Supporting Information

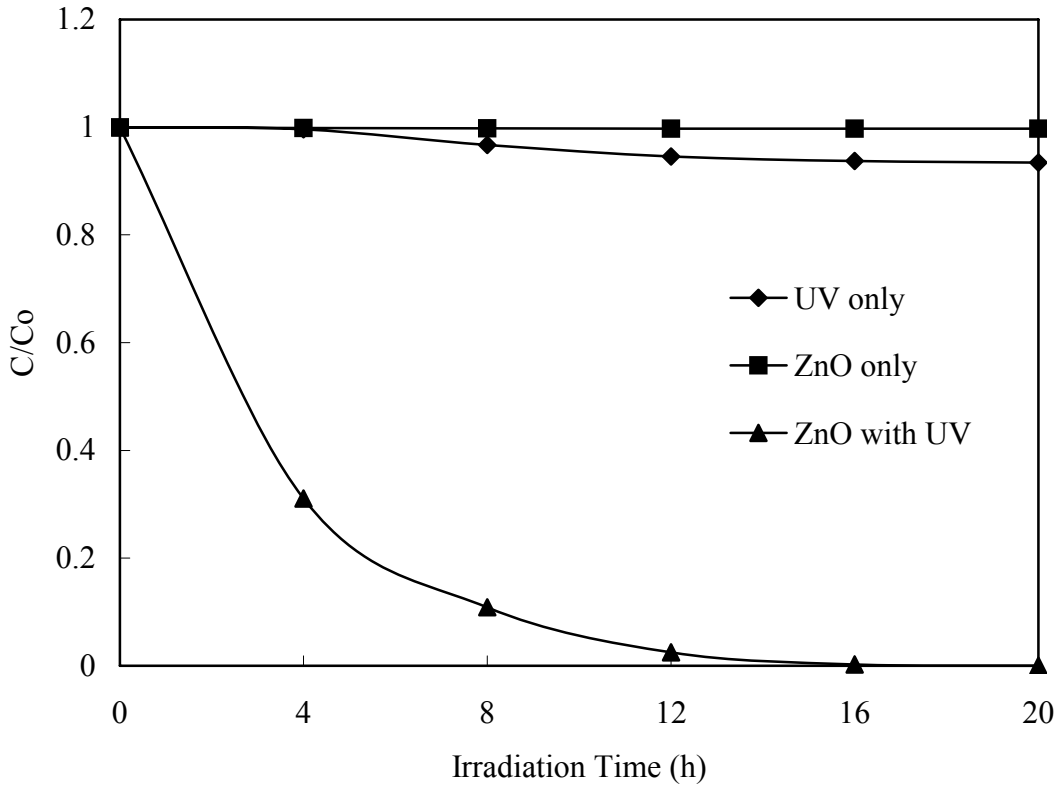


Figure 1S. AB1 degradation under the control conditions (ZnO only and UV only) and photocatalytic conditions (experimental conditions： pH = 8, AB1 = 0.05g/L, ZnO = 0 g/L in photolysis, 0.5g/L in photocatalysis, UV-365nm in photolysis and photocatalysis conditions).

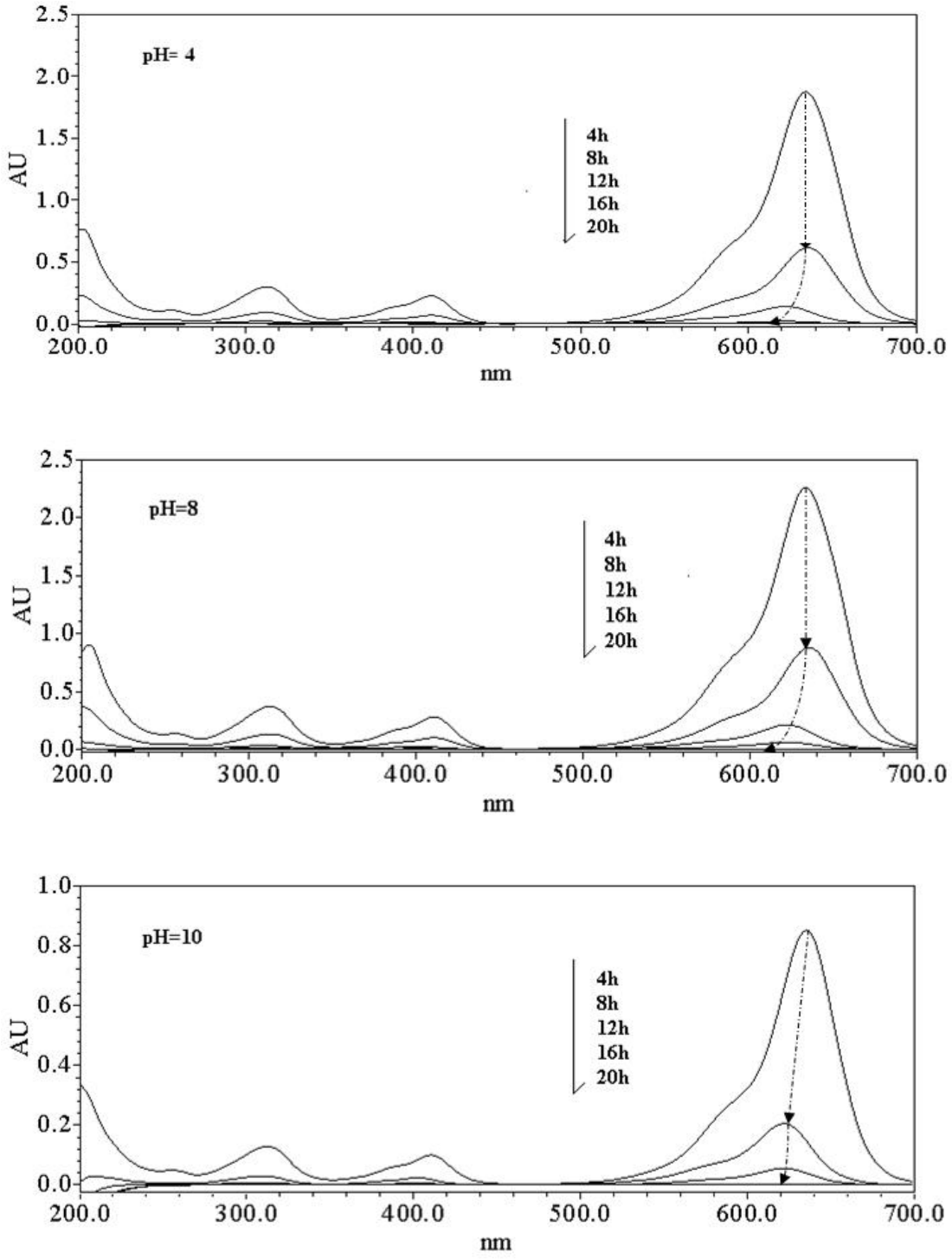
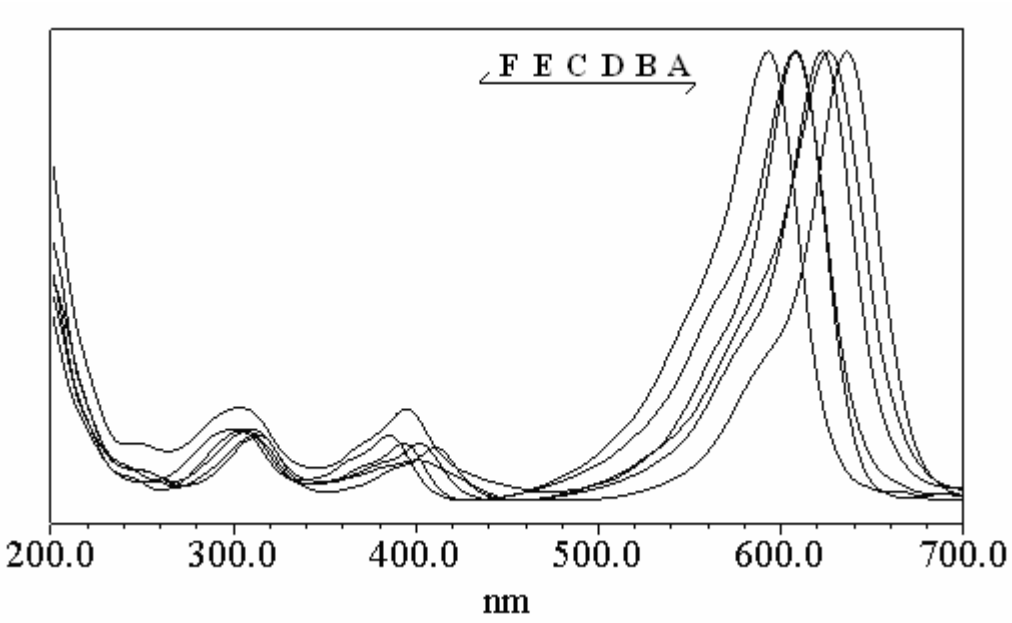
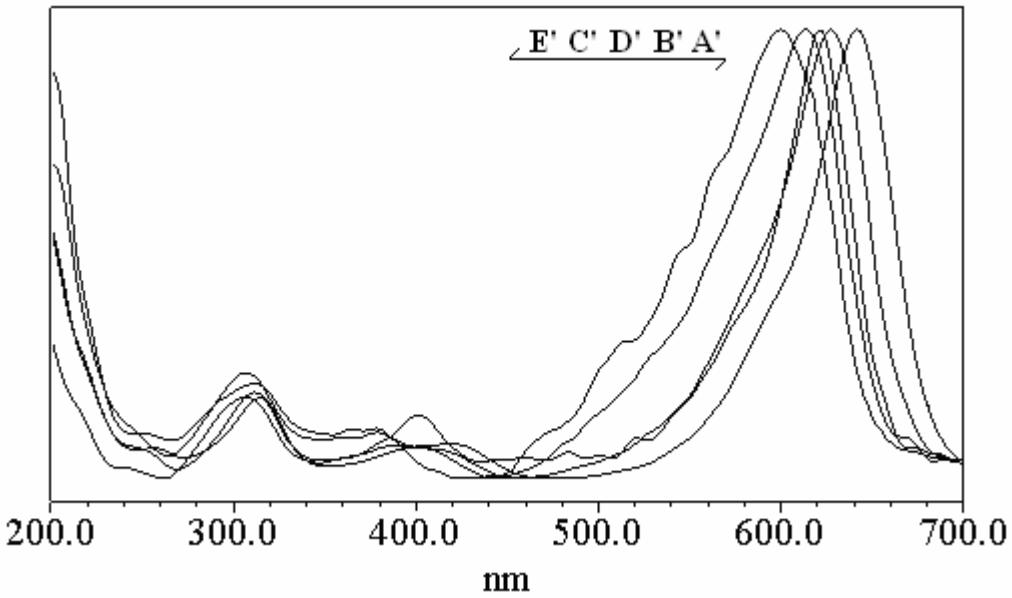
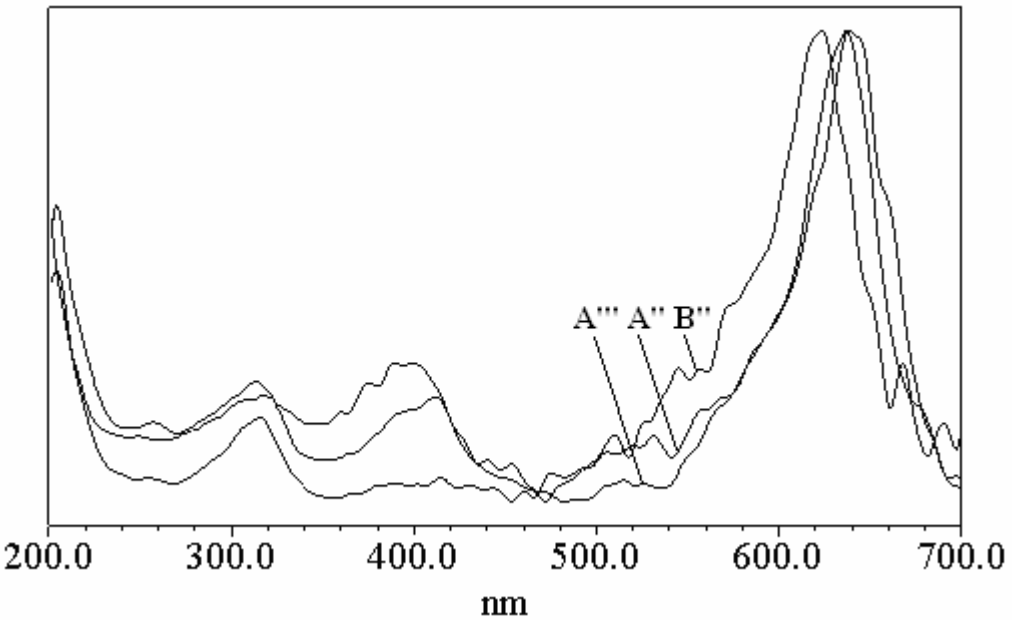
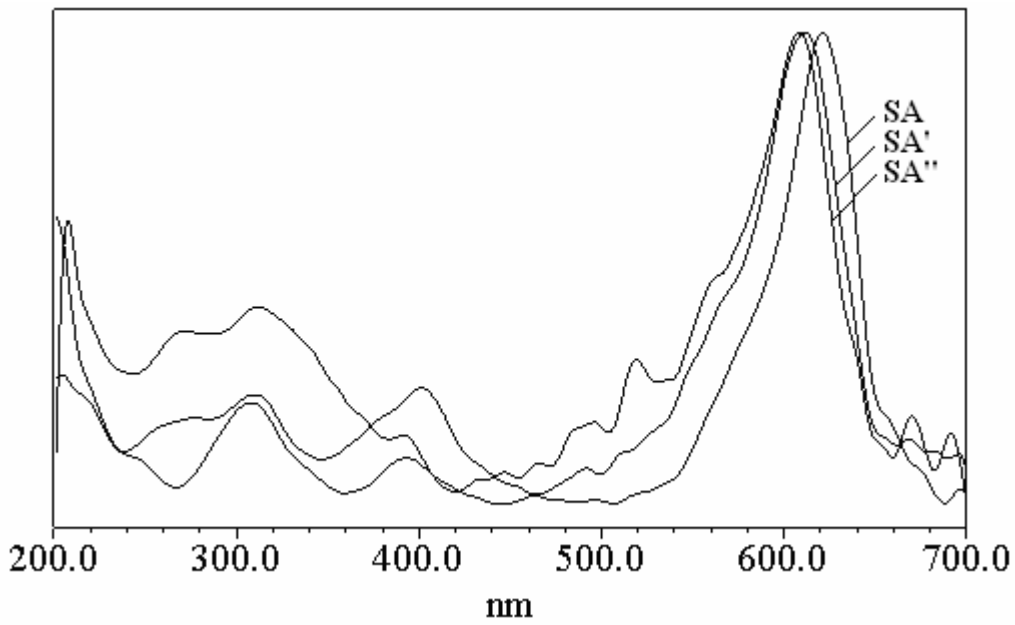


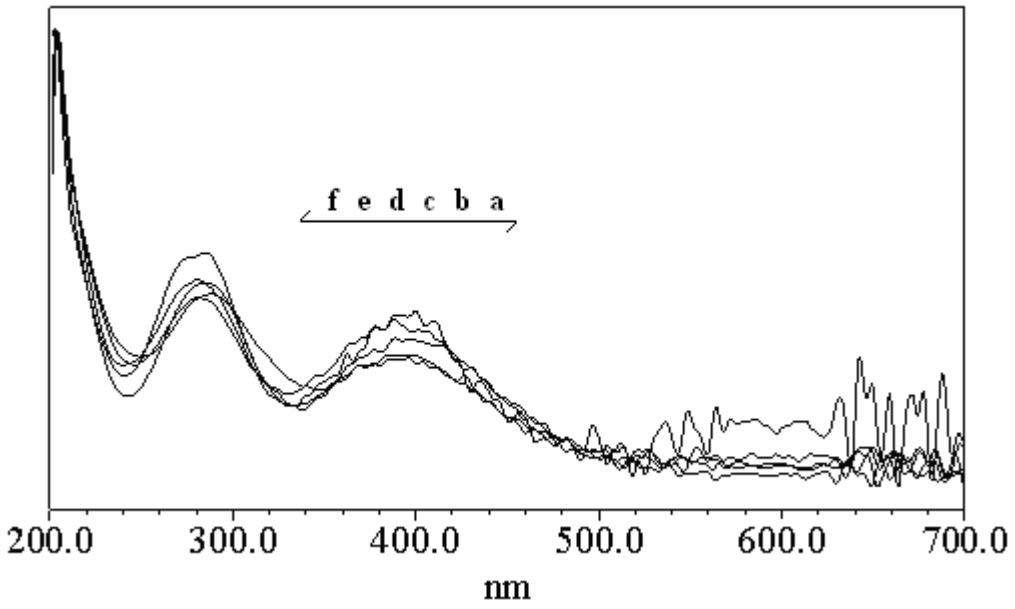
Figure 2S. UV-visible spectra changes of the AB1 dye in aqueous ZnO dispersions (AB1 0.05g/L, ZnO 0.5g/L, pH 4, 8, 10) as a function of the irradiation time. Spectra from top to bottom correspond to the irradiation times of 4, 8, 12, 16, 20, hours, respectively.

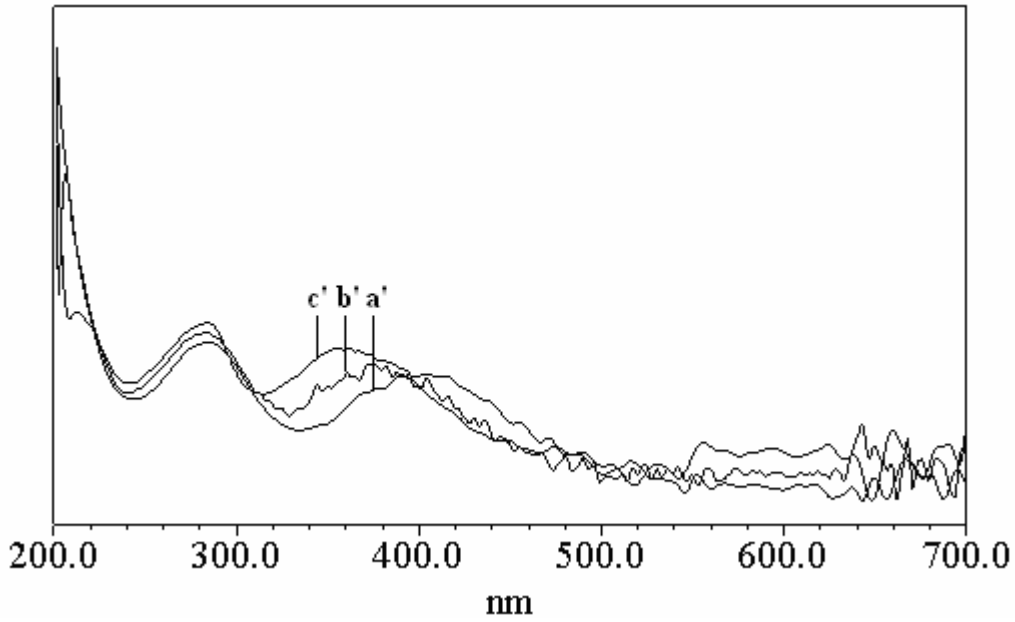

F E C D B A
200.0
300.0
400.0
500.0
600.0
700.0
nm

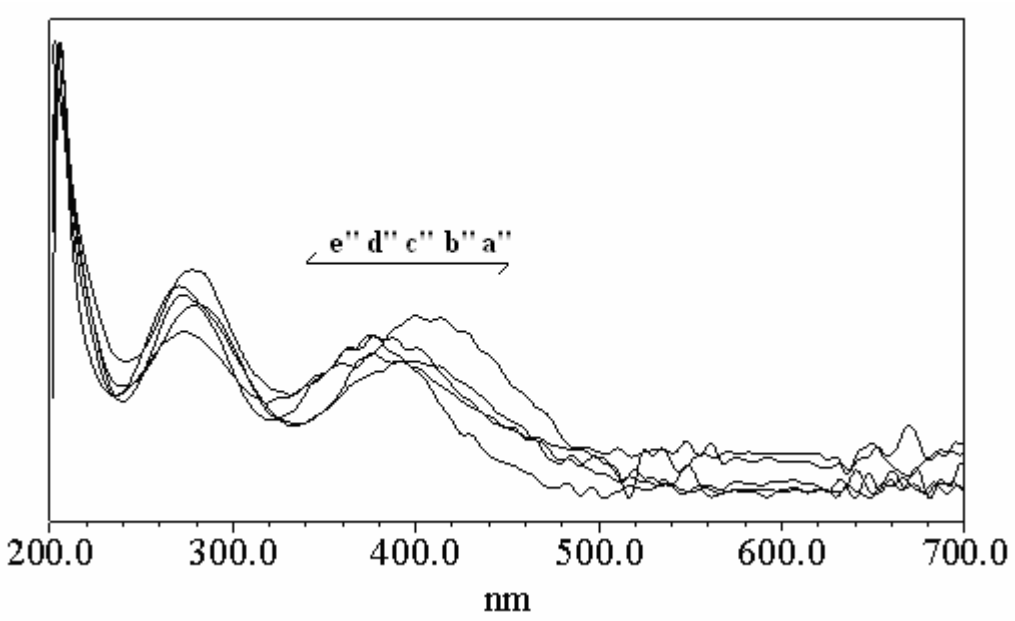

E' C' D' B' A'
200.0
300.0
400.0
500.0
600.0
700.0
nm

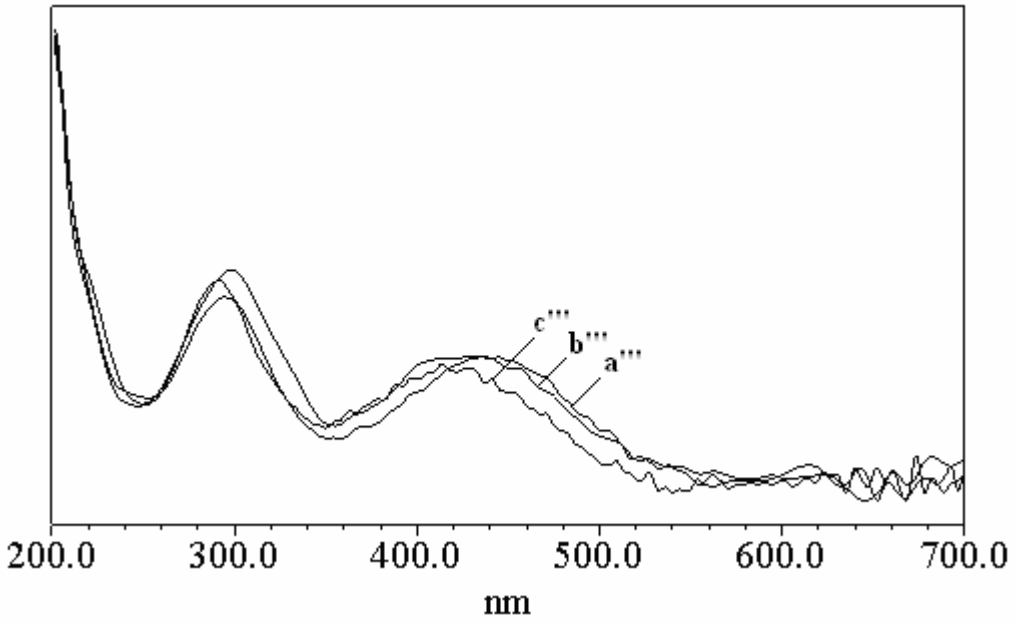

A''' A'' B''
200.0
300.0
400.0
500.0
600.0
700.0
nm

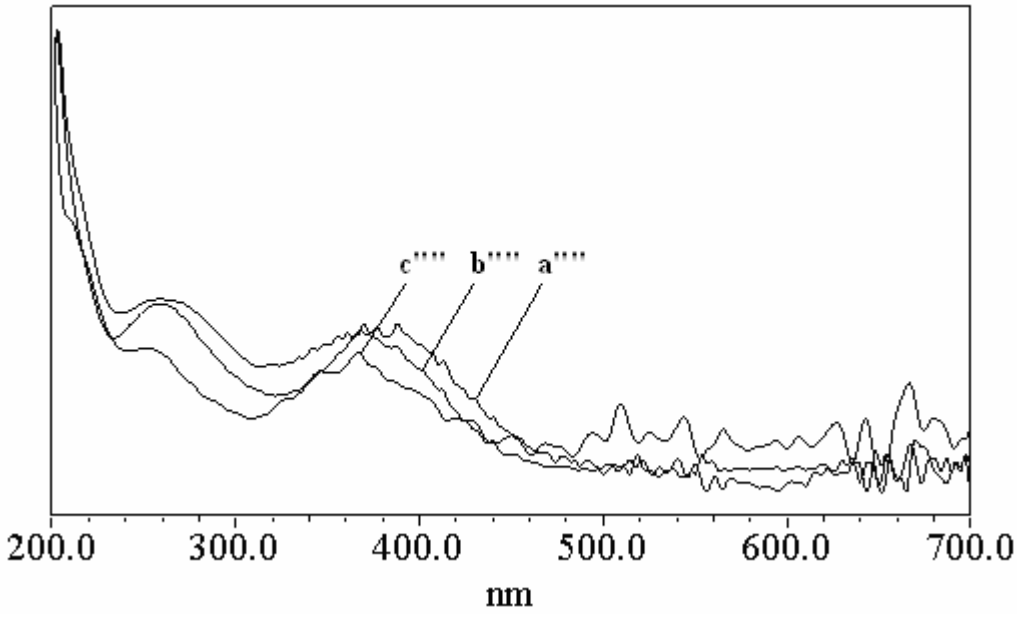

SA
SA'
SA''
200.0
300.0
400.0
500.0
600.0
700.0
nm

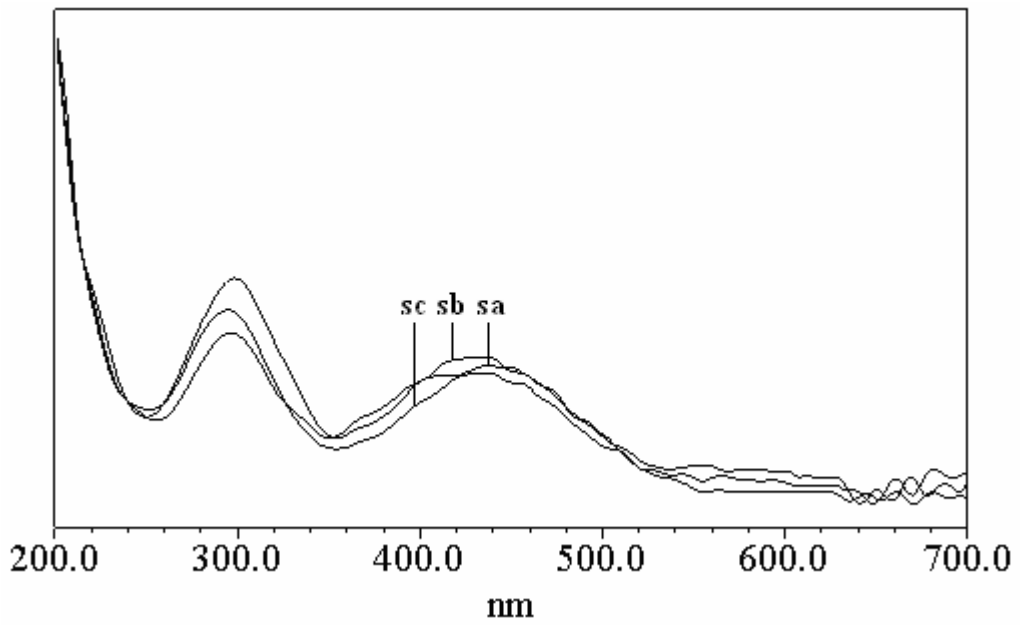

f e d c b a
200.0
300.0
400.0
500.0
600.0
700.0
nm

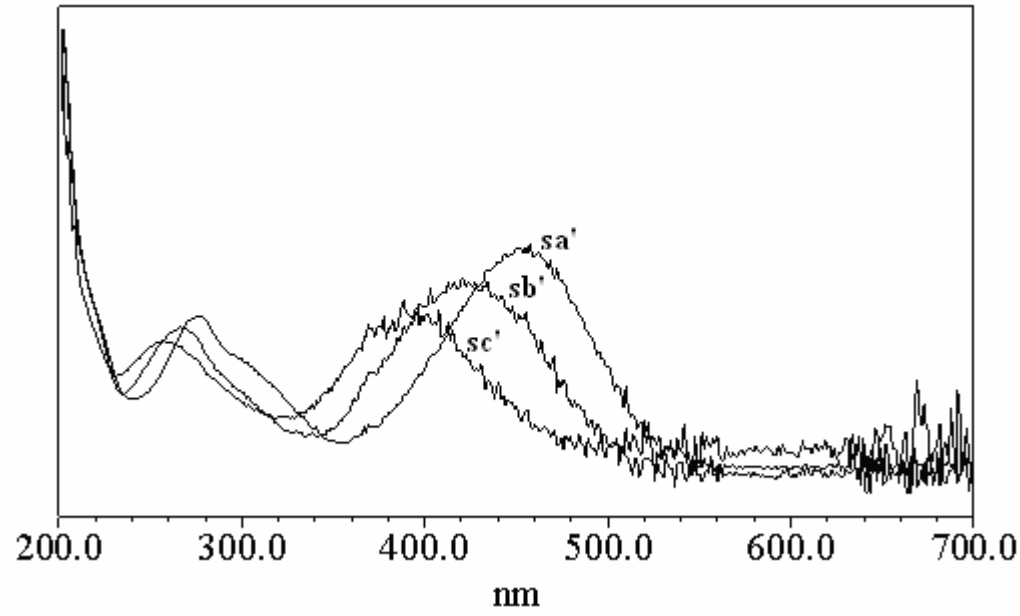

c' b' a'
200.0
300.0
400.0
500.0
600.0
700.0
nm

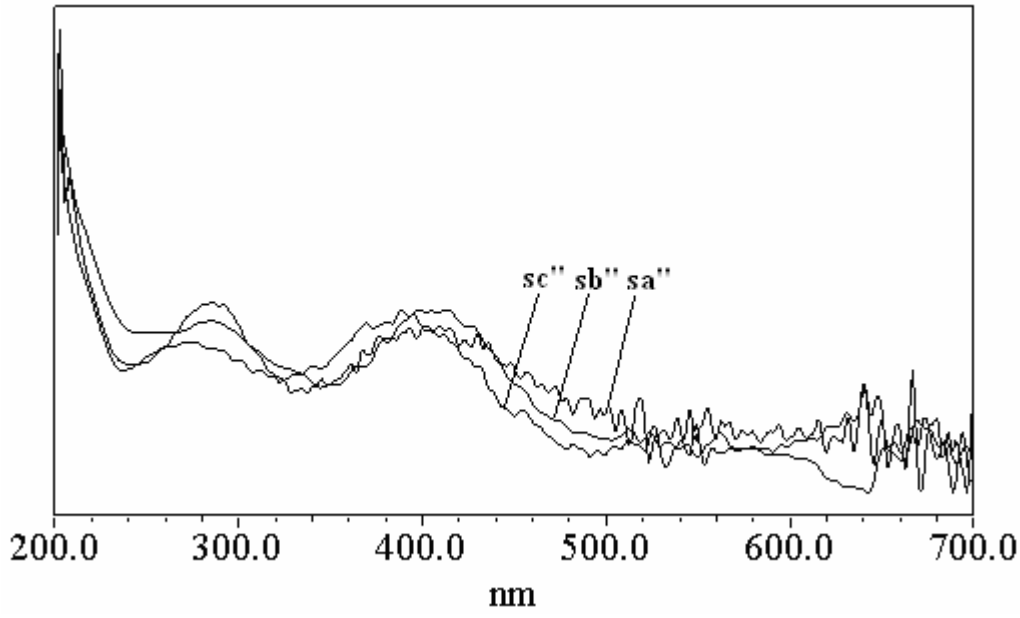

e'' d'' c'' b'' a''
200.0
300.0
400.0
500.0
600.0
700.0
nm

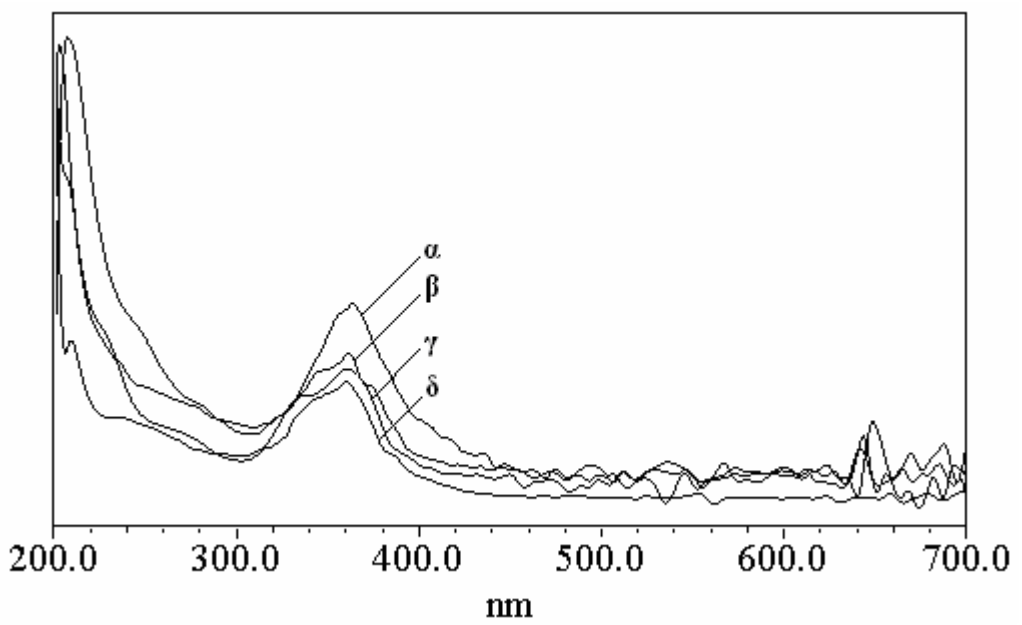

c'''
b'''
a'''
200.0
300.0
400.0
500.0
600.0
700.0
nm

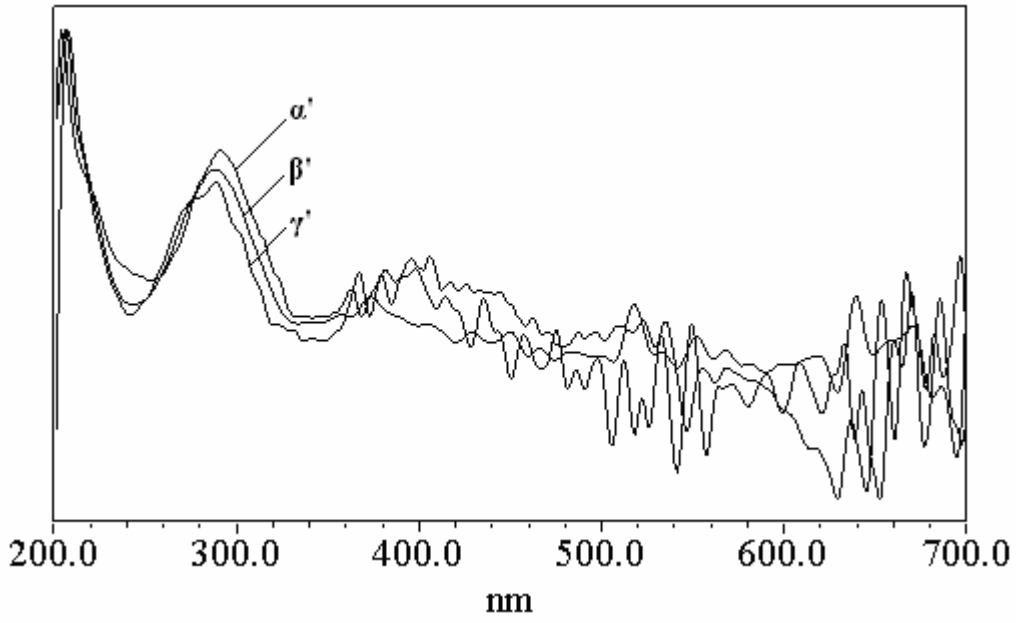

c''''
b''''
a''''
200.0
300.0
400.0
500.0
600.0
700.0
nm


sc sb sa
200.0
300.0
400.0
500.0
600.0
700.0
nm


sa'
sb'
sc'
200.0
300.0
400.0
500.0
600.0
700.0
nm


sc'' sb'' sa''
200.0
300.0
400.0
500.0
600.0
700.0
nm


α
β
γ
δ
200.0
300.0
400.0
500.0
600.0
700.0
nm


α'
β'
γ'
200.0
300.0
400.0
500.0
600.0
700.0
nm

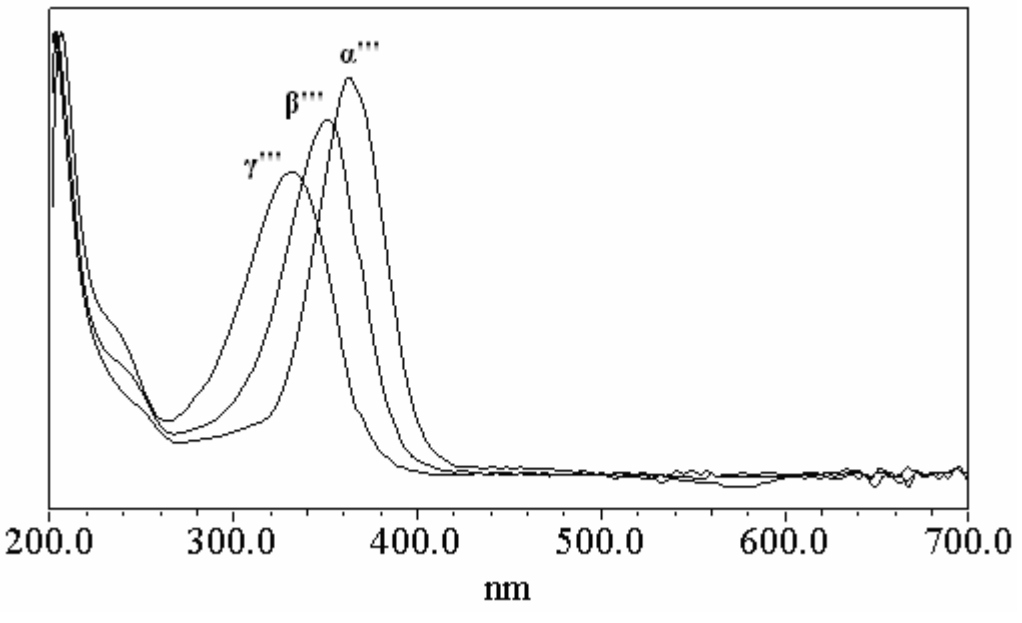
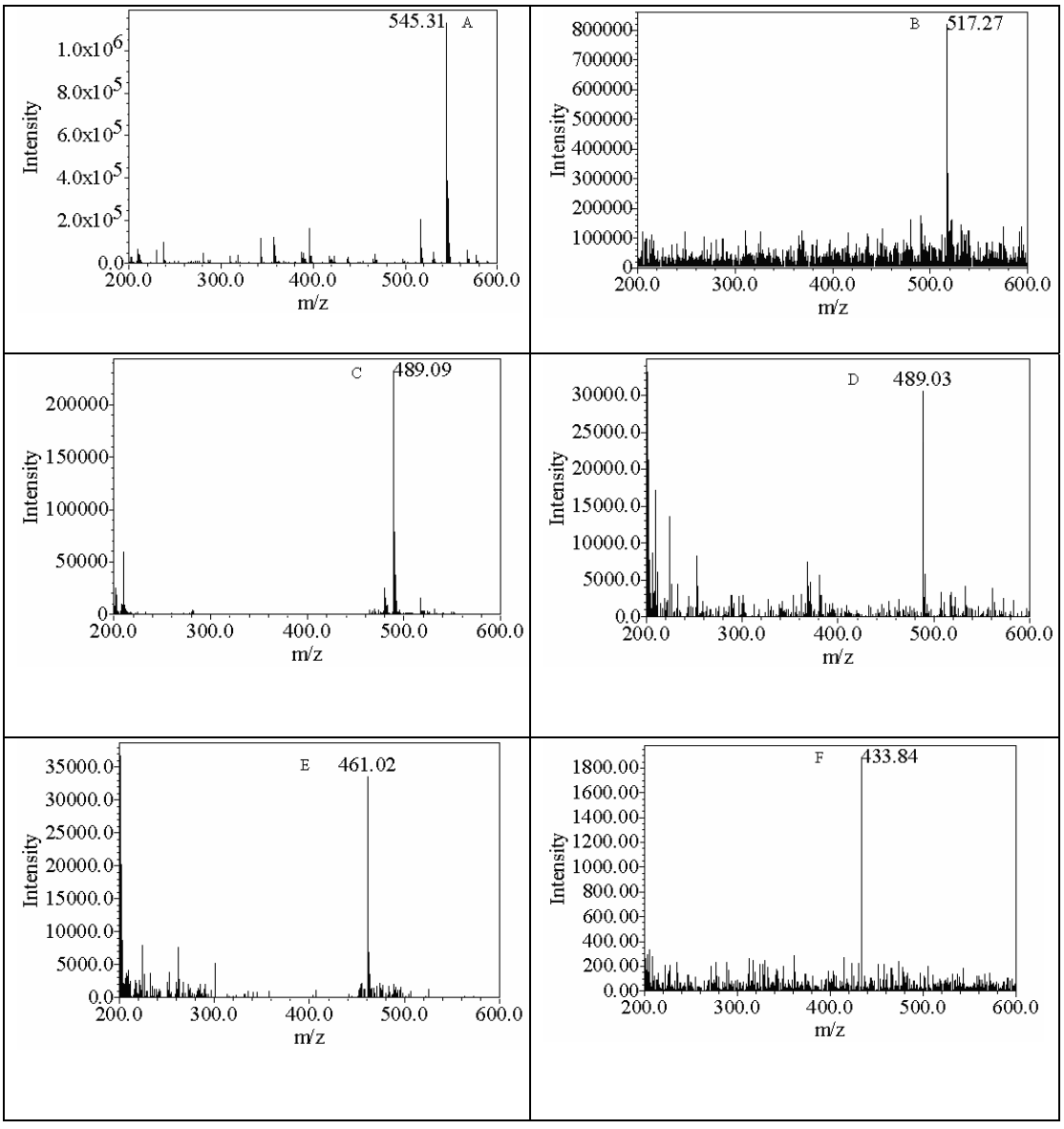
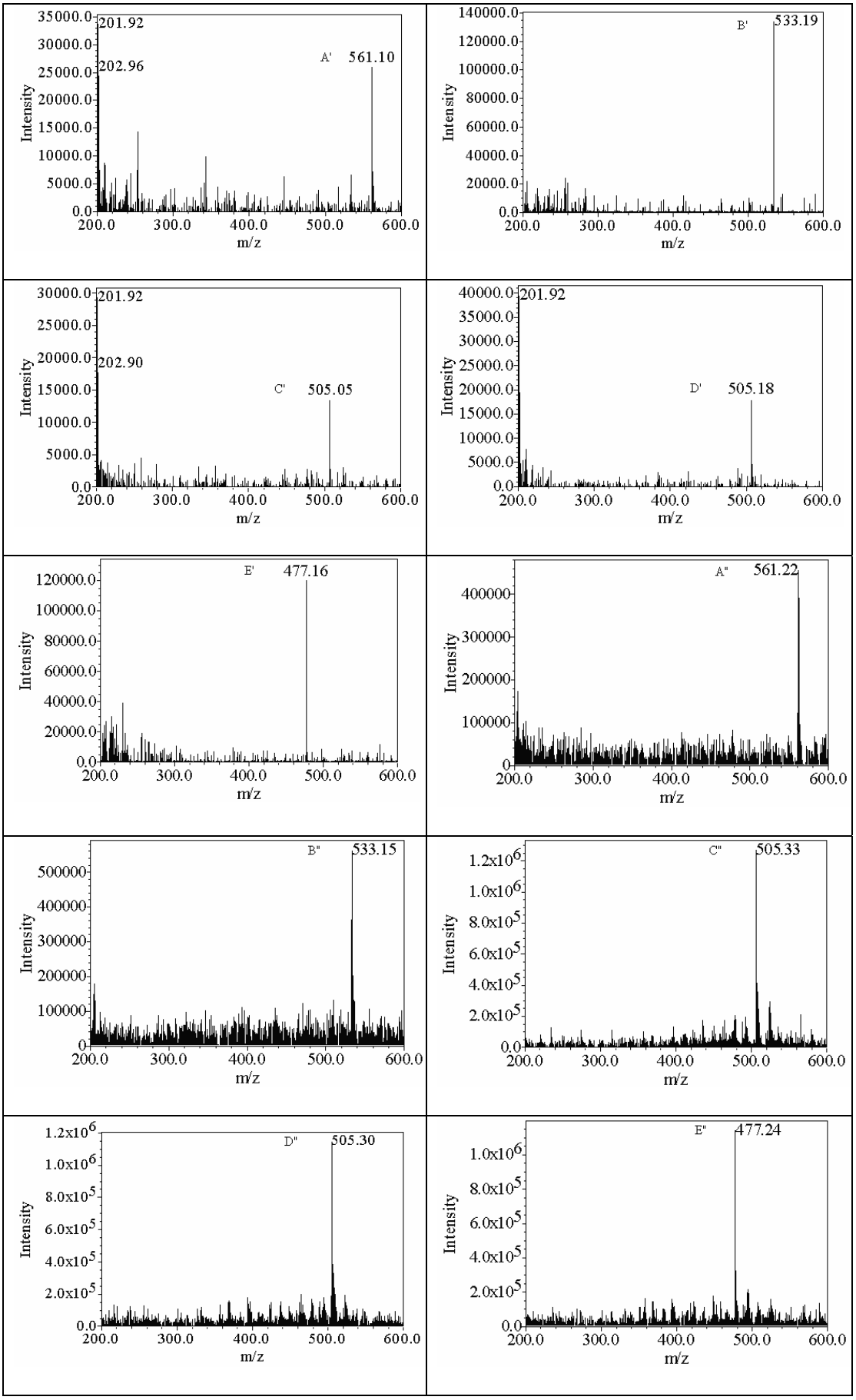
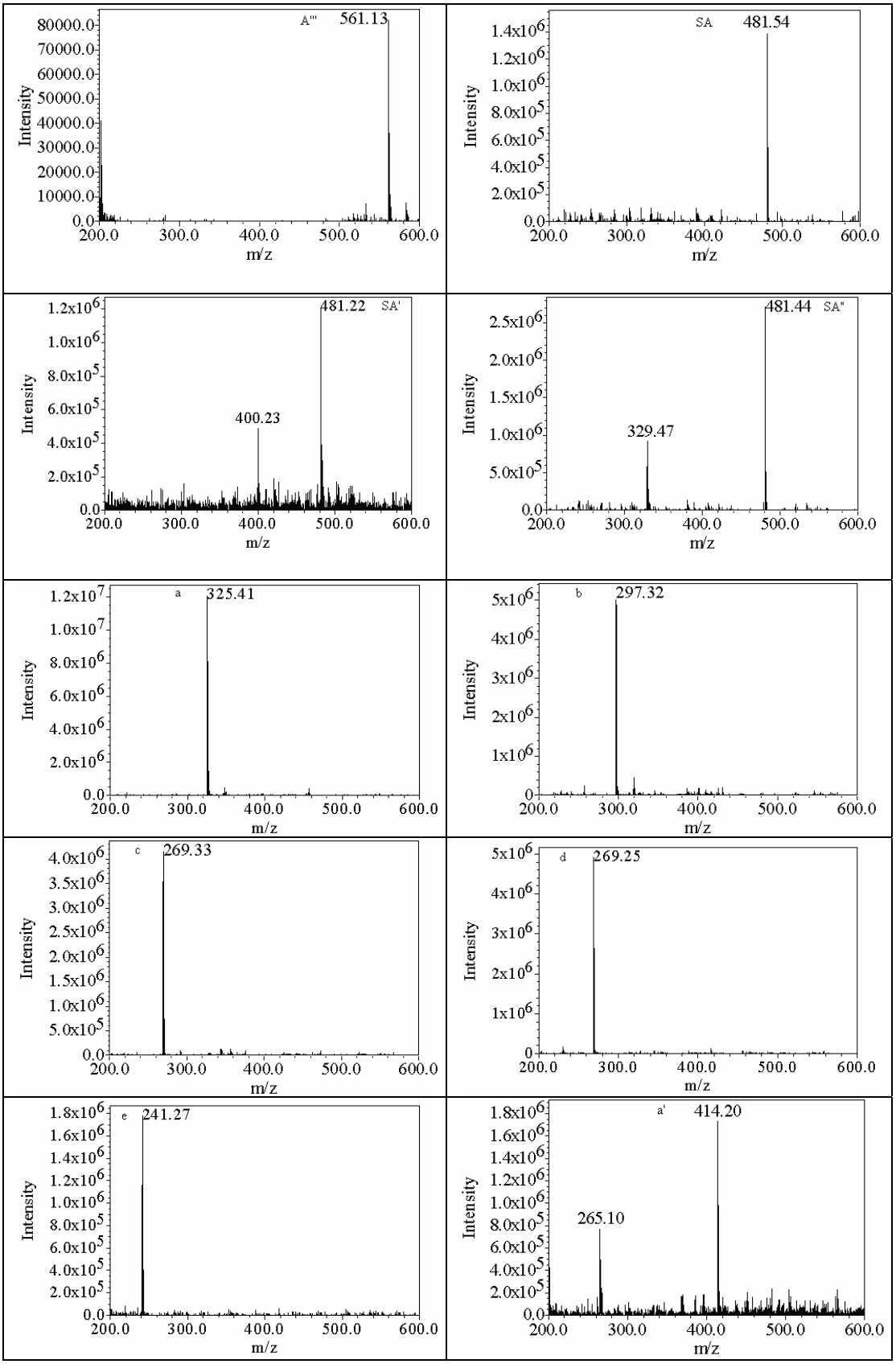

α'''
β'''
γ'''
200.0
300.0
400.0
500.0
600.0
700.0
nm

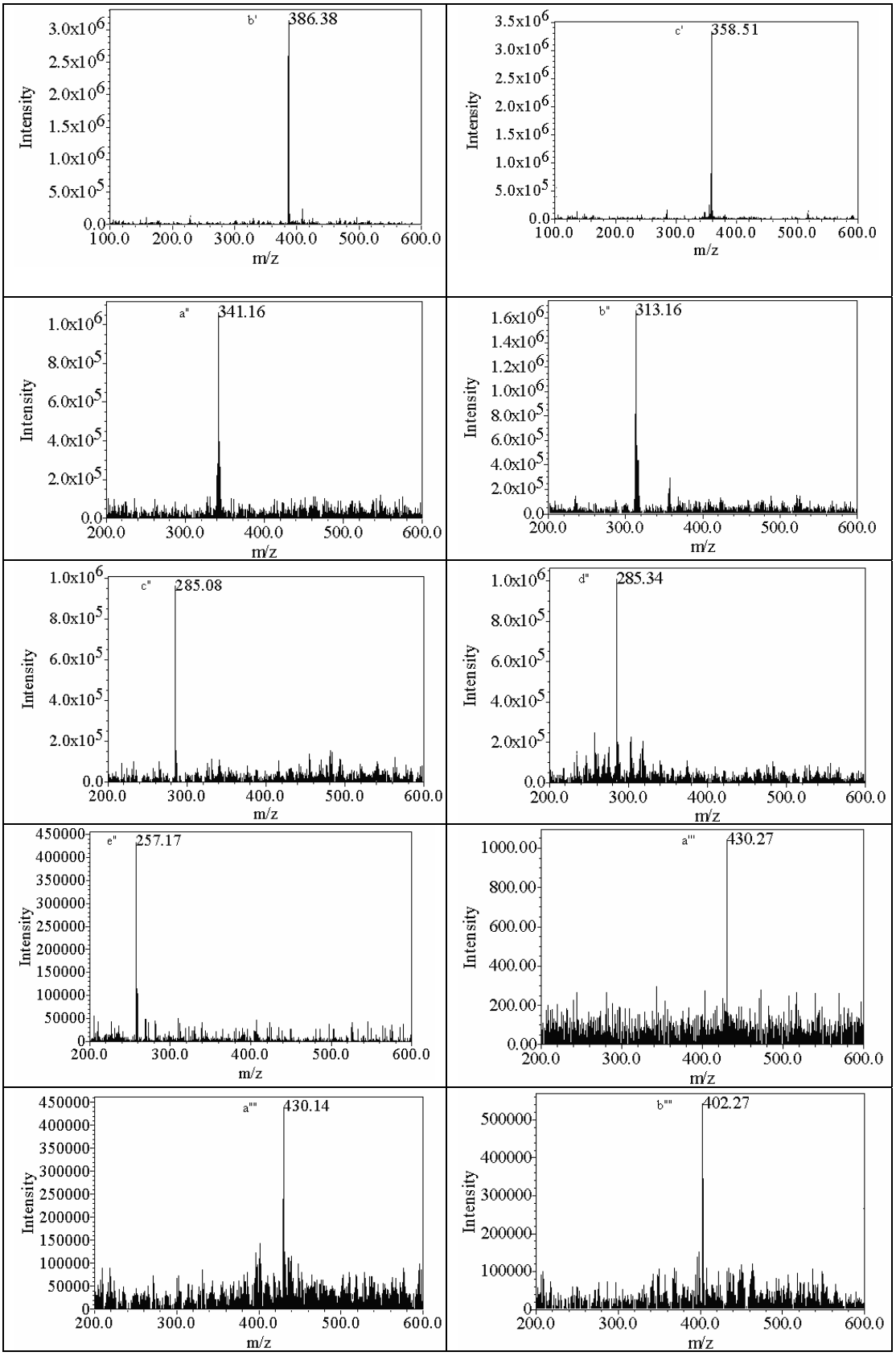
Figure 3S. Absorption spectra of the *N*-de-ethylated intermediates formed during the photodegradation process of the AB1 dye corresponding to the peaks in the HPLC chromatograph of Figure 6. Spectra were recorded using the photodiode array detector. Spectra A-E, A′-E′ correspond to the peaks A-E, A′-E′ in Figure 6, respectively.

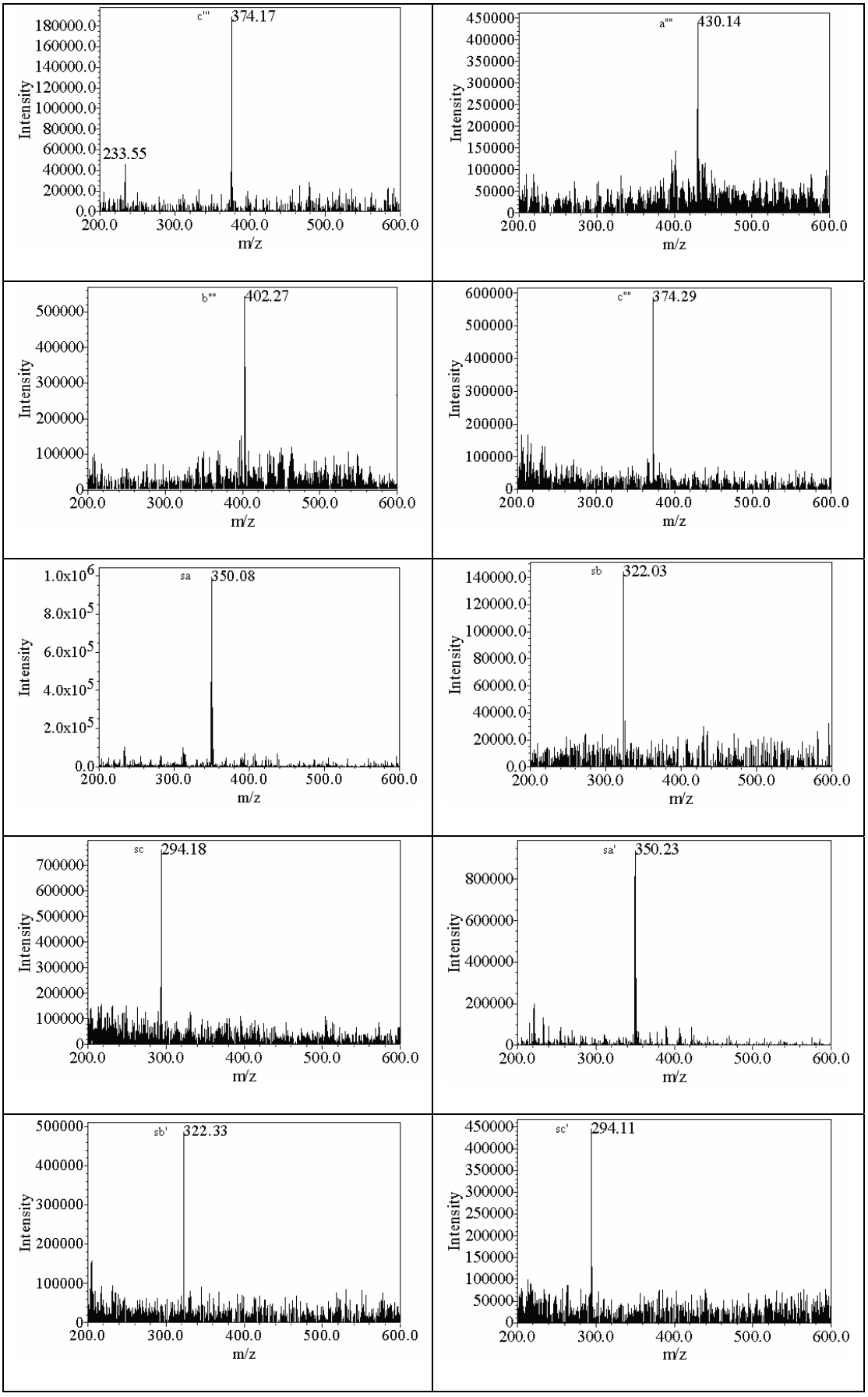
(a) ES^+ mass spectra

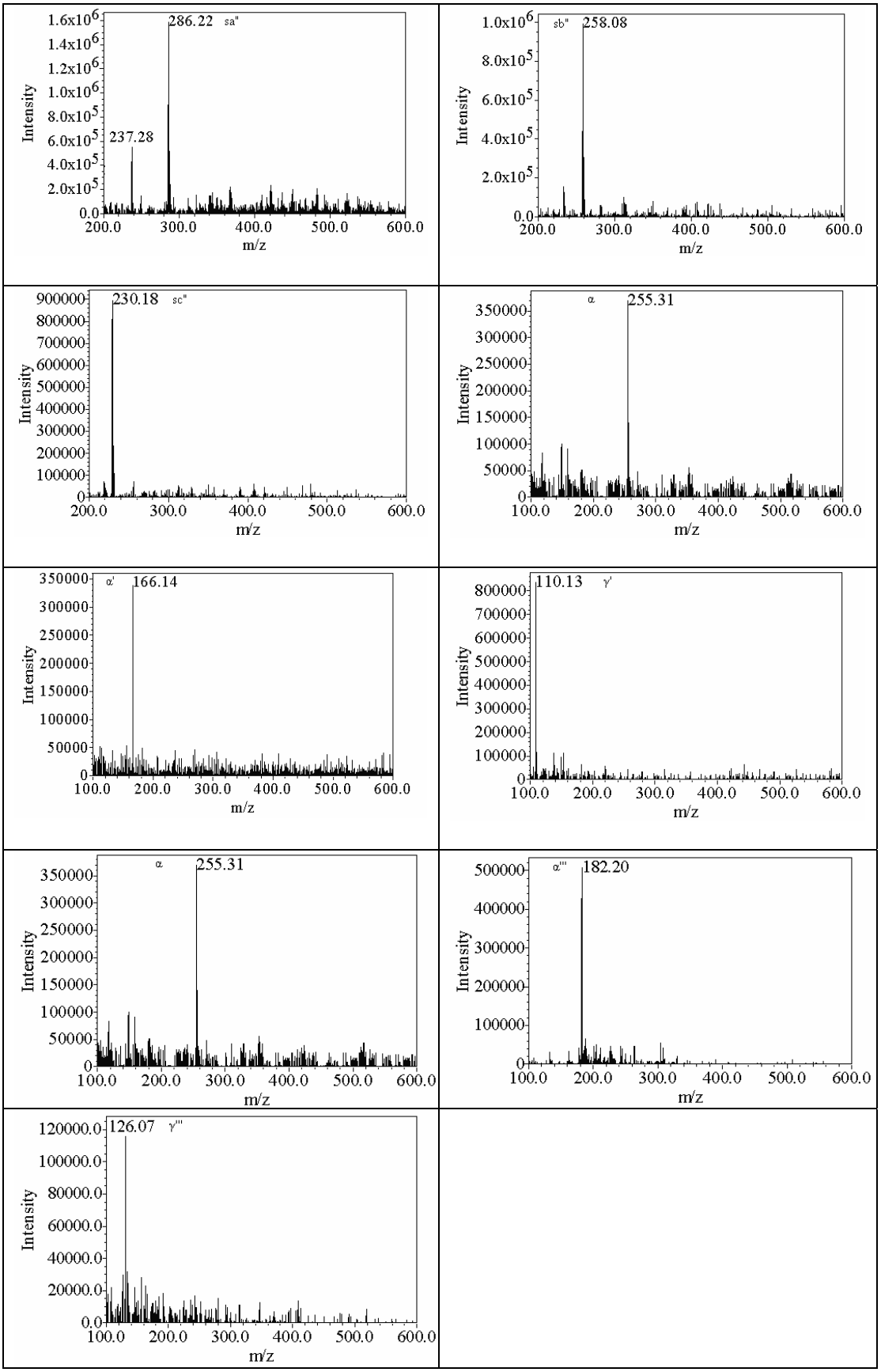



A' 561.10
201.92
202.96
B' 533.19
C' 505.05
201.92
202.90
D' 505.18
201.92
E' 477.16
A" 561.22
B" 533.15
C" 505.33
D" 505.30
E" 477.24
Intensity
m/z

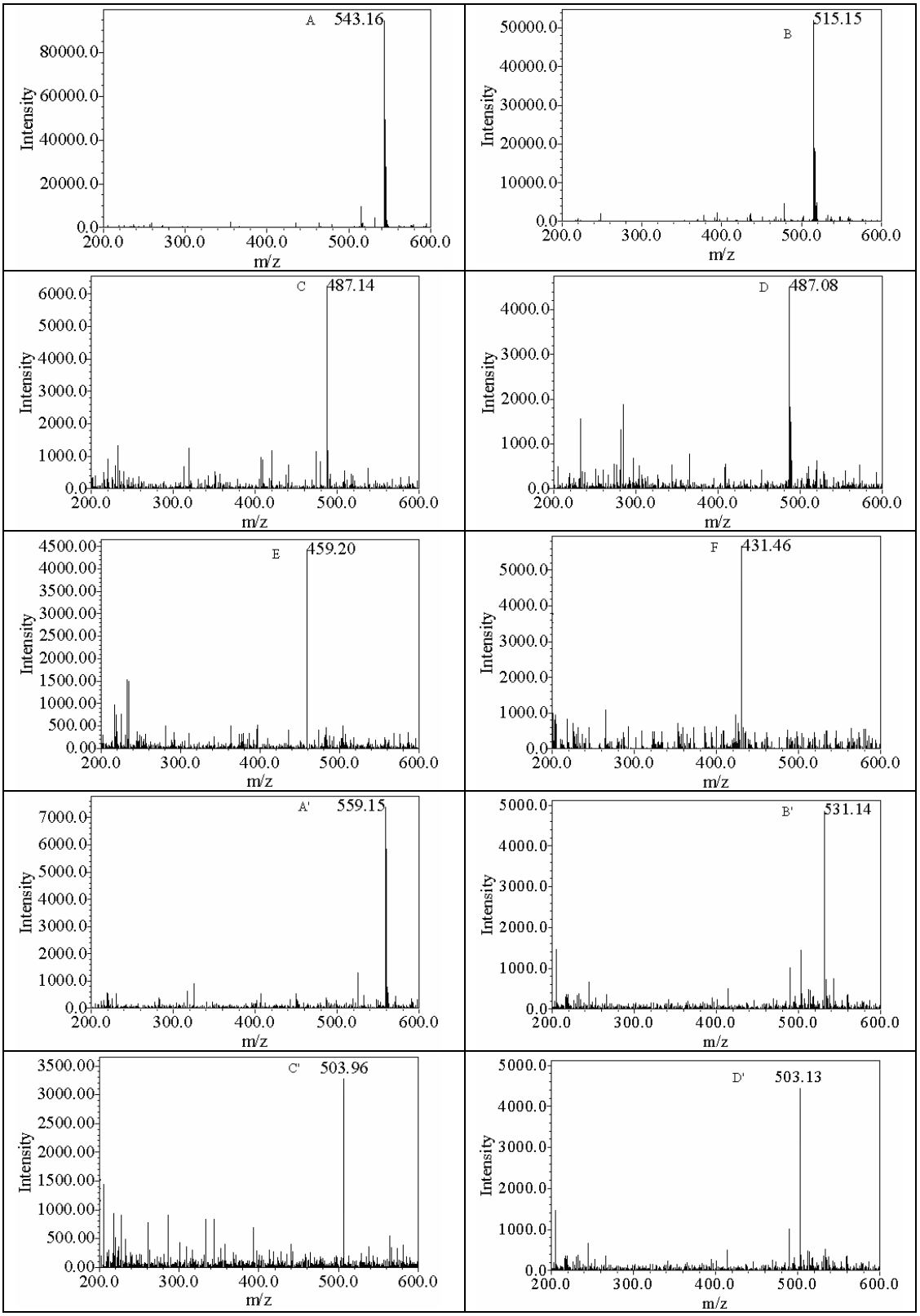

A'''
561.13
SA
481.54
481.22
SA'
400.23
481.44
SA''
329.47
a
325.41
b
297.32
c
269.33
d
269.25
e
241.27
a'
414.20
265.10
Intensity
m/z

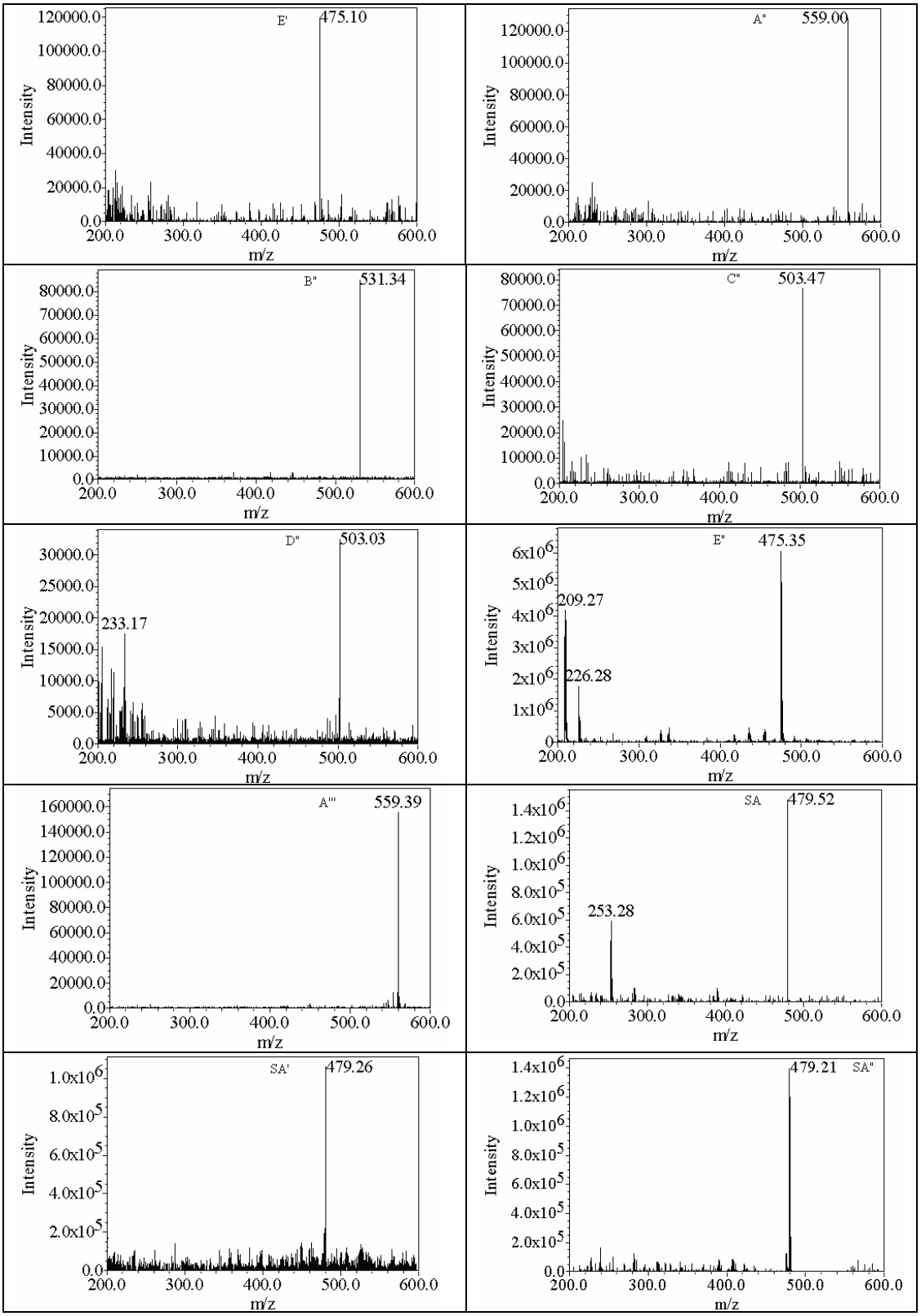

b'
386.38
c'
358.51
a"
341.16
b"
313.16
c"
285.08
d"
285.34
e"
257.17
a'''
430.27
a""
430.14
b""
402.27
Intensity
m/z

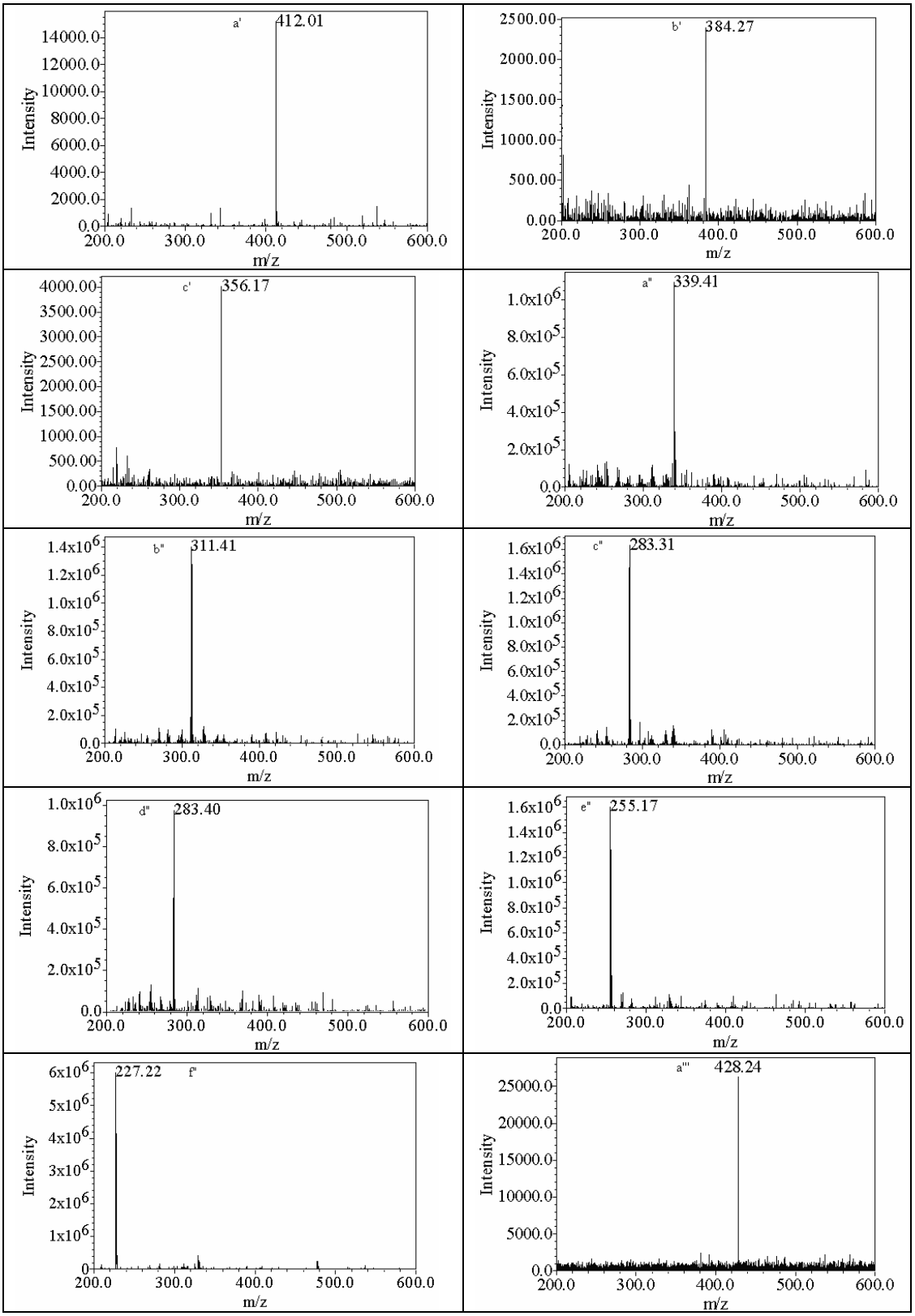

c''' 374.17
233.55
a'' 430.14
b'' 402.27
c'' 374.29
sa 350.08
sb 322.03
sc 294.18
sa' 350.23
sb' 322.33
sc' 294.11
Intensity
m/z

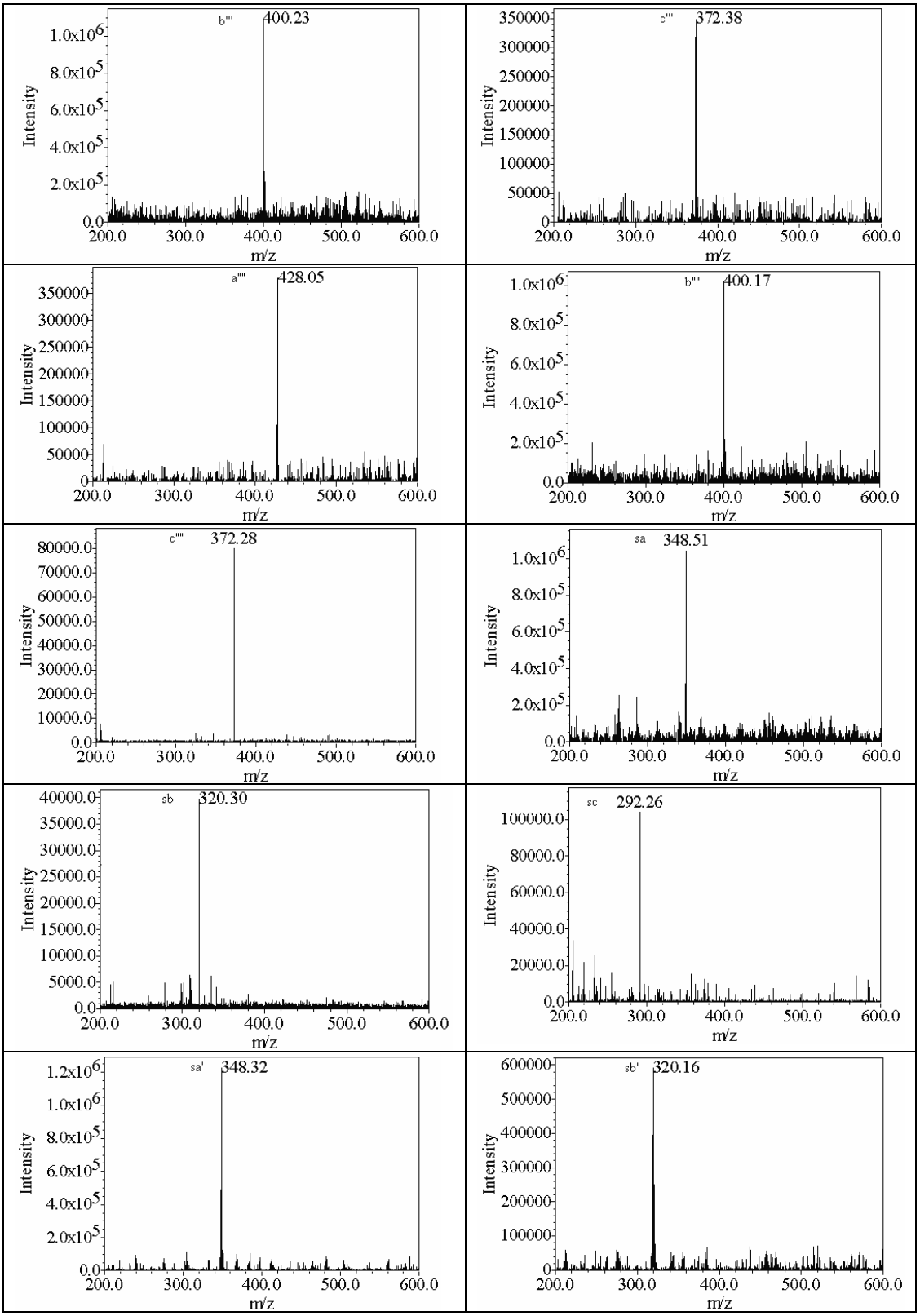


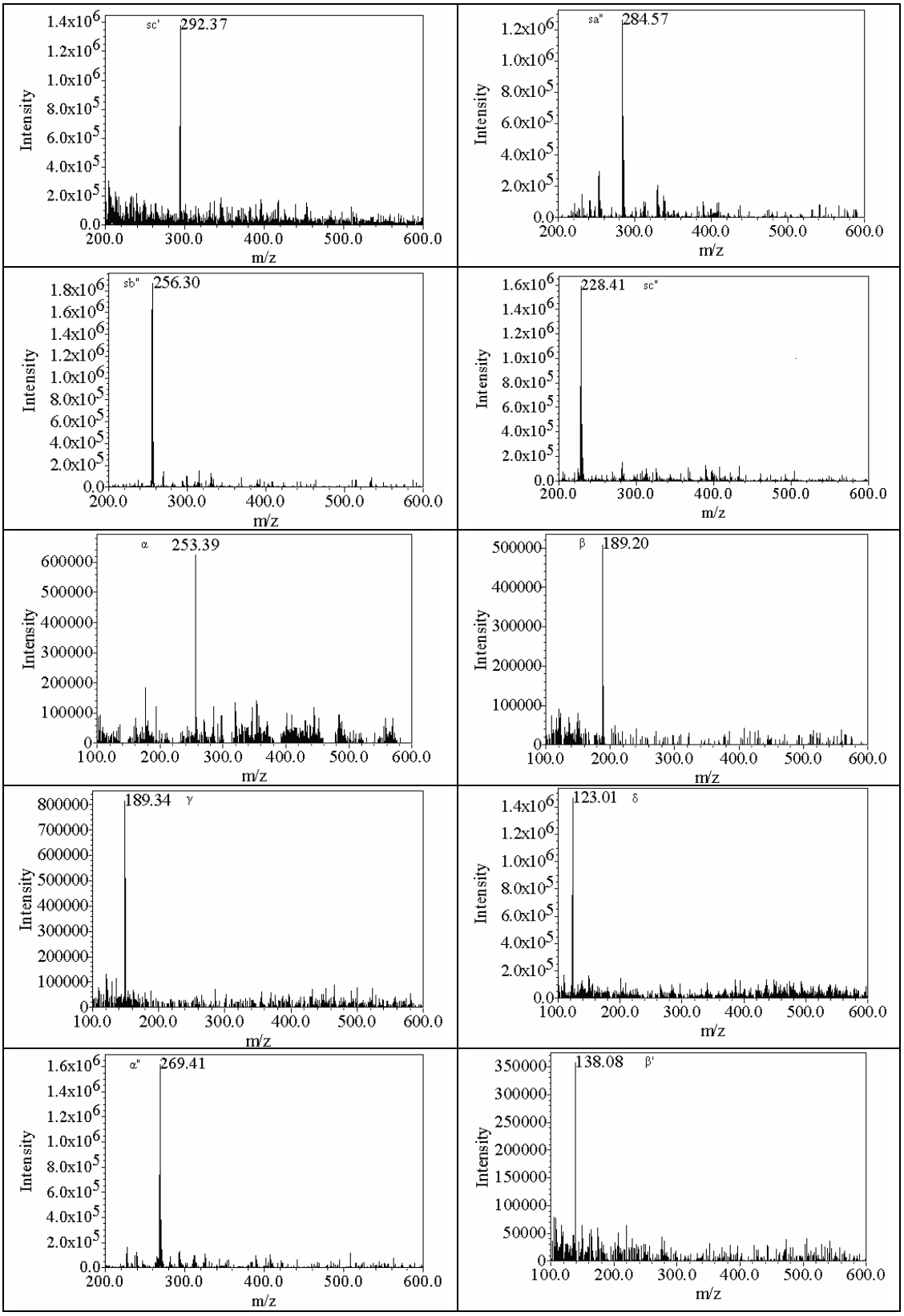
(b) ES$^-$ mass spectra


A 543.16
B 515.15
C 487.14
D 487.08
E 459.20
F 431.46
A' 559.15
B' 531.14
C' 503.96
D' 503.13
Intensity
m/z


E'
475.10
A"
559.00
B"
531.34
C"
503.47
D"
503.03
233.17
E"
475.35
209.27
226.28
A'''
559.39
SA
479.52
253.28
SA'
479.26
479.21
SA"
Intensity
m/z


a' 412.01
b' 384.27
c' 356.17
a" 339.41
b" 311.41
c" 283.31
d" 283.40
e" 255.17
f" 227.22
a''' 428.24
Intensity
m/z


b''' 400.23
c''' 372.38
a''' 428.05
b''' 400.17
c''' 372.28
sa 348.51
sb 320.30
sc 292.26
sa' 348.32
sb' 320.16
Intensity
m/z


sc' 292.37
sa" 284.57
sb" 256.30
228.41 sc"
α 253.39
β 189.20
189.34 γ
123.01 δ
α" 269.41
138.08 β'
Intensity
m/z

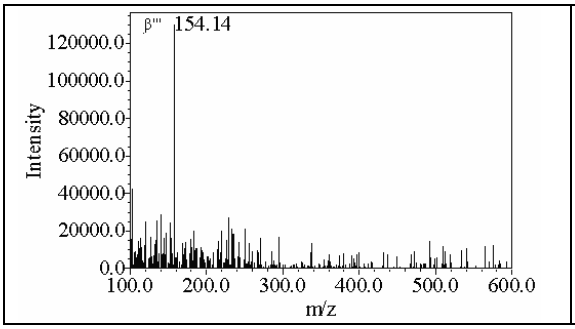
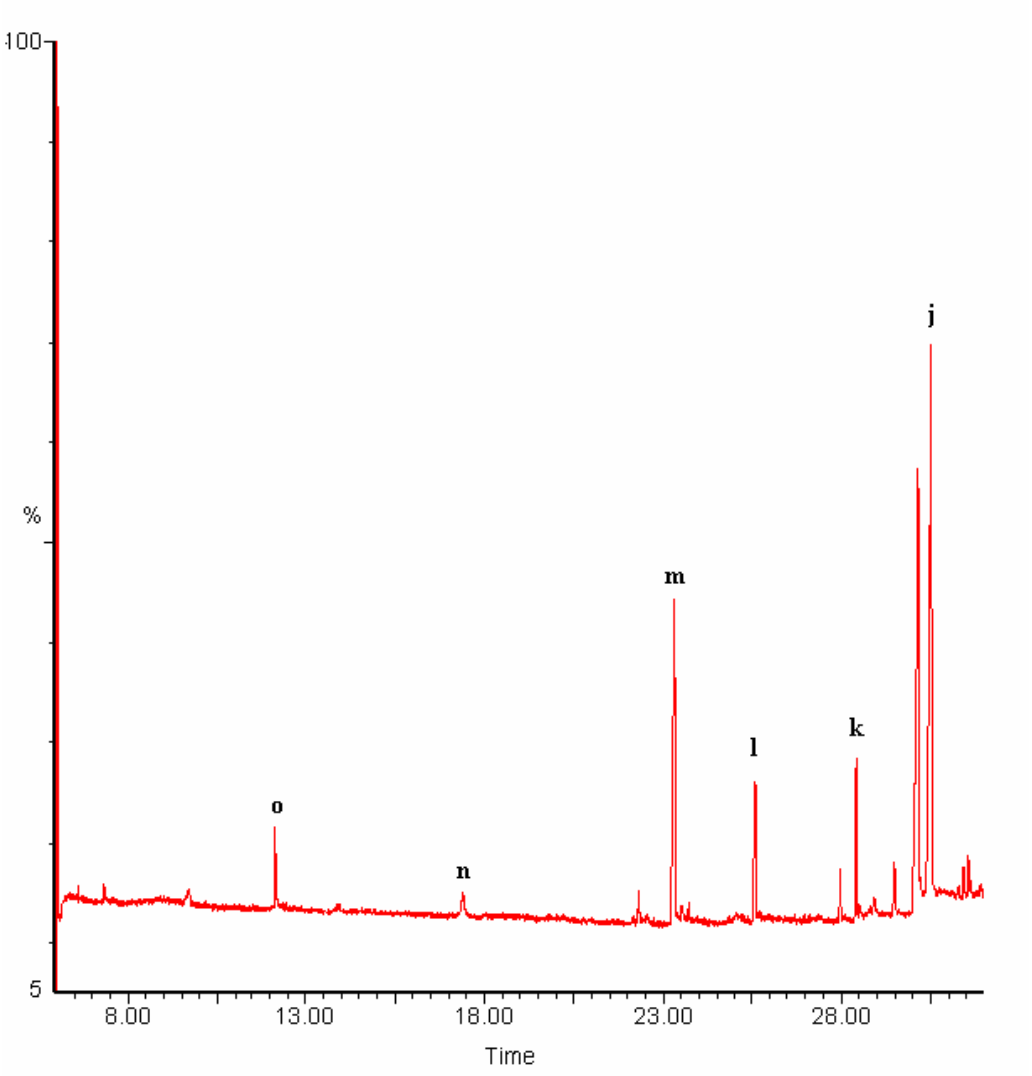
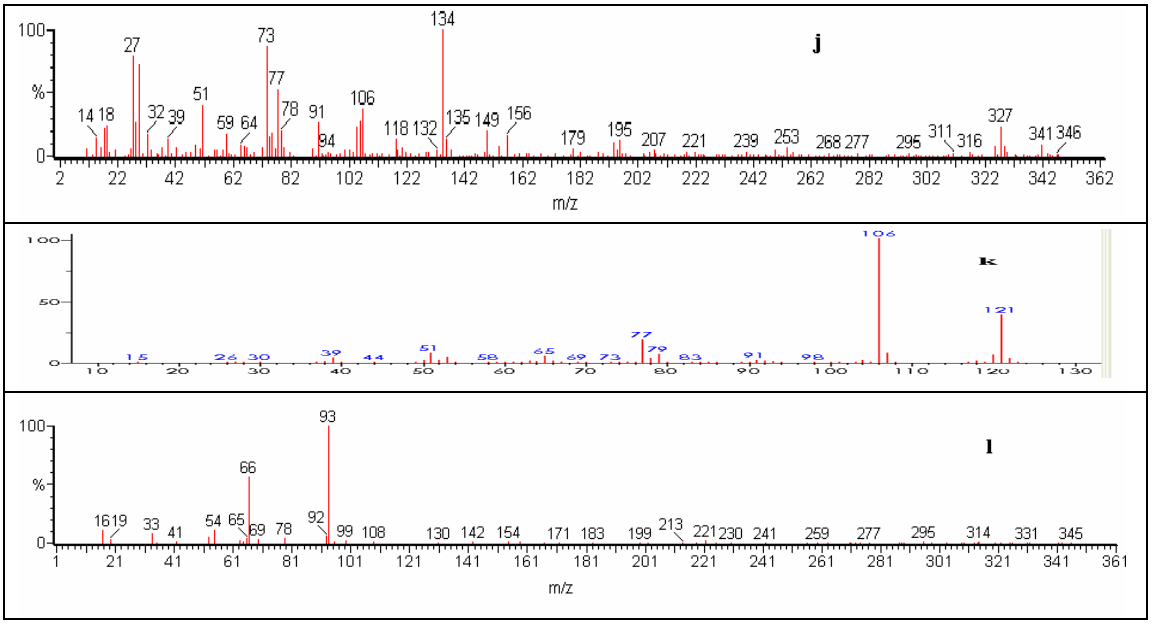


Figure 4S. Mass spectra of *N*-de-ethylated intermediates formed during the photodegradation of the **AB1** dye after they were separated by HPLC or GC method: mass spectra denoted **A-F**, **A′-E′**, **A″-B″**, **A‴**, **SA**, **SA′**, **SA″**, **a-e**, **a′-c′**, **a″-e″**, **a‴-b‴**, **a⁗-c⁗**, s**a-sc**, **sa′-sc′**, **sa″-sc″**, **α-δ**, **α′-γ′**, **α″** and **α‴-γ‴** corresponds to the **A-F**, **A′-E′**, **A″-B″**, **A‴**, **SA**, **SA′**, **SA″**, **a-e**, **a′-c′**, **a″-e″**, **a‴-b‴**, **a⁗-c⁗**, s**a-sc**, **sa′-sc′**, **sa″-sc″**, **α-δ**, **α′-γ′**, **α″** and **α‴-γ‴** species in **Figure 6**, respectively.


100
%
5
o
n
m
l
k
j
8.00
13.00
18.00
23.00
28.00
Time


j
m/z
k
l
m/z

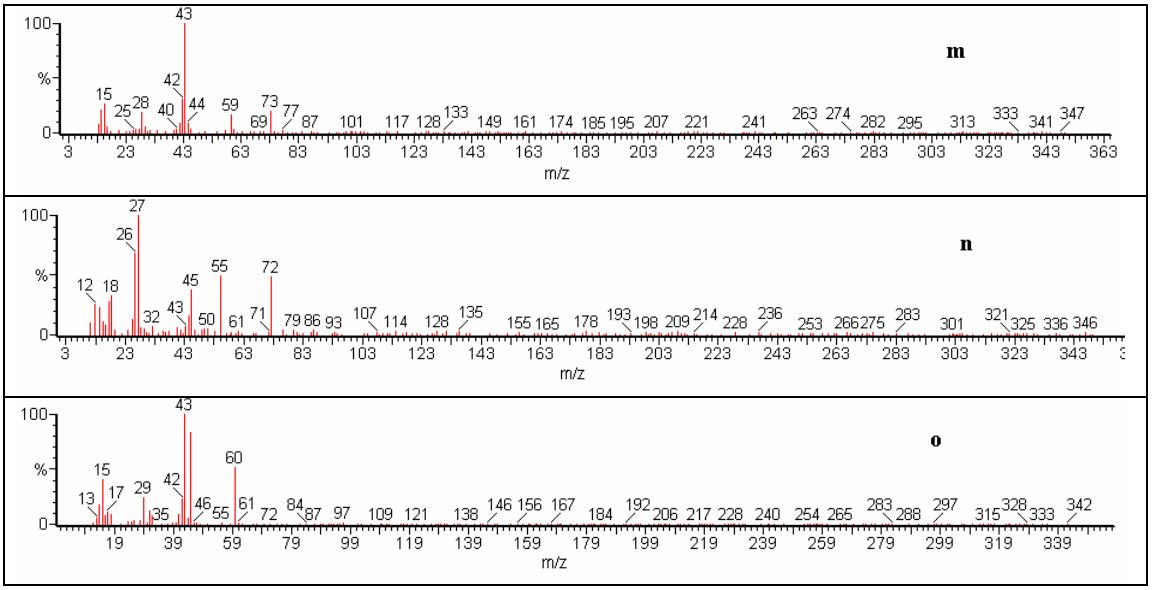


Figure 5S. EI mass spectra of intermediates formed during the photodegradation of the **AB1** dye after they were separated by GC method: mass spectra denote **j-o** correspond to the **j-o** species in chromatography, respectively.