

Name:

Student code:

Laboratory Task II

RESULTS SHEET:

28.6 points

PART I

Q.1) Show the distillate (≥ 5 mL) to your demonstrator and ask for his/her signature.

Demonstrator Signature:.....

(0 or 5 marks)

Q.2) Functional Groups Analysis of the distilled essential oil (S): (5.5)

Tick (\checkmark) where appropriate.

Reagents	Positive test	Negative test
0.2% KMnO_4	\checkmark	
1% FeCl_3	\checkmark	
2,4-DNP		\checkmark
Ceric ammonium nitrate	\checkmark	
Tollen's Reagent		\checkmark

2.5 marks

0.5 for each correct result

Functional groups in S	Present	Not present
$-\text{C}=\text{C}-$	\checkmark	
$-\text{OH}$ (alcoholic)		\checkmark
$-\text{OH}$ (phenolic)	\checkmark	
$-\text{CHO}$		\checkmark
$-\text{CO}-$		\checkmark
$-\text{COOH}$		\checkmark

3 marks

0.5 for each correct result

Q.3) Functional Groups Analysis of unknown Y: (7)

Tick (\checkmark) where appropriate.

Reagents	Positive test	Negative test
5% HCl		\checkmark
5% NaOH	\checkmark	
5% NaHCO_3	\checkmark	
0.2% KMnO_4		\checkmark
1% FeCl_3		\checkmark
2,4-DNP		\checkmark
Ceric ammonium nitrate		\checkmark
Tollen's Reagent		\checkmark

4 marks

0.5 for each correct result

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Functional groups in Unknown Y	Present	Not present
-C=C-		√
-OH (alcoholic)		√
-OH (phenolic)		√
-CHO		√
-CO-		√
-COOH	√	

3 marks
0.5 for each correct result

Student signature:.....

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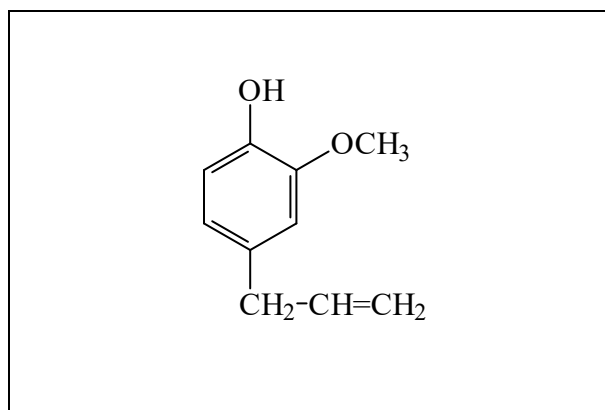
Laboratory Task II

PART II

Q. 4) Structure Elucidation:

(6)

The structure which represents the main essential oil (S):



2 marks

0.5 mark for OH, 0.5 mark for OCH₃, 0.5 mark for CH₂CH=CH₂,
0.5 mark for 1, 2, 4-trisubstituted benzene

NMR Assignment of the main essential oil (S):

(See peak number in the given ¹H NMR spectrum)

Peak No.	Chemical shift (δ, ppm)	No. of proton(s)	Multiplicity	¹ H NMR Assignment
1	3.31	2H	d (0.25 mark)	
2	3.84	3H	s (0.25 mark)	
3	5.0-5.1	2H	m (0.25 mark)	
4	5.6	1H	s (0.25 mark)	
5	5.9-6.0	1H	m (0.25 mark)	
6	6.7	2H	s (0.25 mark) d or m (0.5 mark)	
7	6.87	1H	d (0.25 mark)	

4 marks

2 marks for multiplicity assignment
2 marks for chemical shift assignment
(0.25 mark for each proton assignment)

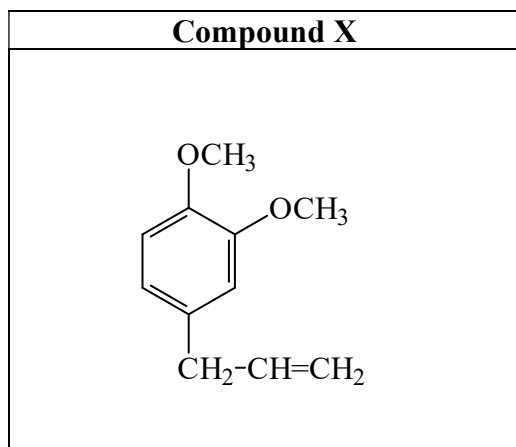
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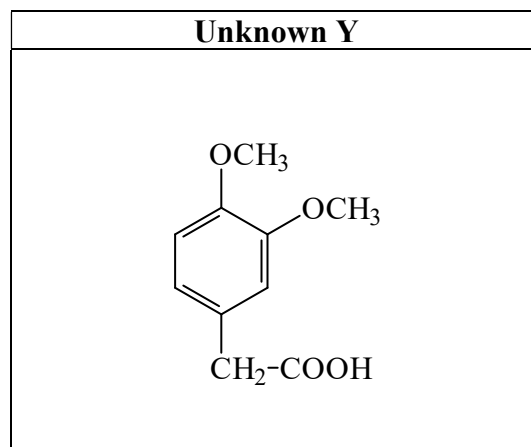
Laboratory Task II

Q.5) The structure of compound X and unknown Y:

(5)



1 mark

0.5 mark for 2(OCH₃)0.5 mark for CH₂CH=CH₂

1 mark

0.5 mark for 2(OCH₃)0.5 mark for CH₂COOH

NMR Assignment of Unknown Y:

(See peak number in the given ¹H NMR spectrum, labile proton does not appear in the spectrum)

Peak No.	Chemical shift (δ, ppm)	No. of proton(s)	Multiplicity	¹ H NMR Assignment
1	3.59	2H	s (0.25 mark)	<p>Draw a structure of the unknown Y with peak no. assignment at each proton.</p>
2	3.86	3H	s (0.25 mark)	
3	3.88	3H	s (0.25 mark)	
4	6.81	3H	s (0.25 mark) d (0.5 mark) m (0.75 mark)	

3 marks

1.5 marks for multiplicity assignment

1.5 marks for chemical shift assignment
(0.25 for each proton assignment)