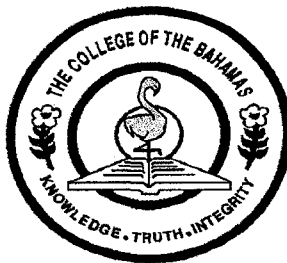


THE COLLEGE OF THE BAHAMAS



FINAL EXAMINATION

SEMESTER 01-2003

FACULTY OF PURE AND APPLIED SCIENCES
SCHOOL OF NATURAL SCIENCES AND ENVIRONMENTAL STUDIES

- X NASSAU
 FREEPORT
 EXUMA
 ELEUTHERA

DATE AND TIME OF EXAMINATION: Wednesday, April 16, 2003 at 2 p.m.
DURATION: 3 HOURS

COURSE NUMBER: CHEM 230

COURSE TITLE: ORGANIC CHEMISTRY I

STUDENT NAME:

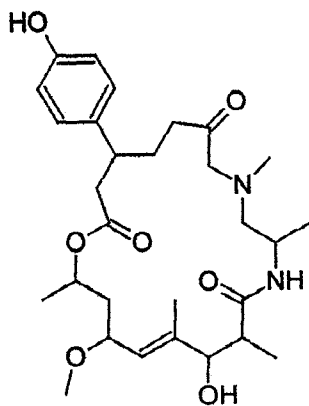
STUDENT NUMBER:

LECTURER'S NAME: Dr. D. Davis

INSTRUCTIONS TO CANDIDATES:

This examination paper consists of 12 questions on 7 pages (excluding this instruction page). Answer ALL questions in the spaces provided on the examination paper. Students are allowed to use calculators during this examination.

1. With regard for the following structure answer the questions below



(a) Circle and name all of the functional groups in the molecule. Where applicable indicate 1°, 2° and 3° groups.

[5 marks]

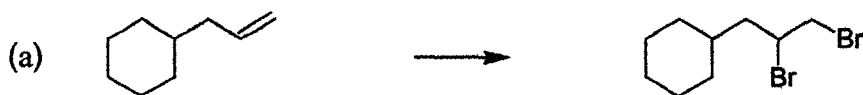
(b) Identify and label with an asterisk all of the stereocenters in the molecule.

[2 marks]

(c) How many stereoisomers of the molecule are possible?

[1 marks]

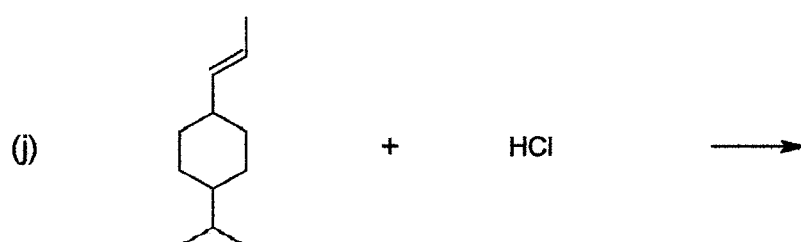
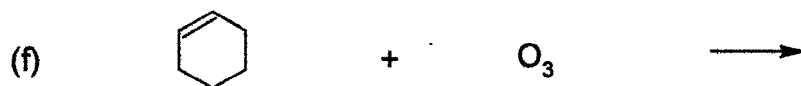
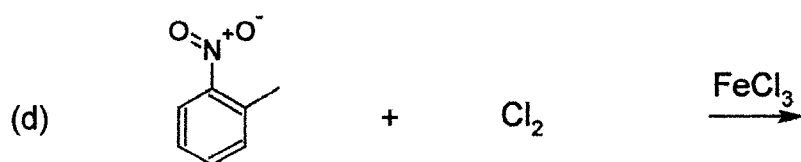
2. Add the necessary reagents and conditions to complete the following transformations?



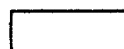
[4 marks]



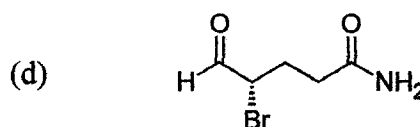
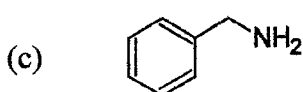
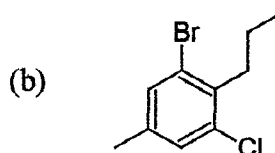
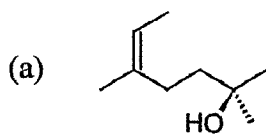
3. Add the products and/or reagents as required to complete the reactions below. Show stereochemistry where applicable.



[10 marks]



4. Give the systematic names, including stereochemical designation (*R*, *S*, *cis* or *trans*, etc.) where required for the following molecules:



[4 marks]

5. Draw the chemical structure, showing stereochemical designation (*R*, *S*, *cis* or *trans*, etc.) where required, for the following molecules:

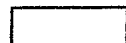
(a) 2,3-dimethylbenzoic acid

(b) *trans*-3-heptene

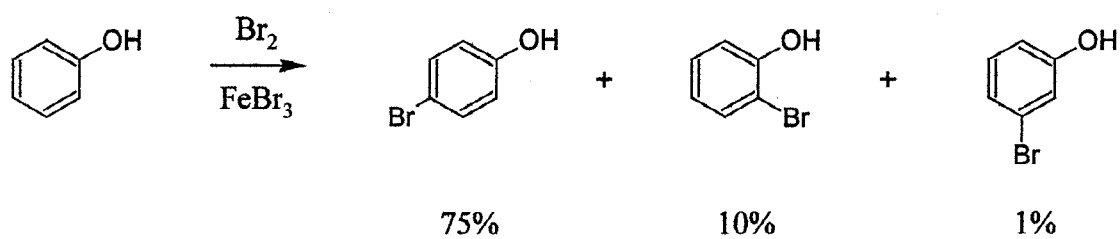
(c) 4-[(1*R*,3*R*)-1-hydroxy-3-methylpentyl]phenol

(d) (*R*)-4-amino-3-oxohexanal

[4 marks]



6. Explain the product ratio given below, your explanation must account for the formation of the major product as well as the minor products. Curved arrow mechanisms combined with a few sentences may be your best approach to providing a complete answer to this question.




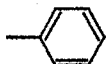
7. Four stereoisomers exist for 3-penten-2-ol. Draw and give the full stereochemical name of the four possible isomers of 3-penten-2-ol.

[4 marks]

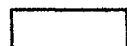
8. A 50/50 mixture of (trifluoromethyl)benzene and toluene was reacted with chlorine in the presence of FeCl_3 . The major product was *p*-chlorotoluene with only a trace amount of 1-chloro-4-(trifluoromethyl)benzene. How do you explain the observed product ratio?

[4 marks]

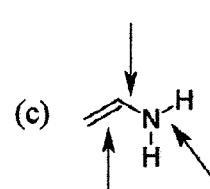
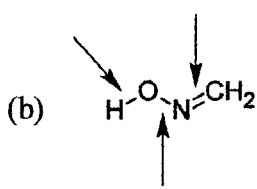
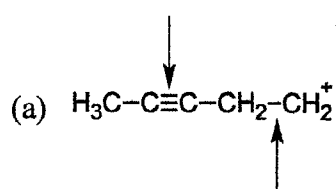
9. Assign priority numbers to the following groups. Let the number 4 represent the group of highest priority and the number 1 represent the group of lowest priority.

	-COOH	-CH ₂ NH ₂	-CH ₂ NHCH ₃	
(a)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	-SH	-SCH ₃	-CH ₂ CH ₃	-OH
(b)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
		-CH ₂ CH=CH ₂	-C≡CH	-CH=C=CH ₂
(c)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	-OH	-F	-NH ₂	-N=NH
(d)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

[4 marks]

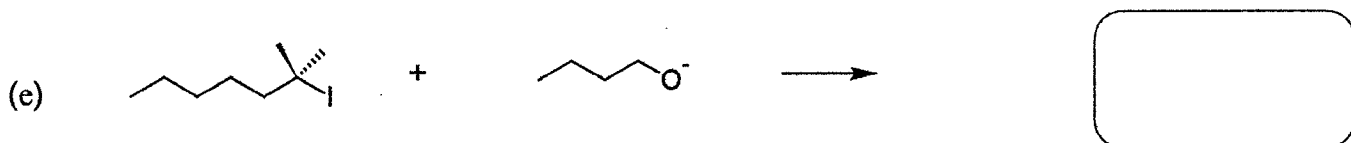
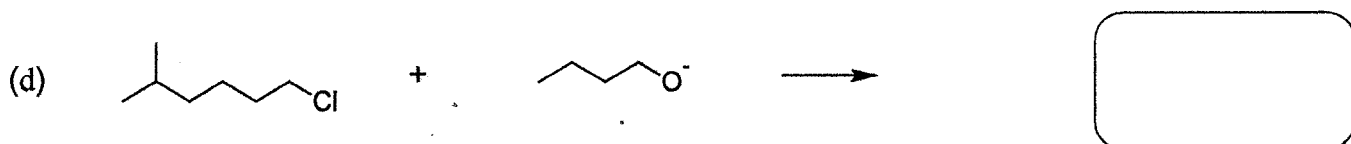
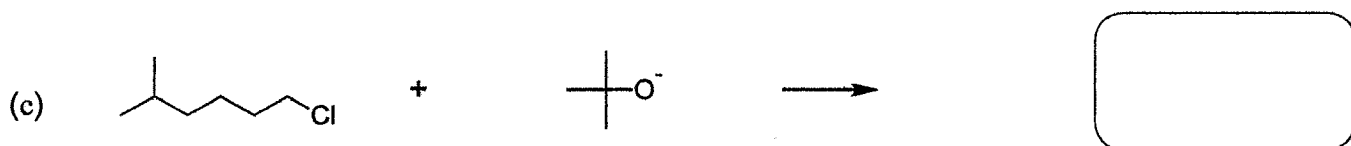
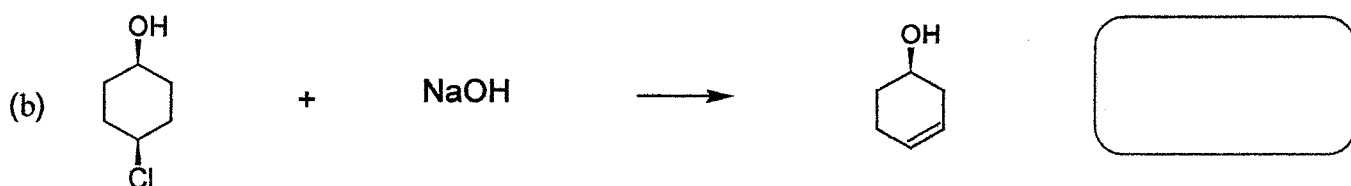
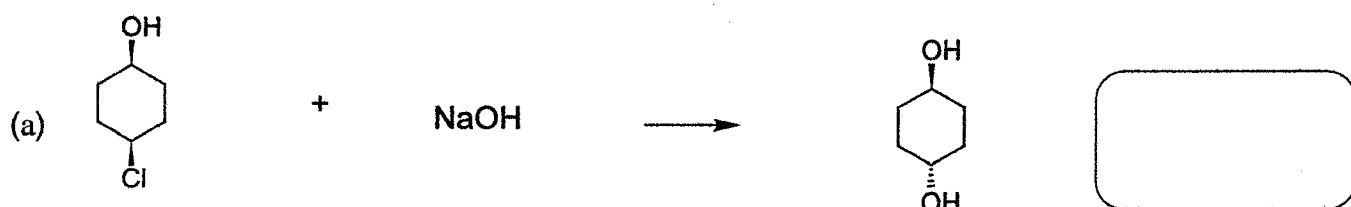


10. Identify and label which atomic orbitals are involved in the formation of the bonds highlighted in the following molecules.



[6 marks]

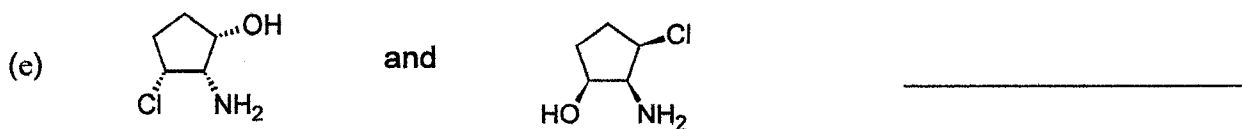
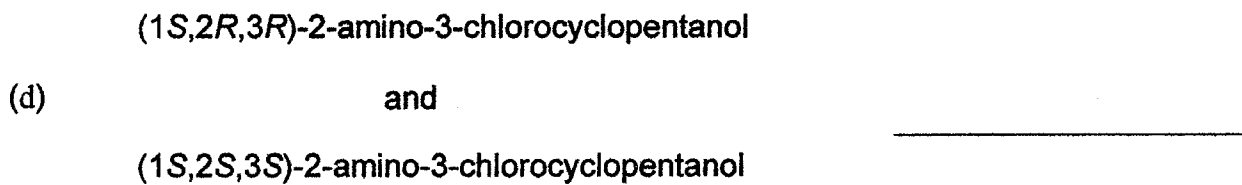
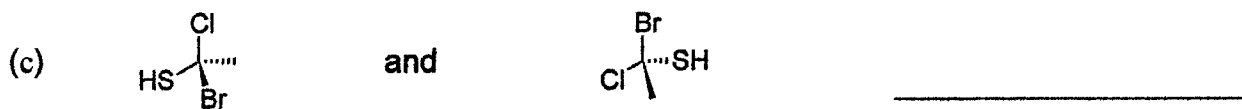
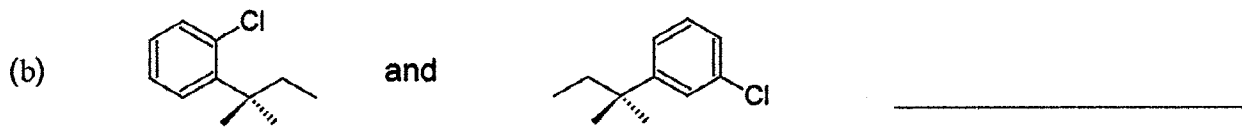
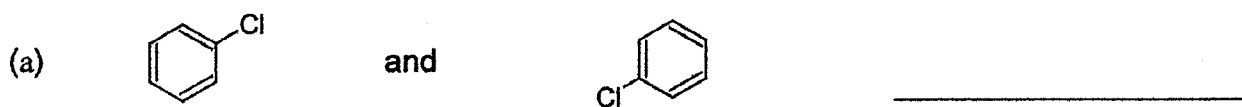
11. For the reactions shown below, specify the most likely mechanism (e.g., $\text{S}_{\text{N}}1$, $\text{S}_{\text{N}}2$, $\text{E}1$, $\text{E}2$) by which each will proceed?



[5 marks]



12. Assign one designation of “identical”, “enantiomers”, “diastereomers” or “constitutional isomers” to each pair of molecules below.



[5 marks]

***** End of Examination *****

