Section 3C Review

Name:

1) Using the following reaction, how much heat is absorbed when 3 g of iron is added to excess carbon dioxide? 2 Fe + 3 CO2 ---> Fe2O3 + 3 CO Δ H = +26.8 kJ

0.718 kJ

2) How many grams of ammonia must be burned in order to release 305 kJ of heat according to the reaction: 4 NH3 + 502 - \rightarrow 4 NO + 6 H2O Δ H = - 905.4 kJ.

22.9 g

3) Define the difference between an endothermic and exothermic reaction in terms of both the heat and the enthalpy.

An endothermic reaction absorbs heat and has a positive enthalpy. An exothermic reaction releases heat and has a negative enthalpy.

4) Describe the differences in fuel, cost and emissions between gas and electric powered vehicles.

- Gasoline engines use gasoline as fuel. Electric cars use electricity, which is generated by a combination of fossil fuels and renewable energy sources
- The cost of gasoline cars are roughly $\frac{1}{3}$ to $\frac{1}{2}$ the price of electric vehicles
- Emissions for gasoline cars are produced locally, and are roughly 33% more than electric cars, which are produced at the source of the electricity.

5) Describe the difference between a monomer and a polymer, and how they are related to one another.

A monomer is a building block a polymer. If a bunch of modified monomers are strung together in a long string, the resulting hydrocarbon would be considered a polymer, which is commonly called a plastic.

6) How is an unsaturated hydrocarbon different from a saturated hydrocarbon? Give an example of each.

A saturated hydrocarbon is an alkane in which every carbon of the hydrocarbon has a maximum number of hydrogens. Every carbon is single bonded and bonded to at 4 other atoms. Octane (gasoline) is an example of a saturated hydrocarbon. Unsaturated hydrocarbons have double and triple bonds, which means that not every carbon has a maximum number of hydrogens. In this case, a carbon may not have any hydrogens on it.

7) The basic formula for an alkane is C_nH_{2n+2} . What is the basic formula for an alkene and an alkyne?

Alkene: $C_n H_{2n}$ Alkyne: $C_n H_{2n-2}$

8) Label each for the following based on its type of molecule.

A. $CH_3-CH_2-CH_2-CH_2-CH_2-CH_3$ alkane C. $CH \equiv C-CH_2-CH_3$ alkyne D. CH_3 B. $CH_3-CH_2-CH_2$ CH_3 E. $O=C-O-CH_3$

$$| branched alkane | ester CH3- CH2- CH2- CH2- CH3 CH2- CH2- CH2- CH2- CH3$$

9) Creating biodiesel from used cooking oil has both advantages and disadvantages. Give two of each.

Advantages: Recycling the used cooking oil results in less waste being treated or placed into landfills. Biodiesel is better for the environment because it does not require pulling more petroleum from the ground, saving natural resources.

Disadvantages: The making of biodiesel uses very toxic chemicals in the process which need to be disposed of. The biodiesel itself does not burn as well as petroleum diesel. The process of making biodiesel in large quantities is time consuming and difficult.

10) Give a common example of each of the following.

a) carboxylic acids vinegar, fruit juice b) esters flowers, perfumes

c)) alcohols disinfectants, liquor

- e) alkanes gasoline, propane
- 11) Draw structures for the following compounds:

a) cis-1,2 dimethyl-1-hexene

 $CH= C- CH_2- CH_2- CH_2- CH_3$ $| \qquad | \\CH_3 CH_3$

b) 2,6-dibromooctane

 $\begin{array}{cccc} CH_3\text{-} CH\text{-} CH_2\text{-} CH_2\text{-} CH_2\text{-} CH_2\text{-} CH_2\text{-} CH_3\\ & | & |\\ Br & Br \end{array}$

c) 1-propene

CH₃- CH=CH₂

d) cycloheptane CH_2 - CH_2 - CH_2 | / CH_2 CH_2 | / CH_2 - CH_2 | / CH_2 - CH_2 e) 1-butyne

 CH_3 - CH_2 - $C\equiv CH$

d) polymers plastics, PVC, milk jugs

f) 2,4-heptene

CH₃- CH=CH- CH=CH- CH₂- CH₃

d) 2-pentanic acid

h) 4-decanol

 $\begin{array}{c} CH_{3}- \ CH_{2}- \$ O = C - OHOH

12) Write the names for the following compounds.

a) CH_3 $CH_3 CH_3 CH_3$ b) | | | $CH_3-CH-CH_2-CH_2-CH_2-CH-CH CH_2-CH_3$ | 1,3 pentene

2,6,7-trimethyldecane

c)	$CH_3-C\equiv C-CH_2-CH_2-CH_2-CH_3$
-,	

2-heptyne

d)

f)

CH_3 | $CH_3-CH_2-CH_2-C=C-CH_2-CH_2-CH_3$ | CH_3 Trans 4,5 dimethyl 4 octene

CH₃-CH₂-OH

ethanol

e) CH_2 - CH_2 - CH_2 - CH_2 - CH_3 | O=C-O- CH_3

1 methylpentanate

13) Describe the process necessary to make a polymer, such as polyvinyl chloride (PVC), using an addition reaction. To help explain yourself, it may be helpful to show the changes in the structures of the molecules.

A vinyl chloride, which has a double bond has its double bond broken by a catalyst. This provides two open bonding sites for the vinyl chloride to bond with 2 other vinyl chlorides. This process of continuous bonding happens over and over, creating a long hydrocarbon (often 100s of carbons long). This polymer is called polyvinyl chloride, a polymer version of the monomer vinyl chloride.

14) In all forms of electricity generation except solar panels, how is the electricity made? A bundle of copper wire is move or spun through a magnetic field. As the copper moves, the magnets begin pulling the electrons through the wire, generating electricity.

15) Describe the three types of energy and give one example in which one type of energy is transformed into a different type of energy.

Kinetic energy – energy in motion

Potential energy – stored energy due to position or bonds Radiant energy – Energy that radiates out from a source (ex: sound, light)

When a book falls off a shelf, the potential energy is converted into kinetic energy. Then, when the book hits the ground, the energy moves the floor (kinetic) and makes noise (radiant)