

Question 1

Signal	Chem. Shift	Integration	Multiplicity	Adj. H	H-Type	Structure and Assignment
A	3.3	2	Quartet	3	-CH <sub>2</sub>	Br-CH <sub>2</sub> -CH <sub>3</sub>
B	1.7	3	Triplet	2	-CH <sub>3</sub>	

Question 2

C <sub>4</sub> H <sub>8</sub> O		D of U = 1				
Signal	Chem. Shift	Integration	Multiplicity	Adj. H	H-type	Structure and Assignment
A	2.4	2	Quartet	3	-CH <sub>2</sub> -CH <sub>3</sub>	
B	2.1	3	Singlet	0	-(C=O)CH <sub>3</sub>	
C	1.1	3	Triplet	2	-CH <sub>3</sub>	

Question 3

C <sub>4</sub> H <sub>8</sub> O <sub>2</sub>		D of U = 1				
Signal	Chem. Shift	Integration	Multiplicity	Adj. H	H-type	Structure and Assignment
A	4.1	2	Quartet	3	-CH <sub>2</sub> -O-	
B	2.0	3	Singlet	0	-(C=O)CH <sub>3</sub>	
C	1.3	3	Triplet	2	-CH <sub>3</sub>	

Question 4

C <sub>5</sub> H <sub>10</sub> O <sub>2</sub>		D of U = 1				
Signal	Chem. Shift	Integration	Multiplicity	Adj. H	H-type	Structure and Assignment
A	5.0	1	Septet	6	-O-CH-(CH <sub>3</sub> ) <sub>2</sub>	
B	2.0	3	Singlet	0	-(C=O)CH <sub>3</sub>	
C	1.3	6	Doublet	1	-O-CH-(CH <sub>3</sub> ) <sub>2</sub>	

Question 5

C <sub>4</sub> H <sub>8</sub> O		D of U = 1				
Signal	Chem. Shift	Integration	Multiplicity	Adj. H	H-type	Structure and Assignment
A	9.5	1	Singlet	0	O=CH	
B	2.4	1	Septet	6	-O-CH-(CH <sub>3</sub> ) <sub>2</sub>	
C	1.11	6	Doublet	1	-O-CH-(CH <sub>3</sub> ) <sub>2</sub>	

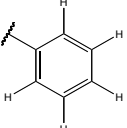
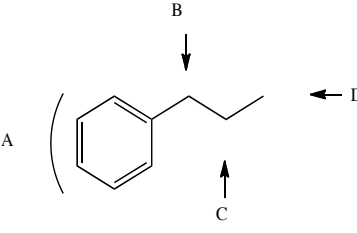
Question 6

C <sub>5</sub> H <sub>10</sub> O <sub>2</sub>		D of U = 1				
Signal	Chem. Shift	Integration	Multiplicity	Adj. H	H-type	Structure and Assignment
A	4.0	2	Triplet	2	O-CH <sub>2</sub>	
B	2.0	3	Singlet	0	(O=C)-CH <sub>3</sub>	
C	1.8	2	Sextet	5	-CH <sub>2</sub> -CH <sub>2</sub> -CH <sub>3</sub>	
D	1.0	3	Triplet	2	-CH <sub>2</sub> -CH <sub>3</sub>	

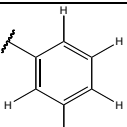
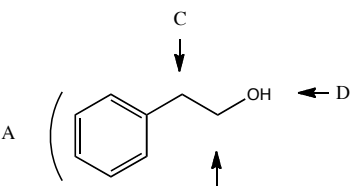
Question 7

C <sub>4</sub> H <sub>8</sub> O <sub>2</sub>		D of U = 1				
Signal	Chem. Shift	Integration	Multiplicity	Adj. H	H-type	Structure and Assignment
A	11.5	1	Singlet	0	(C=O)OH	
B	2.4	2	Triplet	2	(O=C)CH <sub>2</sub>	
C	1.8	2	Sextet	5	-CH <sub>2</sub> -CH <sub>2</sub> -CH <sub>3</sub>	
D	1.0	3	Triplet	2	-CH <sub>2</sub> -CH <sub>3</sub>	

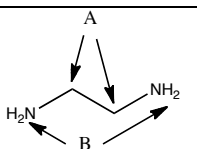
Question 8

C <sub>9</sub> H <sub>12</sub>		D of U = 4				
Signal	Chem. Shift	Integration	Multiplicity	Adj. H	H-type	Structure and Assignment
A	7.1	5	Multiplet	-		
B	2.6	2	Triplet	2	-CH <sub>2</sub> -CH <sub>2</sub> -R	
C	1.7	2	Sextet	5	-CH <sub>2</sub> -CH <sub>2</sub> -CH <sub>3</sub>	
D	0.9	3	Triplet	2	-CH <sub>2</sub> -CH <sub>3</sub>	

Question 9

C <sub>8</sub> H <sub>10</sub> O		D of U = 4				
Signal	Chem. Shift	Integration	Multiplicity	Adj. H	H-type	Structure and Assignment
A	7.2	5	Multiplet	-		
B	3.8	2	Triplet	2	R-CH <sub>2</sub> -CH <sub>2</sub> -R	
C	2.8	2	Triplet	2	R-CH <sub>2</sub> -CH <sub>2</sub> -R	
D	2.0	1	Singlet	0	-OH	

Question 10

C <sub>2</sub> H <sub>8</sub> N		D of U = 0				
Signal	Chem. Shift	Integration	Multiplicity	Adj. H	H-type	Structure and Assignment
A	2.8	1	Singlet	0	CH <sub>2</sub> -R	
B	1.3	1	Singlet	0	NH <sub>2</sub> -CH <sub>2</sub> -	

Question 11

C <sub>7</sub> H <sub>14</sub> O		D of U = 1				
Signal	Chem. Shift	Integration	Multiplicity	Adj. H	H-type	Structure and Assignment
A	2.4	4	Triplet	2	(O=C)- CH <sub>2</sub> -CH <sub>2</sub> -	
B	1.6	4	Sextet	5	-CH <sub>2</sub> -CH <sub>2</sub> - CH <sub>3</sub>	
C	0.9	6	Triplet	2	-CH <sub>2</sub> -CH <sub>3</sub>	

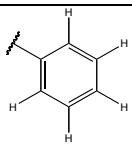
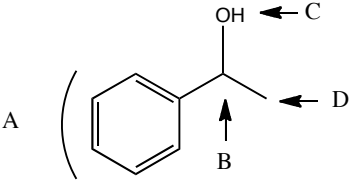
Question 12

C <sub>5</sub> H <sub>8</sub> O <sub>2</sub>		D of U = 2				
Signal	Chem. Shift	Integration	Multiplicity	Adj. H	H-type	Structure and Assignment
A	4.1	4	Triplet	2	CH <sub>2</sub> -CH <sub>2</sub> - O-	
B	2.7	4	Triplet	2	(O=C)- CH <sub>2</sub> -CH <sub>2</sub> -	

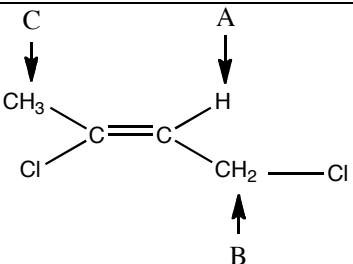
Question 13

C <sub>2</sub> H <sub>2</sub> Cl <sub>2</sub>		D of U = 0				
Signal	Chem. Shift	Integration	Multiplicity	Adj. H	H-type	Structure and Assignment
A	5.9	1	Quartet	3	CH <sub>3</sub> -CH-R <sub>2</sub>	
B	2.1	3	Doublet	1	CH <sub>3</sub> -CH-R <sub>2</sub>	

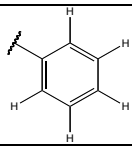
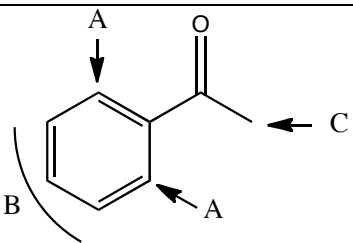
Question 14

C <sub>8</sub> H <sub>10</sub> O		D of U = 4				
Signal	Chem. Shift	Integration	Multiplicity	Adj. H	H-type	Structure and Assignment
A	7.3	5	Multiplet	-		
B	4.8	1	Quartet	3	-CH-CH <sub>3</sub>	
C	2.7	1	Singlet	0	-OH	
D	1.4	3	Doublet	1	-CH-CH <sub>3</sub>	

Question 15

C <sub>4</sub> H <sub>6</sub> Cl <sub>2</sub>		D of U = 1				
Signal	Chem. Shift	Integration	Multiplicity	Adj. H	H-type	Structure and Assignment
A	5.8	1	Triplet	2	HC=C-	
B	4.1	2	Doublet	1	-C=C-CH <sub>2</sub> -	
C	2.1	3	Singlet	0	C=C-CH <sub>3</sub>	

Question 16

C <sub>8</sub> H <sub>8</sub> O		D of U = 5				
Signal	Chem. Shift	Integration	Multiplicity	Adj. H	H-type	Structure and Assignment
A	8.0	2	Multiplet	-		
B	7.5	3	Multiplet	-		
C	2.6	3	Singlet	0	(O=C)-CH <sub>3</sub>	

Question 17

C <sub>9</sub> H <sub>8</sub> O <sub>2</sub>		D of U = 6				Structure and Assignment
Signal	Chem. Shift	Integration	Multiplicity	Adj. H	H-type	
A	11.0	1	Singlet	0	-(C=O)OH	
B	7.8	1	Doublet	1	-HC=CH-	
C	7.4	2	Multiplet	-		
D	7.2	3	Multiplet	-		
E	6.4	1	Doublet	1	-HC=CH-	

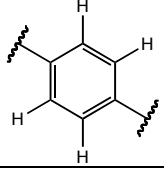
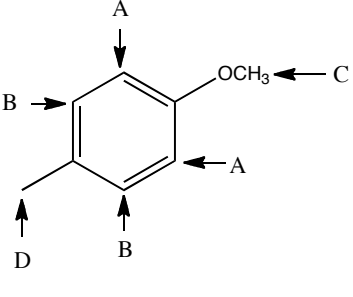
Question 18

C <sub>9</sub> H <sub>12</sub>		D of U = 4				Structure and Assignment
Signal	Chem. Shift	Integration	Multiplicity	Adj. H	H-type	
A	7.0	4	Multiplet	-		
B	2.7	2	Quartet	3	-CH <sub>2</sub> -CH <sub>3</sub>	
C	2.2	3	Singlet	0	-CH <sub>3</sub>	
D	1.2	3	Triplet	2	-CH <sub>2</sub> -CH <sub>3</sub>	

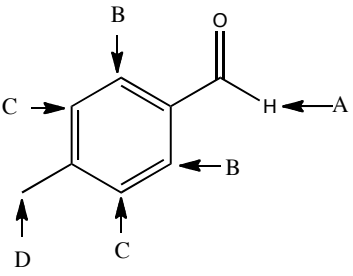
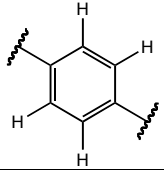
Question 19

C <sub>9</sub> H <sub>12</sub> O		D of U = 4				Structure and Assignment
Signal	Chem. Shift	Integration	Multiplicity	Adj. H	H-type	
A	6.8	4	Multiplet	-		
B	4.8	1	Singlet	0	-OH	
C	2.5	2	Triplet	2	-CH <sub>2</sub> -CH <sub>2</sub> -	
D	1.6	2	Sextet	5	-CH <sub>2</sub> -CH <sub>2</sub> -CH <sub>3</sub>	
E	1.0	3	Triplet	2	-CH <sub>2</sub> -CH <sub>3</sub>	

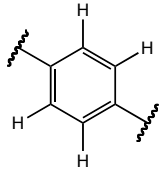
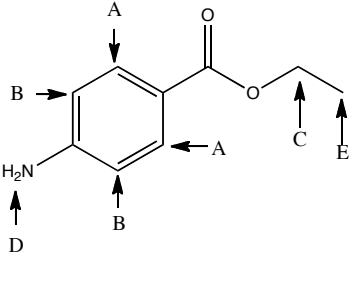
Question 20

C <sub>8</sub> H <sub>10</sub> O		D of U = 4				
Signal	Chem. Shift	Integration	Multiplicity	Adj. H	H-type	Structure and Assignment
A	7.0	2	Doublet	1		
B	6.8	2	Doublet	1		
C	3.7	3	Singlet	0	-OCH <sub>3</sub>	
D	2.2	3	Singlet	0	-CH <sub>3</sub>	

Question 21

C <sub>8</sub> H <sub>8</sub> O		D of U = 5				
Signal	Chem. Shift	Integration	Multiplicity	Adj. H	H-type	Structure and Assignment
A	9.9	1	Singlet	0	-(C=O)H	
B	7.8	2	Doublet	1		
C	7.3	2	Doublet	1		
D	2.4	3	Singlet	0	-CH <sub>3</sub>	

Question 22

C <sub>9</sub> H <sub>11</sub> O <sub>2</sub> N		D of U = 5				
Signal	Chem. Shift	Integration	Multiplicity	Adj. H	H-type	Structure and Assignment
A	7.9	2	Doublet	1		
B	6.7	2	Doublet	1		
C	4.4	2	Quartet	3	-CH <sub>2</sub> -CH <sub>3</sub>	
D	4.1	2	Singlet	0	-NH <sub>2</sub>	
E	1.4	3	Triplet	2	-CH <sub>2</sub> -CH <sub>3</sub>	

Question 23

C <sub>6</sub> H <sub>10</sub> O <sub>3</sub>		D of U = 2				
Signal	Chem. Shift	Integration	Multiplicity	Adj. H	H-type	Structure and Assignment
A	4.2	2	Quartet	3	-CH <sub>2</sub> -CH <sub>3</sub>	
B	3.4	2	Singlet	0	R-CH <sub>2</sub> -R	
C	2.3	3	Singlet	0	R <sub>3</sub> -CH <sub>3</sub>	
D	1.3	3	Triplet	2	-CH <sub>2</sub> -CH <sub>3</sub>	

Question 24

C <sub>4</sub> H <sub>9</sub> NO		D of U = 1				
Signal	Chem. Shift	Integration	Multiplicity	Adj. H	H-type	Structure and Assignment
A	4.7	2	Singlet	0	-(C=O)-NH <sub>2</sub>	
B	3.7	1	Septet	6	-CH-(CH <sub>3</sub> ) <sub>2</sub>	
C	1.3	6	Doublet	1	-CH-(CH <sub>3</sub> ) <sub>2</sub>	

Question 25

C <sub>4</sub> H <sub>6</sub> O <sub>2</sub>		D of U = 2				
Signal	Chem. Shift	Integration	Multiplicity	Adj. H	H-type	Structure and Assignment
A	11.3	1	Singlet	0	-(C=O)-OH	
B	6.3	1	Quartet	3	H <sub>2</sub> C=C-R	
C	5.7	1	Quartet	3		
D	2.0	3	Triplet	2	-CH <sub>3</sub>	

## Question 26

C <sub>7</sub> H <sub>14</sub> O <sub>2</sub>		D of U = 1				
Signal	Chem. Shift	Integration	Multiplicity	Adj. H	H-type	Structure and Assignment
A	5.0	1	Septet	6	-CH-(CH <sub>3</sub> ) <sub>2</sub>	
B	2.2	2	Triplet	2	-CH <sub>2</sub> -CH <sub>2</sub> - (C=O)O-	
C	1.7	2	Sextet	5	-CH <sub>2</sub> -CH <sub>2</sub> - CH <sub>3</sub>	
D	1.2	6	Doublet	1	-CH-(CH <sub>3</sub> ) <sub>2</sub>	
E	0.9	3	Triplet	2	-CH <sub>2</sub> -CH <sub>3</sub>	

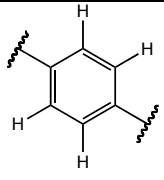
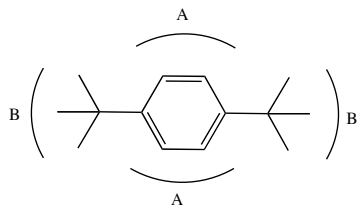
## Question 27

C <sub>7</sub> H <sub>14</sub> O <sub>2</sub>		D of U = 1				
Signal	Chem. Shift	Integration	Multiplicity	Adj. H	H-type	Structure and Assignment
A	4.1	2	Singlet	0	-CH <sub>2</sub> -CH <sub>3</sub>	
B	1.3	3	Septet	6	-CH <sub>2</sub> -CH <sub>3</sub>	
C	1.1	9	Doublet	1	-C-(CH <sub>3</sub> ) <sub>3</sub>	

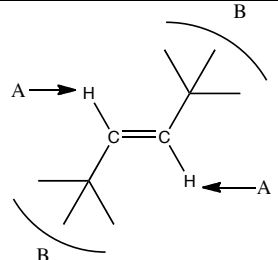
## Question 28

C <sub>7</sub> H <sub>15</sub> NO		D of U = 1				
Signal	Chem. Shift	Integration	Multiplicity	Adj. H	H-type	Structure and Assignment
A	3.3	2	Singlet	0	R <sub>2</sub> N-CH <sub>2</sub> -	
B	2.5	4	Quartet	3	-CH <sub>2</sub> -CH <sub>3</sub>	
C	2.1	3	Singlet	0	-(C=O)CH <sub>3</sub>	
D	1.0	6	Triplet	2	-CH <sub>2</sub> -CH <sub>3</sub>	

Question 29

C <sub>14</sub> H <sub>22</sub>		D of U = 4				
Signal	Chem. Shift	Integration	Multiplicity	Adj. H	H-type	Structure and Assignment
A	7.3	4	Singlet	0		
B	1.3	18	Singlet	0	-C-(CH <sub>3</sub> ) <sub>3</sub>	

Question 30

C <sub>10</sub> H <sub>20</sub>		D of U = 1				
Signal	Chem. Shift	Integration	Multiplicity	Adj. H	H-type	Structure and Assignment
A	5.4	2	Singlet	0	-CH=CH- (trans)	
B	1.4	18	Singlet	0	-C-(CH <sub>3</sub> ) <sub>3</sub>	