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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:

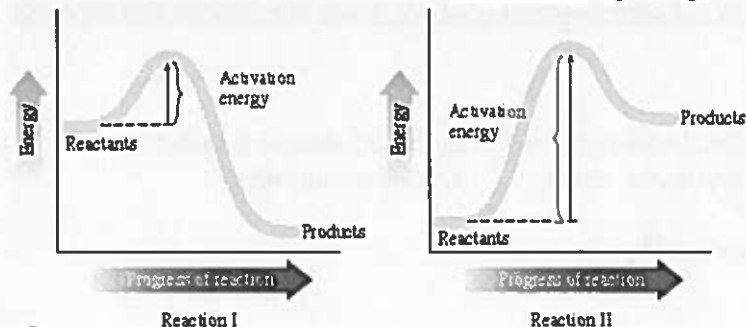
- A) collision orientation of molecules
B) the states of the reactants
C) the activation energy
D) the overall loss or gain of energy when the bonds break and reform

(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) <i>Show calculation.</i>	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) <i>Show calculation.</i>	59.1 °C	
Mass of the nut (g)	1.481 g	$\begin{array}{r} 1.481 \\ - .134 \\ \hline 1.347 \text{ g} \end{array}$
Mass of the residue after nut is burned (g)	0.134 g	
Mass of nut consumed by combustion (g) <i>Show calculation</i>	1.347 g	
Specific heat of water	1.00 calorie/g °C	$Q = C_p \times g \times \Delta T$ $102.986 \text{ g} \times 1 \times 59.1 =$ $\underline{6086 \text{ cal}}$ $6086 / 1000 = 6.086 \text{ Cal}$
(6 pt) Energy absorbed by water (cal) <i>Show calculation.</i>	6090 cal	
(2 pt) Energy released by the nut (cal) <i>same</i>	6,090 cal	
(2 pt) Energy released by the nut (Cal) <i>Show calculation.</i>	6.09 Cal	
(4 pt) Cal/g of nut consumed <i>Show calculation</i>	4.52 Cal/g	$\frac{6.086 \text{ Cal}}{1.347 \text{ g}} = 4.52 \frac{\text{Cal}}{\text{g}}$

CHP 5.2 (Reaction Rates)

3. Determine which of the statements is CORRECT regarding this figure:



- 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?

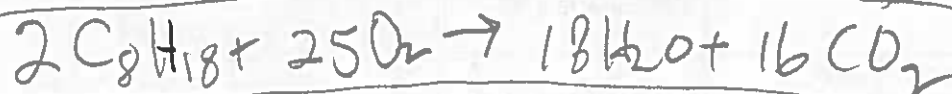
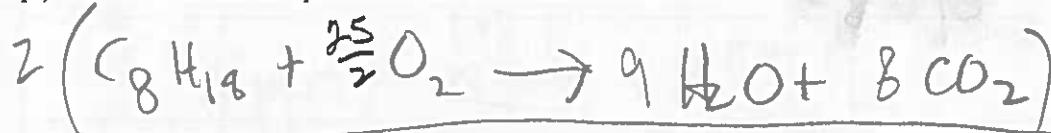
- A) An antacid tablet reacting with stomach acid to produce carbon dioxide
 B) A hot pan cooling on the counter
 C) Water turning to ice below 0°C
 D) A battery being recharged

5. Which of the following actions would not increase the rate of a reaction?

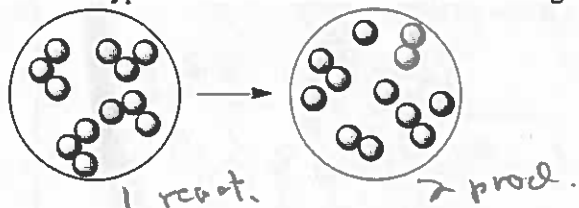
- A) Diluting the reactants by a factor of 2
 B) Increasing the temperature by 10°C
 C) Adding a catalyst
 D) Increasing the concentration of the reactants by a factor of 2

CHP 5.3 (Types of Chemical Reactions)

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



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



- 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

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?

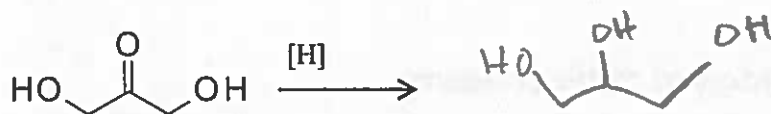
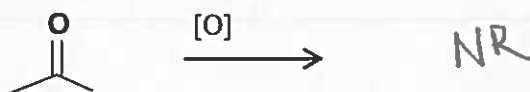
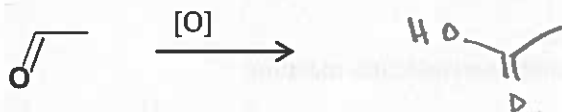
- A) NADH₂ **B) NADH** C) NAD D) NAD⁻

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

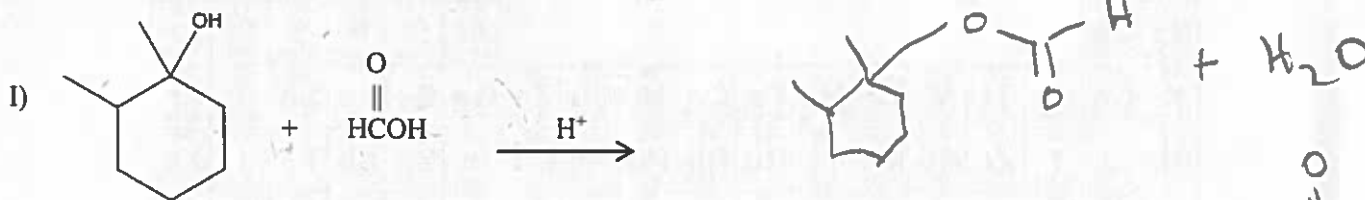


- A) The sugar is reduced
B) The sugar is oxidized.
C) The copper (II) ion is reduced and forms a brick red Cu₂O precipitate.
 D) The copper (II) ion is oxidized and forms a brick red Cu₂O precipitate

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

CHP 5.5 (Condensation Reactions)

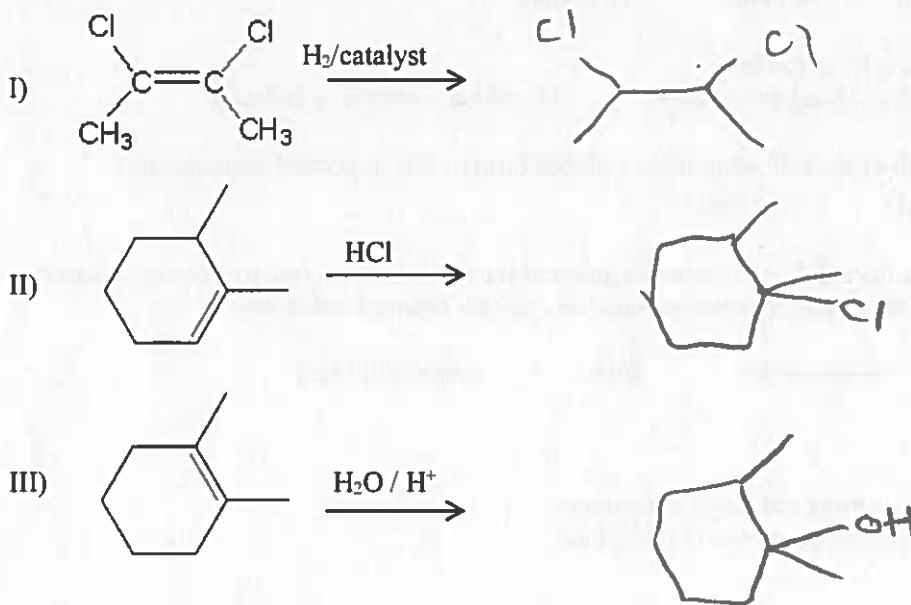
Complete each of the following reactions (4 pt ea)

12. Reaction I above is a condensation reaction.

- A) I** B) II C) no reaction is a condensation reaction.

CHP 5.6 (Addition Reactions)

Complete the following addition reactions (2 pt ea).



15. Reaction III 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

1 H 1.00797																	2 He 4.0026
3 Li 6.939	4 Be 9.0122											5 B 10.811	6 C 12.0112	7 N 14.0067	8 O 15.9994	9 F 18.9984	10 Ne 20.183
11 Na 22.98976928	12 Mg 24.304											13 Al 26.9815385	14 Si 28.0855	15 P 30.973761998	16 S 32.06	17 Cl 35.453	18 Ar 39.948
19 K 39.0983	20 Ca 40.078	21 Sc 44.955912	22 Ti 47.88	23 V 50.9415	24 Cr 51.9961	25 Mn 54.938044	26 Fe 55.845	27 Co 58.933194	28 Ni 58.71	29 Cu 63.546	30 Zn 65.376	31 Ga 69.723	32 Ge 72.597	33 As 74.9216	34 Se 78.96	35 Br 79.904	36 Kr 83.80
37 Rb 85.4678	38 Sr 87.62	39 Y 88.90584	40 Zr 91.224	41 Nb 92.90638	42 Mo 95.94	43 Tc [98]	44 Ru 101.072	45 Rh 102.9055	46 Pd 106.42	47 Ag 107.8682	48 Cd 112.411	49 In 114.818	50 Sn 118.710	51 Sb 121.757	52 Te 127.603	53 I 126.90447	54 Xe 131.29
55 Cs 132.90545196	56 Ba 137.327	*57 La 138.90487	72 Hf 178.49	73 Ta 180.94788	74 W 183.84	75 Re 186.207	76 Os 190.23	77 Ir 192.222	78 Pt 195.084	79 Au 196.966569	80 Hg 200.59	81 Tl 204.377	82 Pb 207.19	83 Bi 208.9804	84 Po [210]	85 At [210]	86 Rn [222]
87 Fr [223]	88 Ra [226]	†89 Ac [227]	104 Rf [261]	105 Db [262]	106 Sg [266]	107 Bh [266]	108 Hs [265]	109 Mt [266]	110 ? [271]	111 ? [272]	112 ? [277]						

* Lanthanide Series

58 Ce 140.12	59 Pr 140.907	60 Nd 144.24	61 Pm [147]	62 Sm 150.35	63 Eu 151.96	64 Gd 157.25	65 Tb 158.924	66 Dy 162.50	67 Ho 164.930	68 Er 167.26	69 Tm 168.934	70 Yb 173.04	71 Lu 174.967
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† Actinide Series

90 Th 232.0377	91 Pa [231]	92 U 238.02891	93 Np [237]	94 Pu [242]	95 Am [243]	96 Cm [247]	97 Bk [247]	98 Cf [249]	99 Es [254]	100 Fm [253]	101 Md [256]	102 No [256]	103 Lr [257]
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