

CHEMISTRY 2210 - Practice Exam #1

Section 1 - Multiple Choice

This section of the exam is multiple choice. Choose the BEST answer from the choices which are given and write the letter for your choice in the space provided. All questions are equally weighted and there is no penalty for guessing. (45 pts)

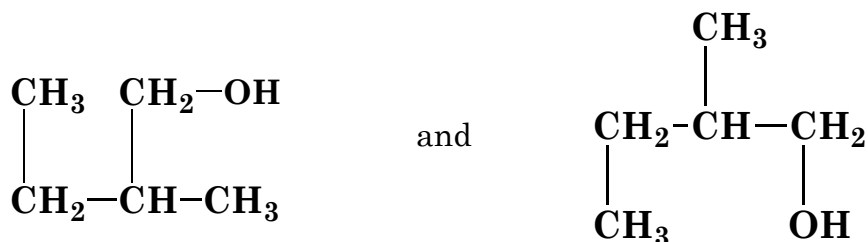
_____ 1. Which of the following statements is **FALSE** ?

- A. Because inorganic chemistry deals with about 105 elements, there are many more inorganic compounds than organic compounds.
- B. Inorganic compounds usually contain primarily ionic bonds while organic compounds generally contain covalent bonds.
- C. The melting points of organic compounds are usually lower than those of inorganic compounds
- D., Inorganic compounds generally decompose at very high temperatures.

_____ 2. In forming compounds, carbon almost always

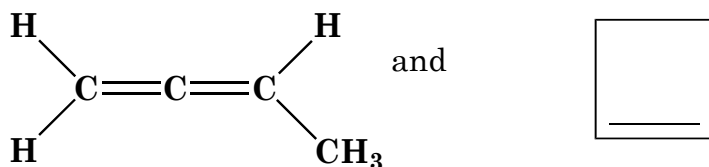
- A. forms four covalent bonds.
- B. loses four electrons to form a 4+ ion.
- C. gains four electrons to form a 4- ion.
- D. gains two electrons to form a 2- ion.

_____ 3. Describe the relationship between the following two compounds.



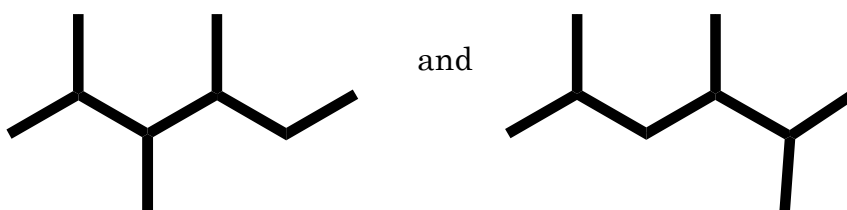
- A. The formulas represent the same compound.
- B. The formulas represent constitutional isomers.
- C. The formulas represent geometric isomers.
- D. The formulas represent unrelated compounds.

_____ 4. Describe the relationship between the following two compounds.



- A. The formulas represent the same compound.
- B. The formulas represent constitutional isomers.
- C. The formulas represent geometric isomers.
- D. The formulas represent unrelated compounds.

_____ 5. Describe the relationship between the following two compounds.



- A. The formulas represent the same compound.
- B. The formulas represent constitutional isomers
- C. The formulas represent geometric isomers.
- D. The formulas represent unrelated compounds.

_____ 6. Which of the following **ARE NOT** hydrocarbons ?

- A. ketones
- B. alkanes
- C. alkynes
- D. alkenes

_____ 7. Which of the following has the **LOWEST** melting point ?

- A. CCl_4
- B. NaCl
- C. pentane
- D. CH_4

_____ 8. Which of the following has the **HIGHEST** boiling point ?

- A. $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$
- B.
$$\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{C} - \text{CH}_3 \\ | \\ \text{CH}_3 \end{array}$$
- C.
$$\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{CH}_2 - \text{CH} \\ | \\ \text{CH}_3 \end{array}$$
- D. $\text{CH}_3\text{CH}_2\text{CH}_3$

- _____ 9. Alkanes usually have low boiling points because
- A. they are very polar molecules.
 - B. they are extremely stable like the inert gases.
 - C. they have weak secondary forces compared to other organic compounds.
 - D. when heated they tend to solidify.
- _____ 10. Which is the correct molecular formula for an linear alkane ?
- A. C_4H_9 B. C_3H_6 C. C_2H_6 D. C_2H_2
- _____ 11. The hybridization of the carbon atoms in cyclohexane is
- A. sp^4 B. sp^3 C. sp^2 D. sp
- _____ 12. What are the bond angles in a normal alkane?
- A. 180° B. 120° C. 109.5° D. 90°
- _____ 13. What are the bond angles around the triple bonded carbon in a normal alkyne ?
- A. 180° B. 120° C. 109.5° D. 90°
- _____ 14. How many constitutional isomers exist with the formula C_4H_{10} ?
- A. 2 B. 3 C. 4 D. 5
- _____ 15. A student **incorrectly** named a molecule 1,2-diethyl propane. What is correct IUPAC name for this compound?
- A. 2-ethyl pentane
 - B. 3-methyl hexane
 - C. 3-ethyl-1-methyl butane
 - D. 2,3-diethyl propane

Section 2 - Isomerism

(18 pts)

16. Draw structural formulas* for any **two different structural isomers** with the molecular formula C_6H_{14} .



17. Draw structural formulas* for any **two different isomers** with the molecular formula C_5H_{10} .



18. Draw structural formulas* for any **two different isomers** with the molecular formula C_3H_8O .

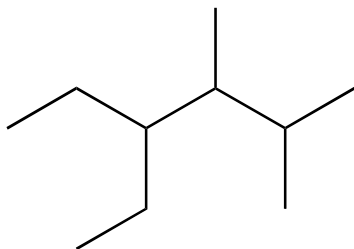


*Your structural formulas may be condensed, but they must contain enough information to **represent the structure unambiguously**.

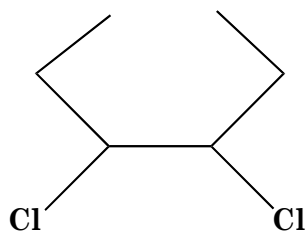
Section 3 - Nomenclature - Give correct systematic names for the following compounds

(20 pts)

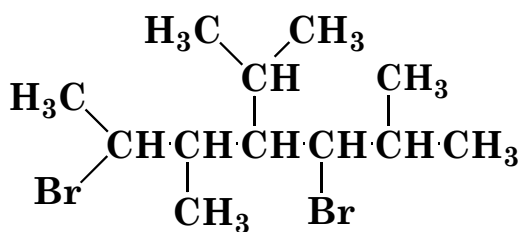
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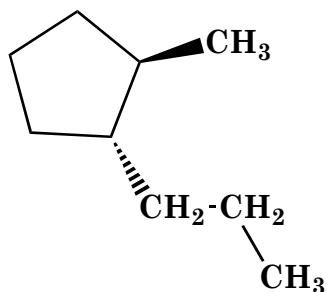
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21.



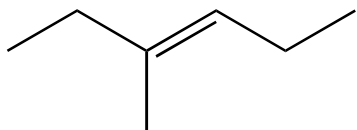
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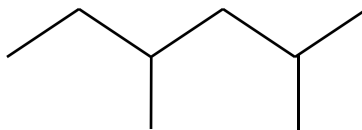
Section 4 - General Questions on Hydrocarbons

(12 pts)

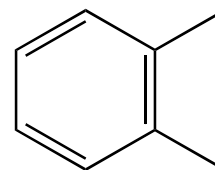
23. Consider the following three compounds:



A



B



C

Give a **molecular formula** for each compound.

A. **C H**

B. **C H**

C. **C H**

Classify each compound as **saturated** or **unsaturated** .

A. _____

B. _____

C. _____

Classify each compound as **aliphatic** or **aromatic** .

A. _____

B. _____

C. _____

Section 5 - Chemical Reactions of Hydrocarbons

(5 pts)

24. Complete and Balance the Equation for the combustion of heptane:



Bonus Question - For the following reaction, give a **structural formula** for the **major product** of the substitution reaction (molecular is formula given). (up to 5 pts)

