MC, Chem1B, Fall 11, LecExam1

Name

Read questions carefully to understand what is being asked. If you have doubt, do ask your instructor. Use the reverse side of your answer paper as scratch. Use attached periodic table and important constants chart. On your scantron, please start from number 10 to answer the multiple choice questions. (Total pts. = 78 + 27 + 8 = 113)

SHORT ANSWER: Show all your calcualtions using appropriate set up and units.

Identify the hybridization of the central atom in the following compounds (3 pts.
 (a) SF3+

(b) SF4

(c) SO₄2-

(d) I3-

2) Draw the structures and name the isomers of C₆H₃F₃ (12 pts.)

2)

3) Write the condensed	structure of 2-meth	yl-4-propylnonane (4 p	ts.).
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4) What is the name of the compound CH₃CH₂CH(OH)CH₂CH₂CH₃? (4 pts.)

5) Draw the condensed structures of the reactants and product(s) of the reaction between propionic acid and 1-propanol (8 pts.) and name the major product (2 pts.) and the functional group it conatins (2 pts.).

6) Draw the structures of the reactants and major product of the reaction between 2-methyl propene and hydrochloric acid (6 pts.) and name the major product (4 pts.)

6)

3) _____

4)

5)

	Initial Conce	ntrations	Initial Rate
Experiment	[NO]	[O2]	(M s-1)
1	0.0010	0.0010	7.0 x 10-6
2	0.0010	0.0020	1.4 x 10-5
3	0.0010	0.0030	2.1x 10-5
4	0.0020	0.0030	8.4 x 10-5
5	0.0030	0.0030	1.9 x 10 -4

 $2NO(g) + O_2(g) ----> 2 NO_2(g)$

1 11

a. Calculate the order of the reaction with respect to each reactant (6 pts.).

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b. Write the rate law for the reaction (2 pts.).

c. Calculate rate of NO₂ formation when $[NO] = [O_2] = 0.005 \text{ M} (4 \text{ pts.})$

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8) If the rate of foramtion of oxygen gas is 6.0 x 10 ⁻⁵ M/s in the following conversion:
2 O₃ (g) -----> 3 O₂, then calculate the rate of disappearance of O₃ (g) at that same time. (4 pts.)

9) Carbon dating may be used to date (once living) materials that are between 100 and 40,000 years old. The half-life of the **first-order** decomposition of carbon-14 is 5730 years. What percentage of carbon-14 remains (ratio of final to initial concentrations multiplied by 100) in a sample after 40,000 years (8 pts.).

9) _____

MULTIPLE CHOICE. Start on line 7 of your scantron paper. Select the one alternative that best completes the statement or answers the question (3 pts each).

10) The molecular geometry of the PF₄⁺ ion is _____.

10) _____

A) trigonal pyramidal

B) octahedral

C) trigonal bipyramidal

D) tetrahedral

E) trigonal planar

4

	B) 120°	C) 180°	D) 45°	E) 109.5°
12) There are	gand	π bonds in the	HaC=C=CHa mo	lecule 12)
A) 2. 6	B) 6, 4	C) 6, 2	D) 4, 2	E) 2.2
	2) 0) 2	0) 0) =	-/ -/ Terraria	a a traditional de la companya de la
13) The general form	ula of an ester is _		ultako est etakos y	13)
A) $R - O - R'$	1			
C) R-OH	4			
D) R-CO-R'				
E) R-CO-OH	[
14) The compound b	elow is an	•		14)
	н н			
HC=	$\equiv C - C - H$			
	пп			
A) aromatic co	mpound		ai é sideal (qu'il)	$e^{2i\theta_1+\delta x_1} = e^{i\theta_1} e^{-i\theta_2} e^{-i\theta_1} e^{-i\theta_2} e^{-i\theta_1} e^{-i\theta_2} e^{-i\theta_1} e^{-i\theta_2} e^{-i\theta_1} e^{-i\theta_2} e^{-i\theta_1} e^{-i\theta_2} e^{-i\theta_1} e^{-i\theta_$
B) alkyne	1 1			
C) olefin				
D) alkene E) alkane				
L) unune				
15) The addition of H	-IBr to 2-butene p	roduces	Alle a la achteoch	15)
15) The addition of I A) no reaction	IBr to 2-butene p	roduces	Allina Lavideora	15)
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10 E E

17) Under constant conditions, the half–life of a first–order reaction	17)
A) is constant	
B) does not depend on the initial reactant concentration	
C) is the time necessary for the reactant concentration to drop to half its original va	alue
D) can be calculated from the reaction rate constant	
E) All of the above are correct.	
18) The graph shown below depicts the relationship between concentration and time for	the 18)
following chemical reaction.	
$2A \longrightarrow C$	
ln [A]	
time	
The slope of this line is equal to	
A) -k B) k C) $\ln[A]_0$ D) -1/k E) 1.	/k
	- 25.06.
TRUE/FALSE. In your scantron, fill up bubble A for true and bubble B for false answers (2	pts./question).
19) Possible shapes of AB ₃ molecules are linear, trigonal planar, and T-shaped.	19)
20) XeE4 is a polar molecule	20)
20) Aci 4 15 u polui molecule.	
21) Rates of reaction can be positive or negative	21)
22) The helf life for a first order rate law depends on the starting concentration	22)
22) The nan-me for a first order rate law depends on the starting concentration.	<i>∠∠)</i>

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	1	1 H 1.0079	2 2A	-C		р р		2						13 3A	14 4A	15 5A	16 6A	17 7A	2 He 4.0026			
~	2	3 Li 6.941	4 Be 9.0122											5 B 10.811	6 C 12.011	7 N 14.007	8 O 15.999	9 F 18.998	10 Ne 20.180			
	3	11 Na 22.990	12 Mg 24.305	3 3B	4 4B	5 5B	6 6B	7 7B	8 8B	9 8B	10 8B	11 1B	12 2B	13 Al 26.982	14 Si 28.086	15 P 30.974	16 S 32.066	17 Cl 35.453	18 Ar 39.948			
	4	19 K 39.098	20 Ca 40.078	21 Sc 44.956	22 Ti 47.867	23 V 50.942	24 Cr 51.996	25 Mn 54.938	26 Fe 55.845	27 Co 58.933	28 Ni 58.693	29 Cu 63.546	30 Zn 65.39	31 Ga 69.723	32 Ge 72.64	33 As 74.922	34 Se 78.96	35 Br 79.904	36 Kr 83.80			
	5	37 Rb 85.468	38 Sr 87.62	39 Y 88.906	40 Zr 91.224	41 Nb 92.906	42 Mo 95.94	43 T c (98)	44 Ru 101.07	45 Rh 102.91	46 Pd 106.42	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.71	51 Sb 121.76	52 Te 127.60	53 I 126.90	54 Xe 131.29			
	6	55 Cs 132.91	56 Ba 137.33	57 - 71 La-Lu	72 Hf 178.49	73 Ta 180.95	74 W 183.84	75 Re 186.21	76 Os 190.23	77 Ir 192.22	78 Pt 195.08	79 Au 196.97	80 Hg 200.59	81 Tl 204.38	82 Pb 207.2	83 Bi 208.98	84 Po (209)	85 At (210)	86 Rn (222)			
	7	87 Fr (223)	88 Ra (226)	89 -103 Ac-Lr	104 Rf (261)	105 Db (262)	106 Sg (266)	107 Bh (264)	108 H s (277)	109 Mt (268)	110 Ds (281)	111 Uuu (272)	112 Uub (285)		114 Uuq (289)							
			Lanth	anide	57 La 138.91	58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 (145)	62 Sm 150.36	63 Eu 151.96	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.93	68 Er 167.26	69 Tm 168.93	70 Yb 173.04	71 Lu 174.97			
			Ac	tinide	89 Ac (227)	90 Th 232.04	91 Pa 231.04	92 U 238.03	93 (237)	94 (244)	95 (243)	96 ((247)	97 (247)	98 ()) (251)	99 (1) (252)	100 (257)	101 (258)	102 (259)	103 (262)			
Some Constants & Co (1) Avogadro number: 1 (3) Gas Constant: $R = 0$ (5) Electronic Charge: c (7) 1 joule = 1 kg. m ² /s (10) 1 pascal = 1 Newto (14) 1 m = 100 cm; (15)	nvers N = 6 0.0821 e = 1.0 $2^{2} = 0.0$ on / m) 1 nm	sion F: .022 x latm L 602 x 239 ca $a^2 = 1 k$ a = 10	actors 10 ²³ / /mol I 10 ⁻¹⁹ (lorie = cg/m.s	: mole K or R Coulon = $(1 co$ $(1^{2}; (11))$ (16) 1	= 8.3 nb ulomb 1 atm pm =	145J/n = 760 10^{-12}	nol K volt);)mm H n; (17	(8) 1 Hg = 7 /) 1 L	calori 760 to = 100	ie = 4. rr 0 cm^3	184 jo	ules	 (2) P (4) S (6) π (9) F (12) I (18) I 	lanck' peed o araday K = °C 1 kg =	s cons f Ligh π 's Con 2 + 273 10^{3} g	tant: h t: c = = 3.1 istant: 8.15 °C ; (19)	a = 6.6 2.997 4159 F = 9 C; (13) 1 g =	26 x x 10 2.648 z) °C /5 10 ³ m	10^{-34} J m/sec x 10^{-4} c 5 = (°F mg; (20	.sec coulomb - 32) / 9)) 11b = 4	/mol () 453.6g	electron;