SUZANNE CORY
High School

Unit 1 Chemistry 2021
Assessment: Molecular Theory and Organic Chemistry Test

Section	Number of Questions	Number of Marks
A. Multiple Choice	**11**	**11**
B. Short Answer	**7**	**31**
	Total	**42**

Reading time: 5 minutes
Writing time: 60 minutes

Name : ANSWERS Teacher : _____

Question Booklet

Materials
You should have pens, pencils, a ruler, an eraser, a scientific calculator.
You will be supplied with a Data Book.

Instructions
Ensure that you write your name and your teacher's name clearly on the booklet.
Answer all questions in section A on the multiple choice answer sheet provided- no answers written in this booklet will be accepted.

Answer all questions in section B in the space provided in this question and answer booklet.
No marks will be deducted for incorrect answers.

Section A Multiple Choice

Record all answers for this section on the ***multiple choice answer grid*** provided.

1. Covalent bonding can be best described as;
   a. Complete transfer of one or more electrons from one atom to another
   b. Sharing of electrons by two atoms
   c. A gain of electrons
   d. The formation of particles of opposite charge

2. Identify the list that contains **only** covalently bonded molecules
   a. NaCl, MgO, $C_3H_6O_6$
   b. $MgSO_4$, H_2, $CaCl_2$
   c. H_2, C_2H_6, O_2
   d. O_2, Mg, CH_4

3. Which one of the following best describes a homologous series?
   a. Compounds in which successive members differ by one carbon and 2 hydrogen
   b. A series of compounds that exist in different physical forms
   c. Compounds in which each member differs from the previous one by a CH_3 group
   d. Compounds with the same molecular formula but different arrangements of atoms

4. Which of the following elements does not form a double bond?
   a. Carbon
   b. Nitrogen
   c. Oxygen
   d. Fluorine

5. Molecular substances have atoms joined together by covalent bonding and might be expected to
   a. Conduct electricity in the liquid state but not when solid
   b. Be malleable and ductile
   c. Sometimes have low melting points and boiling temperatures
   d. Be good thermal conductors.

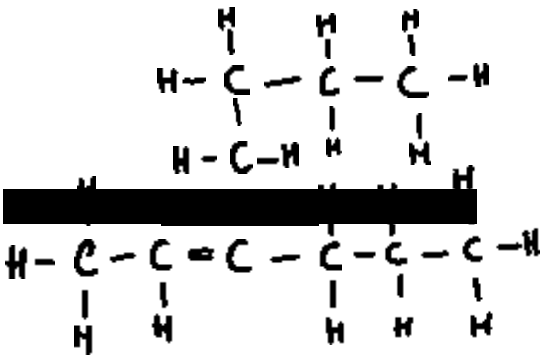
6. Of the molecules CO_2, CH_4, CF_4 and PH_3 the polar molecule is
   a. CO_2
   b. CH_4
   c. CF_4
   d. PH_3

7. Isomers are best described as
   a. Particles that have the same atomic number but different mass numbers
   b. Compounds whose chemical formulae that differ by -CH_2-
   c. Particles that have the same number of electrons but different atomic numbers

d. Compounds that have the same chemical formula but different structures

8. Which one of the following formulae is that of a saturated hydrocarbon?
   a. CH_3OH
   b. C_2H_2
   c. C_3H_8
   d. C_4H_8

9. The number of carbons in the parent chain is:



   a. 6
   b. 7
   c. 8
   d. 10

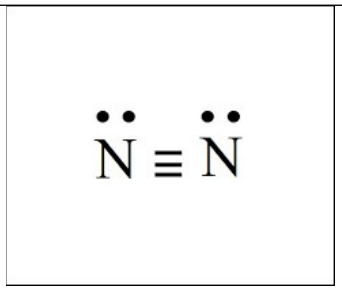
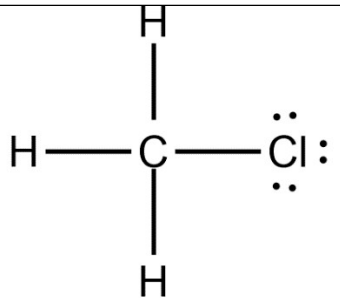
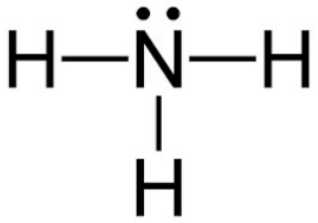
10. Which of the following best describes thermoplastic polymers?
   a. Polymer with intermolecular forces weaker than intramolecular forces, enabling remoulding upon heating.
   b. Polymer with strong intermolecular forces, enabling it to not degrade when being remoulded.
   c. Polymer with covalent intermolecular forces which, when broken, cause the molecule to decompose.
   d. Polymer with covalent intermolecular forces, meaning that when the molecule is heated either intermolecular bonds or intramolecular bonds may be broken

11. Which of the following carbon allotropes has free delocalized electron between layers that gives rise to electrical conductivity?
   a. Graphite
   b. Diamond
   c. Charcoal
   d. None of the above

Secti3on B Short Answer

Answer all questions in the space provided in this question and answer booklet.

1. Complete the following table (9 marks)

	Valence structure	Molecular shape name	Polar/ non-polar
N_2		Linear	Non-polar
CH_3Cl		Tetrahedral	Polar
NH_3		pyramidal	Polar

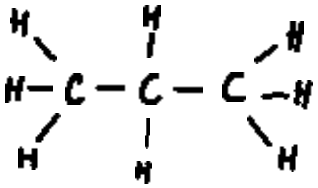
2. At room temperature, H_2O is a liquid whereas CH_4 is a gas explain why this case with reference to intermolecular forces. (3 marks)

   Water has Hydrogen bond intermolecular forces (1)

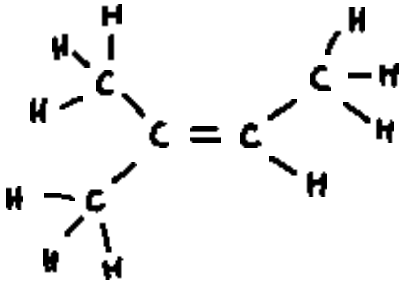
   Methane has dispersion forces (1)

   Hydrogen bonds are the greater intermolecular force (1)

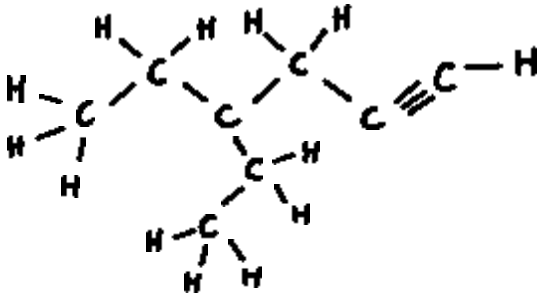
3. Give the correct IUPAC names for the following organic substances (4 marks)

a. 

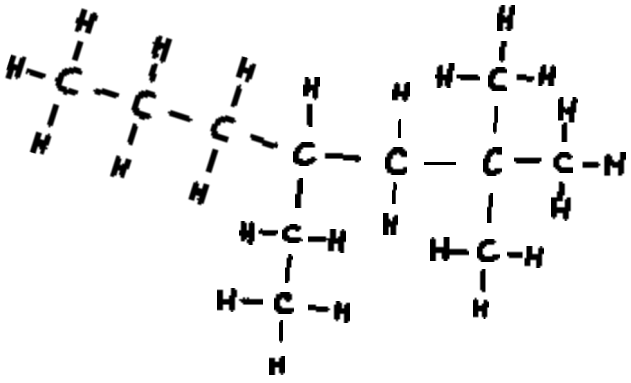
Propane

b. 

2-methylbut-2-ene

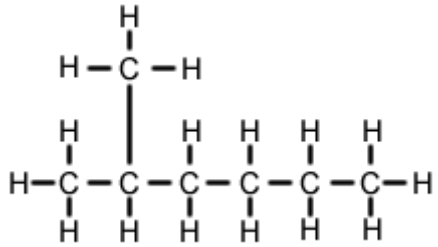
c. 

4-ethylhex-1-yne

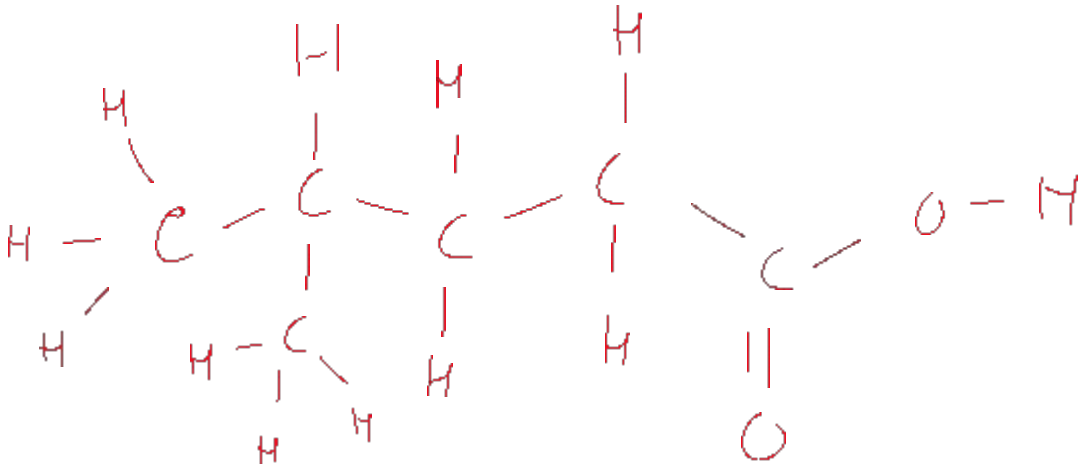
d. 

4-ethyl-2,2-dimethylheptane

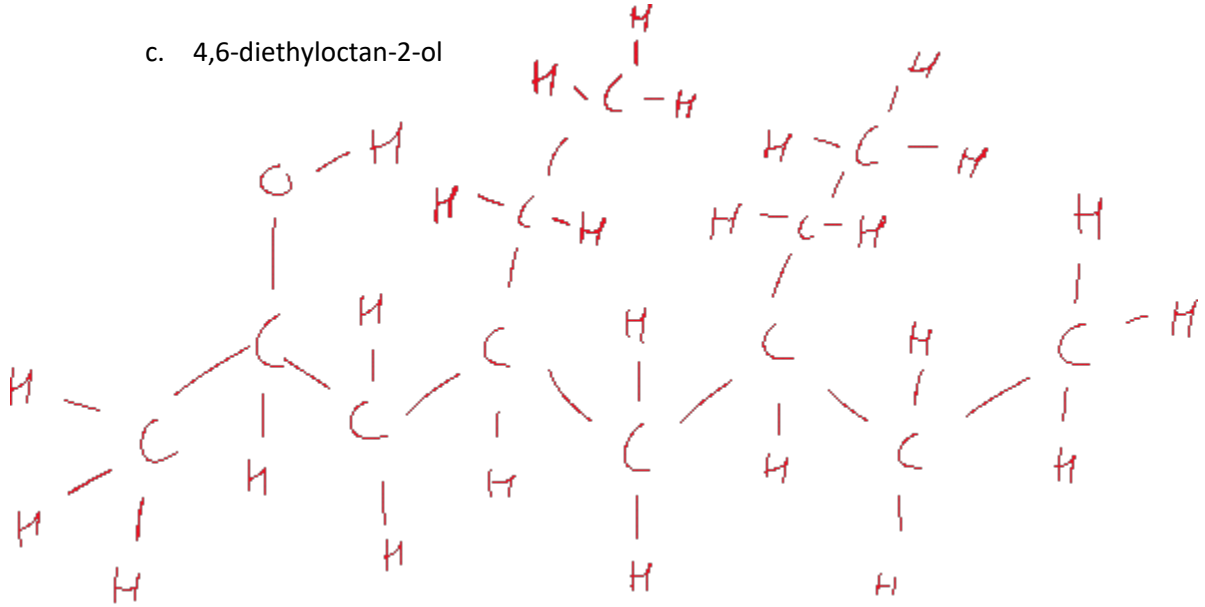
4. Draw structural formulas of the following molecules (3 marks)
   a. 2-methylheptane



   b. 4-methylpentanoic acid



   c. 4,6-diethyloctan-2-ol



5. During the experiment "Making esters" 2 esters were created from ethanoic acid/ethanol and ethanoic acid/pentanol. The procedure was as follows:

Procedure

1. Label two semi-micro test-tubes 'A' and 'B'. Place 10 drops of ethanoic acid in each tube.

2. Add 10 drops of pentanol to test-tube 'A' and add 10 drops of ethanol to test-tube 'B'. Then add two drops of concentrated sulfuric acid to each tube.

3. Heat the mixtures for 10 mins in a beaker of boiling water (from the kettle) and then pour each one into a separate 250 mL beaker containing 200 mL of cold water

4. Try to identify the odour of the esters produced by cautiously and briefly wafting the vapour from the ester towards you. Note the name of the carboxylic acid and alcohol used in this test and describe the smell in the table below.

a. State the independent variable (1 mark) type of ester, alcohol used

b. State the dependent variable (1 mark) Smell

c. Identify an appropriate safety measure when undertaking the experiment (1 mark)

   Wafting when smelling the ester

   Fume hood for H_2SO_4

   Labcoat, gloves

   Other appropriate things?

d. What was the purpose of adding Sulfuric acid to the mixture? (1 mark)

   Catalyst

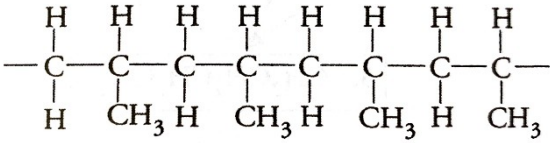
e. During the experiment write up little Jimmy has incorrectly named the ester formed from the combination of ethanoic acid and pentanol as ethyl pentanoate. Identify what Jimmy has done wrong and therefore give the correct IUPAC name for the ester formed (2 marks)

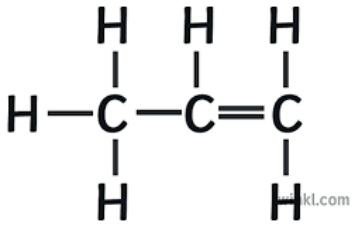
   Mixed up the alcohol and carbocyclic acid… (1) or

   Named the carboxylic acid as the alkyl group…

   Pental ethanoate (1)

6. Draw the structural formula of the monomer that would be used to make the polymer shown below. (2 marks)





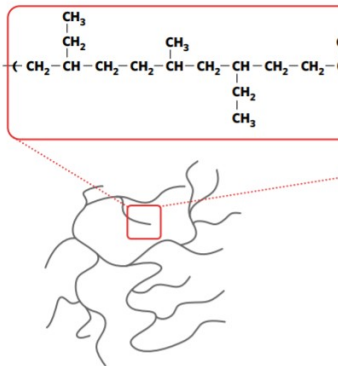
7. Kevin, a teacher at SCHS, wants to design a new water bottle to celebrate SCHS's 10-year anniversary, and suggests that it should be made from low density polyethene.

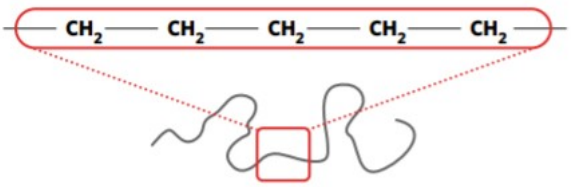
   a. Explain the difference between low density and high density polyethene in terms of molecular structure and physical properties with the aid of a diagram. (3 marks)

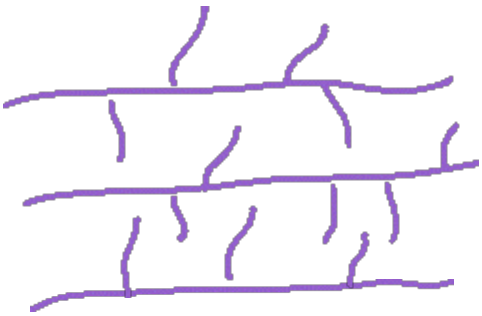
   Low density polyethene has many branches/ High density polyethene has very few branches (1)

   LDPE, soft, low melting point, opaque/ HDPE, hard, high melting point, translucent (1)

   LDPE HDPE







b. Is using a low density polyethene the correct choice, explain? (1 mark)

Yes or No, as long as the students explains using a correct supporting statement.