Module 1 Summative Assessment

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| ***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 |  |  |

1. 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. C6H6
2. C9H16
3. C12H26
4. C15H30
 |

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

**(2 Marks)**

|  |  |
| --- | --- |
| **Answer** | **Compound Classification** |
|  | Alkane |
|  | Alkene |
|  | Alkyne |
|  | Aromatic |

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

**Answers (10 Marks)**

|  |  |
| --- | --- |
|  | **IUPAC Name** |
|  |  |
|  |
|  |  |
|  |
|  |  |
|  |
|  | CH3 – (CH2)7 – CH3 |
|  |
|  |  |
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1. 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 |  |

1. For each of the following organic compounds, draw a condensed structural diagram.
2. 2-methyl-4-propyloctane

**Answer (1 Mark)**

|  |  |
| --- | --- |
| condensed structural diagram |  |

1. methylcyclobutane

**Answer (1 Mark)**

|  |  |
| --- | --- |
| condensed structural diagram |  |

1. hex-2-yne

**Answer (1 Mark)**

|  |  |
| --- | --- |
| condensed structural diagram |  |

1. propene

**Answer (1 Mark)**

|  |  |
| --- | --- |
| condensed structural diagram |  |

1. 1,3-diethylbenzene

**Answer (1 Mark)**

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

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



**Answer (1 Mark)**

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| --- |
|  |

1. 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 | **C5H10** |
| 1-ethyl-2-methylbenzene |  |
| cyclohexane |  |
| But-2-yne |  |
| 2-methyl-5-propylnonane |  |

1. Draw condensed structural diagrams and write IUPAC names for six structural isomers of C5H10. 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 (oC)** | **Number of Electrons** |
| cyclopropane | -34.4 | 24 |
| cyclobutane | -13 | 32 |
| cyclopentane | 49.5 | 40 |
| cyclohexane | 81.4 | 48 |
| cycloheptane | 118 | 56 |
| cyclooctane | 149 | 64 |

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

**Answer (4 Marks)**

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| --- |
|  |

1. 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)**

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| --- |
|  |

1. 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)**

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| --- |
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