BINDURA UNIVERSITY OF SCIENCE EDUCATION

CHEMISTRY DEPARTMENT

COURSE: CH323: ADVANCED ORGANIC CHEMISTRY

2 HOURS

ANSWER QUESTION ONE AND FOUR OTHERS, TWO FROM EACH OF THE SECTIONS A AND B. EACH QUESTION CARRIES 20 MARKS

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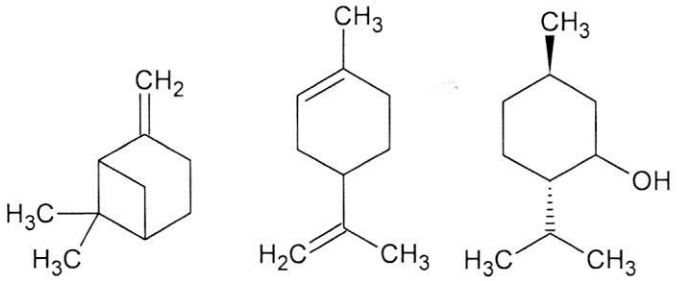
1 (a) Draw the following compounds and encircle the isoprene units.

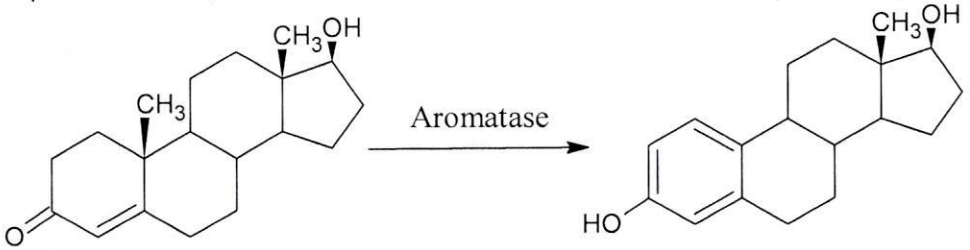


(i) (ii) (iii)

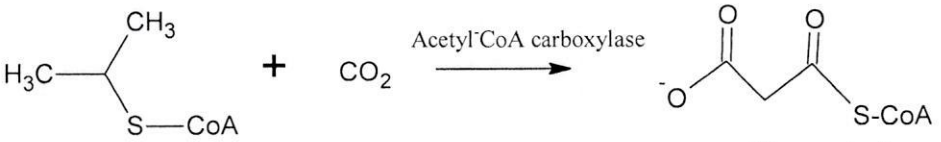
[2 x 3 marks]

(b) Explain how the reactions below can be used to develop useful products.

(i)



(ii)



[8 marks]

(c) (i) Describe the chemistry behind the removal of scum by softening agents that are added to soap. **[4 marks]**

(ii) Why are phytochemicals important in the diet? **[2 marks]**

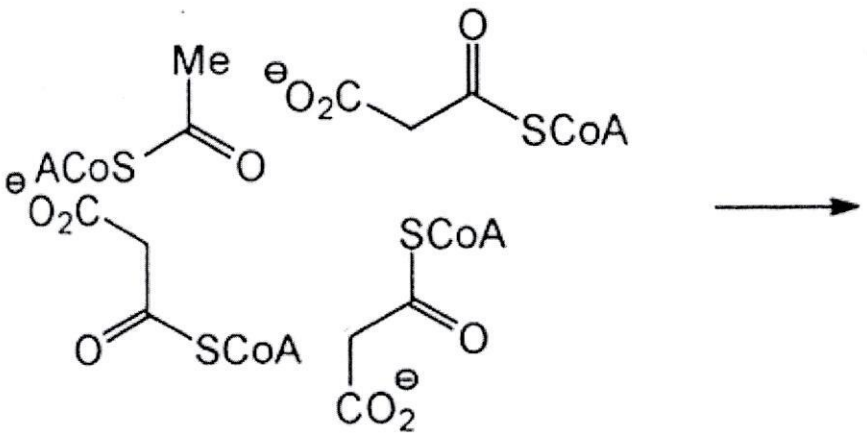
SECTION A: ANSWER ANY TWO QUESTIONS

2 (a) (i) Draw the structure of isopentyl pyrophosphate. **[3 marks]**

(ii) Outline a mechanism for the synthesis of geraniol. **[10 marks]**

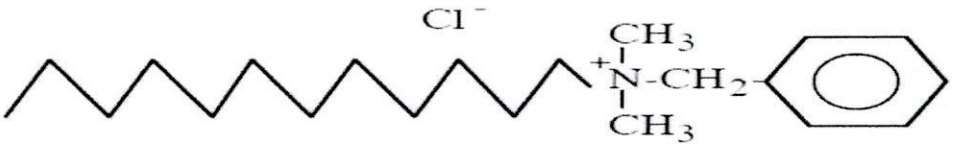
(iii) Draw structures of two synthetic phenolic acids you know. **[4 marks]**

(b) Draw the product of the following reaction;



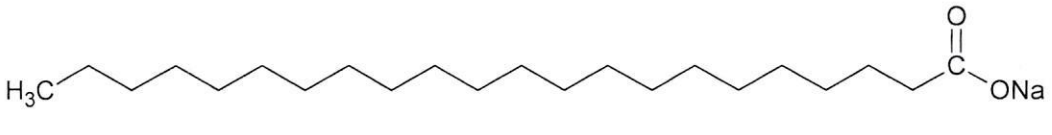
[3 marks]

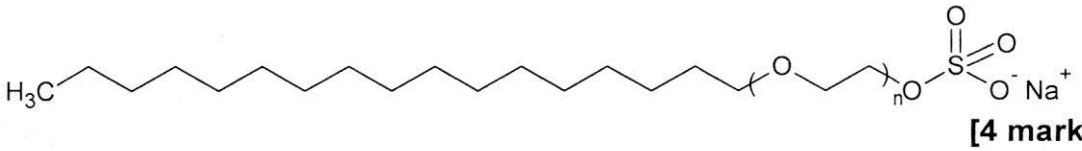
3 (a) What can you formulate from the raw material with the structure shown below?



[2 marks]

(b) Describe the advantages and disadvantages of the cleaning agents shown below.

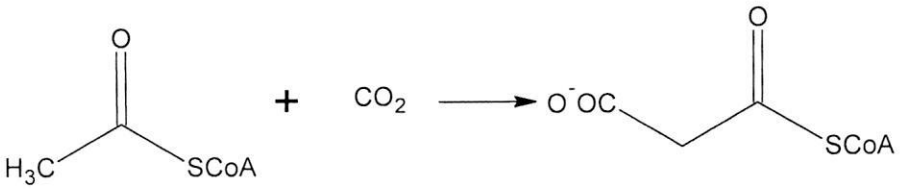




[4 marks]

(c) (i) Outline steps that are involved in the synthesis of mevalonic acid. **[8 marks]**

(ii) Suggest a mechanism for the following conversion. **[6 marks]**



4 (a) Evaluate the use of thioesters as chain extenders. **[6 marks]**

(b) Describe a chemical test that can be used to distinguish geraniol from limonene. **[4 marks]**

(c) (i) What type of compound is cholesterol? **[1 mark]**

(ii) Describe the effects of excessive cholesterol concentration in the body. **[4 marks]**

(d) (i) Suggest a general structure of an steroid **[2 marks]**

(ii) Using examples, evaluate the use of terpenoids in industry **[3 marks]**

SECTION B: ANSWER ANY <u>TWO</u> QUESTIONS

5 (a) Outline a mechanism for the synthesis of a geranyl diphosphate. **[10 marks]**

(b) Draw the general structure of a phenolic compound. **[2 marks]**

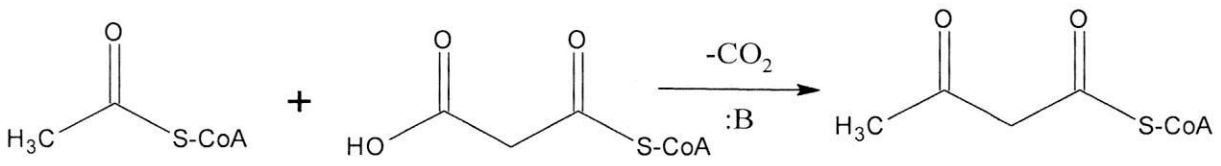
(c) Phenolic compounds exhibit antioxidant activity.

(i) Define an antioxidant. **[2 marks]**

(ii) Suggest a mechanism to illustrate how phenolic compounds function as antioxidants in the body. **[6 marks]**

6 Discuss the advantages and disadvantages of using synthetic antioxidants in food industries **[20 marks]**

7 (a) (i) Suggest a mechanism for the following reaction.



[10 marks]

(ii) Describe the function of irradiated ergosterol in milk and other foods meant for infants. **[2 marks]**

(b) Describe the chemistry behind the anti-diabetic activity of flavonoids. **[8 marks]**

END OF EXAMINATION