CHEM 2OB3 Test 2 March 14, 2008 Answer Key

NAME (First and Last):_____ ID#:_____

Lab Station*:* _____ (*Print 'E' if you are exempt from the labs*)

Please circle your lab section in the table below.

Group	Tuesday	Wednesday	Thursday	Friday
I	L02	L03	L04	L05
II	L07	L08	L09	L10

Duration: 90 minutes Instructor: Dr. A. Capretta

Instructions:

This examination paper consists of 12 pages, containing 15 (fifteen) multiple choice (MC) questions, and 5 (five) short answer questions. Only **Casio FX 991** calculators and a molecular model kit may be used.

You are responsible for ensuring your copy of the question paper is complete.

You are responsible for ensuring all answers are in the correct place, and that you follow the correct procedure for filling out the scan sheet.

All McMaster rules and procedures relating to **Academic Dishonesty and Academic Integrity** apply to this exam; **all violations will result in a penalty**. Students **must** do their own work. A program designed to detect similar answers will be used for this exam.

You MUST also complete ALL the information at the top of this page.

Questions 1 -15 (MC)	Question 16	Question 17	Question 18	Question 19	Question 20	SHORT ANSWER TOTAL
/30	/20	/8	/8	/10	/10	/56

OMR EXAMINATION – STUDENT INSTRUCTIONSOMR EXAMINATION – STUDENT INSTRUCTIONS

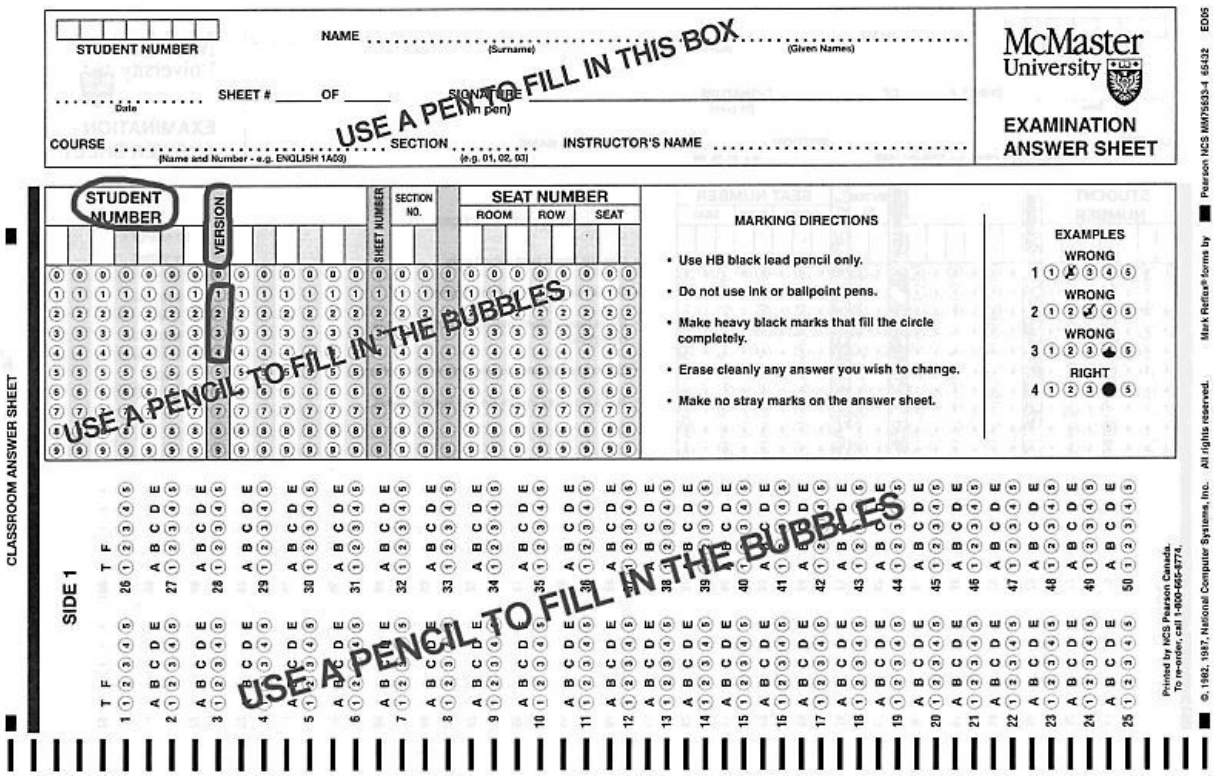
NOTE: IT IS YOUR RESPONSIBILITY TO ENSURE THAT THE ANSWER SHEET IS PROPERLY COMPLETED. YOUR EXAMINATION RESULT DEPENDS UPON PROPER ATTENTION TO THESE INSTRUCTIONS.

The scanner, which reads the sheets, senses the bubble shaded areas by their non-reflection of light. **A heavy mark must be made, completely filling the circular bubble, with an HB pencil.** Marks made with a pen will **NOT** be sensed. Erasures must be thorough or the scanner will still sense a mark. Do **NOT** use correction fluid on the sheets. Do **NOT** put any unnecessary marks or writing on the sheet.

1. On SIDE 1 (**red side**) of the form, in the top box, print your student number, name, course name, and the date in the spaces provided, *in pen*. Then you **MUST** write your signature, in the space marked SIGNATURE.

2. In the second box, mark your **student number** and **test or exam version number (1, 2, 3 …)** by filling in the corresponding bubbles underneath, *in pencil*. Then fill in your section number; section 01 and section 02 are Dr. Capretta's sections.

3. Answers: mark only **ONE** choice from the alternatives (A,B,C,D,E) provided for each question. The question number is to the left of the bubbles. Make sure that the number of the question on the scan sheet is the same as the number on the test paper. Begin answering Question # 1 using the first set of bubbles, marked "1". Do Not use Side 2.



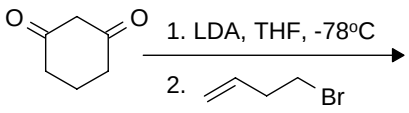
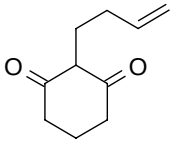
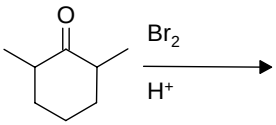
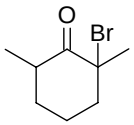
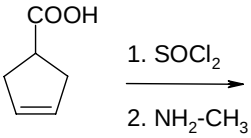
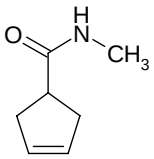
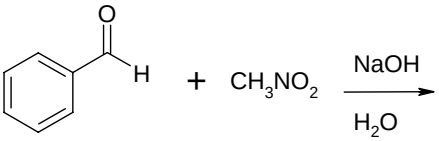
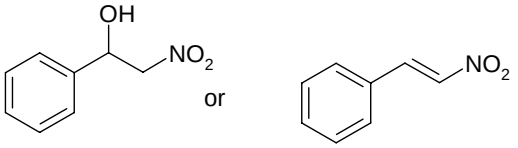
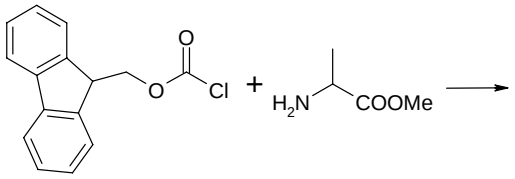
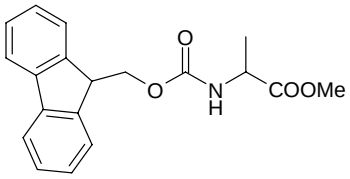
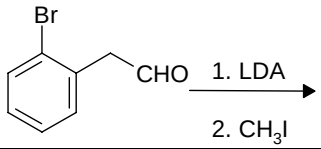
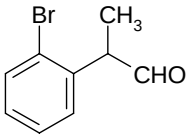
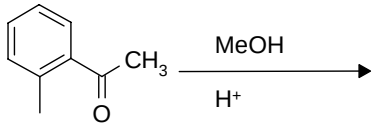
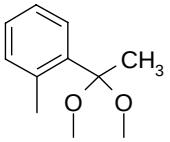
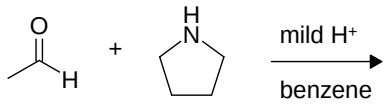
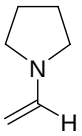
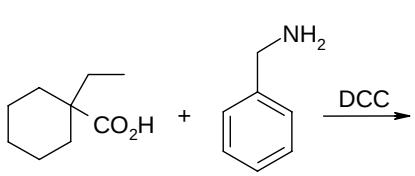
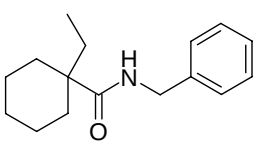
Section 1 – Multiple Choice [2 marks each].

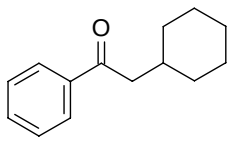
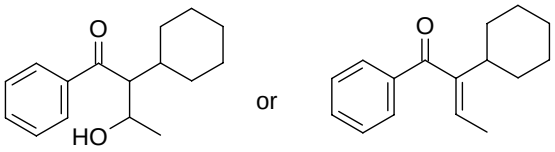
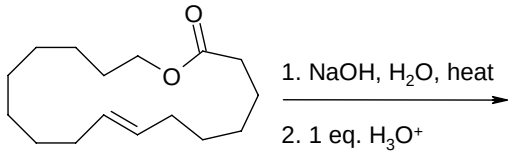
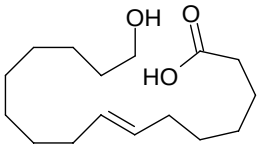
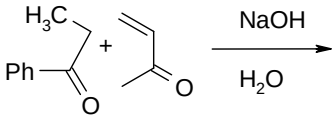
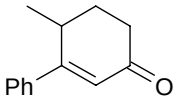
All versions the same:

1. E
2. B
3. A
4. A
5. C
6. C
7. C
8. B
9. D
10. B
11. C
12. D
13. D
14. C
15. D

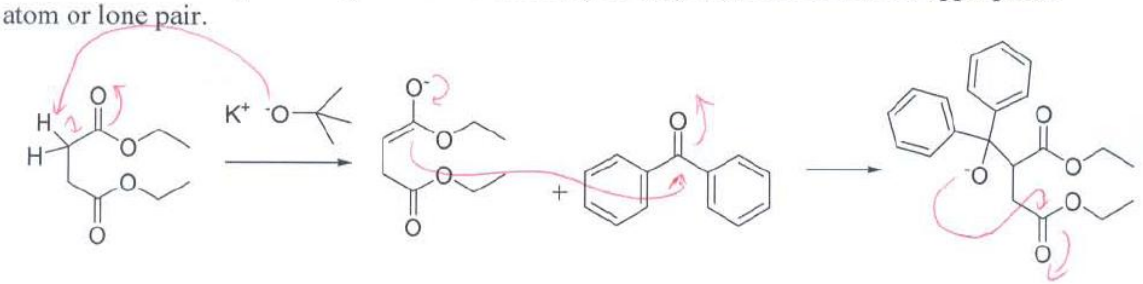
End of multiple choice.

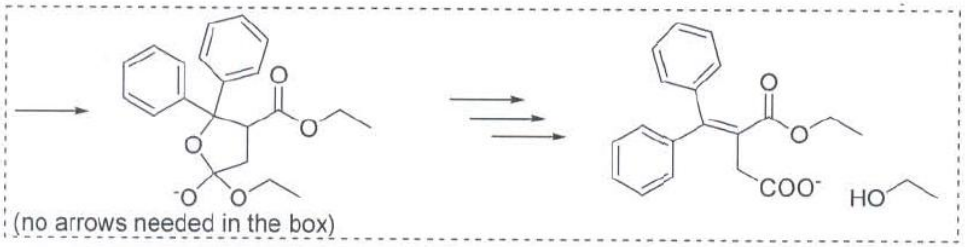
Question 16. Draw the MAJOR product for **ten** of the twelve reactions below. If more than 10 are attempted, the first 10 will be marked.

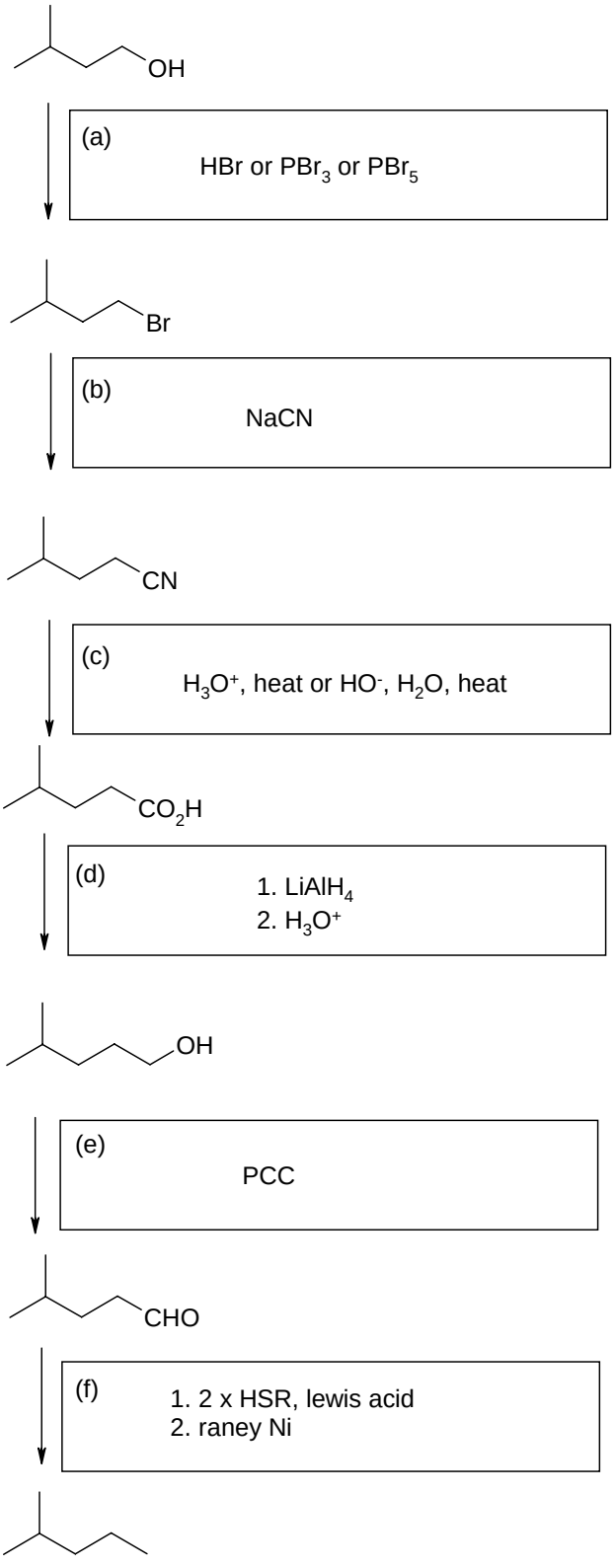
Question 17. For the reaction below, draw the appropriate "curly arrows" to show the flow of electrons in each step. Place your arrows carefully so they start and end at the appropriate atom or lone pair.



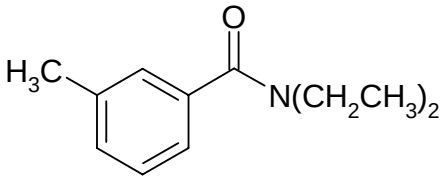


Question 18.

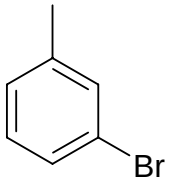
Identify the missing reagents (a-f) in the following scheme. Please delineate multiple steps.



Question 19 N,N-Diethyl-*m*-toluamide (DEET) is the active ingredient in many insect repellants. Outline a synthesis of this substance from *m*-bromotoluene and any other reagents you need.

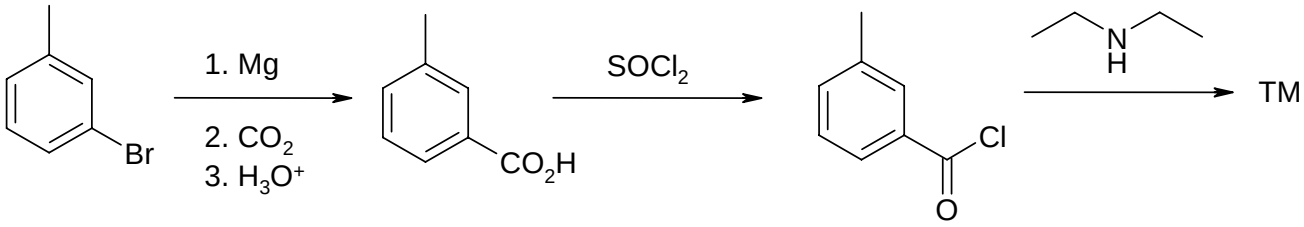


from

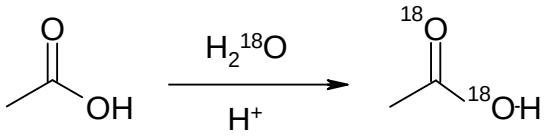


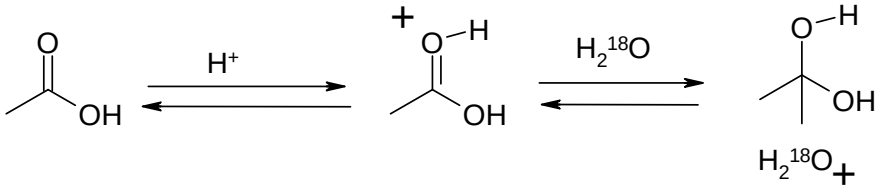
N,N-Diethyl-*m*-toluamide (DEET)

m-bromotoluene

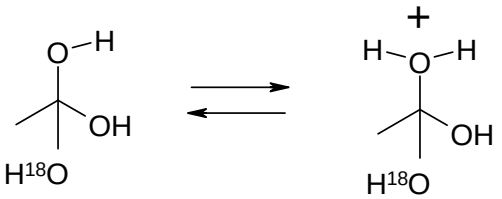


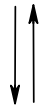
Question 20. When a carboxylic acid is dissolved in ^{18}O labeled water containing a drop of acid, the ^{18}O label rapidly becomes incorporated into both oxygen atoms of the carboxylic acid. Explain why. Use a mechanism to illustrate your answer.





Protonation of any of these hydoxyls can now take place followed by formation of a carbonyl and loss of water





Given that the reaction uses ^{18}O labelled water as the solvent, the reaction will be driven so as to incorporate ^{18}O at all the oxygen positions.