

16th
 January, 2023



OBAFEMI AWOLowo UNIVERSITY, ILE-IFE
 B.Sc. Degree (Industrial Chemistry) Examination, Part III
 Harmattan Semester 2021/2022 Session
ICH 309: Nutritional Chemistry

Obafemi Awolowo University

Time Allowed: 2 Hrs

INSTRUCTION: Answer sections A and B in separate booklets.

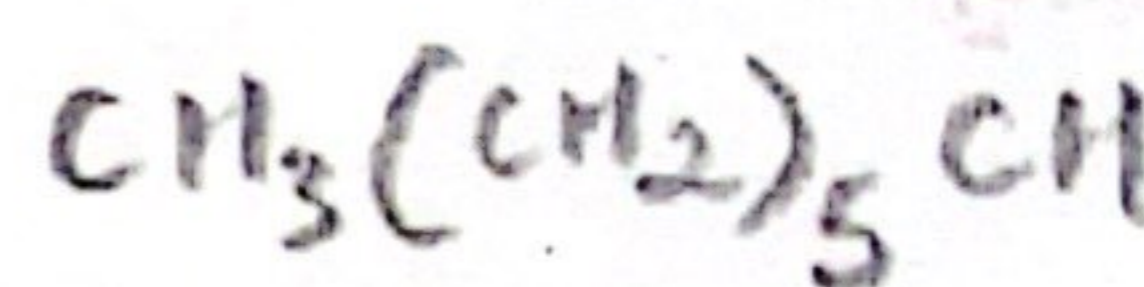
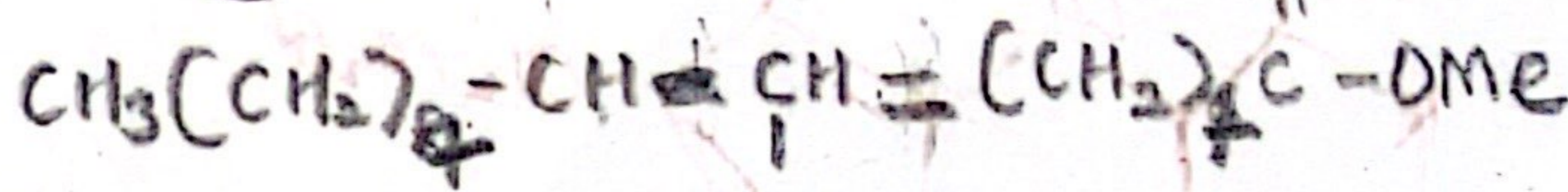
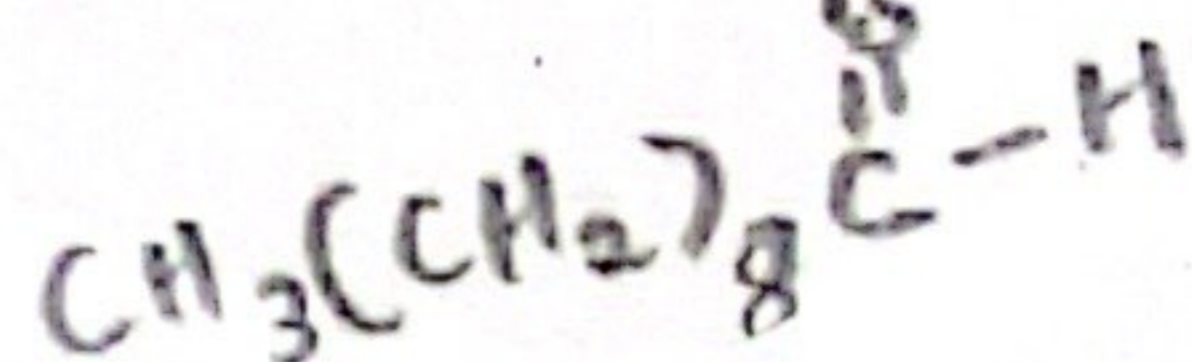
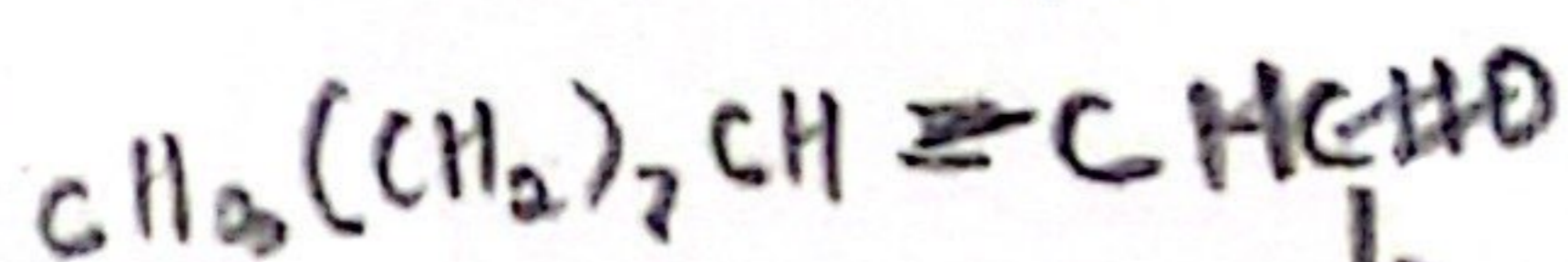
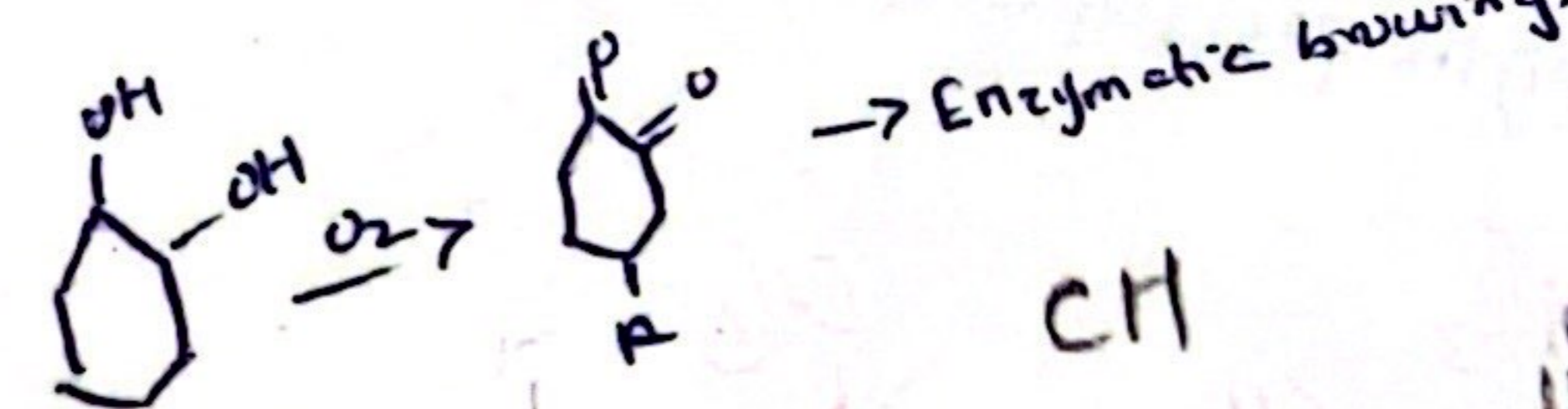
Answer all questions

SECTION A

- 1a. (i) Classify lipids based on their structural components and (ii) Draw the structures of the following phospholipids: Cardiolipin; 3-phosphatidylcholine and phosphatidyl inositol.
- b. (i) What do you understand by essential amino acids? List the names of these essential amino acids.
 (ii) With the aid of a suitable chemical equation, explain the Chemistry of the following reagents used in amino acids determinations:
 (1) Ninhydrin [2,2 - Dihydroxy - 1,3 - indanedione] (2) 1,2 - Benzenedicarbonyl and (3) Dansylchloride.
- c. A quality control Chemist in a reputable vegetable oil industry analysed a sample of vegetable oil and discovered high level of 8-hydroperoxide formed from the decomposition of methyl oleate. A few days later, the analysis of the same oil revealed the presence of the following compounds:
 (i) decanal (ii) methyl - 8 - oxooctanoate (iii) 2 - undecenal and (iv) methyl heptanoate formed from the decomposition of 8 - hydroperoxide of methyl oleate. Draw the structure of the 8-hydroperoxide formed in the vegetable oil and with the aid of suitable mechanisms, account for the formation of all the four compounds observed in the vegetable oil. **Mark is 25**
2. (a) With the aid of suitable chemical equations, show that thiamine (Vitamin B₁) is not stable in a solution of sodium sulphite as well as in basic medium.
 (b) What is the name of pro-vitamin D obtained from plants? This pro-vitamin is not an active form of Vitamin D but it is converted to the active form when it is exposed to sunlight, with the aid of chemical equation, explain this conversion and provide the name of the active form obtained after the exposure to sunlight. **Mark is 10**

SECTION B

- 3a. Provide chemical equations for the action of enzyme - polyphenol oxidase on polyphenols present in fruits and vegetables.



62

200 100g 200g

- b. Ascorbic acid formulation has been suggested to prevent the reaction in the question (3a) above, why do we need to replenish the formulation from time to time?
 - c. Suggest four other ways of preventing the reaction in the question 3(a). *Addition of acid complex sulphiting agent Ascorbic acid*
 - d. List the functions of the following additives given specific examples in food preparation: (i) seasoning agent (ii) acidulant (iii) coagulant and (iv) emulsifier.
- 4a. what are zymogens? *→ endopeptic*
- b. Explain the action of the enzyme trypsin and chymotrypsin in protein digestion.
 - c. With the aid of chemical equation, explain the formation of Amadori products during heat processing of foods.
 - d. Explain two strategies of improving diets of community with noticeable nutrients deficiency.
5. Study the Table given below and answer the questions that follow: *28 25 53 weight 12*

Parameters	Man	Woman
Weight (kg)	70	85
Height (m)	1.6	1.4
Energy Requirement (kJ/kg body weight)	197	168
Nutrient intakes		
Carbohydrate (g)	368	320
Protein (g)	45	60
Fat (g)	50	66
Occupation	Labourer	Secretary

88 71

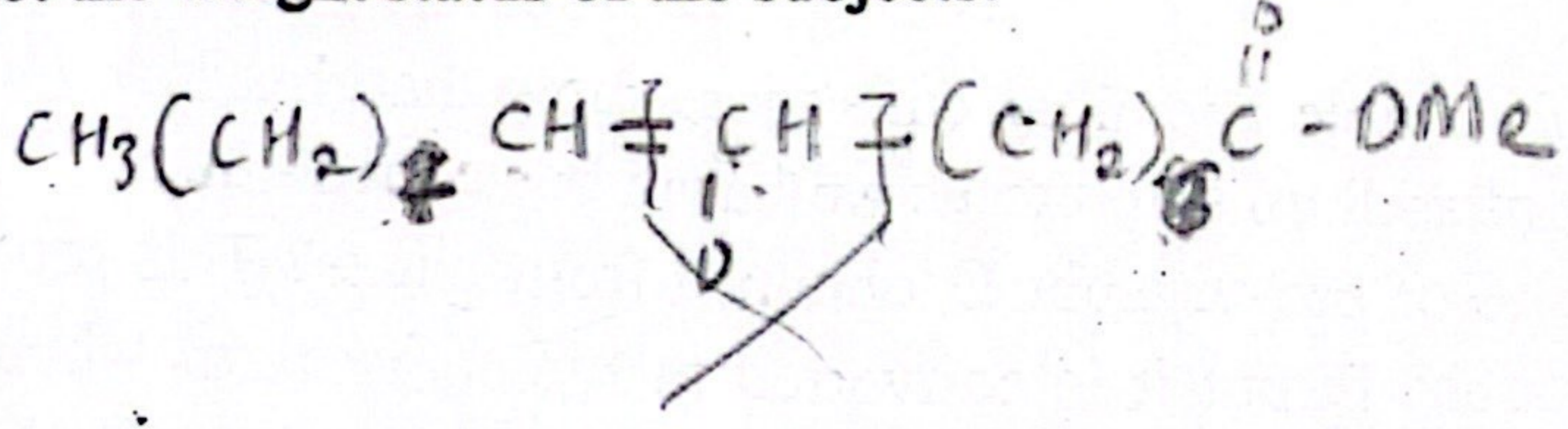
17g 17g

8902

1.76cm 176cm = 1.76m 27

Note: Carbohydrate = 17 kJ/g; Fat 37 kJ/g and Protein = 17 kJ/g

- (a) Calculate the energy intake of the subjects (man and woman).
- (b) Calculate the Body Mass Index (BMI) of the subjects.
- (c) From the information obtained from energy requirement and intake coupled with BMI results, predict the weight status of the subjects.



197 =

1000g = 1kg

8871g = 8.871kg

368g = 0.368kg

1000g = 1kg

368g = 0.368kg

1000g = 1kg

I am a success
 My academics is a success
 I have understanding than my teachers
 My memory is blessed
 I am greatly helped of God
 My efforts + God's mercy → excellence
 I find favour in the sight of my teachers
 I have strength for success

