

T1. A Journey through time: The secrets of Avicenna

7%						
1.1	1.2	1.3	1.4	1.5	1.6	Σ
3	4	3	4	7	4	25

1.1 (3.0 pt)

X:

☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
☐ 6	☐ 7	☐ 8	☐ 9	☐ 10

Y:

☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
☐ 6	☐ 7	☐ 8	☐ 9	☐ 10

1.2 (4.0 pt)

Z:

☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
☐ 6	☐ 7	☐ 8	☐ 9	☐ 10

Theory



A1-2

English (Official)

1.2 (cont.)

A	B
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1.3 (3.0 pt)

$n =$ _____

W:

☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
☐ 6	☐ 7	☐ 8	☐ 9	☐ 10

1.4 (4.0 pt)

Q:

C · xH₂O:

D:

1.5 (7.0 pt)

E	F	G
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Theory



A1-5

English (Official)

1.6 (4.0 pt)

Stone :

H :

T2. Kinetics of the Belousov-Zhabotinsky reaction

6%							
2.1	2.2	2.3	2.4	2.5	2.6	2.7	Σ
2	11	4	2	9	4	3	35

2.1 (2.0 pt)

2.2 (11.0 pt)

$[\text{HBrO}_2]_{\text{A}} = \text{_____ M}$

2.2 (cont.)

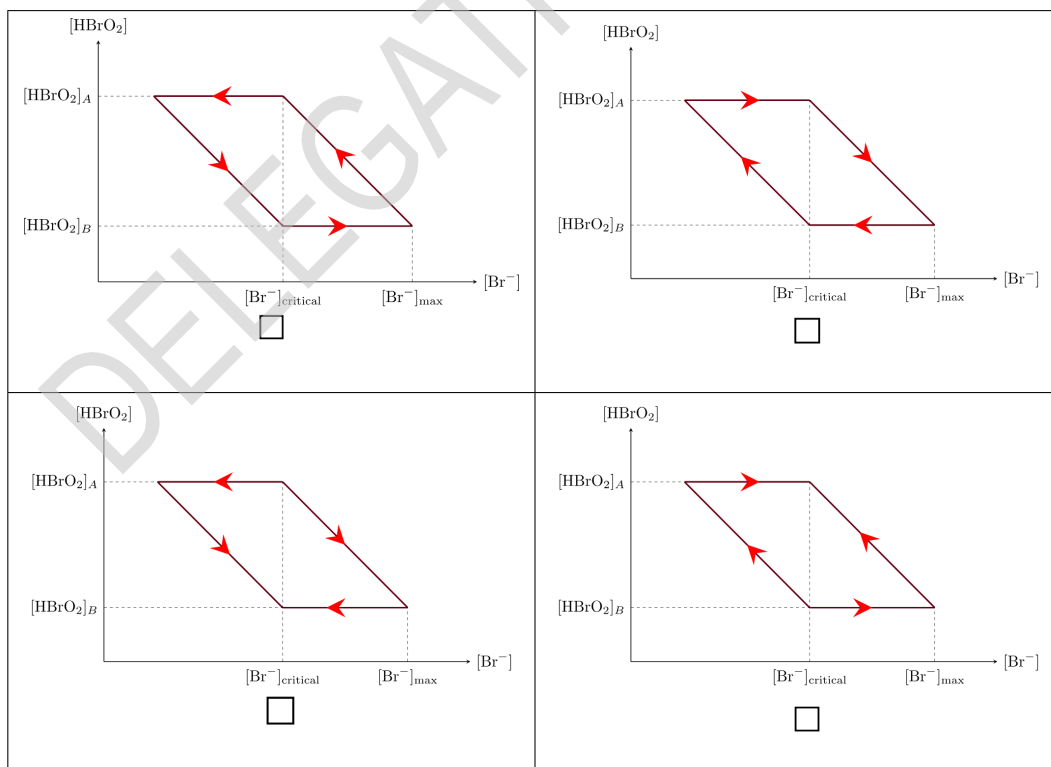
$[\text{HBrO}_2]_{\text{B}} = \text{_____} \text{ M}$

Theory

2.3 (4.0 pt)

$[\text{Br}^-]_{\text{critical}} = \underline{\hspace{2cm}} \text{ M}$

2.4 (2.0 pt)



2.5 (9.0 pt)

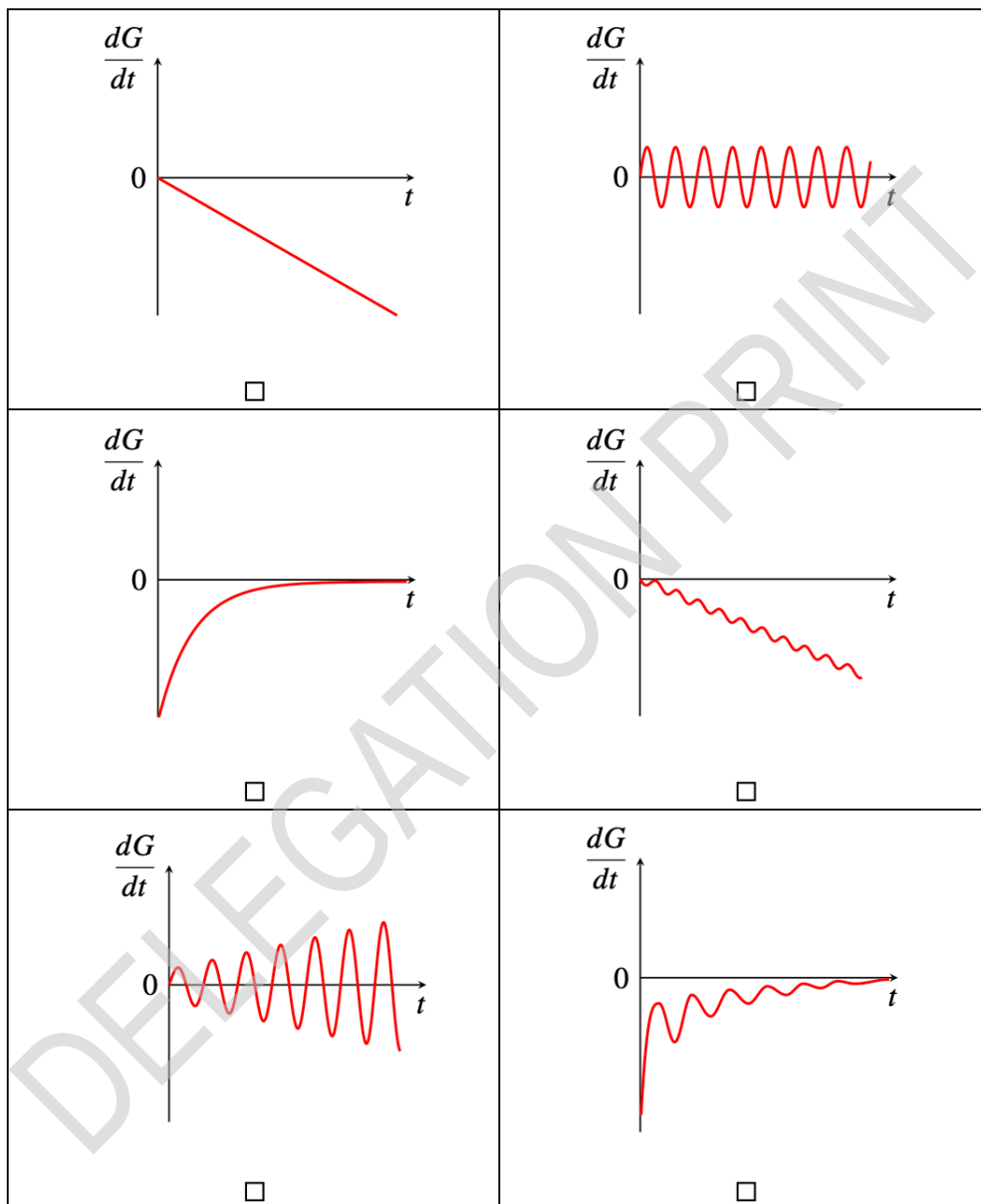
DELEGATION PRINT

$\tau =$ _____ s

2.6 (4.0 pt)

	a	b	c	d	e
1.	☐	☐	☐	☐	☐
2.	☐	☐	☐	☐	☐
3.	☐	☐	☐	☐	☐
4.	☐	☐	☐	☐	☐

2.7 (3.0 pt)



T3. Into Reticular Chemistry

7%							
3.1	3.2	3.3	3.4	3.5	3.6	3.7	Σ
2	3	23	12	6	12	5	63

3.1 (2.0 pt)

COF-1: _____

C: _____ %

3.2 (3.0 pt)

d = _____ Å

Theory

3.3 (23.0 pt)

Tetragonal 1	Tetragonal 2	Hexagonal 1	Hexagonal 2	Trigonal	Kagome	Tetrahe- dral
		A2 + B3	E1 + D2		C2 + D4	

3.4 (12.0 pt)

COF-3	COF-4
COF-5	COF-6

DELEGATION PRINT

3.5 (6.0 pt)

3.6 (12.0 pt)

$E, \text{kJ mol}^{-1}$	AA	AA'	AB	AB'
		-67.1		

3.7 (5.0 pt)

$q_e =$ _____ mg g^{-1}

COF-9: $\text{UO}_2^{2+} =$ _____

T4. The nuclear past of Uzbekistan

6% of total									
4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	Σ
2	3	3	2	2	2	2	2	4	22

4.1 (2.0 pt) ^{235}U : _____%**4.2** (3.0 pt)

(a) :

(b) :

(c) :

4.3 (3.0 pt)

Theory



A4-2

English (Official)

4.4 (2.0 pt)

ΔE : _____ MeV

4.5 (2.0 pt)

n_c : _____

4.6 (2.0 pt)

$\Delta_r H_{298} =$ _____ kJ mol^{-1}

Theory

4.7 (2.0 pt)

$$\Delta_r H_{2000} = \text{_____} \text{ kJ mol}^{-1}$$

4.8 (2.0 pt)

$$E = \text{_____} \text{ J day}^{-1}$$

Theory

4.9 (4.0 pt)

$TN =$ _____

$m =$ _____ kg

T5. Cardiolipins

6%						
5.1	5.2	5.3	5.4	5.5	5.6	Σ
1	6	4	2	2	3	18

5.1 (1.0 pt)

(a)	(b)	(c)

5.2 (6.0 pt)

PL1

Y

Theory

5.3 (4.0 pt)

$N_{C=C} =$

RCOOH : _____

5.4 (2.0 pt)

X:

5.5 (2.0 pt)

(a)	(b)	(c)	(d)

5.6 (3.0 pt)

PL2

PL3

DELEGATION PRINT

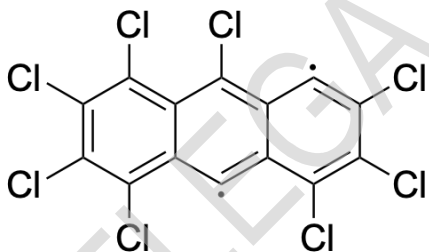
T6. Carbon Nanorings

7%							
6.1	6.2	6.3	6.4	6.5	6.6	6.7	Σ
10	11	2	12	24	20	4	83

6.1 (10.0 pt)

	C_{18}	C_{16}	$^3C_{13}$	$^1C_{13}$
A				
AA				

6.2 (11.0 pt)

 A	B
C	D

6.3 (2.0 pt)

X = _____

6.4 (12.0 pt)

<i>m/z</i>	591	783	879	1174
	[E + H] ⁺			

6.5 (24.0 pt)

F	G
H	I

DELEGATION PRINT

6.5 (cont.)

J	K
L	

Theory

6.6 (20.0 pt)

M	N
O	Q

DELEGATION PRINT

6.6 (cont.)**6.7 (4.0 pt)**

$n(e)$	
$n(t)$	

T7. Nitrogen Fixation

7%							
7.1	7.2	7.3	7.4	7.5	7.6	7.7	Σ
3	8	15	3	6	6	13	54

7.1 (3.0 pt)

	CH ₄	H ₂ O	CO	O ₂	H ₂	N ₂	NH ₃	CO ₂
M1								
M2								

$x > y$	$x = y$	$x < y$

7.2 (8.0 pt)

$m(\text{CH}_4) = \underline{\hspace{2cm}}$

DELEGATION PRINT

Theory



A7-3

English (Official)

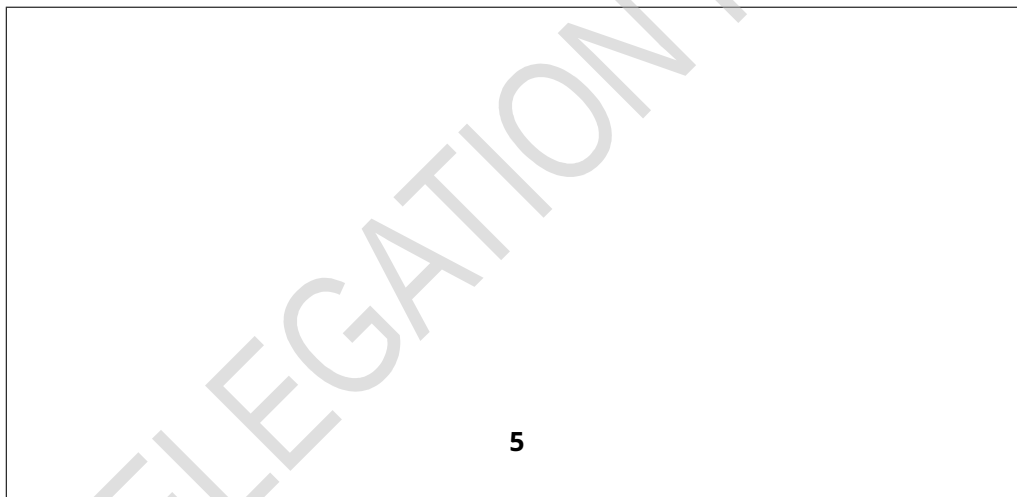
7.3 (15.0 pt)

$f_n =$ _____

$n =$ _____

7.4 (3.0 pt)

7.5 (6.0 pt)



7.6 (6.0 pt)

Theory



A7-5

English (Official)

7.7 (13.0 pt)

7: _____ 8: _____ 9: _____ 10: _____

S: _____ T: _____

T8. Recycling of Carbon Dioxide

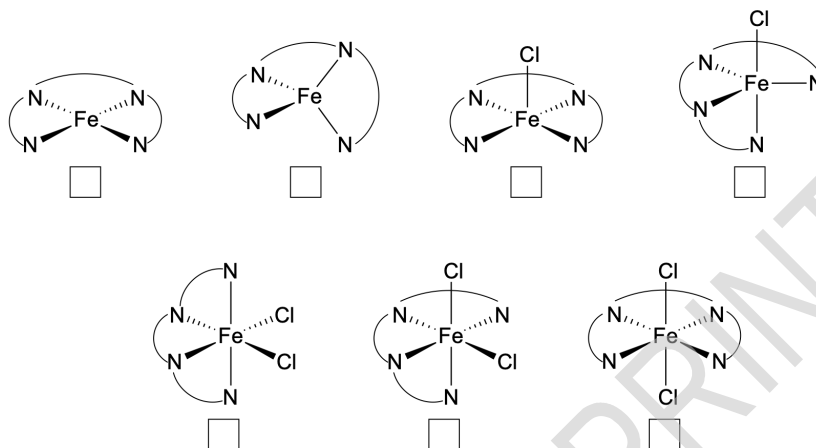
7%										
8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9	8.10	Σ
2	16	2	29	5	10	2	4	12	2	84

8.1 (2.0 pt)

8.2 (16.0 pt)

3	4
5	6
7	

8.3 (2.0 pt)



Theory

8.4 (29.0 pt)

9

$Z = \underline{\hspace{2cm}}$

$OS = \underline{\hspace{2cm}}$ $CN = \underline{\hspace{2cm}}$ $VE = \underline{\hspace{2cm}}$

10

$Z = \underline{\hspace{2cm}}$

$OS = \underline{\hspace{2cm}}$ $CN = \underline{\hspace{2cm}}$ $VE = \underline{\hspace{2cm}}$

11

$Z = \underline{\hspace{2cm}}$

$OS = +3$ $CN = 6$ $VE = \underline{\hspace{2cm}}$

12

$Z = \underline{\hspace{2cm}}$

$OS = \underline{\hspace{2cm}}$ $CN = 5$ $VE = \underline{\hspace{2cm}}$

8.4 (cont.)

13

 $Z = \underline{\hspace{2cm}}$ $OS = +2 \quad CN = \underline{\hspace{2cm}} \quad VE = \underline{\hspace{2cm}}$

14

 $Z = \underline{\hspace{2cm}}$ $OS = \underline{\hspace{2cm}} \quad CN = \underline{\hspace{2cm}} \quad VE = \underline{\hspace{2cm}}$

15

 $Z = \underline{\hspace{2cm}}$ $OS = \underline{\hspace{2cm}} \quad CN = \underline{\hspace{2cm}} \quad VE = 16$

8.5 (5.0 pt)

$N_{cat} =$ _____

8.6 (10.0 pt)

$\varphi =$ _____ %

8.7 (2.0 pt)

a	b	c
☐	☐	☐

8.8 (4.0 pt)

	N	R	G	B
a	☐	☐	☐	☐
b	☐	☐	☐	☐
c	☐	☐	☐	☐
d	☐	☐	☐	☐

8.9 (12.0 pt)

$$\eta_q(S_1) = \text{_____} \%$$

$$\eta_q(T_1) = \text{_____} \%$$

8.10 (2.0 pt)

a	b	c
☐	☐	☐

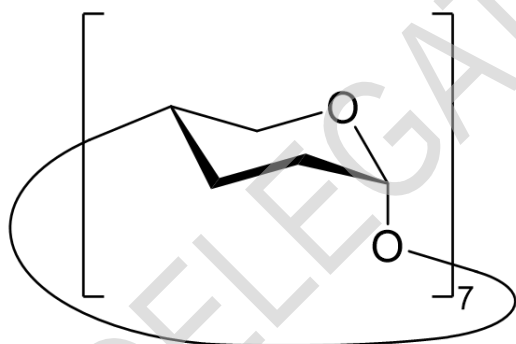
T9 Cyclodextrin Chemistry

7%									
9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9	Σ
2	6	8	3	2	4	6	18	4	53

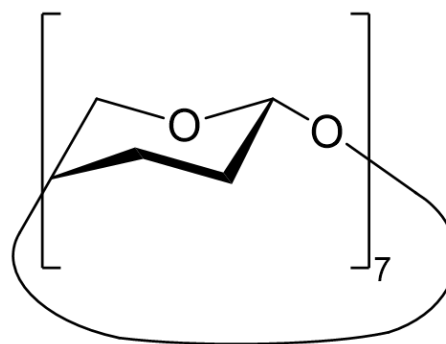
9.1 (2.0 pt)

 $M_w : \beta\text{-CD} = \underline{\hspace{2cm}}$

9.2 (6.0 pt)



□



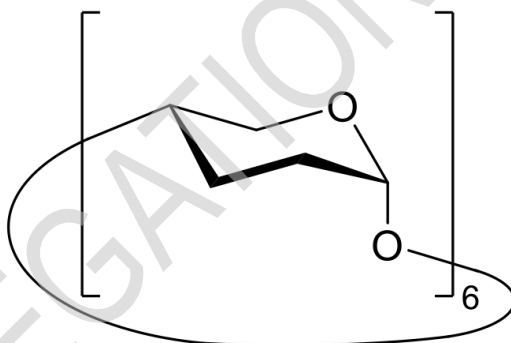
□

9.3 (8.0 pt)

rs: _____

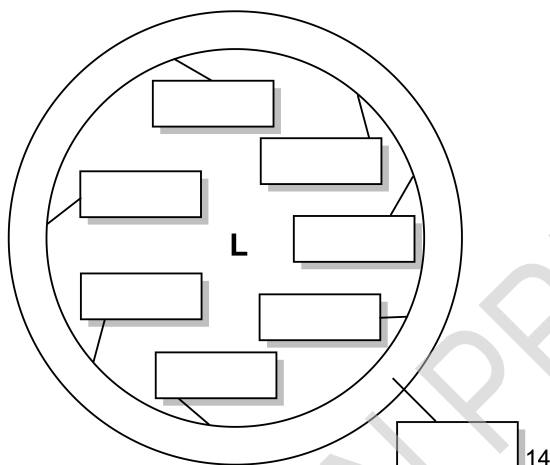
sc: _____

9.4 (3.0 pt)



Y – $\text{C}_{72}\text{H}_{132}\text{O}_{24}\text{Si}_6$

9.5 (2.0 pt)



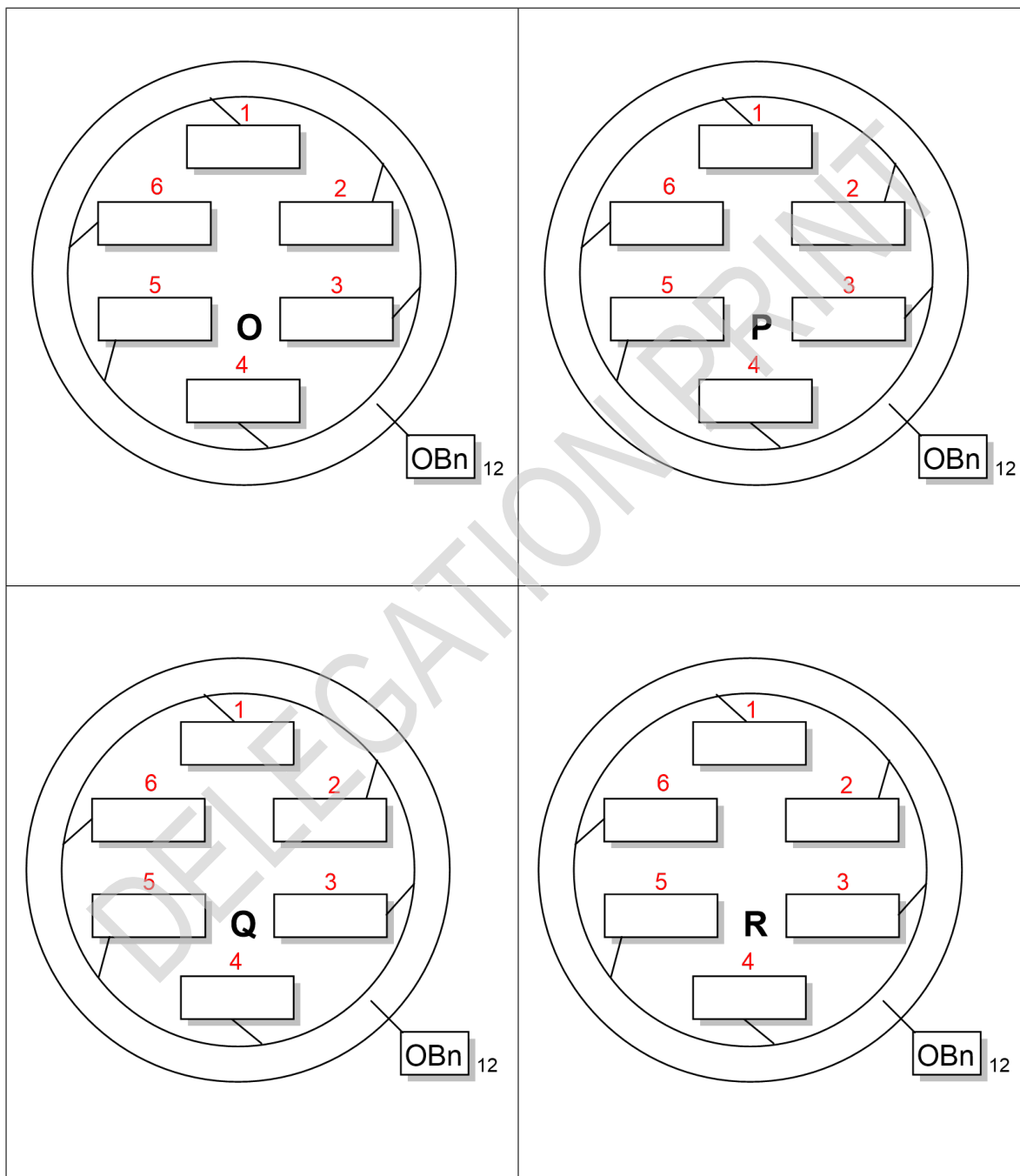
9.6 (4.0 pt)

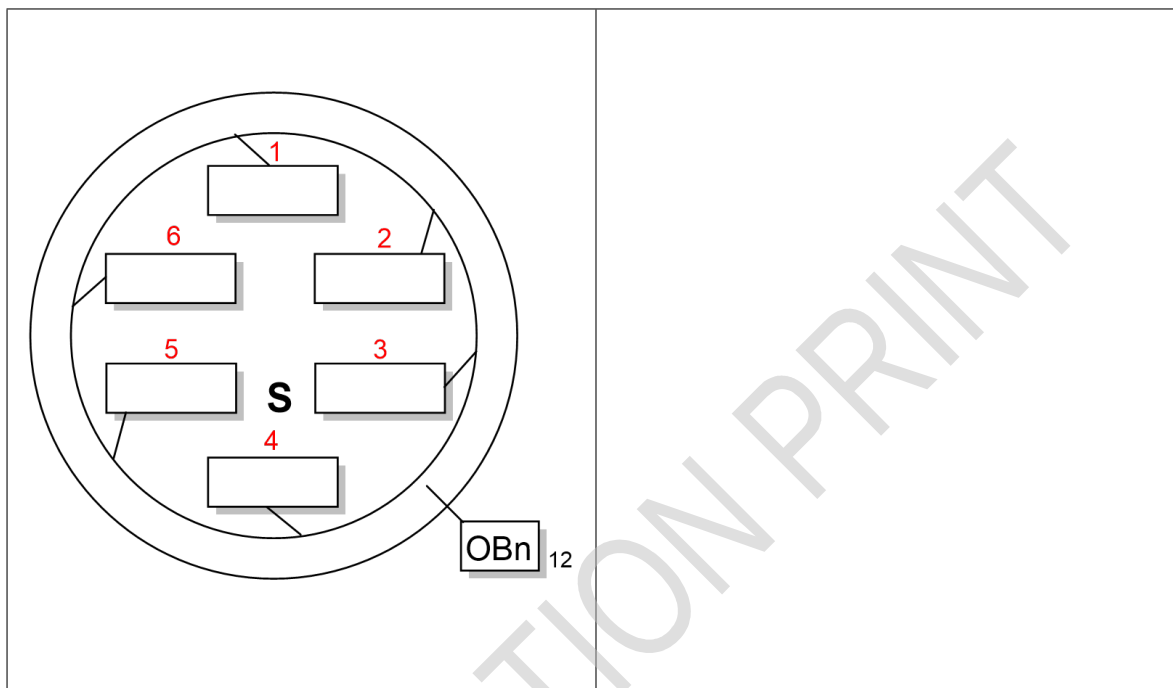
9.7 (6.0 pt)

$[M_1 + Na]^+$: _____

$[M_2 + Na]^+$: _____

9.8 (18.0 pt)



9.8 (cont.)**9.9 (4.0 pt)**