Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2016/2017

COURSE NAME	:	FOOD ANALYSIS II
COURSE CODE	:	BWD 20603
PROGRAMME CODE	:	BWD
EXAMINATION DATE	:	JUNE 2017
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWERS **ALL** QUESTIONS

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

Q1 Spectroscopy methods are very informative and widely used for both quantitative and qualitative analyses. There are many different spectroscopic methods available for solving a wide range of analytical problems in food industry. The principle of spectroscopy methods are based on quantum nature of matter.

(a) State **FOUR (4)** spectroscopic methods which involved absorption of radiation.

(4 marks)

(b) Explain what does it mean to say that the energy content of matter is quantized?

(6 marks)

(c) A particular food coloring has a molar absorptivity of $3.8 \times 10^3 cm^{-1}M^{-1}$ at 510 nm.

(i) What will be the absorbance of a 2×10^{-4} M solution in a cuvette with 2 cm height and 1 cm length?

(ii) What will be the percent transmittance of the solution in (a)?

(5 marks)

(d) Identify the factors that affect the frequency of vibration of a molecular functional group in infrared spectroscopy. Explain your answer.

(10 marks)

Q2 Chromatography is general term applied to a wide variety of separation techniques based on the partitioning or distribution of a sample between a mobile phase and stationary phase. Gas chromatography (GC) and high performance liquid chromatography (HPLC) are the most popular chromatography techniques.

(a) Based on Van Deemter equation, explain briefly how does the use of GC packed column can give the disadvantages in term of stagnant mobile phase mass transfer factor as compared to GC capillary column.

(4 marks)

(b) A sample containing solutes 1, 2, 3 and 4 were analyzed via reversed-phase HPLC using a column packed with a silica-based C_{18} bonded phase. A 1:5 solution of ethanol and water was used as the mobile phase. The chromatogram in **Figure Q2 (b)** was obtained.

(i) Arrange the solutes 1, 2, 3 and 4 in ascending order of their polarity?

(1 mark)

(ii) Given the width of the eluting peak at the baseline for solutes 1, 2, 3 and 4 are 1.5, 1.6, 1.2 and 1.8 min respectively and a void retention time is 0.3 min. Calculate the separation factors for solutes 1, 2 and 3, 4.

(4 marks)

(iii) State the separation achievement for solutes 1 and 2 as compared to solutes 3 and 4, based on your calculation in **Q2(b)ii**.

(2 marks)

(iv) Propose method should be used, in order solutes 3 and 4 will elute sooner without changing the relative positions of solutes 1 and 2. Explain briefly why this would work.

(4 points)

(c) By using suitable graphic organizer, compare and contrast between reversed-phase and normal-phase chromatography.

(10 marks)

Q3 (a) Dominant wavelength (λ_d), % purity and luminosity (Y) in the CIE *XYZ* system correspond to what indices in the Munsell system? And in the CIE *L*C*H* system?

(5 marks)

(b) Most triglycerides exist at least in three crystalline forms, α (alpha), β' (beta-prime) and β (beta). Sketch a typical DSC graph for a vegetable oil, which contains these three crystalline forms. Explain the graph briefly with assumption that the trace shows the glass transition and melting point.

(10 marks)

(c) Different techniques have been used to study the microstructure of dairy foods in recent years. Discuss **TWO (2)** techniques that can be used to study the interaction of dairy food protein (structured in casein micelles) and their interaction with other components.

(10 marks)

Q4 (a) Compare and contrast **TWO (2)** principles behind 1-D and 2-D gel electrophoresis of proteins.

(10 marks)

(b) You are a manufacturer of bakery products and you knew rheological properties of a dough are extremely important since they affect the quality if the finished product. How do you determined the rheological properties of a bakery product and suggest **ONE (1)** method to improve the properties of products.

(15 marks)

-END OF QUESTION –

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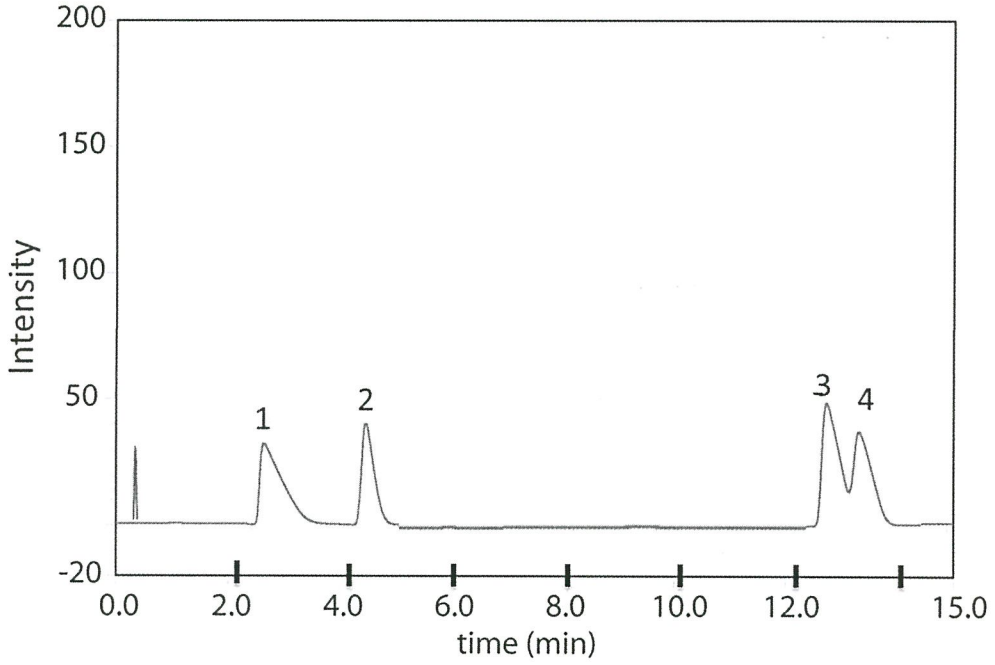

Figure Q2(b)