Anglo-Chinese School
(Barker Road)
A Methodist Institution
Founded in 1886

CHEMISTRY
DEPARTMENT OF SCIENCE

Name: ..... ( ) Class: SEC 4 .....

OC: ALCOHOLS & CARBOXYLIC ACIDS (EXTENSIONS) – ASSIGNMENT

Multiple-Choice Questions [20 Marks]

TOTAL SCORE	/ 30

Write in your selected answer for the multiple-choice questions in the boxes provided.

1	2	3	4	5	6	7	8	9	10

11	12	13	14	15	16	17	18	19	20

1. Three chemical reactions are shown below:

   Reaction I: $C_3H_8O + C_3H_6O_2 \longrightarrow C_6H_{12}O_2 + H_2O$
   Reaction II: $C_6H_{12} + HCl \longrightarrow C_6H_{13}Cl$
   Reaction III: $C_6H_6 + Br_2 \longrightarrow C_6H_5Br + HBr$

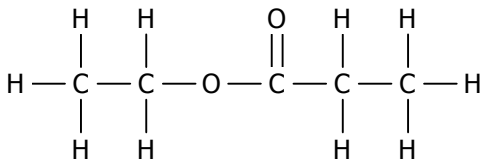
   Which of the following best describes the three reactions?

	Reaction I	*Reaction II*	*Reaction III*
A	condensation	addition	substitution
B	condensation	substitution	elimination
C	photosynthesis	addition	substitution
D	photosynthesis	substitution	elimination

2. When organic compounds undergo a condensation reaction,

   A a single product is formed.
   B two organic molecules combine to for a larger molecule.
   C water is added to the structure of an organic molecule.
   D water vapour turns into liquid water.

3. What is the name of the molecule below?



   A ethyl ethanoate
   B ethyl propanoate
   C propyl ethanoate
   D propyl propanoate

4. A sample of butanol was heated under reflux with methanoic acid, using concentrated sulfuric acid as a catalyst. A sweet-smelling product was obtained.

   What is the name and chemical formula of this product?

	name	*chemical formula*
A	butyl methanoate	$CH_3COOC_3H_7$
B	butyl methanoate	$HCOOC_4H_9$
C	methyl butanoate	$CH_3COOC_3H_7$
D	methyl butanoate	$HCOOC_4H_9$

5. Two aqueous samples of ethanoic acid and carbonic acid have been mixed up. Which of the following tests will enable us to identify the two solutions?

   A adding a few drops of phenolphthalein
   B adding a strip of zinc metal
   C heating under reflux with acidified potassium dichromate(VI)
   D warming with ethanol and concentrated sulfuric acid

6. What do propanol, propanoic acid and propyl propanoate have in common?

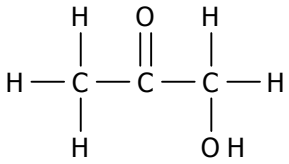
   A they have the same combustion products
   B they have the same melting and boiling points
   C they have the same number of carbon atoms
   D they have the same solubility in water

7. Which of the following most accurately describes the variation across esters?

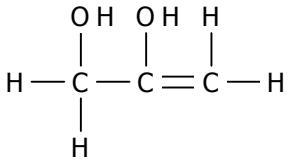
   A The larger the molecular size, the lower the melting point.
   B The larger the molecular size, the higher the percentage mass of oxygen.
   C The larger the molecular size, the lesser the number of isomers.
   D The larger the molecular size, the lower the solubility in water.

8. An isomer of ethyl methanoate is able to decolourise both aqueous bromine and acidified potassium permanganate. Which compound could this be?

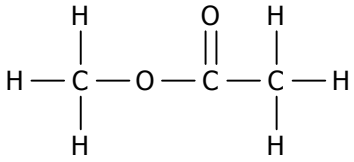
A



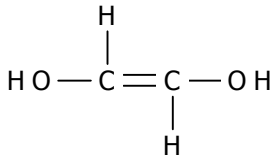
C



B



D



9. All of the following molecules are isomers except

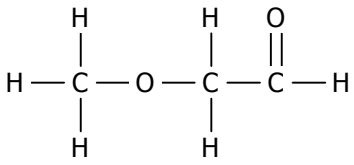
   A butanoic acid **B** butyl butanoate **C** ethyl ethanoate **D** methyl propanoate

10. Which of the following molecules contain the highest mass of carbon per mole?

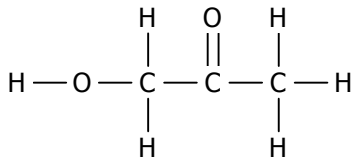
A ethanoic acid **B** ethanol **C** ethene **D** ethyl ethanoate

11. Which of the following substances have a fruity smell?

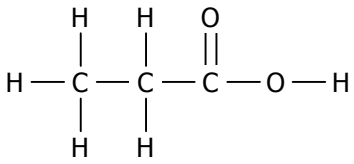
A



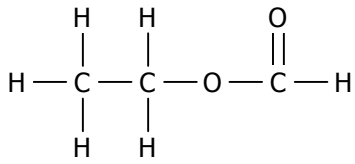
C



B



D



12. Which of the following is **not** a common use for esters?

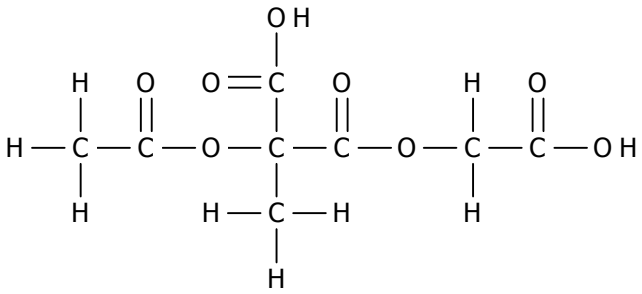
A It is used as a fuel.
B It is used as a solvent.
C It is used in flavourings.
D It is used to manufacture fragrances.

13. In the laboratory preparation of propyl butanoate,

A acidified potassium dichromate(VI) is added to the reactants.
B propanoic acid is used as a starting reagent.
C the organic product is obtained by using a separating funnel.
D the reactants are heated in an open beaker.

14. An ester linkage can be separated by boiling the compound with dilute hydrochloric acid, in a process known as *hydrolysis*. The reverse process of condensation, each ester linkage is split into a carboxylic acid and an alcohol.

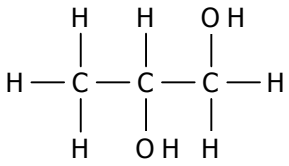
Molecule **X** below is hydrolysed by boiling with dilute hydrochloric acid. How many molecules of organic products are produced for every molecule of **X**?



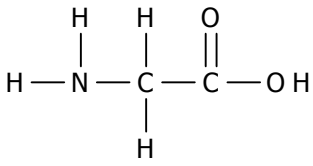
A three **B** four **C** five **D** six

15. Which of the following molecules is **not** able to undergo condensation polymerisation?

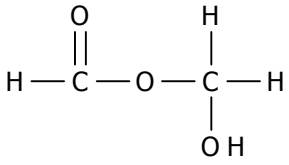
A



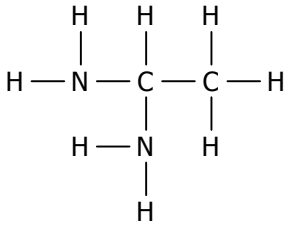
C



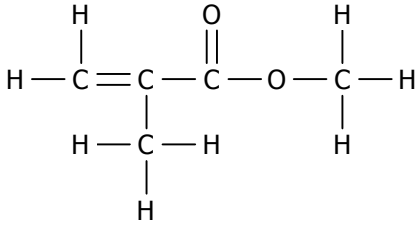
B



D



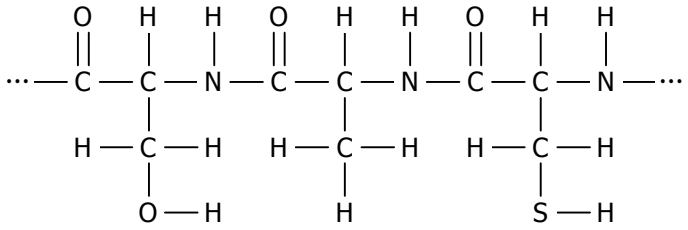
16. The structure methyl methacrylate is shown below.



What form of polymerization is methyl methacrylate able to undergo, if any?

A addition polymerisation only
B condensation polymerisation only
C both addition and condensation polymerisation
D neither addition nor condensation polymerisation

17. A segment of a polyamide is shown below.



Assuming that all amide linkages in this polymer were formed as a result of condensation polymerisation, state the number of repeating units represented in the above diagram, and the number of monomers needed to form the above segment of the polymer chain.

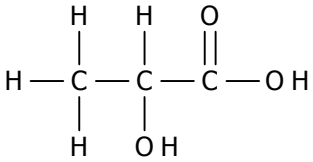
	number of repeating units	*number of monomers*
A	1	1
B	1	3
C	3	1
D	3	3

18. An organic molecule **Y** is found to be able to undergo both addition and condensation polymerization.

Which of the following best describe the mass of polymer formed when 100 g of monomers were separately allowed to undergo addition and condensation polymerization?

	addition polymer	*condensation polymer*
A	100 g	100 g
B	100 g	less than 100 g
C	more than 100 g	100 g
D	more than 100 g	less than 100 g

19. Consider the following monomer:



What is the mass of polymer formed from 100 g of the above monomer?

A 70 g **B** 80 g **C** 90 g **D** 100 g

20. Four segments of a polymer chain are represented below:

Diagram I

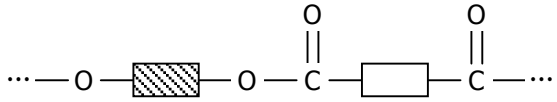


Diagram II

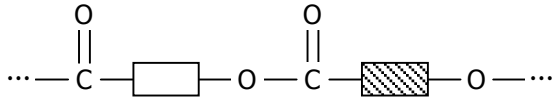


Diagram III

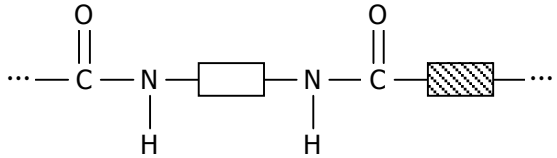
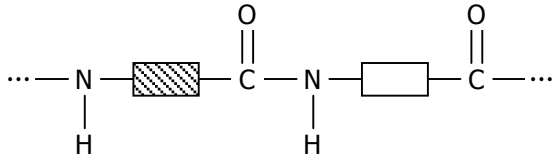


Diagram IV

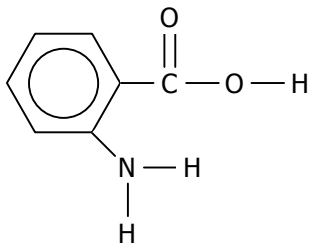


Which of the above diagrams most accurately represents *Terylene* and nylon respectively?

	Terylene	*nylon*
A	I	III
B	I	IV
C	II	III
D	II	IV

Structured Questions [10 Marks]

21. Anthranlic acid is an example of an amino acid, sometimes referred to as Vitamin L. The structure of anthranlic acid is shown below.



anthranlic acid

(a) (i) Define 'condensation polymerisation'. [1]

.....

.....

(ii) Is anthranlic acid able to undergo condensation polymerisation? Why or why not? [1]

.....

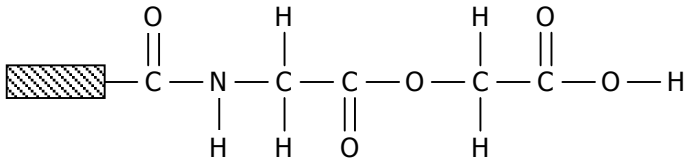
.....

(b) Draw the structure of the compound formed when anthranlic acid reacts with

(i) propanol, [1]

(ii) ethanoic acid. [1]

22. Hippuric acid is an organic compound which was first isolated from stallions' urine. It reacts with glycine, an amino acid, to form hippurylglycolic acid. Hippurlglycolic acid reacts with another compound, 2-hydroxyethanoic acid, to form substance **X** below.

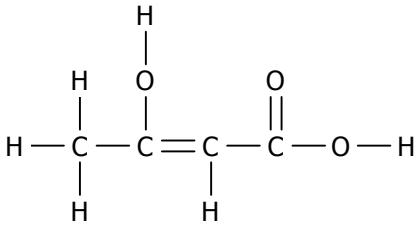


*substance **X***

(a) Substance **X** is able to undergo hydrolysis (the reverse process of condensation). In the space below, draw all **three** products of the complete hydrolysis of substance **X**. [3]

(b) Glycine, the nitrogen-containing product of the above hydrolysis, is able to undergo condensation polymerisation. Draw the structure of polyglycine. [1]

23. The structure of 3-hydroxybut-2-enoic acid is shown below.



3-hydroxybut-2-enoic acid

(a) Draw the product of condensation polymerisation of the above molecule, showing the full structural formula of two repeating units of the polymer. [1]

(b) Draw the product of addition polymerisation of the above molecule, showing the full structural formula of two repeating units of the polymer. [1]

END