

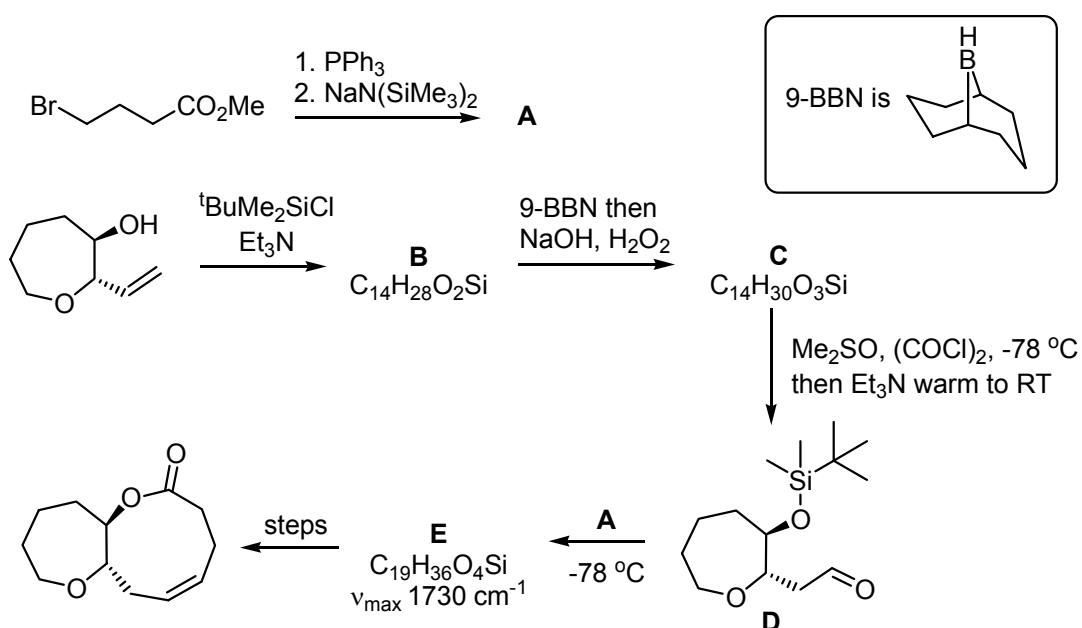
**P, S, Si and B Chemistry: Exam Question 06550, Jan 2008**

Page 1 This page  
Page 2-3 Exam question from Jan 2008  
Pages 4-7 Answer. Try the problems before you look at this page!

1. Answer part (a) and **two** from parts (b)-(e).

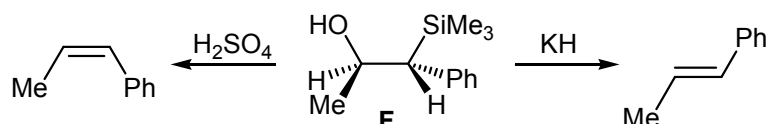
(a) Consider the scheme below which describes a route to a fragment of the marine natural product brevetoxin.

- Work out the structures of **A**, **B**, **C** and **E**.
- Give a mechanism for the conversion of **C** to **D**.
- Explain the stereochemical outcome of the conversion **D** to **E**.



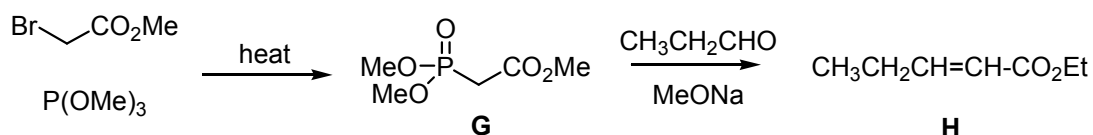
(10, 3, 2 marks)

(b) Hydroxysilane **F** produces isomeric alkenes depending on whether treated with acid or base. Using reaction mechanisms account for this difference in behaviour.



(5 marks)

(c) Using a reaction mechanism show how phosphonate **G** can be made from the reagents given. Predict, with a brief explanation, the stereochemistry of the carbon-carbon double bond in **H**.

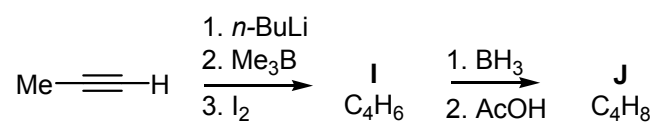


(5 marks)

(Q1 continued)

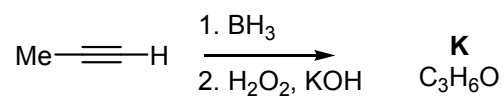
**P, S, Si and B Chemistry: Exam Question 06550, Jan 2008**

- (d) Consider the following scheme and work out the structures of **I** and **J**.



(5 marks)

- (e) Consider the following scheme and work out the structure of **K**.



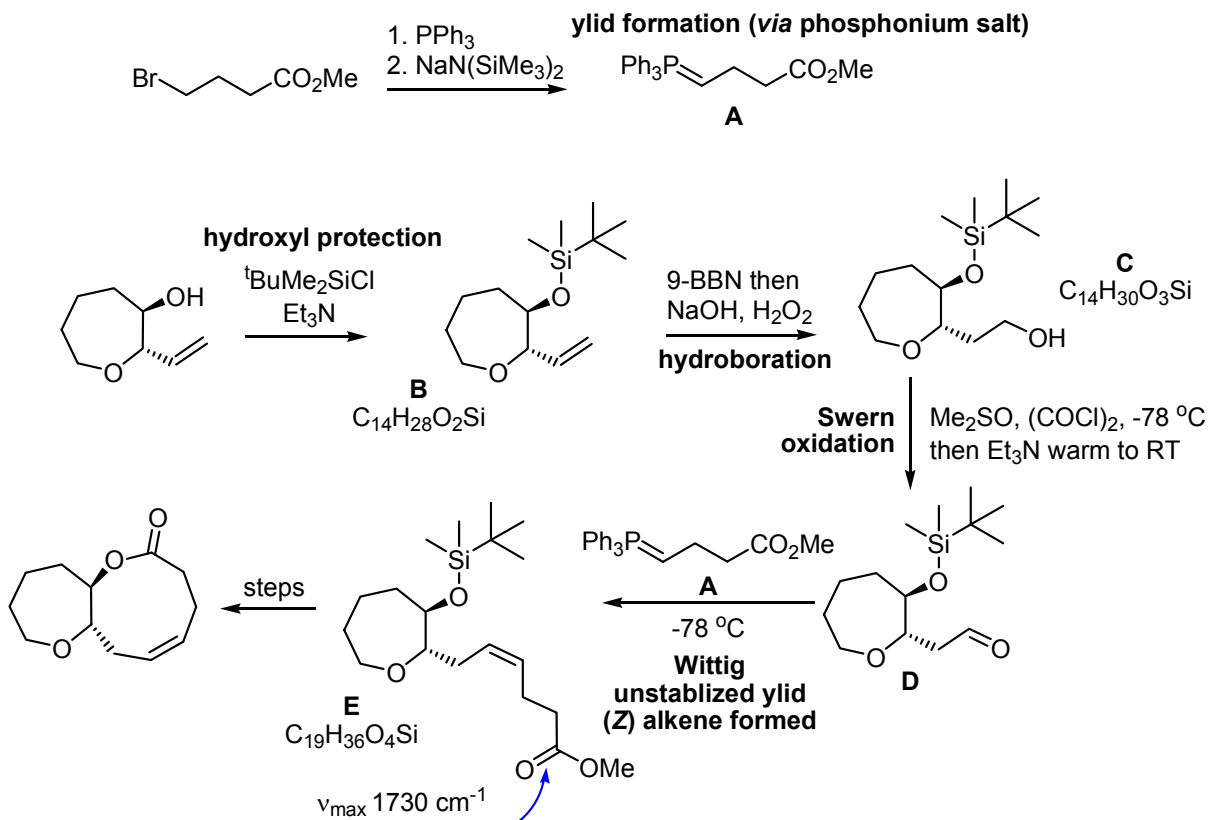
(5 marks)

P, S, Si and B Chemistry: Exam Question 06550, Jan 2008

1. Model answer

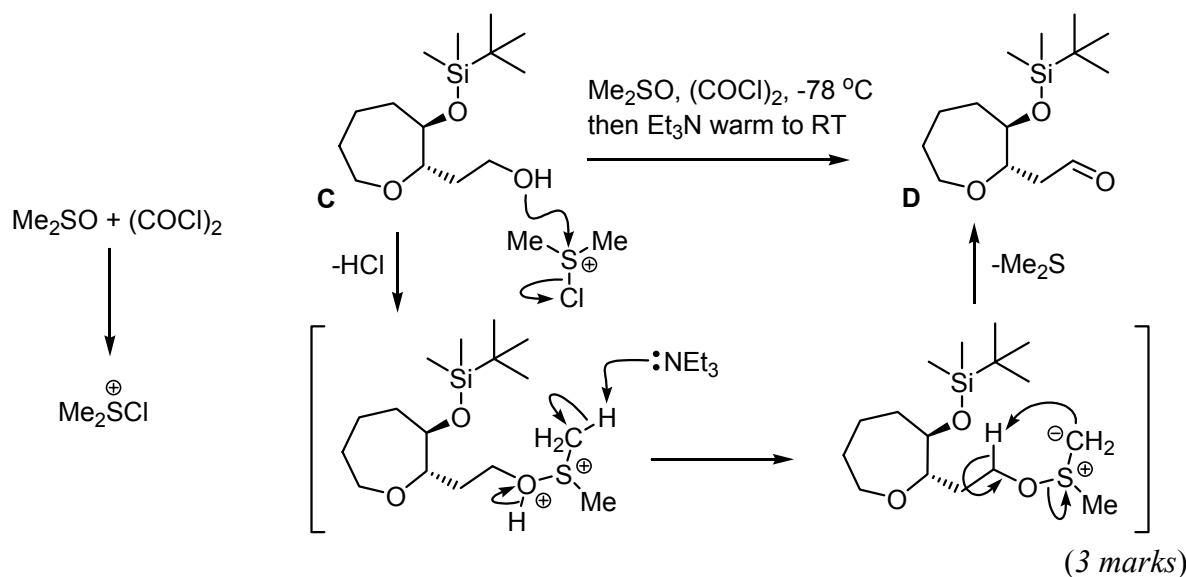
(a) Consider the scheme below which describes a route to a fragment of the marine natural product brevetoxin.

(i) Work out the structures of A, B, C and E.



(10 marks)

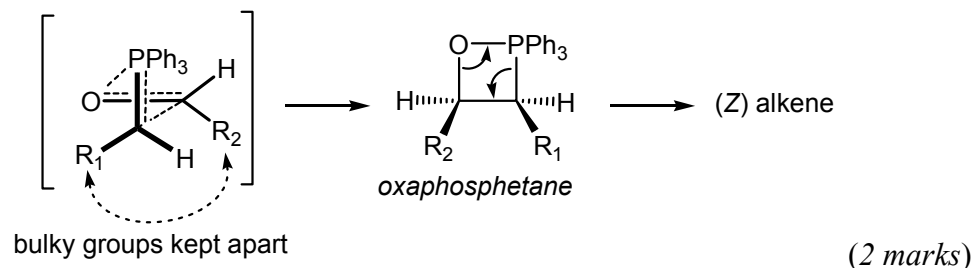
(ii) Give a mechanism for the conversion of C to D.



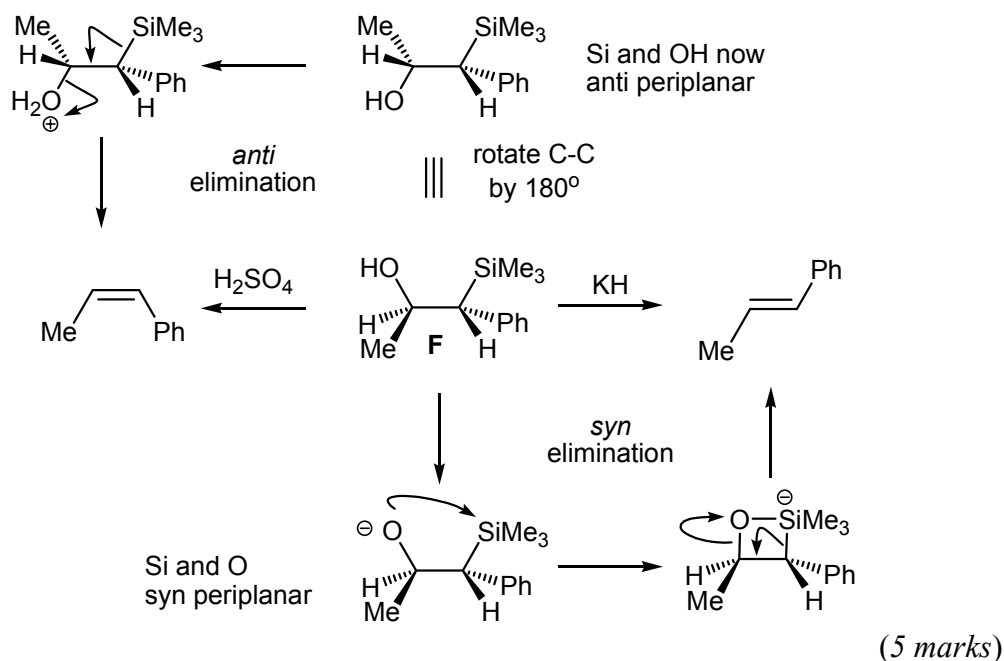
**P, S, Si and B Chemistry: Exam Question 06550, Jan 2008**

(iii) Explain the stereochemical outcome of the conversion **D** to **E**.

**D**, an aldehyde, reacts with unstabilized ylid **A** under Li-free conditions (using NaHMDS as base). Under these conditions, the addition is essentially irreversible and goes directly to the *syn*-oxaphosphetane, which then leads to the (*Z*)-alkene.

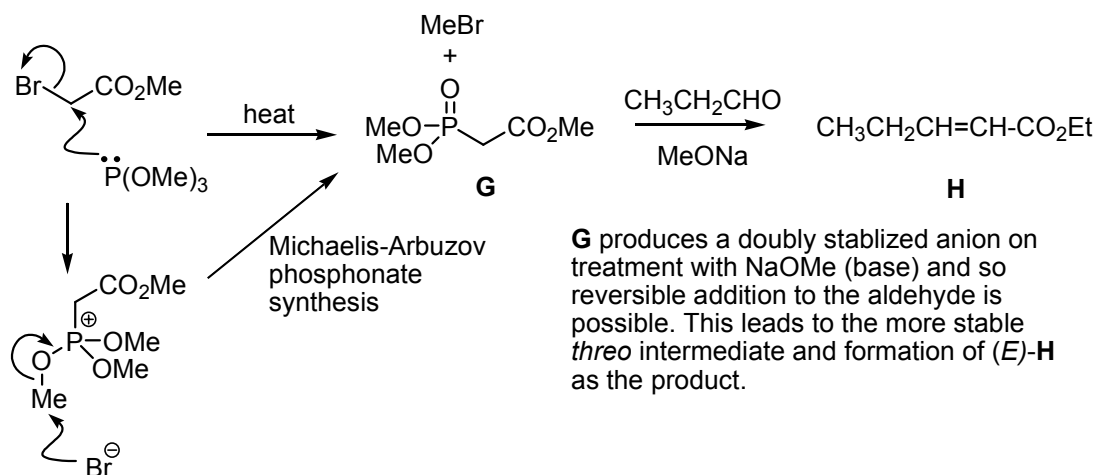


(b) Hydroxysilane **F** produces isomeric alkenes depending on whether treated with acid or base. Using reaction mechanisms account for this difference in behaviour.



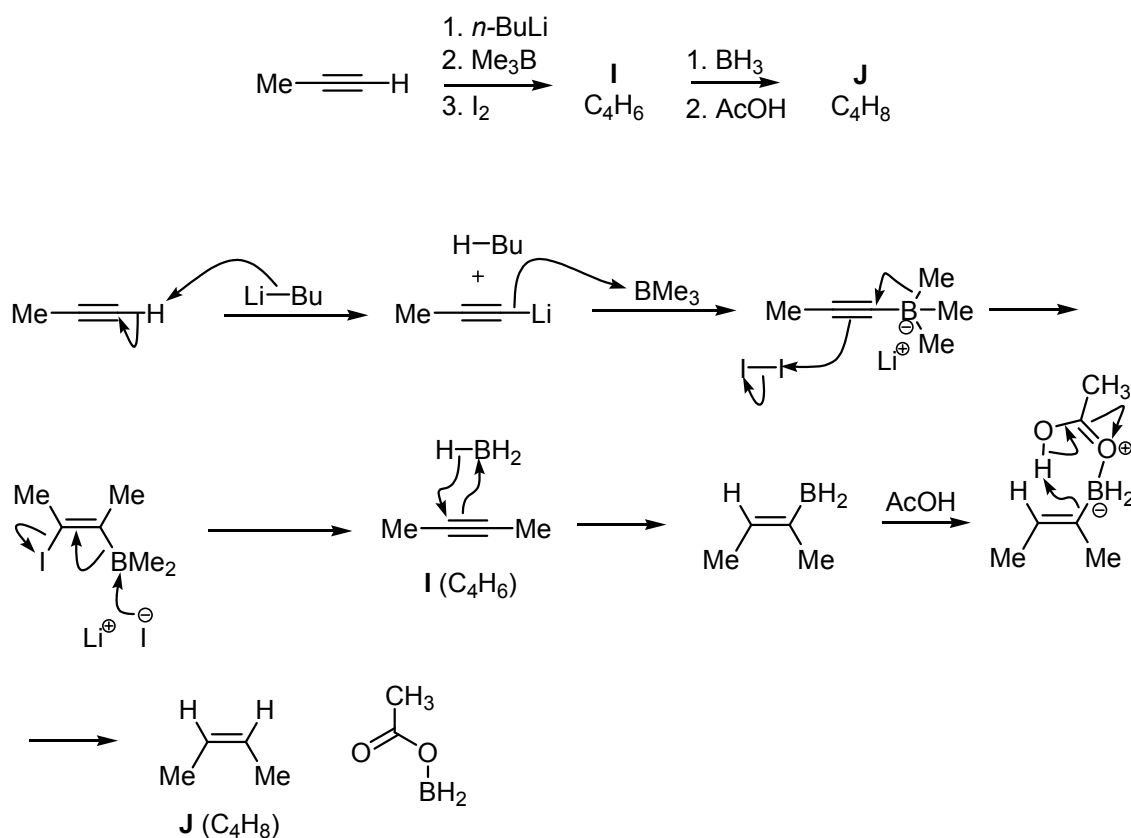
P, S, Si and B Chemistry: Exam Question 06550, Jan 2008

- (c) Using a reaction mechanism show how phosphonate **G** can be made from the reagents given. Predict, with a brief explanation, the stereochemistry of the carbon-carbon double bond in **H**.



(5 marks)

- (e) Consider the following scheme and work out the structures of **I** and **J**.



(5 marks)

**P, S, Si and B Chemistry: Exam Question 06550, Jan 2008**

(f) Consider the following scheme and work out the structure of **K**.

