Name _____ KEY _____

70 pt

15

Answer Questions 1-26 on your scantron. Only one answer for each question (2 pt ea). Some have instructions to mark your scantron with more than one answer.

CHP 5.1 (Reaction Thermodynamics)

1. The minimum energy that reactants need in order for the molecules to be in the correct orientation is called:
   A) collision energy   B) dissociation energy   C) activation energy   D) orientation energy

2. For a reaction to be exothermic or endothermic it is determined by:
   A) collision orientation of molecules
   B) the states of the reactants
   C) the activation energy
   D) the overall loss or gain of energy when the bonds break and reform

(18 pt) Calculate the Calories in the nut from the following data obtained from the calorimetry experiment done in lab.

Mass of empty soft drink can (g)	32.543 g	$\begin{array}{r} 135.529 \\ -32.543 \\ \hline 102.986 \end{array}$
Mass of can + water (g)	135.529 g	
(2 pt) Mass of water (g) Show calculation.	102.986 g	
Initial temperature water (°C)	20.1 °C	$\begin{array}{r} 79.2 \\ -20.1 \\ \hline 59.1 \end{array}$
Final temperature water (°C)	79.2 °C	
(2 pt) Temperature change of water (°C) Show calculation.	59.1 °C	
Mass of the nut (g)	1.481 g	
Mass of the residue after nut is burned (g)	0.134 g	
Mass of nut consumed by combustion (g) Show calculation	1.347 g	$\begin{array}{r} 1.481 \\ -.134 \\ \hline \end{array}$ 1.347 g
Specific heat of water	1.00 calorie/g °C	$Q = C_p \times g \times \Delta T$
(6 pt) Energy absorbed by water (cal) Show calculation.	6090 cal	$102.986g \times 1 \times 59.1 =$ 6086 cal
(2 pt) Energy released by the nut (cal) same	6,090 cal	
(2 pt) Energy released by the nut (Cal) Show calculation.	6.09 Cal	$6086 / 1000 = 6.086$ Cal
(4 pt) Cal/g of nut consumed Show calculation	4.52 Cal/g	$\dfrac{6.086 \text{ Cal}}{1.347g} = 4.52 \dfrac{Cal}{g}$

22 pt

CHP 5.2 (Reaction Rates)

3. Determine which of the statements is <u>CORRECT</u> regarding this figure:

Reaction I   Reaction II
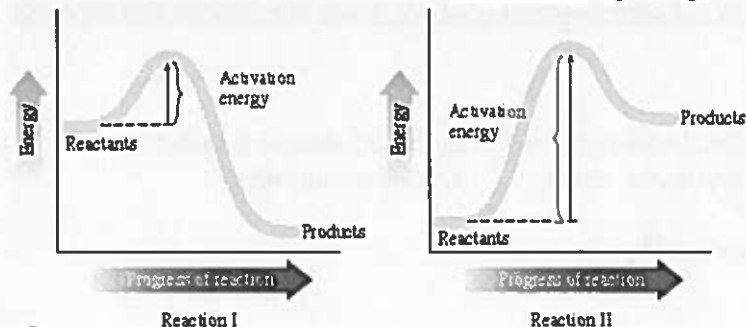
A) Reaction I occurs faster than reaction II.
B) Reaction II occurs faster than reaction I.
C) Reaction I is endergonic.
D) Reaction II is exergonic.
E) The activation energy for reaction I is larger than that of reaction II.

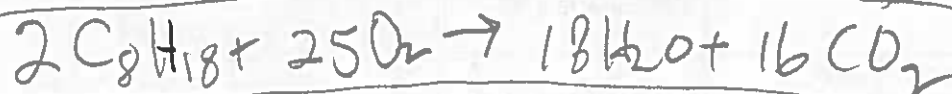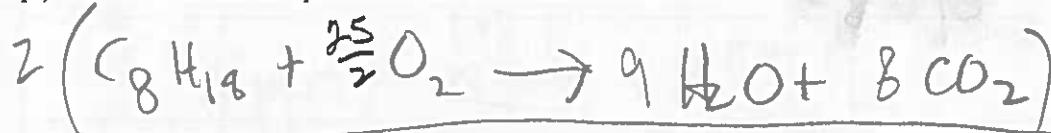4. Which of the following processes is nonspontaneous?
  A) An antacid tablet reacting with stomach acid to produce carbon dioxide
  B) A hot pan cooling on the counter
  C) Water turning to ice below 0°C
  D) A battery being recharged

5. Which of the following actions would <u>not</u> increase the rate of a reaction?
  A) Diluting the reactants by a factor of 2
  B) Increasing the temperature by 10°C
  C) Adding a catalyst
  D) Increasing the concentration of the reactants by a factor of 2

CHP 5.3 (Types of Chemical Reactions)

(8 pt) Write the balanced equation for the combustion of octane.

$$\sim\!\sim\!\sim = C_8H_{18}$$

$$2\left(C_8H_{18} + \tfrac{25}{2}O_2 \rightarrow 9\,H_2O + 8\,CO_2 \right)$$

$$2\,C_8H_{18} + 25\,O_2 \rightarrow 18\,H_2O + 16\,CO_2$$

6. What type of reaction is illustrated in this diagram?

1 react.   2 prod.
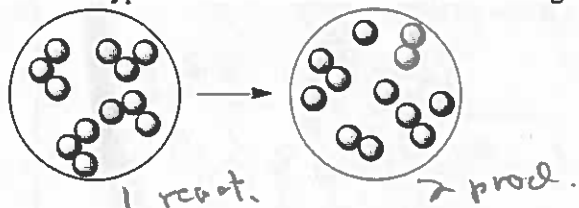
A) combination   B) decomposition   C) single displacement   D) double displacement

7. A piece of zinc placed in hydrochloric acid results in a fierce effervescence and the zinc eventually dissolves, yielding a solution of zinc chloride. A glowing splint gives a "popping" sound, indicating the presence of hydrogen gas. What type of reaction is it?

A) combination   B) decomposition   C) single displacement   D) double displacement

18 pt

CHP 5.4 (Oxidation and Reduction)

8. When a substance is oxidized it is called a(n):
   A) oxidizing agent   B) reducing agent   C) both   D) neither

9. When an organic molecule loses hydrogens it is said to be:
   A) reduced   B) oxidized   C) both oxidized and reduced   D) neither oxidized or reduced

10. If this is the oxidized form of NAD^+ which of the following is the reduced form of this important biomolecule?
    A) $NADH_2$ B) NADH   C) NAD   D) NAD^-

11. In the Benedict's test for monosaccharides the aldehyde functional group of the sugar is converted to a carboxylic acid groupl (*Mark two answers, one for the oxidized substance and one for the reduced substance.*):

$$\overset{+2}{CuCl_2} \quad + \quad \underset{(sugar)}{aldehyde} \quad \longrightarrow \quad \overset{+1}{Cu_2O} \quad + \quad carboxylic\ acid$$

A) The sugar is reduced
B) The sugar is oxidized.
C) The copper (II) ion is reduced and forms a brick red Cu_2O precipitate.
D) The copper (II) ion is oxidized and forms a brick red Cu_2O precipitate

(6 pt) Complete each of the following oxidation/reduction reactions. Write NR if there is no reaction.
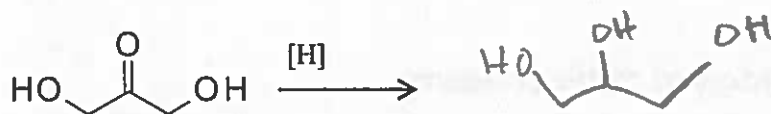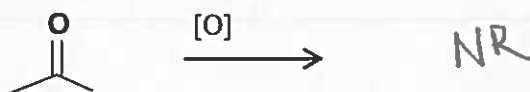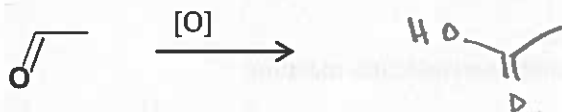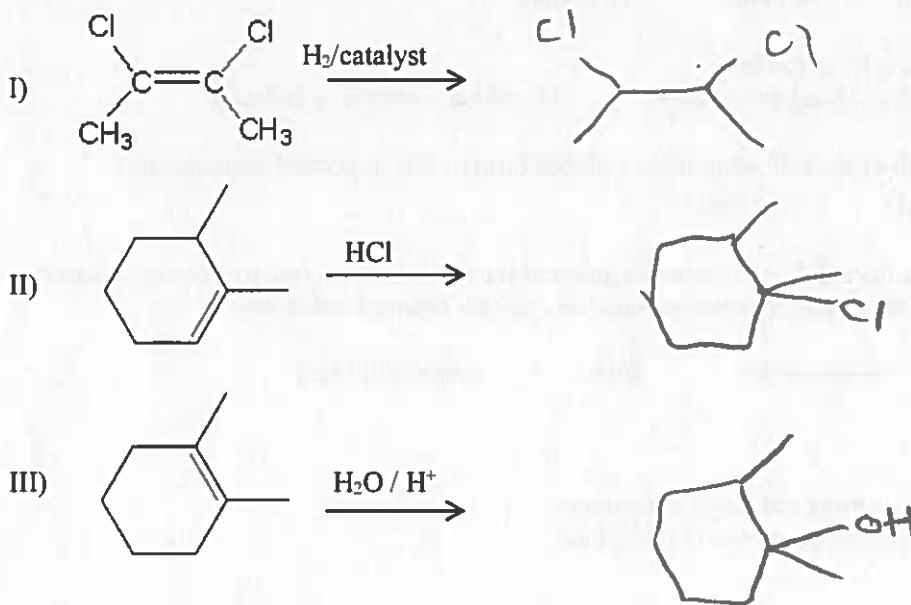

CHP 5.5 (Condensation Reactions)
Complete each of the following reactions (4 pt ea)

I)

II) $CH_3(CH_2)_3OCCH_3$ $\xrightarrow{H^+}$
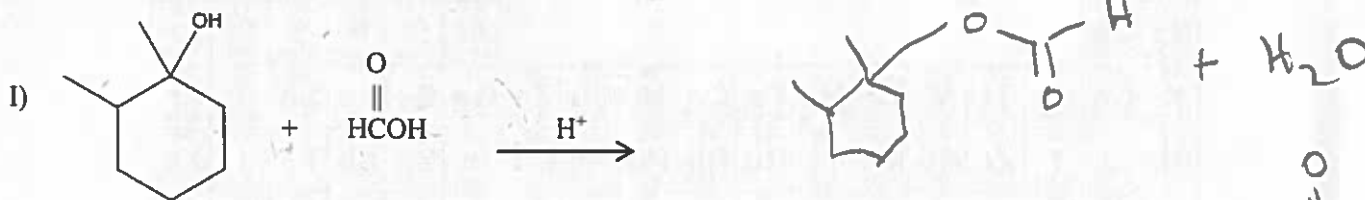
12. Reaction _____ I _____ above is a condensation reaction.
    A) I   B) II   C) no reaction is a condensation reaction.

24 pt

CHP 5.6 (Addition Reactions)
Complete the following addition reactions (2 pt ea).

I)

H_2/catalyst

II)

HCl

III)

H_2O / H^+

15. Reaction _____ above is a hydration reaction.
   B) I   B) II   C) III   D) no reaction is a hydration reaction.

8 pt

PERIODIC CHART OF THE ELEMENTS