

**UNIVERSITY OF JAFFNA**  
**BACHELOR OF PHARMACY**  
**THIRD YEAR FIRST SEMESTER EXAMINATION – JULY 2013**  
**PHACN 3104 – CHEMISTRY OF NATURAL PRODUCTS**

**Date: 15.08.2013**

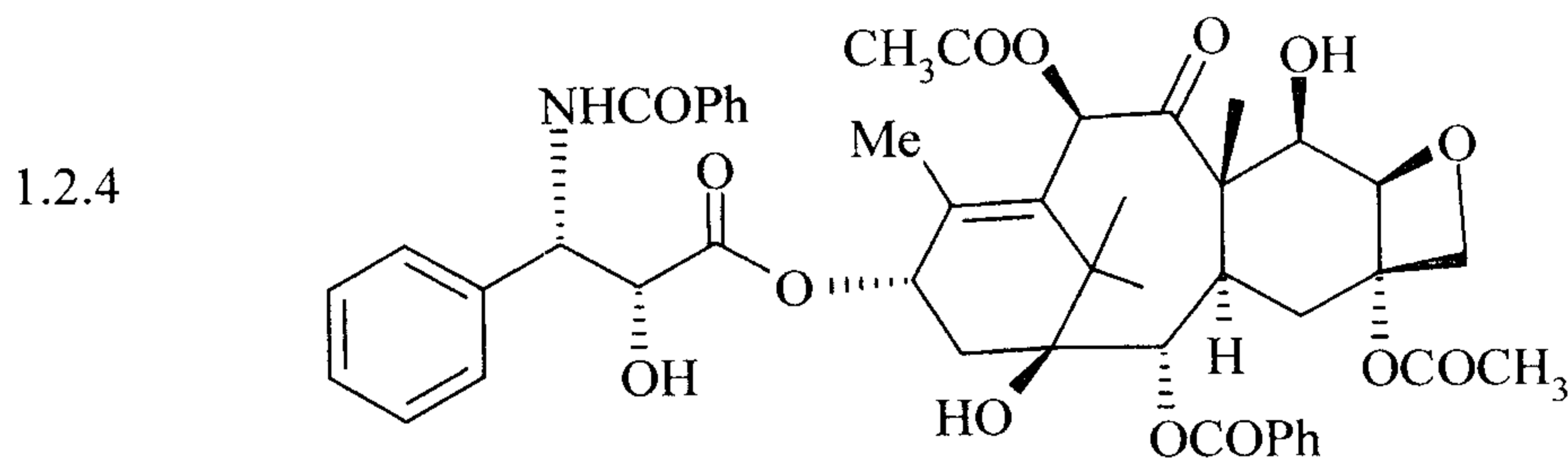
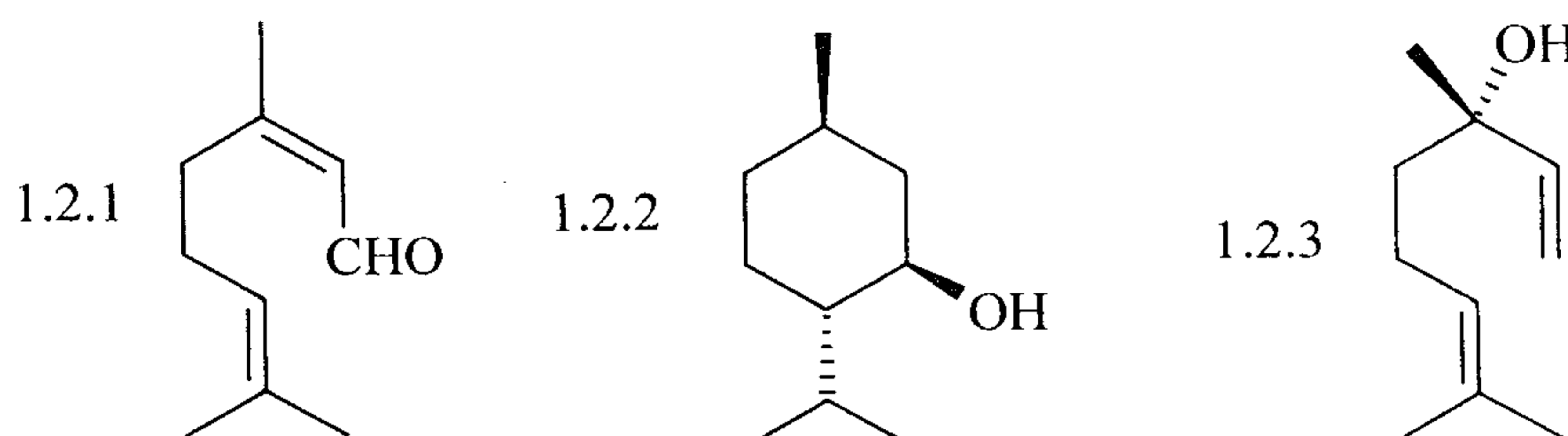
Answer **ALL** questions.

Time: **Three** hours

1.

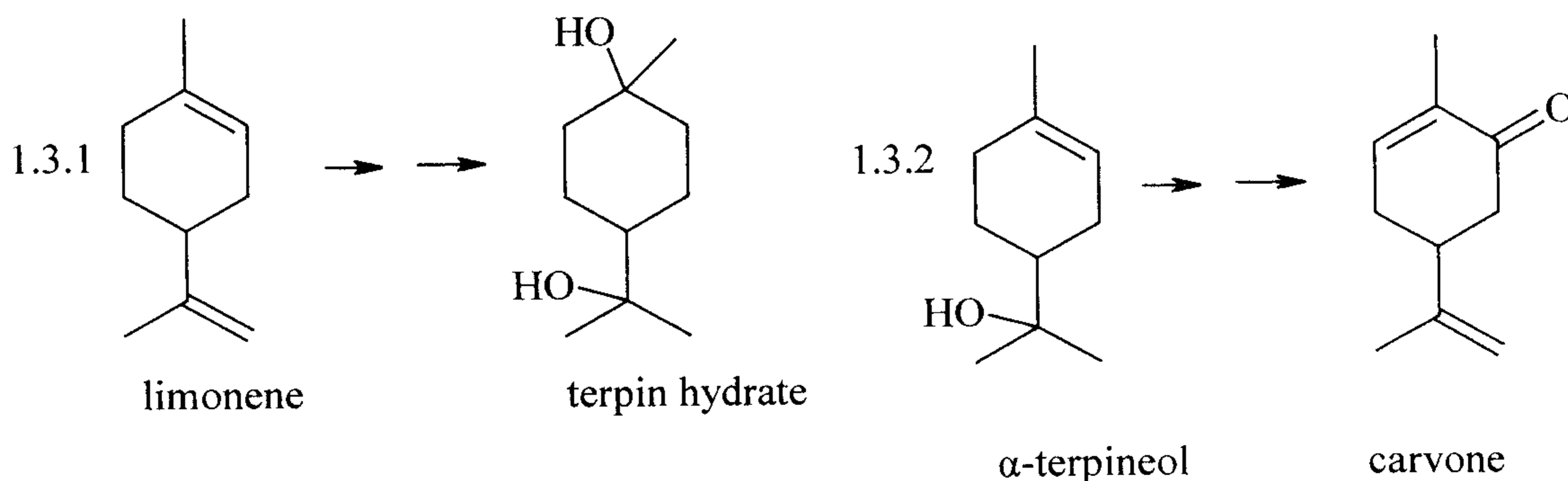
1.1 How do you classify terpenoids according to the number of carbon atoms? **(20 Marks)**

1.2 The following compounds are used for the pharmacopoeia. Identify these compounds as their IUPAC or trivial names and explain the pharmaceutical uses of each compound.



**(40 Marks)**

1.3 Indicate how the following transformations may be effected in terpenoid chemistry (each of which may involve several steps). Give essential reagents and experimental conditions.



**(40 Marks)**

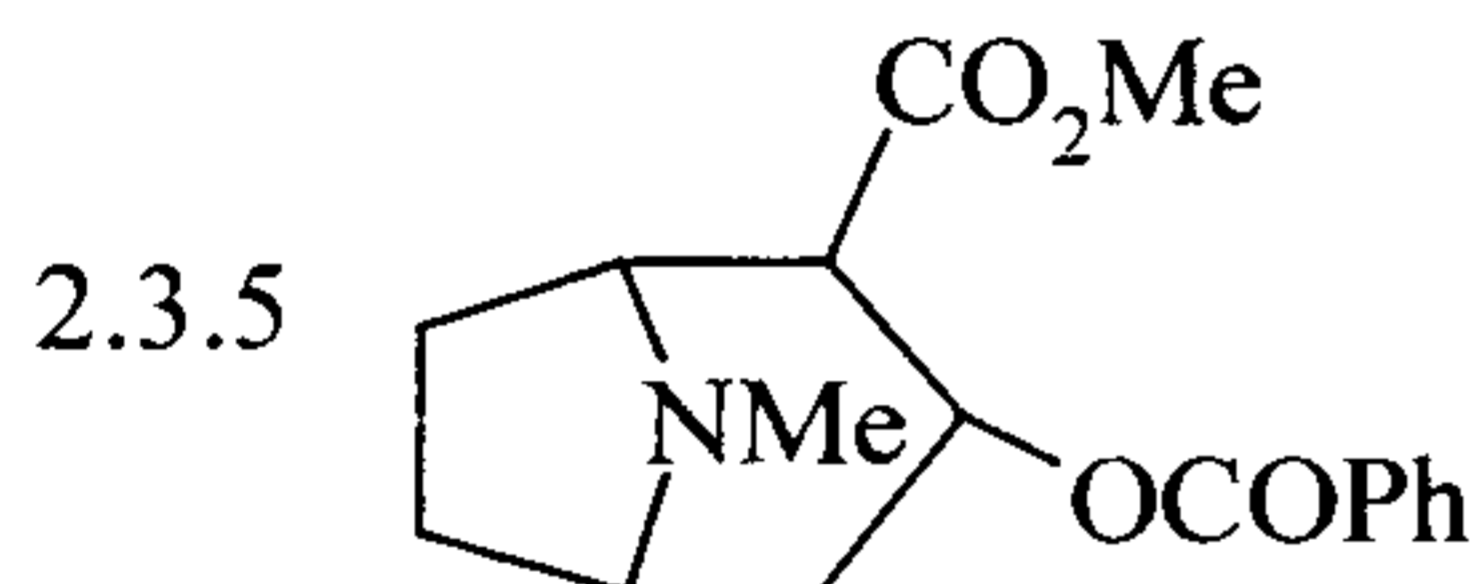
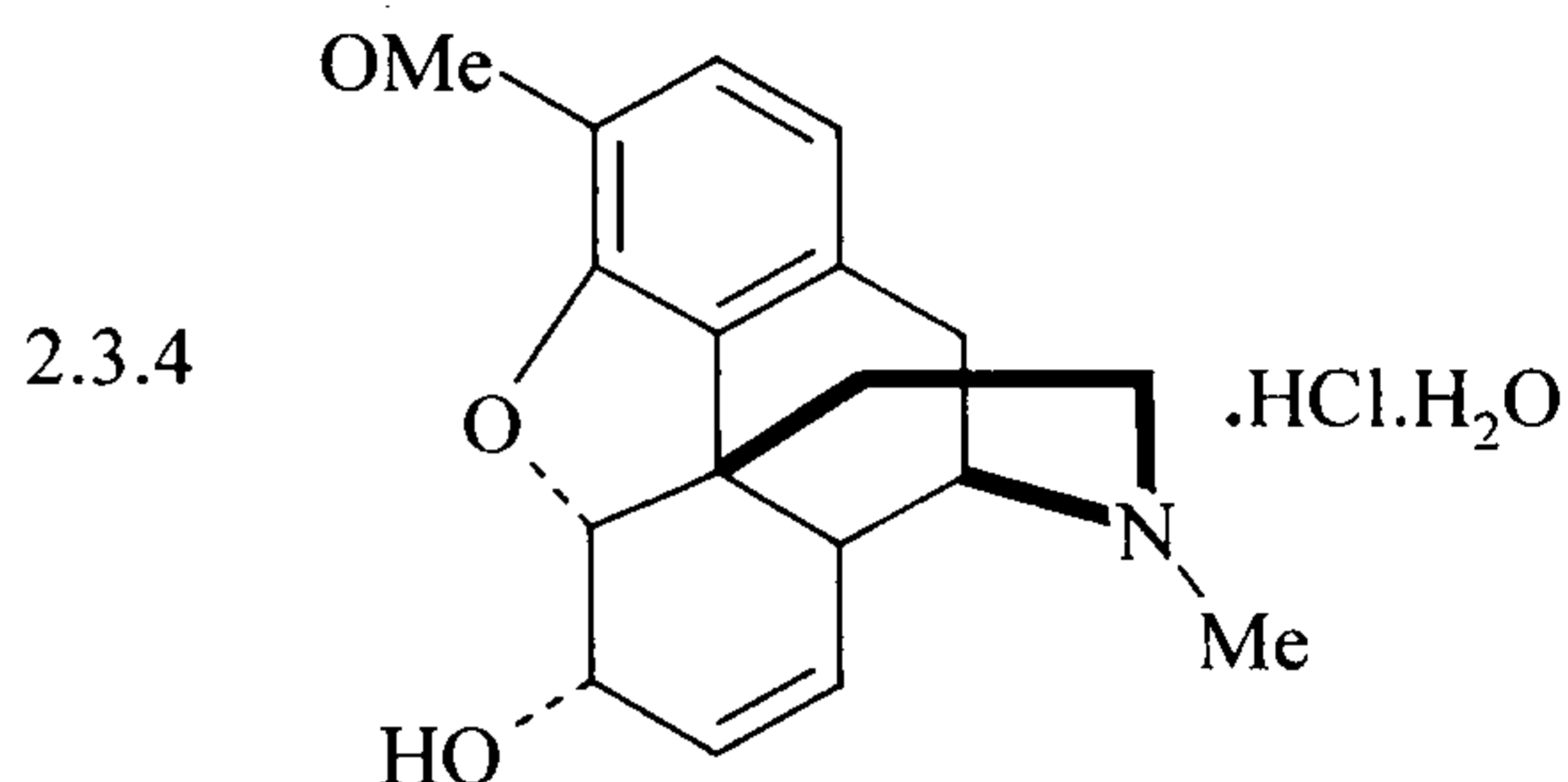
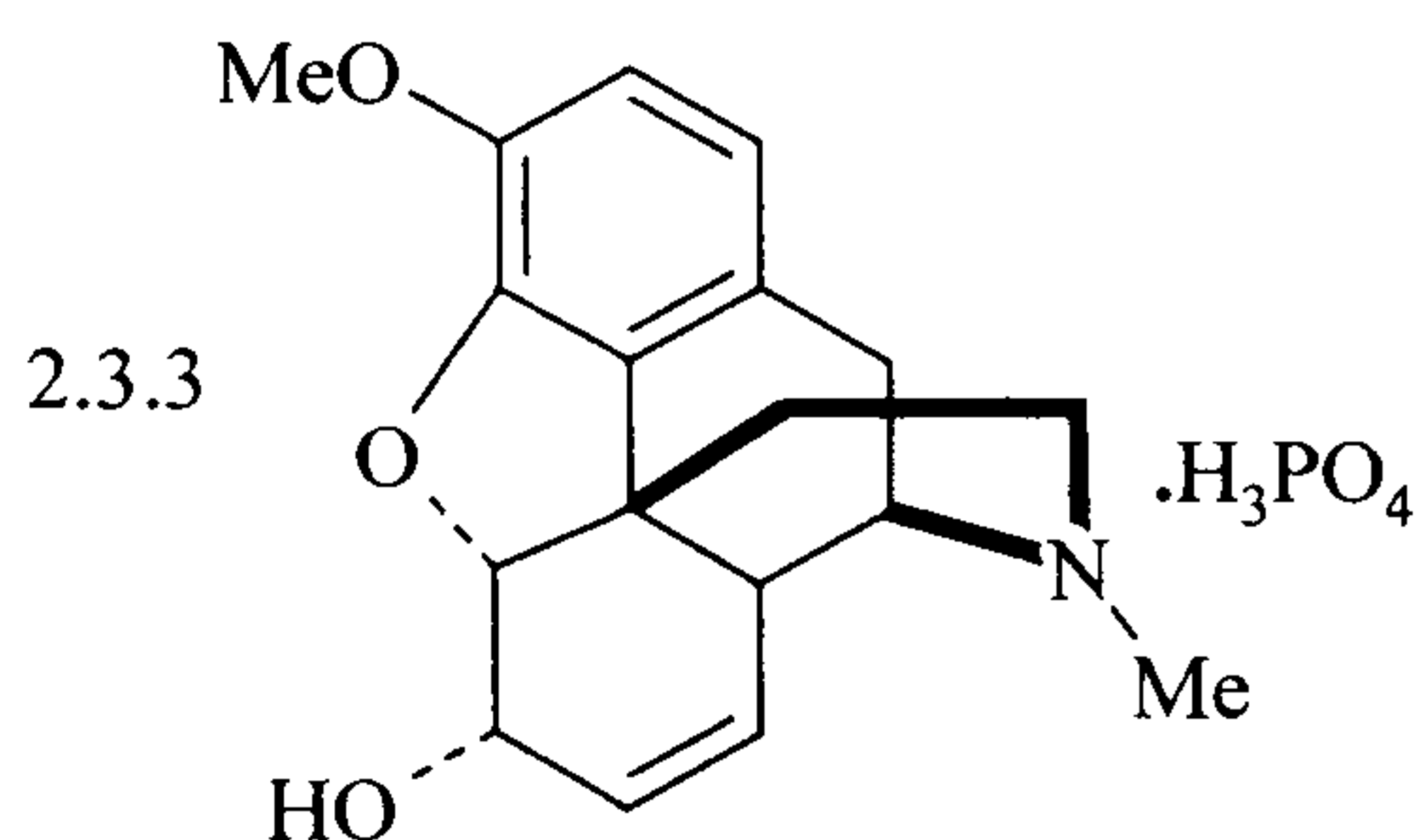
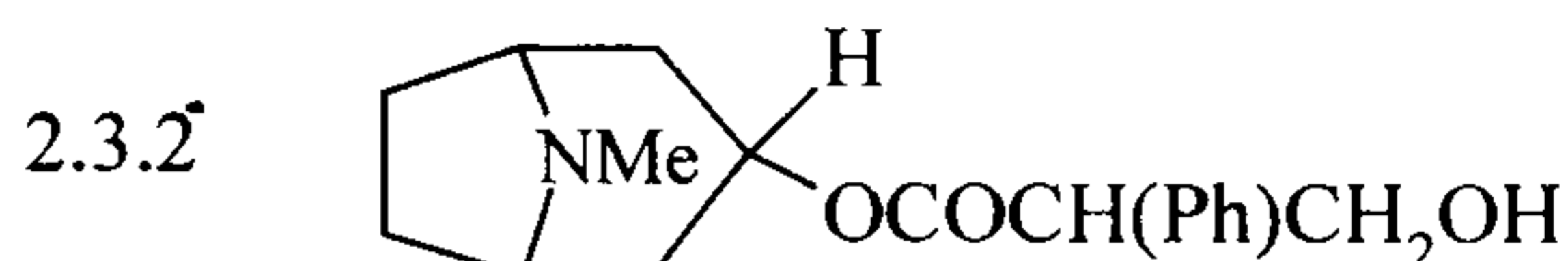
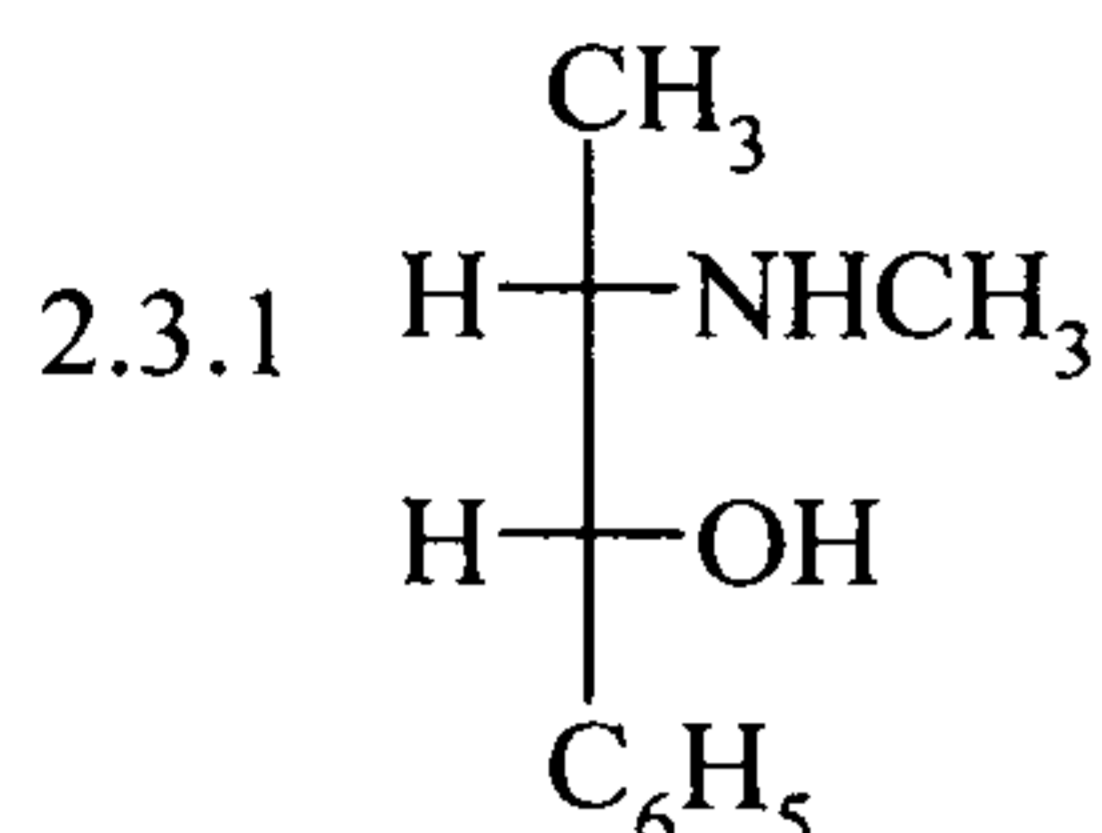
2

2.1 Describe the common isolation method of alkaloids from the natural sources. (20 Marks)

2.2 Nicotine is one of the alkaloid isolated from tobacco leaf.

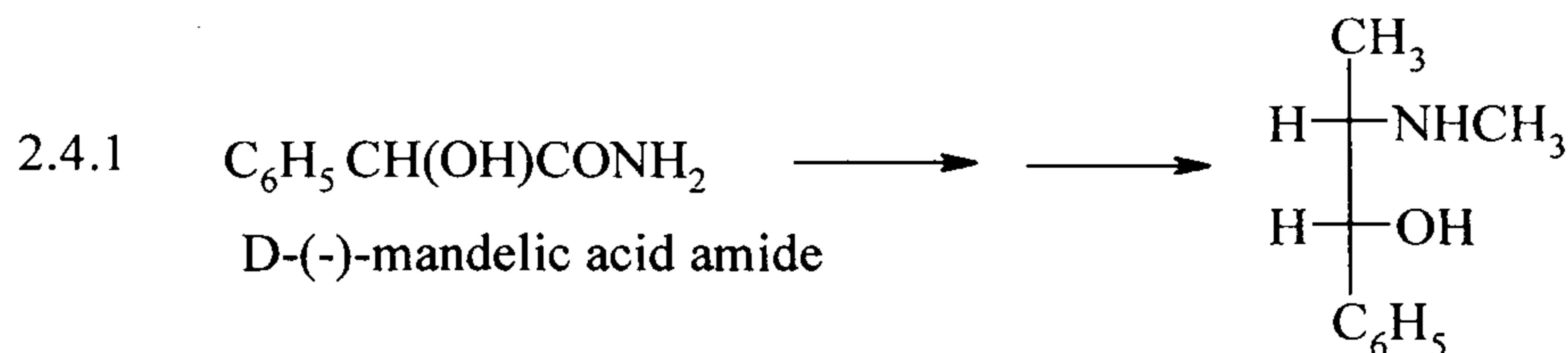
Draw the structure of nicotine and give the general uses of nicotine. (15 Marks)

2.3 Identify the following compounds as their common or trivial names and explain the pharmaceutical uses of each compound.



(50 Marks)

2.4 Indicate how the following transformation may be effected (This transformation may involve several steps) and give essential reagents and experimental conditions.



(15 Marks)

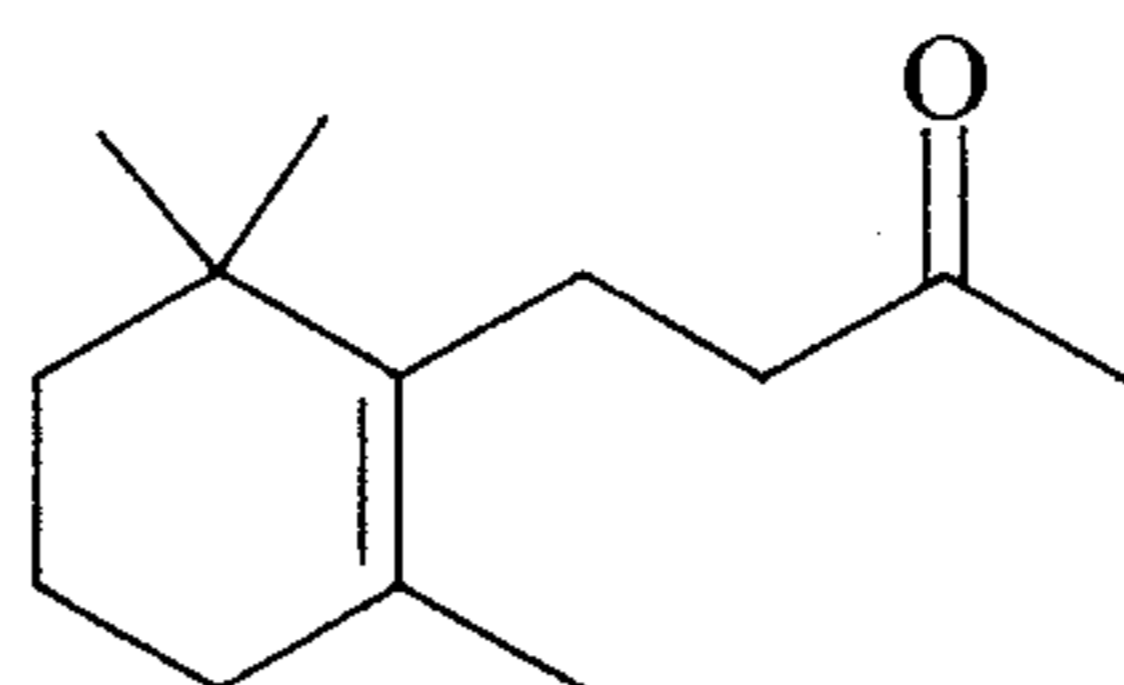
3.

3.1 What do you understand the terms "carotenes" and "xanthophylls". (20 Marks)

3.2 Write a brief account to identify carotenoids by using spectroscopic methods. (40 Marks)

3.3 Draw the structures of  $\alpha$ -,  $\beta$ - and  $\gamma$ -carotenes. (18 Marks)

3.4 How would you synthesize  $\beta$ -carotene from  $\beta$ -ionone? (22 Marks)



$\beta$ -ionone

4.

4.1 Draw the structures of the following compounds.

4.1.1 Vitamin H (or Biotin)

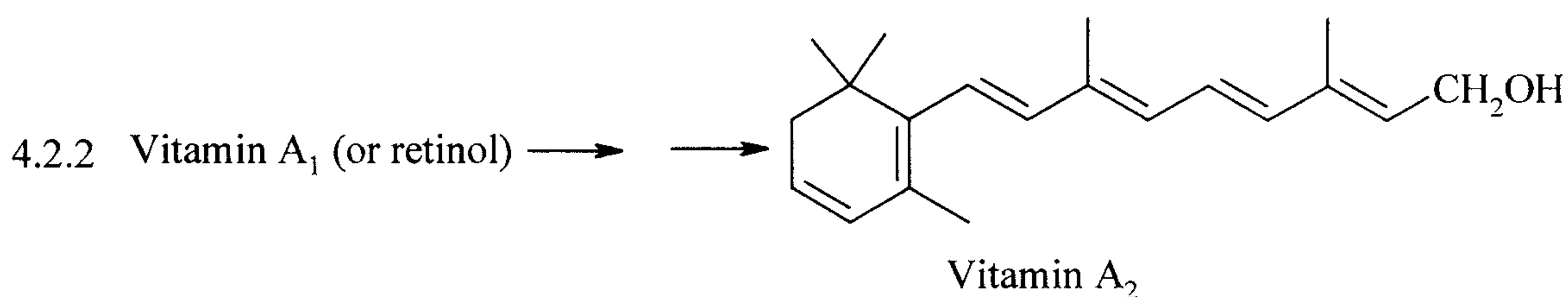
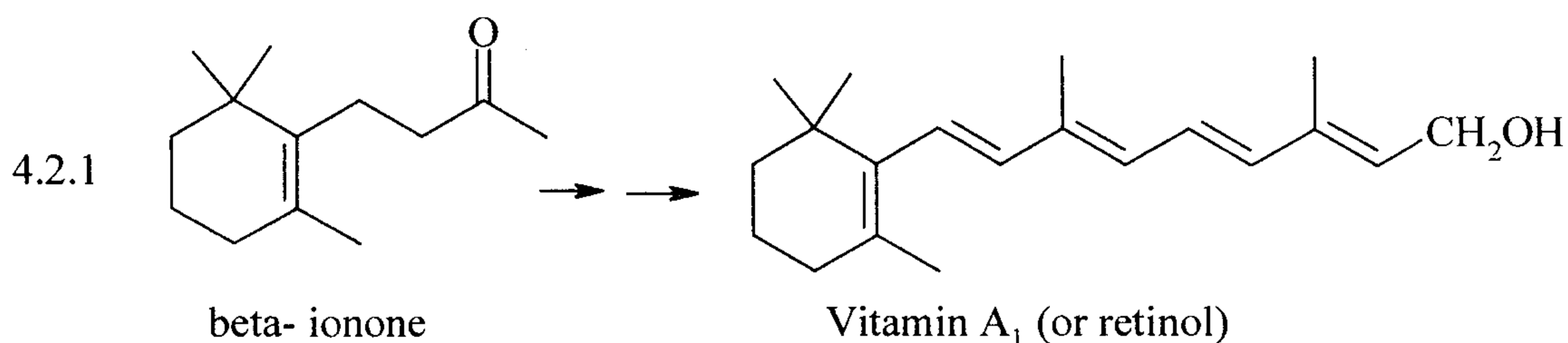
4.1.2  $\alpha$ -tocopherol (or Vitamin-D)

4.1.3 Vitamin K<sub>3</sub>

4.1.4 Vitamin B<sub>2</sub> (or Lactoflavin)

(40 Marks)

4.2 Indicate how the following transformations may be effected (each of which may involve several steps). Give essential reagents and experimental conditions.



(60 Marks)

5.

5.1 How do you classify proteins? (10 Marks)

5.2 What are the general characteristics of protein? (20 Marks)

5.3 Draw the structures of the following amino acids. (40 Marks)

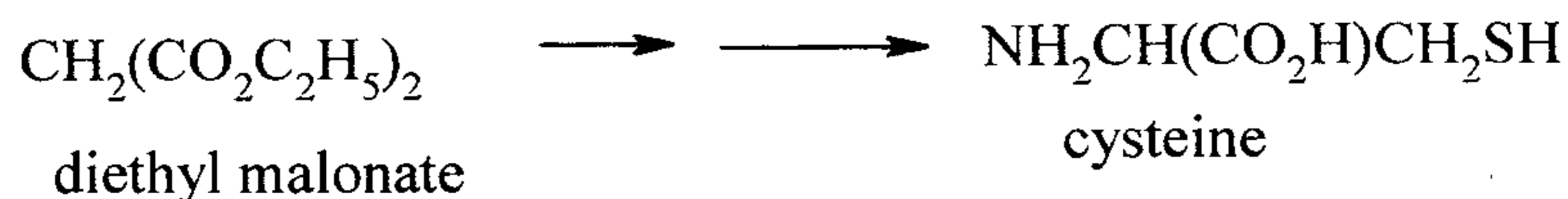
5.3.1 Phenylalanine

5.3.2 Tyrosine

5.3.3 Threonine

5.3.4 Arginine

5.4 How would you synthesize **cysteine** from **diethyl malonate**? (30 Marks)



6.

6.1 Define the terms used in the carbohydrate chemistry.

6.1.1 Monosaccharide

6.1.2 Glycoside

6.1.3 Aldose

6.1.4 Ketose

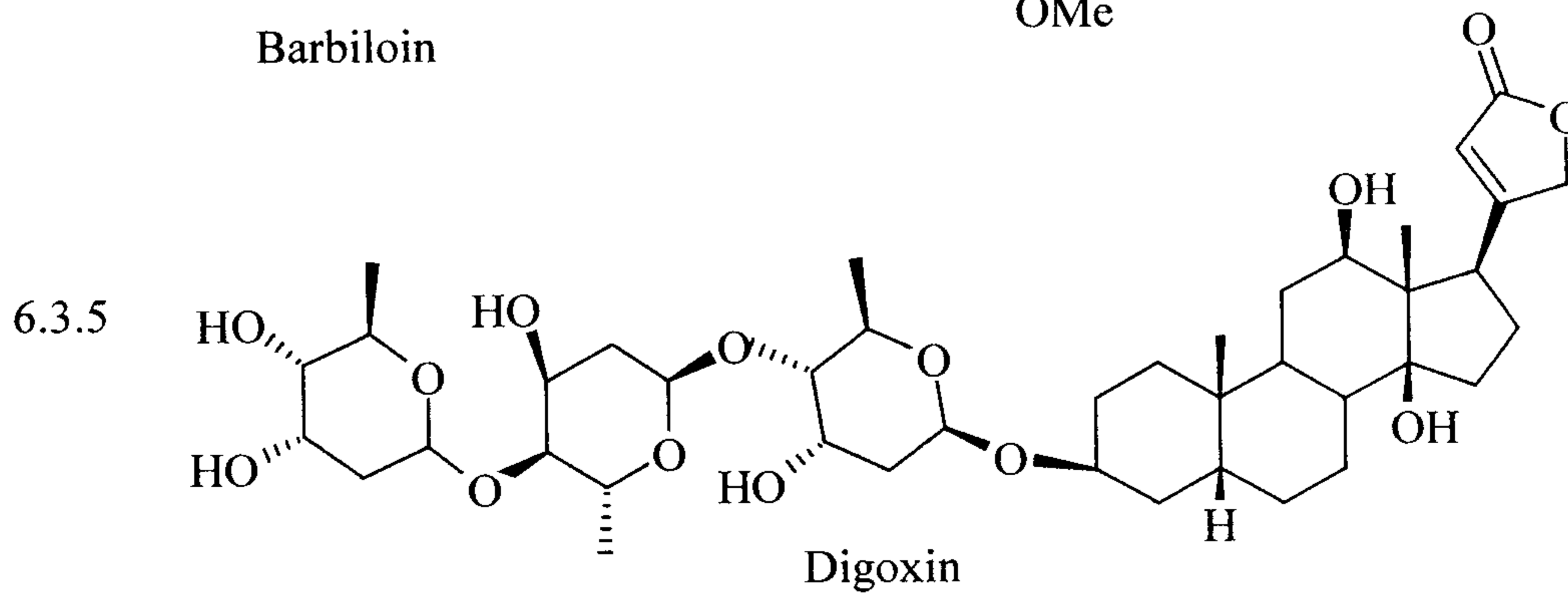
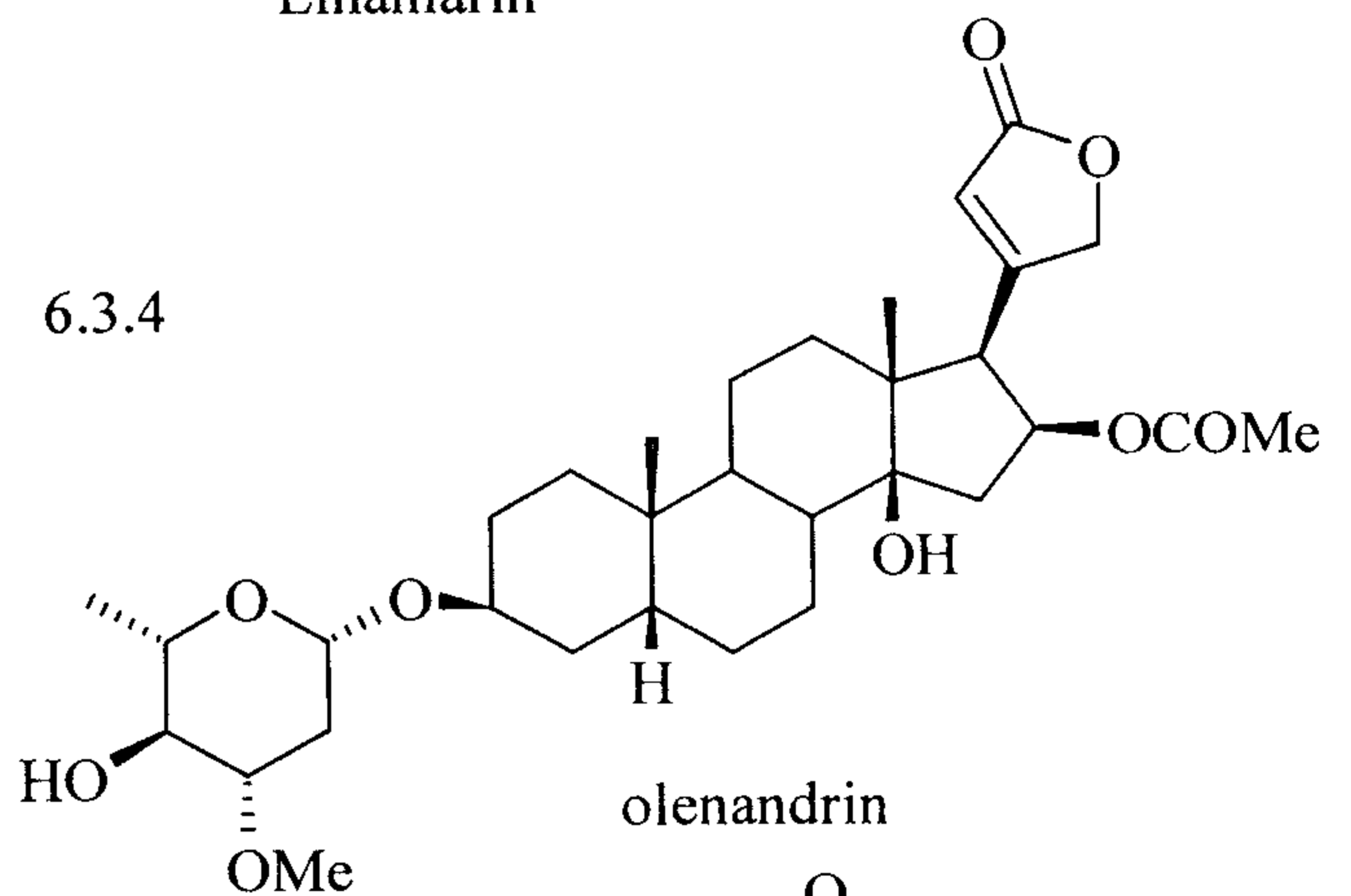
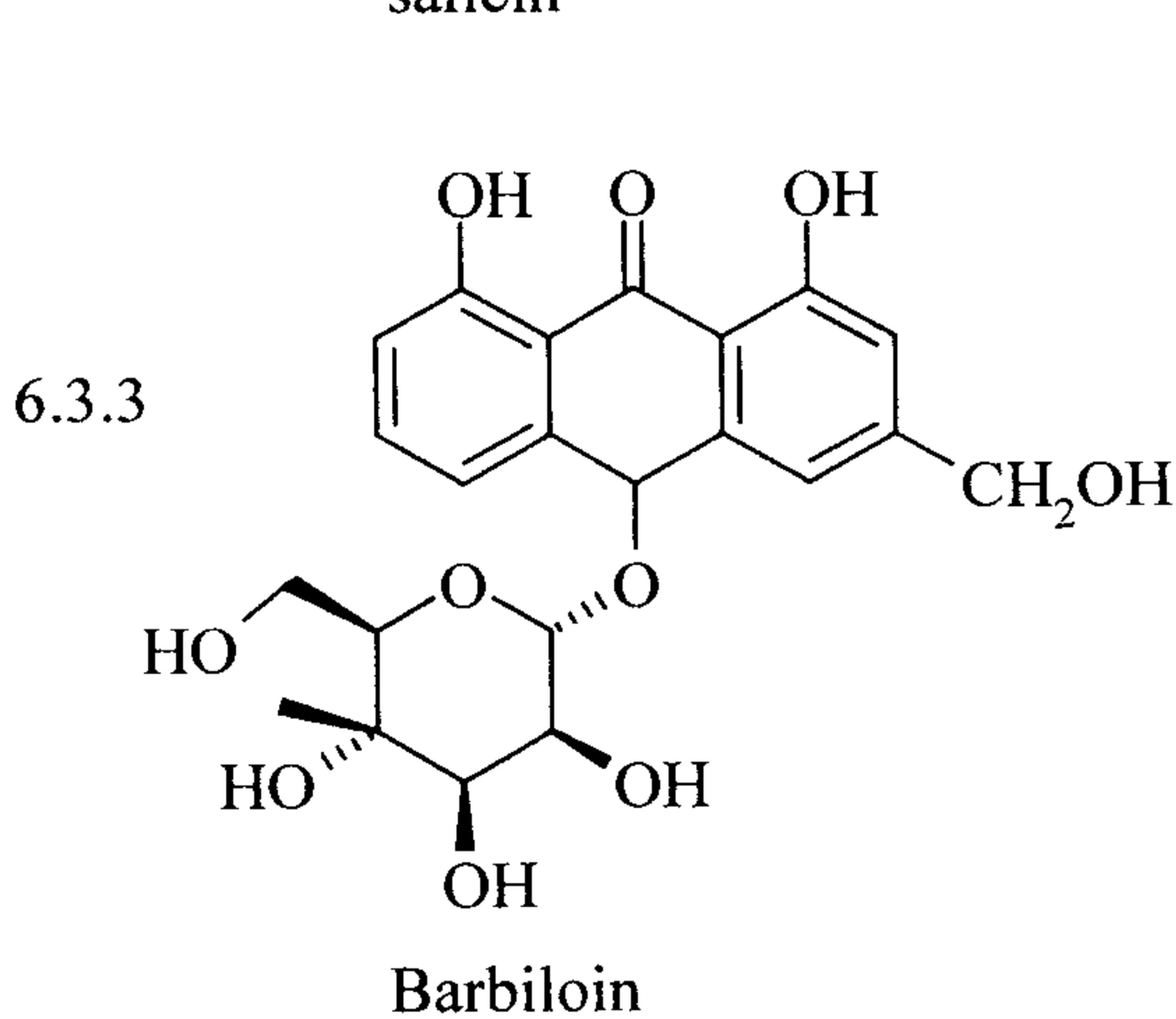
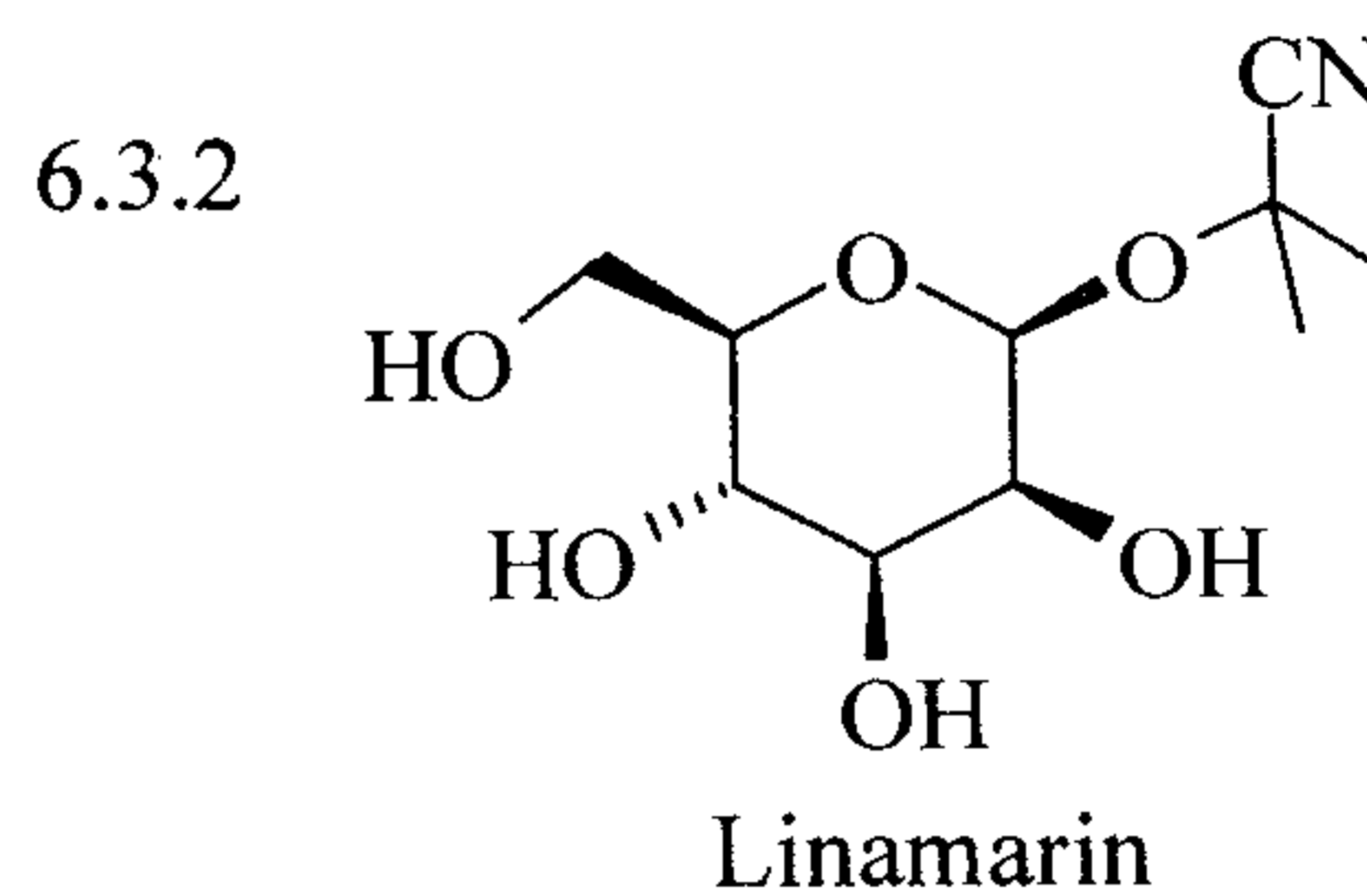
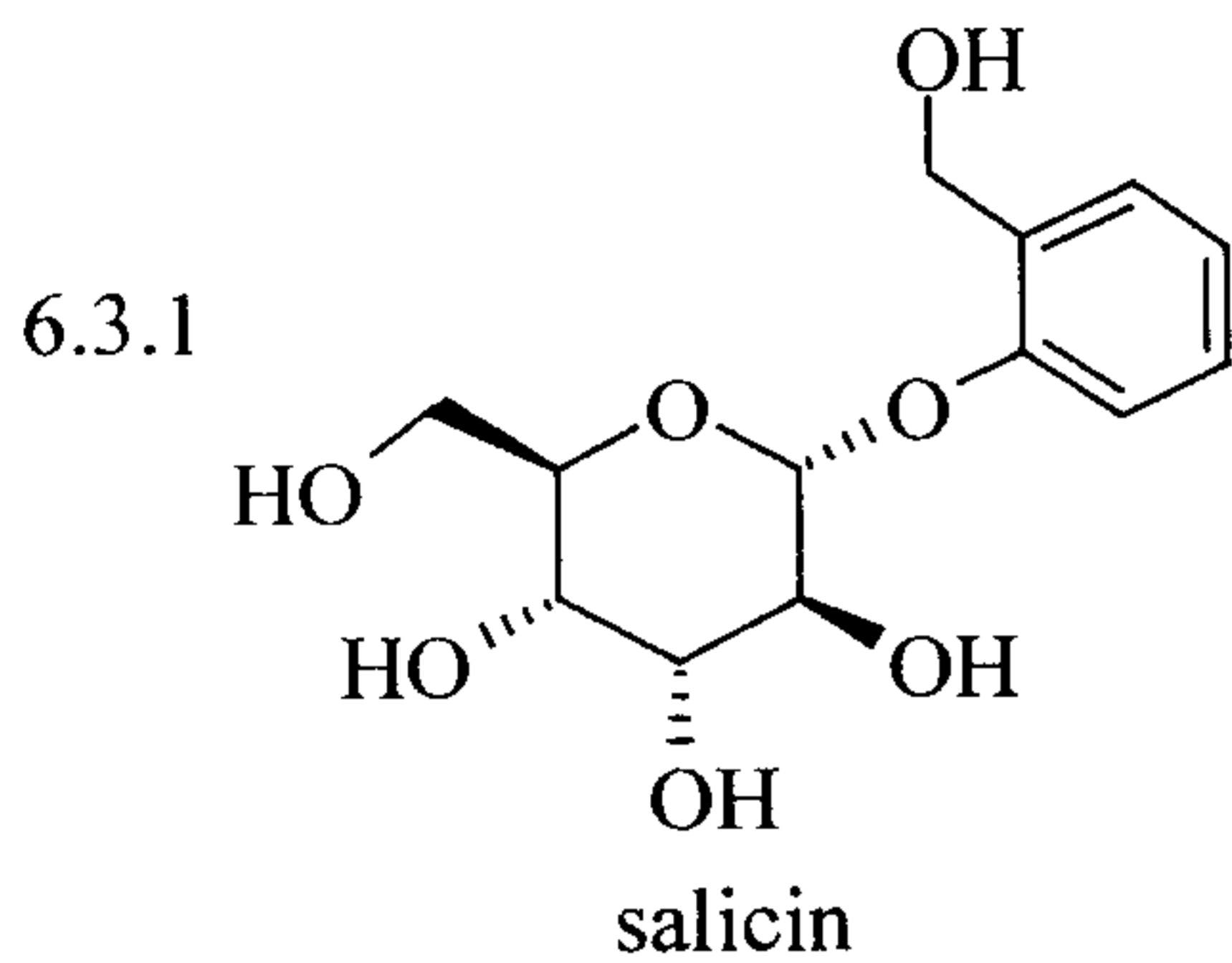
6.1.5 Pyranose

6.1.6 Furanose

(30 marks)

6.2 Glycosides are classified according to the chemical nature of aglycone. How would you classify glycosides on the basis of aglycone? (20 Marks)

6.3 How would you identify the following compounds on the basis of aglycone type?



(50 Marks)

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