

Fall Semester 2013  
Organic Chemistry I  
Midterm Examination #1

Name (print): *Key*

Name (sign):

Recitation Instructor (name, day):

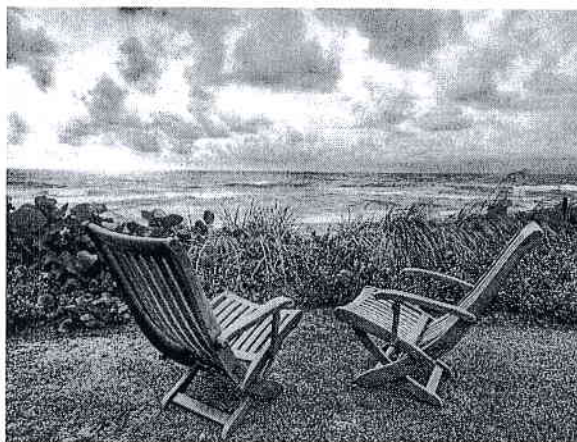
**Instructions**

1. Keep the exam closed until you are instructed to begin.
2. The exam consists of 10 questions. The first thing you should do is make sure that no pages are missing. If a page is missing, notify a proctor immediately
3. You will have 1 hour and 15 minutes. Questions are labeled from easy (\*) to hard(\*\*\*). Budget your time wisely.
4. Make sure to show all of your work, and this should fit into the space provided. If you need to use the back of the paper, you must make note of it in the space provided for credit.

Good Luck!

1. \_\_\_\_ (5 points)
2. \_\_\_\_ (5 points)
3. \_\_\_\_ (10 points)
4. \_\_\_\_ (10 points)
5. \_\_\_\_ (10 points)
6. \_\_\_\_ (10 points)
7. \_\_\_\_ (10 points)
8. \_\_\_\_ (10 points)
9. \_\_\_\_ (20 points)
10. \_\_\_\_ (10 points)

<u>approximate grade</u>		<u>breakdown</u>	
	> 90	- 6	high - 95
<i>~ A</i> <i>(~ 75+)</i>	80-90	- 12	Ave - 56
	70-80	- 37	Median - 58
<i>~ B 75-60</i>	60-70	- 43	
	C [ 50-60	- 35	
	D [ 40-50	- 35	
	F [ 30-40	- 28	
	< 30	- 13	



148NE

## Periodic Table of the Elements Ground State Electron Configurations

<http://www.chemistry.about.com>  
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 About Chemistry

1A												3A						4A		5A		6A		7A		8A								
1 H <small>[1s]<sup>1</sup></small>												5 B <small>[He]2s<sup>2</sup>2p<sup>1</sup></small>	6 C <small>[He]2s<sup>2</sup>2p<sup>2</sup></small>	7 N <small>[He]2s<sup>2</sup>2p<sup>3</sup></small>	8 O <small>[He]2s<sup>2</sup>2p<sup>4</sup></small>	9 F <small>[He]2s<sup>2</sup>2p<sup>5</sup></small>	10 Ne <small>[He]2s<sup>2</sup>2p<sup>6</sup></small>												2 He <small>[1s]<sup>2</sup></small>					
3 Li <small>[He]2s<sup>1</sup></small>	4 Be <small>[He]2s<sup>2</sup></small>											13 Al <small>[Ne]3s<sup>2</sup>3p<sup>1</sup></small>	14 Si <small>[Ne]3s<sup>2</sup>3p<sup>2</sup></small>	15 P <small>[Ne]3s<sup>2</sup>3p<sup>3</sup></small>	16 S <small>[Ne]3s<sup>2</sup>3p<sup>4</sup></small>	17 Cl <small>[Ne]3s<sup>2</sup>3p<sup>5</sup></small>	18 Ar <small>[Ne]3s<sup>2</sup>3p<sup>6</sup></small>																	
11 Na <small>[Ne]3s<sup>1</sup></small>	12 Mg <small>[Ne]3s<sup>2</sup></small>	3B	4B	5B	6B	7B	8B		1B	2B	19 K <small>[Ar]4s<sup>1</sup></small>	20 Ca <small>[Ar]4s<sup>2</sup></small>	21 Sc <small>[Ar]3d<sup>1</sup>4s<sup>2</sup></small>	22 Ti <small>[Ar]3d<sup>2</sup>4s<sup>2</sup></small>	23 V <small>[Ar]3d<sup>3</sup>4s<sup>2</sup></small>	24 Cr <small>[Ar]3d<sup>5</sup>4s<sup>1</sup></small>	25 Mn <small>[Ar]3d<sup>5</sup>4s<sup>2</sup></small>	26 Fe <small>[Ar]3d<sup>6</sup>4s<sup>2</sup></small>	27 Co <small>[Ar]3d<sup>7</sup>4s<sup>2</sup></small>	28 Ni <small>[Ar]3d<sup>8</sup>4s<sup>2</sup></small>	29 Cu <small>[Ar]3d<sup>10</sup>4s<sup>1</sup></small>	30 Zn <small>[Ar]3d<sup>10</sup>4s<sup>2</sup></small>	31 Ga <small>[Ar]3d<sup>10</sup>4s<sup>2</sup>4p<sup>1</sup></small>	32 Ge <small>[Ar]3d<sup>10</sup>4s<sup>2</sup>4p<sup>2</sup></small>	33 As <small>[Ar]3d<sup>10</sup>4s<sup>2</sup>4p<sup>3</sup></small>	34 Se <small>[Ar]3d<sup>10</sup>4s<sup>2</sup>4p<sup>4</sup></small>	35 Br <small>[Ar]3d<sup>10</sup>4s<sup>2</sup>4p<sup>5</sup></small>	36 Kr <small>[Ar]3d<sup>10</sup>4s<sup>2</sup>4p<sup>6</sup></small>						
37 Rb <small>[Kr]5s<sup>1</sup></small>	38 Sr <small>[Kr]5s<sup>2</sup></small>	39 Y <small>[Kr]4d<sup>1</sup>5s<sup>2</sup></small>	40 Zr <small>[Kr]4d<sup>2</sup>5s<sup>2</sup></small>	41 Nb <small>[Kr]4d<sup>4</sup>5s<sup>1</sup></small>	42 Mo <small>[Kr]4d<sup>5</sup>5s<sup>1</sup></small>	43 Tc <small>[Kr]4d<sup>5</sup>5s<sup>2</sup></small>	44 Ru <small>[Kr]4d<sup>7</sup>5s<sup>1</sup></small>	45 Rh <small>[Kr]4d<sup>8</sup>5s<sup>1</sup></small>	46 Pd <small>[Kr]4d<sup>10</sup></small>	47 Ag <small>[Kr]4d<sup>10</sup>5s<sup>1</sup></small>	48 Cd <small>[Kr]4d<sup>10</sup>5s<sup>2</sup></small>	49 In <small>[Kr]4d<sup>10</sup>5s<sup>2</sup>5p<sup>1</sup></small>	50 Sn <small>[Kr]4d<sup>10</sup>5s<sup>2</sup>5p<sup>2</sup></small>	51 Sb <small>[Kr]4d<sup>10</sup>5s<sup>2</sup>5p<sup>3</sup></small>	52 Te <small>[Kr]4d<sup>10</sup>5s<sup>2</sup>5p<sup>4</sup></small>	53 I <small>[Kr]4d<sup>10</sup>5s<sup>2</sup>5p<sup>5</sup></small>	54 Xe <small>[Kr]4d<sup>10</sup>5s<sup>2</sup>5p<sup>6</sup></small>																	
55 Cs <small>[Xe]6s<sup>1</sup></small>	56 Ba <small>[Xe]6s<sup>2</sup></small>	57-71 Lanthanides	72 Hf <small>[Xe]4f<sup>14</sup>5d<sup>2</sup>6s<sup>2</sup></small>	73 Ta <small>[Xe]4f<sup>14</sup>5d<sup>3</sup>6s<sup>2</sup></small>	74 W <small>[Xe]4f<sup>14</sup>5d<sup>4</sup>6s<sup>2</sup></small>	75 Re <small>[Xe]4f<sup>14</sup>5d<sup>5</sup>6s<sup>2</sup></small>	76 Os <small>[Xe]4f<sup>14</sup>5d<sup>6</sup>6s<sup>2</sup></small>	77 Ir <small>[Xe]4f<sup>14</sup>5d<sup>7</sup>6s<sup>2</sup></small>	78 Pt <small>[Xe]4f<sup>14</sup>5d<sup>9</sup>6s<sup>1</sup></small>	79 Au <small>[Xe]4f<sup>14</sup>5d<sup>10</sup>6s<sup>1</sup></small>	80 Hg <small>[Xe]4f<sup>14</sup>5d<sup>10</sup>6s<sup>2</sup></small>	81 Tl <small>[Xe]4f<sup>14</sup>5d<sup>10</sup>6s<sup>2</sup>6p<sup>1</sup></small>	82 Pb <small>[Xe]4f<sup>14</sup>5d<sup>10</sup>6s<sup>2</sup>6p<sup>2</sup></small>	83 Bi <small>[Xe]4f<sup>14</sup>5d<sup>10</sup>6s<sup>2</sup>6p<sup>3</sup></small>	84 Po <small>[Xe]4f<sup>14</sup>5d<sup>10</sup>6s<sup>2</sup>6p<sup>4</sup></small>	85 At <small>[Xe]4f<sup>14</sup>5d<sup>10</sup>6s<sup>2</sup>6p<sup>5</sup></small>	86 Rn <small>[Xe]4f<sup>14</sup>5d<sup>10</sup>6s<sup>2</sup>6p<sup>6</sup></small>																	
87 Fr <small>[Rn]7s<sup>1</sup></small>	88 Ra <small>[Rn]7s<sup>2</sup></small>	89-103 Actinides	104 Rf <small>[Rn]5f<sup>14</sup>6d<sup>2</sup>7s<sup>2</sup></small>	105 Db <small>[Rn]5f<sup>14</sup>6d<sup>3</sup>7s<sup>2</sup></small>	106 Sg <small>[Rn]5f<sup>14</sup>6d<sup>4</sup>7s<sup>2</sup></small>	107 Bh <small>[Rn]5f<sup>14</sup>6d<sup>5</sup>7s<sup>2</sup></small>	108 Hs <small>[Rn]5f<sup>14</sup>6d<sup>6</sup>7s<sup>2</sup></small>	109 Mt <small>[Rn]5f<sup>14</sup>6d<sup>7</sup>7s<sup>2</sup></small>	110 Ds <small>[Rn]5f<sup>14</sup>6d<sup>10</sup>7s<sup>2</sup></small>	111 Rg <small>[Rn]5f<sup>14</sup>6d<sup>10</sup>7s<sup>1</sup></small>	112 Cn <small>[Rn]5f<sup>14</sup>6d<sup>10</sup>7s<sup>2</sup></small>	113 Uut <small>[Rn]5f<sup>14</sup>6d<sup>10</sup>7s<sup>2</sup>7p<sup>1</sup></small>	114 Fl <small>[Rn]5f<sup>14</sup>6d<sup>10</sup>7s<sup>2</sup>7p<sup>2</sup></small>	115 Uup <small>[Rn]5f<sup>14</sup>6d<sup>10</sup>7s<sup>2</sup>7p<sup>3</sup></small>	116 Lv <small>[Rn]5f<sup>14</sup>6d<sup>10</sup>7s<sup>2</sup>7p<sup>4</sup></small>	117 Uus <small>[Rn]5f<sup>14</sup>6d<sup>10</sup>7s<sup>2</sup>7p<sup>5</sup></small>	118 Uuo <small>[Rn]5f<sup>14</sup>6d<sup>10</sup>7s<sup>2</sup>7p<sup>6</sup></small>																	
		57 La <small>[Xe]5d<sup>1</sup>6s<sup>2</sup></small>	58 Ce <small>[Xe]4f<sup>1</sup>6s<sup>2</sup></small>	59 Pr <small>[Xe]4f<sup>2</sup>6s<sup>2</sup></small>	60 Nd <small>[Xe]4f<sup>3</sup>6s<sup>2</sup></small>	61 Pm <small>[Xe]4f<sup>4</sup>6s<sup>2</sup></small>	62 Sm <small>[Xe]4f<sup>6</sup>6s<sup>2</sup></small>	63 Eu <small>[Xe]4f<sup>7</sup>6s<sup>2</sup></small>	64 Gd <small>[Xe]4f<sup>7</sup>5d<sup>1</sup>6s<sup>2</sup></small>	65 Tb <small>[Xe]4f<sup>9</sup>6s<sup>2</sup></small>	66 Dy <small>[Xe]4f<sup>10</sup>6s<sup>2</sup></small>	67 Ho <small>[Xe]4f<sup>11</sup>6s<sup>2</sup></small>	68 Er <small>[Xe]4f<sup>12</sup>6s<sup>2</sup></small>	69 Tm <small>[Xe]4f<sup>13</sup>6s<sup>2</sup></small>	70 Yb <small>[Xe]4f<sup>14</sup>6s<sup>2</sup></small>	71 Lu <small>[Xe]4f<sup>14</sup>5d<sup>1</sup>6s<sup>2</sup></small>																		
		89 Ac <small>[Rn]6d<sup>1</sup>7s<sup>2</sup></small>	90 Th <small>[Rn]6d<sup>2</sup>7s<sup>2</sup></small>	91 Pa <small>[Rn]5f<sup>2</sup>6d<sup>1</sup>7s<sup>2</sup></small>	92 U <small>[Rn]5f<sup>3</sup>6d<sup>1</sup>7s<sup>2</sup></small>	93 Np <small>[Rn]5f<sup>4</sup>6d<sup>1</sup>7s<sup>2</sup></small>	94 Pu <small>[Rn]5f<sup>6</sup>6d<sup>1</sup>7s<sup>2</sup></small>	95 Am <small>[Rn]5f<sup>7</sup>7s<sup>2</sup></small>	96 Cm <small>[Rn]5f<sup>7</sup>6d<sup>1</sup>7s<sup>2</sup></small>	97 Bk <small>[Rn]5f<sup>9</sup>7s<sup>2</sup></small>	98 Cf <small>[Rn]5f<sup>10</sup>7s<sup>2</sup></small>	99 Es <small>[Rn]5f<sup>11</sup>7s<sup>2</sup></small>	100 Fm <small>[Rn]5f<sup>12</sup>7s<sup>2</sup></small>	101 Md <small>[Rn]5f<sup>13</sup>7s<sup>2</sup></small>	102 No <small>[Rn]5f<sup>14</sup>7s<sup>2</sup></small>	103 Lr <small>[Rn]5f<sup>14</sup>6d<sup>1</sup>7s<sup>2</sup></small>																		

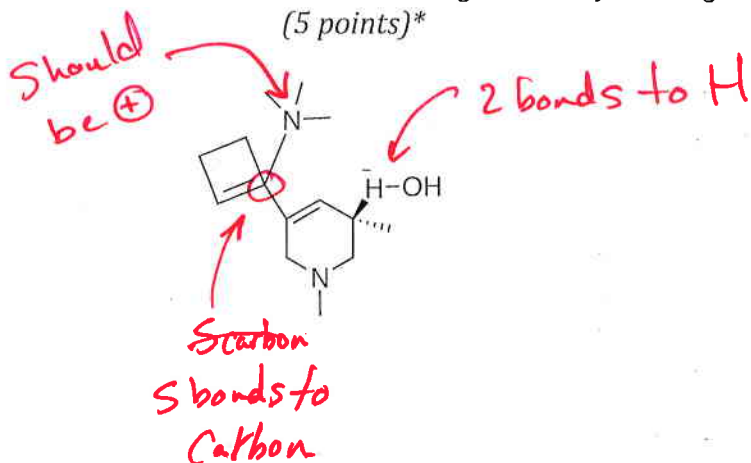
\* values are based on theory and are not verified

1. Provide an IUPAC Name for the following molecule (5 points).\*

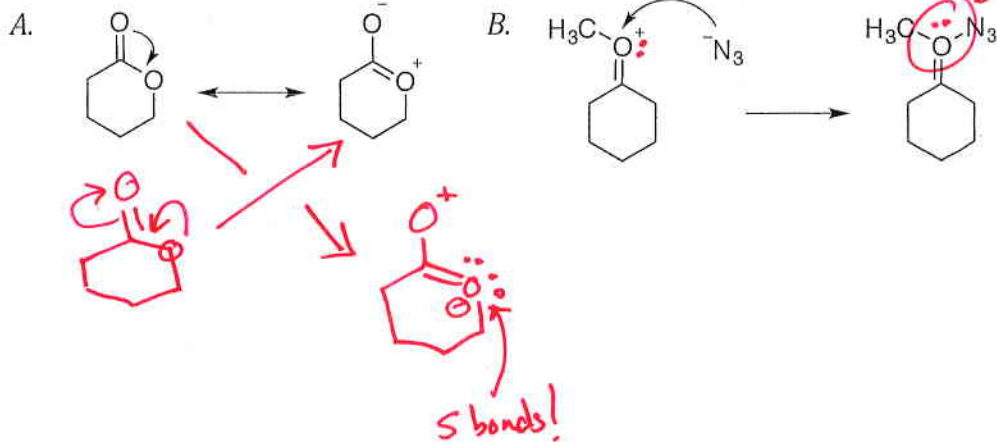


3,3-dimethylpentane

2. What is wrong with the following molecule? There may be more than one thing (5 points)\*

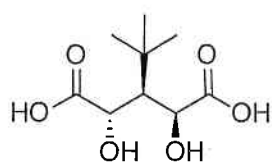


3. What are wrong with the following reaction mechanisms? (10 points)\*



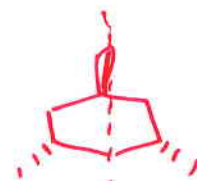
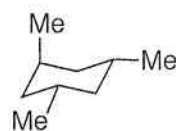
4. Is the following molecule chiral or achiral, and if it is achiral is it meso? (10 points)\*\*

A.



Chiral

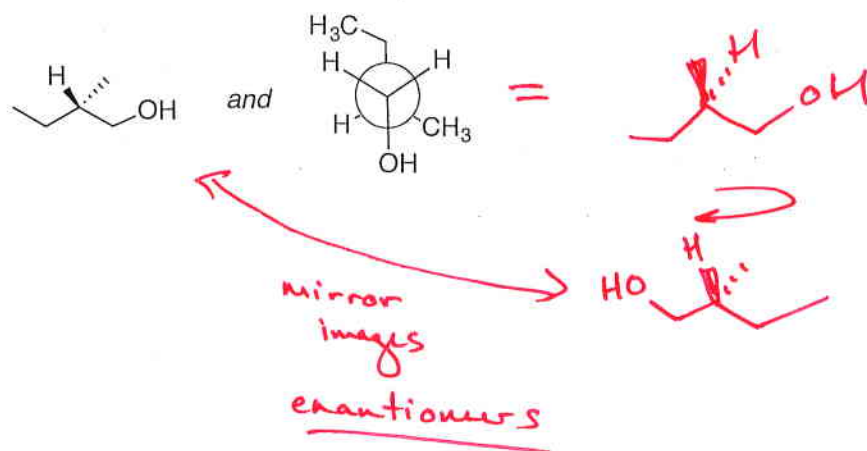
B.



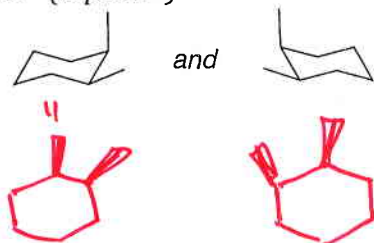
achiral

no stereocenters  
Based on what we know

5. Are the following molecules enantiomers, diastereomers, or identical? (5 points)

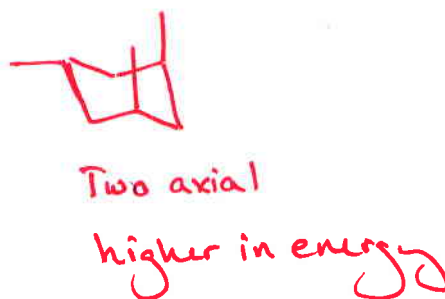
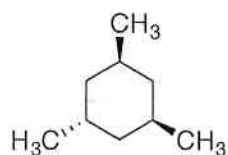


b. (5 points)

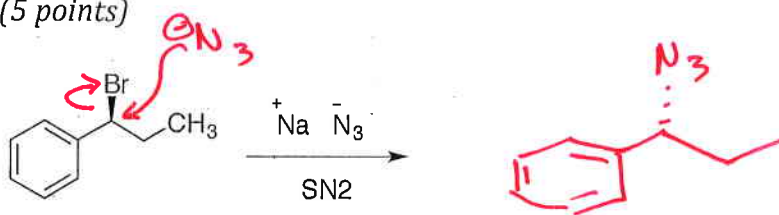


Same compd

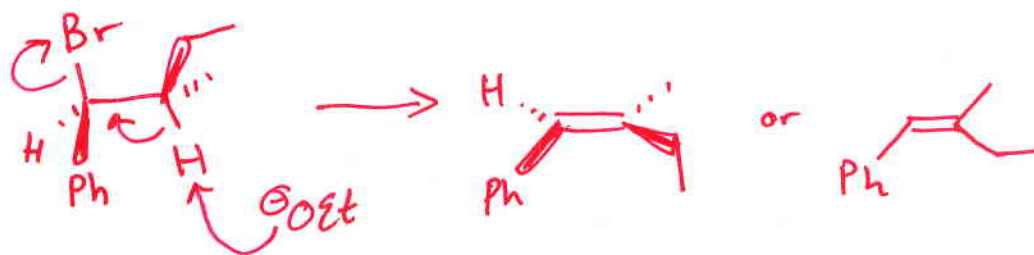
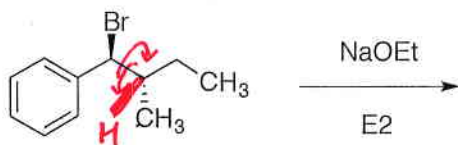
6. Draw both chair conformations of the following molecule, and circle the one that is lower in energy. (10 points)\*\*



7. Predict the product of the following reaction and show a mechanism.\*\*  
a. (5 points)

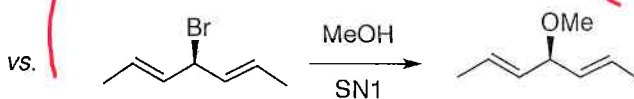
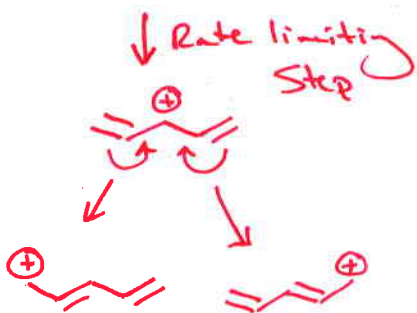
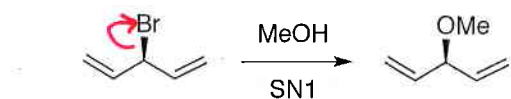


- b. (5 points)



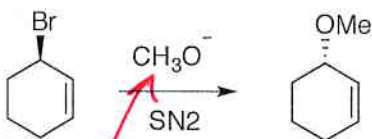
8. Which of the following reactions would you expect to go faster. Explain your answer.

a. (5 points)



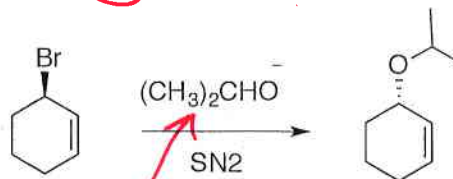
Carbocation resonance forms are better since they are 2°.

b. (5 points)



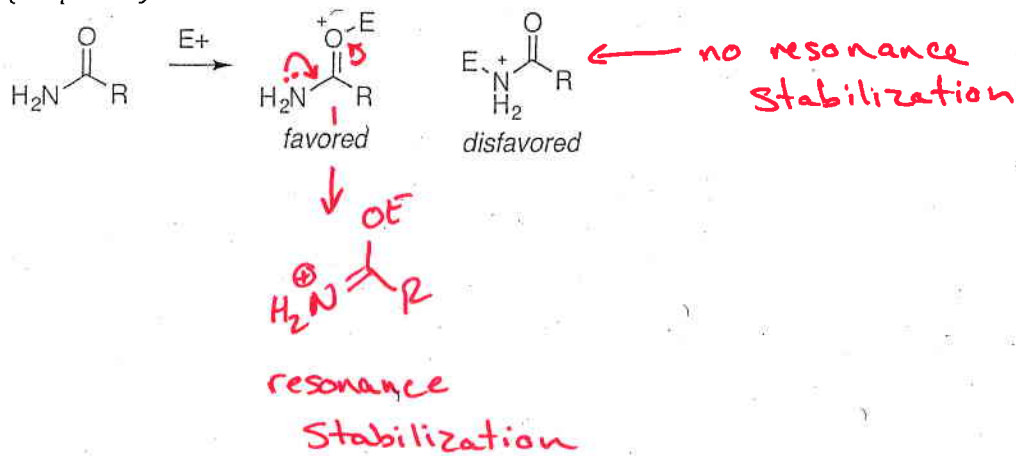
Smaller nucleophile = faster

vs.

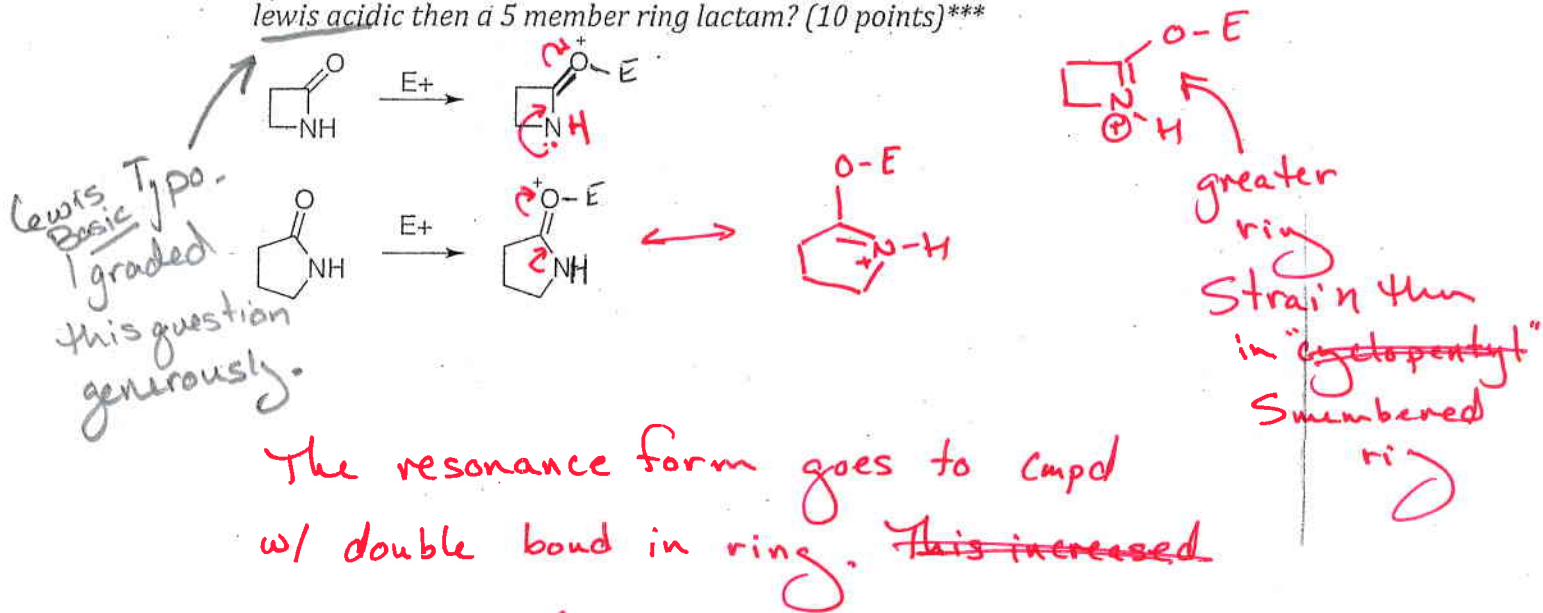


bigger nucleophile. Slower

9. Explain why the oxygen of an amide is more nucleophilic than the nitrogen.  
(10 points)\*\*.



9b. Why might you expect the oxygen of a 4-member ring lactam to be less Lewis acidic than a 5 member ring lactam? (10 points)\*\*\*



AA

10. The following is a reaction called a Ritter reaction. Using what you have learned to date (Acid/Base, Resonance forms, Substitution, Elimination) propose a reasonable mechanism (10 points)\*\*\*

