

# **Modern Organic Chemistry**

Exam

04-04-2016

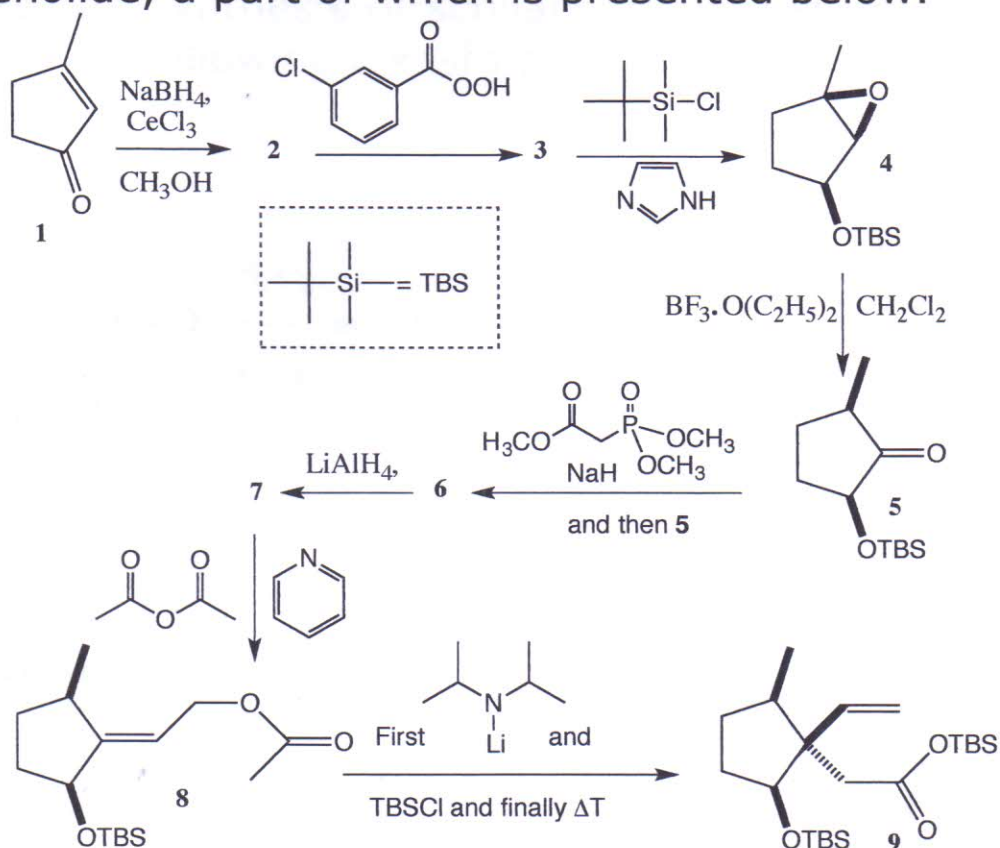
time: 3 hours

Every answer sheet must be provided with your  
name, study and student number

*(The maximum points for every question is indicated)*

**Question 1. (30 points)**

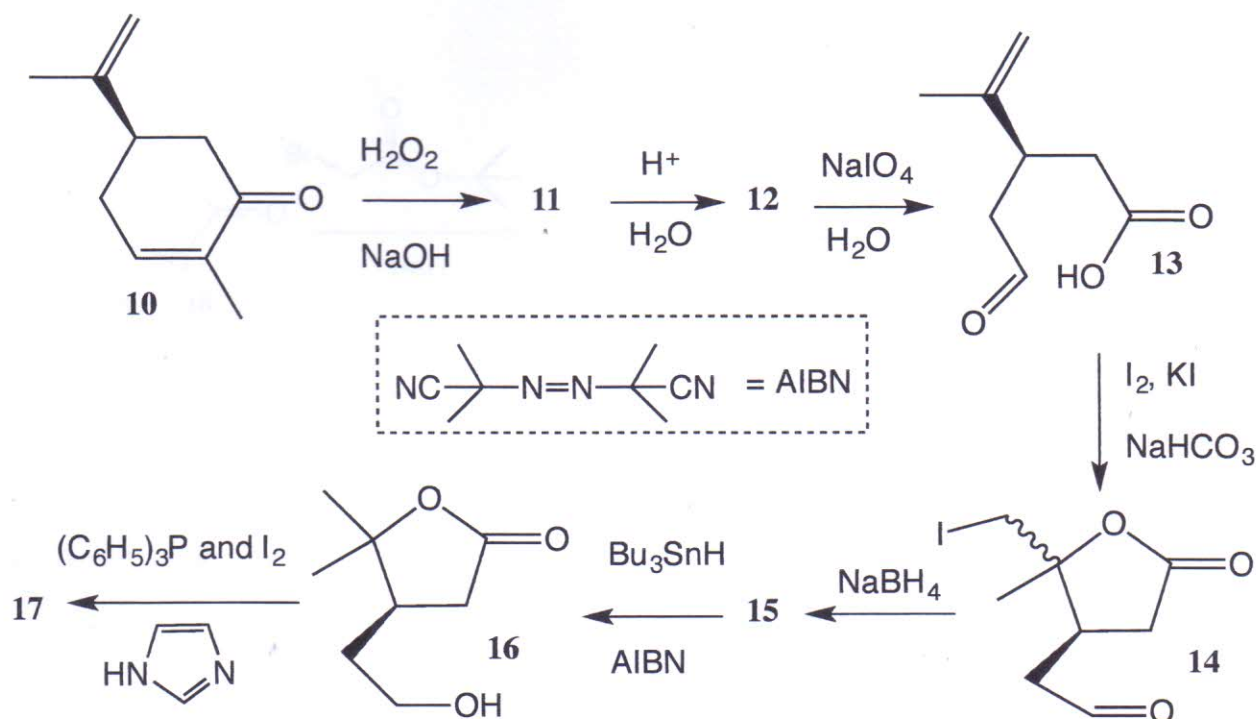
The group of Paterson presented a synthesis to Jiadifenolide, a part of which is presented below.



- Provide the structure of **2** and the mechanism of the reaction.
- Provide the structure (including the stereochemistry) of **3** and the mechanism of the reaction.
- Provide the mechanism of the reaction of **3**  $\rightarrow$  **4**.
- Provide the mechanism (including the stereochemistry) of the conversion of **4**  $\rightarrow$  **5**.
- Provide the structure of **6** and the mechanism of the corresponding reaction.
- Provide the structure of **7** and the mechanism of the corresponding reaction.
- Provide the mechanism of the reaction to **8**.
- Provide the mechanism of the conversion of **8**  $\rightarrow$  **9**. Explain the stereochemistry of the reaction.

## Question 2. (25 points)

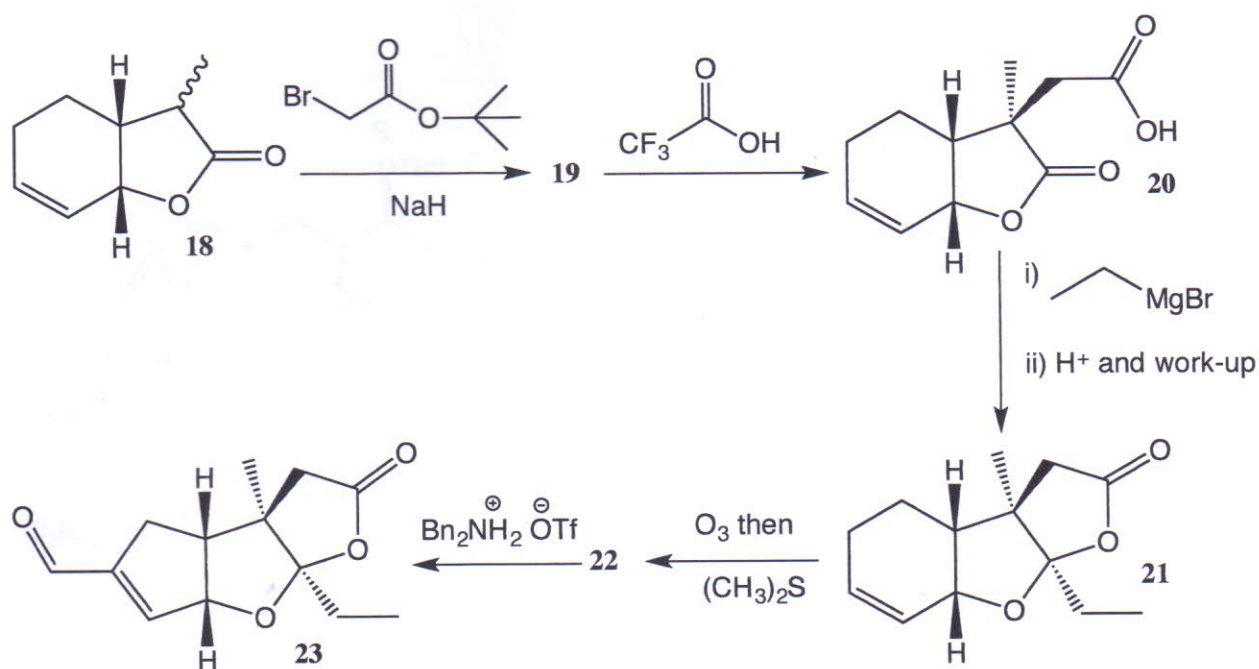
Toward the synthesis of schilancitrilactones by the group of Tang the following transformations were executed.



- Draw the structure (including the stereochemistry) of **11** and give the mechanism of the reaction.
- Draw the structure of **12** (a mixture of stereoisomers is formed) and give the mechanism of the corresponding reaction.
- Oxidation of **12** results in an intermediate with three carbonyl groups. Further oxidation of this intermediate gives **13**. Give the mechanisms of the corresponding reactions.
- Give the mechanism of **13**  $\rightarrow$  **14**.
- Draw the structure of **15** and give the mechanism of the reaction. Explain the observed chemo-selectivity.
- Give the mechanism of **15**  $\rightarrow$  **16**.
- Give the mechanism of **16**  $\rightarrow$  **17**.

### Question 3. (25 points)

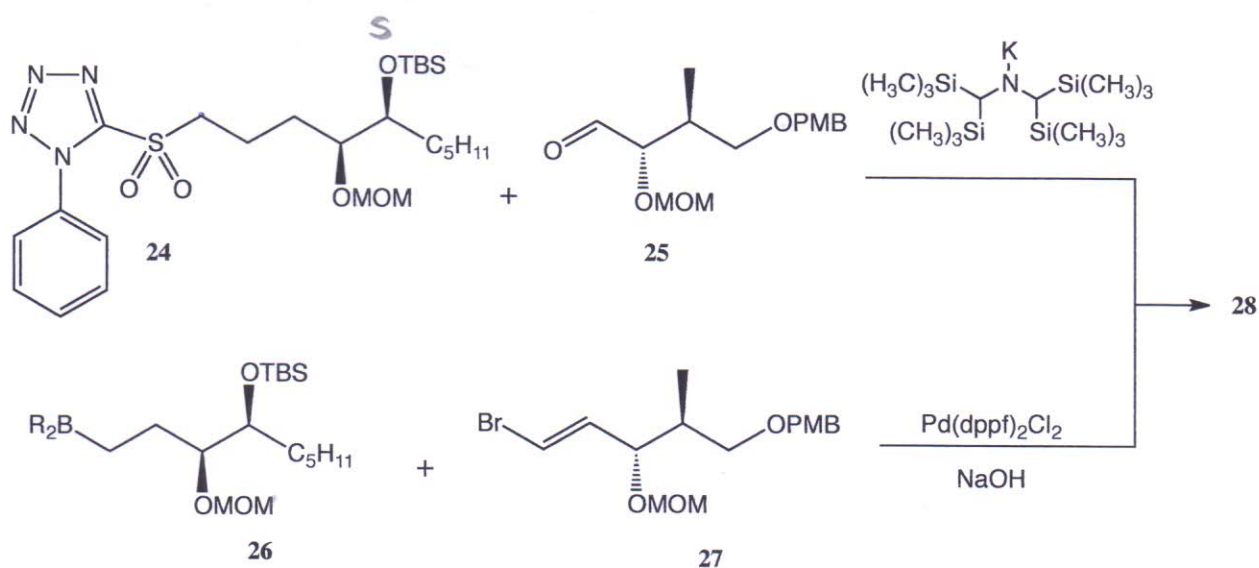
The group of Tang also performed the following transformations to schilancitrilactones.



- Give the structure of **19** (including the stereochemistry) and the mechanism of the reaction.
- Give the mechanism of the conversion of **19**  $\rightarrow$  **20**.
- Give the mechanism (including the stereochemistry) of the conversion of **20**  $\rightarrow$  **21**.
- Give the structure of compound **22** and the mechanism of the corresponding reaction.
- Give the mechanism of the conversion of **22**  $\rightarrow$  **23**.

### Question 4. (10 points)

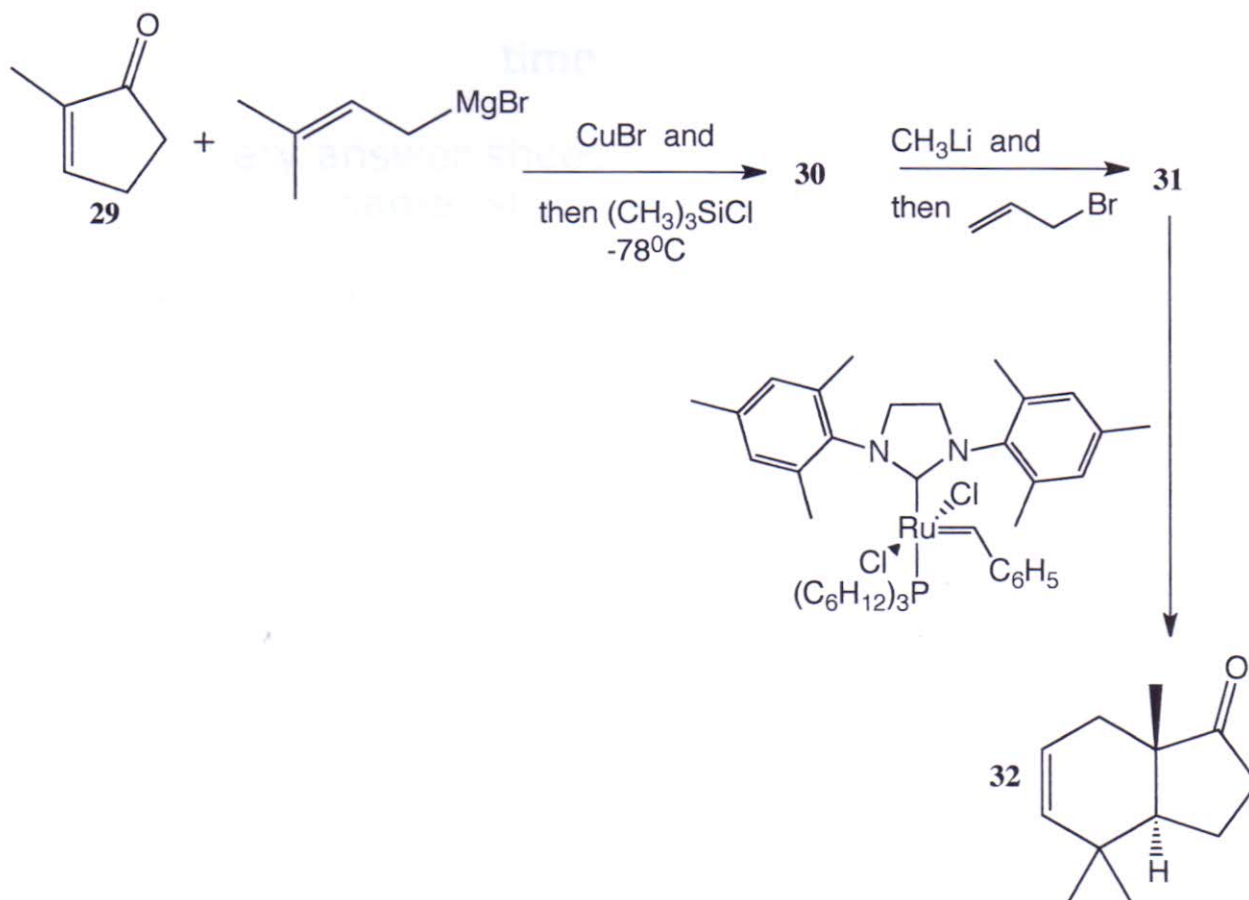
En route to cytospolides the group of Nanda prepared compound **28** via two different reactions from **24** and **25** as well as from **26** and **27**, respectively.



- Draw the structure of **28**, including the stereochemistry.
- Give the mechanism of the conversion of **24** + **25** into **28**.
- Give the mechanism of the conversion of **26** + **27** into **28**.

### Question 5. (10 points)

Some reactions to the marine natural product Norrisolide are shown in the scheme below.



- Give the structure of compound **30** and the mechanism of **29**  $\rightarrow$  **30**.
- Give the structure of compound **31** and the mechanism of **30**  $\rightarrow$  **31**.
- Give the mechanism of conversion **31**  $\rightarrow$  **32**.