※ 注意：請於試卷上依序作答，並應註明作答之部份及其題號。

Part A: (50 %)

1. The acid value, saponification value and unsaponifiable matter of a crude oil are determined as 6.0 mg.KOH/g.oil, 200 mg.KOH/g.oil, and 3.5 %, respectively. Calculate the theoretical yield of the refined oil prepared from the above crude oil. (5 %)
2. Describe the theory and the procedure for the determination of Folin nitrogen. (5 %)
3. Describe the theory, by means of chemical reactions, for the determination of peroxide value. (5 %)
4. The crude protein of a sample usually expressed by "(nitrogen content) x (6.25)". Here, why the factor of 6.25 is used? (5 %)
5. An aqueous 0.001*M* HCl solution is diluted with distilled water by 10^6 folds. Calculate the final pH of the diluted solution. (5 %)
6. A 25-g food sample was dried, then ashed, and finally analyzed for salt (NaCl) content by the Volhard titration method. The weight of the dried sample was 5g, and the ashed sample weighed 1 g. Then 30 ml of 0.1*N* $AgNO_3$ was added to the ashed sample, the resultant precipitate was filtered out, and a small amount of ferric ammonium sulfate was added to the filtrate. The filtrate was then titrated with 3 ml of 0.1*M* KSCN to a red endpoint. What was the salt content of the original sample in terms of percent (wt/wt) NaCl?(Na = 23; Cl = 35.5). (5 %)
7. Write the chemical structures of the following compounds: (20 %)
   (1) Tyrosine (2) Fructose (3) epicatechin (4) cyanidin (5) maltol
   (6) ethylparaben (7) sorbic acid (8) MSG (9) genistein (10) cysteine

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Part B (50%)

1. How to determine the contents of sugars, total starch and resistant starch in a dietary fiber fortified (with resistant starch) raisin bread? The answers should cover the procedures of sample preparations and methods used for determinations. (10%)
2. Vacuum-packed meat is a dull purple color but when the package is opened and the meat exposed to the air takes on a bright-red color. Why? (6%)
3. Some types of pectin can be gelled with calcium ions while another requires high sugar and low pH, and why? What are the chemical differences between these types of pectin? (6%)
4. Which type of gum (carrageenan, gum arabic, methylcellulose, and locust bean gum) will you choose for the following products and why? Please give the basic chemical structural unit and characteristics of the specific gum. (16%)
   (1) If you wanted to suspend chocolate particles in a milk-based system
   (2) strong synergism with carrageenan to be both stronger and more elastic
   (3) add to doughnut dough/batter to reduce oil absorption
   (4) useful for encapsulating volatile flavors for use in dry beverage powders
5. Choose the correct answer for each question (12%) ※ 注意：以下請於試卷上「選擇題作答區」依序作答。

   (1) Baking powder differs from baking soda primarily in having _____ and starch as additional ingredients. (a) dry source of acid(s), (b) sucrose, (c) salt, (d) soda.

   (2) Which of the following is not a leavening agent? (a) carbon dioxide, (b) water vapor, (c) air, (d) nitrogen.

   (3) The sweetener that was combined with saccharin to produce the commercial product Sucaryl was _____. (a) HFCS, (b) cyclamate, (c) aspartame, (d) thaumatin.

   (4) Saccharin is _____ times as sweet as sugar. (a) 30, (b) 100, (c) 200-250, (d) 300-400.

   (5) The precursor of gelatin, which is obtained from animal hide, is (a) collagen, (b) actin, (c) myosin, (d) elastin.

   (6) The basic repeat unit of gelatin can be described by which answer (where X is an acidic or basic amino acid)? (a) X-pro-gly, (b) gly-pro-X, (c) X-gly-X, (d) X-pro-X.

   (7) Monosaccharide aldoses that differ in configuration at C-1 are best described as (a) isomers, (b) epimers, (c) anomers, (d) enantiomeric.

   (8) A monosaccharide with a five membered ring system would be generally described as a (a) pyranose, (b) septanose, (c) furanose, (d) triulose.

   (9) The series of steps in the Maillard reaction after glycosylamine formation that results in the conversion of the glycosylamine into a 1-amino-1deoxyketose is called the (a) Lobry de Bruyn-Alberda van Ekenstein transformation, (b) Heyns rearrangement, (c) Amadori rearrangement, (d) Diels-Alder reaction.

   (10) The Strecker degradation, an important aroma producing side reaction of the Maillard reaction, requires _____ and _____ for the reaction to take place. (a) sucrose, water, (b) alpha dicarbonyls, fatty acids, (c) alpha amino acids and sucrose, (d) alpha amino acids, alpha dicarbonyls.

   (11) The point of cross-linking starches is to (a) make the granules easy to gelatinize, (b) make granules less fragile, (c) make the granules able to swell in cold water, (d) made starch paste more freeze-thaw stable.

   (12) In the beginning of a typical RVA (rapid visco analyzer) experiment, the temperature is brought to 95℃ and then held at 95℃ and for specified period of time, The change in dispersion viscosity during this holding period is called (a) pasting, (b) peak, (c) breakdown, (d) setback.

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