

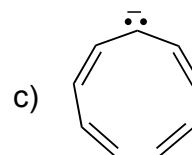
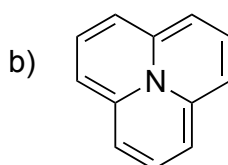
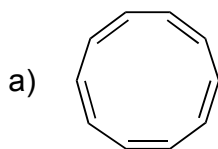
Date: 30/9/2016

Marks: [45]

Duration: 2 h

- 1) For each molecule below, predict whether it is aromatic, anti-aromatic or nonaromatic. Explain the basis for your prediction in fewer lines.

(6 marks)

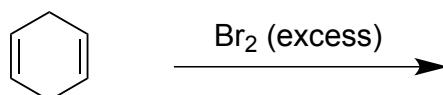


- 2) Draw the most stable conformation of 3-pentanone.

(2 marks)

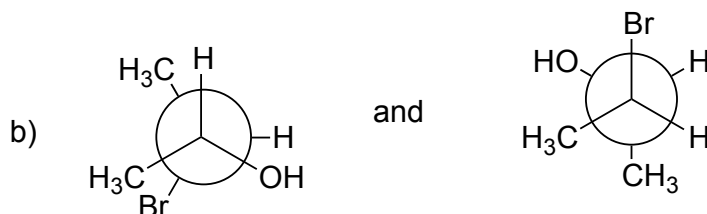
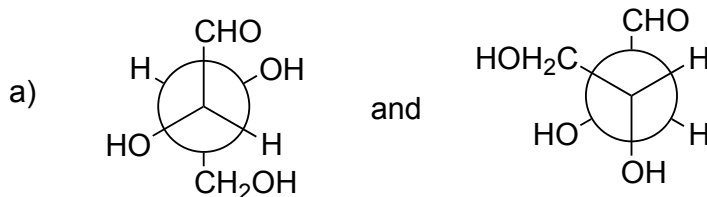
- 3) Draw all possible stereoisomeric products of the following bromination reaction.

(3 marks)

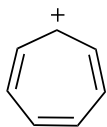


- 4) Indicate whether the following pairs of compounds are identical, enantiomers, or diastereomers.

(6 marks)



- 5) Explain the stability of the following cation using HMO (Hückel molecular orbital) energy diagram for conjugated planar ring systems.



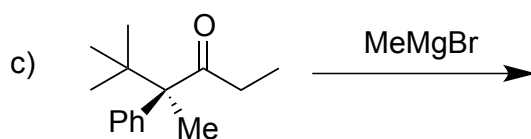
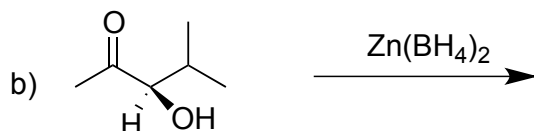
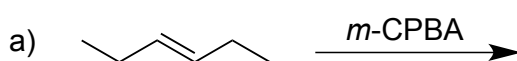
(3 marks)

- 6) Draw the most stable conformation of *cis*-5-*tert*-butyl-2-methyl-1,3-dioxane.

(2 marks)

- 7) Draw the major products of the following reactions with relevant stereochemistry.

(9 marks)

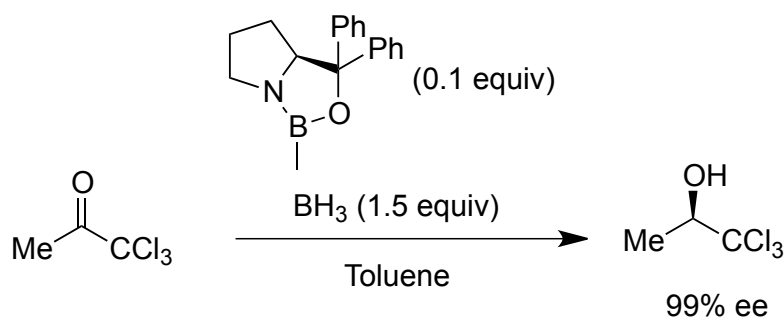


- 8) Choose an E2 elimination reaction of your choice and draw an energy diagram for the same. Predict the rate determining step, and structures of transition states, intermediates and products as applicable.

(3 marks)

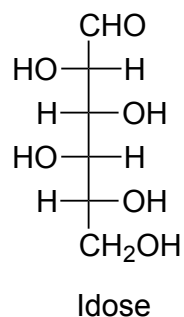
- 9) Draw a possible transition state (with catalyst, electrophile and nucleophile) of the following CBS reduction to explain the enantioselectivity of the product.

(3 marks)



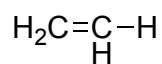
- 10) Draw chair conformations of α -D-Idopyranose and β -D-Idopyranose of the following Idose.

(3 marks)

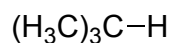


- 11) Rank the following C–H bonds in decreasing order of bond dissociation energies (strongest C–H bond first).

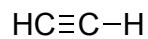
(2 marks)



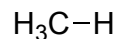
A



B



C



D

- 12) ^1H -NMR spectrum of cyclooctatetraene shows a singlet at 5.78 ppm. But the ^1H -NMR spectrum of cyclooctatetraene dissolved in H_2SO_4 shows four peaks at 8.5 (5H), 6.4 (2H), 5.1 (1H) and -0.3 (1H) ppm. Predict the product and explain the data.

(3 marks)