Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2015/2016

COURSE NAME	:	FOOD ANALYSIS II
COURSE CODE	:	BWD 20603
PROGRAMMECODE	:	BWD
EXAMINATION DATE	:	JUNE / JULY 2016
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWERS ALL QUESTIONS

THIS QUESTION PAPER CONSISTS OF **FIVE (5)** PAGES

Q1 Spectroscopy deals with the production, measurement, and interpretation of spectra arising from the interaction of electromagnetic radiation with matter. Spectroscopic methods based on the absorption or emission of radiation in the ultraviolet (UV), visible (Vis), infrared (IR) and radio (nuclear magnetic resonance, NMR) frequency ranges are most commonly encountered in traditional food analysis laboratory.

(a) State the spectrum ranges (in wavelength) of the electromagnetic radiation in the UV, Vis, IR and NMR.

(4 marks)

(b) **Figure Q1(b)** shows a spectrum obtained by UV-Vis spectrophotometer in 1 mM solution of compound Z in a sample cell with a path length of 1 cm. Calculate the molar absorptivity of compound Z at 295 nm and 348 nm.

(5 marks)

(c) Compare and contrast between flame AAS and graphite furnace AAS with suitable graphic organizer

(10 marks)

(d) An experiment was conducted to identify the product rancidity (compound W) of food using FTIR. **Figure Q1 (d)** shows mid-IR spectrum of compound W. Based on the absorbance bands of organic functional group in **Figure Q1 (d)**, propose compound W. Justify your answer.

(6 marks)

Q2 Chromatography has a great impact on all areas of analysis, including in food and food product analysis. The most popular chromatography techniques are high performance liquid chromatography (HPLC) and gas chromatography (GC).

(a) Kumar conducted an experiment to determine the content of individual sugars in beverage samples using HPLC. He used amine column and acetonitrile as mobile phase.

Based on the above statement, write the operational definition of chromatography.

(4 marks)

(b) **Figure Q2(b)** shows the chromatogram of food sample A which has been run in GC packed column, 2m x 4mm ID; 0.05µm film; oven temperature, 50 °C for 15 minutes; carrier gas is helium with flow rate 20cm/sec; detector is FID at 250 °C. A void retention time is 0.3 min. The width of the eluting peak at the baseline for solute 1, 2, 3 and 4 are 1.5, 1.6, 1.2 and 1.8 min, respectively.

State the separation achievement for the solutes 1and 2 as compared to solutes 3 and 4. Support your statement with quantitative data.

(7 marks)

(c) The chromatogram of food sample A shows in **Figure Q2(c)** is run in GC capillary column, 100m x 0.25mm ID; 0.5µm film.

Based on Van Deemter equation, point out how GC capillary column can give the advantages with compare to GC packed column in (b).

(10 marks)

(d) Give inference the GC method used in Q2(c).

(4 marks)

Q3 (a) Sketch a typical DSC graph for a rice flour with a temperature range from 60 °C to 100 °C, at 10 % and 80 % water content, respectively. Explain the graph briefly with assumption that the trace shows the glass transition and melting point.

(10 marks)

(b) As a food analyst, you want to recommend thermal analysis techniques to Managing Director of your company, which produces organic polymers such as bioplastics. Elaborate to him the advantages and disadvantages of introducing these techniques into the research and quality-control laboratories, to convince him to implement the technique for the use of organic polymers production.

(15 marks)

Q4 (a) A recent research project carried out to examine potential use of various other thickeners as replacements for gelatine in dessert products. Outline the steps to determine the structure of different thickeners using scanning electron microscope (SEM).

(6 marks)

(b) High pressure processing (HPP) has increasingly found new applications in biological systems and has been proposed as a promising method for food preservation. As a food technologist, what test method can you use to study of cellular injuries of the yeast after HPP treatment? Justify your answer.

(9 marks)

(c) Differentiate the principles behind 1-D and 2-D gel electrophoresis of proteins.

(10 marks)

-END OF QUESTION –

FINAL EXAMINATION

SEMESTER / SESSION : SEM II / 2015/2016
COURSE NAME: FOOD ANALYSIS II

PROGRAMME CODE : BWD
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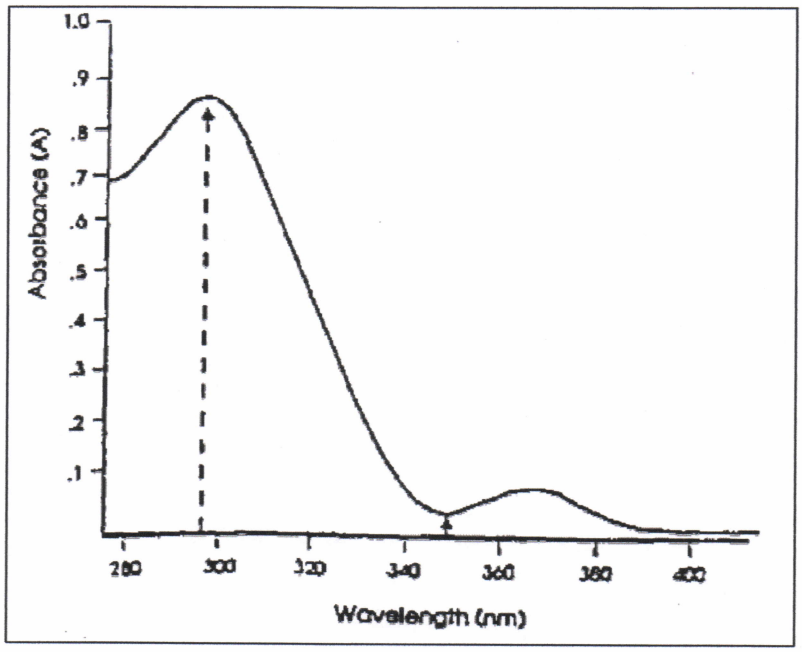

Figure Q1 (b)

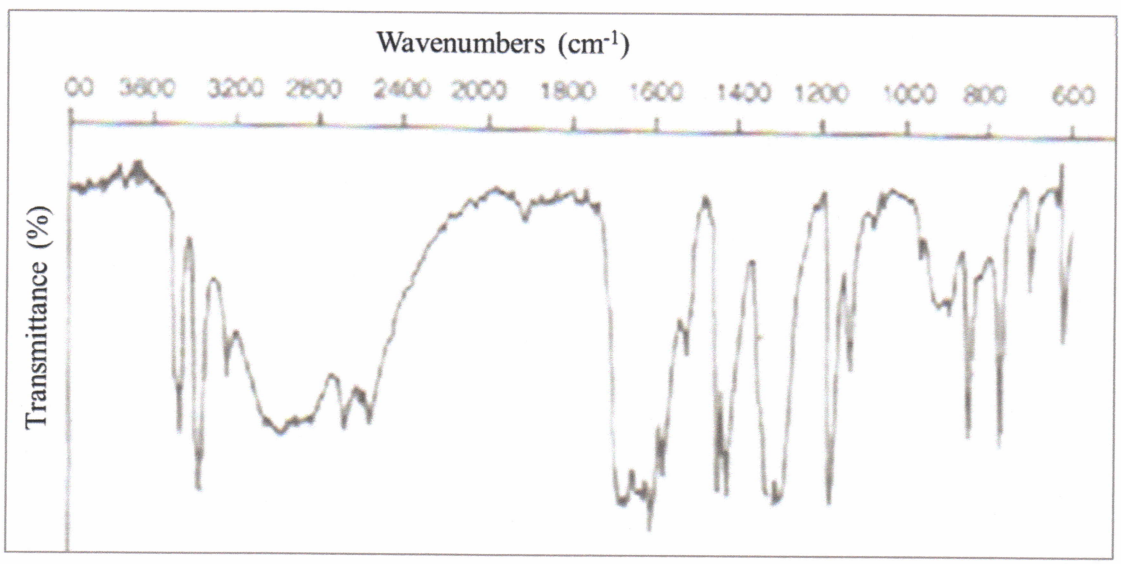

Figure Q1 (d)

FINAL EXAMINATION

SEMESTER / SESSION : SEM II / 2015/2016
COURSE NAME : FOOD ANALYSIS II
PROGRAMME CODE : BWD
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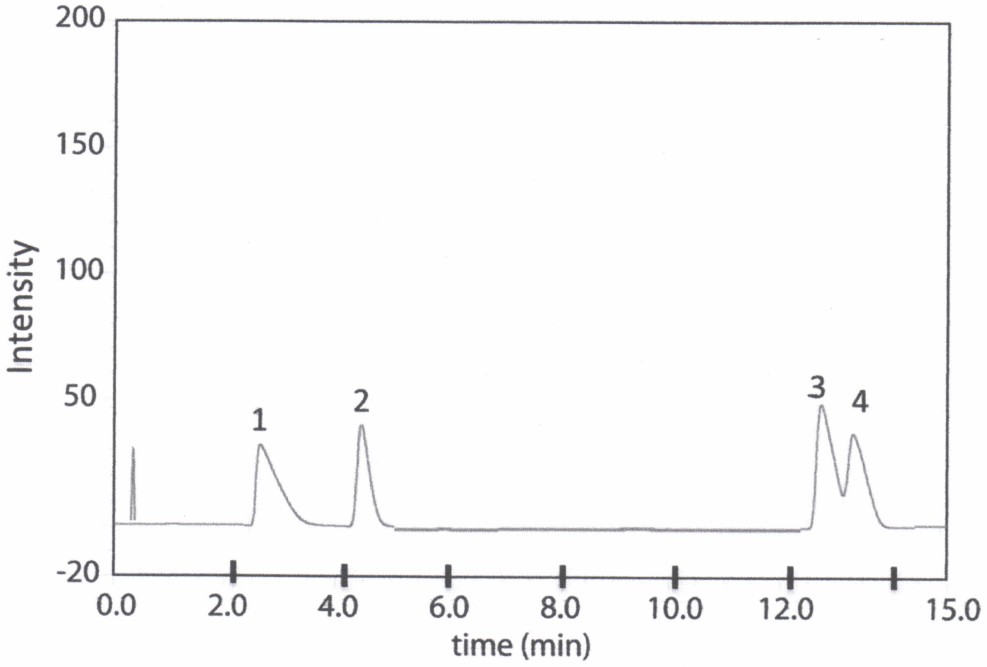

Figure Q2 (b)

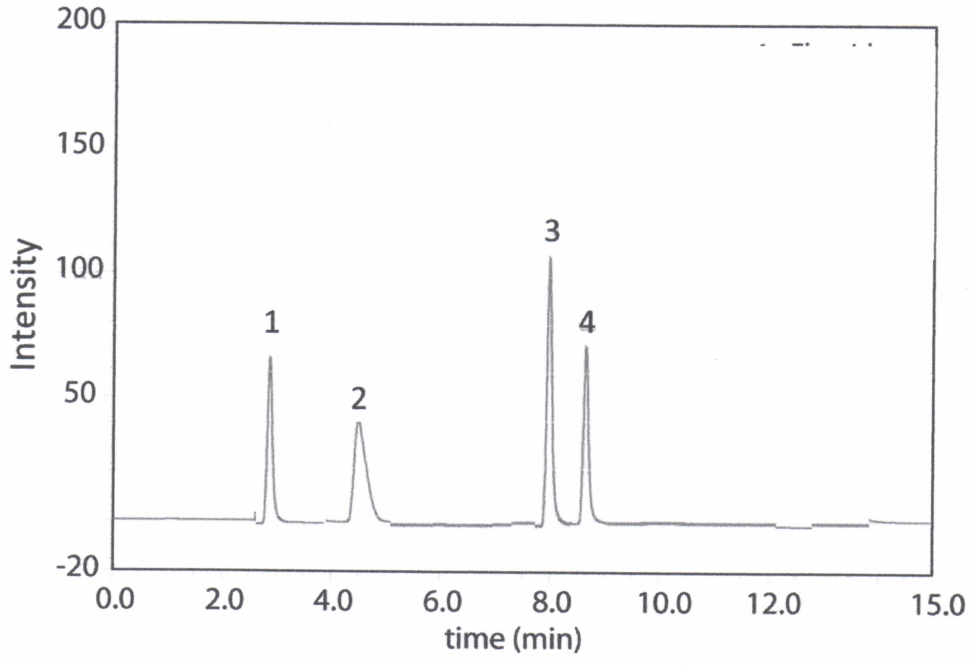

Figure Q2 (c)