

國立臺灣海洋大學九十九學年度研究所碩士班暨碩士在職專班入學考試試題

考試科目：科技英文

系所名稱：食品科學系碩士班食工組

1.答案以橫式由左至右書寫。2.請依題號順序作答。

1. (21%) 字彙: 請依序解釋下列文章中劃底線的單字

Certain foodstuffs, pharmaceuticals¹, and biological materials, which may not be heated even to moderate temperatures in ordinary drying, may be freeze-dried. The substance to be dried is usually frozen by exposure² to very cold air. In Freeze-drying, the water is removed as a vapor³ by sublimation⁴ from the frozen material in a vacuum⁵ chamber. After the moisture⁶ sublimates to a vapor, it is removed by mechanical vacuum pumps or steam⁷ jet ejectors.

2. (20%) 翻譯: 請將下列文章整段翻譯成中文(勿逐字翻譯)

(a) High-pressure technology offers the food industry a unique opportunity to develop new foods with high nutritional and sensory quality, novel texture, more convenience, higher safety, and increased shelf life. The status of technology today is such that capacity, operating, process control, and safety requirements for high-pressure food processing can readily be met.

(b) When fluid is flowing in a circular pipe and the velocities are measured at different distances from the pipe wall to the center of the pipe, it has been shown that in both laminar and turbulent flow, the fluid in the center of the pipe is moving faster than the fluid near the walls.

3. (9%) 問答: 請根據文意以英文句子回答相對應問題

The kinetic theory of gases gives us a good physical interpretation of the motion of individual molecules in fluids. Because of their kinetic energy the molecules are in rapid random movement, often colliding with each other. Molecular transport or molecular diffusion of a property such as momentum, heat, or mass occurs in a fluid because of these random movements of individual molecules. Each individual molecule containing the property being transferred moves randomly in all directions, and there are fluxes in all directions. Hence, if there is a concentration gradient of the property, there will be a net flux of the property from high to low concentration. This occurs because equal numbers of molecules diffuse in each direction between the high-concentration and low-concentration regions.

(a) Why is molecular transport of heat occurring?

(b) When there is flux of property (momentum, heat, or mass), what is the direction of the net flux?

(c) Do you think the author acknowledged the existence of momentum "concentration"?

4. 請將下述英文翻譯成中文 (10分):

Drying involves four transport processes:

- External heat transfer from source to surface of food.
- Internal heat transfer from surface to moisture.
- Internal mass transfer of moisture to surface of food.
- External mass transfer of moisture from surface of food to a sink, such as the atmosphere.

5. 請問下列英文在說明什麼? (10分)

Basic data on phase equilibria, transport properties, and rheological parameters are usually quite incomplete and indeed not easy to determine experimentally, due to the very complex composition and microstructure of many foods and food ingredients.

6. 請問下列圖形 (Figure 3) 在說明什麼? (15分)

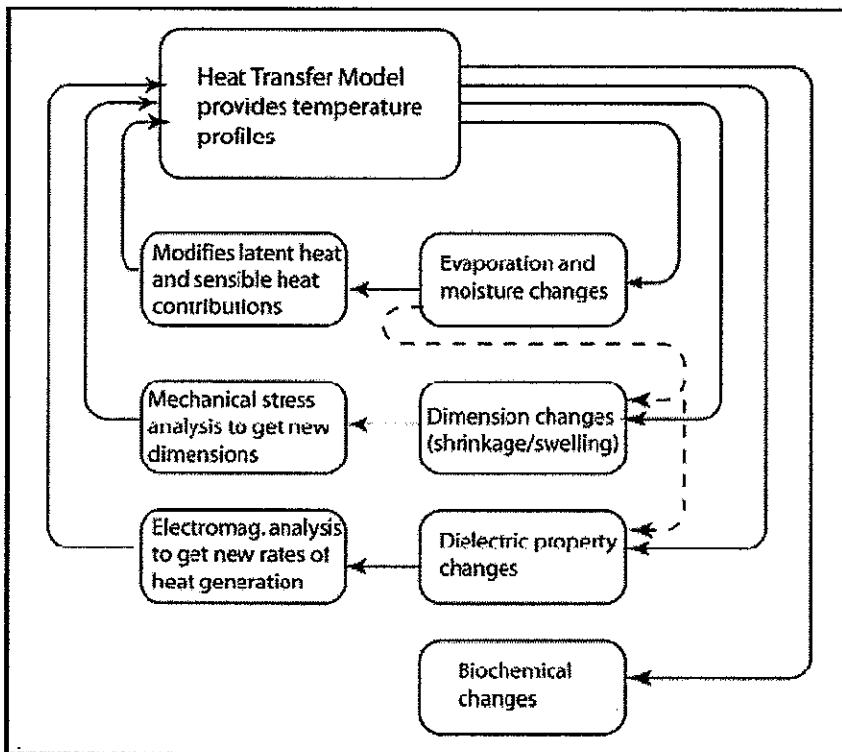


Figure 3 – Schematic showing coupling of different types of physics with heat transfer. The connecting solid lines stand for coupling due to temperature itself, whereas the dashed lines stand for additional coupling that can arise in a heating process such as moisture loss.

7. 請問下面圖17的(b)部分 (圖表中的6、7、8部分) 在敘述什麼? (15分)

【註: (a)部分的圖形已經刪除】

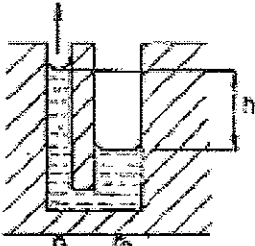
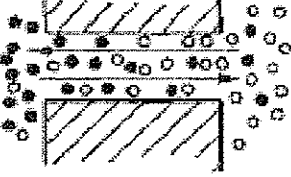

TYPE	PICTURE	EQUATION
6. CAPILLARY FLOW		$n_w^t = -\rho_p \kappa \nabla \theta$ $\theta = \text{m}^3 \text{ water} / \text{m}^3 \text{ porous material}$ $\kappa = \text{permeability} \quad [\text{m}^2/\text{s}]$
7. LIQUID DIFFUSION		$n_w^t = -\rho_l D_{we} \nabla w_w$ $w_w = \text{moisture content} \quad [\text{kg}/\text{kg}]$ $D_{we} = \text{effective diffusivity} \quad [\text{m}^2/\text{s}]$
8. SURFACE DIFFUSION		$n_w^t = -\rho_l D_s \nabla w_w$ $D_s = \text{surface diffusivity} \quad [\text{m}^2/\text{s}]$

Figure 17—(a) Mechanisms for vapor transport in capillary-porous materials, (b) Mechanisms for liquid transport in capillary porous materials (Bruin and others 1980)