

Exam 3. Chem 3045**Friday, December 4, 1998**

Instructions: This is a 50 minute, open book examination. You may use any notes, books, or external materials you choose during the course of the examination. **PRINT CLEARLY** your name and social security number on the front page of the examination in the indicated space below. Also please **PRINT YOUR NAME ON TOP OF EACH PAGE OF THE EXAM.**

Be sure to allot your time in a manner that is related to the point value of the question. All material to be graded should be written on the exam sheet in the space provided or on the back page of the exam sheet. Please show your thinking and if you wish indicate any assumptions or rules you are following to produce an answer. Any relevant ideas will receive credit even if the answer is incomplete.

YOUR NAME: _____

YOUR SOC. SEC. NUMBER: _____

Question 1:	10 Points	_____
Question 2:	10 Points	_____
Question 3:	10 Points	_____
Question 4:	10 Points	_____
Question 5:	20 Points	_____
Question 6:	40 Points	_____

TOTAL 100 Points

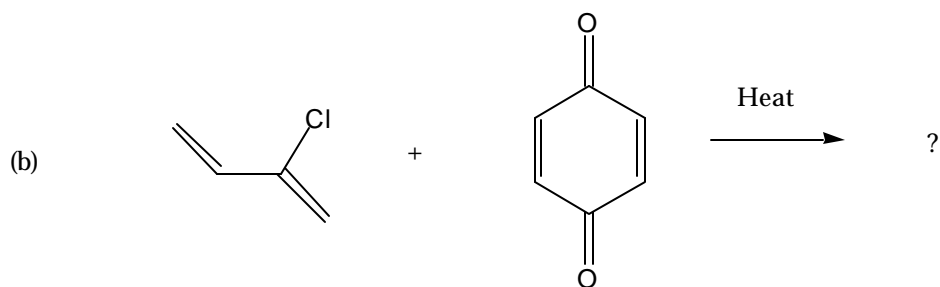
1. (10 Points). Which molecule has the shorter CH bond, acetylene or ethane? Explain the reason for your choice.

2. (10 Points. 5 Points each part). Which of the following substances is capable of cis-trans-isomerization? Which of the following substances is capable of optical isomerism? Briefly explain your reasoning.
 - (a) 1,3-dichloro propadiene

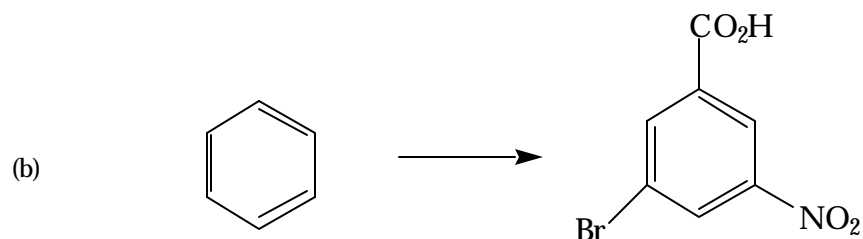
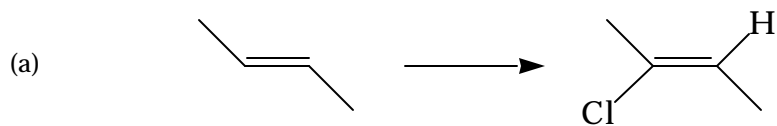
 - (b) 1,4-dichloro butatriene

3. (10 Points). One mole of HCl reacts with one mole of 1,3-cyclopentadiene to yield a single product. What is the structure of the product? Explain your reasoning for full credit.
4. (10 Points) A chemist prepares a sample of 3-bromo-1-butene and finds by NMR analysis that it is 100 % pure. A year later the NMR is repeated and the 3-bromo-1-butene is found by NMR analysis to have been converted to another material (X). Further analysis of the sample shows that X is isomeric with 3-bromo-1-butene. Suggest a structure for X and a mechanism for its formation.

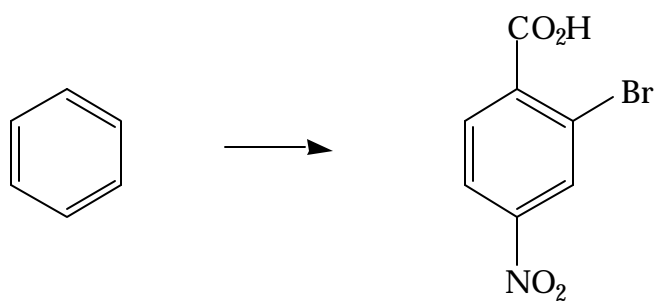
5. (20 Points). Suggest the major product expected to be formed for the following reactions:



6. (40 Points). Suggest a plausible synthesis of the indicated products starting with the indicated starting material. You may use any other organic or inorganic materials you require for the paper syntheses.



(c)



(d)

