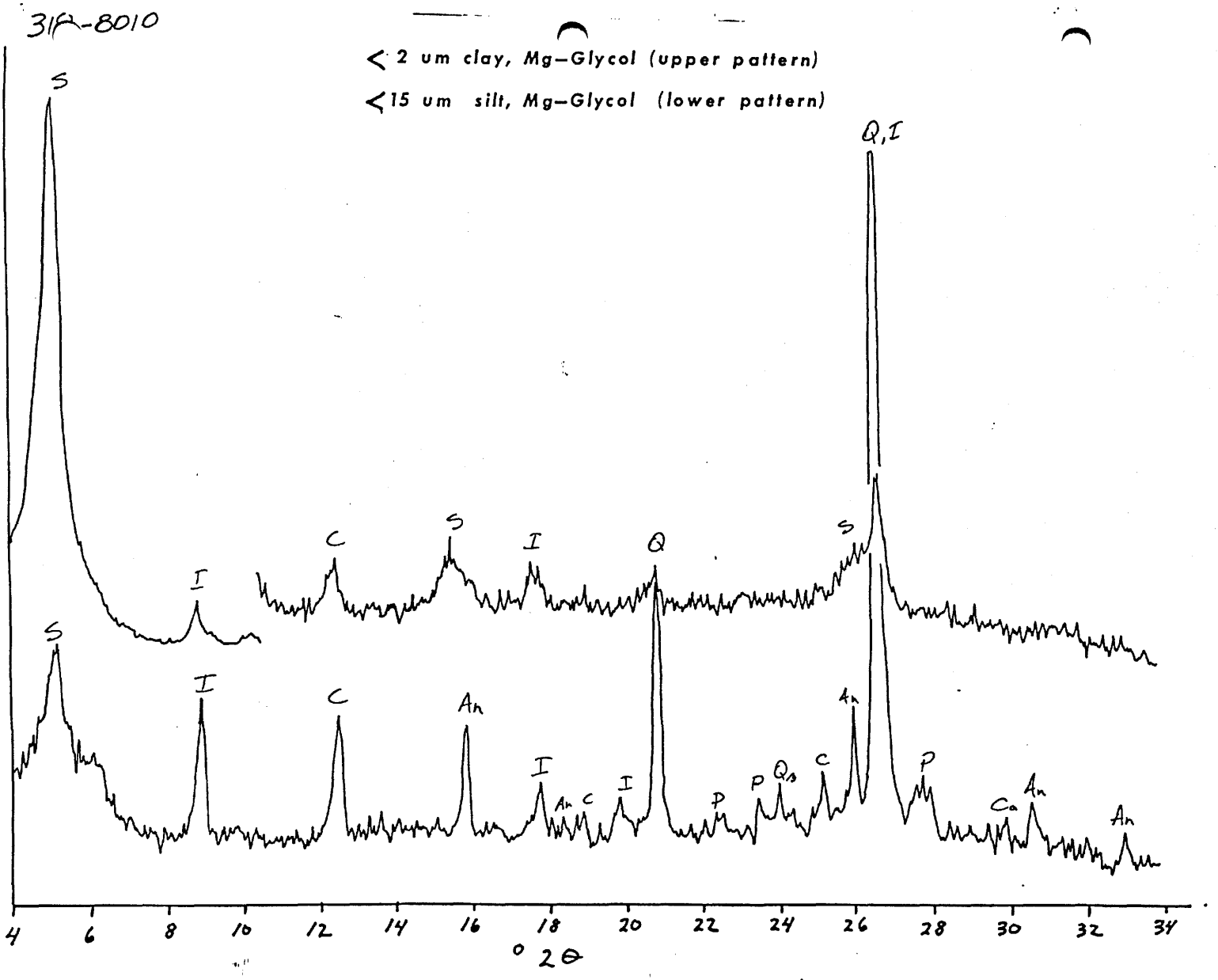
< 2 um clay, Mg–Glycol (upper pattern)

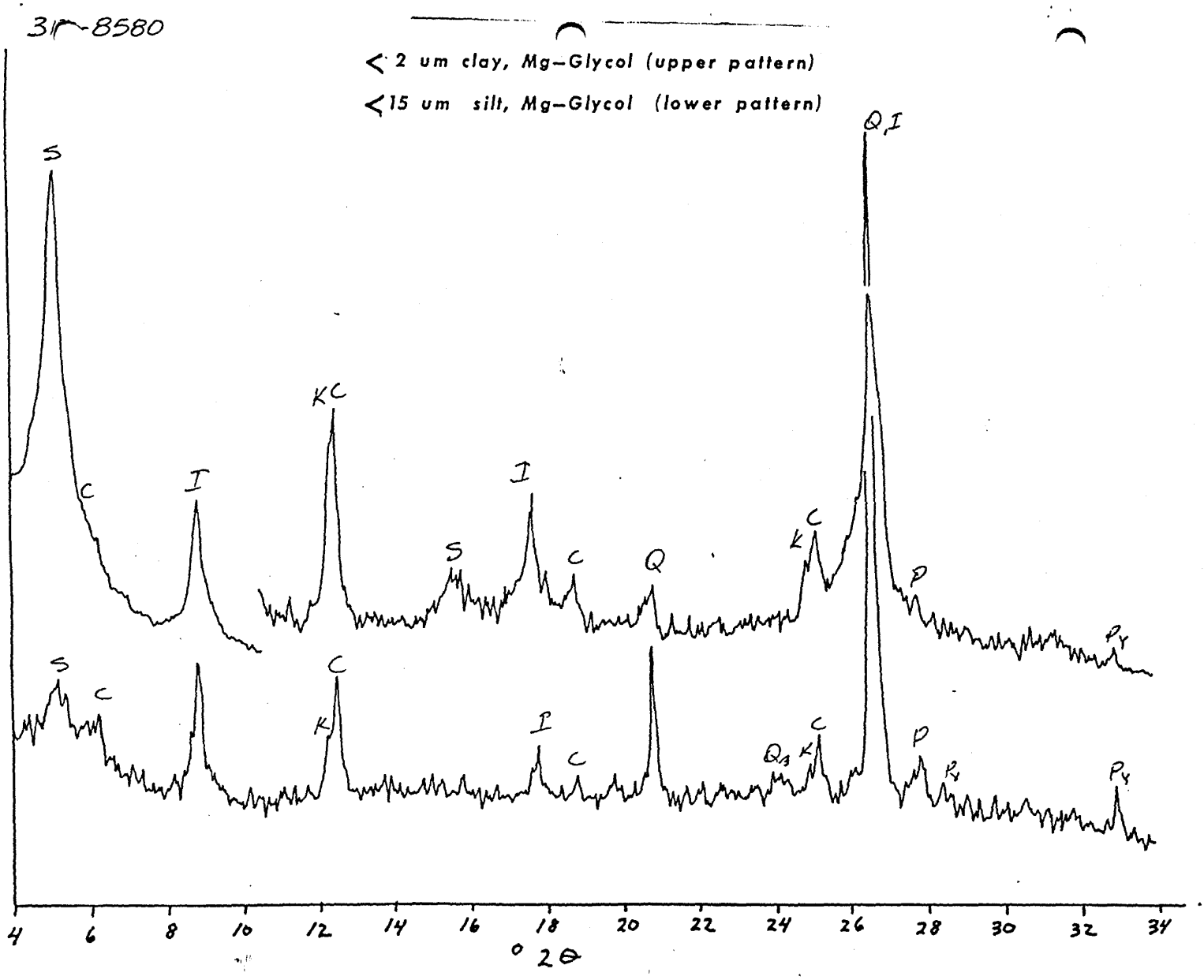
< 15 um silt, Mg–Glycol (lower pattern)



3K-7410


< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
C
I
K
C
S
An
I
C
An
I
Q
K
C
An
Q,I
P
C
S
C
An
I
C
Q
Qs
K
C
An
P
An
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

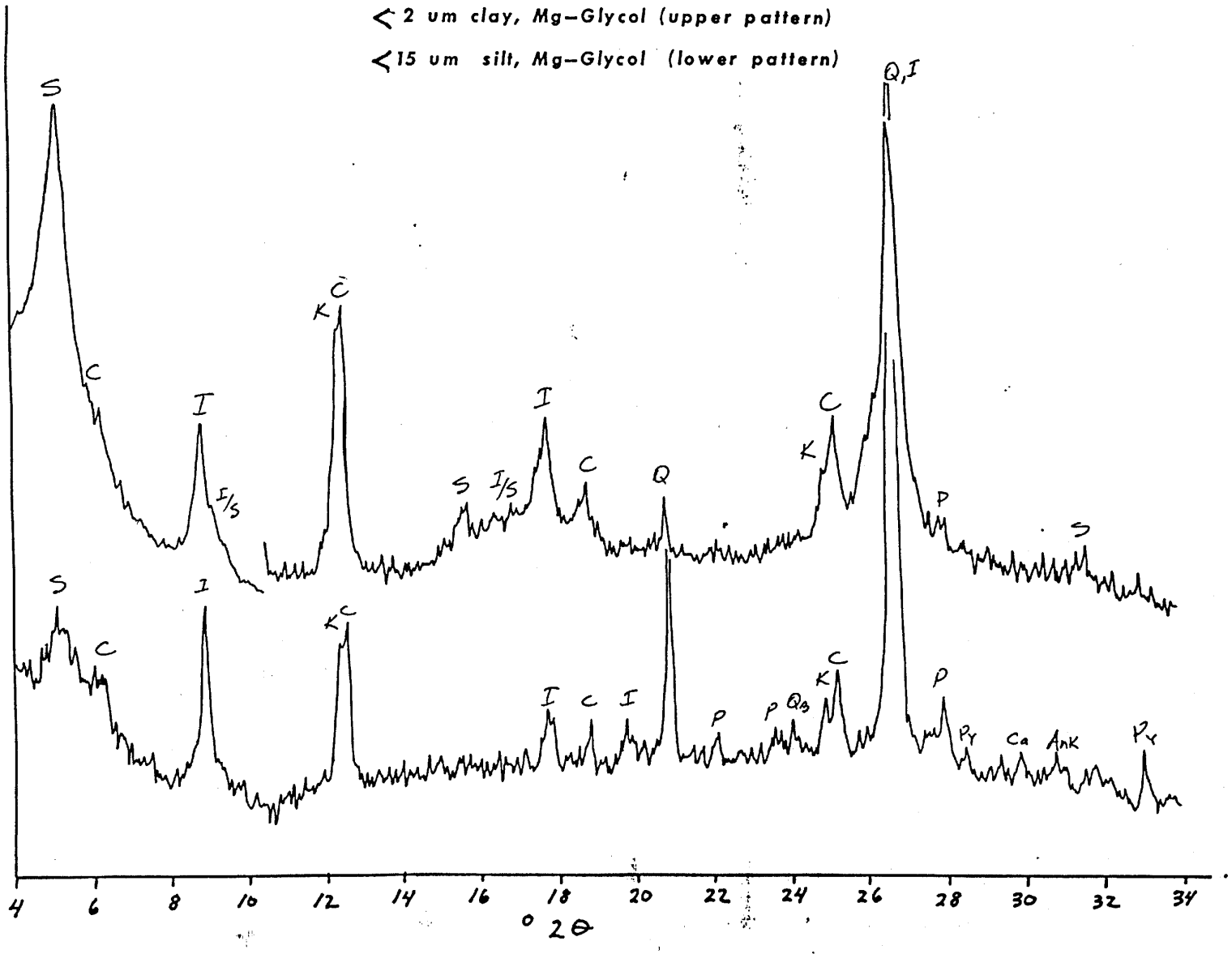

31A-8010
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
I
C
S
I
Q
S
Q,I
S
I
C
An
I
An
C
I
P
P
Qs
C
An
P
Ca
An
An
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


31-8580
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
C
I
K C
S
I
C
Q
K
C
Q, I
P
P
S
C
K
C
I
C
Q
K
C
P
P
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

317-8910

< 2 um clay, Mg–Glycol (upper pattern)

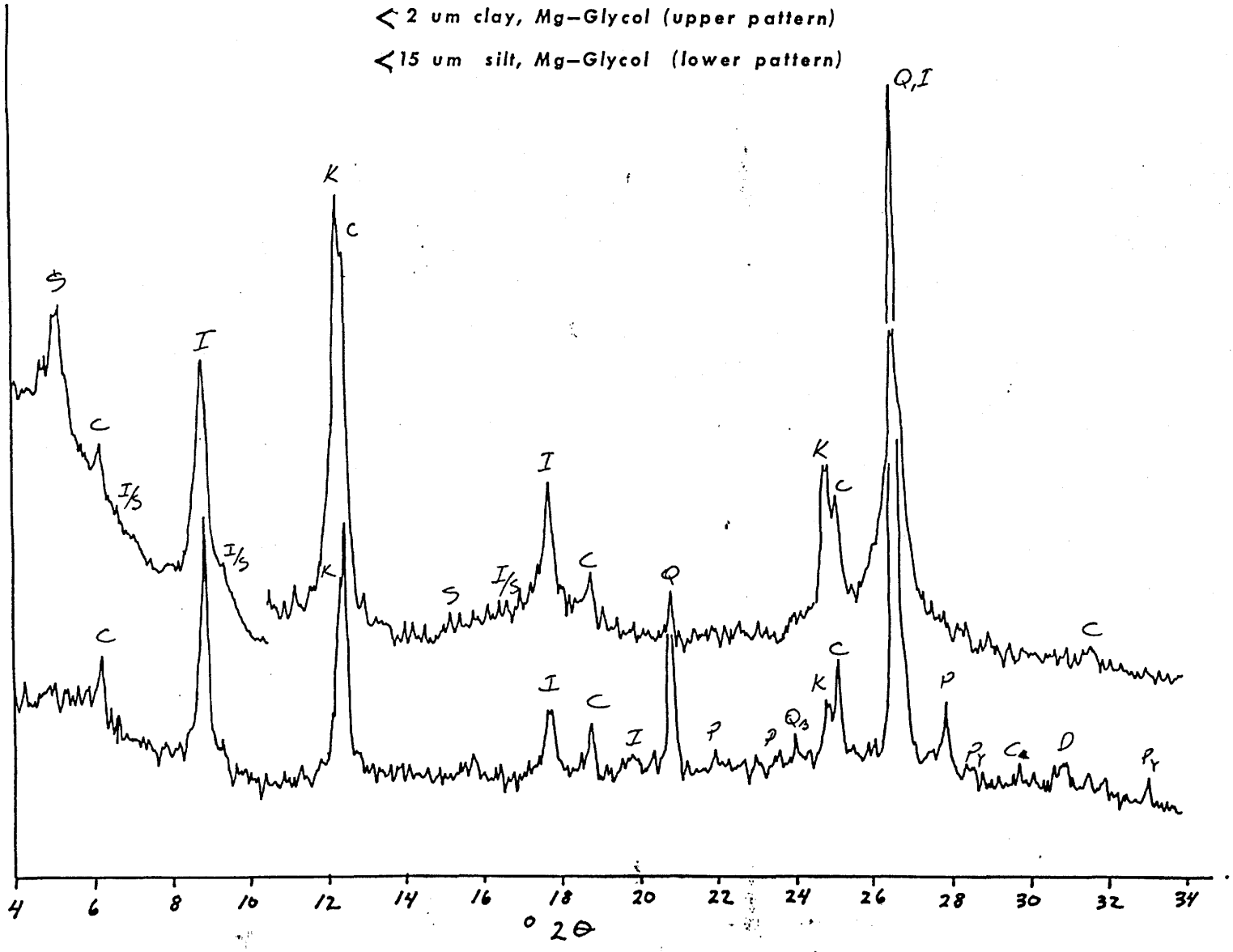
< 15 um silt, Mg–Glycol (lower pattern)

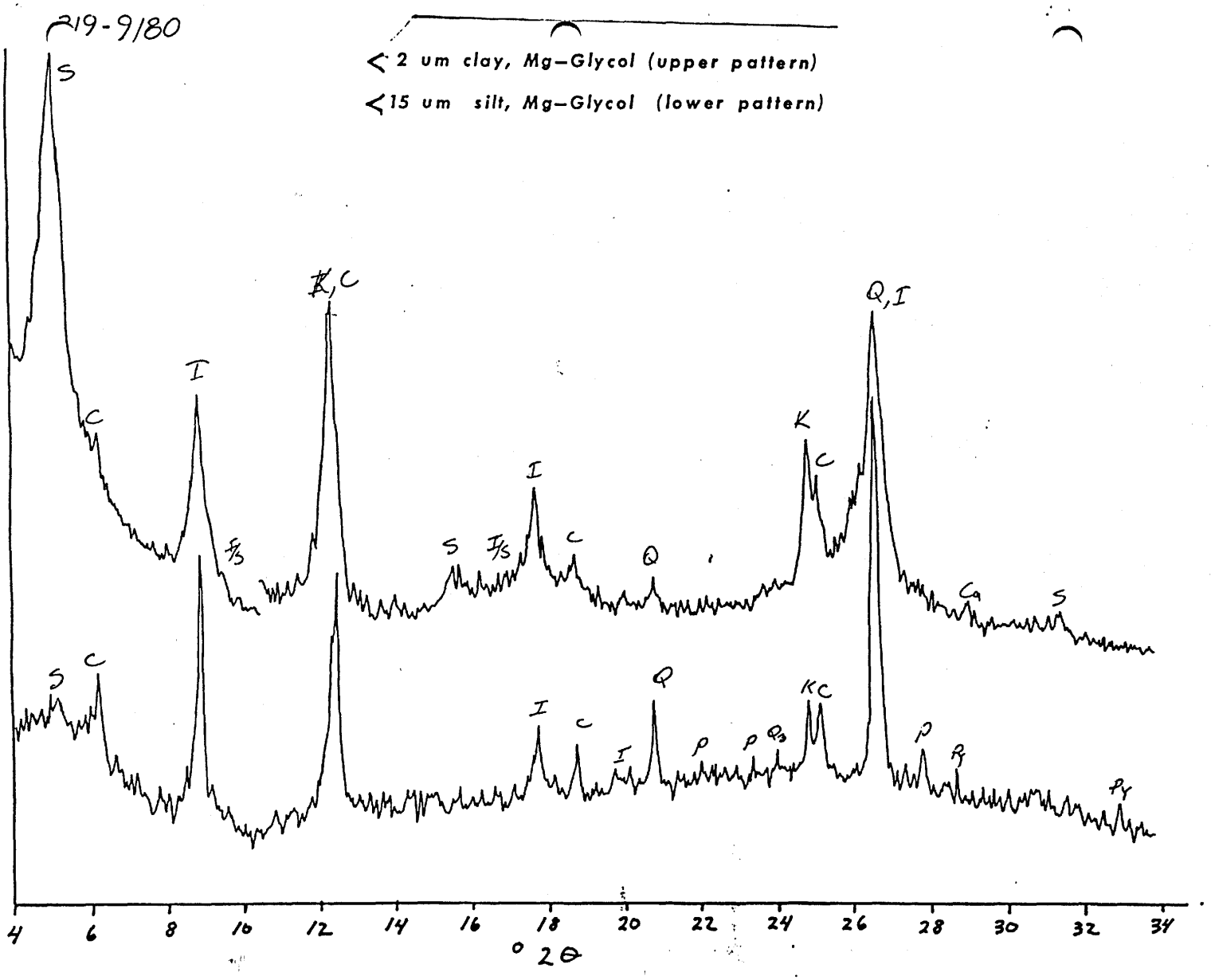


219-9090

< 2 um clay, Mg–Glycol (upper pattern)

< 15 um silt, Mg–Glycol (lower pattern)

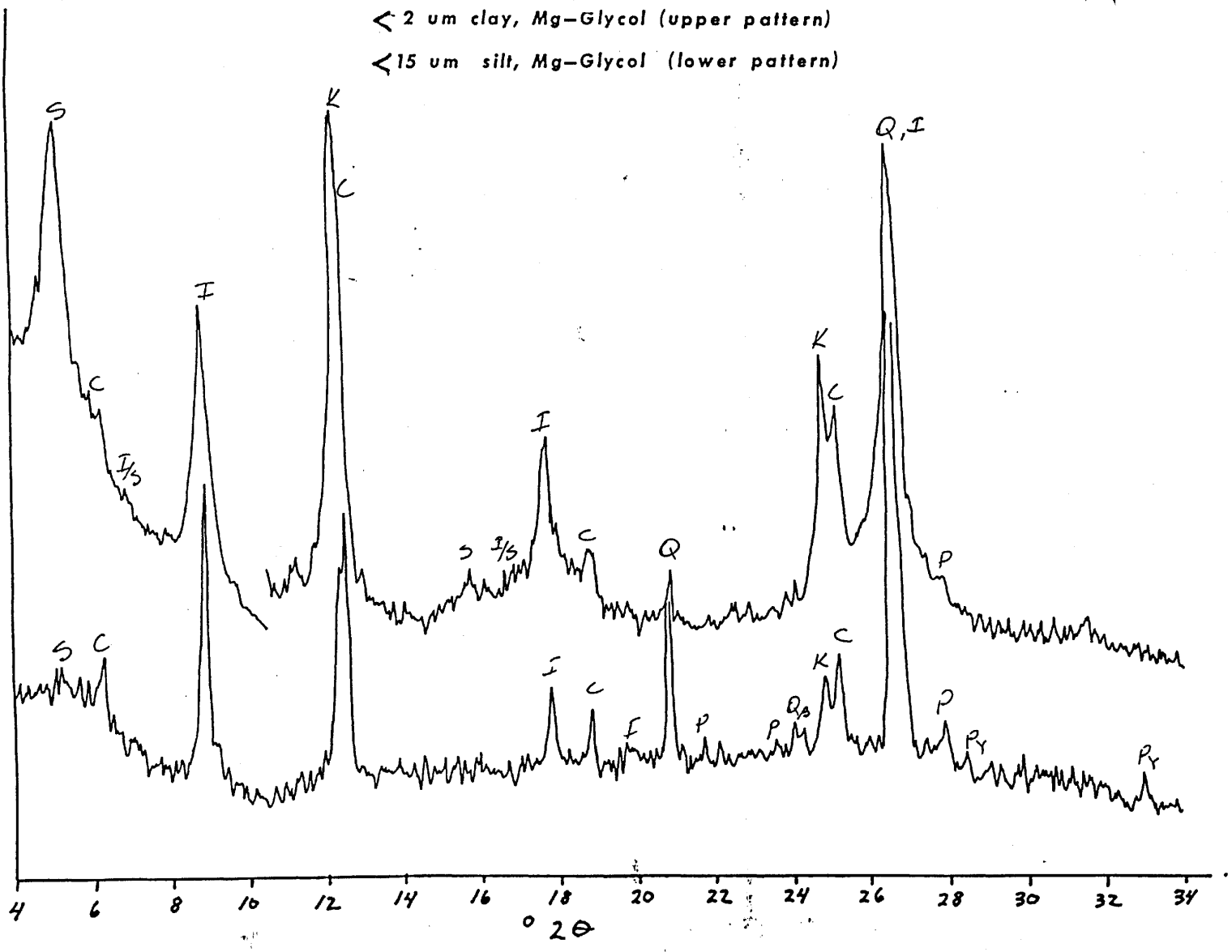


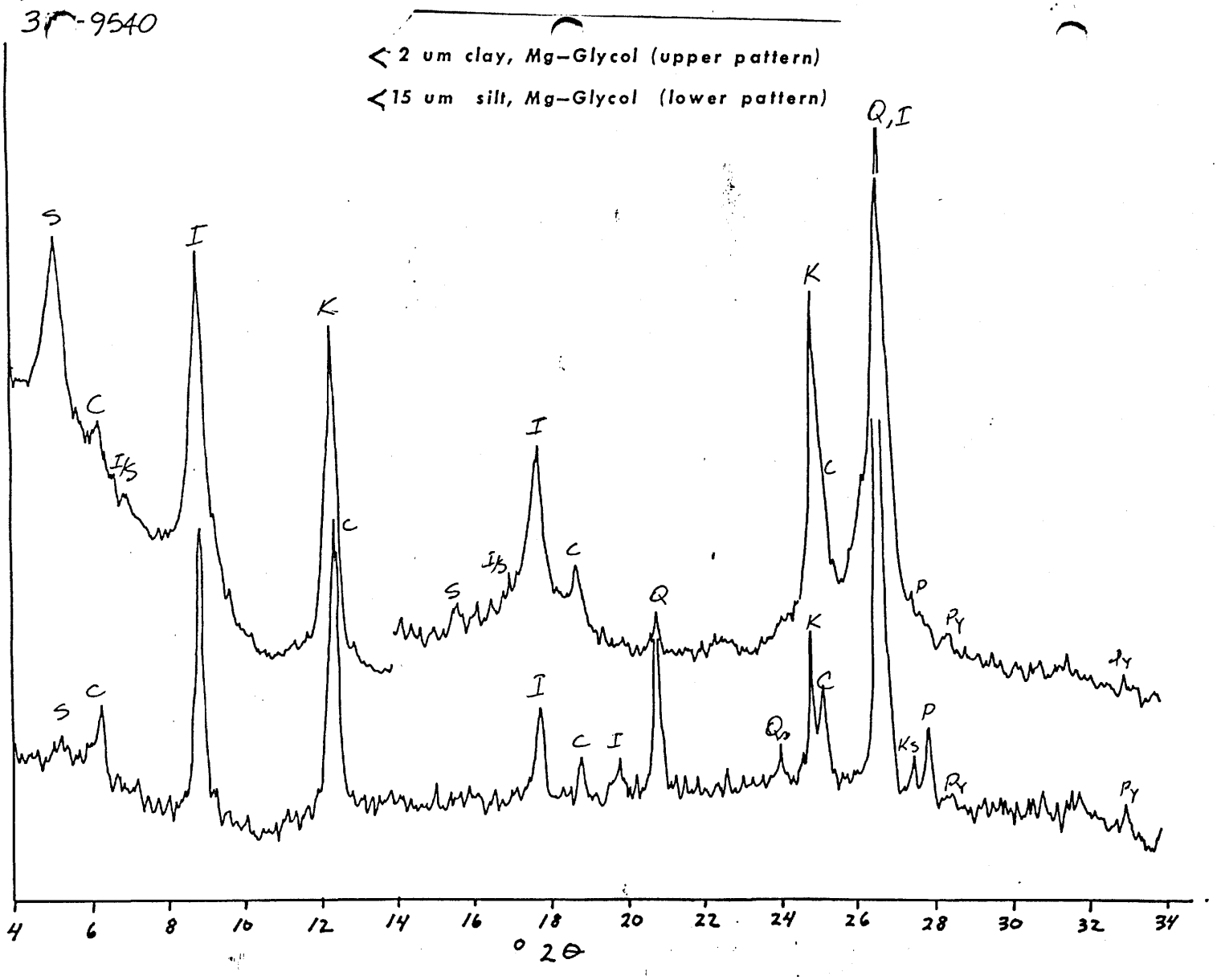

219-9/80
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
C
I
K,C
I/S
I
C
Q
K
C
Q,I
Ca
S
S
C
I
C
I
Q
P
P
P3
KC
P
P
P
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

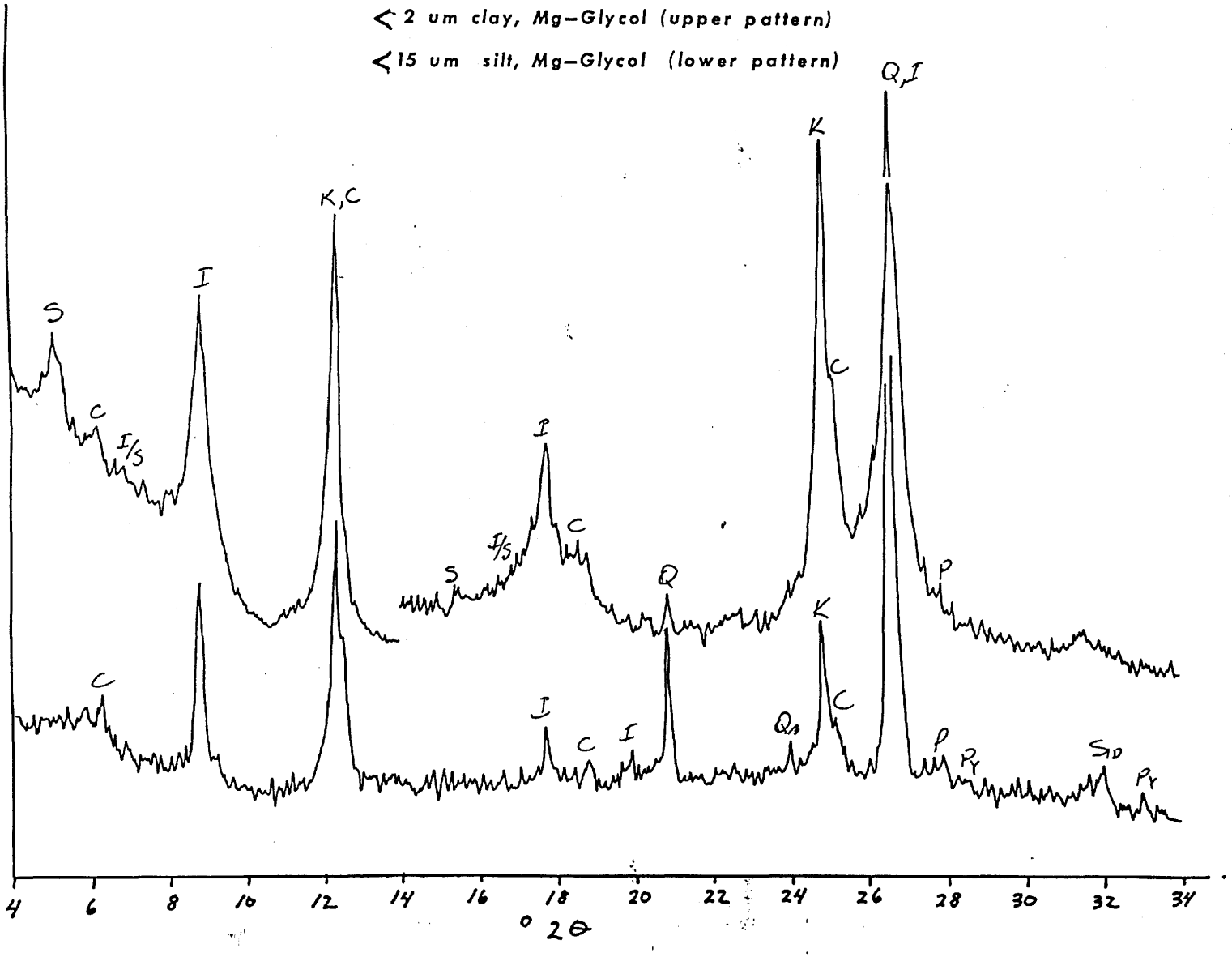
319-9300

< 2 um clay, Mg–Glycol (upper pattern)

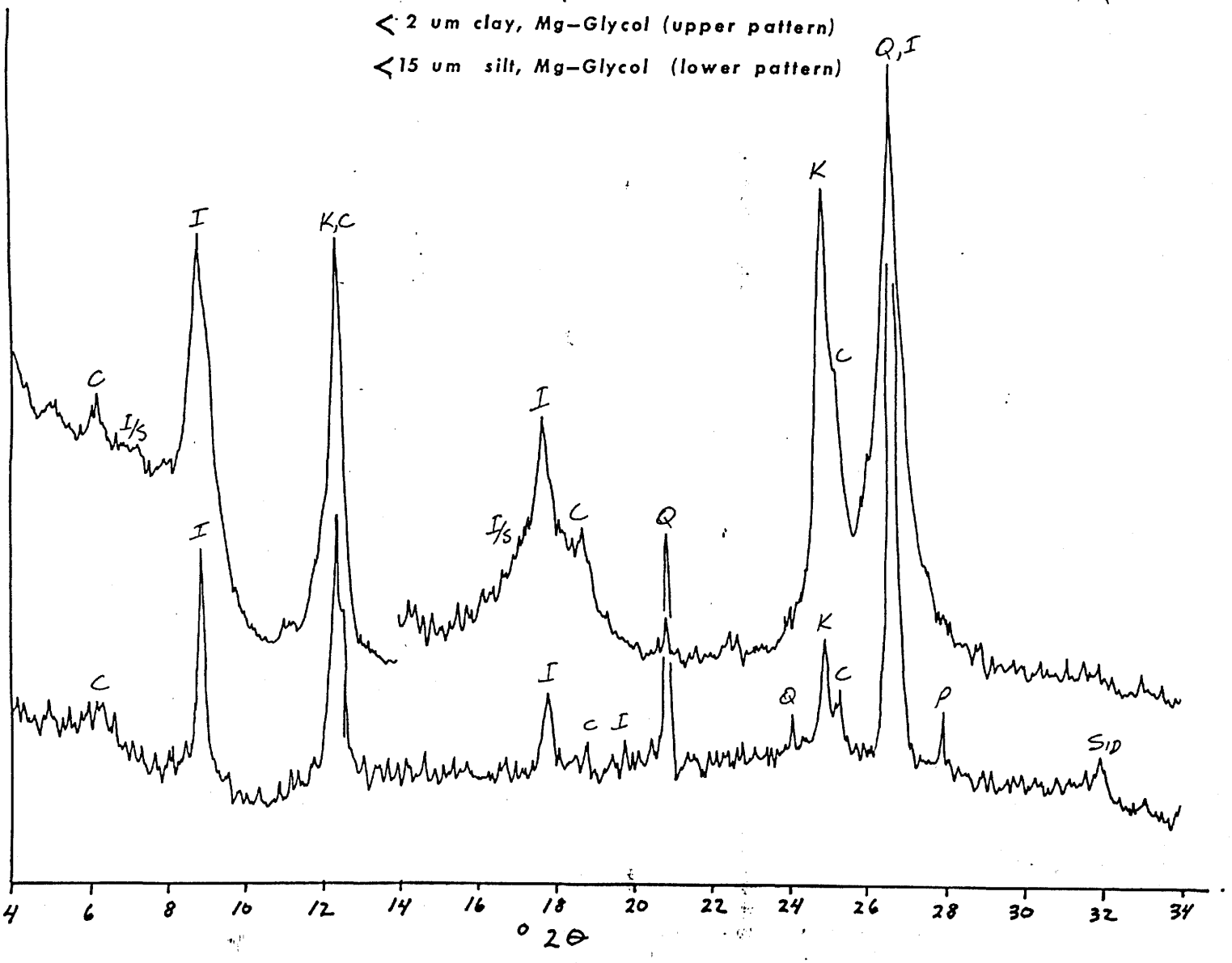
< 15 um silt, Mg–Glycol (lower pattern)

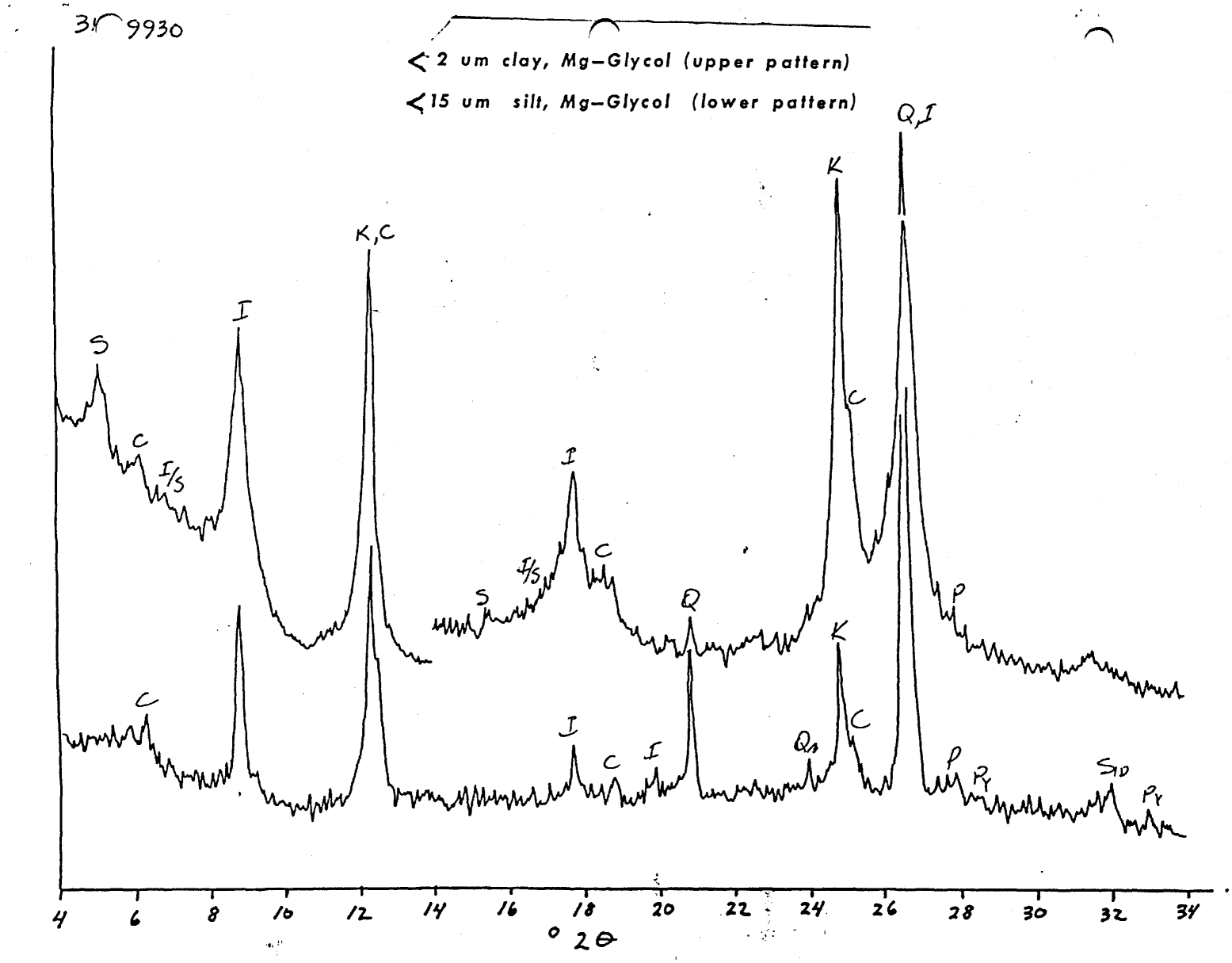


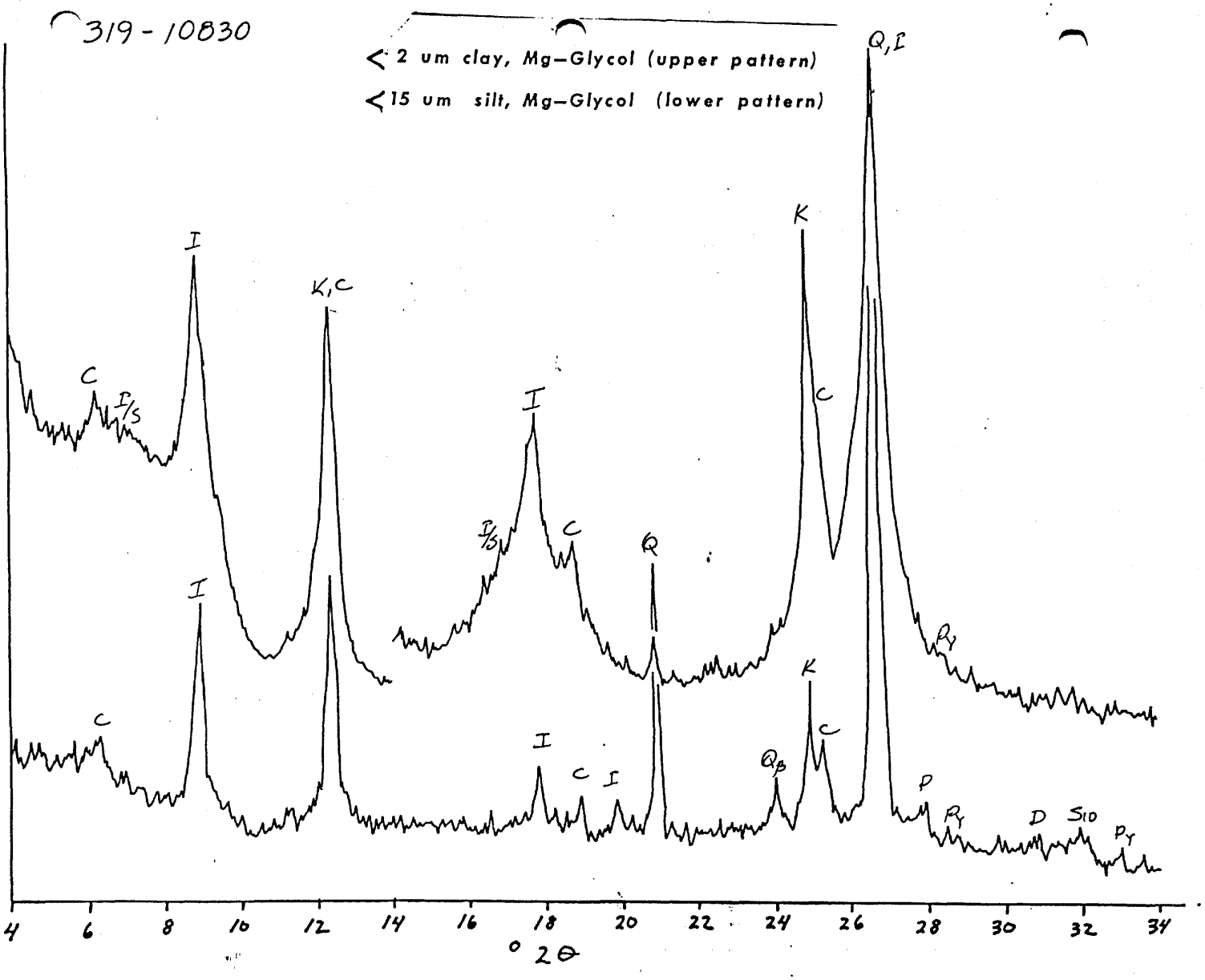

3F-9540
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
C
I/S
I
K
C
I
C
S
I/S
Q
K
C
Q,I
P
Py
Py
S
C
I
C
I
Qp
K
C
Ks
P
Py
Py
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


31 9930
< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
S
C
I/S
I
K,C
S
I/S
I
C
Q
K
C
Q,I
P
C
I
C
I
Q
Q
K
C
P
P
P
S
P
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

31-10440


< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
C
I/S
I
K,C
I
I/S
C
Q
K
C
Q,I
C
I
c I
Q
K
C
P
S,D
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


3r 9930
< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
S
C
I/S
I
K,C
S
I/S
I
C
Q
K
C
Q,I
P
C
I
C
I
Qs
K
C
P
Pr
Sw
Pr
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


319 - 10830
< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
Q,I
K
I
K,C
C
I/S
I
C
I/S
Q
C
I
K
C
Qβ
C
I
C
I
P
Qγ
D
S10
Pγ
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

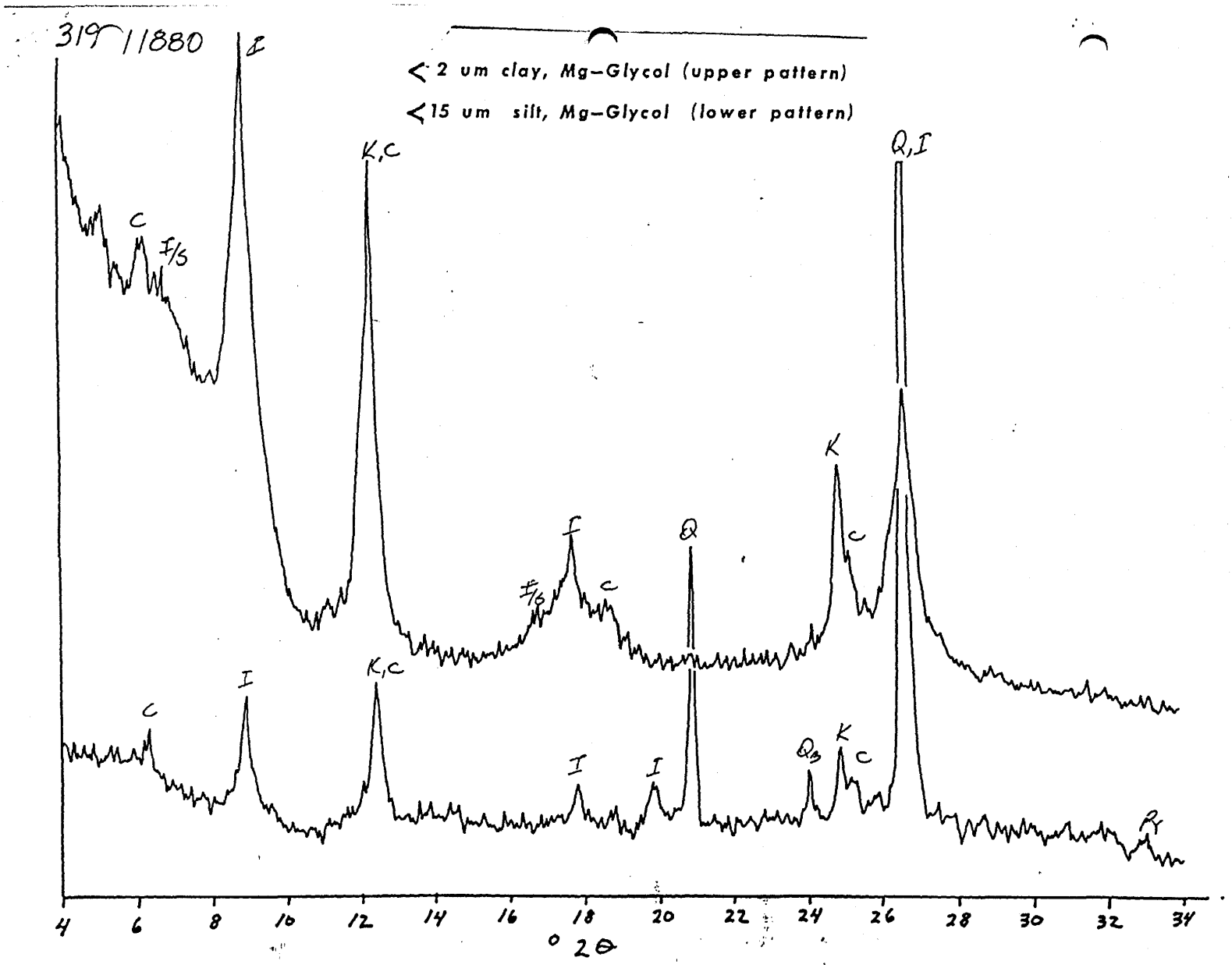
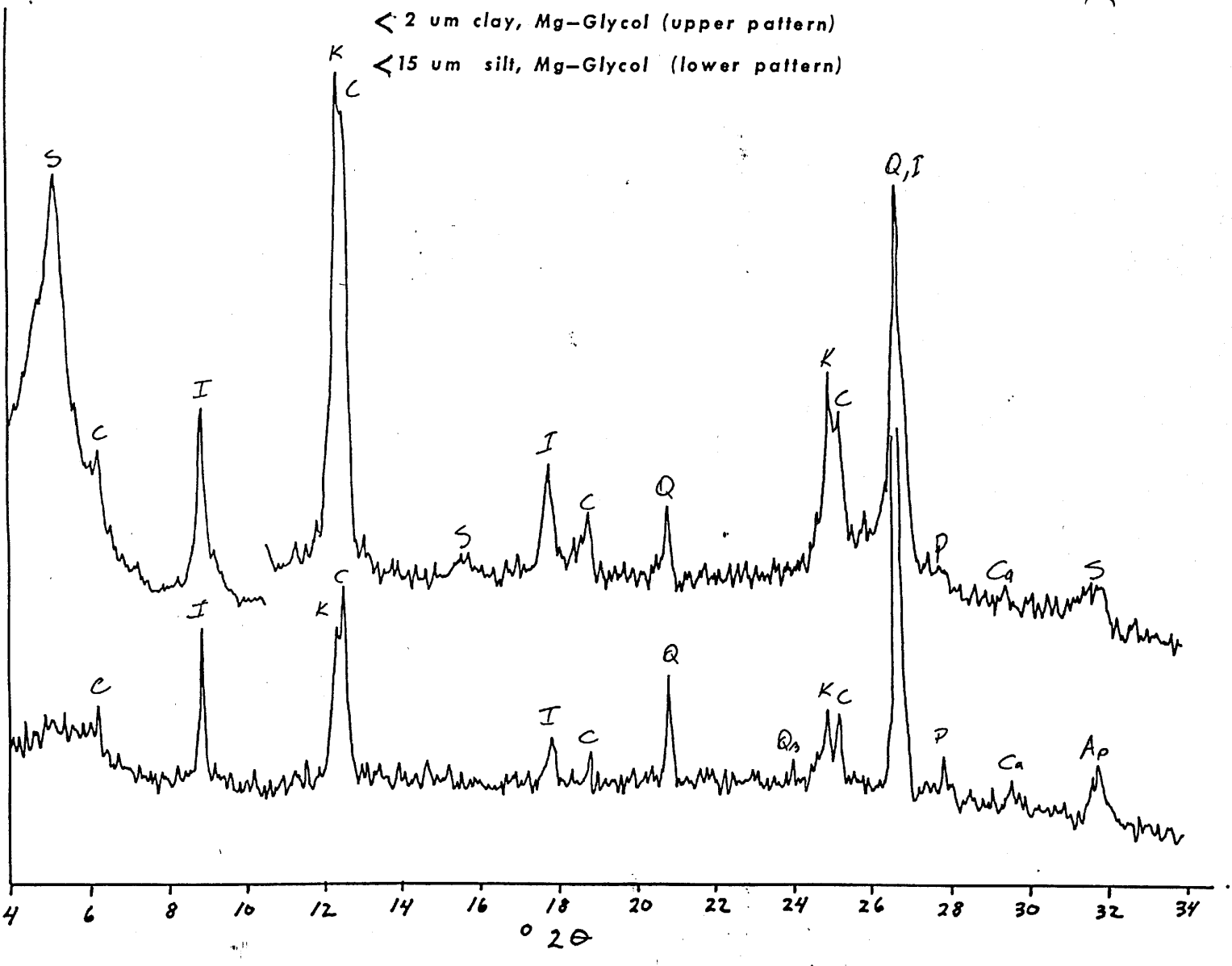

319 / 11880
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
I
K,C
C
F/S
Q,I
K
F
Q
C
F/S
C
I
K,C
C
I
I
Q
K
C
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

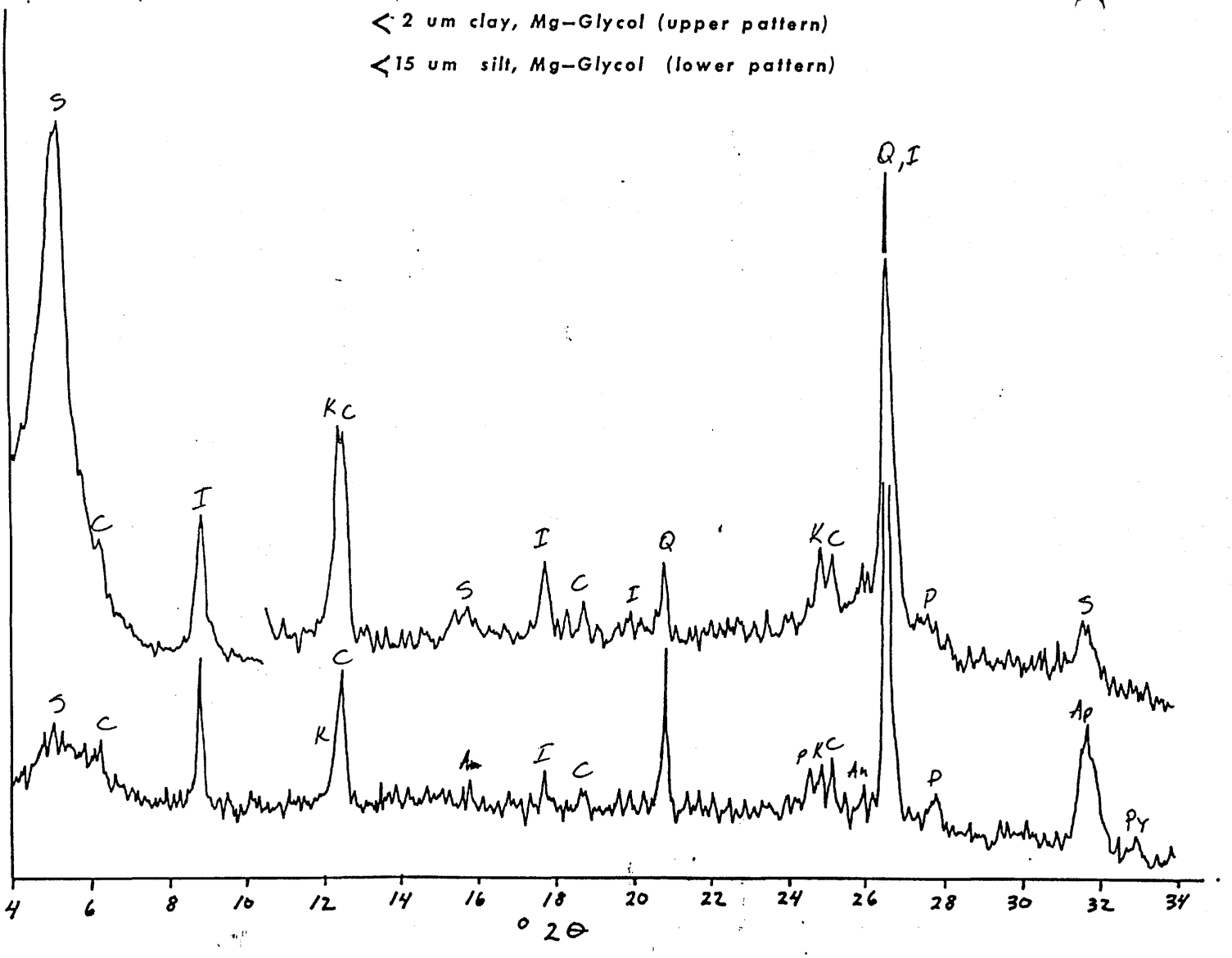
Table 22: Clay mineralogy of samples from Arco East Bay St. #1 well.

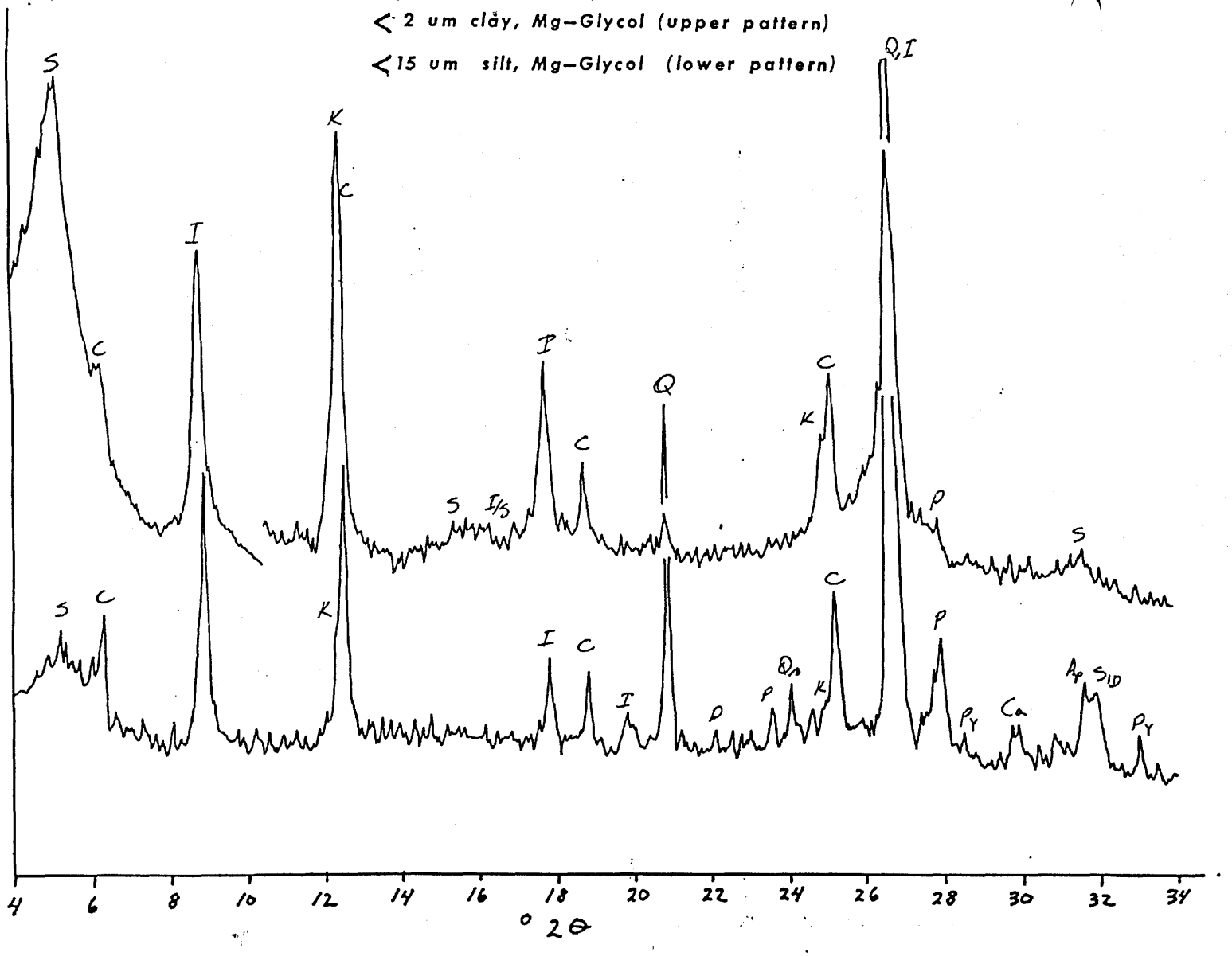
ARCO EAST BAY STATE #1

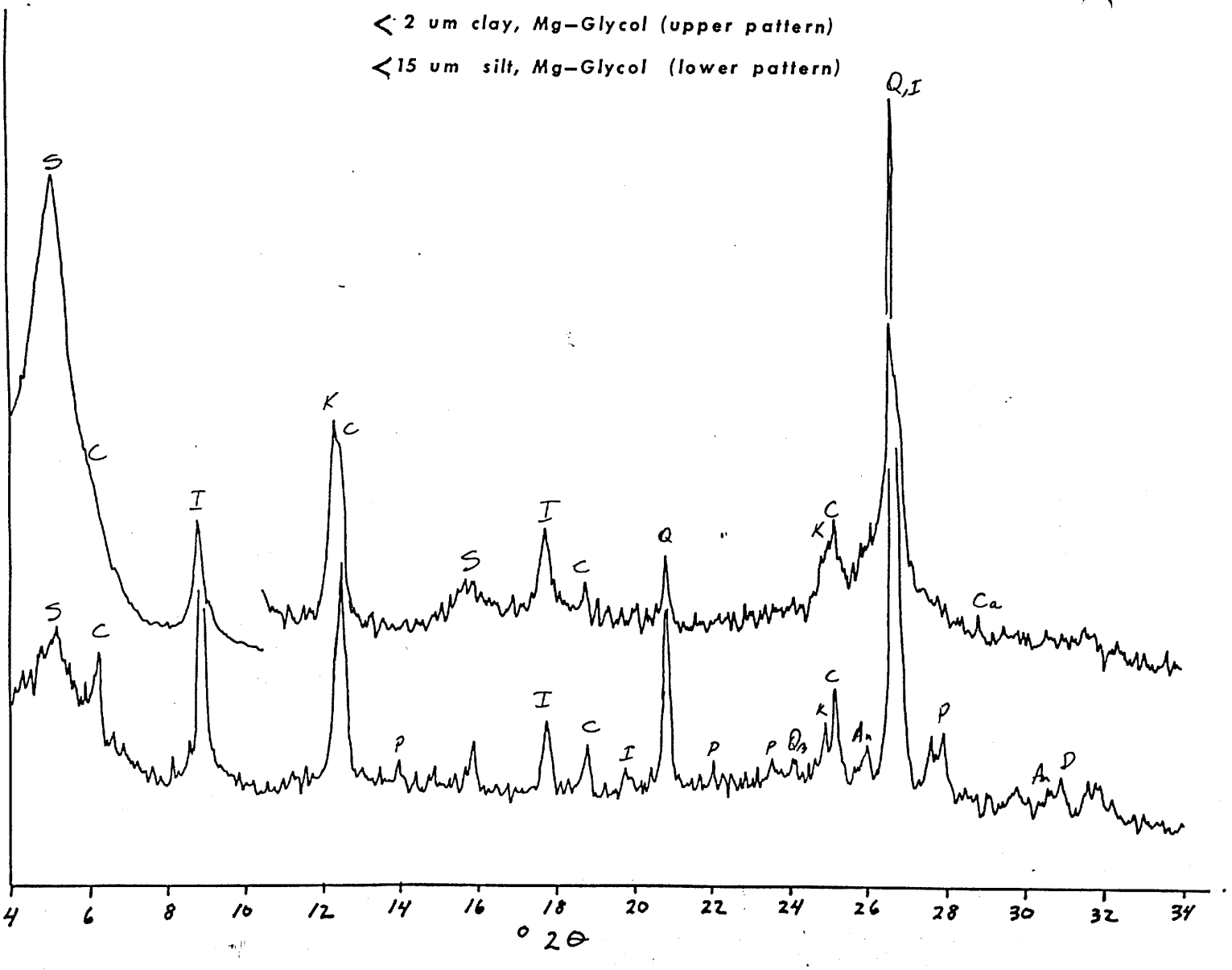
DEPTH FEET	STYPE	SMECTITE	CHLORITE	MIXED LAYER I/S	ILLITE	KAOLINITE	OTHER
7530	C	MOD	MOD	-	MOD	MOD	Q1,P,CA,MDM,BULKXRD,COAL
7530-S	C	TR	MOD	-	MIN	MIN	Q2,CA,AP
7800	C	MAJ	MOD	-	MOD	MOD	Q2,P,MDM,BULKXRD
7800-S	C	MIN	MIN	-	MOD	MIN	Q3,P,AP1,AN,PY
8370	C	MOD	MOD	MIN	MOD	MOD	Q1,P,MDM,BULKXRD
8370-S	C	MIN	MOD	-	MOD	TR	Q3,P2,CA,AP1,SID1,PY1
8550	C	MAJ	MIN	-	MOD	MIN	Q1,CA?,MDM,BULKXRD
8550-S	C	MIN	MOD	-	MOD	MIN	Q3,AN1,P1,D,
9010	C	MAJ	MIN	-	MOD	MIN	Q1,TUFF.BK/GR.SH.
9010-S	C	MIN	MOD	-	MOD	MIN	Q3,P,CA
9180	C	MIN	-	MOD	MAJ	MOD	Q1,P,PY,TUFF.BK.SH, DM
9180-S	C	-	-	-	MOD	MIN	Q3,P,D,PY
9280	C	MIN	-	MOD	MAJ	MOD	Q1,PY,BK.ORG.SH. DM
9280-S	C	-	-	-	MIN	MIN	Q3,P,CA1,D,PY1
9370	C	MIN	-	MOD	MAJ	MAJ	Q2,CA1,P1,TUFF.BK.SH. DM
9370-S	C	-	-	-	MOD	MIN	Q3,P,CA2,D,PY1
9440	C	MIN	-	MOD	MOD	MAJ	Q,BK.ORG.SH. DM
9440-S	C	-	-	-	MIN	MOD	Q3,CA1,PY1
9480	C	MIN	-	MOD	MOD	MAJ	Q2,PY1,BULKXRD
9480-S	C	-	-	-	MIN	MOD	Q3,CA,PY1

Definitions: TR = less than 3%, MIN = 3 - 12%, MOD = 13 - 35%, MAJ = >35%. Other mineral abbreviations: Q = quartz, P = plagioclase, KS = k-spar, AN = analcime, HC =heulandite-clinoptilolite, CA = calcite, D = dolomite, AP = apatite, SID = siderite, PY = pyrite, BA = barite. 1 = weak, 2 = moderate, 3 = strong, nothing = trace. MDM = mostly drill mud, BK.SH. = black shale, GR. = gray, SIS. = siltstone, TUFF. = tuffaceous, ANK = ankerite. Also: STYPE = sample type, C = cuttings, CC = core, SW = side wall, S = silt.


32-7530
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
C
I
K
C
S
I
C
Q
K
C
Q,I
P
Ca
S
C
I
K
C
I
C
Q
Qs
K
C
P
Ca
Ap
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


26-7800
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
C
I
K C
S
I
C
I
Q
K C
Q, I
P
S
S
C
K
C
I
C
P K C
P
Ap
Py
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

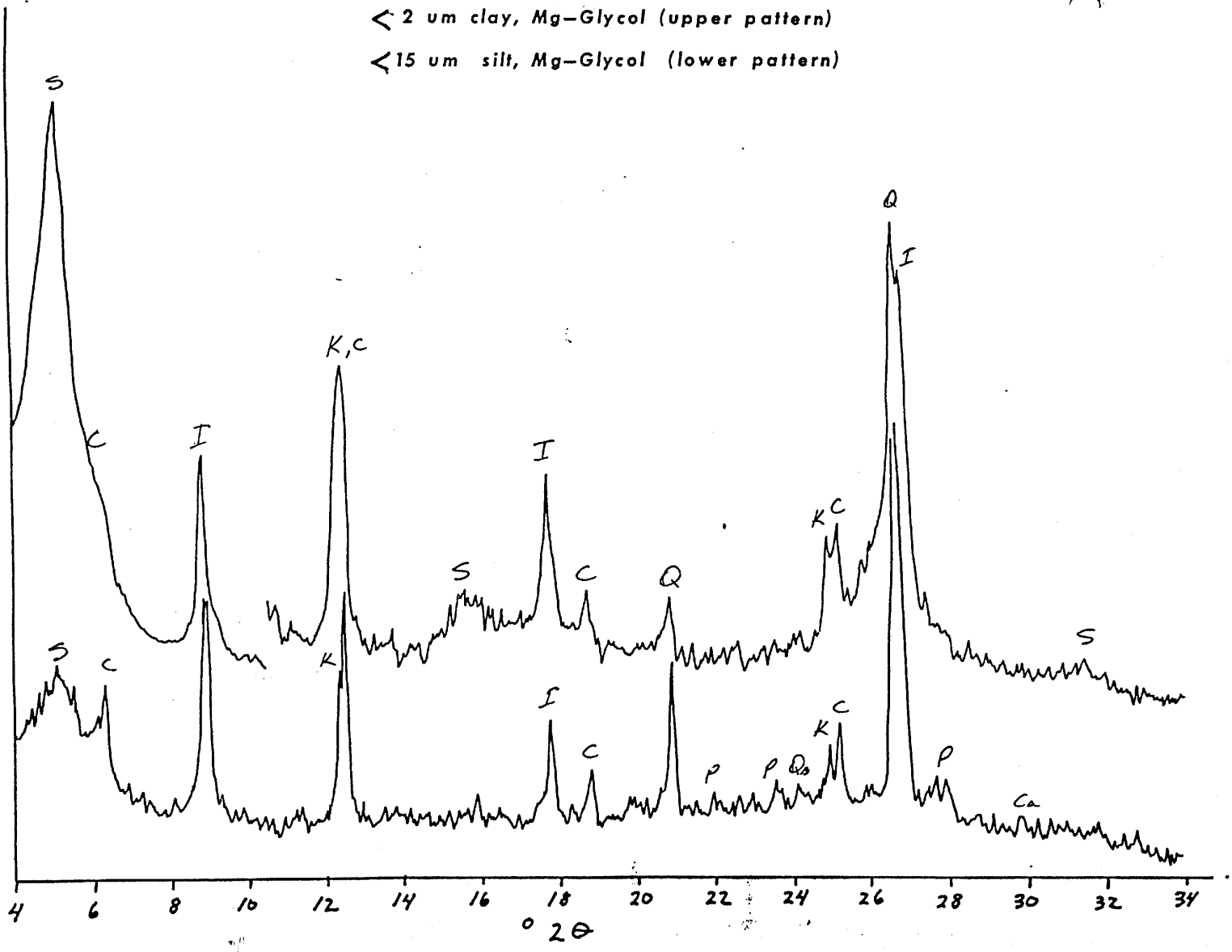

32-8370
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
C
I
K
C
I/S
I
C
Q
K
C
Q,I
P
S
S
C
K
I
C
I
P
P
Q/P
K
C
P
P
Ca
Ap
S/D
P
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

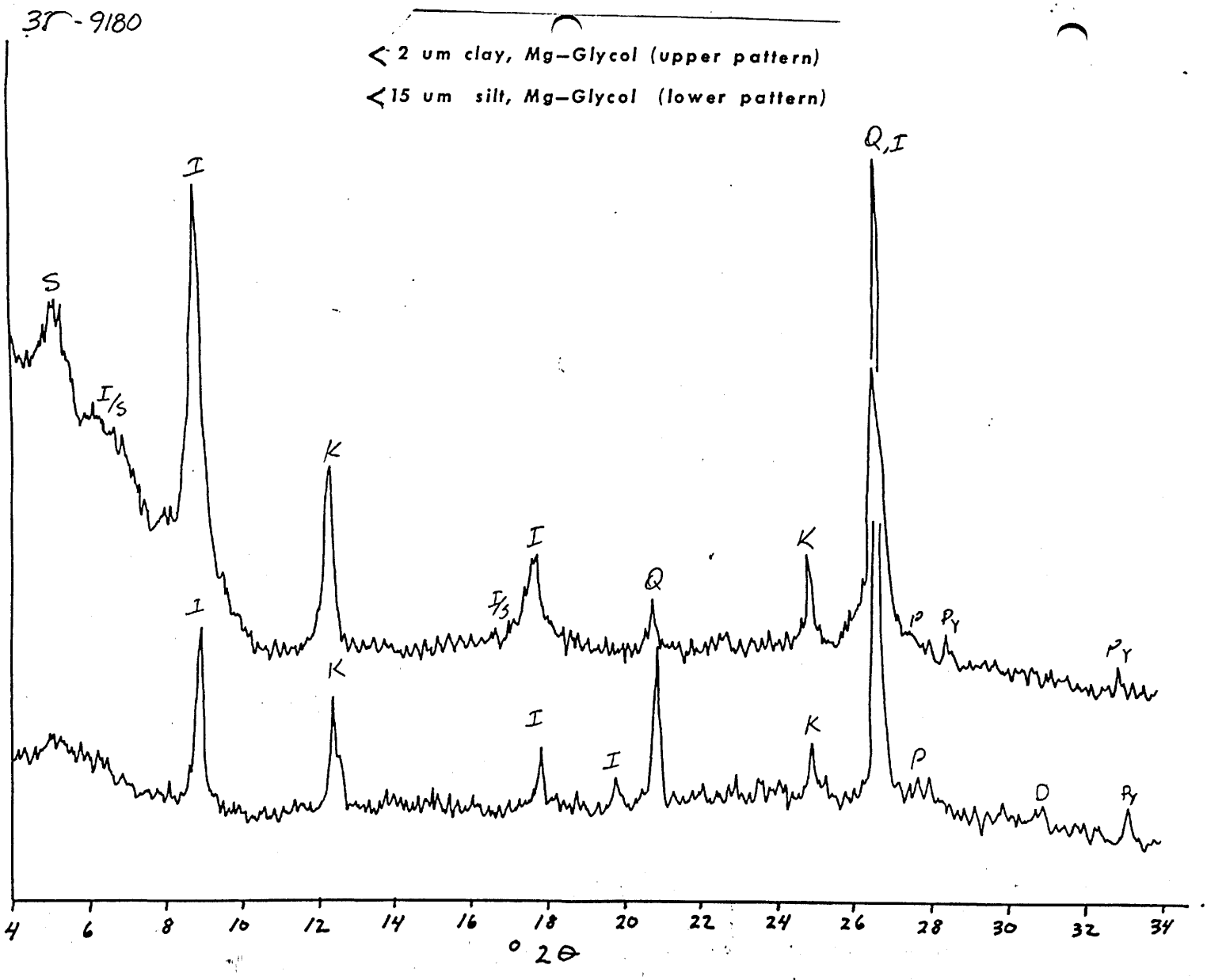

3268550
< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
Q,I
S
C
I
K
C
S
I
C
Q
K
C
Ca
S
C
I
C
P
I
C
P
P
P
Q
K
C
A
P
A
D
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

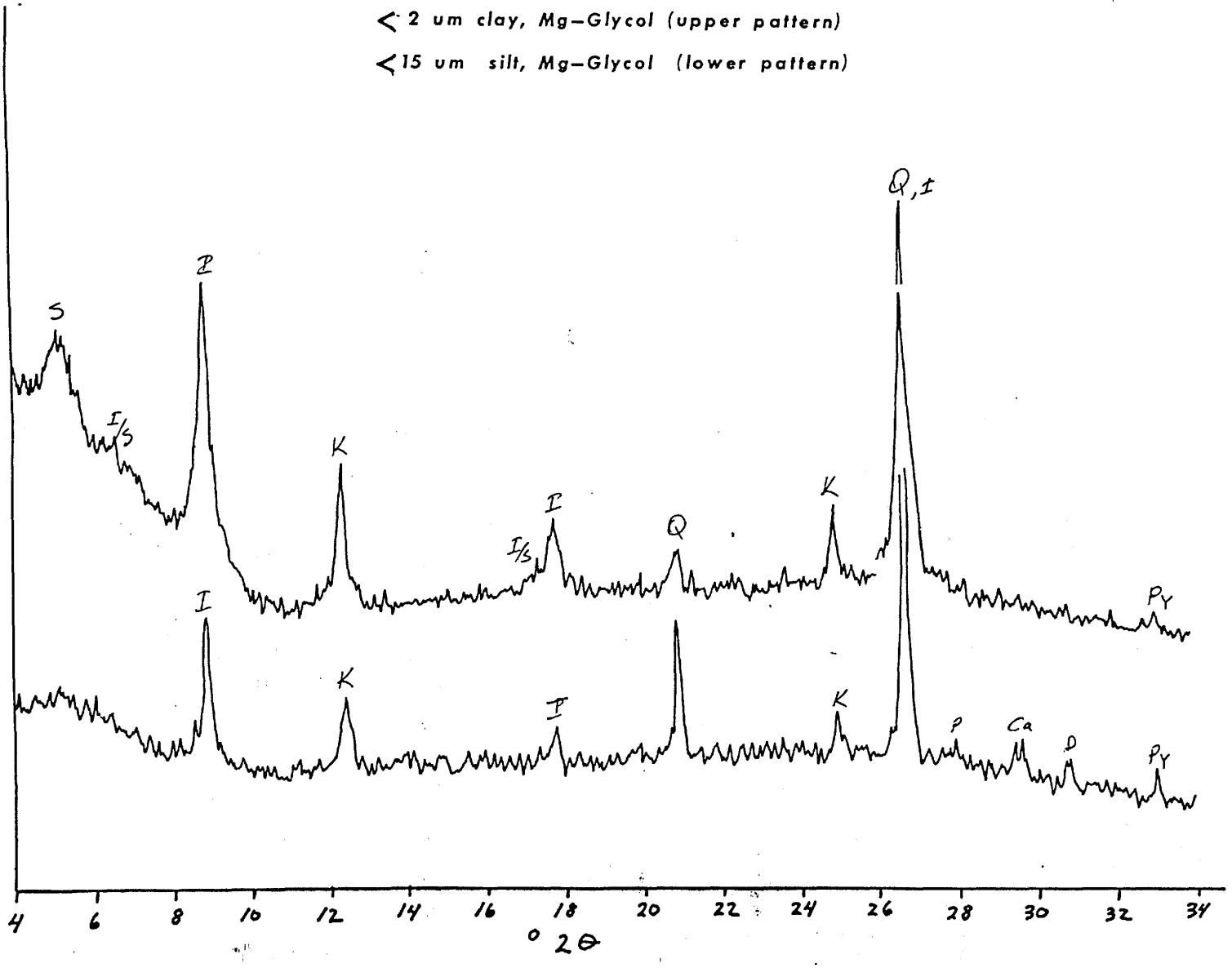
326-010

< 2 um clay, Mg–Glycol (upper pattern)

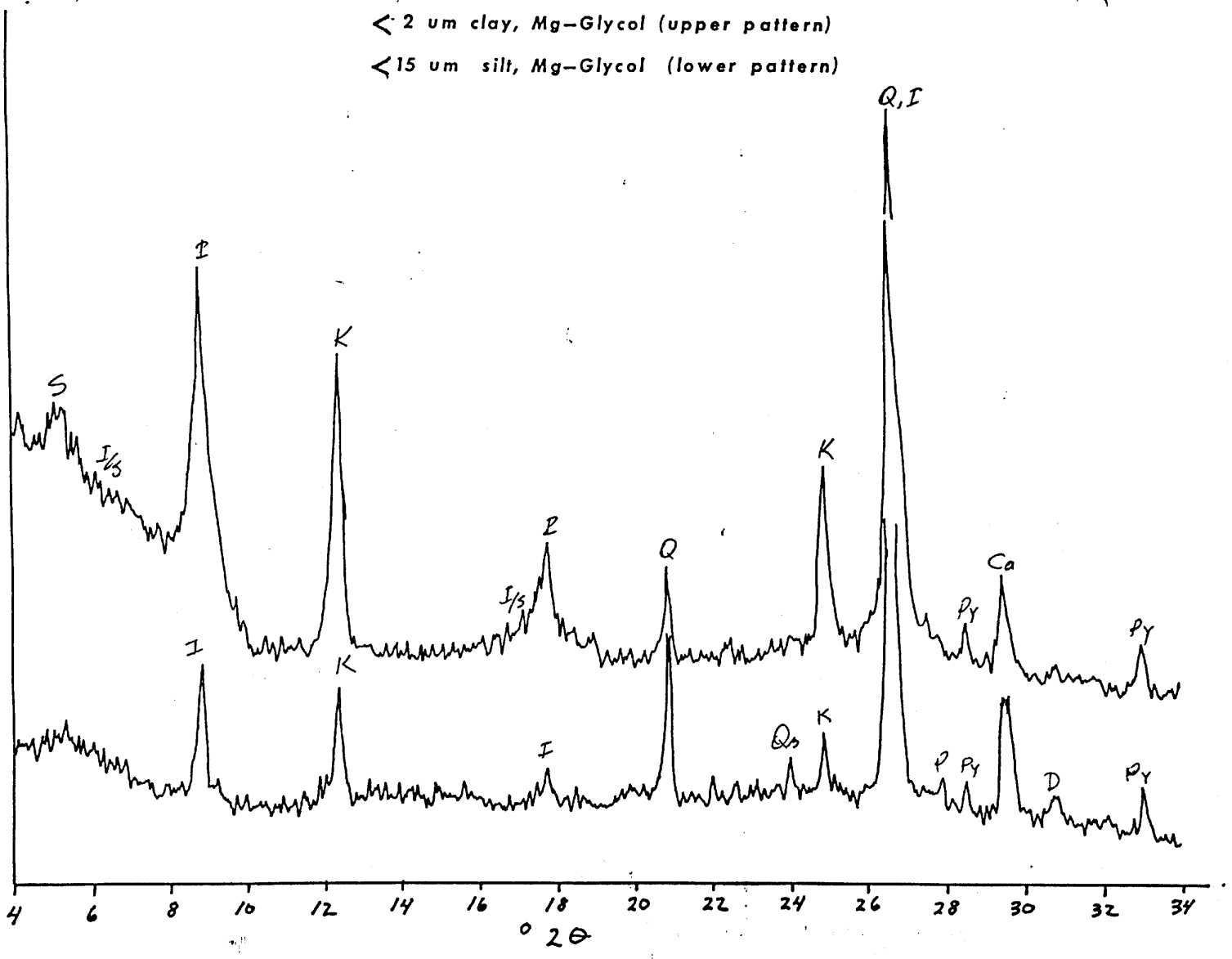
< 15 um silt, Mg–Glycol (lower pattern)




3S-9180
< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
S
I/S
I
K
I/S
I
Q
K
Q,I
I
K
I
I
K
P
D
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


3T-9280
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
S
I/S
I
K
I/S
I
Q
K
Q, I
Py
I
K
I
K
P
Ca
D
Py
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

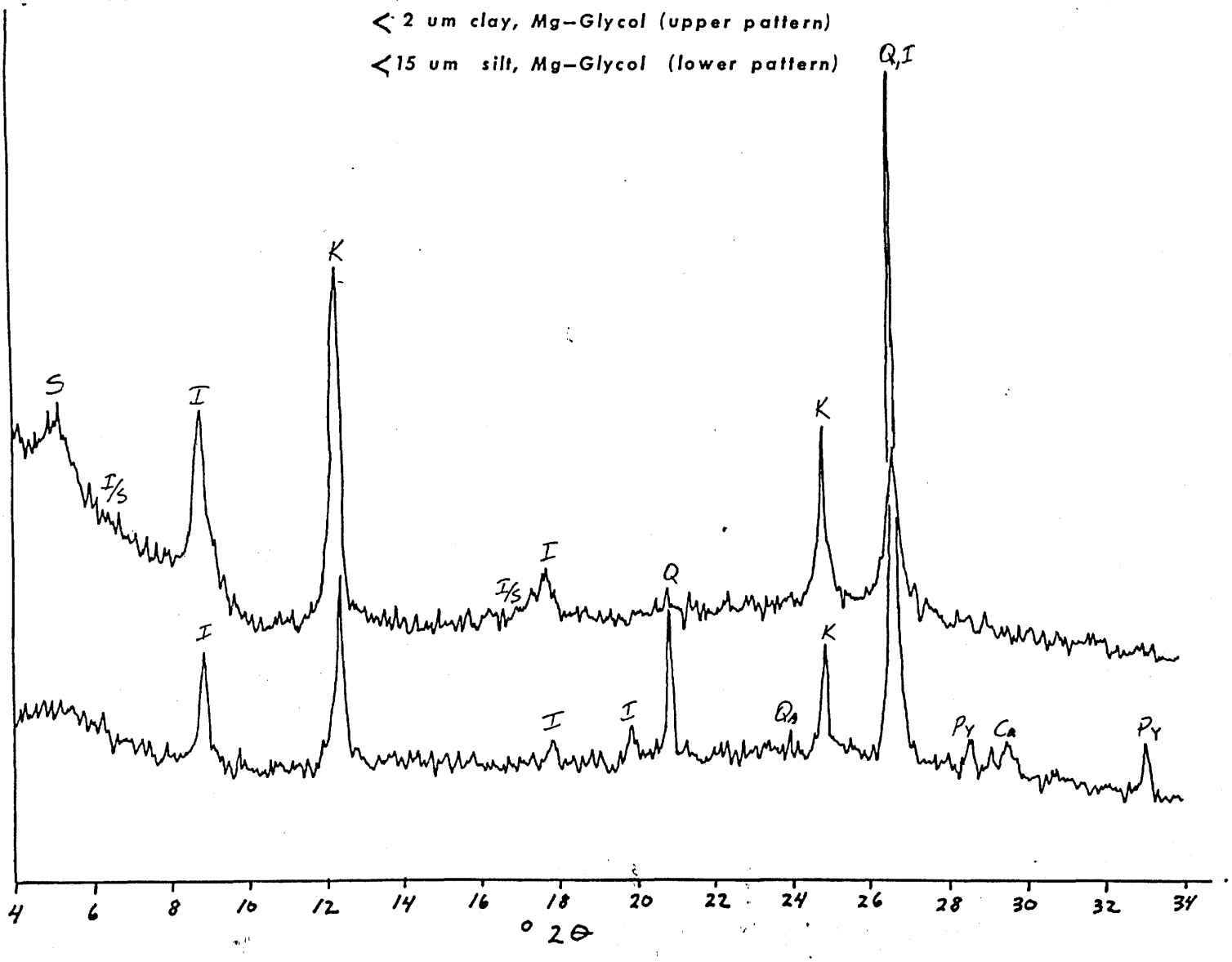
3260-3370


< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
S
I/S
I
K
I/S
I
Q
K
Q,I
Ca
Py
Py
I
K
I
Qs
K
P
Py
D
Py
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

38-9440

< 2 um clay, Mg–Glycol (upper pattern)

< 15 um silt, Mg–Glycol (lower pattern)



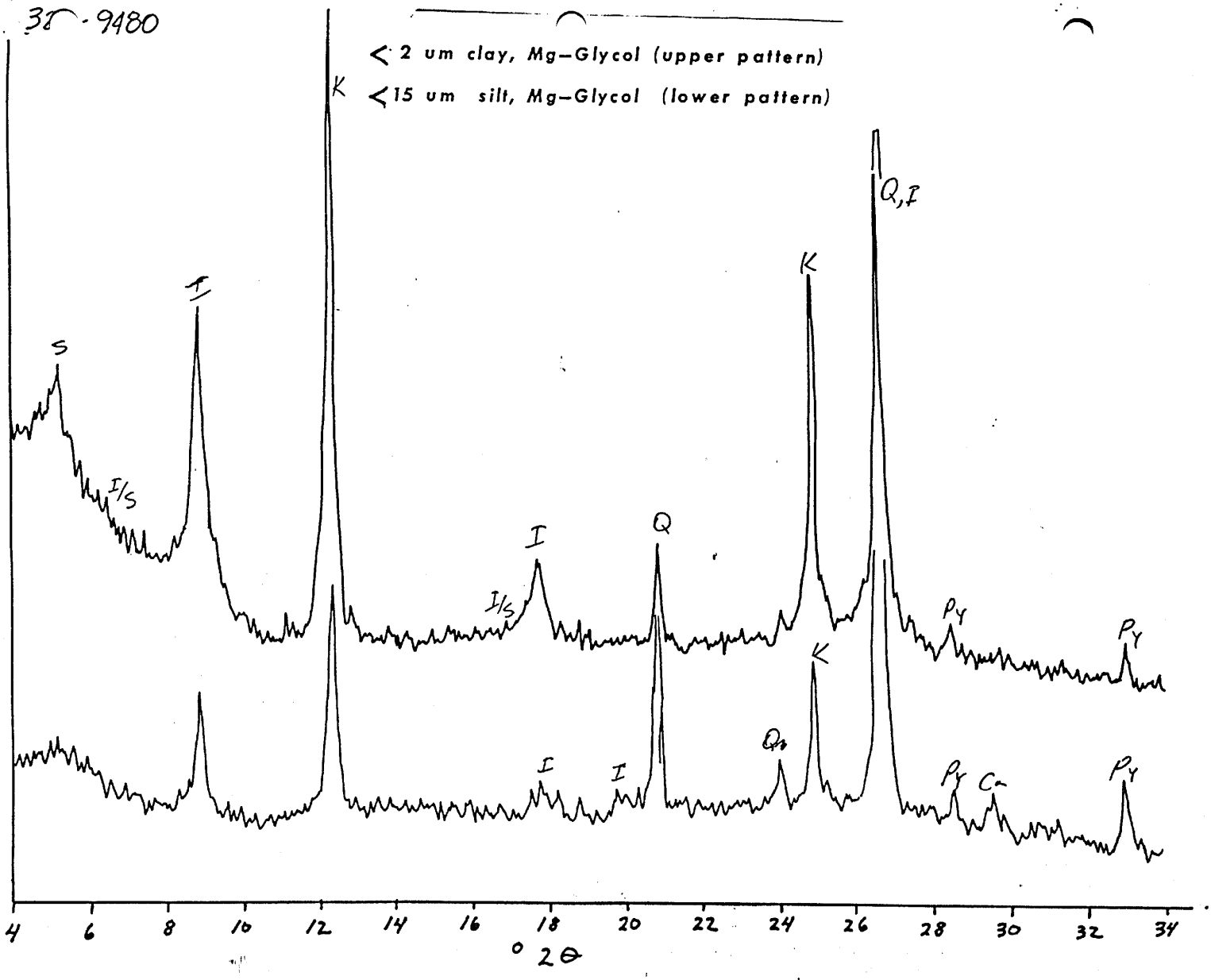
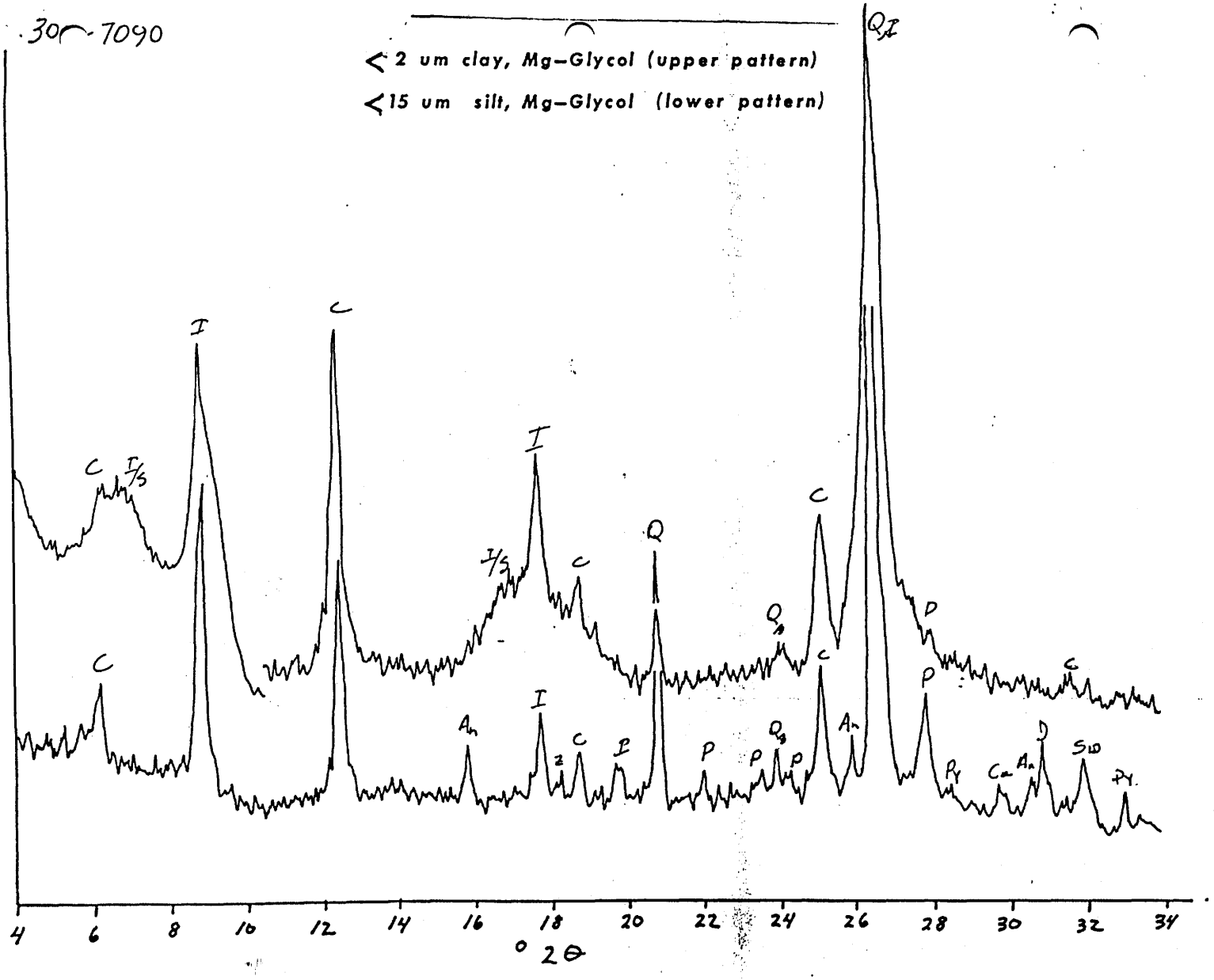

38-9480
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
K
Q,I
K
S
I
I/S
I
Q
I/S
K
Py
Py
I
I
Qtr
Py
Ca
Py
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

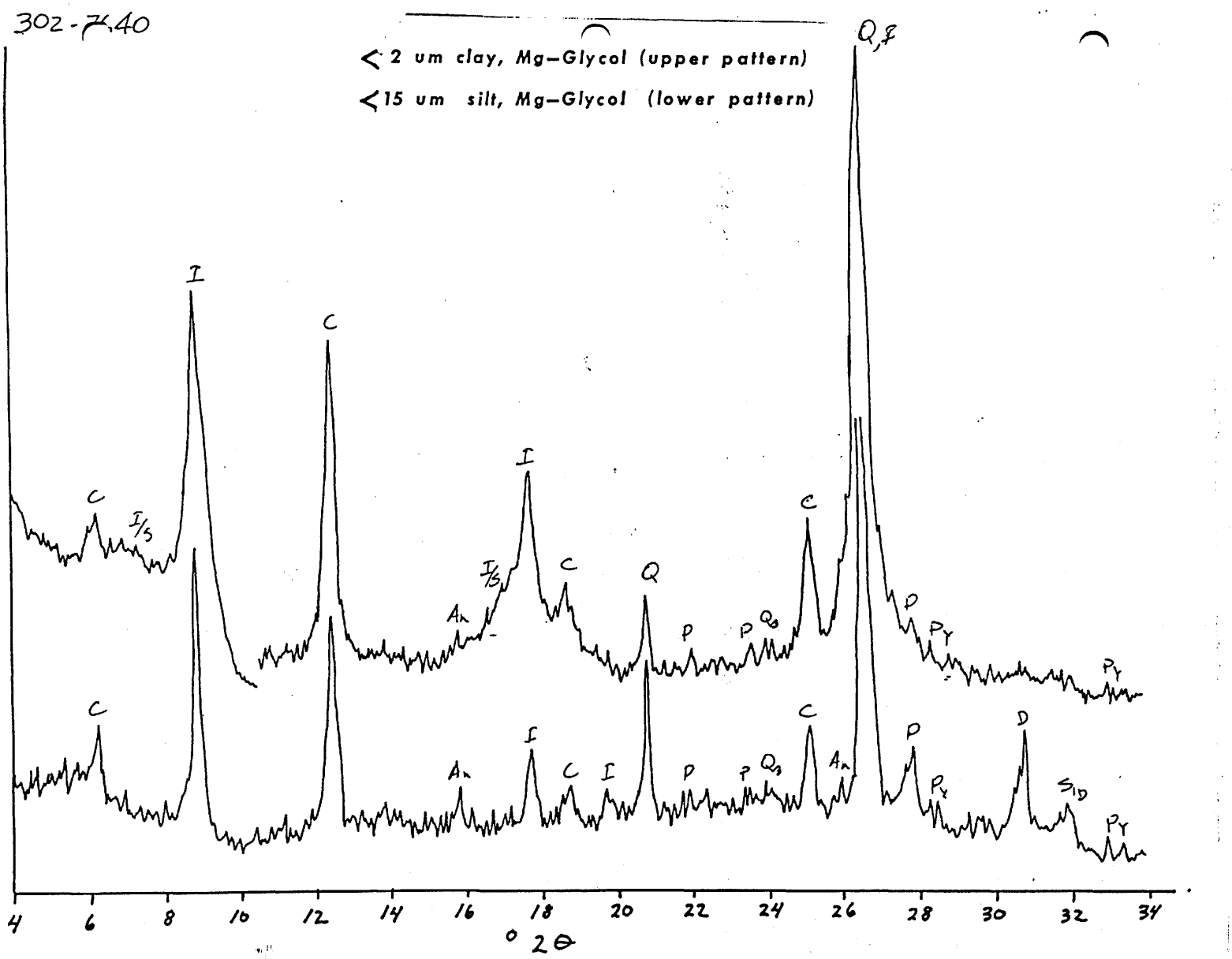
Table 23: Clay mineralogy of samples from Mobil Echooka Unit #1 well.

MOBIL ECHOOKA UNIT #1

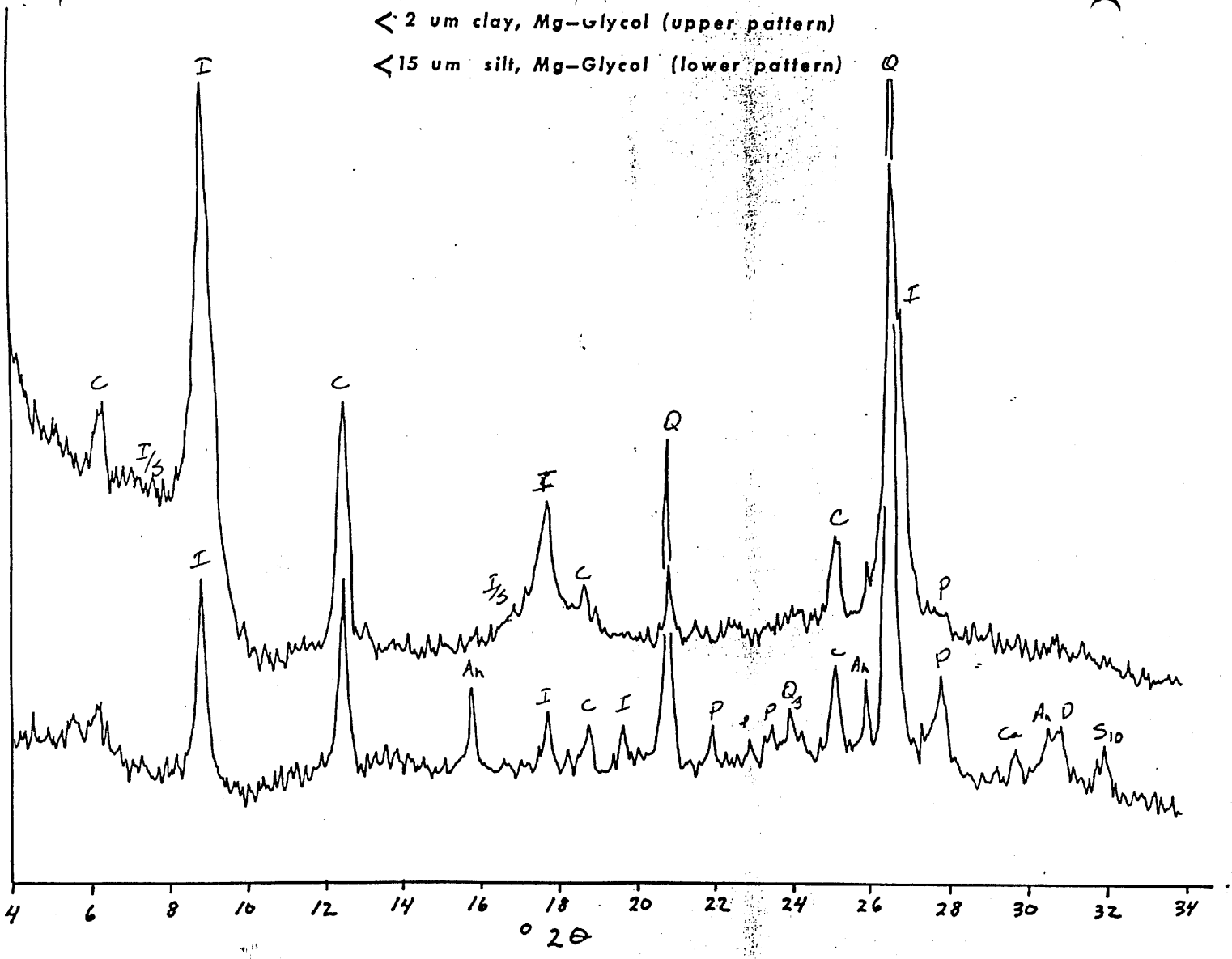
DEPTH FEET	STYPE	SMECTITE	CHLORITE	MIXED LAYER I/S	ILLITE	KAOLINITE	OTHER
7090	C	-	MOD	MOD	MAJ	-	Q2,P,BK.SIS/SH.
7090-S	C	-	MOD	-	MOD	-	Q3,AN1,P2,CA,D1,SID1,PY1
7640	C	-	MAJ	MOD	MAJ	-	Q2,P,PY,BK.SH/SIS.
7640-S	C	-	MOD	-	MOD	-	Q3,P1,AN,D1,SID,PY
8220	C	-	MOD	MOD	MAJ	-	Q2,P,BK.SH/SIS.
8220-S	C	-	MOD	-	MOD	-	Q3,AN1,P1,CA,D1,SID1
8900	C	-	MOD	MOD	MAJ	-	Q2,P,D,MIXED CUT.
8900-S	C	-	MOD	-	MOD	-	Q3,P2,AN,D2,SID1,PY
9320	C	-	MOD	MOD	MAJ	-	Q2,P,TUFF.BK.SH.
9320-S	C	-	MIN	-	MOD	-	Q3,P1,D1,SID1,PY
10040	C	-	MOD	MOD	MAJ	-	Q2,P,CA,D,BK.SH/DIRTY SS
10040-S	C	-	MAJ	-	MAJ	-	Q3,PS,AN,CA,ANK2,D2,SID1,PY
10650	C	-	MOD	MOD	MAJ	-	Q1,P,BK.SH.
10650-S	C	-	MIN	-	MIN	-	Q3,P1,ANK,PY
11415	C	-	MOD	MAJ	MAJ	-	Q1,BK.SIS/SH
11415-S	C	-	MIN	-	MOD	-	Q3,P2,D,PY1
12145	C	-	MOD	MOD	MAJ	-	Q1,P,BK.SH.
12145-S	C	-	MAJ	-	MAJ	-	Q3,P1,PY1
12350	C	-	MOD	MOD	MAJ	-	Q1,P,BK.SH/SIS
12350-S	C	-	MAJ	-	MAJ	-	Q3,P2,CA,D,PY1
12575	C	-	MOD	MAJ	MAJ	-	Q1,BK.SH.
12575-S	C	-	MOD	-	MOD	-	Q2,P1,D1,PY1
13005	C	-	MOD	MOD	MAJ	MOD	Q1,P,BK.SH.
13005-S	C	-	MIN	-	MOD	MIN	Q3,P1,PY

Definitions: TR = less than 3%, MIN = 3 - 12%, MOD = 13 - 35%, MAJ = >35%. Other mineral abbreviations: Q = quartz, P = plagioclase, KS = k-spar, AN = analcime, HC =heulandite-clinoptilolite, CA = calcite, D = dolomite, AP = apatite, SID = siderite, PY = pyrite, BA = barite. 1 = weak, 2 = moderate, 3 = strong, nothing = trace. MDM = mostly drill mud, BK.SH. = black shale, GR. = gray, SIS. = siltstone, TUFF. = tuffaceous, ANK = ankerite. Also: STYPE = sample type, C = cuttings, CC = core, SW = side wall, S = silt.


30-7090
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


302-7.40
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
Q,F
I
C
I/S
A
P
Py
Q
D
SID
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

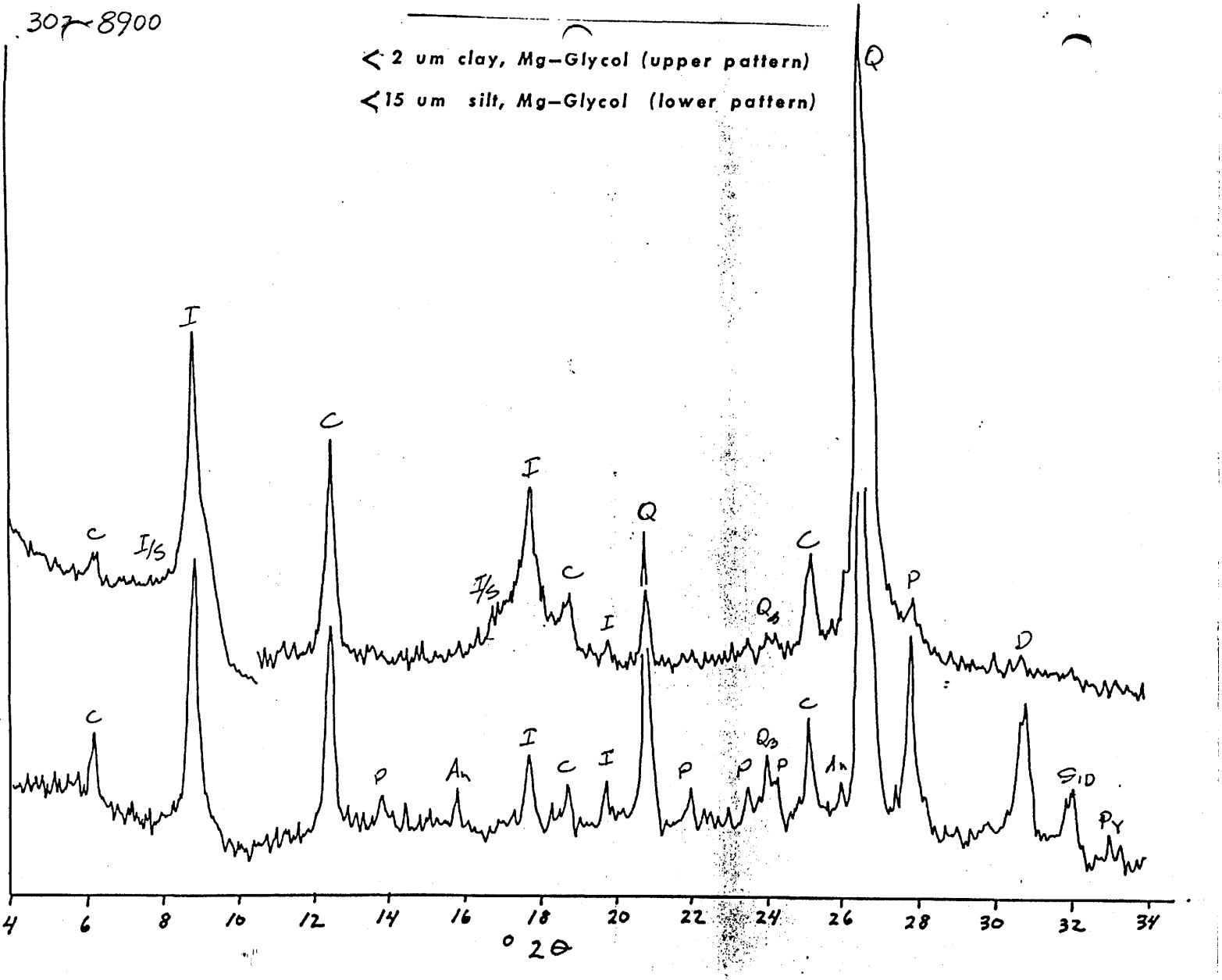
302-8220


< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
I
C
I/S
Q
An
P
Ca
D
S10
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

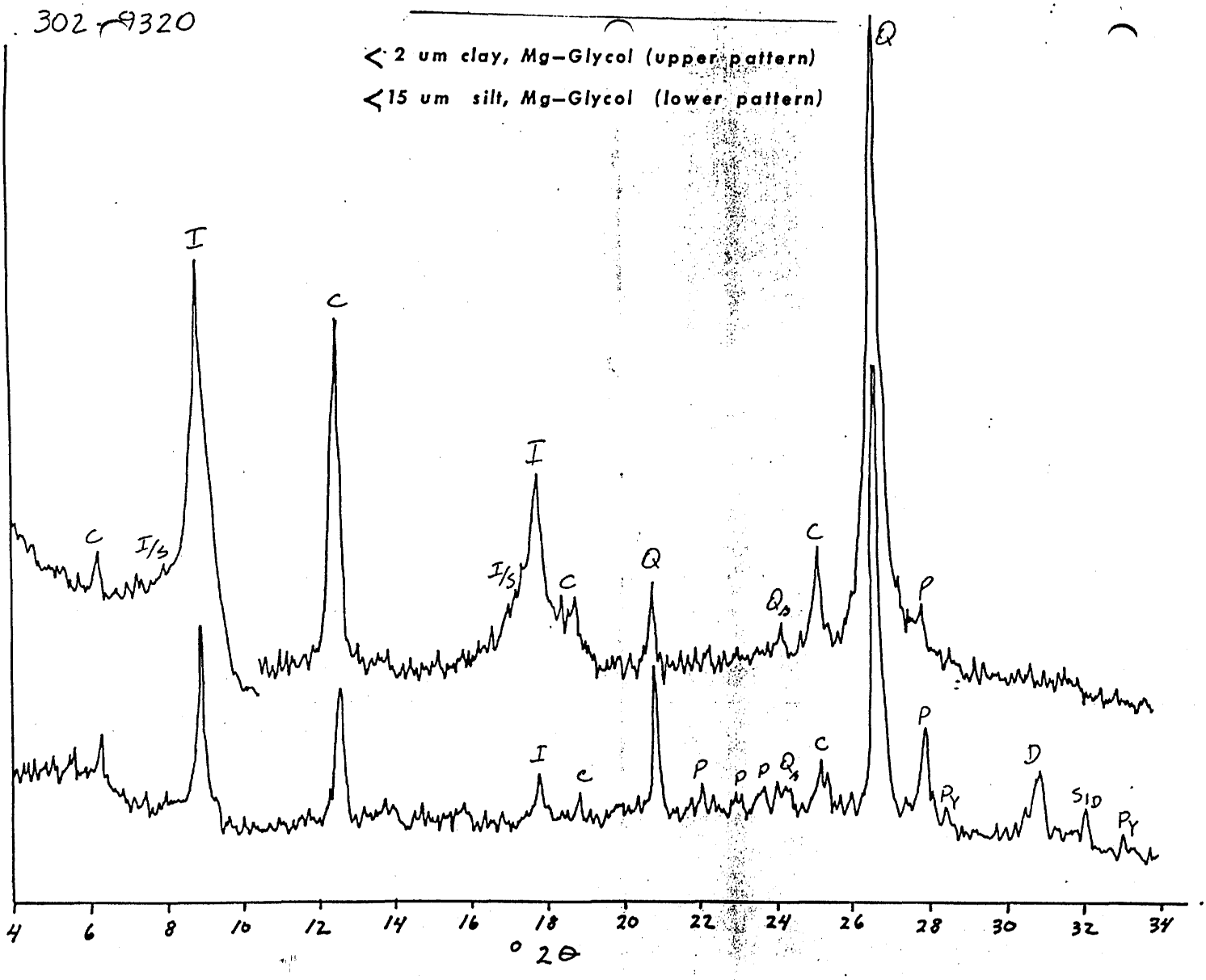
307-8900

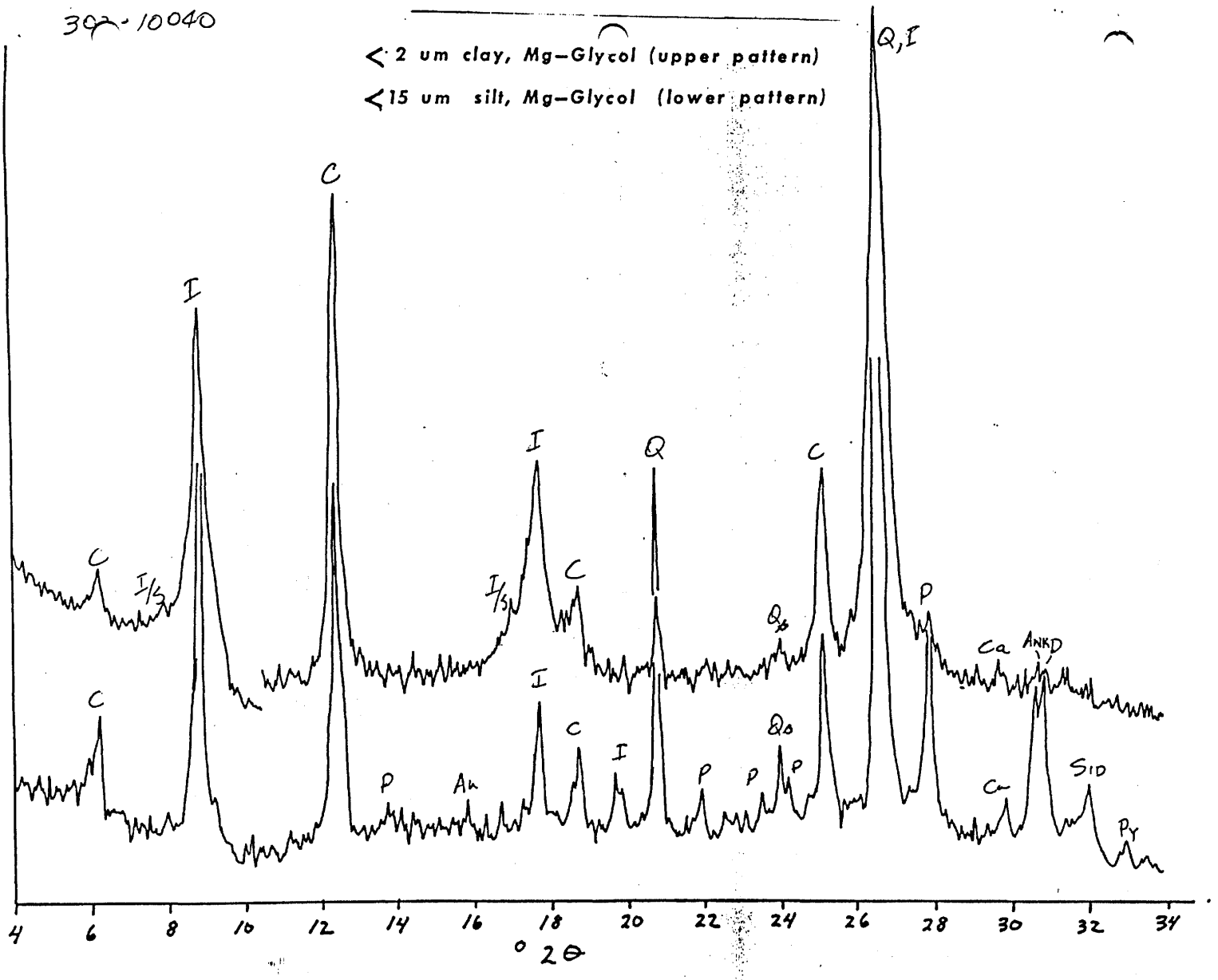
< 2 um clay, Mg–Glycol (upper pattern)

< 15 um silt, Mg–Glycol (lower pattern)

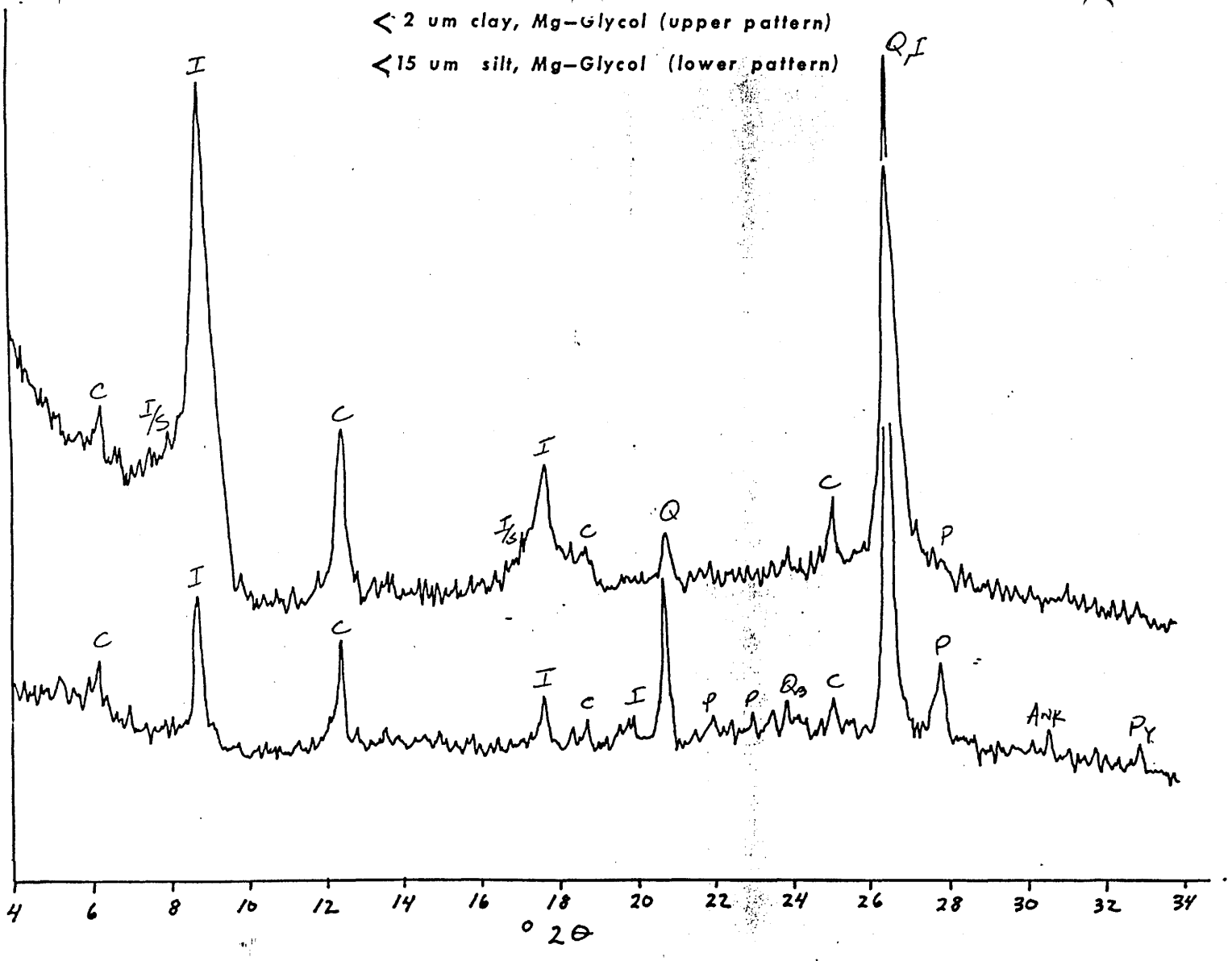


302-9320

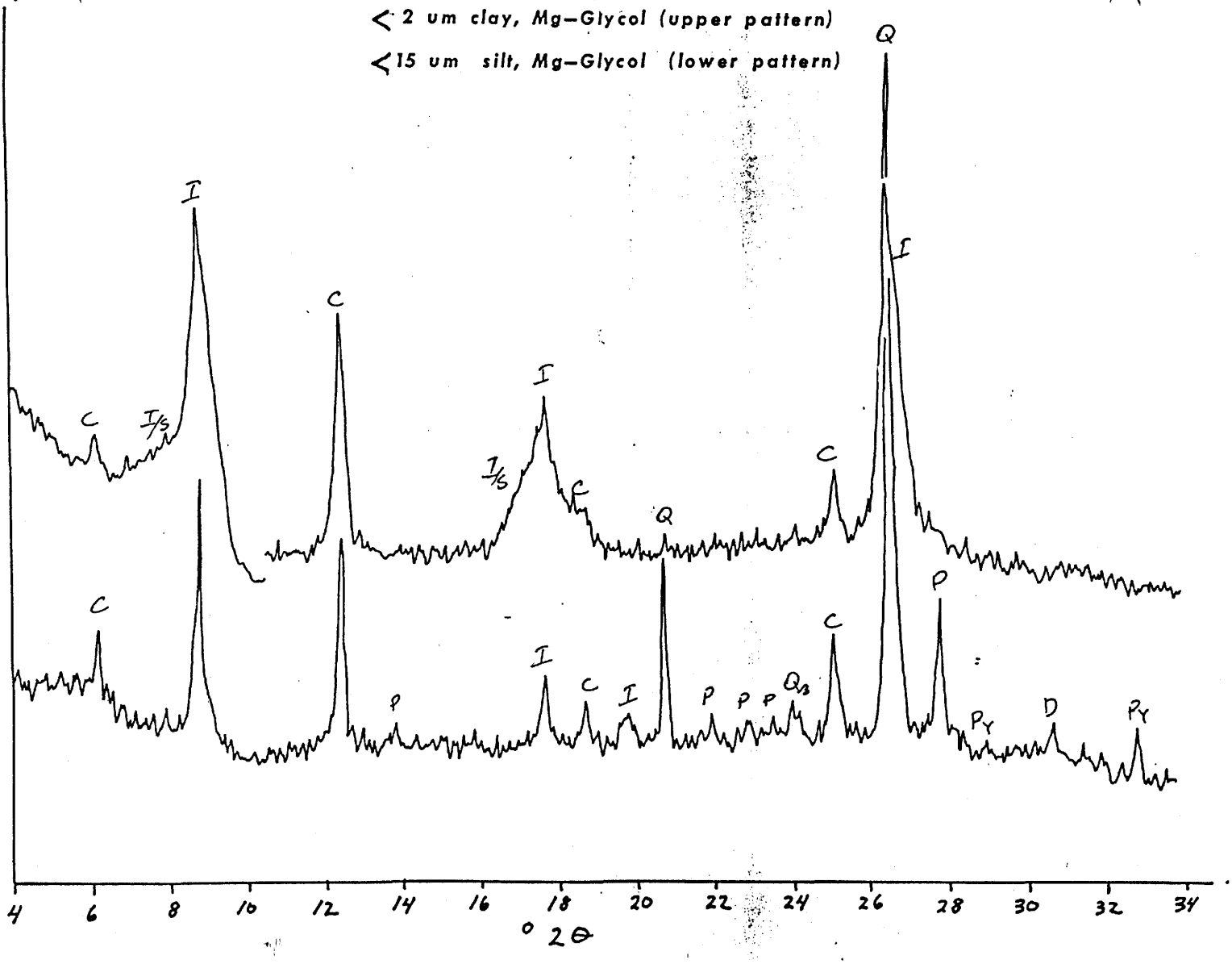

< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
I
C
I/S
Q
P
D
Py
S/D
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


392-10040
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
Q,I
C
I
I
C
I/S
I/S
I
Q
C
Qo
P
Ca
ANKD
C
P
Ao
I
C
I
Qo
P
P
P
Ca
SID
Py
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

302-10650


< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
I
Q,I
C
I/S
C
I
I/S
C
Q
C
P
I
C
C
I
C
I
C
P
P
Q
C
P
ANK
PY
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

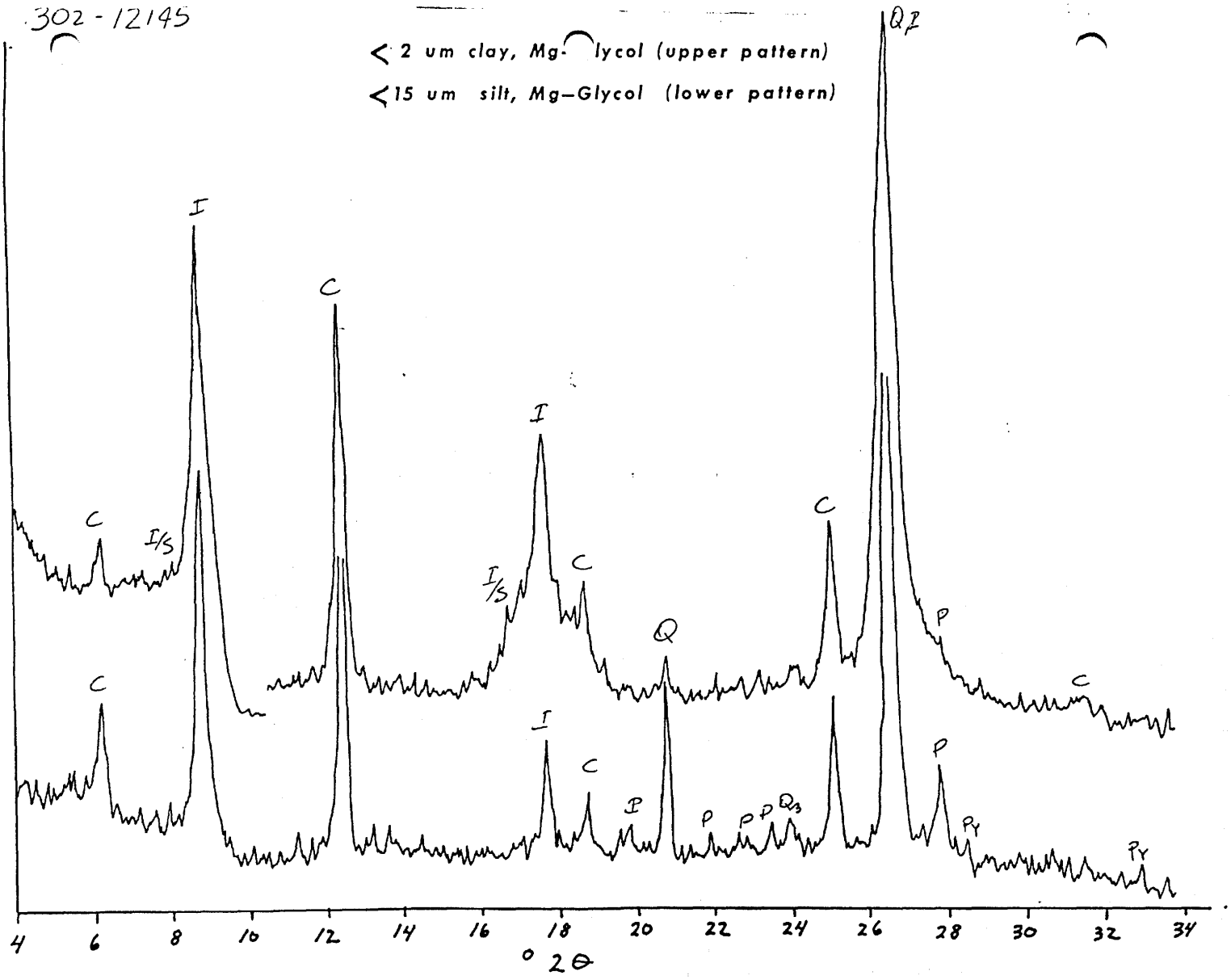
302-11415

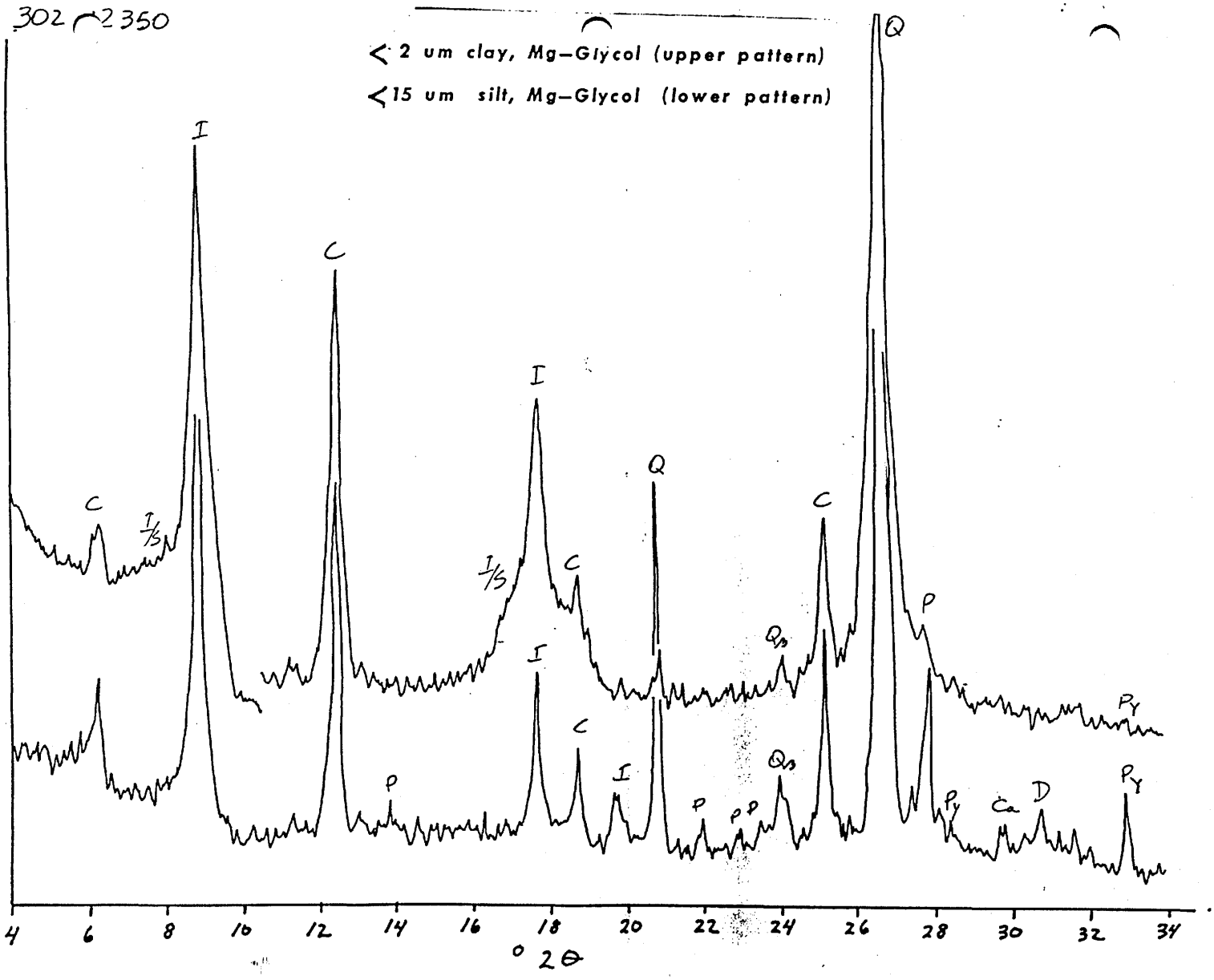

< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
I
C
I/S
Q
P
Py
D
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

302 - 12145

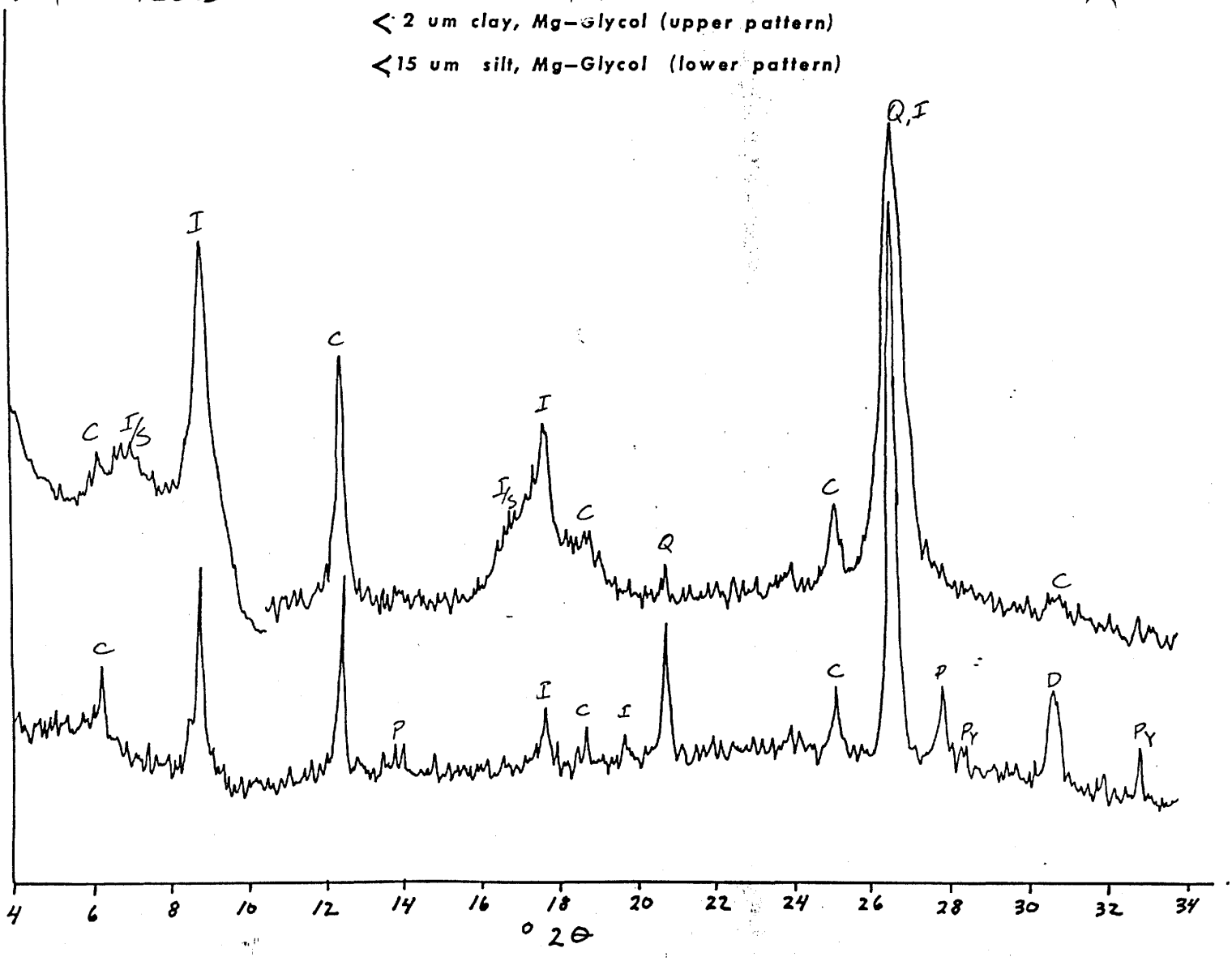
< 2 um clay, Mg-Glycol (upper pattern)

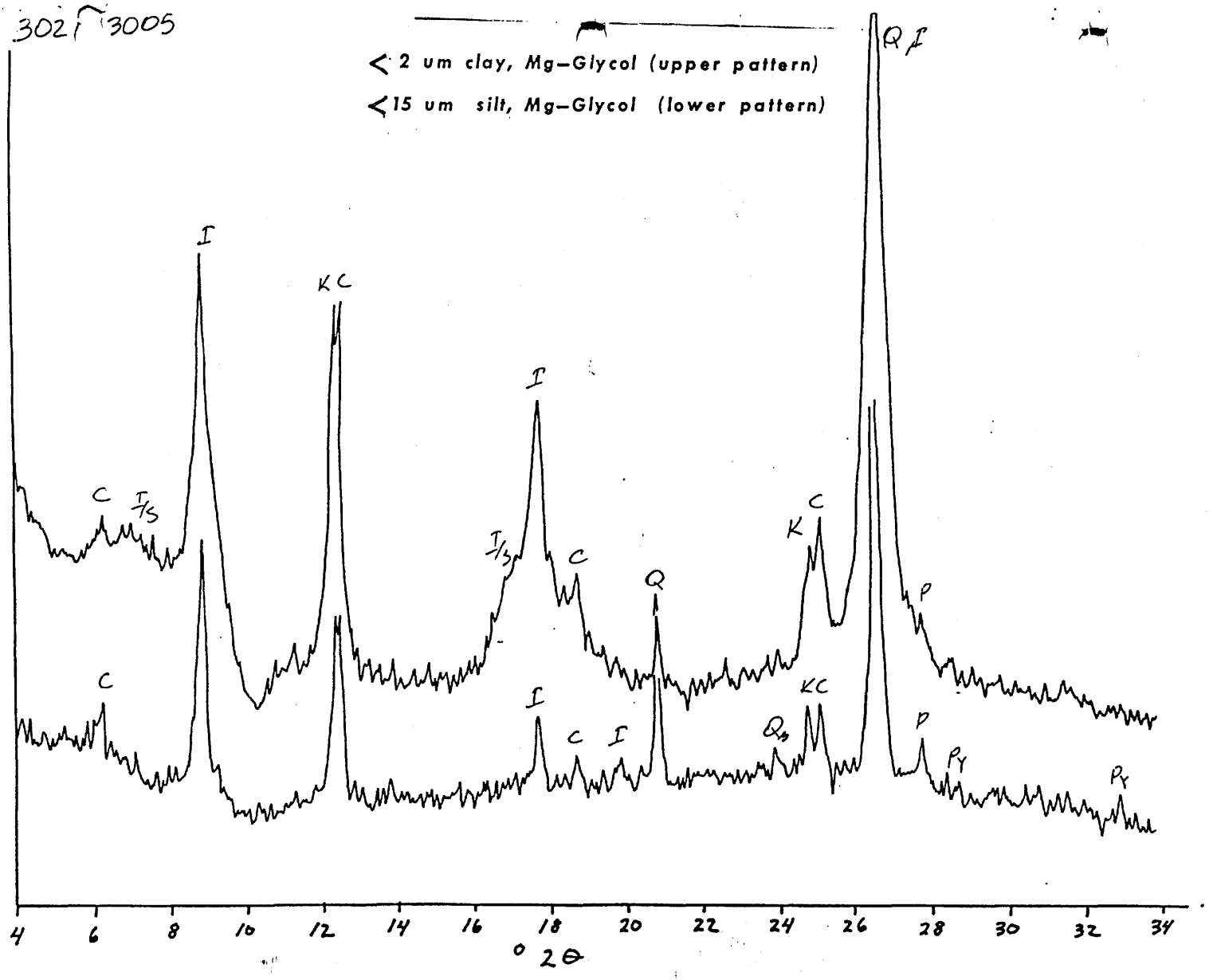
< 15 um silt, Mg-Glycol (lower pattern)




302 ~2350
< 2 um clay, Mg–Glycol (upper pattern)
< 15 um silt, Mg–Glycol (lower pattern)
I
C
I/S
Q
P
Qs
Py
Ca
D
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ

202-12575


< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
Q,I
I
C
C
I/S
I
I/S
C
C
Q
C
C
C
P
I
C
I
C
P
P
D
P
P
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ


3021 3005
< 2 um clay, Mg-Glycol (upper pattern)
< 15 um silt, Mg-Glycol (lower pattern)
I
K C
I
I/S
C
I/S
C
Q
K
C
Q I
P
C
I
C
I
Q
K C
P
P
P
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
° 2θ