

University of Canterbury

End of Year Examinations 2009

Prescription Number(s):	CHEM 402
Paper Title:	Organic Chemistry

Time Allowed: TWO HOURS

Number of pages: EIGHT

Answer **THREE** questions out of FOUR.

All questions are of equal value.

1. (a) (10 marks)

Predict the product of **ONE** the following reactions, providing a detailed mechanism for its formation.

(i)

(ii)

(b) (23 marks)

Investigations of the synthesis of spirocyclic benzofuranones, such as **1**, have used *domino* reactions to give products from a one pot reaction. In the reaction shown below, intermediate **2** is not isolated. It is **NOT** necessary to include a discussion of the stereochemistry of reactions or products as part of your answer.

- (i) Give the structure of intermediate **2**, detailing the types of reactions occurring and indicating any intermediates formed in its formation.
- (ii) Show how **1** is formed from **2**, detailing the types of reactions occurring and indicating any intermediates formed in the course of the transformation.
- (iii) Discuss why it is not necessary to isolate intermediate **2**.

TURN OVER

2. (a) (14 marks)

For **ONE** of the following reactions show how the product is formed, detailing the types of reactions occurring and indicating any intermediates formed in the course of the transformation. It is **NOT** necessary to include a discussion of the stereochemistry of the product.

(i)

(ii)

(b) (19 marks)

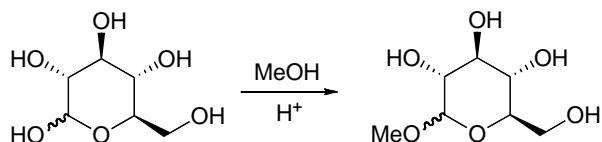
The reaction of the dibromide compound shown below with palladium gives a mixture of isomeric products **A** and **B**.

(i) Give the structure of **ONE** of the products and show how it is formed, detailing the types of reactions occurring and indicating any intermediates formed during the course of the transformation.

(ii) Give the structure of the **OTHER** product, and explain why the reaction gives a mixture of **A** and **B**.

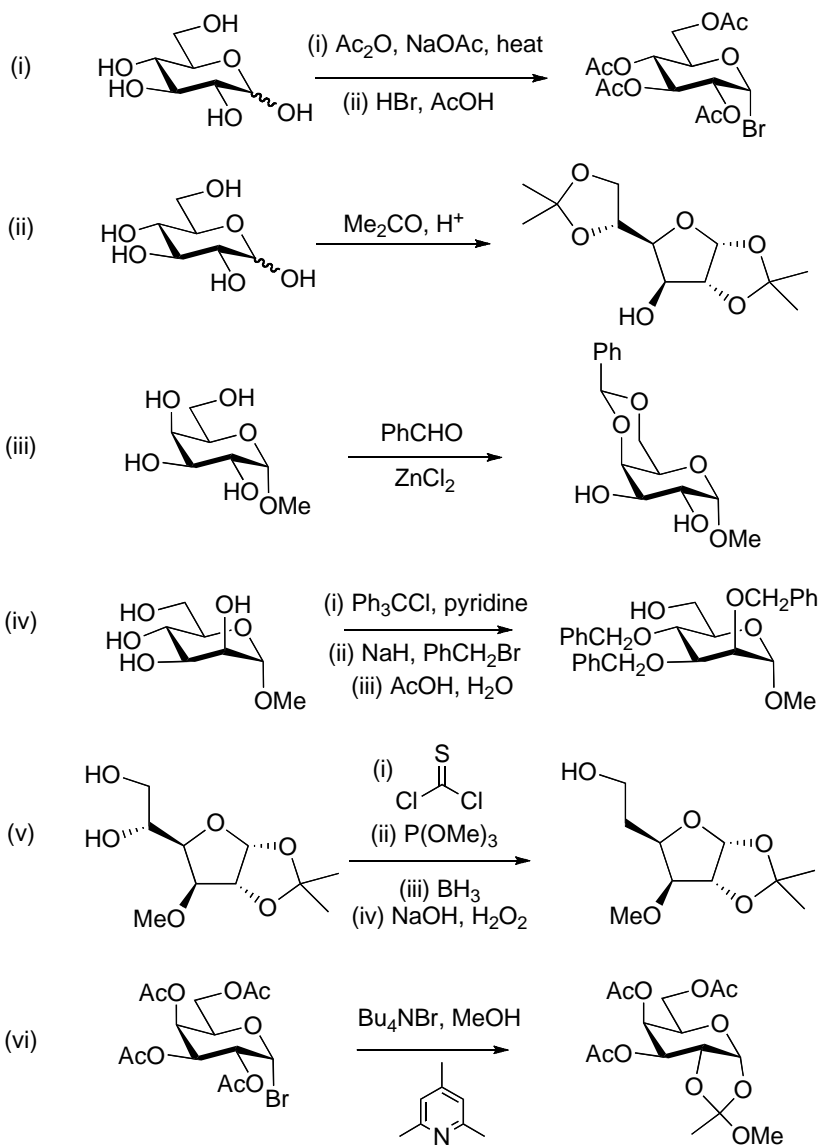
3. (a) (8 marks)

Give a mechanism for the following reaction. It is found that only one stereoisomer is formed; predict which this is, and explain fully why it is the preferred product.



(b) (4 x 5 marks)

Give mechanistic explanations of the chemistry involved in **FOUR** of the following synthetic transformations. Your answers should include comments on any regio- and stereochemical control as appropriate.



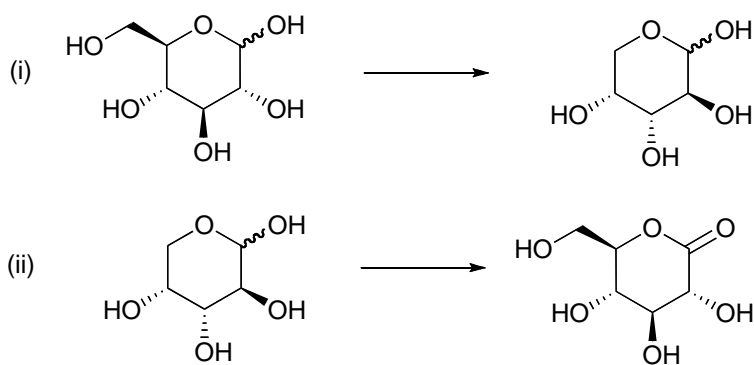
Question 3 continued on following page

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Question 3 continued

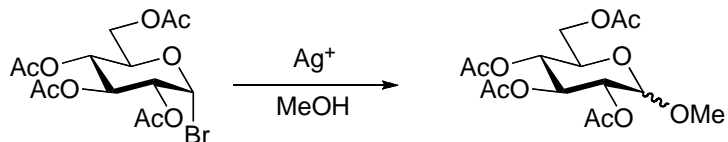
(c) (5 marks)

Suggest how you could achieve one of the following synthetic conversions (mechanisms are not required). More than one step may be required.



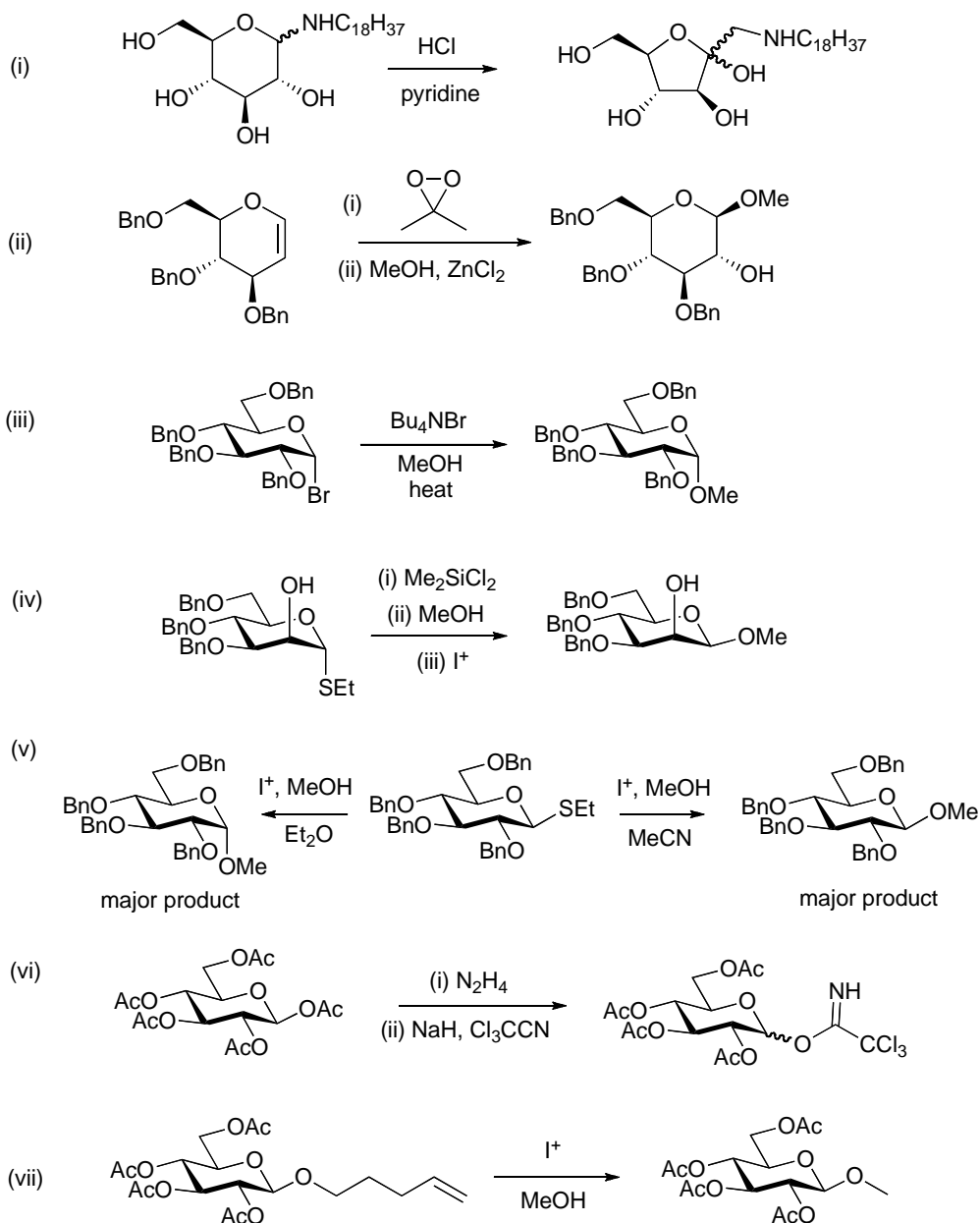
4. (a) (8 marks)

Give a mechanism for the following reaction. It is found that only one stereoisomer is formed; predict which this is, and explain fully why it is the preferred product.



(b) (4 x 5 marks)

Give mechanistic explanations of the chemistry involved in **FOUR** of the following synthetic transformations. Your answers should include comments on any regio- and stereochemical control as appropriate.

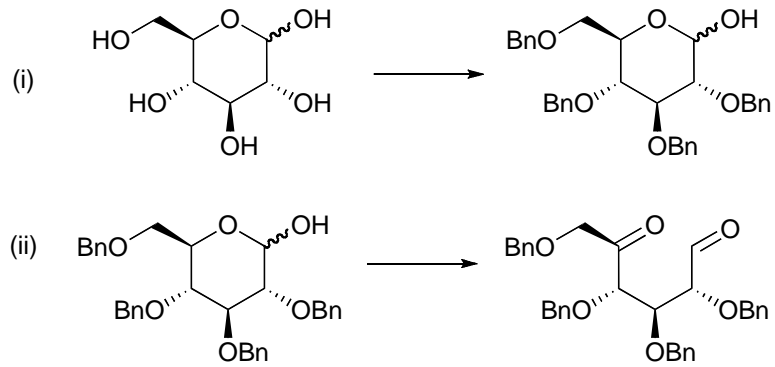


Question 4 continued on following page

Question 4 continued

(c) (5 marks)

Suggest how you could achieve one of the following synthetic conversions (mechanisms are not required). More than one step may be required.



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