

Unit 5 Review: Hydrocarbons

1. Briefly define or explain the significance of the following terms:
- | | | |
|----------------------|------------------|----------------------------|
| a) acetylene | h) aromatic | o) monomer |
| b) acyclic | i) bond energy | p) organic chemistry |
| c) addition reaction | j) calorimeter | q) petroleum |
| d) aliphatic | k) cyclic | r) polymer |
| e) alkane | l) endothermic | s) saturated hydrocarbon |
| f) alkene | m) exothermic | t) unsaturated hydrocarbon |
| g) alkyne | n) fractionation | u) Wöhler |

2. What general formula describes a) alkanes, b) alkenes, c) alkynes, d) cycloalkanes?

3. Draw the structural diagram for benzene.

4. For 3-methylpentane draw the

a) complete structural diagram, b) condensed structural diagram, and c) line structural diagram

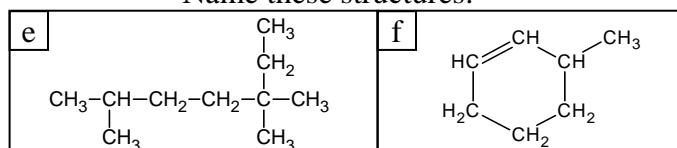
5. a) Write a balanced equation for the complete combustion of hexane.

b) Write two possible balanced equations for the incomplete combustion of hexane.

6. Draw structures for these compounds:

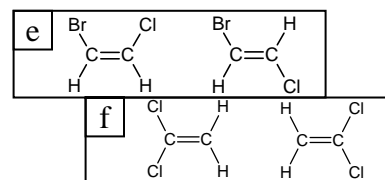
- 2-methylbutane
- 4-propyl-3-heptene
- 5-ethyl-4,4,5-trimethyldecane
- cis-1,3-dimethylcyclohexane

Name these structures:



7. Identify each pair as structural isomers, geometric isomers, or neither

- cyclopentane, pentane
- 1,1-dichloroethene, trans-1,2-dichloroethene
- cis-1,2-dichlorocyclopentane, trans-1,2-dichlorocyclopentane
- cis-1,2-dichlorocyclopentane, trans-1,3-dichlorocyclopentane



8. Using Br₂(aq), how can you easily distinguish between ethane, ethene, and ethyne?

9. Using a table of bond energies calculate the heat of reaction when excess Br₂ reacts with

a) 1 mole of ethene, b) 1 mole of ethyne.

10. Differentiate the following terms with respect to definition, symbol, and units:

a) heat capacity, b) specific heat capacity, c) heat of reaction, d) specific heat, e) molar heat of reaction

11. A forensics lab receives a small 0.16 g sample of metal. To identify the metal they heat it using exactly 3.0 J of energy. The temperature rises from 20°C to 98°C. What is the unknown metal (see pg. 568)?

12. 50.0 grams of butane is placed in a calorimeter. The 350 grams of water in the calorimeter rose from 19.7°C to 21.2°C. a) Calculate the heat released by the butane. b) Calculate the molar heat of reaction.

13. There is something wrong with each of the following names. Identify the error in each case (often the correct name can be determined by trying to draw the structure and then renaming it).

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|--------------------------|----------------------------|-------------------------------|
| a) 5-methyl-3-hexyne | c) 1,2-dichlorocyclobutane | e) 2-ethyl-2-methylhexane |
| b) 3,3-dimethyl-3-hexyne | d) 3-methyloctene | f) 2,3-dimethyl-4-ethylnonane |