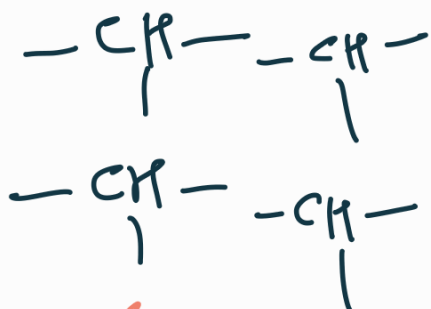


$$2x + 1x + 3x = 12$$



$x = 2$

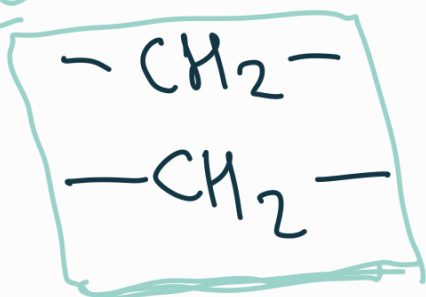
①

4
H

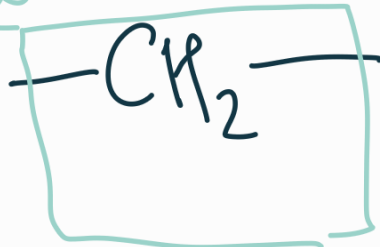
2H

6H

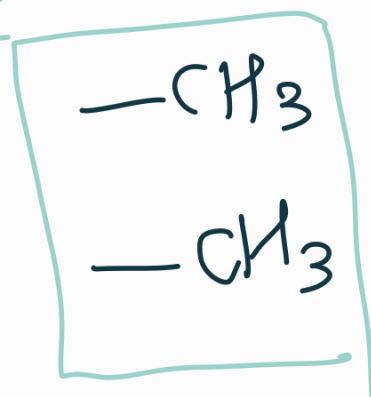
Ⓐ

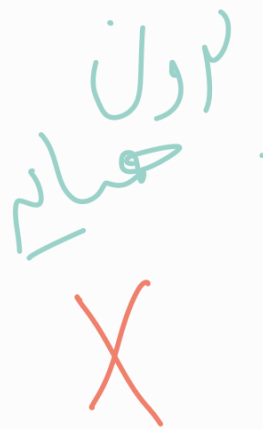


Ⓐ



Ⓐ





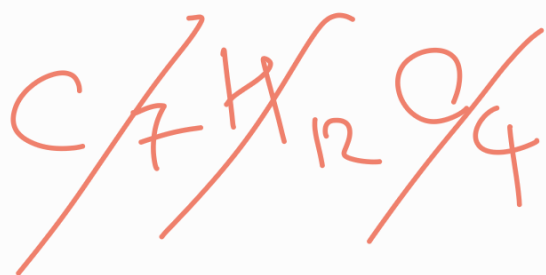
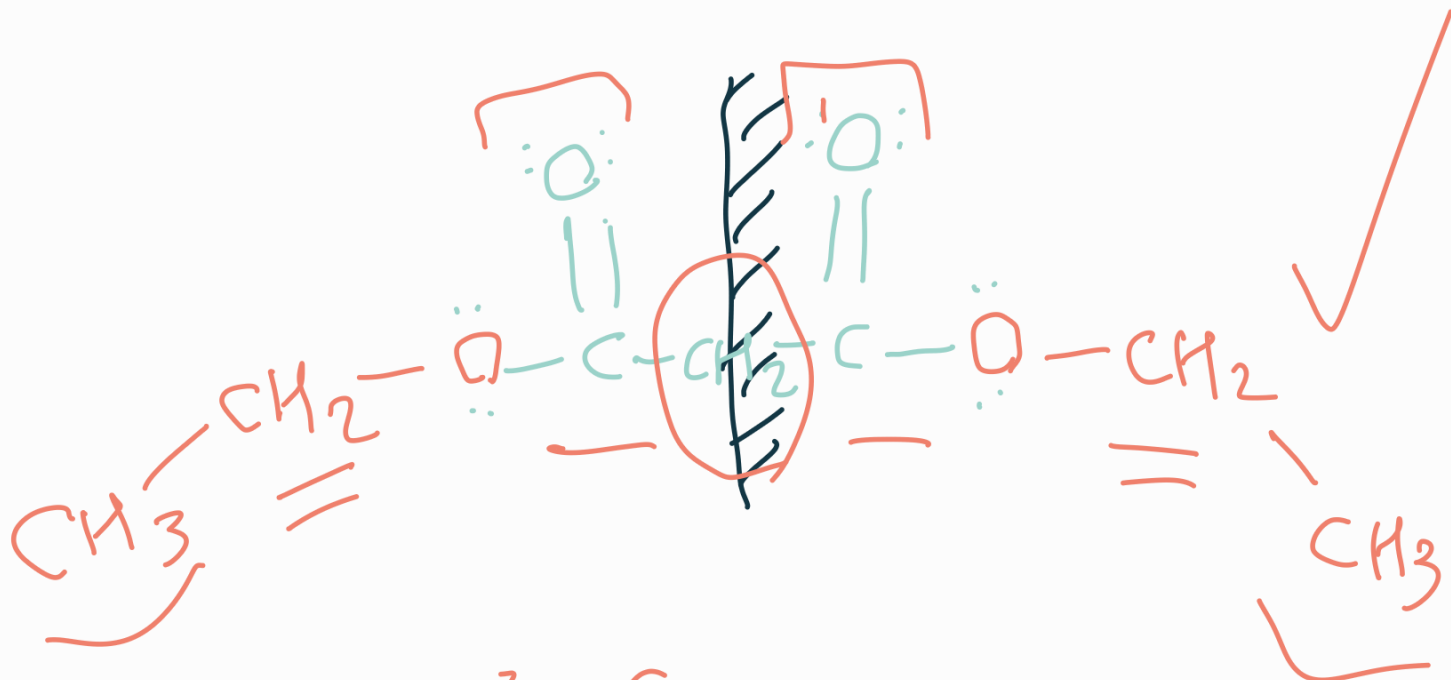
افسار
عاشقانه و فانی



محاسبه
محاسبه و محاسبه
محاسبه و محاسبه

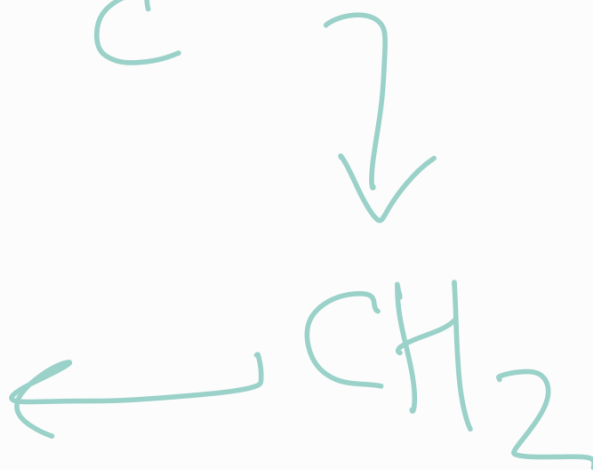
Chemically
equivalent

Symmetry

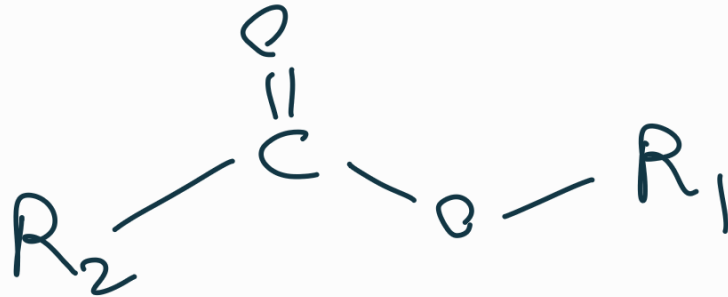


Singlet

برون CH_2

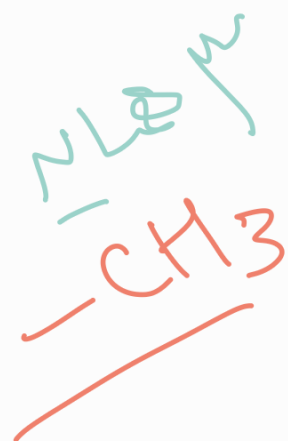


(27)

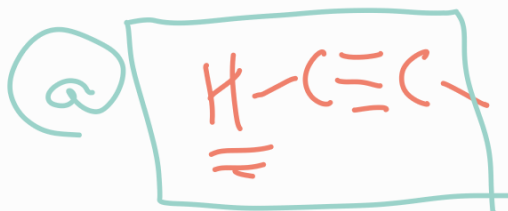


IR 3270-2118 -C≡C-

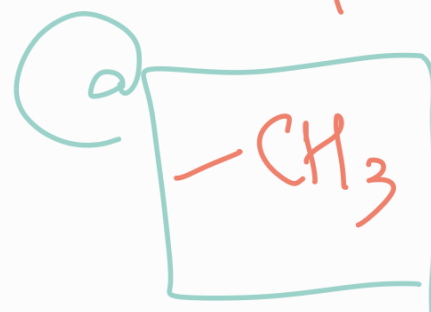
دین البر و طابو
2H

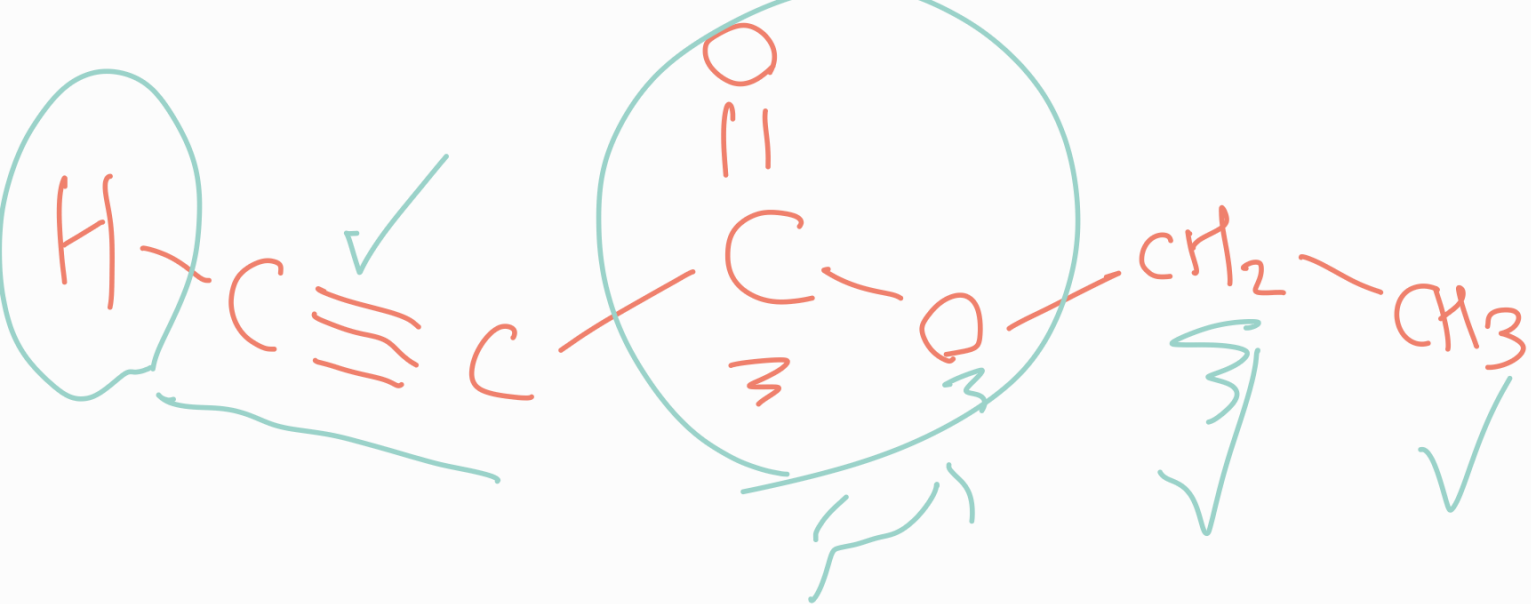


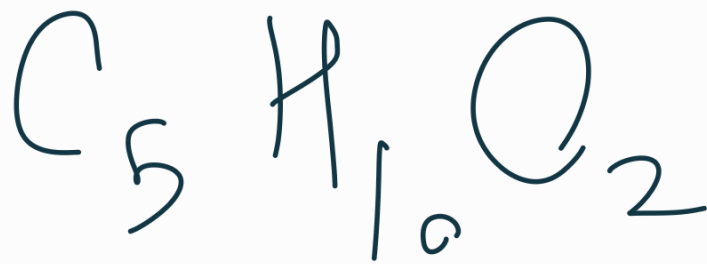
1H



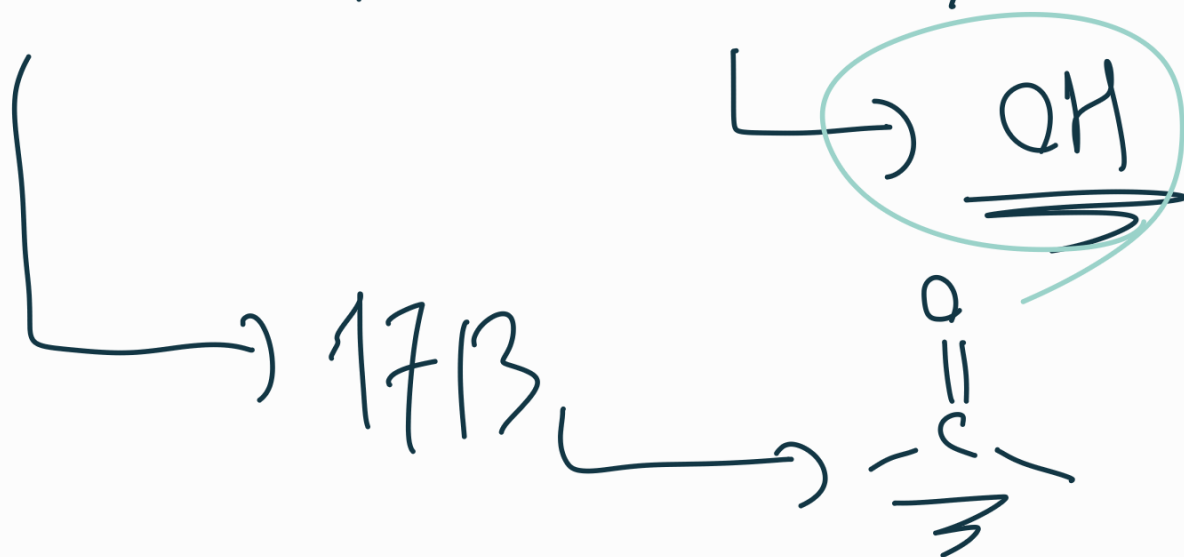
3H





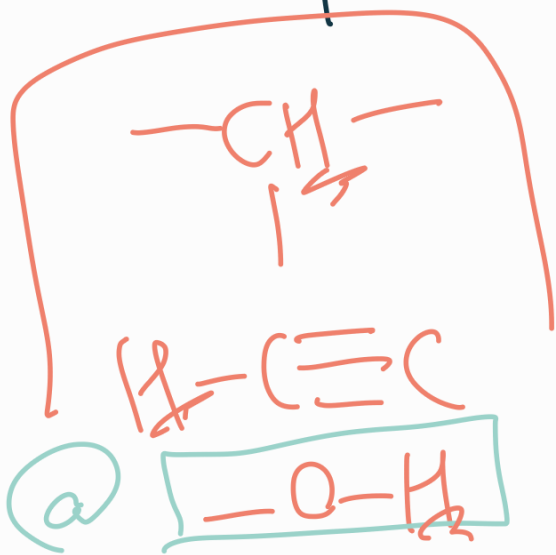


IR \rightarrow 3450 (broad) ✓



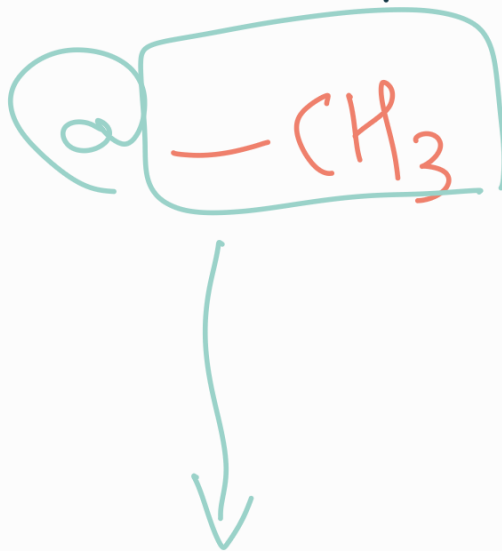
$\delta = 4$

1H



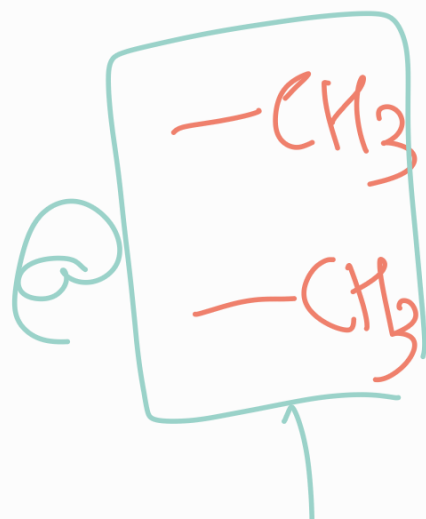
$\delta = 2.3$

3H



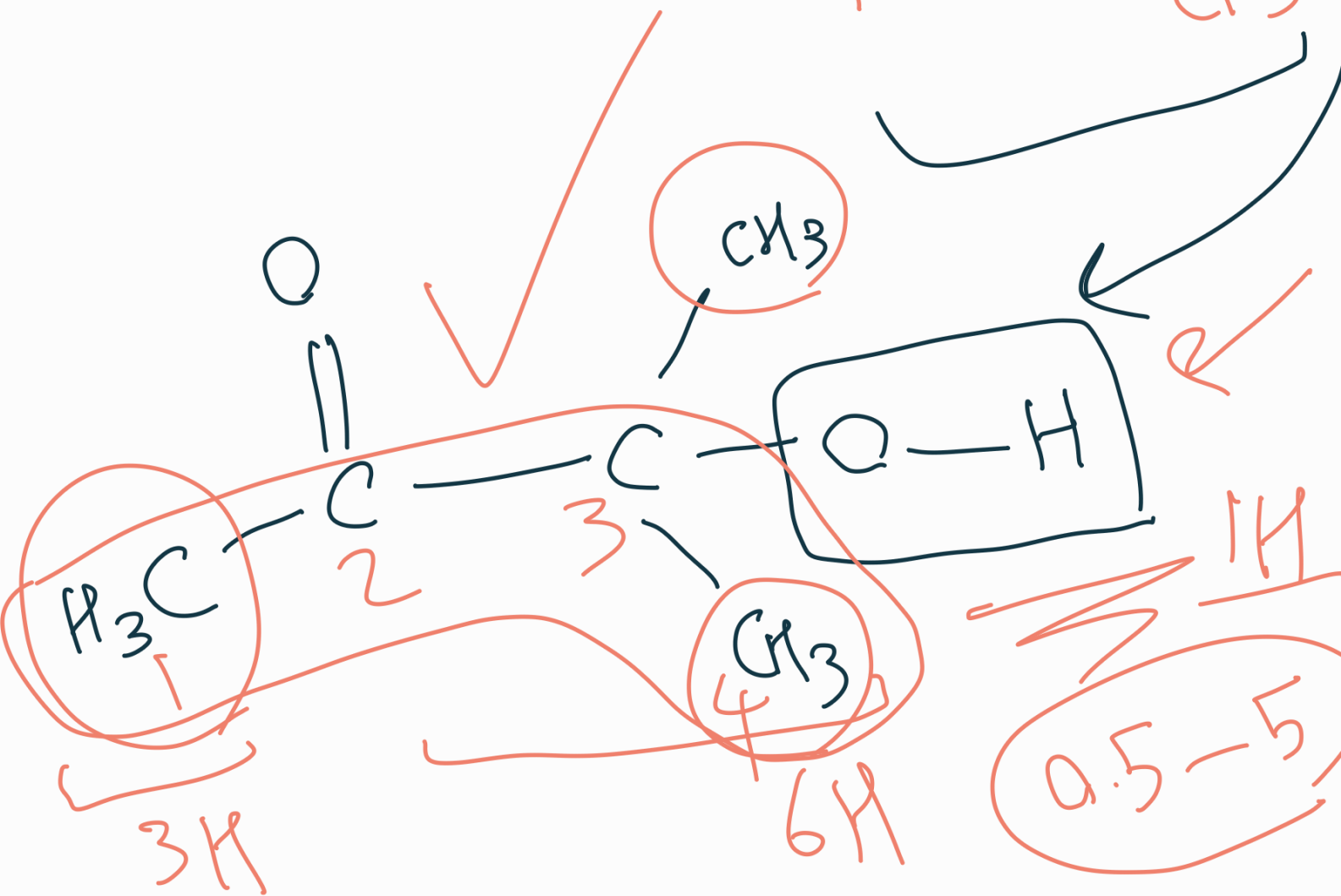
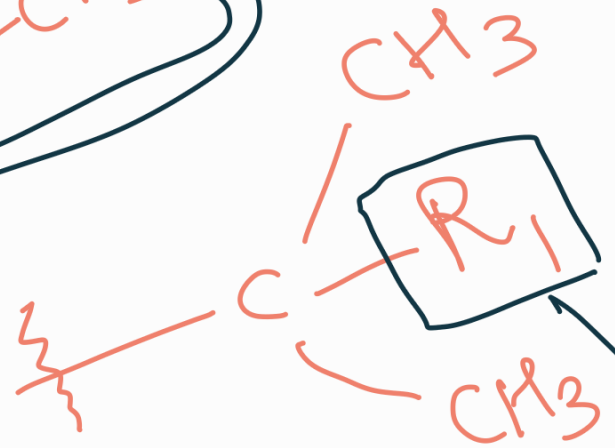
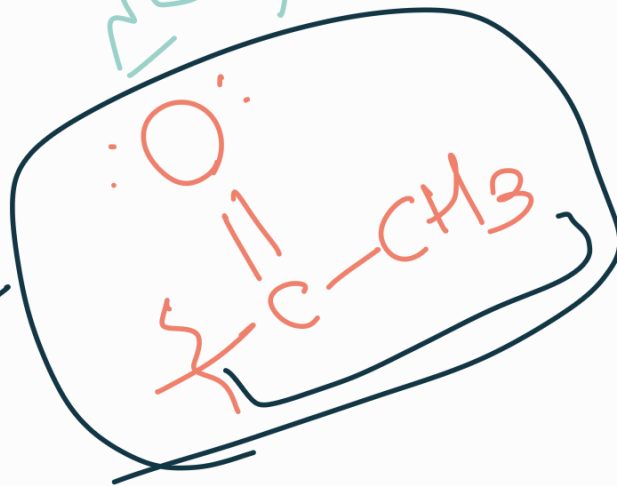
$\delta = 1.5$

6H

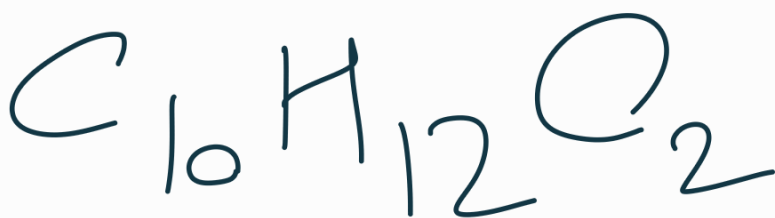


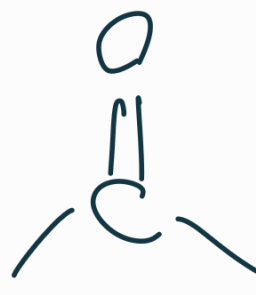


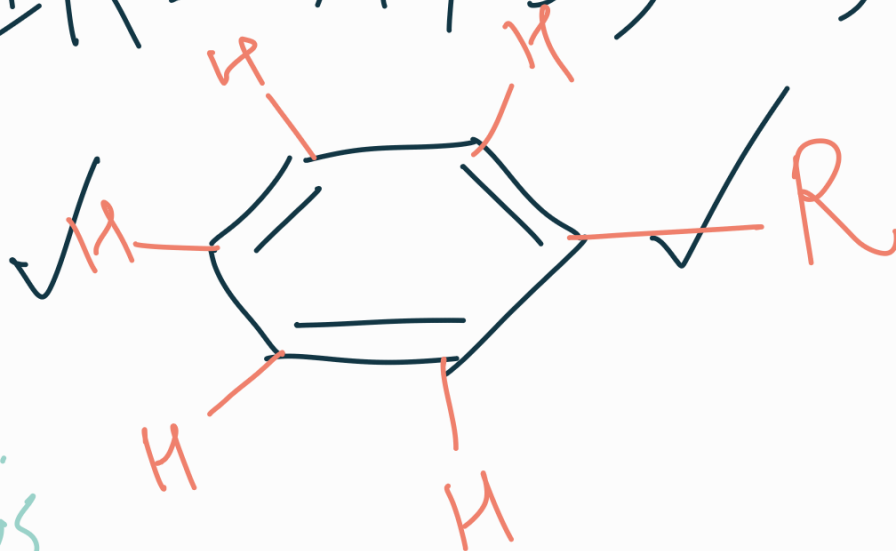
با فرض اینکه
بدون رزونانس



(25)



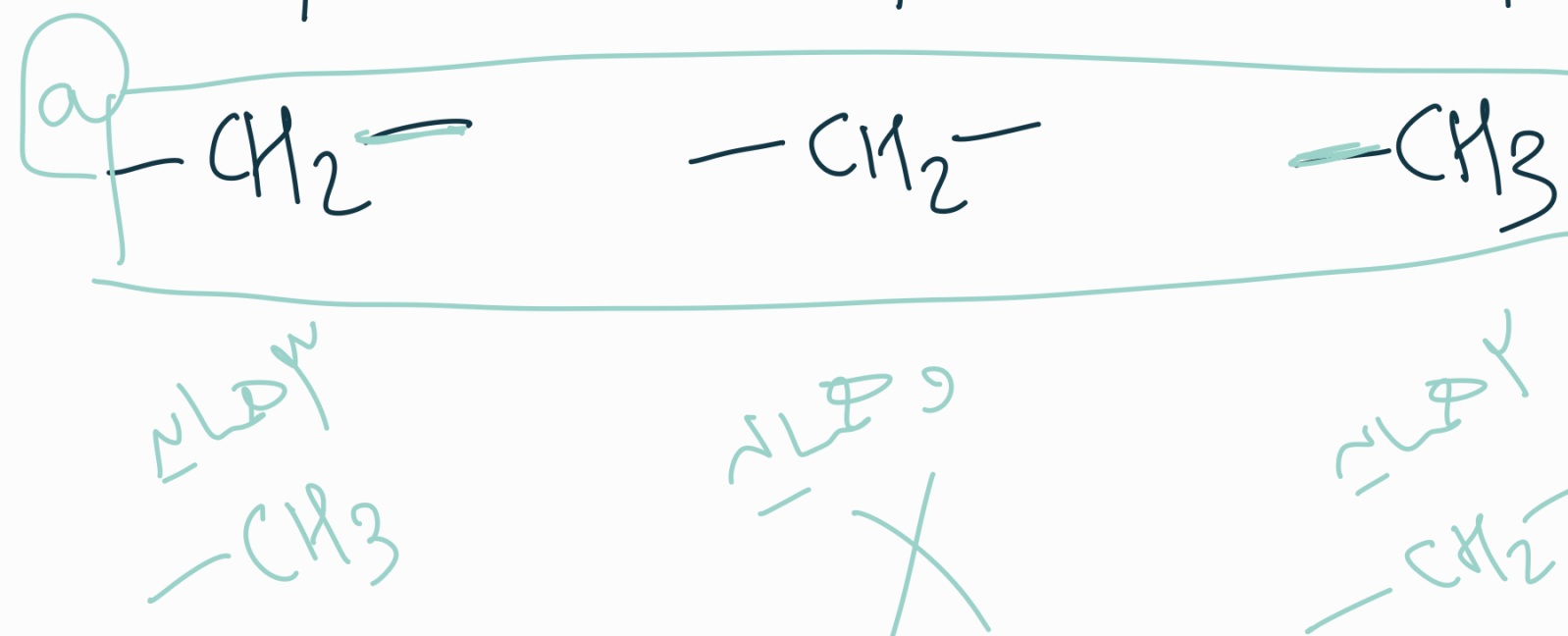
IR \rightarrow 1735 \rightarrow 

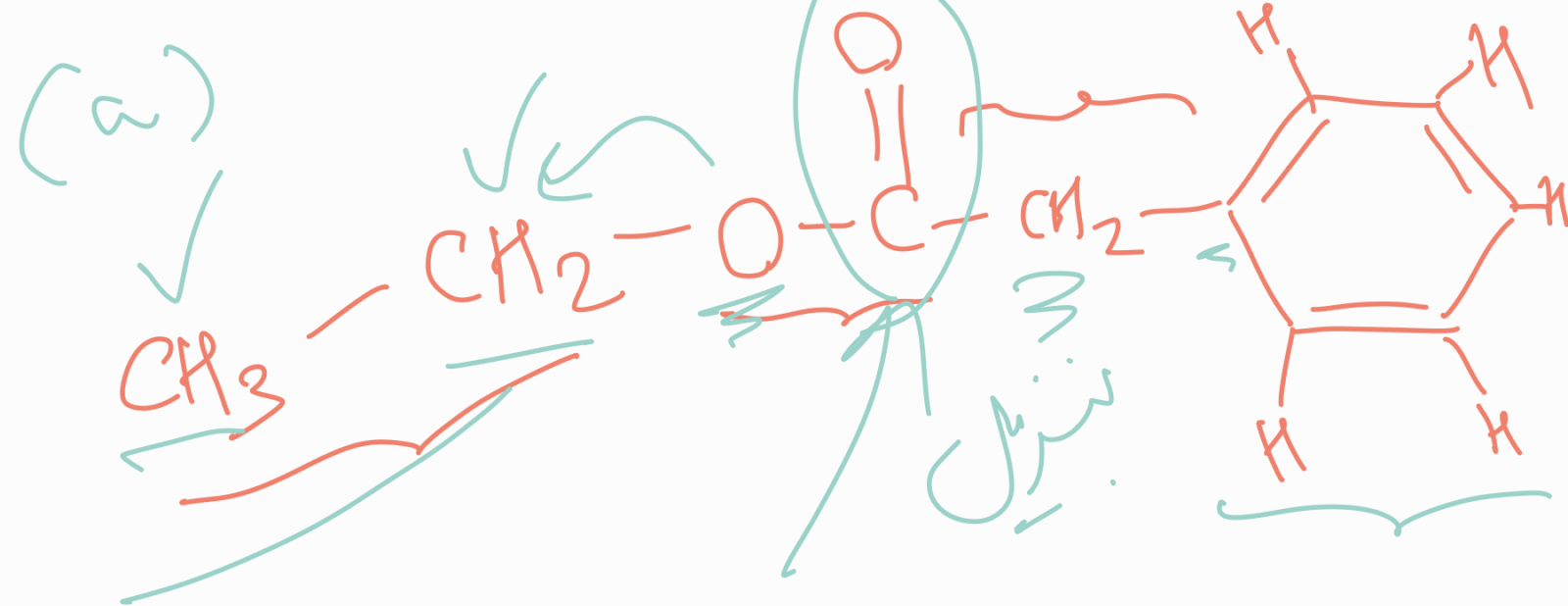


$\delta = 4.2$
2H

$\delta = 3.57$
2H

$\delta = 1.2$
3H





$$\delta = 3.3$$

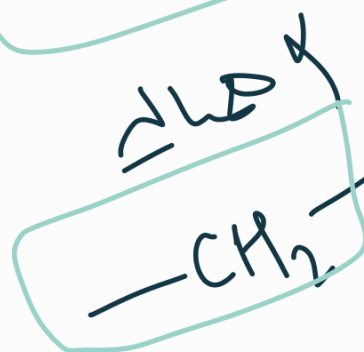
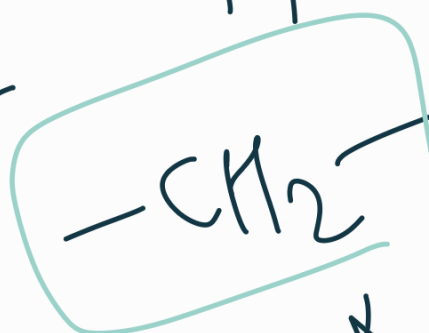
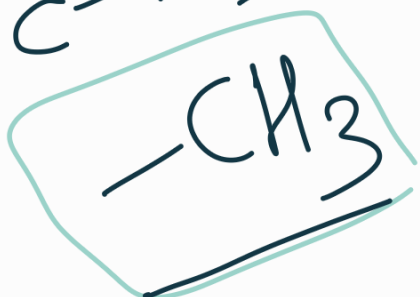
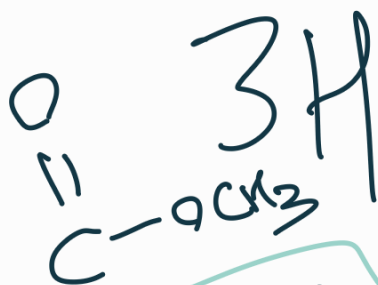
$$\delta = 2.8$$

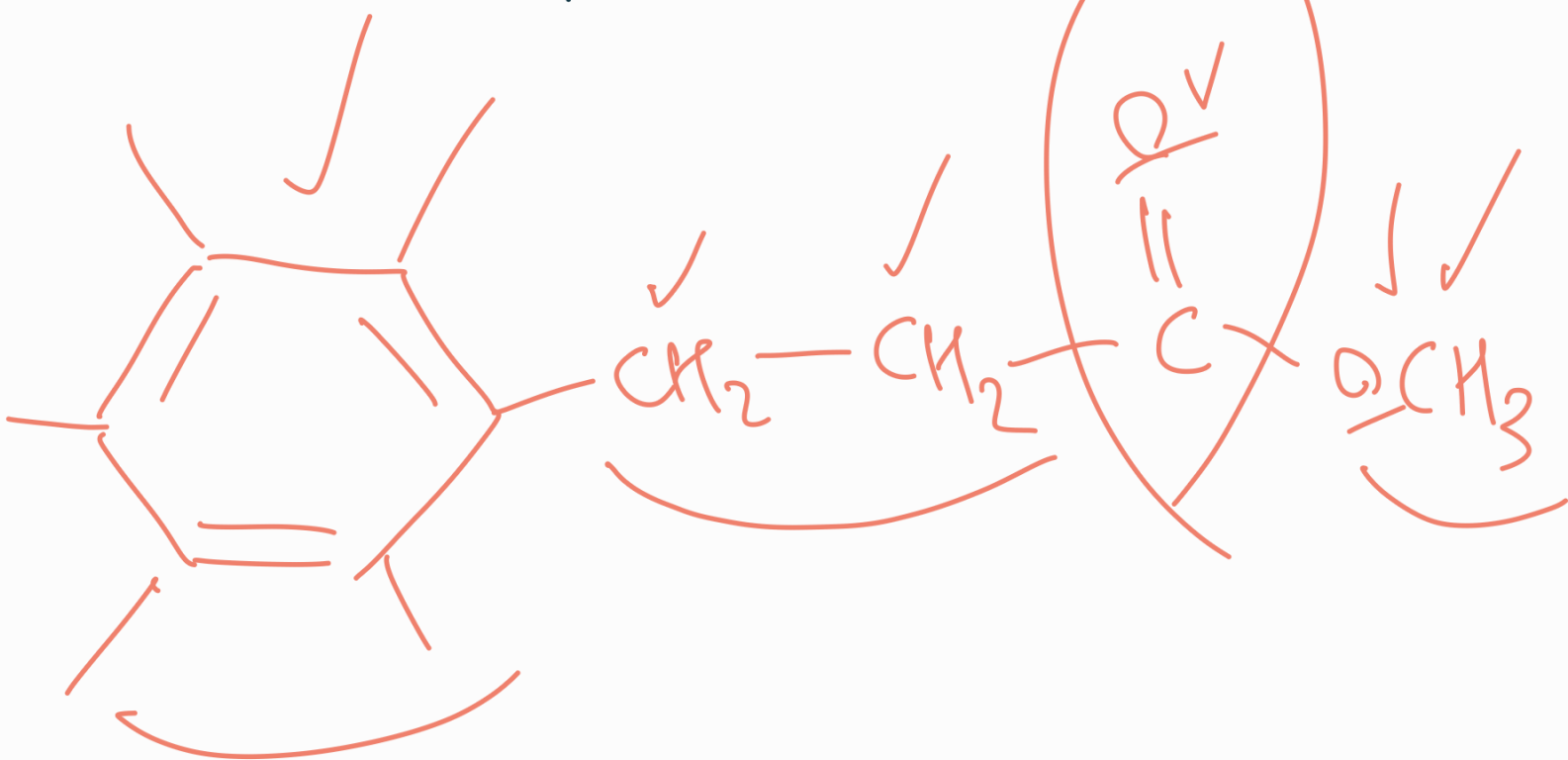
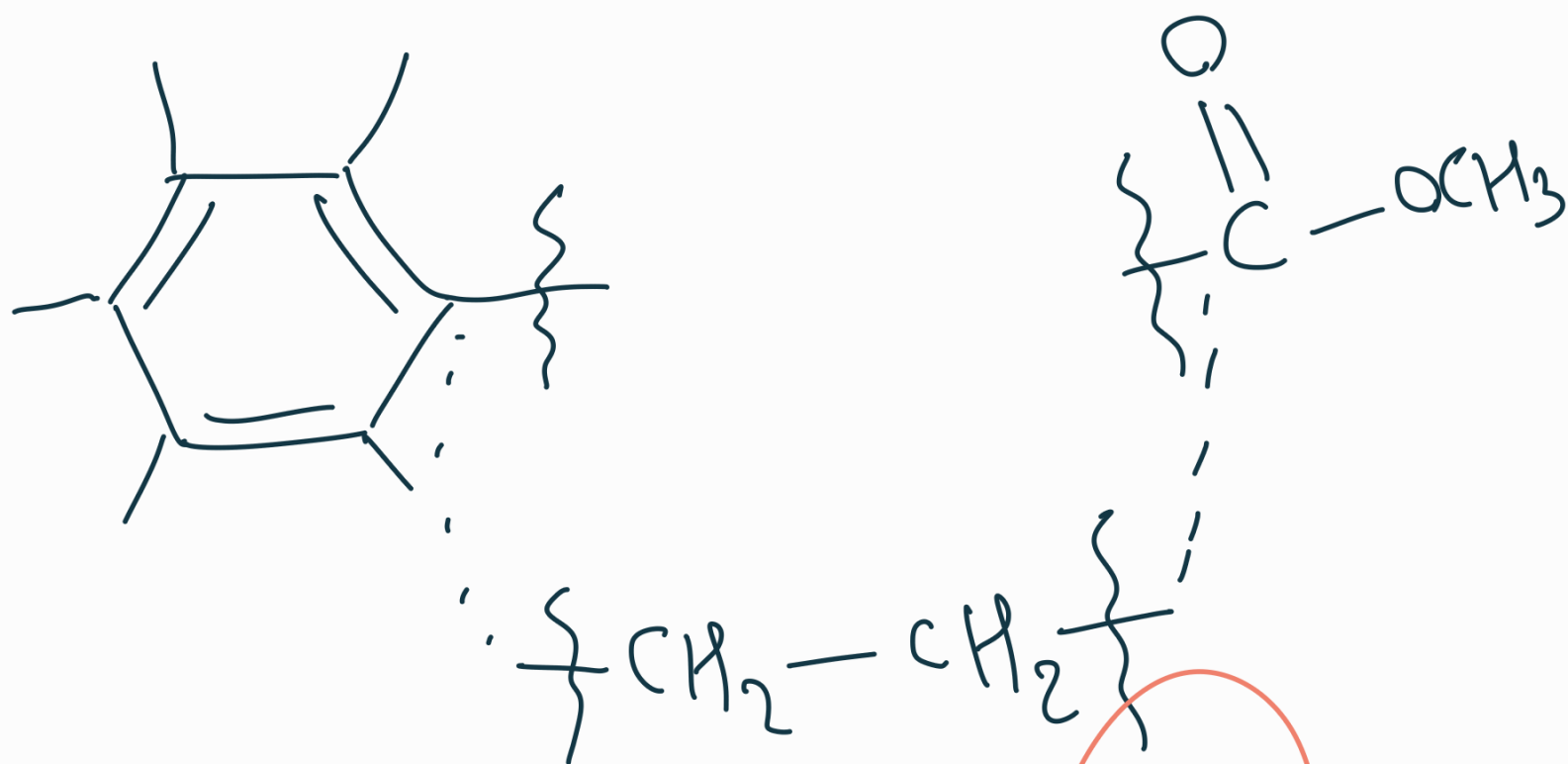
$$\delta = 2.5$$

3H

2H

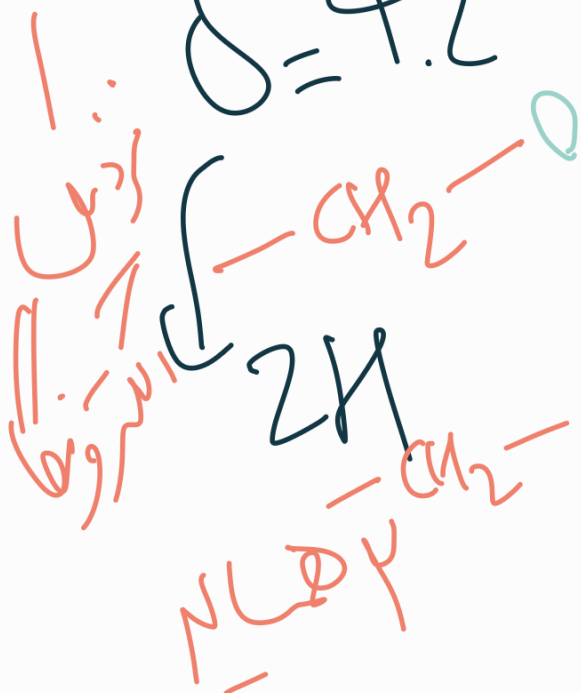
2H



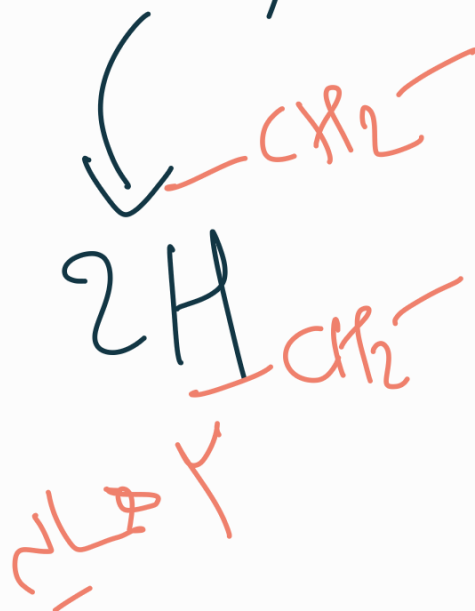


(c)

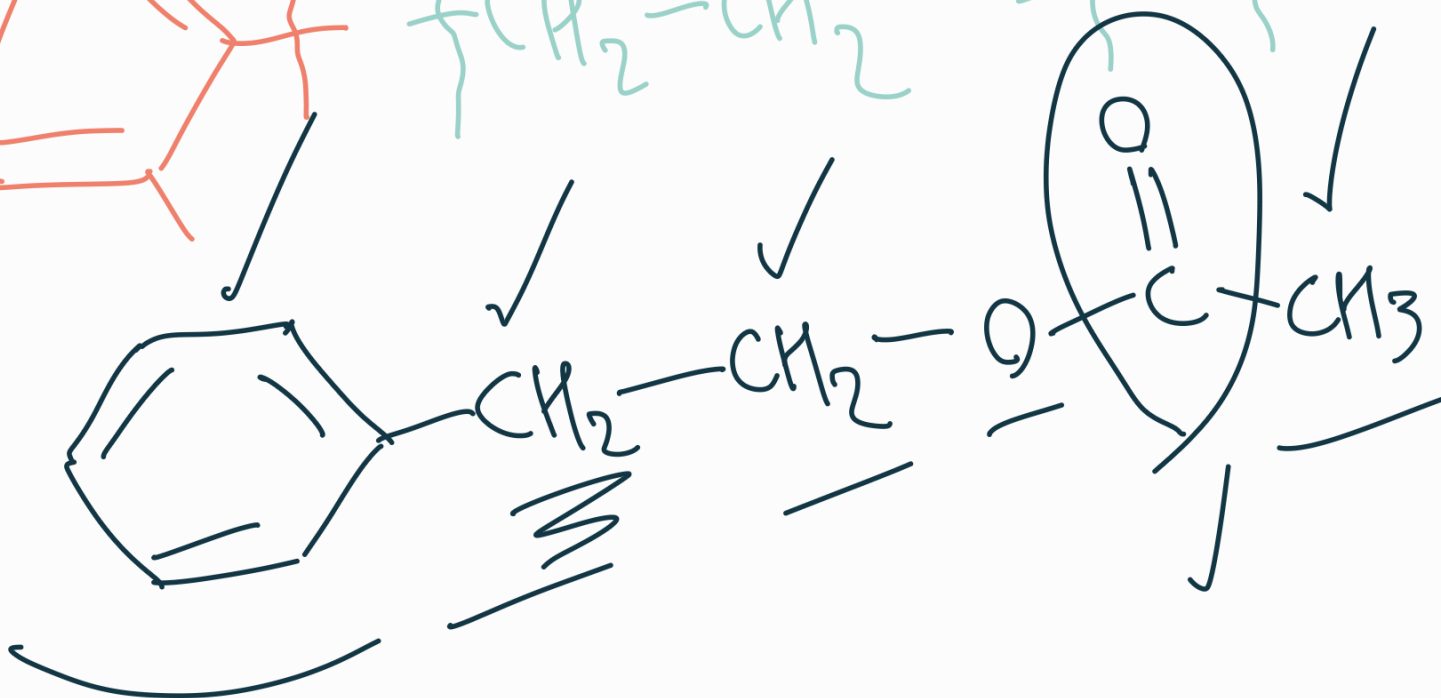
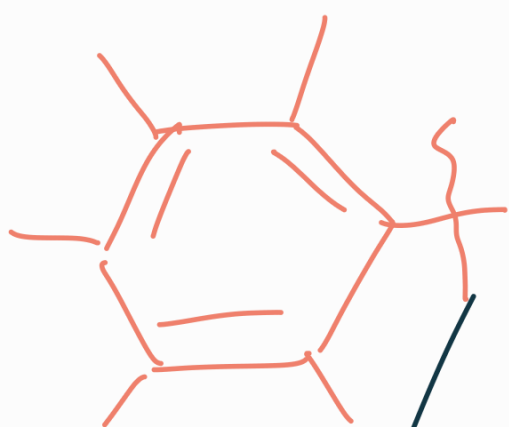
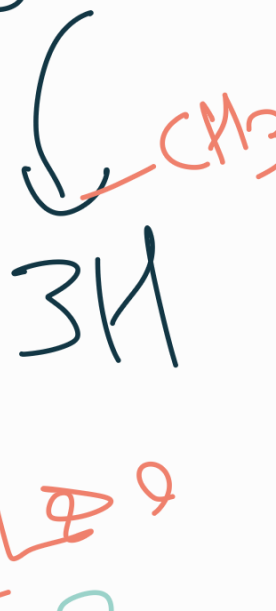
$\delta = 4.2$



$\delta = 2.9$



$\delta = 2$



(2)

$$\delta = 6$$

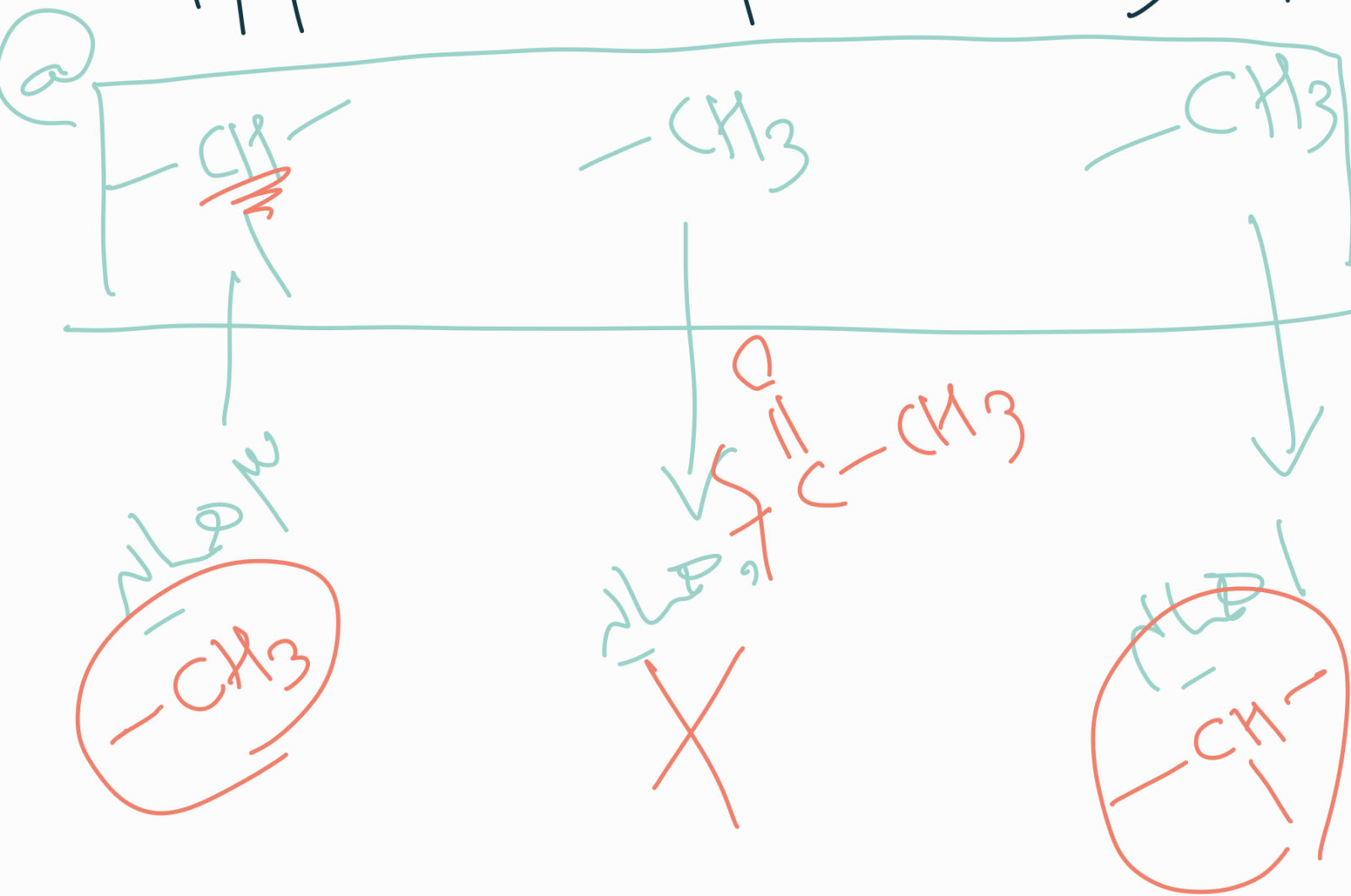
1H

$$\delta = 2$$

3H

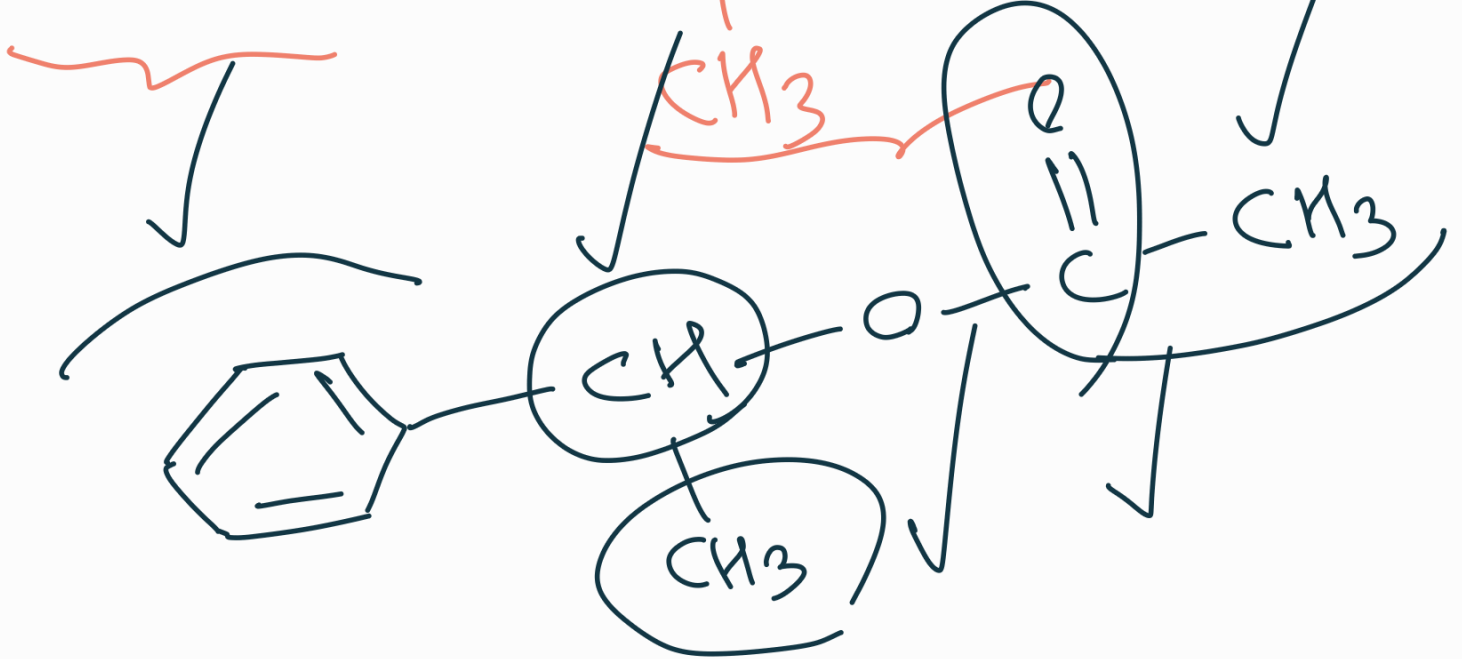
$$\delta = 1.5$$

3H

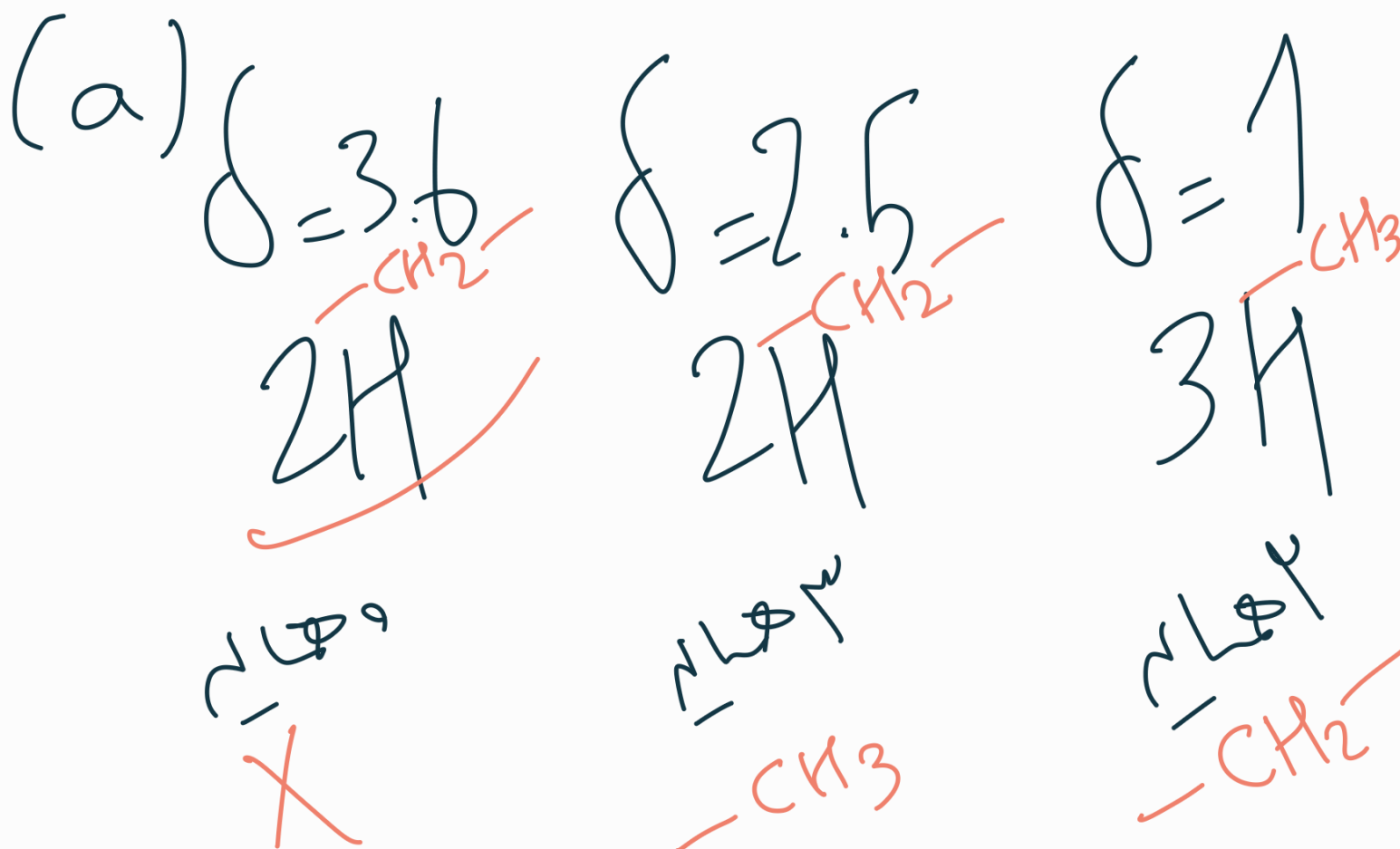
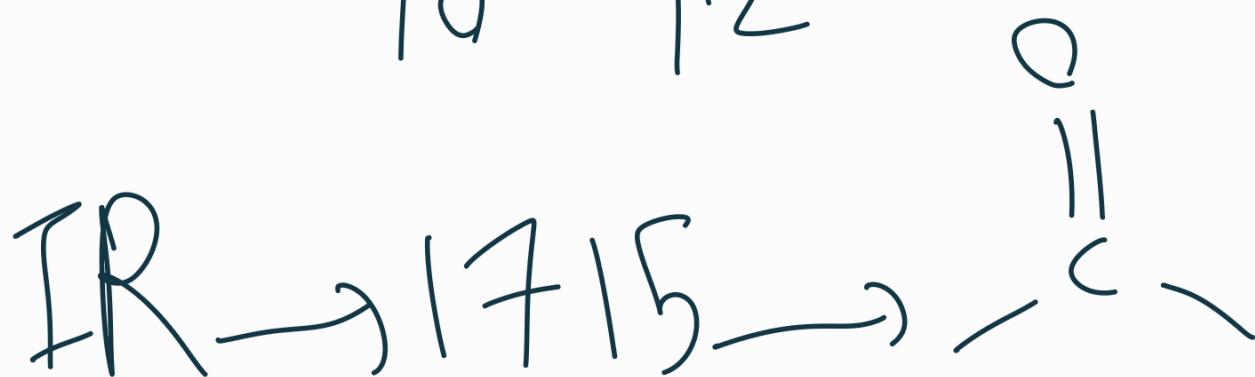
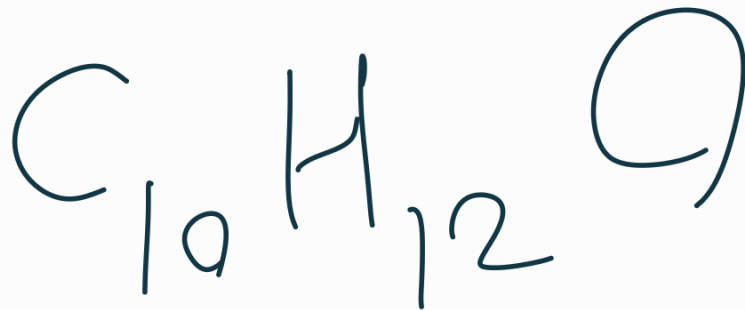


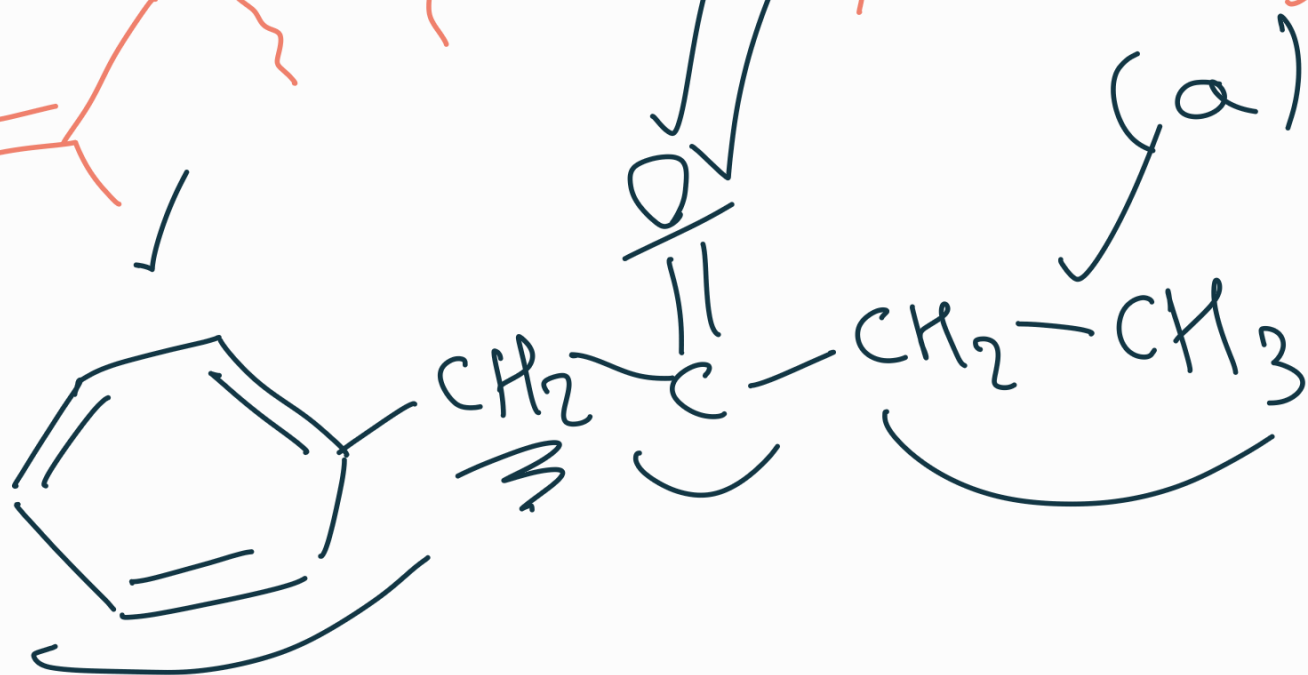
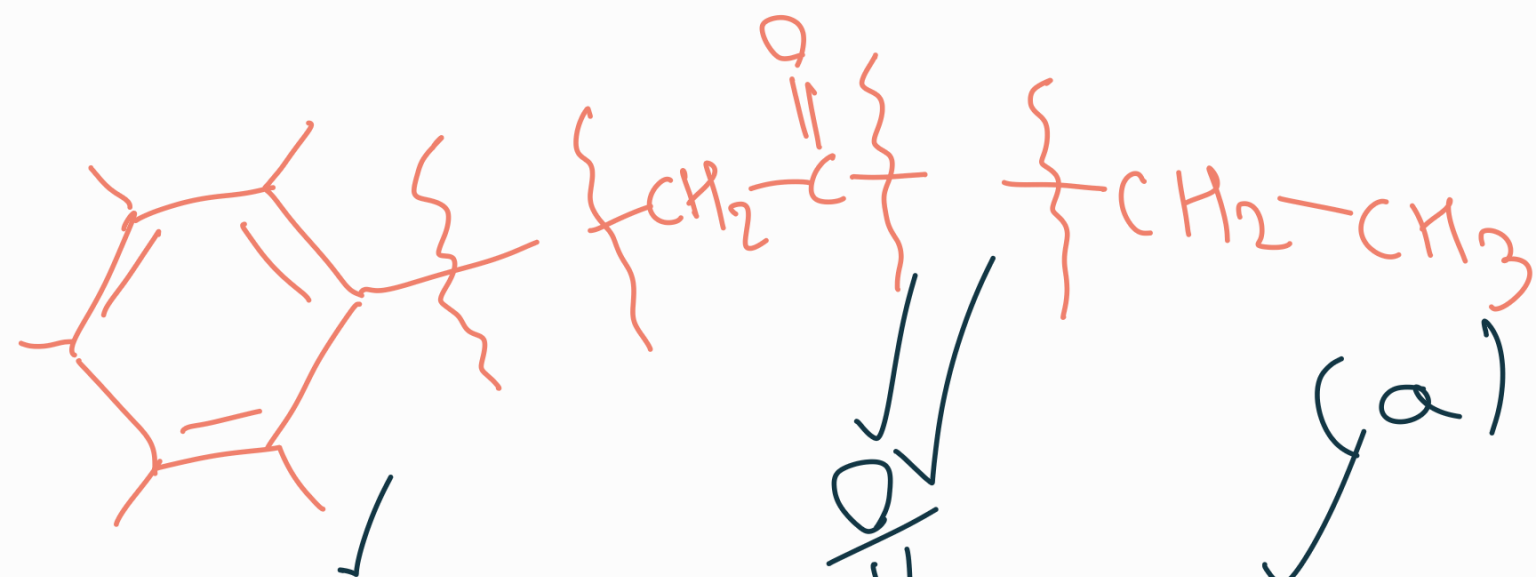
Anisotropy

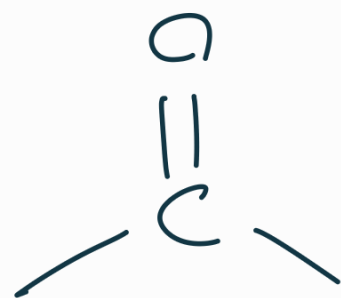
الانحراف



(24)







$$\delta = 2.7$$

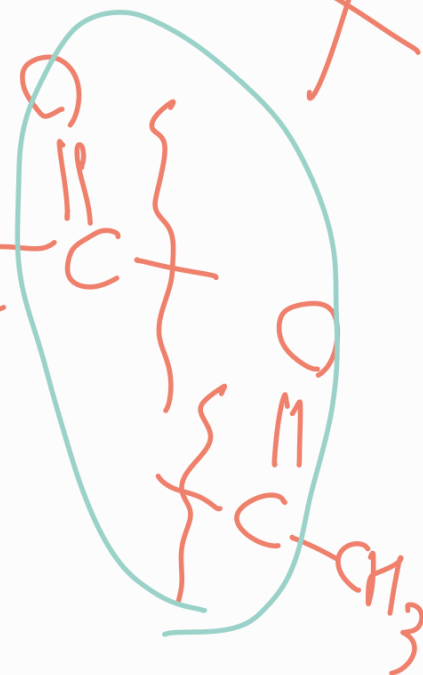
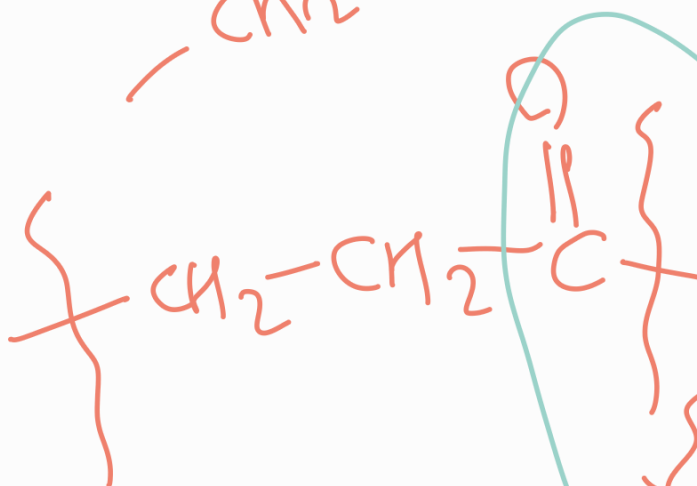
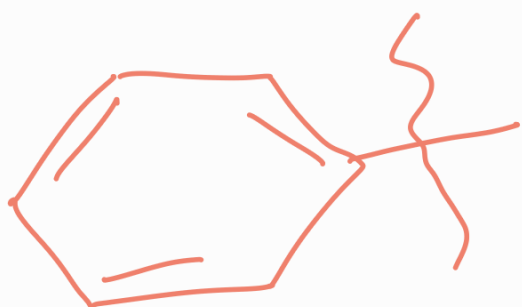
$$\delta = 2.6$$

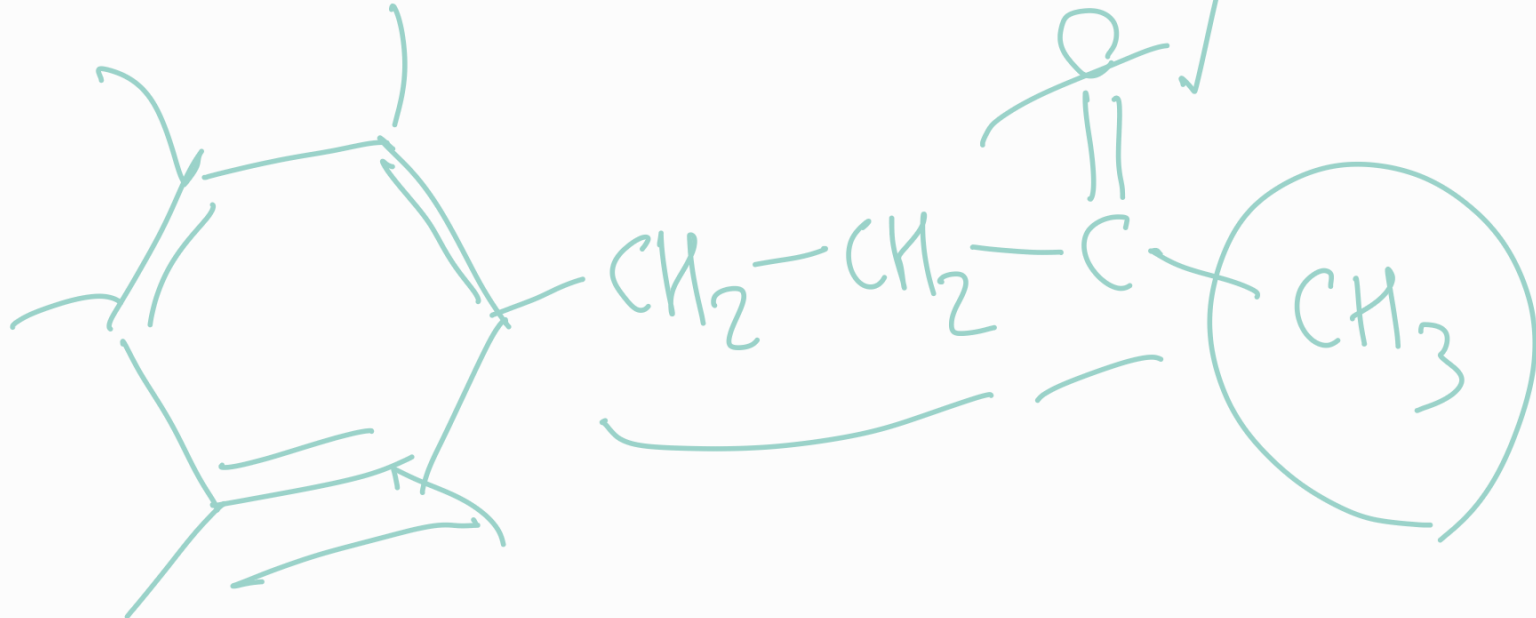
$$\delta = 2$$

2H

2H

3H



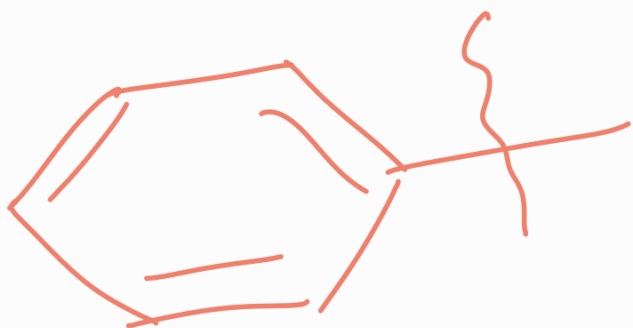


(23)

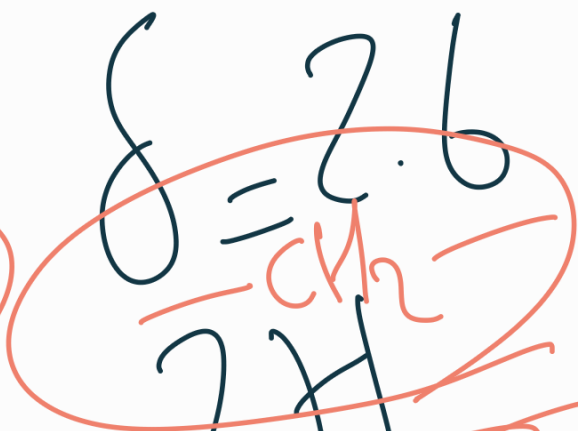


IR → 3350 doublet ~

پسین نوع اول



2H



2H



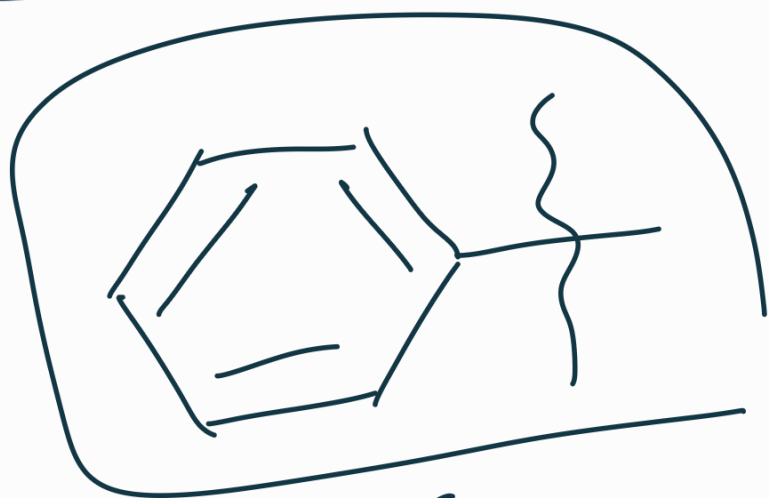
2H



2H⁹



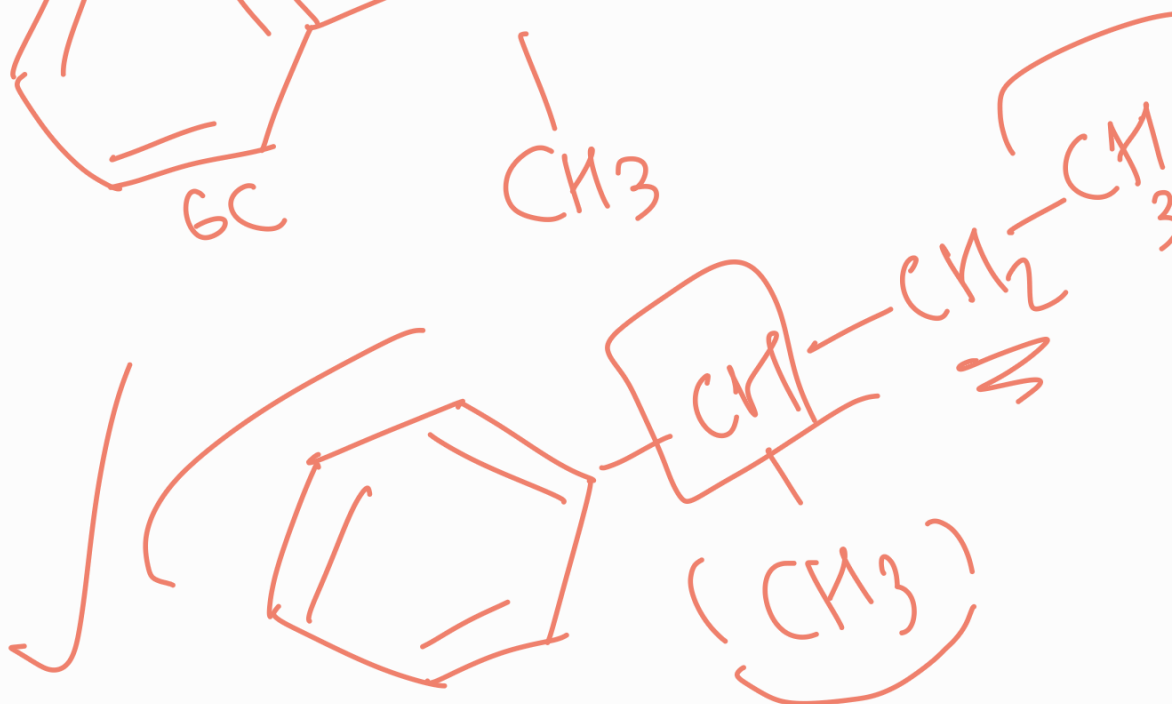
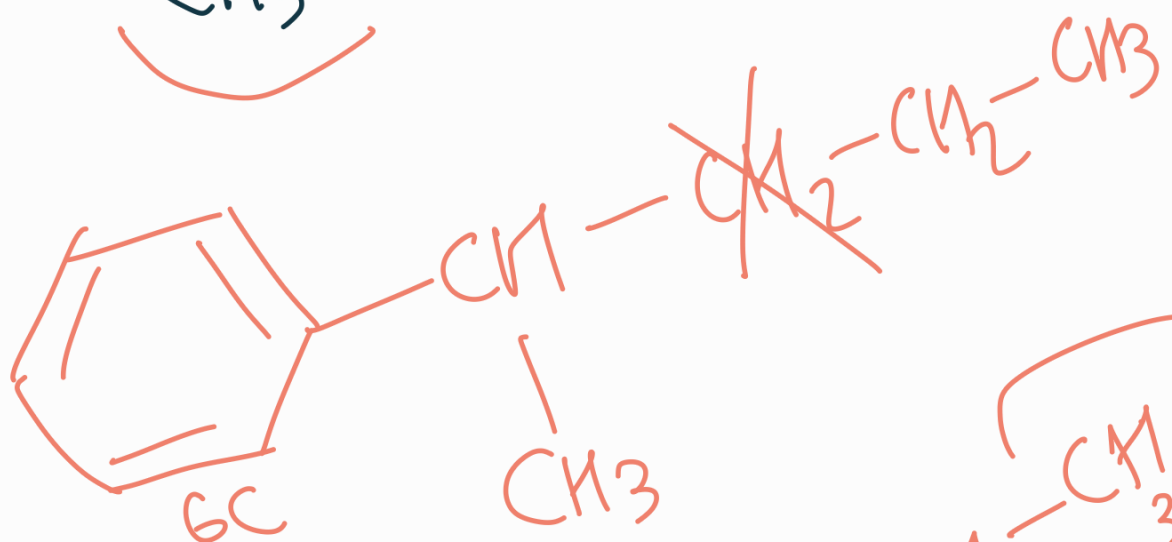
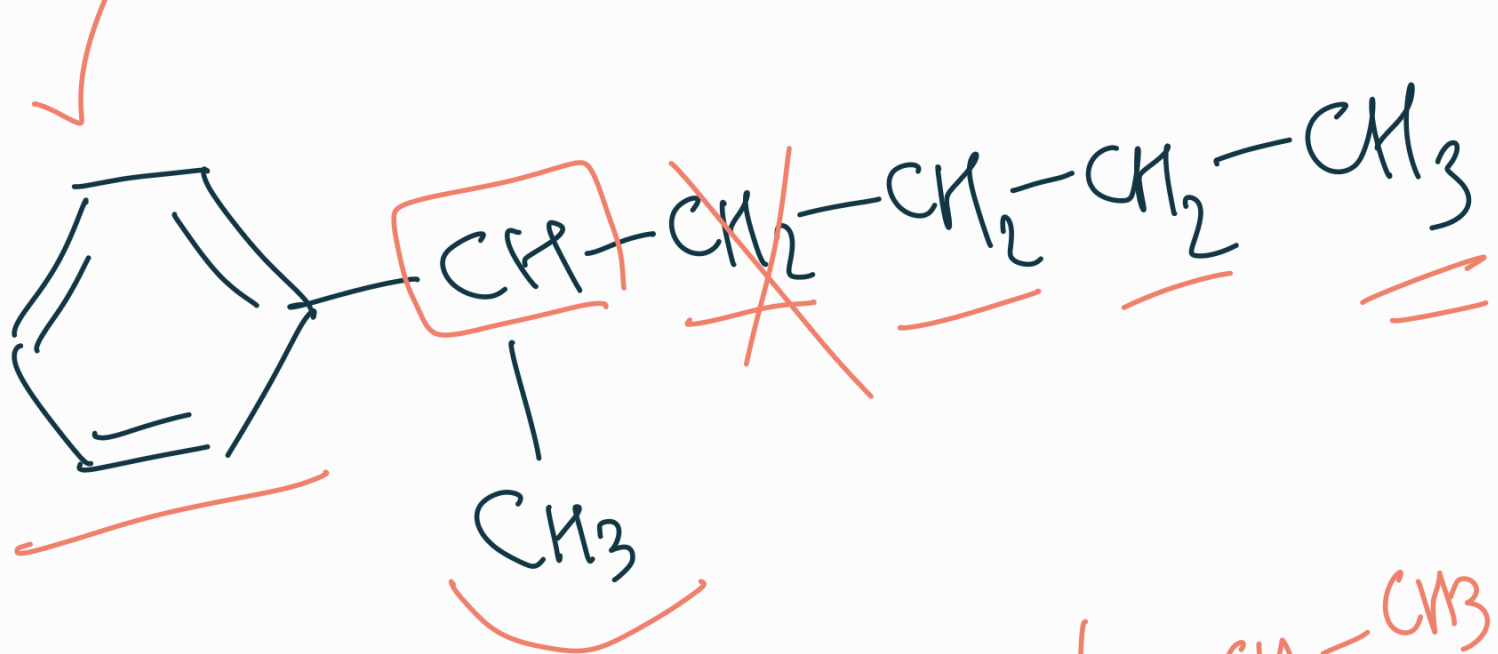
22 (a) $C_{10}H_{14}$



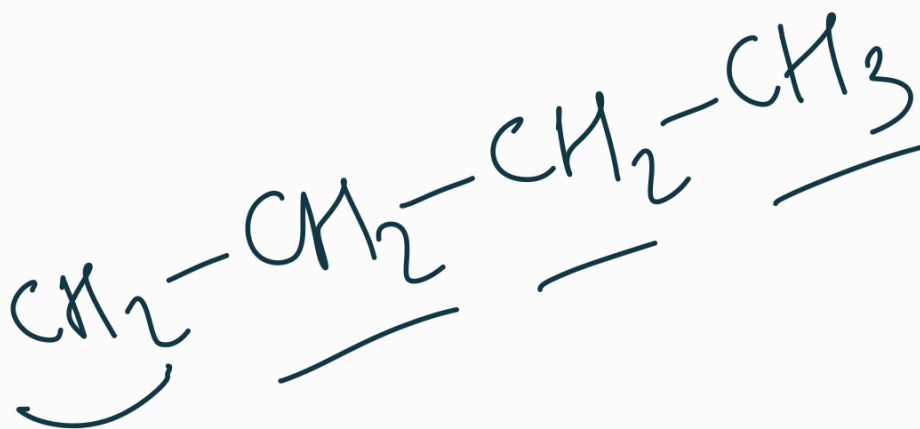
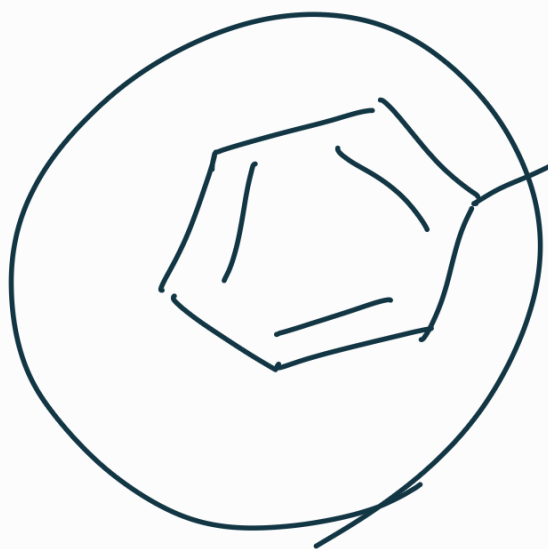
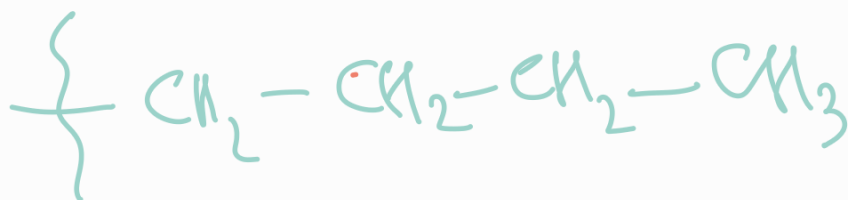
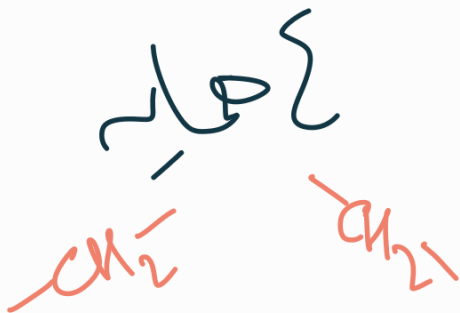
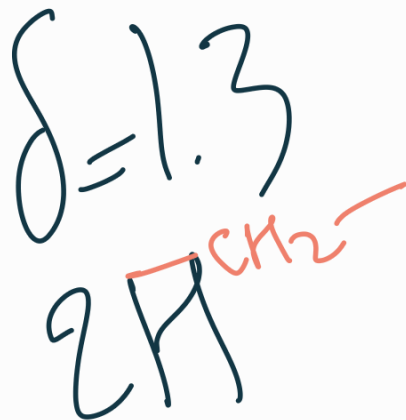
$\delta = 2.5$	$\delta = 1.5$	$\delta = 1.3$	$\delta = 0.7$
1H	2H	3H	3H
CH	CH_2	CH_3	CH_3

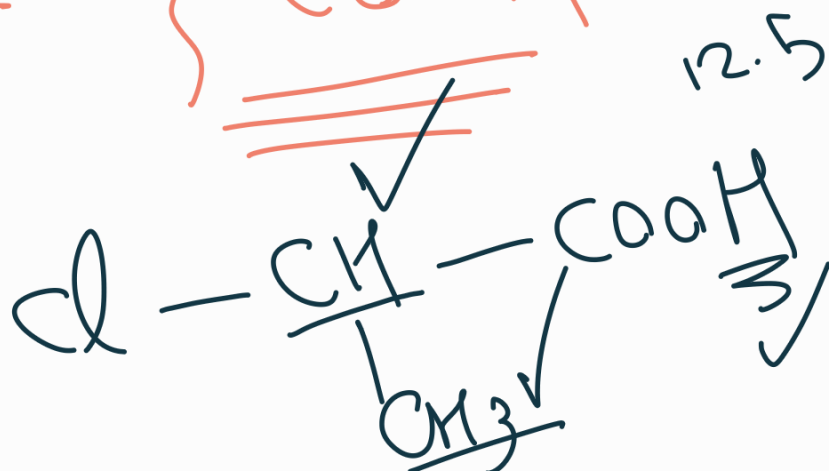
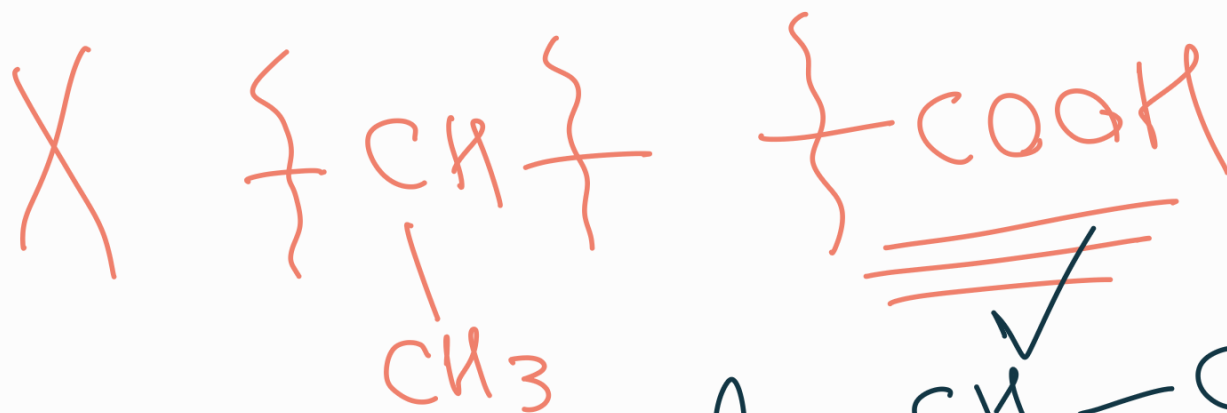
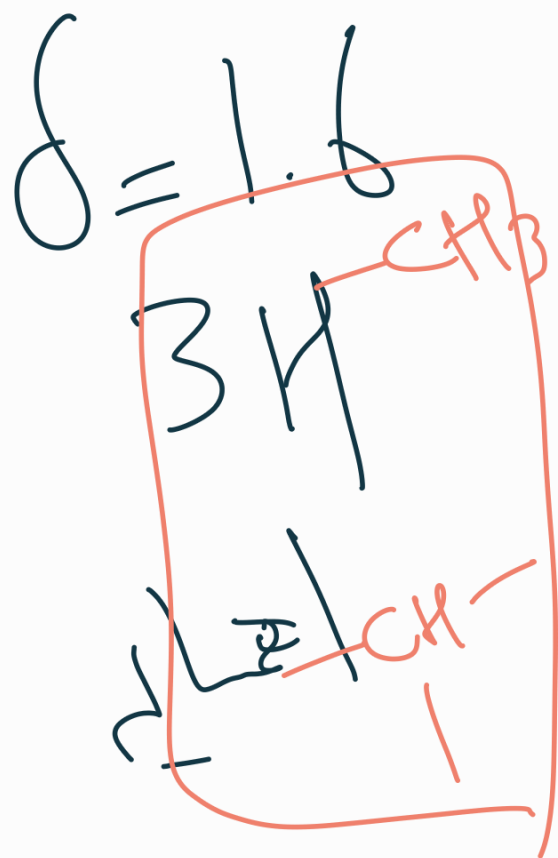
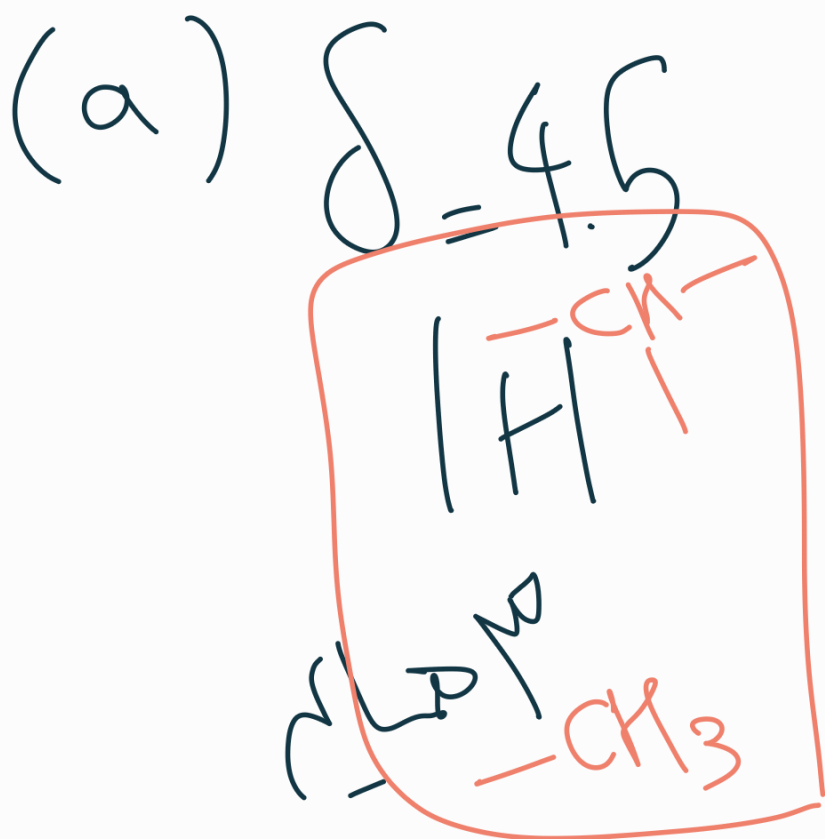
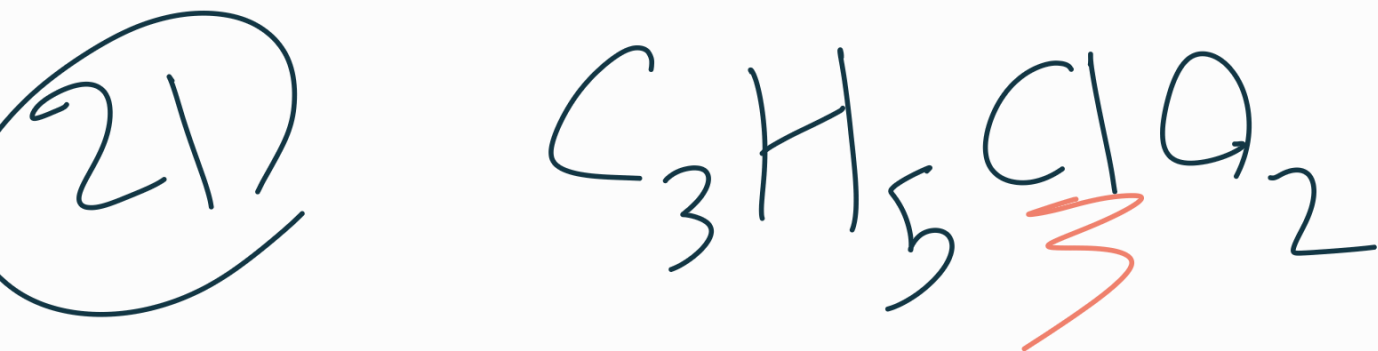
Handwritten chemical fragments in red ink: CH_3 , CH , CH_2 , CH_3 , CH_2 , CH_3 , CH_2 .

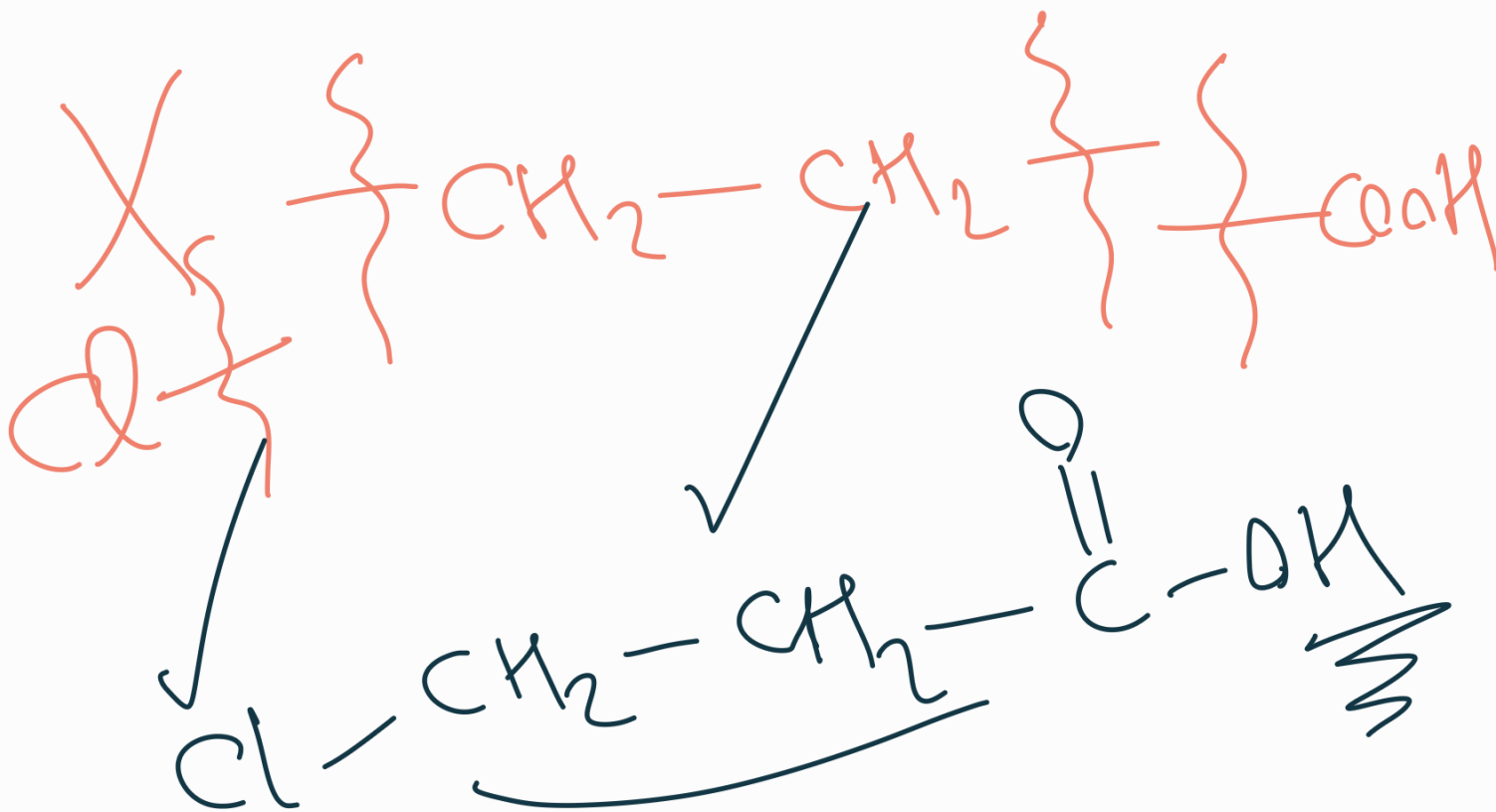
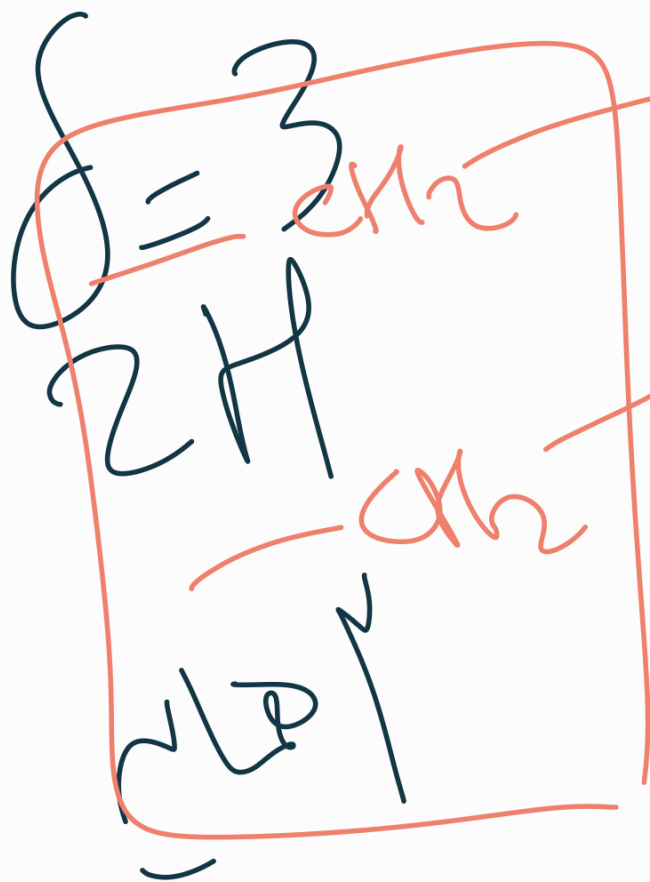
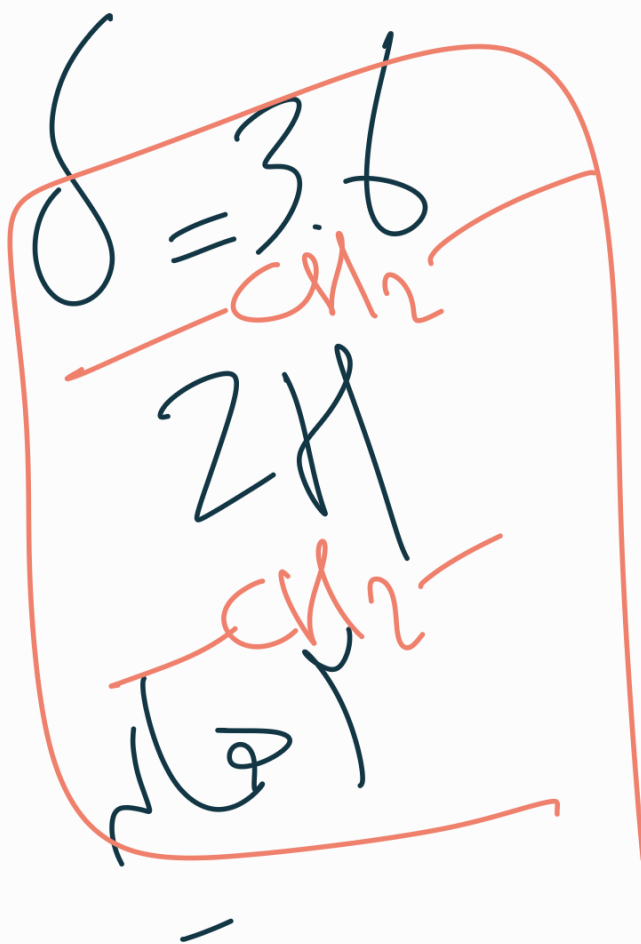




(b)

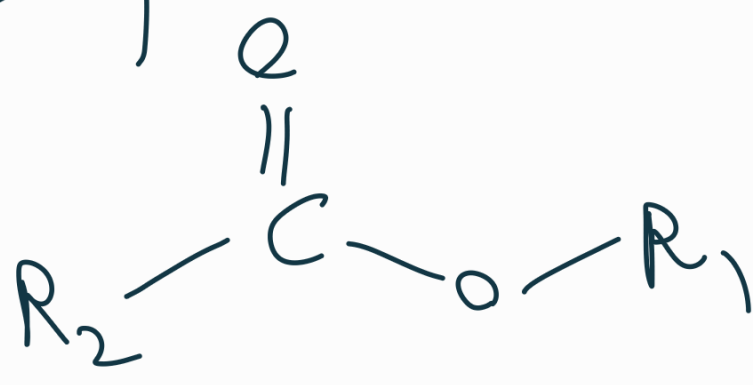




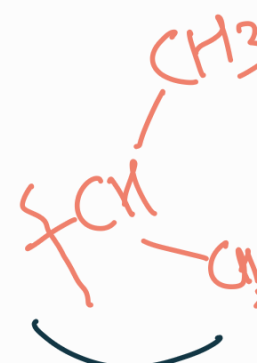
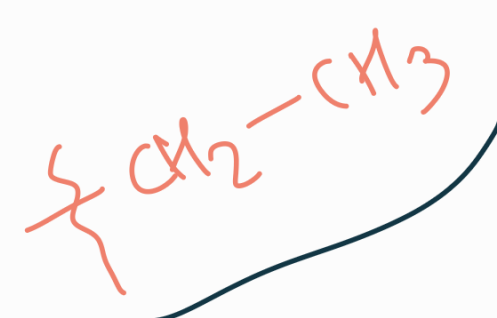
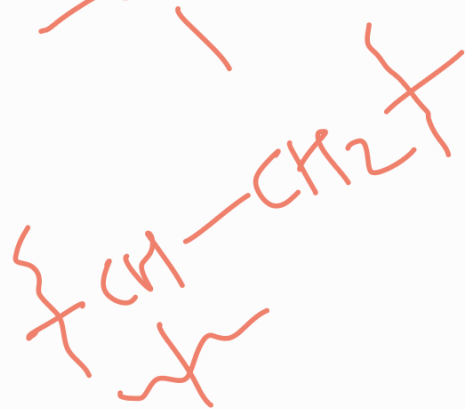
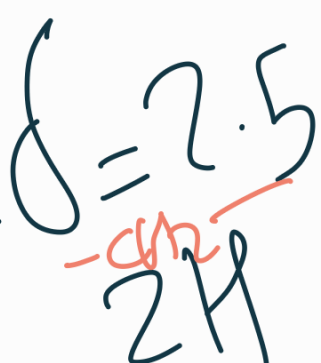


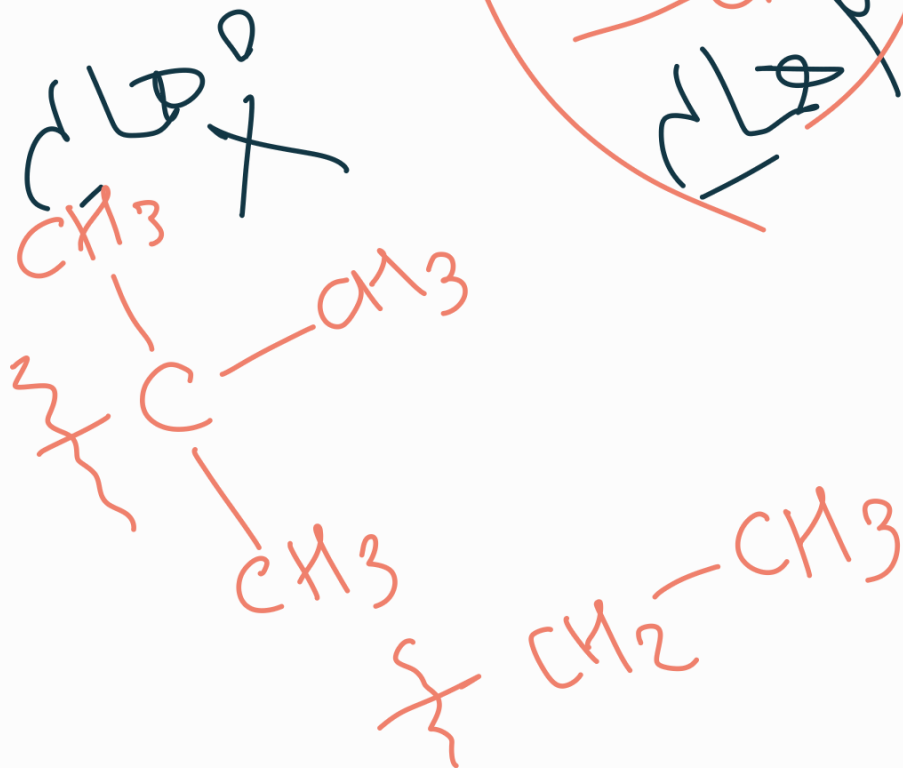
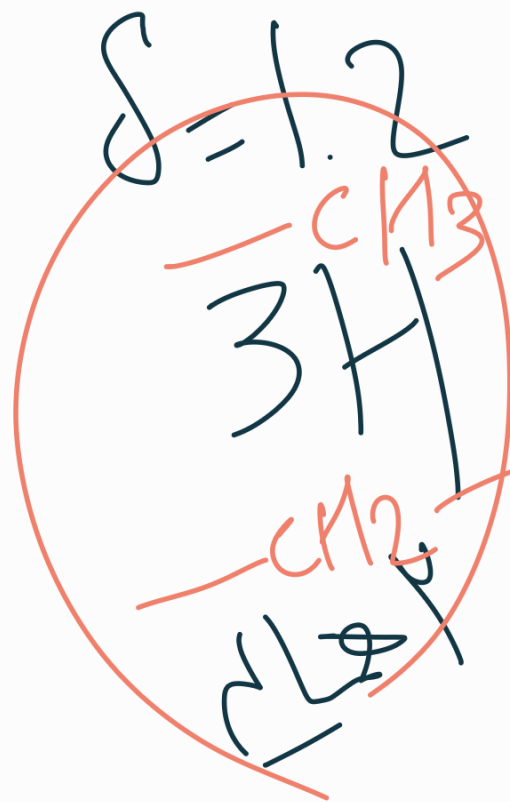
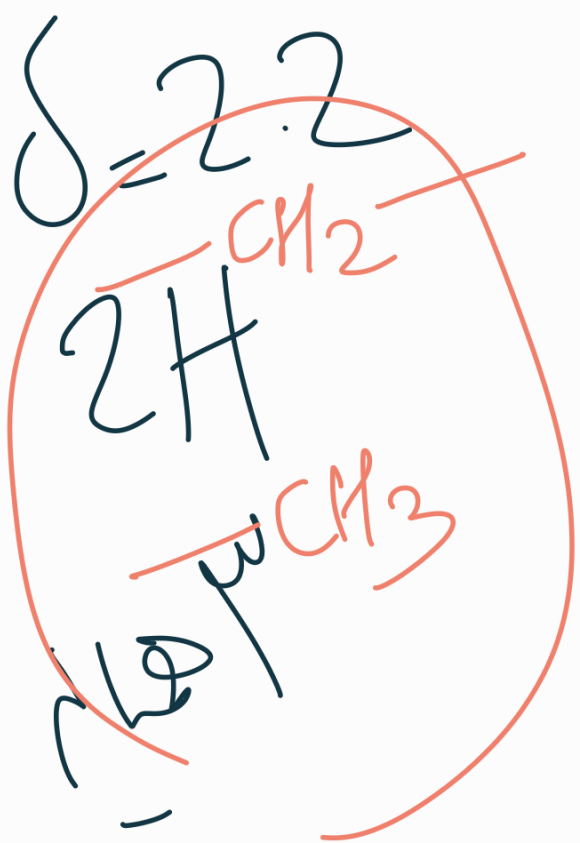
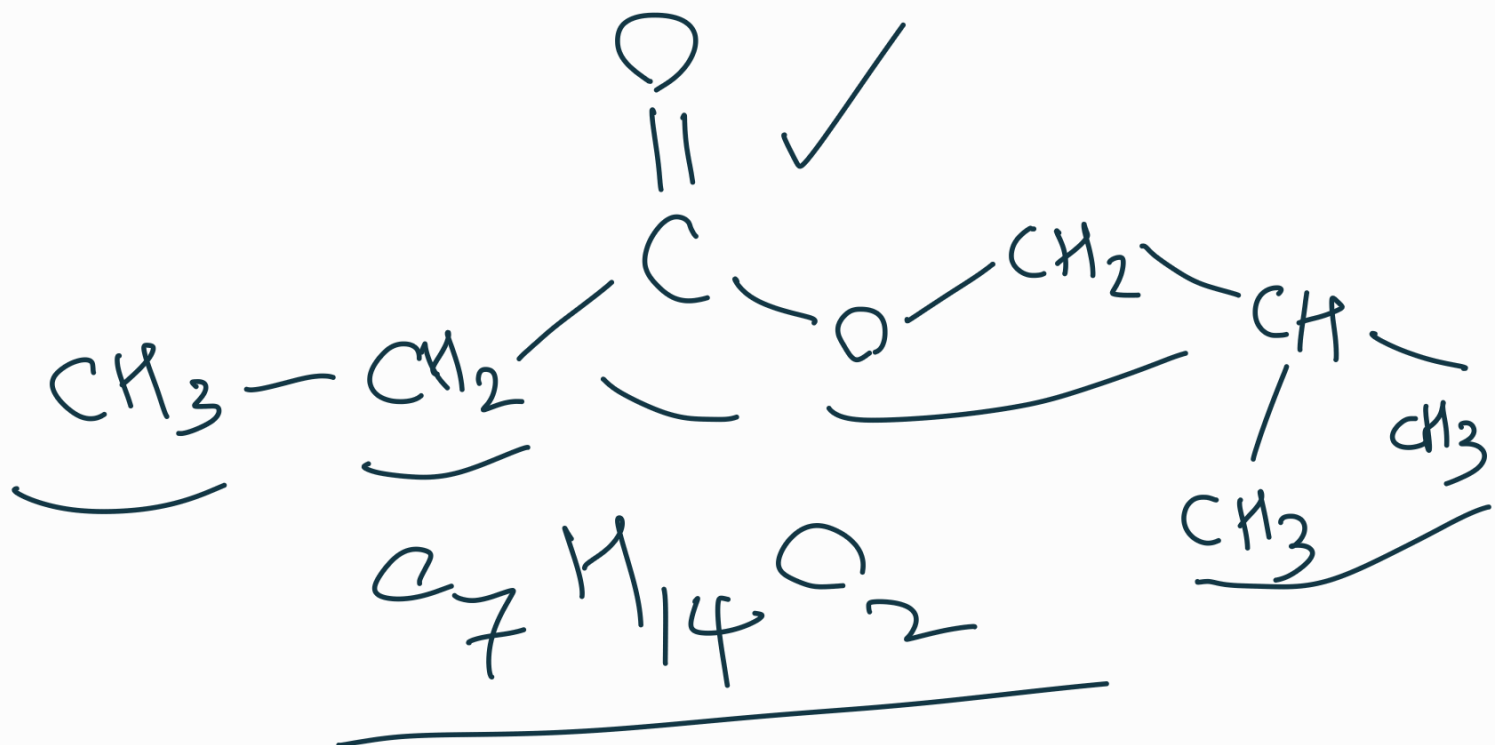
2. (a)

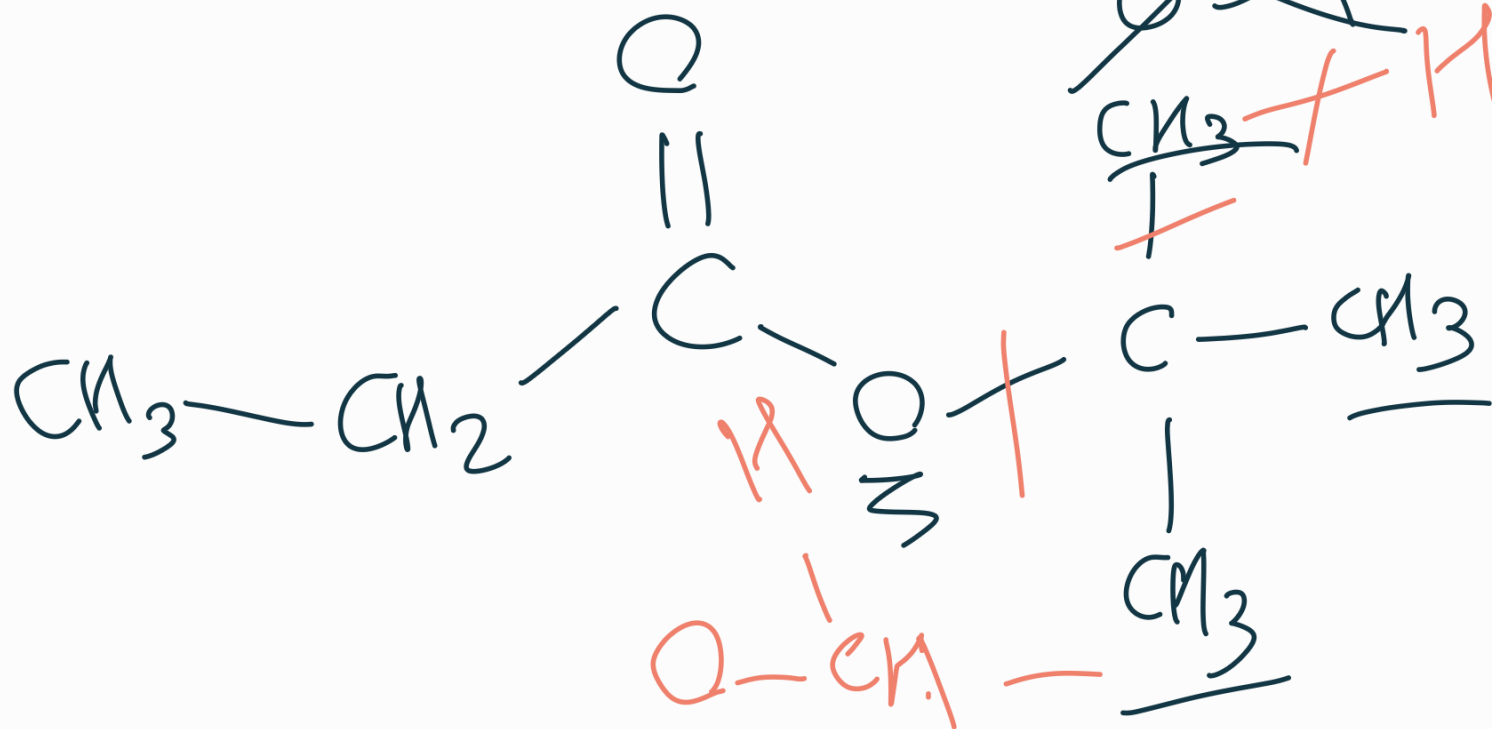
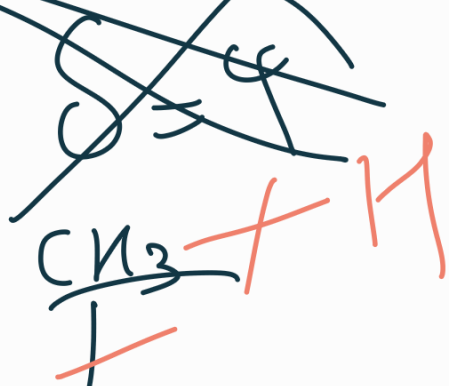
derivat



جواب







(c)

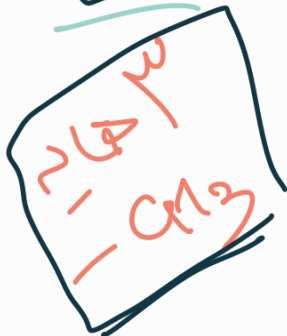
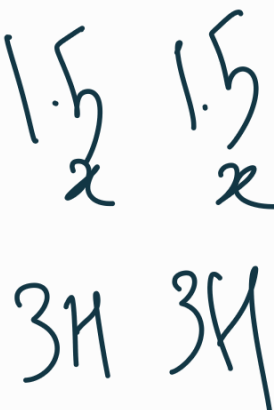
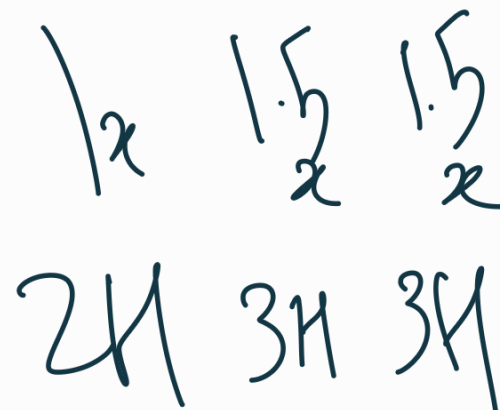


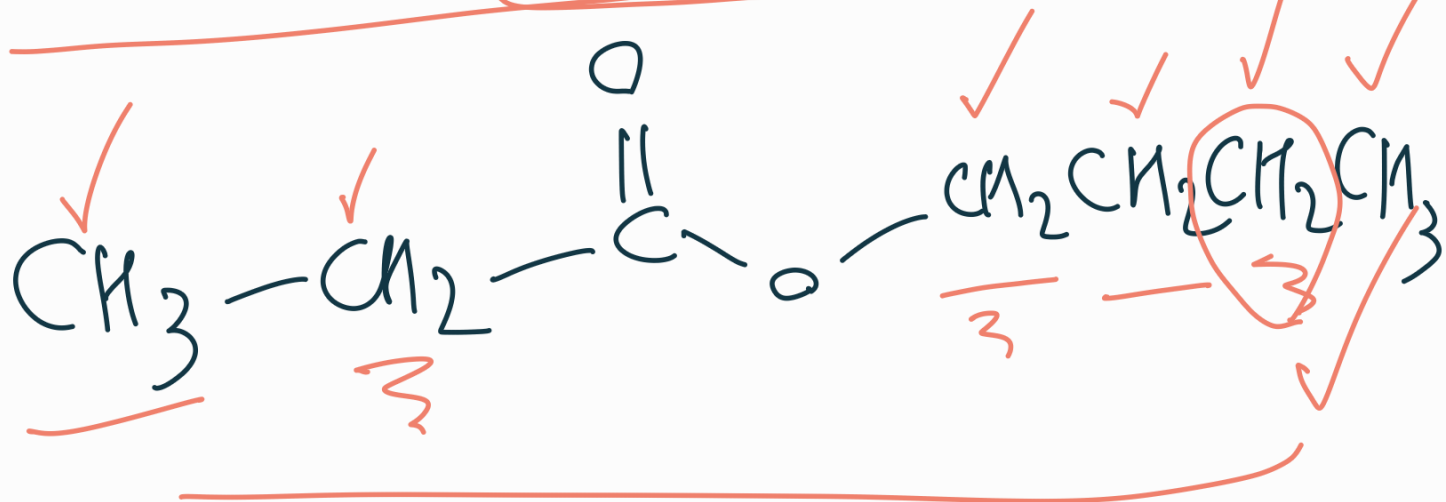
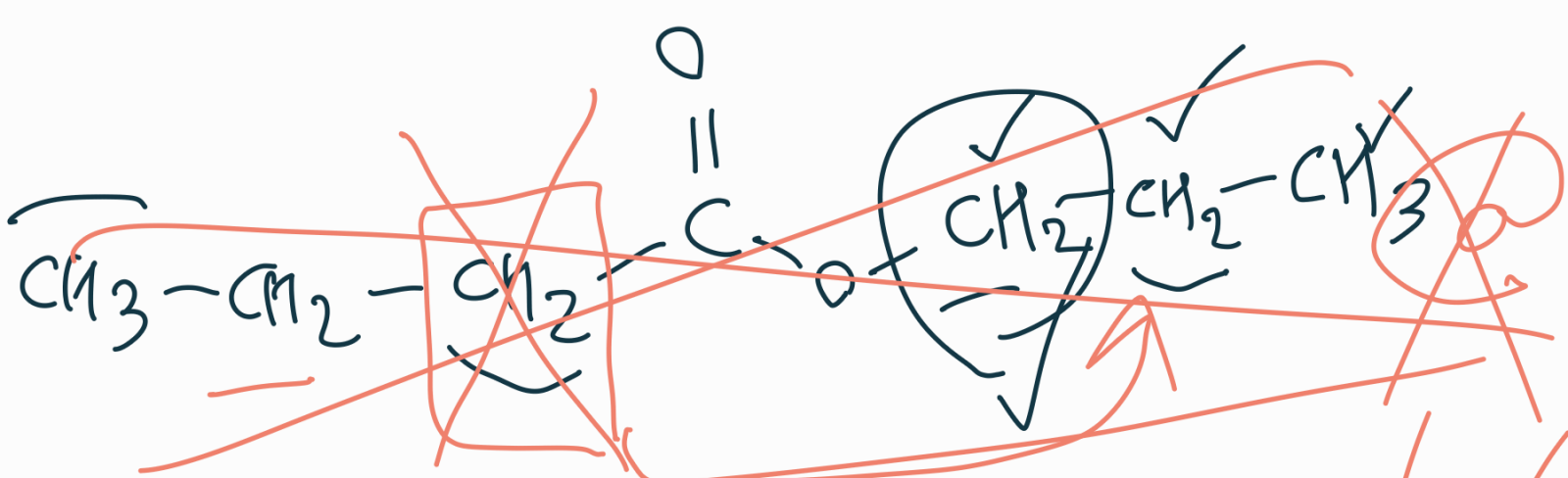
~~2 2 2 2 2 2~~

~~1.5 1.5 1.5 1.5 2 2~~

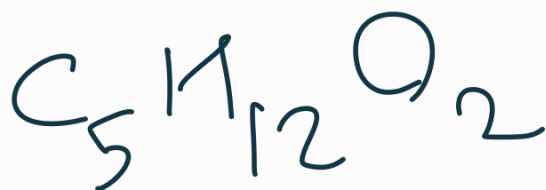
~~3 3 3 3 4 4~~

$\delta = 4$ $\delta = 2.4$ $\delta = 1.6$ $\delta = 1.4$ $\delta = 1.2$ $\delta = 0.9$





19



1.03

~~= 1.2~~

6H

$\delta = 3.3$

$\gamma_H = 1.2$
 $\lambda = 4.1$

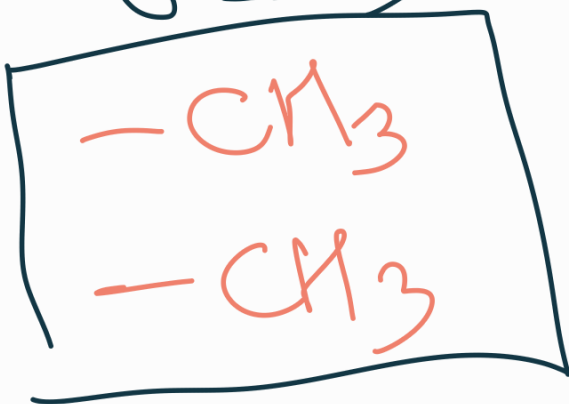
n

1.2

6H

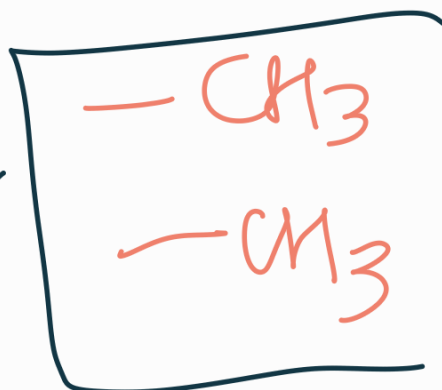
$\delta = 1.2$

a



~LP²

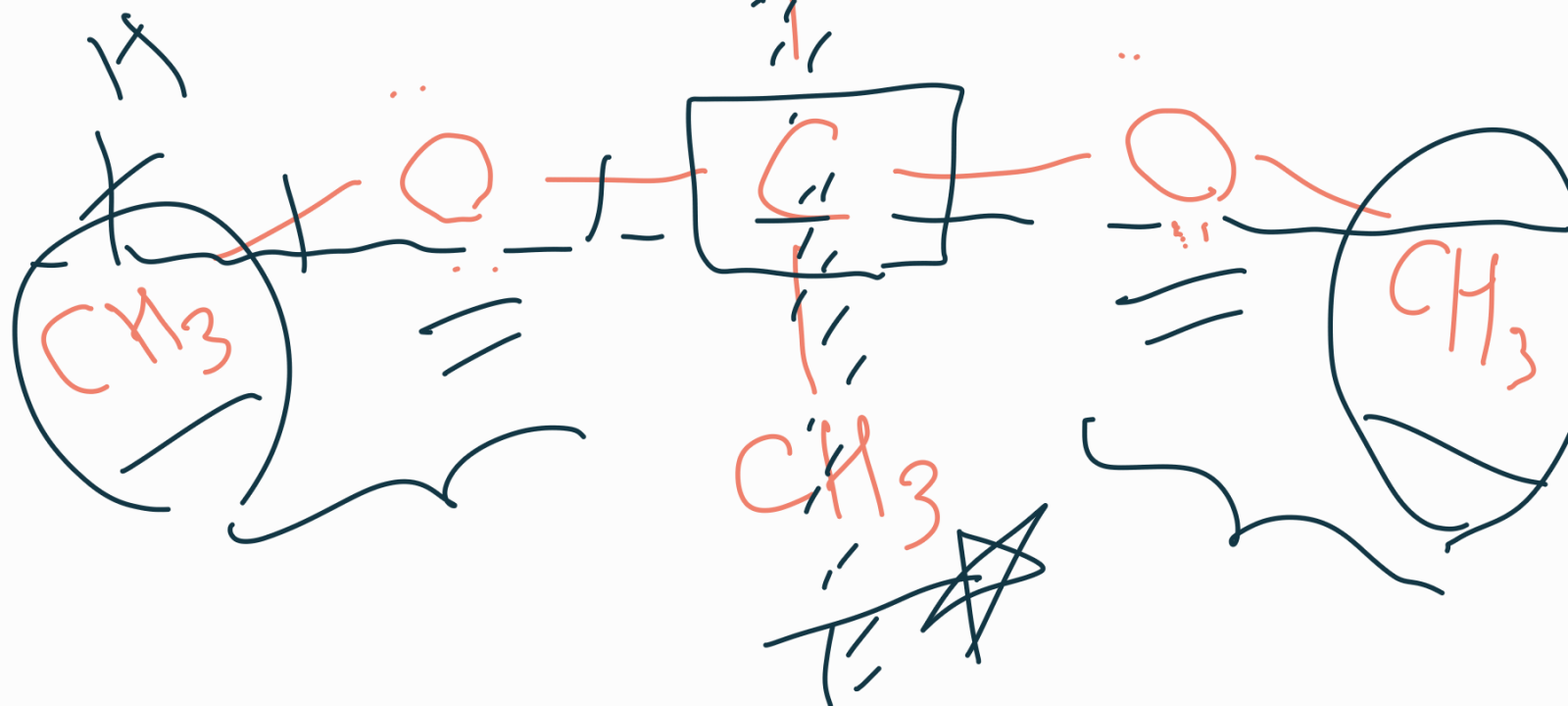
a



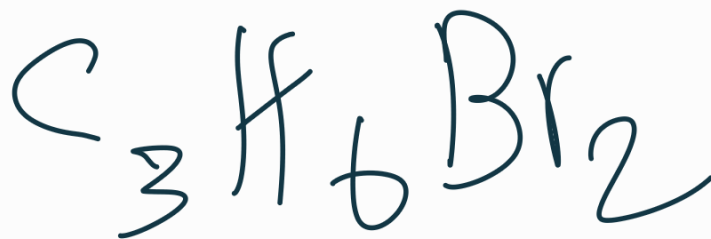
~LP²

c

~



18

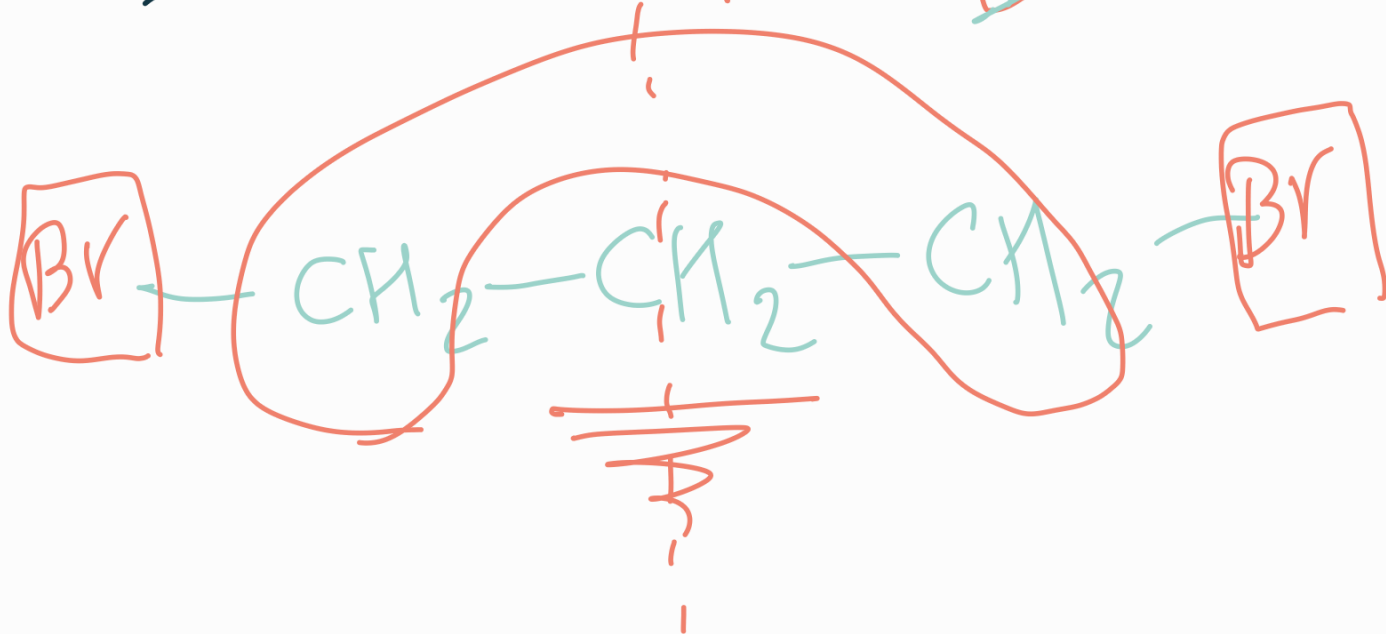


$\delta = 3.5$ @

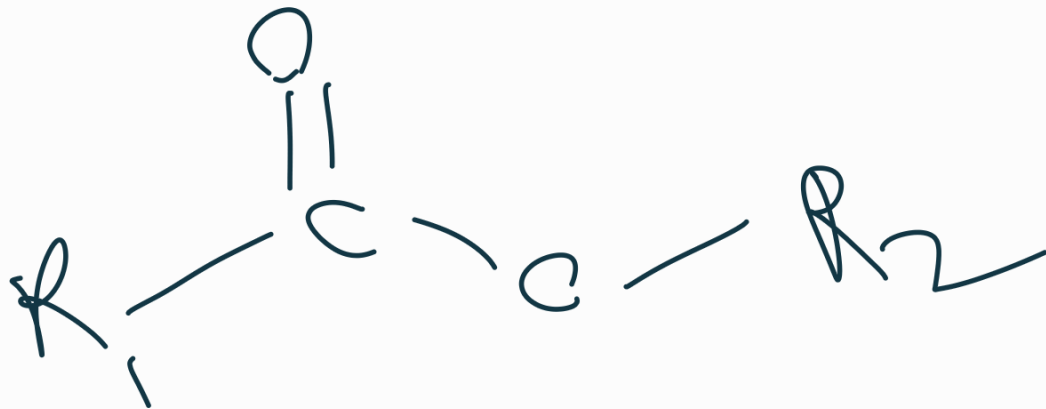


chemically
equivalent

$\delta = 2.5$



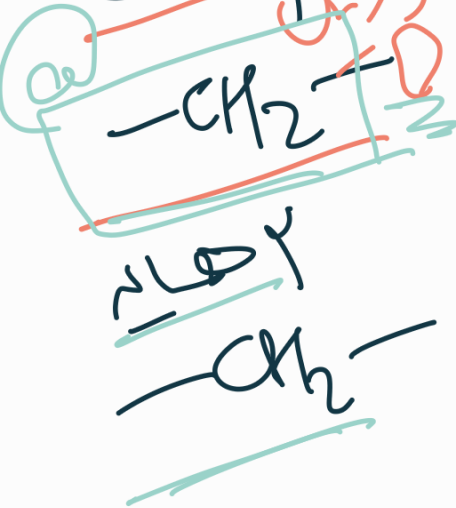
17



(a)

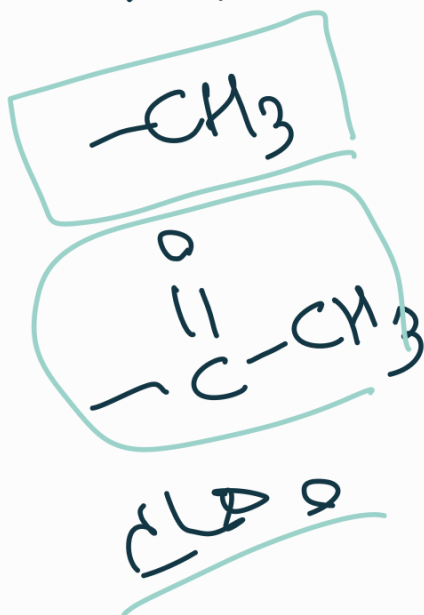
2H

$\delta = 4$



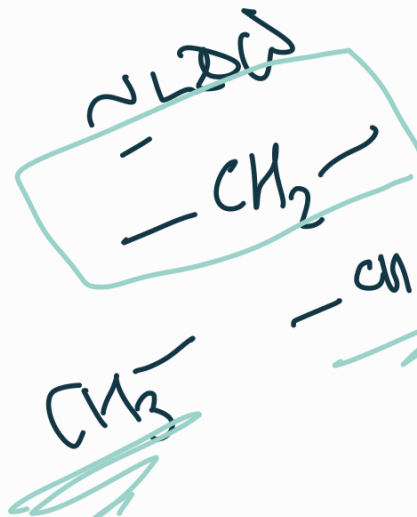
$\delta = 2$

3H



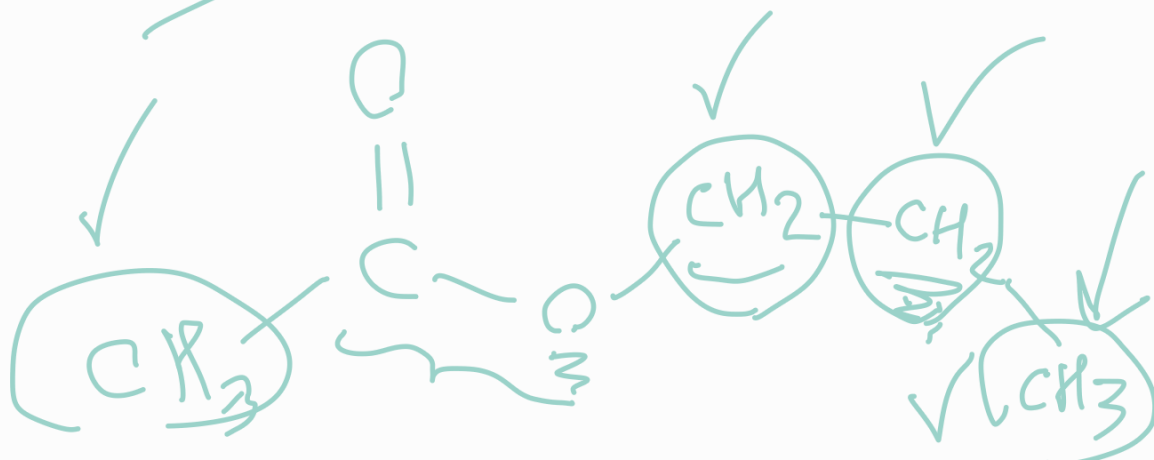
$\delta = 1.6$

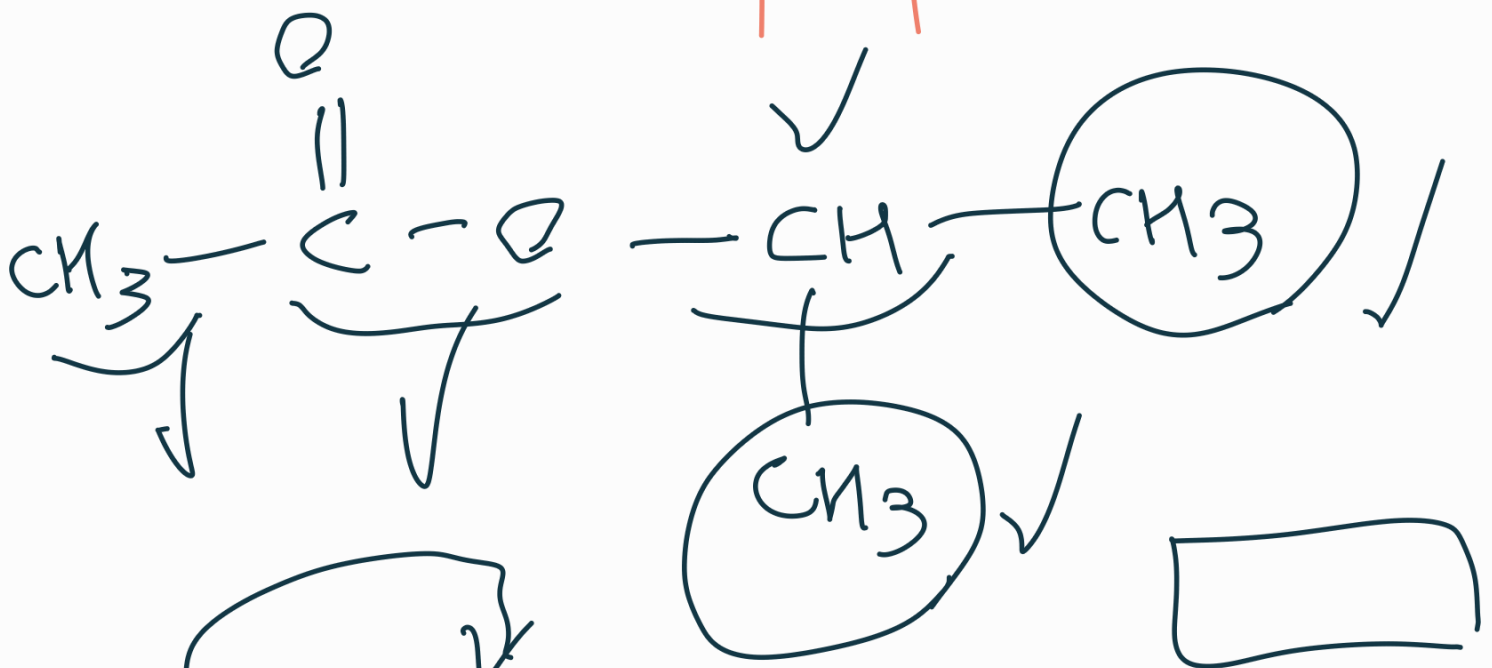
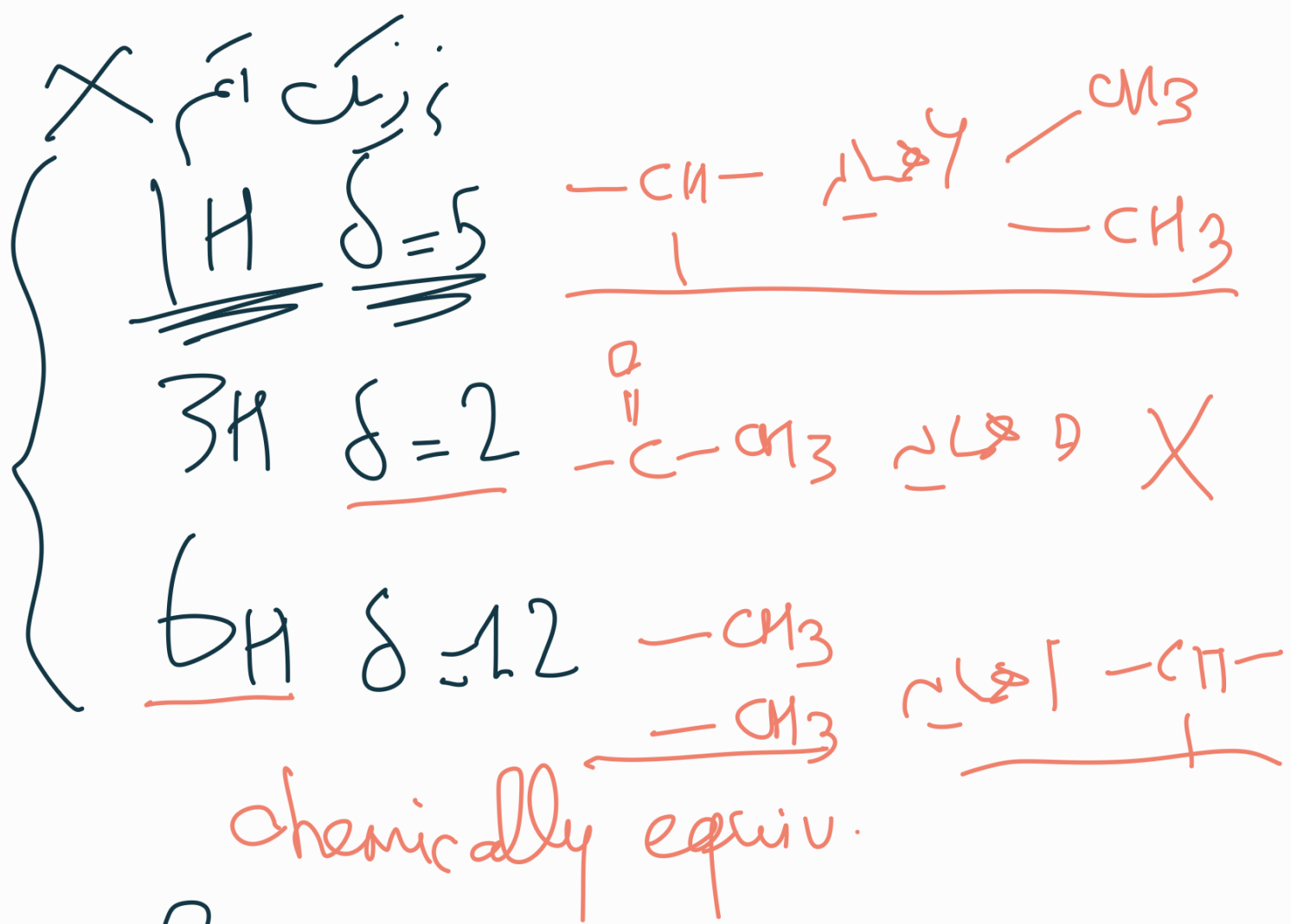
2H



$\delta = 1$

3H





1) Integ

2) δ 3) split

4) probable

✓ CHO...

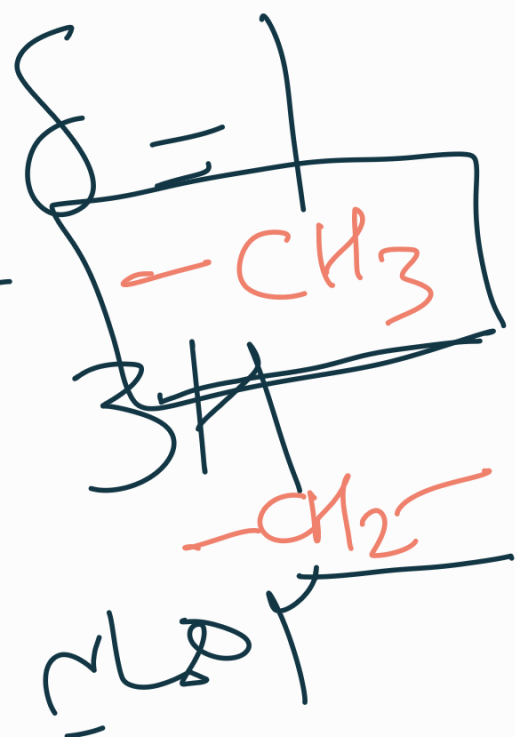
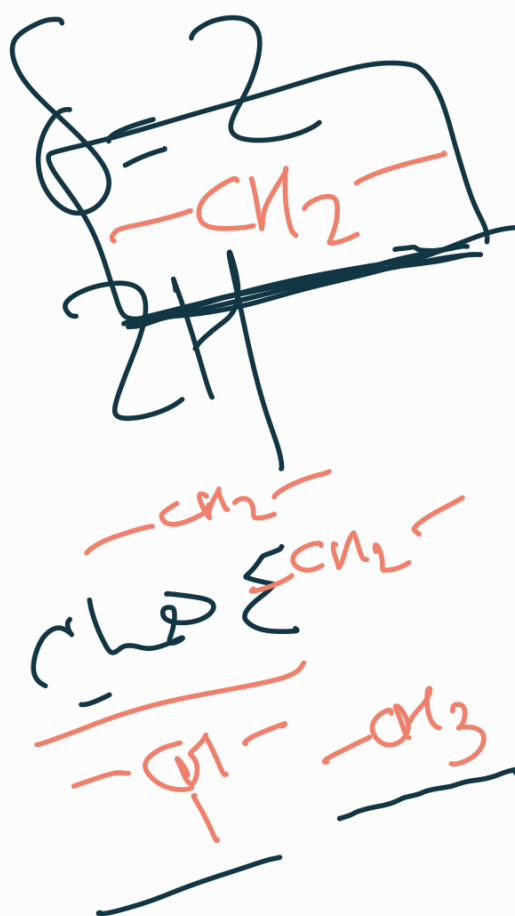
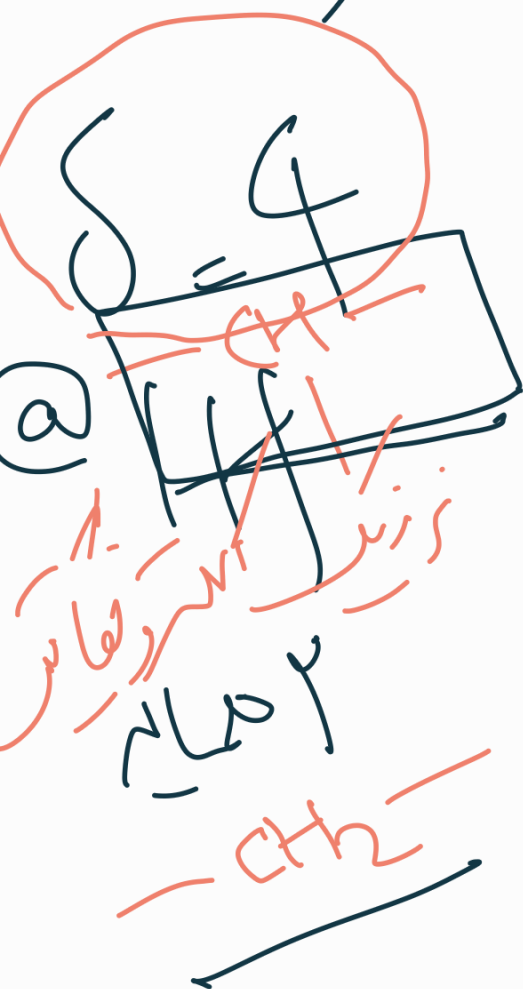
16

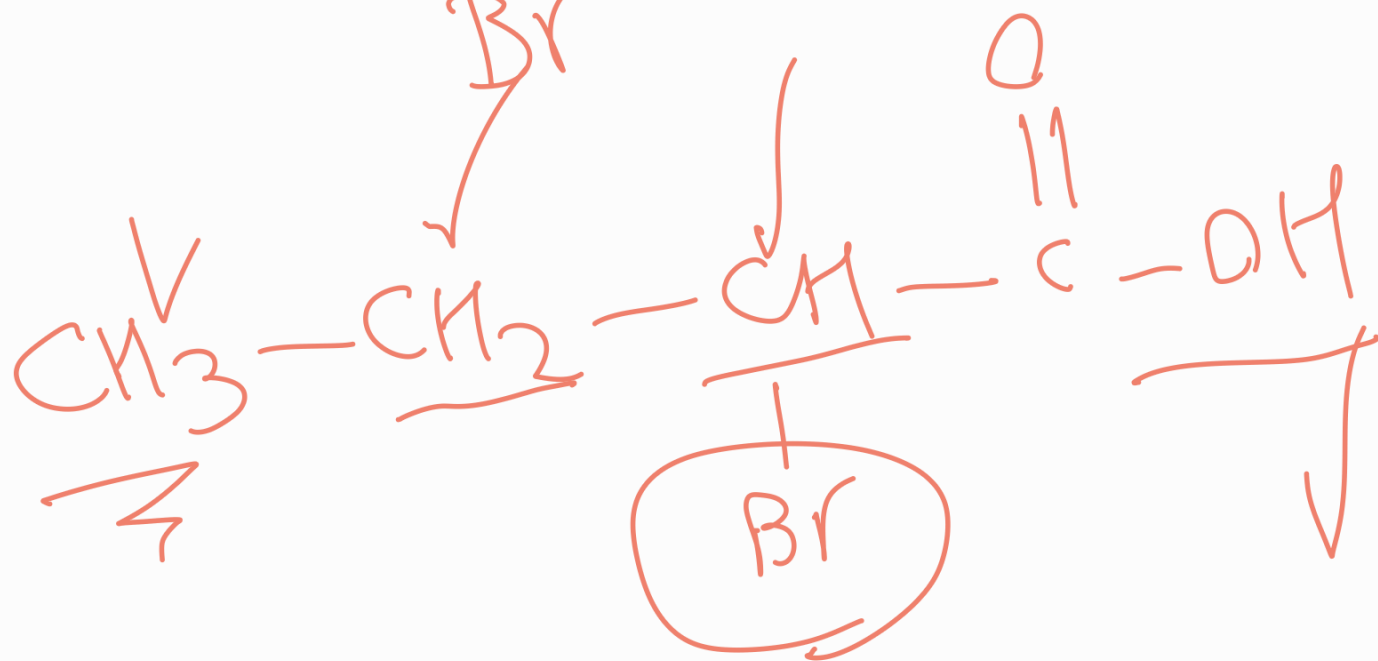
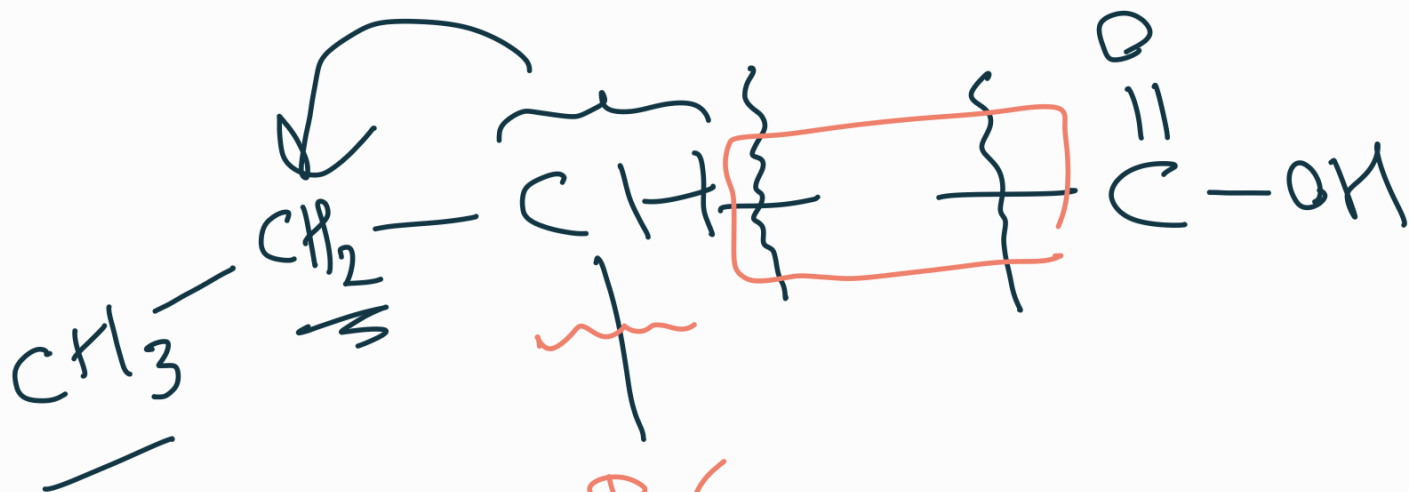
$$R-COOH$$

✓ Br

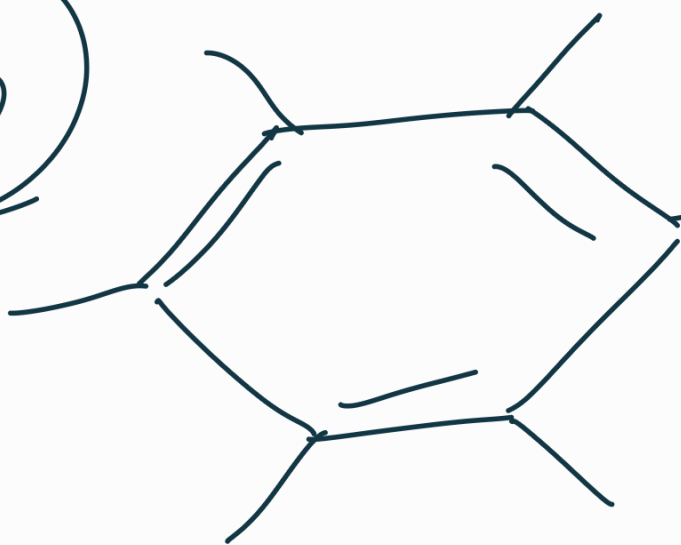
$$C_4H_7Br$$

1) Integration

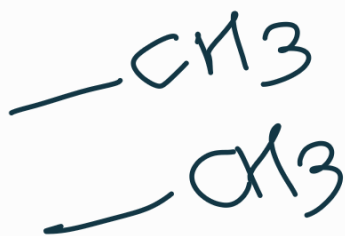
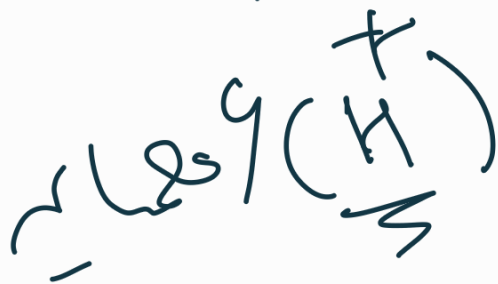
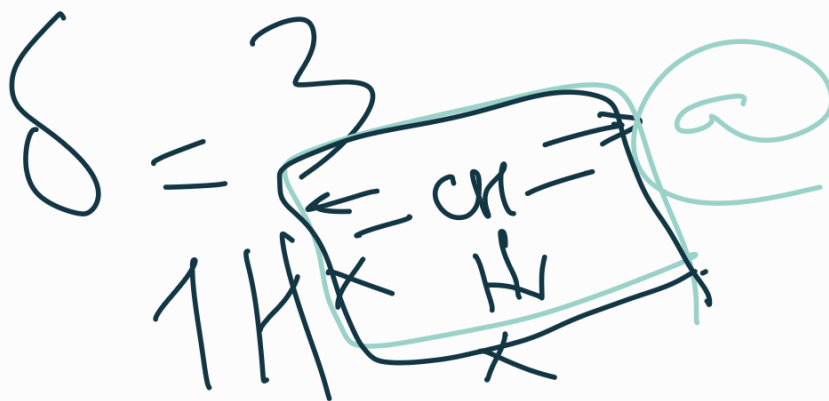




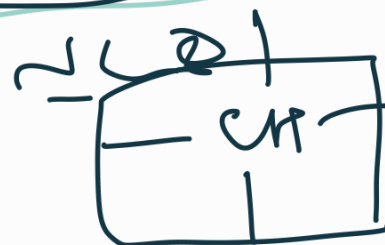
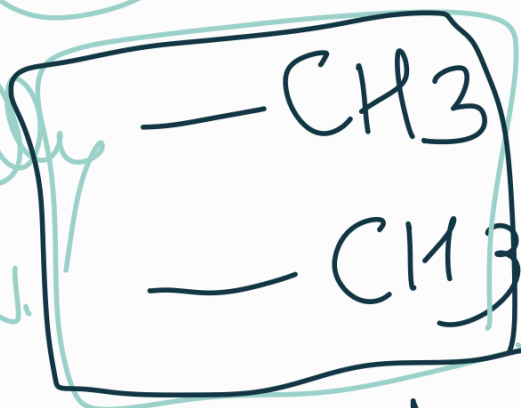
15

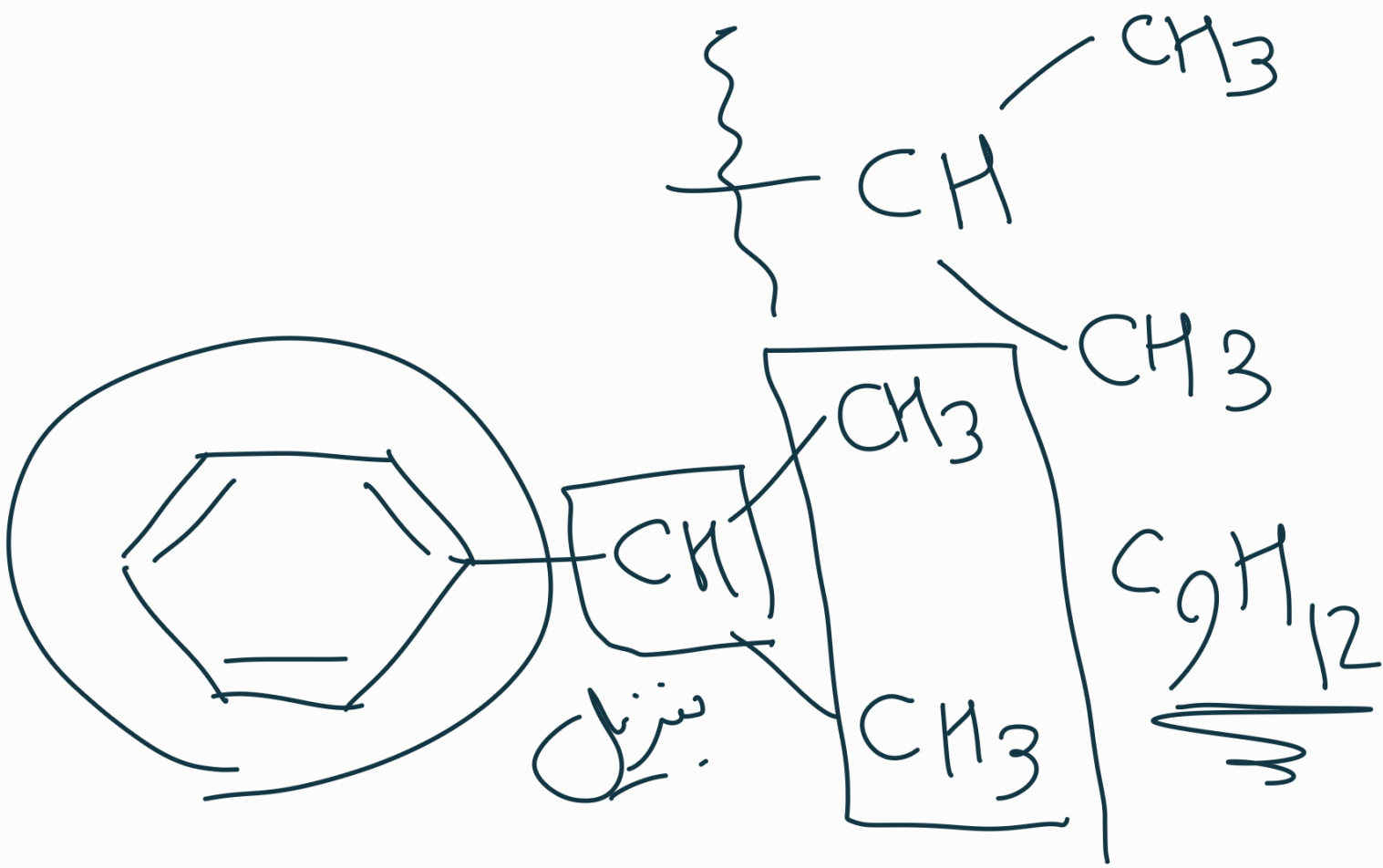


① Integ ✓

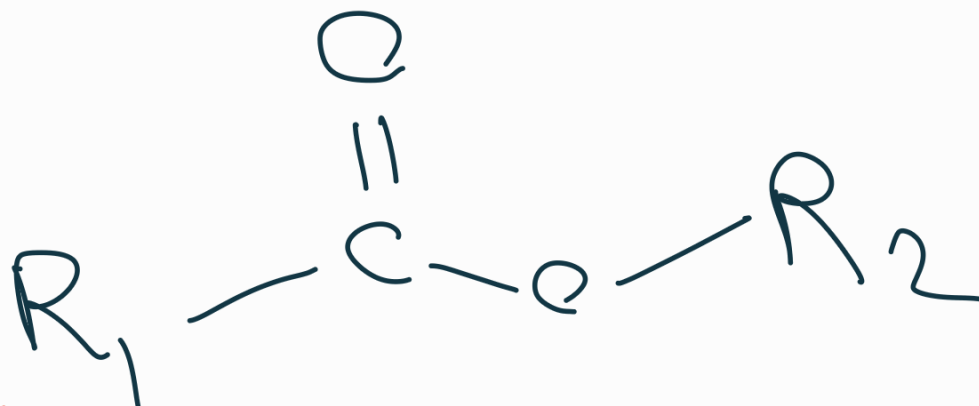
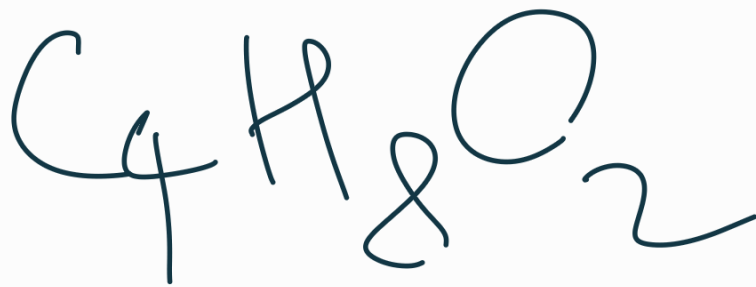


chemically
equiv.



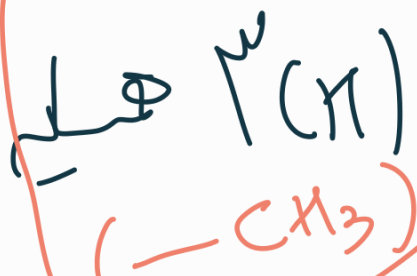


14

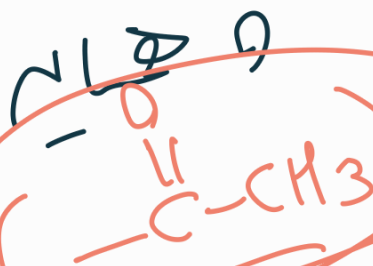


کربیل الیفر و کربن

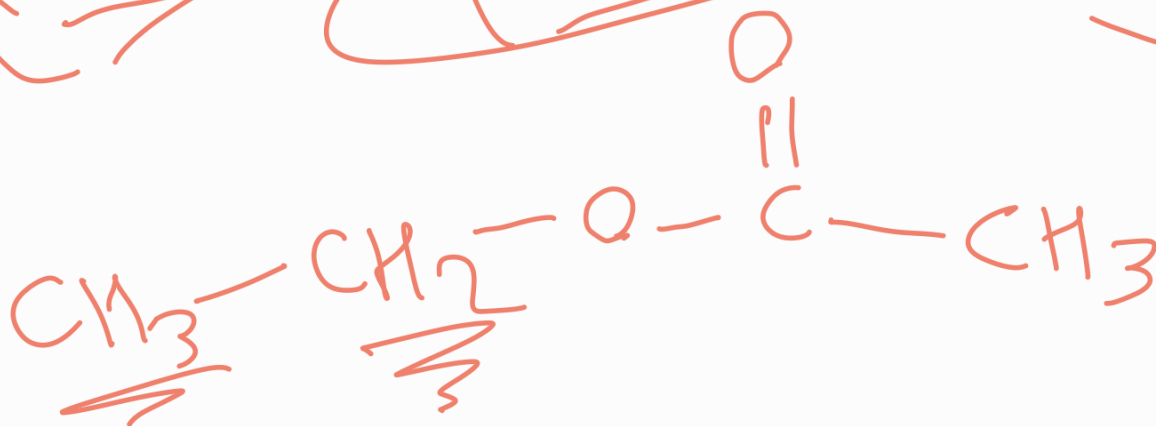
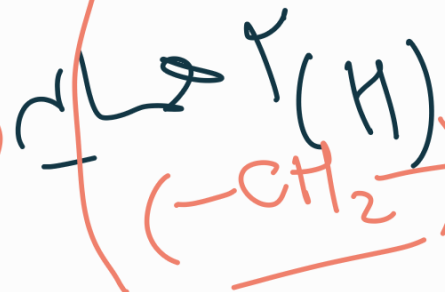
$$\delta = 4$$

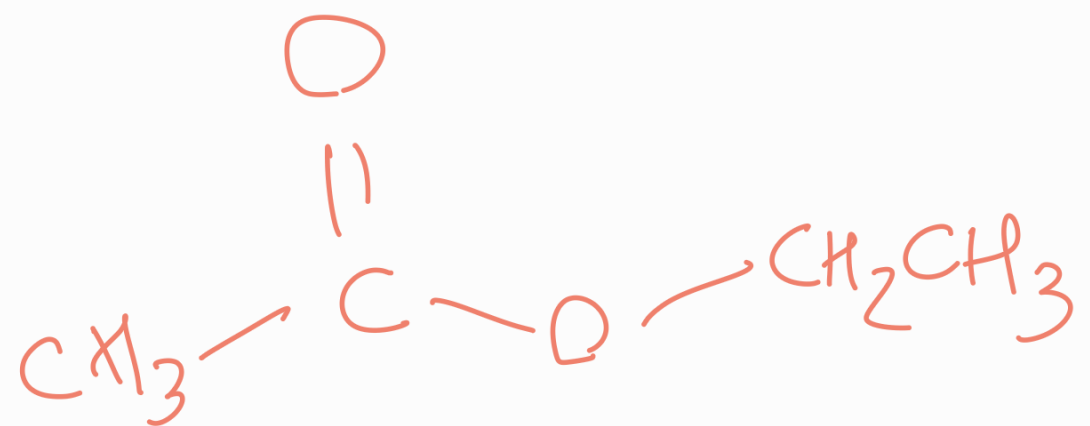


$$\delta = 2$$



$$\delta = 1$$



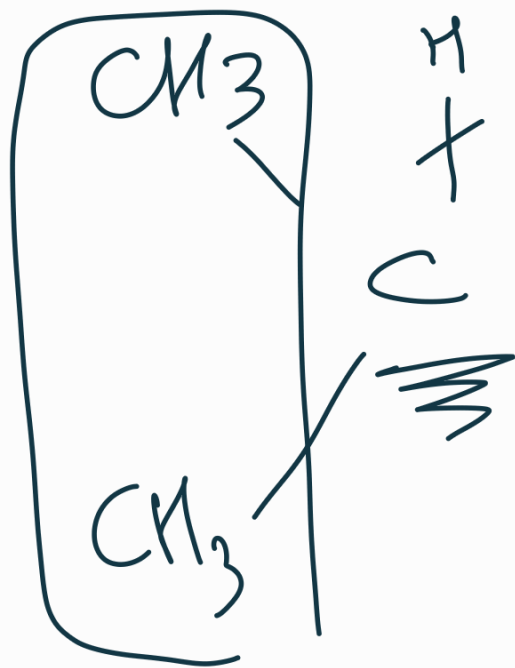


9-13

9 یسینه خبرا

HA
deshield
3 ع

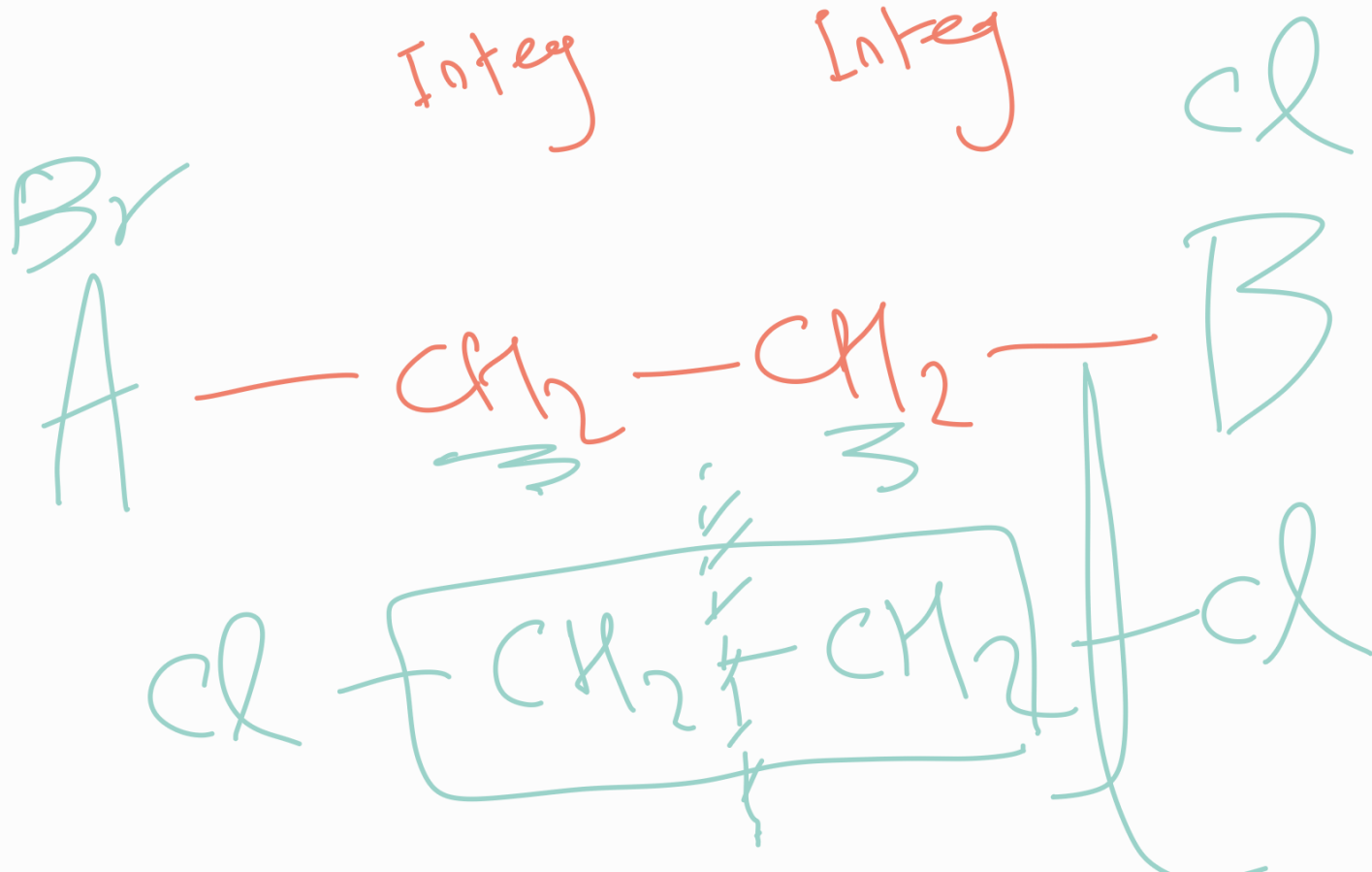
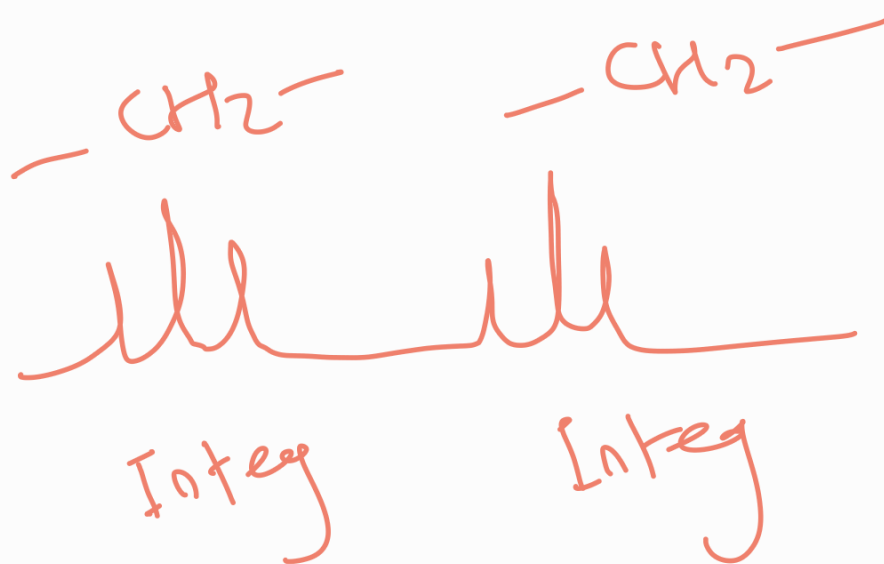
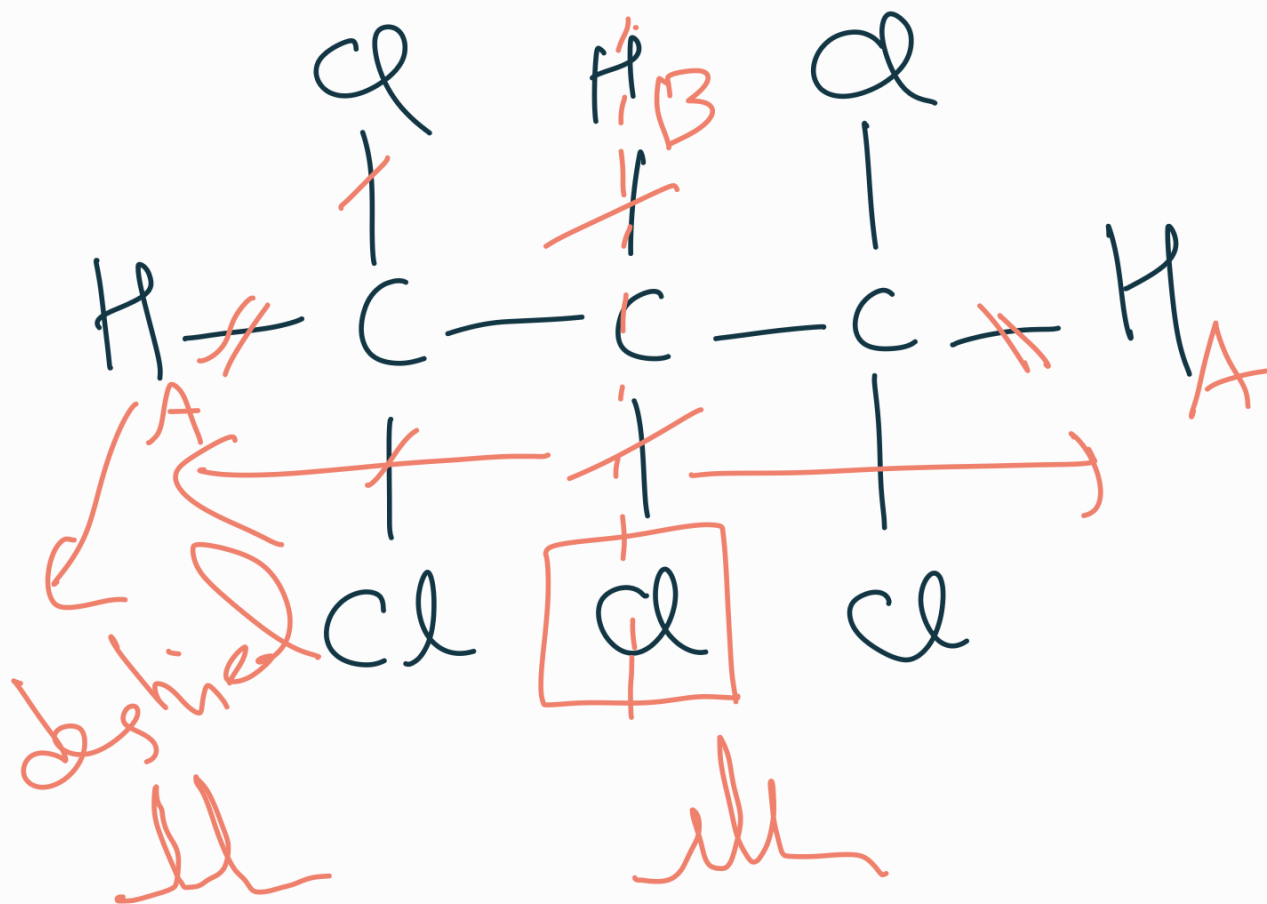
HB
shield
2 ع

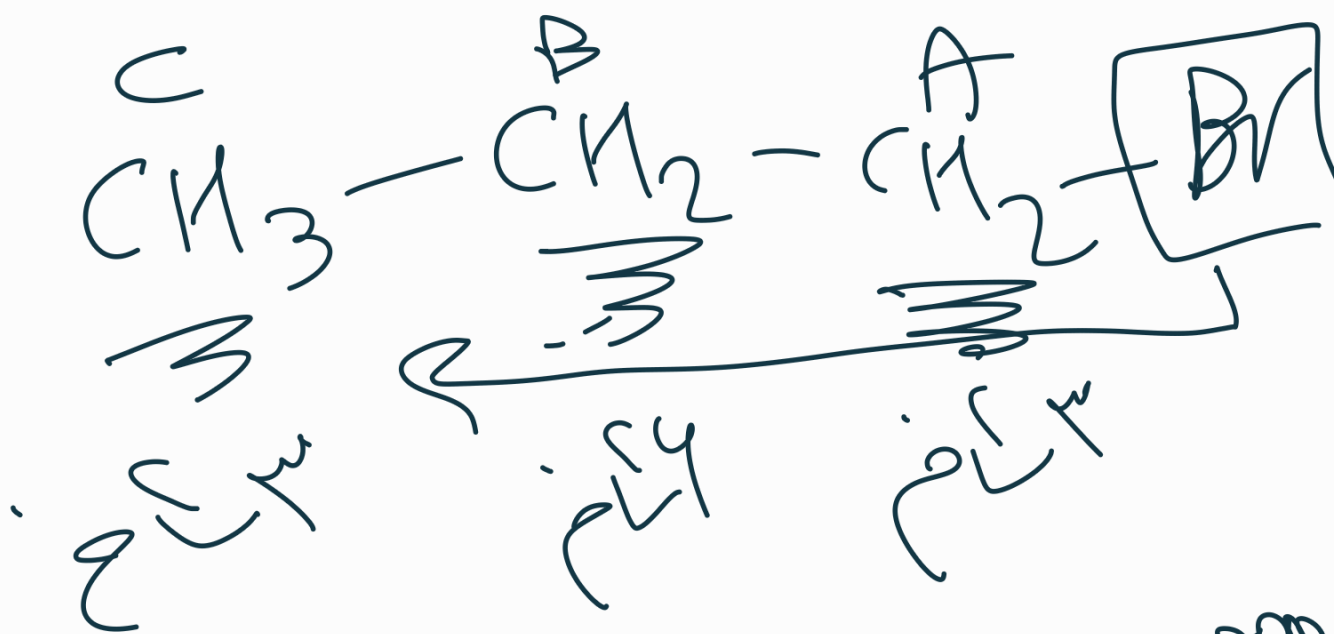


allu
 $\delta = 3$

NMR spectrum showing a doublet signal, characteristic of the methyl protons in isopropyl iodide.

$\delta = 1$





$$\delta = \frac{128 \text{ Hz}}{60 \text{ MHz}} = 2.13 \text{ ppm}$$

$$\delta = \frac{90 \text{ Hz}}{60 \text{ MHz}} \leq 1.5 \text{ ppm}$$

$$1.5 \text{ ppm} = \frac{\boxed{\phantom{120 \text{ Hz}}}}{120 \text{ MHz}}$$

120 Hz

