*考題 1-50 題皆為單選題，每題 2 分，答錯倒扣 0.5 分。請於試卷上之「選擇題作答區」內依序作答。

Article 1

There are two parts of the total process of canning crab meat, the cooking and picking of the meat, can be carried out at the "cottage industry" level, and are well suited to countries with artisanal fisheries.

1. The "cottage industry" means (A) canning industry (B) large industry (C) industry requires heavy machine (D) industry at village level.
2. Which of the following statements is not suitable for describing artisanal fisheries? (A) small scale fisheries (B) fisheries using traditional techniques (C) fisheries using artistic equipment (D) fisheries for small market.

Article 2

The Codex Alimentarius has established a standard for canned crab meat, but there is no standard for imitation crab meat. Imitation crab meat is a seafood product made by blending surimi with various texturizing ingredients, flavorants, and colorants. The last step of manufacturing imitation crab meat is slitting. The slitting is done by a machine which is composed of two steel rollers that cut the surimi sheet into thin 0.1 inch (1.5 mm) wide strands. These thin strands are then bundled and rolled into a rope. This rope is given the appropriate color, wrapped, and cut to the desired size. It is then steamed cooked, forming a product.

3. Which of the following words is not a synonym of slit? (A) slash (B) cut (C) chop (D) put.
4. Which of the following statements is incorrect? (A) surimi literally means ground meat (B) the thin strands are bundled and rolled into a rope for extending the shelf life of the products (C) texturizing ingredients are for altering the rheological property of the product (D) blending is usually conducted in a mixer.
5. Which of the following statements about Codex Alimentarius is incorrect? (A) it is a Greek word (B) it can be translated as food code (C) it is an international food standards (D) it was established by FAO and WHO.

Article 3

Fermentation is widely used within the Pharmaceutical and Food industries. It requires the cultivation in submerged culture of an identified micro-organism (mainly bacterial) as a monoculture under defined environmental conditions. The incubation regime imposed is designed to maximize the productivity of the organism of interest by providing optimal conditions for population growth. The product of interest might be metabolite or protein. During an incubation cycle a nutrient energy source is added and the biomass and end product will increase as this is depleted.

6. Fermentation is rarely used for manufacturing (A) minerals (B) drugs (C) enzymes (D) bioactive compounds.
7. Which of the following word is a synonym of submerge? (A) subdue (B) immerse (C) oxidize (D) cultivate.
8. The population growth of micro-organism during fermentation can increase (A) biomass (B) nutrient (C) energy source (D) water.

Article 4

Freeze concentration is a process of concentrating liquid products by freezing the water content and subsequently removing the so-formed ice crystals from the food system. In dairy processing, this technology offers the advantage of minimizing the heat abuse of sensitive milk components, such as proteins and flavors. It thus provides an opportunity for producing dairy ingredients with enhanced functional and organoleptic qualities. By freeze concentration, skim milk has been concentrated up to 40 wt% total solids (TS) and whole milk up to 44 wt% TS. Lactose and lipids are more concentrated in the ice fraction than in the concentrated fraction. Proteins (casein and whey protein) decrease the ice growth rate and the high viscosity is a limiting factor for the freeze concentration of both skim milk and whole milk.

9. According to this article, freeze concentration cannot produce dairy ingredients with (A) better taste (B) lower lactose content (C) higher protein content (D) better energy efficiency.
10. According to this article, which of the following statements is incorrect? (A) the ice crystals formed during freeze concentration is pure water (B) high viscosity of the fluid is a limiting factor for freeze concentration of milk (C) lipids may be partially removed during freeze concentration of milk (D) formation of large ice crystal is good for freeze concentration of milk.

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Article 5

In a few years, you could be eating the next generation of genetically altered foods — potatoes that do not turn brown or soybeans with a healthier mix of fatty acids. A new generation of crops known as gene edited rather than genetically modified is coming to the market. Created through new tools that snip and tweak DNA at precise locations, they, at least for now, largely fall outside of current regulations. Dr. Choulika said he considered G.M.O.s safe, but that the gene editing techniques like those used by Calyxt would be more acceptable to consumers. Often in G.M.O.s, the inserted genes came from unrelated species, like the bacterial genes that were added to cotton so that it would exude a toxin to repel bollworms, a mixing of species known as transgenesis. Calyxt, a subsidiary of Cellectis doing the geneedited food, is also developing new versions of wheat including one with greater resistance to fungal diseases, another lower in carbohydrates and higher in dietary fibers.

Instead of using bacteria and viruses to burrow into a cell, gene editing techniques — create molecules that act as a template to match a specific segment of DNA and then make a cut there. For the Calyxt soybeans, for example, the only change was to turn off two genes. "There is nothing taken out or added to the plant," Dr. Choulika said. "It's what nature would have produced." Those edits change the mix of fatty acids and perhaps make for a better cooking oil. "Better than olive oil," Dr. Choulika said.

Cited from : Kenneth Chang Jan. 9, 2017, The New York Times,
https://www.nytimes.com/2017/01/09/science/genetically-edited-foods-crispr.html

11. What is whole name of G.M.O.? (A) generally modified oil (B) genetic modified organisms (C) generally modern organisms (D) genesis mediated organs.
12. In which one the bacterial gene is inserted?(A) generally modified oil (B) genetic modified organisms (C) genetic edited plants (D) genesis mediated organs.
13. Gene editing techniques would be more acceptable to consumers since (A) consumers do not know it (B) it is healthier (C) no genes are added (D) it is sweeter.
14. What is gene edited? (A) gene is cut (B) gene is added (C) gene is turned off (D) gene is made by human beings.
15. Why does genetic edited crop fall outside of current regulations? (A) DNA is added (B) DNA is removed (C) DNA is from other crops (D) DNA is snipped and tweaked.
16. The function of bacterial genes in cotton is to exude (A) toxin (B) nitrogen (C) carbon source (D) vitamins to bollworms.
17. Calyxt is a name of a (A) product (B) company (C) country (D) person.
18. Is Dr. Choulika a (A) runner (B) musician (C) boxer (D) scientist.
19. Calyxt soybeans could be better than olive oil due to change in (A) protein (B) fatty acids (C) carbohydrate (D) phytochemical.
20. For preparing GMO, the bacteria is (A) adhered (B) attached (C) denned (D) detached into a cell.

Article 6

Lingzhi (*Ganoderma* spp.) is generally recognized as safe (GRAS) medical mushroom, which has been used for centuries as a nutraceutical to promote health and longevity. Extracellular polysaccharide (EPS) is one of the major bioactive ingredients contributing to health benefits of *Ganoderma* spp. Traditionally, one-factor-at-a-time (OFAT) approach has been carried out by analyzing the effect of single factor on experimental response during fermentation. Although this technique provides simple way to monitor the influence of the variables studied, some drawbacks still exist, including time-consumption, laboriousness and diseconomy. In this study, response surface methodology (RSM) was applied to reveal the optimal culture conditions for EPS production of *Ganoderma formosanum*. RSM is composed of three steps: (1) Executing a set of designed experiment; (2) Evaluating the coefficients of polynomial model; (3) Predicting the response model and obtaining the optimum value. The optimum medium composition was found to be at initial pH 5.3, 49.2 g/L of glucose, and 4.9 g/L of yeast extract by implementing a three-factor-three-level Box-Behnken design (BBD). Under this condition, the predicted yield of EPS was up to 830.2 mg/L, which was 1.4 fold higher than the one from basic medium (604.5 mg/L). Furthermore, validating the experimental value of EPS production showed high correlation (100.4%) with the computational prediction response model. In addition, the percentage of β-glucan in EPS was 53 ± 5.5%. Taken together, this is the first study to investigate the influence of medium composition for *G. formosanum* EPS production as well as its β-glucan composition.

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21. In this study, what kind of Lingzhi was used? (A) *Ganoderma formosanum*, (B) *Trametes versicolor*, (C) *Ganoderma kucidum*, (D) *Lentinus edodes*.
22. In this study, what kind of product was the authors looking for? (A) Intracellular polysaccharide, (B) Ganoderma mycelium, (C) Extracellular polysaccharide, (D) Culture medium.
23. Which step is NOT included for RSM application? (A) Evaluating the coefficients of linear model, (B) Executing a set of designed experiment, (C) Predicting the response model and obtaining the optimum value (D) Evaluating the coefficients of polynomial model.
24. What's the predicted yield of EPS production in this study? (A) 803.2 mg/L, (B) 830.2 g/L, (C) 830.2 mg/L, (D) 8,302 mg/L.
25. The authors also evaluated the percentage of (A) α-glucan, (B) β-glucose, (C) β-galactose, (D) β-glucan, in this study.
26. Which factor is not included for Box-Behnken design in this study? (A) yeast extract, (B) pH, (C) fructose, (D) glucose.
27. What's the meaning of ± 5.5% in this study? (A) Production yield, (B) standard deviation, (C) concentration, (D) control number.
28. What's the full name of GRAS? (A) Generally recognized as safe, (B) generally recognized as not safe, (C) generally considered as safe, (D) good and recognized as safe.
29. Which one is NOT the disadvantage of one-factor-at-a-time method? (A) time-consuming, (B) laboriousness, (C) diseconomy, (D) cost-effective.
30. What's the main purpose of this study? (A) to study the appearance of *Ganoderma* spp., (B) to investigate the influence of medium composition for *G. formosanum*, (C) to investigate the influence of bioreactors on *G. formosanum*, (D) to earn money from foreigners.

Article 7

How your gut's circadian rhythm affects your whole body?

We've known that bacteria live in our intestines as far back as the 1680s, when Leeuwenhoek first looked through his microscope. Until fairly recently our various microbes were thought of as freeloaders without any meaningful benefit to our functioning as healthy human beings. However, that view has changed in a big way over the last couple of decades. Interest in, and knowledge about, the microbiota has recently exploded. These highly diverse communities of microbes live in and on us in staggering numbers; researchers now estimate that a typical human body is made up of about 30 trillion human cells and 39 trillion bacteria. We now recognize they're essential to our health, participating in many important physiological functions such as digestion and metabolism of foods, and immune responses and inflammation; disruption of the gut microbiota might then contribute to a variety of conditions including childhood asthma, obesity, colitis and colon cancer. The total DNA complement of the microbiota is termed the microbiome, and it's what we study to learn about the inner workings of the microbiota. In this field's early days, researchers took fecal samples from people to investigate the composition of the gut microbiome. Later they noticed that defining the microbiome from a sample taken in the morning was quite different from one taken in the evening: The gut microbiota was not static over the span of the day.

Cited from: Richard G. Stevens, Jan. 2, 2017, CNN The Conversation, http://edition.cnn.com/2017/01/02/health/gut-microbiome-circadian-rhythm/

31. Scientists have known that bacteria grow in our gut for more than (A) thirty years (B) three thousand years (C) three hundred year (D) three hundred thousand year.
32. The various microbes live in our gut (A) cause diarrhea (B) are parasites (C) bring meaningful benefit to our health (D) can infect other people.
33. The highly diverse communities of microbes live in and on us in staggering numbers. "Staggering" in this sentence means: (A) huge (B) small (C) moving (D) unsteady
34. Which statement is incorrect? (A) Gut Microbiota is the highly diverse communities of microbes live in human intestine. (B) Human body is made up of about 30 trillion human cells. (C) Gut Microbiota contains 39 trillion bacteria. (D) Our various microbes are freeloaders without any meaningful benefit to our health.
35. Which description is incorrect? Disruption of the gut microbiota might contribute to a variety of conditions including (A) childhood asthma (B) obesity (C) colitis (D) pancreatic cancer.
36. Microbiome is (A) mix of different microbes (B) total DNA complement of the microbiota (C) DNA from a given bacteria (D) total protein complement of the microbiota.
37. To investigate the composition of the gut microbiome, where do researchers take samples from people? (A) mouth (B) blood (C) feces (D) hair.
38. Researchers notice that the gut microbiota from a sample (A) was always the same (B) was static (C) quite different every time (D) was the same in the morning and in the evening.
39. Which description about gut microbiota is wrong? (A) We now recognize they're essential to our health, (B) They are important in for many physiological functions (C) They help human body to digest food. (D) They cause gut inflammation and diarreha.

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40. "Interest in, and knowledge about, the microbiota has recently exploded." What does the sentence imply? (A) New technologies improve our understanding in gut microbiota. (B) Scientists are not interested in microbiota. (C) We know nothing about microbiota until recent years. (D) Too many bacteria cause our guts to explode.

Article 8

Anastassiades (2003) developed an original analytical methodology combining the extraction/isolation of pesticides from food matrices and extract cleanup. They coined the acronym QuEChERS for it, i.e. Quick, Easy, Cheap, Effective, Rugged and Safe. This technique involves micro-scale extraction using acetonitrile and purifying the extract using dispersive solid-phase extraction (d-SPE). Since the development and publication of the method, QuEChERS has been gaining significant popularity. It is the method of choice for food analysis because it combines several steps and extends the range of pesticides recovered over older, more tedious extraction techniques. The method has undergone various modifications and enhancements over the years since its first introduction. These have been designed to improve recovery for specific types of pesticides or types of food.

The traditional methods of determining pesticides in food are usually multi-stage procedures, requiring large samples and one or more extract cleanup steps. Therefore they are time-consuming, labour-intensive, complicated, expensive and produce considerable amounts of wastes. Moreover, the traditional methods often give poor quantitation and involve a single analyte or analytes from a single class of compounds. On the other hand, QuEChERS methodology reduces sample size and quantities of laboratory glassware. Clearly, QuEChERS requires fewer steps (no blending, filtration, large volume quantitative transfers, evaporation/condensation steps, or solvent exchanges required): this is very significant, as every additional analytical step complicates the procedure and is also a potential source of systematic and random errors.

The development of a new methodology requires a number of problems to be addressed, for example – choice of extraction solvent.

For determining pesticide residues in food matrices, the usual solvents have been acetone, ethyl acetate, and acetonitrile, as all of them ensure large analyte recoveries. Although acetone is readily miscible with water but the separation of water from this solvent is impossible without the use of non-polar solvents. On the other hand, ethyl acetate is only partially miscible with water, which renders superfluous the addition of non-polar solvents to separate it from water but the most highly polar pesticides do not separate in it. Acetonitrile extracts of food (fruit and vegetables) contain fewer interfering substances than the corresponding ethyl acetate and acetone extracts, and acetonitrile can be separated fairly easily from water (salting out), therefore it is the extraction solvent of preference in the QuEChERS methodology.

To avoid the use of co-solvents, which are often toxic and expensive, a series of experiments were carried out during the development of the QuEChERS methodology with the addition of various salts that were intended to induce a phase separation. These salts enabled pesticides of differing polarity to be analysed. Amongst the various salts tested, magnesium sulphate by effectively reducing the volume of the aqueous phase facilitates the partitioning of polar analytes into the organic phase and yields the largest recoveries of pesticides, particularly very polar ones like methamidophos, acephate or omethoate. Based on recoveries alone, MgSO4 appears to be the best choice as the salt used in the method, but selectivity of the extraction process must also be considered. By varying the amount of NaCl added to the sample during partitioning with MgSO4, it is possible to control the polarity range of the method and thus the amount of interferents in the extract. Experiments showed that a mixture of 4 g MgSO4 and 1 g NaCl avoided co-extraction of some interferents (like fructose) and thus was used in later experiments.

The authors of the QuEChERS method expressed the opinion that shaking should always be used in preference to blending if results for incurred samples are demonstrated to be the same by both techniques. In support of their view they presented the following advantages of shaking over blending:

a) during shaking the sample does not come into contact with the active metal surfaces of the blender and shaking does not generate heat due to friction (especially when solids are added);

b) cleaning of the blender jar/probe between consecutive sample extractions is obviated, so no extra solvent from rinsing is added to the sample;

c) shaking takes place in a closed vessel, which is safer, because no solvent vapours are emitted;

d) the cost of purchasing and maintaining a vortex mixers/shakers is less than that of a blender.

Conventional column-based solid-phase extraction (SPE) uses plastic or glass columns containing a 250–2000 mg of a sorbent material. Also required is equipment for cleaning up and enriching extracts into the solid phase (vacuum manifold, cover, connectors and valves, pressure gauge, vacuum pump, solvent and sample receivers), not to mention column preconditioning, solvent waste fractions, collection fractions, manual operation and solvent evaporation steps. Although SPE with extraction columns has many advantages, it is not the ideal technique. That is why QuEChERS uses dispersive SPE (d-SPE), which saves time, effort, money and solvents in comparison with traditional SPE.

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The tubes used in d-SPE can be prepared in the laboratory but they are also available commercially and may contain:

a) magnesium sulphate – to separate water from the organic solvent,

b) primary secondary amine (PSA) – to remove various polar organic acids, polar pigments, some sugars and fatty acids,

c) graphitised carbon black (GCB) – to remove sterols and pigments such as chlorophyll,

d) C18 – to remove non-polar interfering substances like lipids.

The QuEChERS method clearly has potential outside of pesticide analysis as it has been shown. This work highlights some of the multiresidue/class procedures applicable to the determination of acidic, basic and neutral drugs in various matrices. Several extraction/cleanup combinations showed promise initially, providing good recoveries of xenobiotics from different groups and classes, but they still need research. To sum up, the QuEChERS method is adaptable and can be easily tailored to cope with new matrices through the selection of alternative sorbents. In fact the initial extract can be divided across tubes containing different sorbents to cater for problem analytes. Work in progress indicates that the developed extraction conditions will recover the majority of food contaminants including pesticides and veterinary drugs.

Source: Food Chemistry, 2011 125(3):803-812

41. What is QuEChERS? (A) An analytical algorithm. (B) An analytical instrument. (C) An extraction method for food analysis. (D) A recovery methodology for pesticides.
42. Why is QuEChERS popular in food analysis? (A) It combines more tedious extraction that reduces the pesticides recovered. (B) It improves recovery for specific types of pesticides in food. (C) It is an inexpensive methodology for pesticides analysis. (D) It is a rugged and safe methodology for food analysis.
43. Which of the following description is WRONG? (A) MgSO4 promotes the solubility of polar analytes, thereby yields the largest recoveries of pesticides. (B) Dispersive SPE is the more efficiency and substantial methodology compared to traditional SPE. (C) NaCl used for removing the interferents by salting out. (D) QuEChERS achieves the extraction/purification by using columns containing a sorbent material.
44. Why acetonitrile was employed in QuEChERS? (A) It can extract less interfering substance. (B) It can easily separate with salt. (C) It is more non-polar solvent compared to ethyl acetate. (D) It is readily miscible with water.
45. Why does QuEChERS use shaking to substitute blending? (A) Shaking generates more heat to active extract efficacy. (B) Extra solvent adjunction during shaking to obviate the interferents. (C) Shaking led to less solvent volatilize. (D) Shaking is more quick, easy and cheaper.
46. Which of the following description about d-SPE is WRONG? (A) Magnesium sulphate was used to partition. (B) Polar substances were carried over by primary secondary amine. (C) Graphitised carbon black clears up the pigments. (D) C18 eliminated non-polar interfernts.
47. What can QuEChERS do? (A) To analyze the xenobiotics in food. (B) To prepare specimens for analysis. (C) To retrieve the loss of pesticide. (D) To make sure the safety of food.
48. According to this article, which one is the best description of "Rugged"? (A) A concise step. (B) A labour-intensive procedure. (C) A durable technique. (D) A rough method.
49. According to this article, which one is the best description of "pesticides"? (A) It is a kind of food. (B) It is a hydrophobic mixture. (C) It is a nutrient which is easy to lose. (D) It is a convention inspection item in food.
50. According to this article, which of the following description is RIGHT? (A) QuEChERS have various application dependents on different sorbents employed. (B) QuEChERS is the procedure for analyzing any substance. (C) QuEChERS recover more pesticides resulting in food safety. (D) QuEChERS contains column, shaker, and extractor.

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