



**UNIVERSITI TUN HUSSEIN ONN MALAYSIA**

**FINAL EXAMINATION  
SEMESTER II  
SESSION 2022/2023**

- COURSE NAME : PHYSICAL PROPERTIES OF FOOD
- COURSE CODE : BWD 11802
- PROGRAMME CODE : BWD
- EXAMINATION DATE : JULY / AUGUST 2023
- DURATION : 2 HOURS
- INSTRUCTIONS :
1. ANSWER ALL QUESTIONS
  2. THIS FINAL EXAMINATION IS CONDUCTED VIA
    - Open book
    - Closed book
  3. STUDENTS ARE **PROHIBITED** TO CONSULT THEIR OWN MATERIAL OR ANY EXTERNAL RESOURCES DURING THE EXAMINATION CONDUCTED VIA CLOSED BOOK

THIS QUESTION PAPER CONSISTS OF TEN (10) PAGES

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**CONFIDENTIAL**

**PART A**

There are **THIRTY FIVE (35)** multiple-choice questions in this section. Read each question and answer option carefully before selecting the **ONE (1)** best answer. Use the OMR form to answer all questions in this section.

**Q1** The surface tension of vegetable oils can be determined using the following methods, **EXCEPT**

- A. Drop weight
- B. Tensiometer
- C. Capillary rise
- D. Turbidimetry

(1 mark)

**Q2** Which of the following is a method used for testing emulsion stability?

- A. Jar test
- B. Rheometer
- C. Centrifuge test
- D. Static foam test

(1 mark)

**Q3** To lower the surface tension of a liquid, the following foaming agent is required, **EXCEPT**

- A. Surfactants
- B. Macromolecules
- C. Dissolved particles
- D. Surfactants and finely divided solids

(1 mark)

**Q4** What happens if the surface of a liquid is stretched?

- A. The system still has the same free energy.
- B. The system has less free energy.
- C. The system has more free energy.
- D. The system loses all of its free energy.

(1 mark)

**Q5** Which of the following surfactants used to stabilize food emulsions and foams belongs to the high molar mass species?

- A. Lipids
- B. Proteins
- C. Monoglycerides
- D. Polyoxyethylenesorbitan monostearate

(1 mark)

- Q6** The following criteria are necessary for a demulsifier to function, **EXCEPT**
- A. A strong attraction to the interface.
  - B. Migrate slowly through the continuous phase to reach the droplet interface.
  - C. The emulsifying agent that stabilises the emulsion is displaced or otherwise countered.
  - D. Promote aggregation and coalescence of the dispersed phase into large droplets that can settle out or otherwise be separated from the continuous phase.
- (1 mark)
- Q7** Which of the following fluid characteristics best describes the resistance of a fluid to flow?
- A. Viscosity
  - B. Inelastic
  - C. Elastic
  - D. Plastic
- (1 mark)
- Q8** Choose a **CORRECT** statement of emulsifiers and stabilisers.
- A. Polysaccharides are examples of emulsifiers, while sucrose esters are examples of stabilisers.
  - B. Polysaccharides are examples of emulsifiers, while polysorbates are examples of stabilisers.
  - C. The emulsifier provides short-term stability, but stabiliser provides long-term emulsion stability.
  - D. The emulsifier provides long-term stability, but stabiliser provides short-term emulsion stability.
- (1 mark)
- Q9** Which of the following emulsions is a double emulsion?
- A. Oil-in-water
  - B. Oil-in-oil
  - C. Oil-in-water-in-water
  - D. Oil-in-water-in-oil
- (1 mark)
- Q10** The physical nature of a simple emulsion can be determined via the methods listed below, **EXCEPT**
- A. Dyeing
  - B. Boiling
  - C. Test strip
  - D. Magnetic resonance imaging
- (1 mark)



**Q11** Which of the following statements best describes foam?

- A. A foam is a colloidal dispersion consisting of a gas dispersed in a continuous liquid phase.
- B. A foam is a colloidal dispersion consisting of a solid dispersed in a continuous liquid phase.
- C. A foam is a colloidal dispersion consisting of a liquid dispersed in a continuous gas phase.
- D. A foam is a colloidal dispersion consisting of a solid dispersed in a continuous gas phase.

(1 mark)

**Q12** Textural qualities of foods vary for the reasons given below, **EXCEPT**

- A. Diversity of colours
- B. Differences in varieties
- C. Processing-related variations
- D. Maturation-related differences

(1 mark)

**Q13** Liquids with high surface tension also have high latent heat values. Identify which of the following liquids best fits this description.

- A. Wine
- B. Water
- C. Cream
- D. Olive oil

(1 mark)

**Q14** Which of the following substances works by reducing interfacial tension?

- A. Dendrimer
- B. Polyamines
- C. Epoxy resins
- D. Sorbitan esters

(1 mark)

**Q15** Which of the following foods exhibits a rise in shear stress and apparent viscosity over time?

- A. Gelatin
- B. Egg white
- C. Shortening
- D. Starch–milk–sugar pastes processed at 75°C

(1 mark)

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- Q16** Which of the following food lists is in decreasing order of surface tension?
- A. Coconut oil, skim milk, diluted wine
  - B. Skim milk, coconut oil, diluted wine
  - C. Diluted wine, coconut oil, skim milk
  - D. Diluted wine, skim milk, coconut oil
- (1 mark)
- Q17** Select **ONE (1)** of the foam-based food products.
- A. Orange juice
  - B. Marshmallow
  - C. Sunflower oil
  - D. Coffee powder
- (1 mark)
- Q18** Which of the following methods is similar to the way people squeeze bread to make sure it is fresh?
- A. Penetration
  - B. Compression
  - C. Cutting shear
  - D. Snapping-bending
- (1 mark)
- Q19** The following parameters are essential in choosing demulsifiers, **EXCEPT**
- A. Molar mass
  - B. Ascorbic acid titration
  - C. Relative solubility numbers
  - D. Principal component analysis
- (1 mark)
- Q20** Select the **CORRECT** emulsion system and its food example from the list below.
- A. Water-in-oil emulsion; butter
  - B. Oil-in-water emulsion; margarine
  - C. Oil-in-water emulsion; coffee creamers
  - D. Water-in-oil emulsion; processed cheese
- (1 mark)
- Q21** Choose a food product that exhibits non-Newtonian fluid behaviour.
- A. Water
  - B. Cooking oil
  - C. Carbonated isotonic drink
  - D. Concentrated pineapple juice
- (1 mark)

**Q22** Which of the following parameters can be measured using a Kramer Shear press?

- A. Firmness of peas
- B. Softness of a cake
- C. Hardness of a pumpkin
- D. Spreadability of mayonnaise

(1 mark)

**Q23** Identify phenomenon occurs when preparing bread dough at home.

- A. Refraction
- B. Vortex formation
- C. Weissenberg effect
- D. Evaporation–condensation phenomena

(1 mark)

**Q24** Which of the following best describes the texture of pudding?

- A. Crisp
- B. Chewy
- C. Crunch
- D. Soft semisolid

(1 mark)

**Q25** Choose the best method for determining butter spreadability.

- A. Penetration
- B. Compression
- C. Cutting shear
- D. Snapping-bending

(1 mark)

**Q26** Measurement of water activity can be done according to the following methods, **EXCEPT**

- A. Colligative properties
- B. Isopiestic transfer
- C. Hygrometer
- D. Desiccator

(1 mark)

**Q27** Water activity is the ratio of \_\_\_\_\_ of water in the system to the \_\_\_\_\_ of pure water at the \_\_\_\_\_ temperature.

- A. Absolute pressure, vapour pressure, different
- B. Vapour pressure, vapour pressure, same
- C. Vapour pressure, atmospheric pressure, same
- D. Atmospheric pressure, vapour pressure, different

(1 mark)

**Q28** Figure Q28.1 shows a sorption isotherm of a food product with hysteresis. Describe the figure correctly.

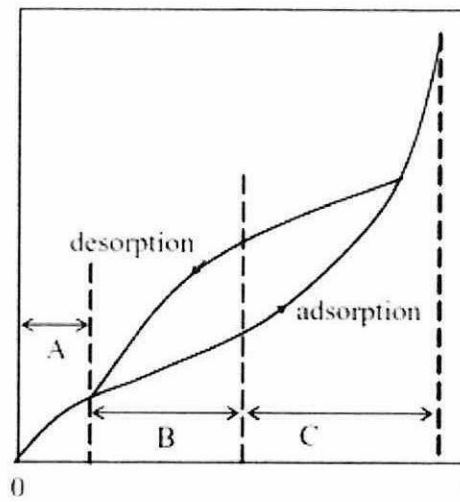


Figure Q28.1 ...

- A. X-axis: moisture content, y-axis: water activity. B: desorption, C : adsorption
  - B. X-axis: water activity, y-axis: moisture content, B: desorption, C: adsorption
  - C. X-axis: water activity, y-axis: moisture content, B: adsorption, C: desorption
  - D. X-axis: moisture content, y-axis: water activity, B: adsorption, C: desorption
- (1 mark)

**Q29** Figure Q29.1 illustrates the classification for sorption moisture isotherm. Choose the **CORRECT** match for the type of isotherm.

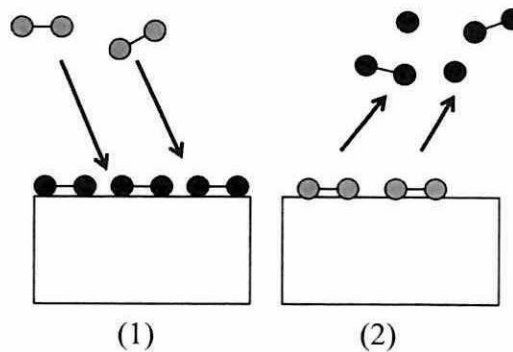


Figure Q29.1

- A. 1: Adsorption, 2: Desorption
- B. 1: Desorption, 1: Adsorption
- C. 1: Adsorption, 2: Absorption
- D. 1: Absorption, 2: Desorption

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(1 mark)



**Q30** Choose the **THREE (3)** types of particle sizes.

- I. Coarse
- II. Fine
- III. Small
- IV. Very fine

- A. I, II and III
- B. I, II and IV
- C. I, III and IV
- D. II, III and IV

(1 mark)

**Q31** Four liquids, A, B, C, and D, have respective masses of 15 g, 8 g, 63 g and 42 g when they are placed in 10 ml measuring cylinders. One floats on top of the other when all four liquids are combined in a container. Recognize which liquid will be at the top layer.

- A. Liquid A
- B. Liquid B
- C. Liquid C
- D. Liquid D

(1 mark)

**Q32** Calculate the aspect ratio of a carrot if its length is 8 cm and its width is 2 cm.

- A. 4 cm
- B. 6 cm
- C. 8 cm
- D. 10 cm

(1 mark)

**Q33** It is important to understand the size and shape of food because

- I. It is much easier to handle
- II. Important in heat processing and freezing
- III. Grading of fruits and vegetables
- IV. More attractive

- A. I and II
- B. II and III
- C. I, II and III
- D. II, III and IV

(1 mark)



**Q34** Density is important in food because

- A. Important during consumption
- B. Required in separation processes such as centrifugation
- C. Part of quality control
- D. As a marketing tool to attract consumers

(1 mark)

**Q35** Determine the appropriate way of analysing the particle size of peanut butter.

- I. Screening analysis
- II. Differential analysis
- III. Temperature analysis
- IV. Moisture content analysis

- A. I
- B. II
- C. III
- D. IV

(1 mark)

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**PART B**

This section contains **TWO (2)** subjective questions. Answer **ALL** questions in the answer booklet provided.

**Q36** (a) The angle of repose is the maximum angle at which a granular material can be piled or stacked without slumping or collapsing due to the force of gravity. It is the angle between the surface of a pile of granular material and the horizontal plane. As a food technologist at your company, explain how the angle of repose affects the flow of the granular materials.

(4 marks)

(b) You are developing a new powder drink that contains pineapple powder. Explain the method involved in determining the angle of repose of the new formulated powder drink.

(6 marks)

**Q37** Water activity is important in food preservation and safety. As a food technologist, you are responsible for the safety of your product, which is strawberry jam. Explain how water activity influences the product's shelf life.

(5 marks)

- END OF QUESTIONS -

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