Chem 260 Midterm 25 October 2013

Name Answer Key (This exam is out of 100 points.)

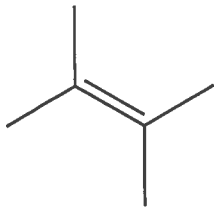
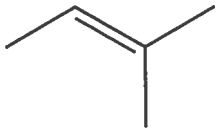
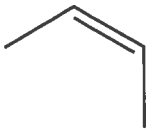
Student Number _____

1. [12] _____
2. [10] _____
3. [12] _____
4. [10] _____
5. [15] _____
6. [10] _____
7. [16] _____
8. [15] _____

Total [100] _____

You may tear off the last page. If you do so, please be sure the staple remains intact.

1. [12 points] Rank the molecules below in order of thermodynamic stabilities from 1 (least stable) to 6 (most stable).

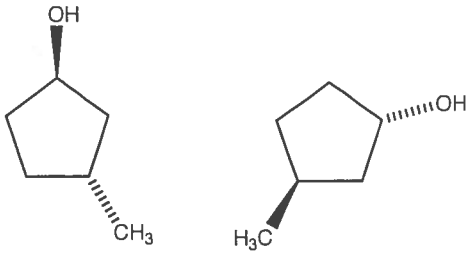
Molecule	Rank	Molecule	Rank
	6		4
	2		5
	1		3

2. [10 points] Rank the molecules below in order of acidities from 1 (least acidic) to 5 (most acidic).

Molecule:	CH_3CO_2H	H_2SO_4	$CH_3CH_2CH_3$	$CH_3CH_2NH_2$	CH_3CH_2OH
Rank:	4	5	1	2	3

3. [12 points] Below are four pairs of structural formulas. In the box to the right of each pair, place the number (from the six terms listed below) that BEST describes the relationship between the two structures. NOTE: Each term may be used more than once and not all terms need be used.

1. Identical
2. Diastereomers
3. Conformers
4. Constitutional isomers
5. Enantiomers
6. None of the above relationships

(a) 

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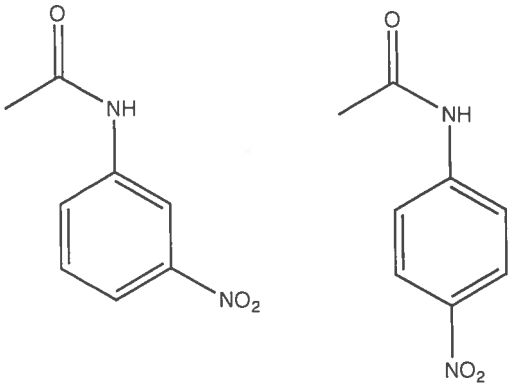
(b) 

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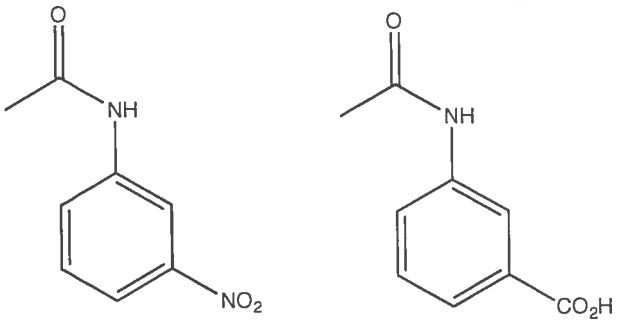
(c) 

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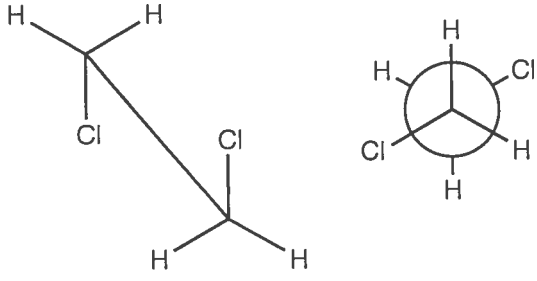
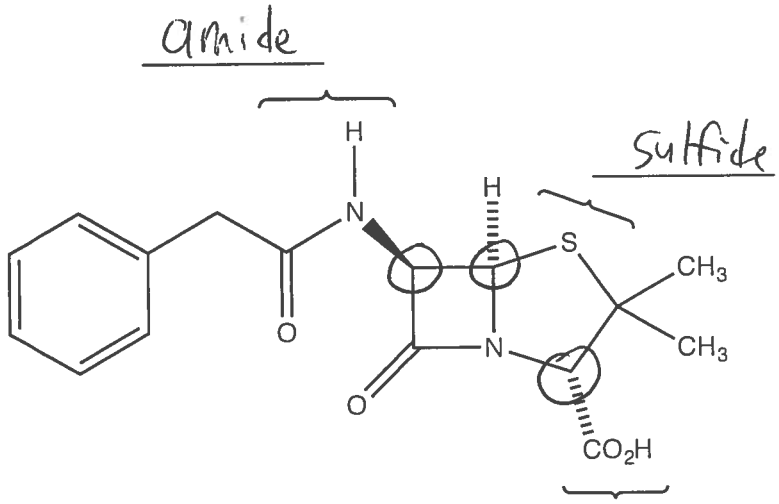
(d) 

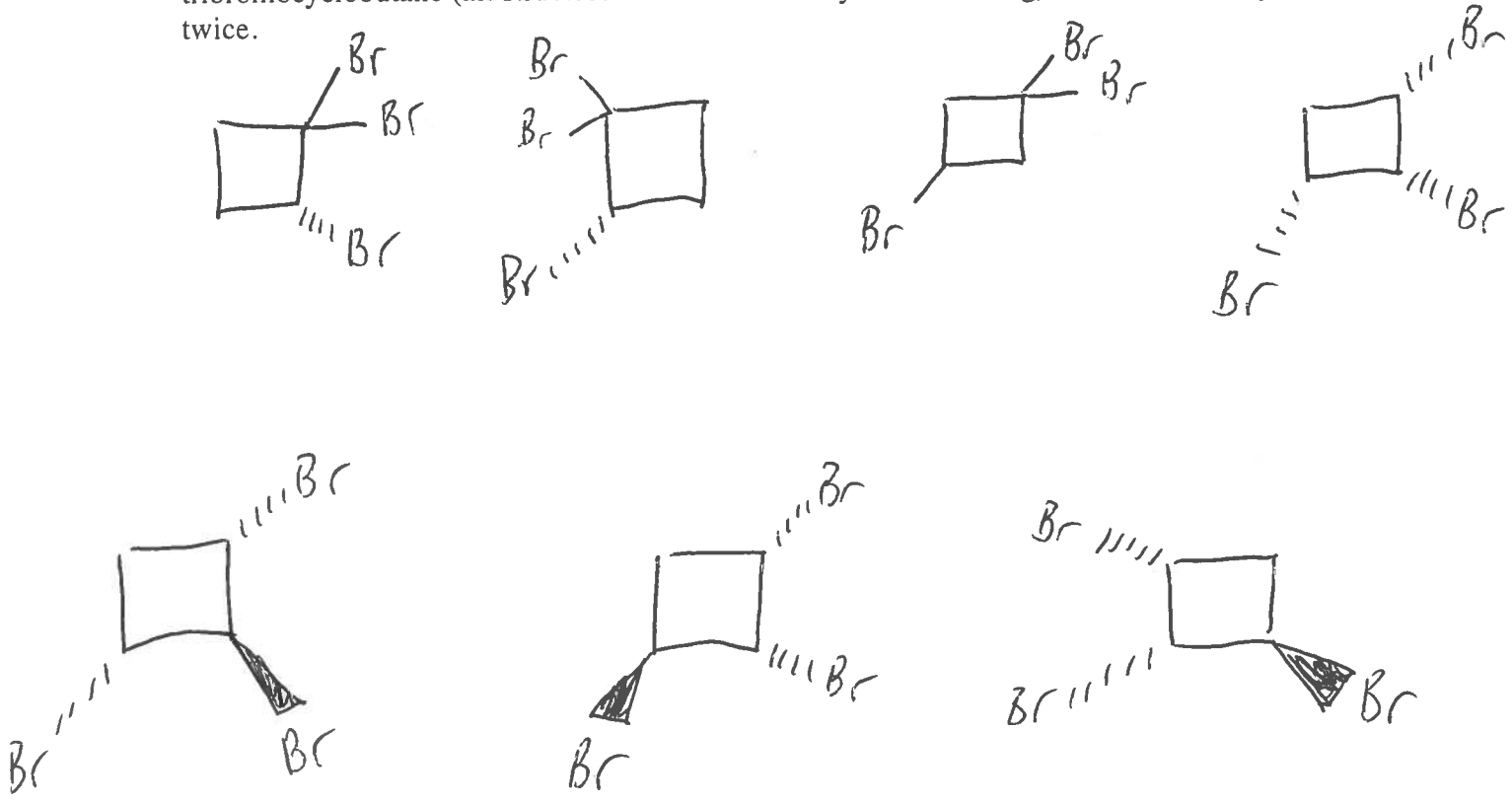
1

4. [10 points] For Penicillin G below, (a) provide the name of each functional group indicated by the brackets. (b) Circle each chirality or stereogenic center.

Penicillin G

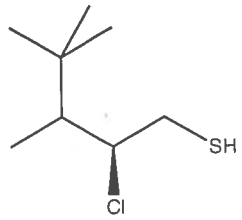


5. [15 points] Draw all of the constitutional isomers and stereoisomers of compounds named tribromocyclobutane (all structures must contain a cyclobutane ring). Do not draw any isomer twice.



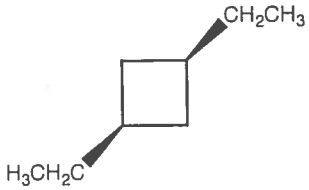
6. [10 points] Name the following compounds. Be sure to indicate stereochemistry where appropriate.

(a)



3,4,4-trimethyl-2-S-pentane thiol

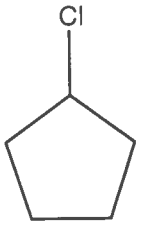
(b)



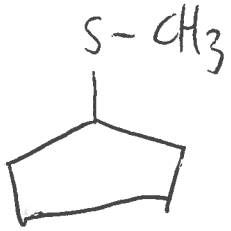
1,3-cis-diethyl cyclobutane

7. [16 points] Draw the major organic product for each of the reactions below. Show stereochemistry where appropriate.

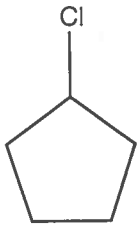
(a)



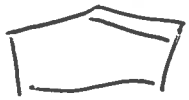
CH_3SH →



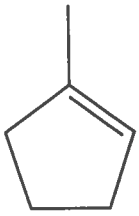
(b)



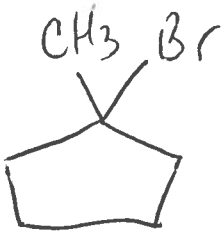
H_2SO_4, Δ, (no water) →



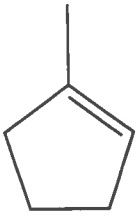
(c)



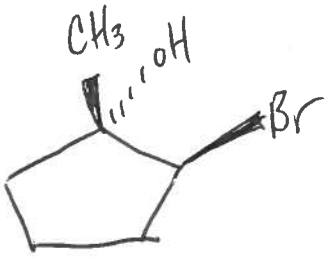
HBr, (no water) →



(d)



Br_2/H_2O →



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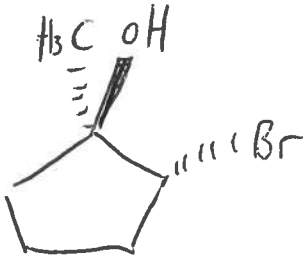
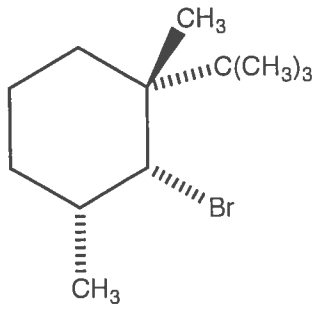
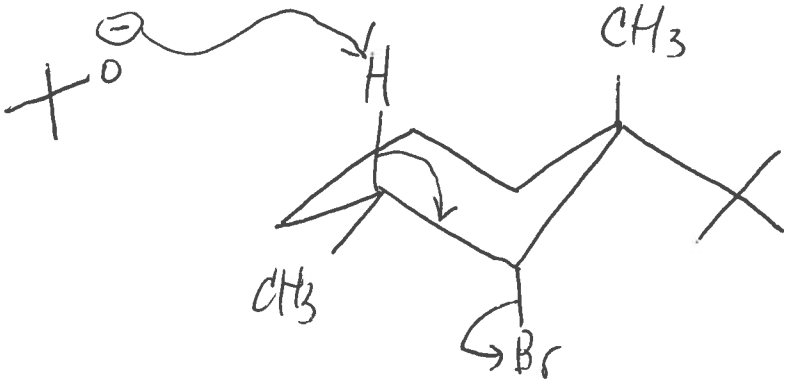
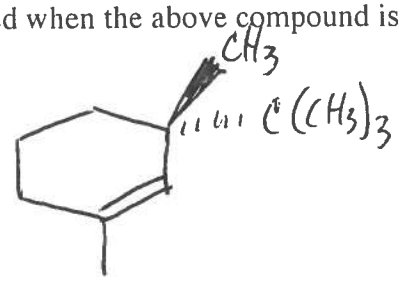


8. [15 points] (a) Draw the compound below in its most stable conformation.





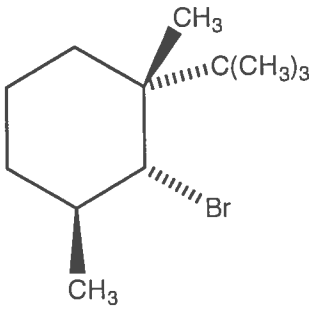
(b) Draw the product formed when the above compound is treated with sodium *t*-butoxide, $NaOC(CH_3)_3$.

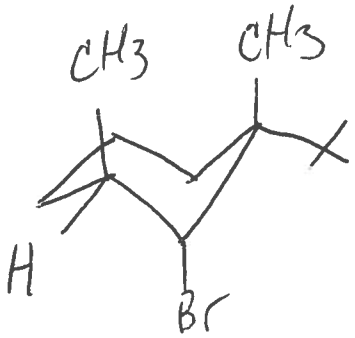


(c) Draw the mechanism for the reaction from part (b). Use the structure you drew in part (a).

See part (a)

(d) Explain why the isomer below is much slower to give the same product formed in part (b) under the same conditions.





There is no H that is anti (trans) to the Br.