**Organic Review Multiple Choice**

*Identify the choice that best completes the statement or answers the question.*

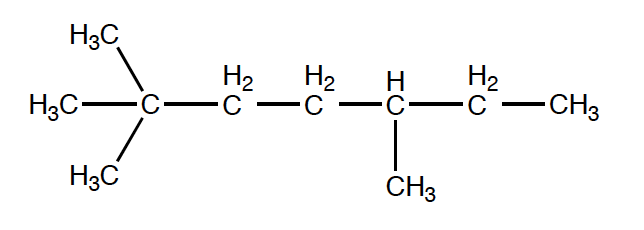
\_\_\_\_ 1. Which of the following compounds is **not** considered an organic compound?

|  |  |
| --- | --- |
| a. | C2H5COOCH3(l) |
| b. | C6H5COOH(s) |
| c. | CH3CH2OH(l) |
| d. | NH4CN(s) |

\_\_\_\_ 2. The structural diagram that represents CH3C(CH3)2CH3 is

|  |  |  |  |
| --- | --- | --- | --- |
| a. |  | c. |  |
| b. |  | d. |  |

*Use the following information to answer the next question.*



\_\_\_\_ 3. The IUPAC name for the structural diagram above is

|  |  |
| --- | --- |
| a. | 2,2,5-trimethylheptane |
| b. | 3,6,6-trimethylheptane |
| c. | 2-ethyl-5,5-dimethylhexane |
| d. | 5-ethyl-2,2-dimethylhexane |

\_\_\_\_ 4. Which of the following line diagrams represents 2,2,4-trimethylpentane?

|  |  |  |  |
| --- | --- | --- | --- |
| a. |  | c. |  |
| b. |  | d. |  |

\_\_\_\_ 5. Which of the following rows identifies the structural diagram and the corresponding IUPAC name of the compound with the chemical formula C8H16(l)?

|  |  |  |
| --- | --- | --- |
| **Row** | **Structural Diagram** | **IUPAC Name** |
| **A.** |  | ethylbenzene |
| **B.** |  | ethylcyclohexane |
| **C.** |  | cyclopentylpropane |
| **D.** |  | propylcyclopentene |

*Use the following information to answer the next question.*

A student added a bromine solution to a hydrocarbon that contains an isomer of C6H12(l) in the absence of light. After shaking the sample, the student observed that the colour of the bromine solution changed from orange to colourless..

\_\_\_\_ 6. *An interpretation that could be made from the student's observation is that the hydrocarbon sample is \_\_\_\_i\_\_\_\_ and the IUPAC name of the sample could be \_\_\_\_ii\_\_\_\_.*

The statement above is completed by the information in row

|  |  |  |
| --- | --- | --- |
| Row | *i* | *ii* |
| A. | saturated | hex-2-ene |
| B. | saturated | cyclopentane |
| C. | unsaturated | hex-2-ene |
| D. | unsaturated | cyclopentane |

*Use the following information to answer the next question.*

|  |
| --- |
| The structural diagram of the active ingredient in many pain-relief medications is shown below. |

\_\_\_\_ 7. *The structural diagram above represents an \_\_\_\_i\_\_\_\_ compound that contains a \_\_\_\_ii\_\_\_\_ and an \_\_\_\_iii\_\_\_\_ functional group.*

The statement above is completed by the information in row

|  |  |  |  |
| --- | --- | --- | --- |
| **Row** | ***i*** | ***ii*** | ***iii*** |
| **A.** | aromatic | carboxyl | alkene |
| **B.** | aromatic | hydroxyl | ester |
| **C.** | aliphatic | carboxyl | alkene |
| **D.** | aliphatic | hydroxyl | ester |

*Use the following information to answer the next question.*

|  |  |
| --- | --- |
| I |  |
| II |  |
| III |  |
| IV |  |

\_\_\_\_ 8. Which of the structural diagrams numbered above represent isomers?

|  |  |
| --- | --- |
| a. | I and II |
| b. | I and IV |
| c. | II and III |
| d. | III and IV |

\_\_\_\_ 9. Which of the following rows identifies the condensed structural diagram or line diagram and the IUPAC name of an isomer of C6H12?

|  |  |  |
| --- | --- | --- |
| **Row** | **Condensed Structural Diagram or Line Diagram** | **IUPAC Name** |
| **A.** |  | Methylcyclopentane |
| **B.** |  | Cyclohexane |
| **C.** |  | 3-methylpent-1-yne |
| **D.** |  | Hex-3-yne |

\_\_\_\_ 10. Which of the following condensed structural diagrams represents the compound with the lowest boiling point?

|  |  |  |  |
| --- | --- | --- | --- |
| a. |  | c. |  |
| b. |  | d. |  |

*Use the following information to answer the next question.*

|  |
| --- |
| The apparatus shown below is used to separate crude oil, a mixture of hydrocarbons, into individual hydrocarbons by their boiling points. |

\_\_\_\_ 11. The method of separating the mixture of hydrocarbon compounds in crude oil that is represented in the diagram above is

|  |  |
| --- | --- |
| a. | titration |
| b. | precipitation |
| c. | solvent extraction |
| d. | fractional distillation |

\_\_\_\_ 12. When methanol and ethanoic acid react, the products are

|  |  |
| --- | --- |
| a. | ethyl methanoate only |
| b. | methyl ethanoate only |
| c. | ethyl methanoate and water |
| d. | methyl ethanoate and water |

\_\_\_\_ 13. *The type of reaction that occurs when ethene gas and chlorine gas react is \_\_\_\_i\_\_\_\_, and the name of the organic compound produced is \_\_\_\_ii\_\_\_\_.*

The statement above is completed by the information in row

|  |  |  |
| --- | --- | --- |
| **Row** | ***i*** | ***ii*** |
| **A.** | addition | 1,2-dichloroethane |
| **B.** | addition | 1-chloroethene |
| **C.** | substitution | 1,2-dichloroethane |
| **D.** | substitution | 1-chloroethene |

*Use the following information to answer the next question.*

|  |
| --- |
|  |

\_\_\_\_ 14. Which of the following monomers is required to produce the polymer in the structural diagram above?

|  |  |
| --- | --- |
| a. | CH2ClCH2Cl |
| b. | CH3CH2Cl |
| c. | CH2CHCl |
| d. | CHCCl |

*Use the following information to answer the next question.*

An economically important reaction involving the fossil fuel propane is represented by the following equation.

C3H8(g) + 5 O2(g)  3 CO2(g) + 4 H2O(g)/

\_\_\_\_ 15. *During this \_\_\_\_i\_\_\_\_ reaction, energy is \_\_\_\_ii\_\_\_\_ the surroundings.*

The statement above is completed by the information in row

|  |  |  |
| --- | --- | --- |
| **Row** | ***i*** | ***ii*** |
| **A.** | combustion | released to |
| **B.** | combustion | absorbed from |
| **C.** | elimination | released to |
| **D.** | elimination | absorbed from |

Use the following information to answer the next \_ questions.

|  |
| --- |
| A student drew the structural diagram shown below.    **Eight-Carbon Structures**  **1**  **5**  **2** oct-3-ene **6** 2,3-dimethyl-1-propylcyclopropane  **3** 2,3-dimethylhex-2-ene **7** octane  **4** 3,3-dimethylhexane |

\_\_\_\_ 16. The structural diagram that the student drew can be described as an

|  |  |
| --- | --- |
| a. | aromatic containing a four-carbon ring structure |
| b. | aliphatic alkene containing a three-carbon parent chain |
| c. | alkane containing a double-bonded four carbon ring structure |
| d. | alkane containing a four-carbon parent with only single bonds |

*Use the following information to answer the next question.*

**Organic Compounds**

**1** 3-methylcyclohexene **4** 5-ethylhept-3-ene

**2** 1,2-dibromopentane **5** cyclopropane

**3** 2,2-dimethylbutane **6** butan-1-ol/

\_\_\_\_ 17. The organic compounds that contain branches off the parent chain are

|  |  |
| --- | --- |
| a. | 1, 3, and 4 |
| b. | 1, 2, 3, and 4 |
| c. | 5 only |
| d. | 5 and 6 |

*Use the following information to answer the next question.*

|  |
| --- |
| Polyhydroxybutyrate (PHB) is a biodegradable plastic. It results from the fermentation of renewable raw materials such as glucose or food scraps. Bacteria, which are added to the fermentation mixture, store energy as fat. When extracted, this bacterial fat solidifies into PHB, which is similar to traditional plastics. The preparation of PHB is represented by the equation below.  **Preparation of PHB** |

\_\_\_\_ 18. *PHB is a \_\_\_\_i\_\_\_\_, and the reactant molecule used to form PHB contains \_\_\_\_ii\_\_\_\_ functional group.*

The statement above is completed by the information in row

|  |  |  |
| --- | --- | --- |
| **Row** | ***i*** | ***ii*** |
| **A.** | monomer | a carboxylic acid |
| **B.** | monomer | an ester |
| **C.** | polymer | a carboxylic acid |
| **D.** | polymer | an ester |

*Use the following information to answer the next question.*

|  |
| --- |
| Drinking milk relieves the burning sensation that can be caused by eating chili peppers much better than drinking eater. The substance responsible for the burning sensation is capsaicin. The structural diagram of capsaicin is shown below.  **Capsaicin** |

\_\_\_\_ 19. The molecular formula of capsaicin is

|  |  |
| --- | --- |
| a. | C18H32NO3 |
| b. | C18H29NO3 |
| c. | C18H27NO3 |
| d. | C17H29NO3 |

*Use the following information to answer the next question.*

|  |
| --- |
| **Line Diagrams for Some Organic Compounds**  **I**  **II**  **III**  **IV** |

\_\_\_\_ 20. Which line diagrams above represent organic compounds that are structural isomers?

|  |  |
| --- | --- |
| a. | I and II |
| b. | II and III |
| c. | III and IV |
| d. | II, III and IV |

*Use the following information to answer the next question.*

|  |
| --- |
| Ascorbic acid, C6H8O6(s), is also known as vitamin C. Vitamin C is obtained from citrus fruits and tomatoes. This vitamin prevents a disease called scurvy, which is characterized by thin bones, bleeding gums, and muscular weakness. The structural diagram of vitamin C is |

\_\_\_\_ 21. *Vitamin C can be classified as an \_\_\_\_i\_\_\_\_ organic compound and contains \_\_\_\_ii\_\_\_\_ functional group.*

The statement above is completed by the information in row

|  |  |  |
| --- | --- | --- |
| Row | *i* | *ii* |
| A. | aliphatic | an ester |
| B. | aliphatic | a carboxylic acid |
| C. | aromatic | an ester |
| D. | aromatic | a carboxylic acid |

*Use the following information to answer the next question.*

|  |
| --- |
| Petroleum refineries use catalytic reforming to make large molecules from smaller ones. The organic compound 2,2,4-trimethylpentane is produced using catalytic reforming and is added to gasoline to increase combustion efficiency.  **2,2,4-trimethyl pentane** |

\_\_\_\_ 22. Two molecules that could be used to make 2,2,4-trimethylpentane are

|  |  |
| --- | --- |
| a. | ethane and hexane |
| b. | propane and pentane |
| c. | propane and 2,2-dimethylpropane |
| d. | methyl propane and 2,2-dimethylpropane |

*Use the following information to answer the next question.*

|  |
| --- |
| Polyvinyl chloride (PVC) is a plastic used in the manufacture of pipes, simulated leather fabrics, and structural plastics. A portion of the polymer is illustrated below. |

\_\_\_\_ 23. Which of the following structural diagrams represents the monomer used in the manufacture of PVC?

|  |  |  |  |
| --- | --- | --- | --- |
| a. |  | c. |  |
| b. |  | d. |  |

**Numeric Response** *Use the following information to answer the next question.*

**Chemical Compounds**

**1** CO2(g) **5** Co(OH)2(s)

**2** CH3OH(l) **6** HCN(g)

**3** H2CO3(aq) **7** CH3COOCH3(aq)

**4** ClCH3(l) **8** HCOOH(l)

.

24. The chemical compounds numbered above that represent organic compounds are \_\_\_\_, \_\_\_\_, \_\_\_\_, and \_\_\_\_.

*(Record your four digit answer in the numeric response section.)*

*Use the following information to answer the next question.*

**General Structural Diagrams**

|  |  |  |  |
| --- | --- | --- | --- |
| **1** |  | **4** |  |
| **2** |  | **5** |  |
| **3** |  | **6** |  |

**R - any chain of carbon and hydrogen atoms**

25. Match the general structural diagrams numbered above with the class of the compound below.

Carboxylic acid \_\_\_\_\_\_ (Record in the **first** column)

Aromatic \_\_\_\_\_\_ (Record in the **second** column)

Alcohol \_\_\_\_\_\_ (Record in the **third** column)

Ester \_\_\_\_\_\_ (Record in the **fourth** column)

*(Record your four digit answer in the numeric response section.)*

***Use the following information to answer the next question.***

**Common Organic Reactions**

**1** C2H4(g) + H2(g)  C2H6(g)

**2** C2H5OH(l)  C2H4(g) + H2O(l)

**3** C6H6(l) + Br2(l)  C6H5Br(l) + HBr(g)

**4** CH3COOH(l) + CH3OH(l)  CH3COOCH3(l) + H2O(l)

.,

26. Match each equation representing the reactions numbered above with the type of reaction it exemplifies below.

Addition \_\_\_\_\_\_ (Record in the **first** column)

Substitution \_\_\_\_\_\_ (Record in the **second** column)

Elimination \_\_\_\_\_\_ (Record in the **third** column)

Esterification \_\_\_\_\_\_ (Record in the **fourth** column)

*(Record your four digit answer in the numeric response section.)*

*Use the following information to answer the next question.*

There are several methods of producing chloroethane, which can be used as a solvent and a refrigerant.

**Reactants Type of Reaction**

**1** Ethane **5** Addition

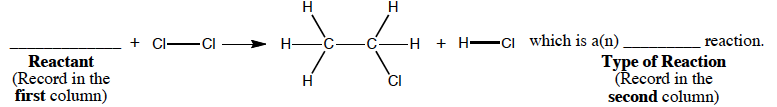
**2** Ethene **6** Condensation

**3** Ethyne **7** Elimination

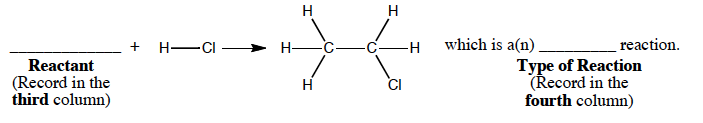
**4** Ethanol **8** Substitution=

27. Match the reactants and type of reaction numbered above with two of the methods of producing chloroethane below

**Method I**



**Method II**



*(Record your four digit answer in the numeric response section.)*

*Use the following information to answer the next question.*

|  |
| --- |
| **Reaction Equation**    **IUPAC Names and Organic Terms**  **1** Ethane **5** Monomer  **2** Ethene **6** Polymer  **3** Ethyne **7** Polymerization  **4** Polyethene |

28. Match the IUPAC name or the organic term numbered above with its descriptor below.

Product name \_\_\_\_\_\_ (Record in the **first** column)

Reactant name \_\_\_\_\_\_ (Record in the **second** column)

Type of organic reaction \_\_\_\_\_\_ (Record in the **third** column)

Classification of product \_\_\_\_\_\_ (Record in the **fourth** column)

*(Record your four digit answer in the numeric response section.)*

*Use the following information to answer the next question.*

The IUPAC names for two organic molecules hept-2-ene and but-2-ene.

**Descriptions**

**1** Saturated **6** Alkanes

**2** Unsaturated **7** Alkenes

**3** Cyclic **8** Contains only single bonds

**4** Aliphatic **9** Contains single and double bonds

**5** Aromatic/

29. The descriptions numbered above that apply to both hept-2-ene and but-2-ene are \_\_\_\_, \_\_\_\_, \_\_\_\_, and \_\_\_\_.

*(Record your four digit answer in the numeric response section.)*

Use the following information to answer the next \_ questions.

|  |
| --- |
| A student drew the structural diagram shown below.    **Eight-Carbon Structures**  **1**  **5**  **2** oct-3-ene **6** 2,3-dimethyl-1-propylcyclopropane  **3** 2,3-dimethylhex-2-ene **7** octane  **4** 3,3-dimethylhexane |

30. The eight-carbon structures numbered above that are isomers of the structural diagram that the student drew are \_\_\_\_, \_\_\_\_, \_\_\_\_, and \_\_\_\_.

*(Record your four digit answer in* ***lowest-to-highest numerical order*** *in the numeric response section.)*

*Use the following information to answer the next question.*

**Compounds Containing Carbon**

**1** CH3COOH(l) **5** CH3OH(l)

**2** CH3CH3(g) **6** CaCO3(s)

**3** CH2CH2(g) **7** SiC(s)

**4** NaCN(s)/

31. The compounds numbered above that can be classified as organic compounds are \_\_\_\_, \_\_\_\_, \_\_\_\_, and \_\_\_\_.

*(Record your four digit answer in* ***lowest-to-highest numerical order*** *in the numeric response section.)*

**Short Answer** *Use the following information to answer the next question.*

Ethanol and methanol are organic compounds commonly used in industry./

32. a. **Draw** the structural diagrams for ethanol and methanol, and **compare** the two diagrams by identifying one similarity and one difference. *(3 marks)*

b. **Identify** another commonly used organic compound other than methanol or ethanol. **Describe** the origin and an application of this compound. *(2 marks)*

Communication *(1 mark)*

33. a. **Draw** and **name** a five-carbon organic compound. **Identify** if the compound you drew is saturated or unsaturated. *(3 marks)*

b. **Draw** and **name** a structural isomer of the compound that you drew above. *(2 marks)*

Communication *(1 mark)*

*Use the following information to answer the next question.*

|  |  |  |
| --- | --- | --- |
| **Compound** | **Boiling Point (°C)** | **Solubility in Water at 25 °C** |
| **I** Cyclobutane | 12 | very low |
| **II** Propan-1-ol | 98 | high |
| **III** Pentan-1-ol | 128 | high |

34. a. **Draw** structural diagrams for compounds I, II, and III. *(3 marks)*

b. **Explain** why the boiling point of compound III is higher than the boiling point of compound II, and **explain** why compound II is more soluble than compound I. *(2 marks)*

Communication  *(1 mark)*

35. a. **Name** and **draw** three hydrocarbons. *(3 marks)*

b. **Describe** a physical, chemical, or technological process that could be used to separate a mixture of hydrocarbons. *(2 marks)*

Communication *(1 mark)*

36. **Identify** one monomer that has economic importance in Alberta.

a. **Draw** the structural formula and provide the IUPAC name for the monomer that you chose. *(2 marks)*

b. **Identify** one use of the polymer formed from the monomer that you chose, and **write** the equation that represents the formation of the polymer. *(3 marks)*

Communication *(1 mark)*

**Organic Review Answer Section**

**MULTIPLE CHOICE**

1. ANS: D PTS: 1 REF: Exemplars 2008

OBJ: 30-C1.1k

2. ANS: B PTS: 1 REF: Exemplars 2008

OBJ: 30-C1.3k

3. ANS: A PTS: 1 REF: Exemplars 2008

OBJ: 30-C1.3k

4. ANS: B PTS: 1 REF: Exemplars 2008

OBJ: 30-C1.3k

5. ANS: B PTS: 1 REF: Exemplars 2008

OBJ: 30-C1.3k

6. ANS: C PTS: 1 REF: Exemplars 2008

OBJ: 30-C1.3k, 30-C1.2s

7. ANS: B PTS: 1 REF: Exemplars 2008

OBJ: 30-C1.4k

8. ANS: D PTS: 1 REF: Exemplars 2008

OBJ: 30-C1.5k

9. ANS: A PTS: 1 REF: Exemplars 2008

OBJ: 30-C1.5k

10. ANS: A PTS: 1 REF: Exemplars 2008

OBJ: 30-C1.6k

11. ANS: D PTS: 1 REF: Exemplars 2008

OBJ: 30-C1.7k

12. ANS: D PTS: 1 REF: Exemplars 2008

OBJ: 30-C2.2k

13. ANS: A PTS: 1 REF: Exemplars 2008

OBJ: 30-C2.2k

14. ANS: C PTS: 1 REF: Exemplars 2008

OBJ: 30-C2.3k

15. ANS: A PTS: 1 REF: Exemplars 2008

OBJ: 30-C2.4k

16. ANS: D PTS: 1 REF: Bulletin 2008

OBJ: 30-C1.3k

17. ANS: A PTS: 1 REF: Bulletin 2008

OBJ: 30-C

18. ANS: C PTS: 1 REF: Bulletin 2008

OBJ: 30-C

19. ANS: C PTS: 1 REF: Bulletin 2008

OBJ: 30-C

20. ANS: B PTS: 1 REF: Bulletin 2008

OBJ: 30-C

21. ANS: A PTS: 1 REF: Bulletin 2008

OBJ: 30-C

22. ANS: C PTS: 1 REF: Bulletin 2008

OBJ: 30-C

23. ANS: A PTS: 1 REF: Bulletin 2008

OBJ: 30-C

**NUMERIC RESPONSE**

24. ANS: 2478 PTS: 1 REF: Exemplars 2008 OBJ: 30-C1.1k

25. ANS: 2615 PTS: 1 REF: Exemplars 2008 OBJ: 30-C1.4k

26. ANS: 1324 PTS: 1 REF: Exemplars 2008 OBJ: 30-C2.1k

27. ANS: 1825 PTS: 1 REF: Exemplars 2008 OBJ: 30-C2.2s

28. ANS: 4276 PTS: 1 REF: Exemplars 2008 OBJ: 30-C2.3k

29. ANS: 2479 PTS: 1 REF: Bulletin 2008 OBJ: 30-C1.3k

30. ANS: 2356 PTS: 1 REF: Bulletin 2008 OBJ: 30-C

31. ANS: 1235 PTS: 1 REF: Bulletin 2008 OBJ: 30-C1.1k

**SHORT ANSWER**

32. ANS: a.1 mark - diagram of ethanol and methanol

1 mark - similarity

1 mark - difference

b. 1 mark - another compound

1 mark - origin and application of compound above

PTS: 1 REF: Exemplars 2008 OBJ: 30-C1.1k

33. ANS: a. 1 mark - drawing of a five carbon compound

1 mark - name of the compound drawn

1 mark - identify as saturated/unsaturated

b. 1 mark - drawing of an isomer

1 mark - name of the compound drawn

PTS: 1 REF: Exemplars 2008 OBJ: 30-C1.5k, 30-C1.3k

34. ANS: a. 1 mark for each diagram

b. 1 mark for explanation for boiling point and 1 mark for solubility

PTS: 1 REF: Exemplars 2008 OBJ: 30-C1.6k

35. ANS: a. 1 mark for each compound

b. 1 mark for name and 1 mark for description of fractional distillation or solvent extraction

PTS: 1 REF: Exemplars 2008 OBJ: 30-C1.7k

36. ANS: a. 1 mark for the drawing and 1 mark for the name

b. 1 mark for the use and 2 marks for a drawing of the polymer

PTS: 1 REF: Exemplars 2008 OBJ: 30-C2.4k