Module 1 Summative Assessment

Marks		
Maximum Possible	***Earned***	***%***
51		

View Virtual Investigation "Properties of Organic and Inorganic Compounds" in the Unit A Introduction. Use the information provided to answer Questions 1 and 2.

1. Fill in the following data table based on your observations from the Virtual Investigation. For each property, **make a generalization** regarding organic and inorganic compounds. Keep in mind that there will always be exceptions – what we want you to do here is generalize.

Answer (6 Marks)

Property	**Inorganic Compounds**	**Organic Compounds**
General appearance – characteristic colours		
State at SATP		
Relative solubility in water (general trend)		
Conductivity in solution		
Relative Melting Point		
Combustibility		

2. Based on the general trends that you observed in this lab, predict whether each theoretical compound is likely to be organic, inorganic or either.

Answer (3 Marks)

Observation	**Classification**
A blue solid that does not ignite with a lit splint	
A white solid that quickly melts when heated	
A white solid that dissolves in water	
A colourless gas with a pungent odour	
A white solid that dissolves in water and conducts electricity	
A clear liquid that ignites with a lit split	

Use the following information to answer Question 3.

Organic Compounds

1. C_6H_6
2. C_9H_{16}
3. $C_{12}H_{26}$
4. $C_{15}H_{30}$

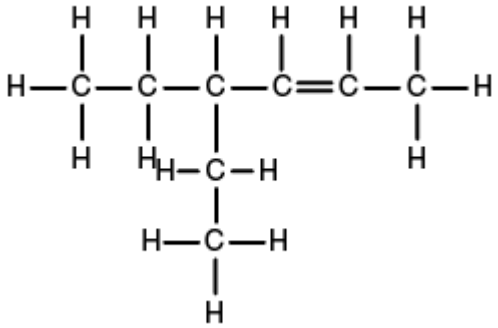
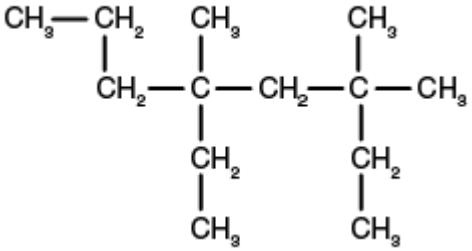
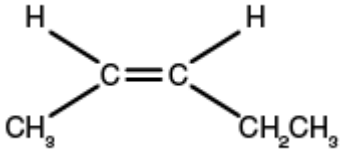
3. Match each of the organic compounds above with its most likely classification below.

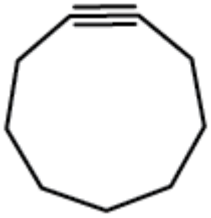
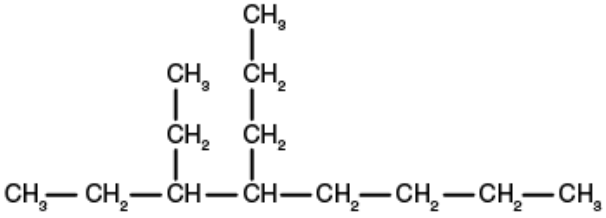
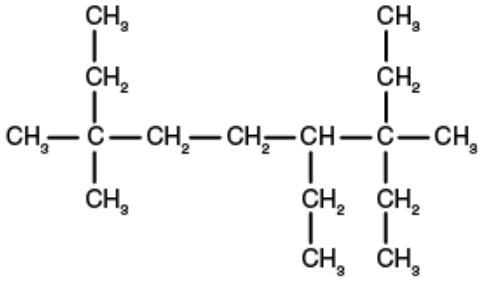
(2 Marks)

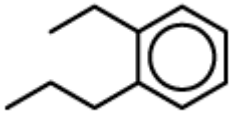
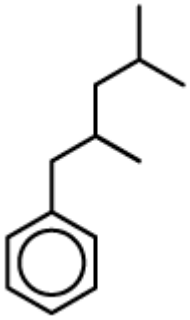
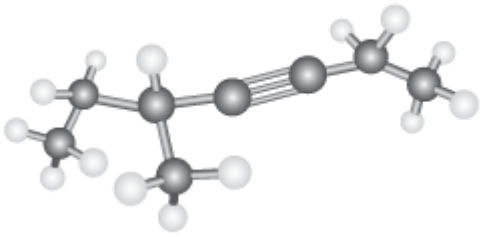
Answer	**Compound Classification**
	Alkane
	Alkene
	Alkyne
	Aromatic

4. Using IUPAC guidelines, name the following organic compounds in the space provided beneath each molecule.

Answers (10 Marks)

	IUPAC Name
A.	
B.	
C.	

D.	$CH_3 - (CH_2)_7 - CH_3$
E.	
F.	
G.	

H.	
I.	
J.	

5. Classify the hydrocarbons in Question 4 as saturated or unsaturated. Use the letters in Question 4 to designate the hydrocarbons.

Answers (5 Marks)

Saturated	
Unsaturated	
Neither	

6. For each of the following organic compounds, draw a condensed structural diagram.

A. 2-methyl-4-propyloctane

Answer (1 Mark)

condensed structural diagram	

B. methylcyclobutane

Answer (1 Mark)

condensed structural diagram	

C. hex-2-yne

Answer (1 Mark)

condensed structural diagram	

D. propene

Answer (1 Mark)

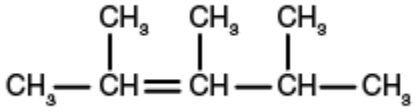
condensed structural diagram	

E. 1,3-diethylbenzene

Answer (1 Mark)

condensed structural diagram (Note: can use a line diagram to represent benzene)	

7. Identify a mistake in the following condensed structural diagram.



Answer (1 Mark)

8. Write the **molecular formula** for the following organic compounds. The first one has been done for you.

Answers (4 Marks)

Organic Compound	**Molecular Formula**
pentene	**C_5H_{10}**
1-ethyl-2-methylbenzene	
cyclohexane	
But-2-yne	
2-methyl-5-propylnonane	

9. Draw condensed structural diagrams and write IUPAC names for six structural isomers of C_5H_{10}. Your isomers must include **two** cyclical compounds, **two** branched compounds and **two** unbranched compounds.

Answers (6 marks)

Type of compound	**Condensed Structural Diagram**	**IUPAC name**
Cyclical Isomers		

Branched Isomers		
Unbranched Isomers		

Use the following information to answer the next 2 questions.

Boiling Points of a Homologous Series

IUPAC Name	Boiling point (°C)	Number of Electrons
cyclopropane	-34.4	24
cyclobutane	-13	32

cyclopentane	49.5	40
cyclohexane	81.4	48
cycloheptane	118	56
cyclooctane	149	64

10. Prepare a graph of the data shown on the previous page.

Answer (4 Marks)

11. Regarding the graph that you prepared in Question 10, describe the relationship between boiling point and number of electrons in the homologous series. Explain the cause of this relationship**.**

Answer (2 Marks)

12. At most service stations, patrons can select their grade of gasoline. The different grades of gasoline are classified based on the octane rating of each fuel. From a chemical point of view, analyze the significance of octane ratings in the fuel industry. Be sure to cite your sources!
Hint: Refer to page 392 in your textbook
Your response should include
    - an explanation of octane numbers
    - a discussion of the importance of octane rating
    - identifying how the octane rating of a fuel is adjusted

Answer (3 Marks)