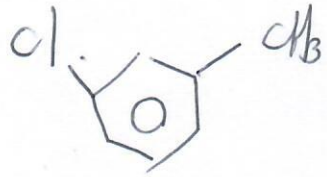
Priority of functional groups.

R, OR, X, NO_2 < Alkene, Alkyne < NH_2

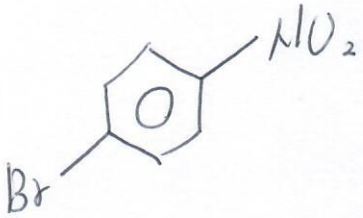
< OH < Carbonyl < Carboxylic acid derivatives

< Carboxylic acid.

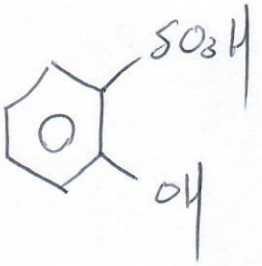
Problem 15.1

(a) 

meta disubstituted

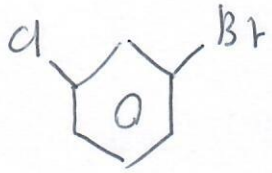
(b) 

para disubstituted

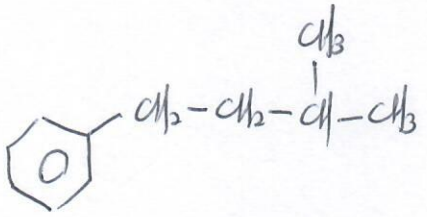
(c) 

ortho disubstituted.

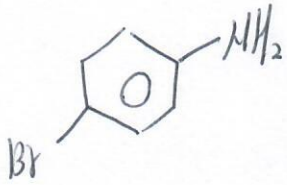
Problem 15.2

(a) 

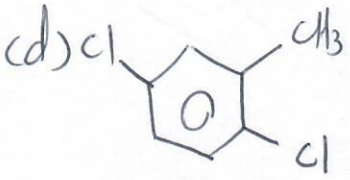
meta - bromo chloro benzene

(b) 

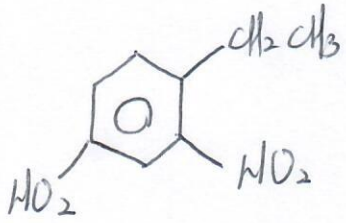
3-methyl ~~butyl~~ benzene.

(c) 

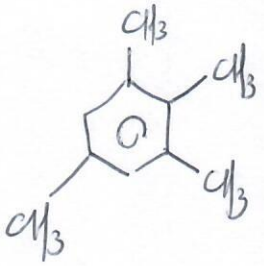
para Bromoaniline

(d) 

2,5- Dichloro toluene.

(e) 

1-ethyl-2.4-dinitro benzene.

(f) 

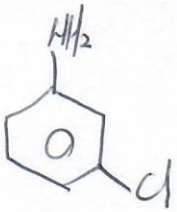
1.2.3,5- Tetramethyl benzene.

Problem 15.3

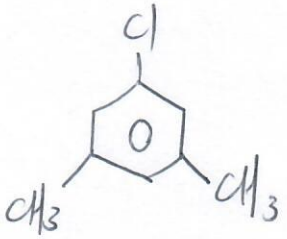
(a) p - Bromo chloro benzene

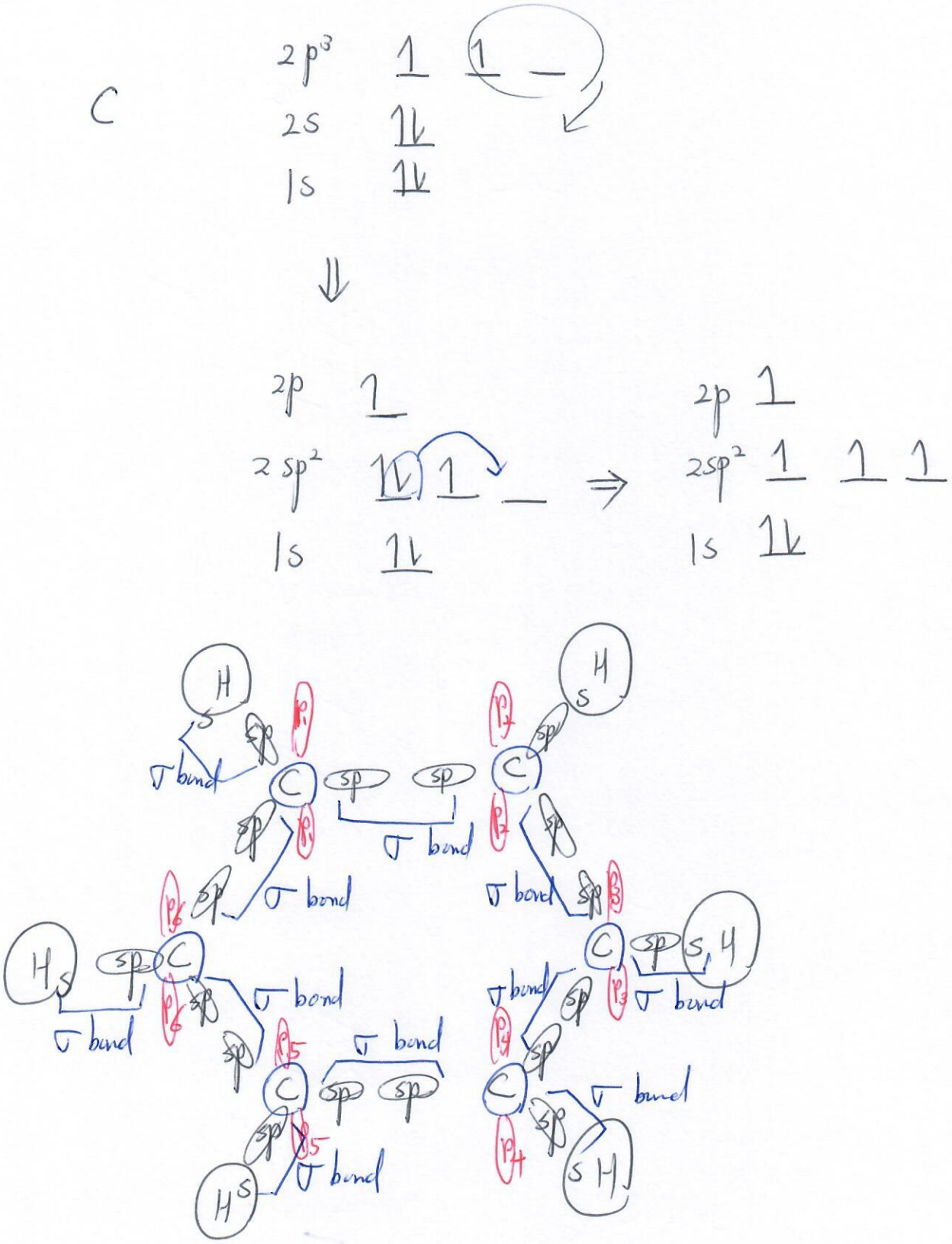
(b) p - Bromo-toluene

(c) m - chloro aniline



(d) 1- Chloro -3.5 - dimethyl benzene




C
2p³
2s
1s
2p
2sp²
1s
⇒
σ bond
π bond
H
C
sp
p1
p2
p3
p4
p5
p6
p7
p1 and p2 ; p3 and p4 ; p5 and p6 π bond
or
p1 and p6 ; p5 and p4 ; p3 and p2 π bond.

Problem 15.4

C $2p$ 1

$2sp^2$ 1 1 1

$1s$ 1

N $2p^3$ 1 1 1

$2s$ 1↓

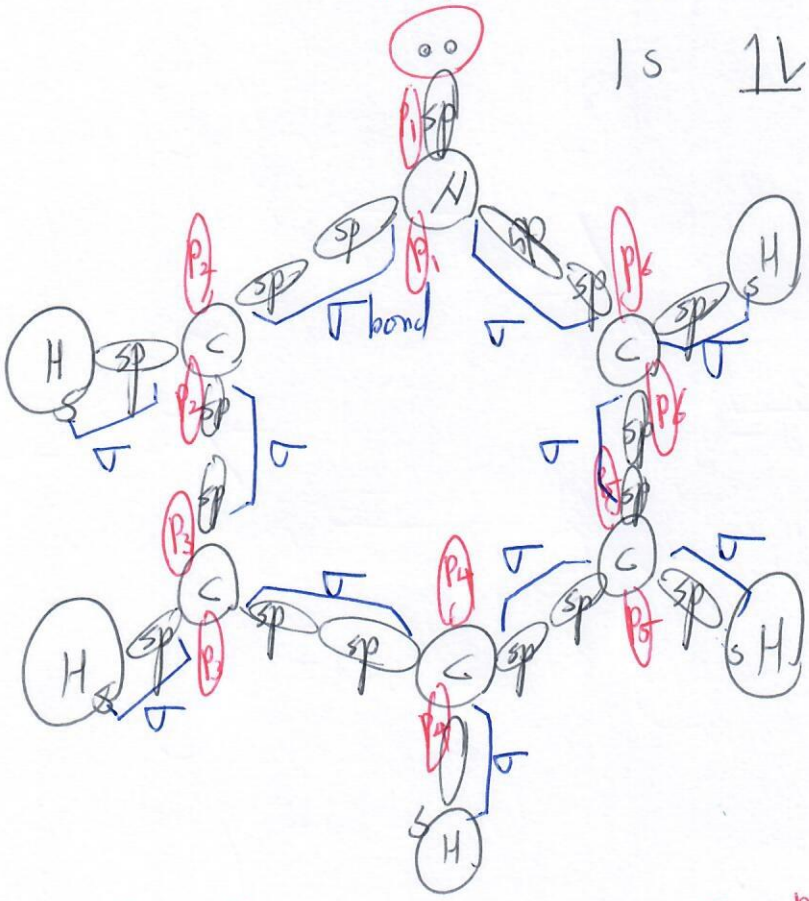
$1s$ 1↓

⇓

$2p$ 1

$2sp^2$ 1↓ 1 1 → lone pair electron

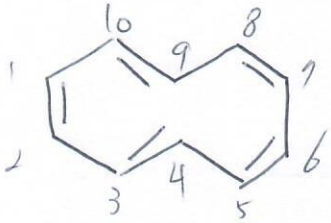
$1s$ 1↓



$P_1 - P_2$
$P_3 - P_4$
$P_5 - P_6$
] π bond

$P_1 - P_6$
$P_5 - P_4$
$P_3 - P_2$
] π bond

problem 15.~~6~~5



cyclodecapentaene.

1) cyclic structure.

2) high angle strain of hydrogen atoms at 4 and 9 point.

3) various structures

. . .

4) satifies the Hückel's rule.

$n = 2$

$4 \times 2 + 2 = 10$ pi electrons

So cyclodecapentaene is not aromatic compound.

Worked Example 15.1

The hybrid orbital of C

2p ↑

$2sp^2$ ↑ ↑ ↑

1s ↑↓

^{16}S $3p^3$ ↑↓ ↑ ↑

3s ↑↓

$2p^3$ ↑↓ ↑↓ ↑↓

2s ↑↓

1s ↑↓

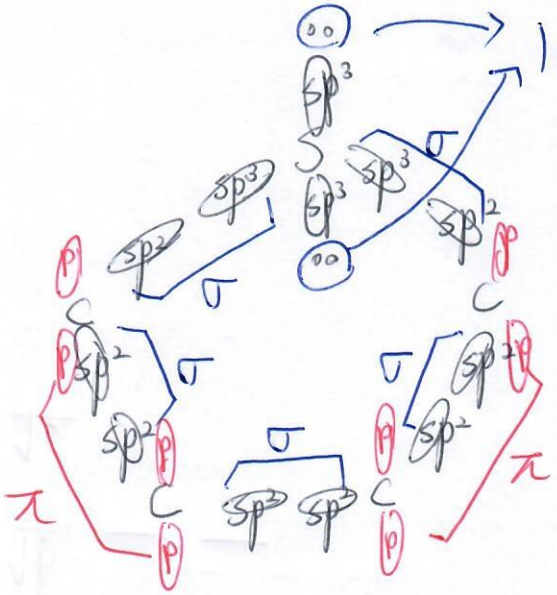
Hybrid orbital of S →

$3sp^3$ ↑↓ ↑↓ ↑ ↑

$2p^3$ ↑↓ ↑↓ ↑↓

2s ↑↓

1s ↑↓



Problem 15.9

The hybrid orbital of C.

2p	1		
$2sp^2$	1	1	1
1s	1		

^8O $2p^3$ 1↓ 1 1

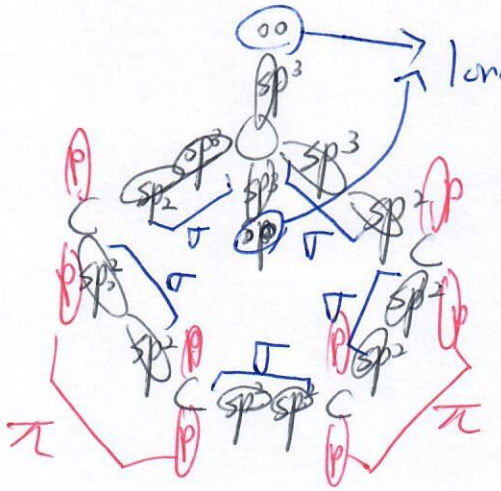
2s 1↓

1s 1↓

Hybrid orbital of O →

$2sp^3$ 1↓ 1↓ 1 1.

1s 1↓



lone pair electrons.