

**CONFIDENTIAL**



**UNIVERSITI TUN HUSSEIN ONN MALAYSIA**

**FINAL EXAMINATION**

**SEMESTER II**

**SESSION 2014/2015**

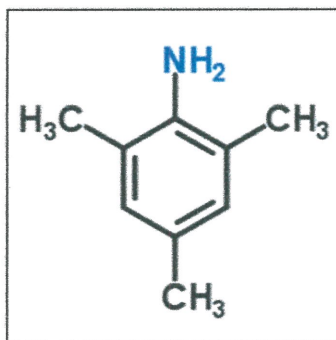
**COURSE NAME : FOOD ANALYSIS II**  
**COURSE CODE : BWD20603**  
**PROGRAMME : 2 BWD**  
**EXAMINATION DATE : JUNE/JULY 2015**  
**DURATION : 3 HOURS**  
**INSTRUCTION : ANSWER ALL QUESTIONS**

**THIS QUESTION PAPER CONSISTS OF FOUR (4) PAGES**

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- Q1** (a) For molecule in **Figure Q1(a)**, how many signals do you expect will appear on  $^1\text{H}$  NMR.

(2 marks)



**Figure Q1(a)**

- (b) Redraw the structure and justify your choice in Q1 (a).

(3 marks)

- (c) Draw ONE (1) structure that would have the least number of  $^1\text{H}$  NMR signals.

(4 marks)

- (d) (i) How many vibrational modes would you expect for hydrazine,  $\text{H}_2\text{NNH}_2$ .

(4 marks)

- (ii) The highest energy band in the IR of hydrazine,  $\text{H}_2\text{NNH}_2$  occurs at about  $3350\text{ cm}^{-1}$ ; what vibration is this likely to be due to?

(2 marks)

- Q2** (a) 20 g of BDA (butanedioic acid) was shaken with a mixture of 100 cm<sup>3</sup> ether and 100 cm<sup>3</sup> water at 25 °C. After titration with standard sodium hydroxide the concentration of the acid was found to be 0.024 mol dm<sup>-3</sup> in ether and 0.16 mol dm<sup>-3</sup> in water.
- (i) Calculate the distribution coefficient **K<sub>D</sub>** for BDA between ether/water.  
(6 marks)
- (ii) If 10 g of BDA was dissolved in 50 cm<sup>3</sup> of ether at 25 °C, calculate how much of the acid can be extracted with 50 cm<sup>3</sup> of water.  
(8 marks)
- (b) The fastest way to analyze organic contamination in food samples is by using GC (gas chromatography). In fact, increasing the speed of analysis has always been an important goal in gas chromatography. Outline THREE (3) approaches that can be done to decrease the time for separation based on your understanding.  
(9 marks)
- Q3** (a) A mixture of proteins were applied in a buffer at pH 8, to anion-exchange column. On the basis of some assays performed, the protein of interest adsorbed to the column.
- (i) Does the anion-exchange stationary phase have a positive or negative charge ion?  
(2 marks)
- (ii) What is the overall charge of the protein of interest (adsorbed to the column) higher or lower than pH 8?  
(2 marks)
- (iii) Is the isoelectric point of the protein of interest higher or lower than pH 8?  
(4 marks)
- (iv) Distinguish TWO (2) common methods that could be used to elute the protein of interest from the anion exchange column.  
(8 marks)

- (b) DSC (differential scanning calorimetry) has gained remarkable popularity in thermal studies of foods and their components following the development of instrumentation of sufficient sensitivity.
- (i) Based on your knowledge, propose a sketch of typical DSC plot for a cookie/cracker flour. (4 marks)
- (iii) Explain the graph with assumption that the trace shows the glass transition and melting point. (8 marks)
- Q4** (a) You work for a research lab in a large Malaysia pharmaceutical company and are responsible for developing sago starch as a potential source to be used as pharmaceutical excipient. In your opinion, what are the factors that affect the rheological properties of sago starch and how these studies help you if developing sago as the excipient? (10 marks)
- (b) Iron-deficiency anaemia has long been recognized and is still an important nutritional deficiency problem in Malaysia. Thus, there has always been an interest in identifying local foods rich in iron. Colorimetric procedures and atomic absorption spectrophotometry has been used to determine minerals. In a table form, compare and contrast between the two procedures. (14 marks)
- Q5** (a) Electron microscopy is a valuable tool that can be used in a number of applications. There are two types of electron microscope, a SEM and TEM (tunnelling electron microscope). Which electron microscope should be used for scanning at the structural differences of muscle fibers between fish, prawns and squid? This may help to establish why squid muscles are much stiffer than fish and prawns. Explain your choice. (10 marks)

**END OF QUESTION**