科目： 專業英文 系所組： 食品科學系

I、Answer questions 26-32 according to the following abstract which is published in Food Chemistry 155 (2014) 161–166.

The reactivity of iron contained within insoluble colloidal metal-pyrophosphate salts was determined and compared to the reactivity of a soluble iron salt ($FeCl_3$). As a model system for the reactivity of iron in food products, the formation of an iron–polyphenol complex was followed with spectrophotometry. Three types of systems were prepared and their colloidal stability and reactivity studied: Fe^{3+} pyrophosphate, protein-coated Fe^{3+} pyrophosphate and mixed-metal pyrophosphates containing Fe^{3+} and a second cation M. The additional cation used was either monovalent (sodium) or divalent (M^{2+}). It was found that: (i) incorporating iron in a colloidal salt reduced its reactivity compared to free Fe^{3+} ions; (ii) coating the particles with a layer of hydrophobic protein (zein) increased stability and further decreased the reactivity. Finally, the most surprising result was that (iii) a mixed system containing more Fe^{3+} than M actually increased the reactivity of the contained iron, while the reverse, a system containing excess M, inhibited the reactivity completely.

26. What is the most likely topic of this abstract?
A. Stability and chemical reactivity of Fe^{3+} in foods.
B. The reactive properties of Fe^{3+} in foods.
C. Stability and chemical reactivity of complex colloids containing Fe^{3+}.
D. Increase of reactivity of Fe^{3+} in foods by adding cations.

27. Which of following statement is correct?
A. Fe^{3+} is insoluble.
B. zein-coated Fe^{3+} pyrophosphate is soluble.
C. colloidal Fe^{3+}-pyrophosphate is insoluble.
D. colloidal Fe^{3+}-pyrophosphate is soluble.

28. Which of following system is **not** studied in this paper?
A. free Fe^{3+}.
B. metal pyrophosphates containing Fe^{3+} and Na^{+}.
C. zein-coated Fe^{3+} pyrophosphate.
D. Fe^{3+} pyrophosphate.

29. What may **not** be the cation M in the abstract?
A. Ca. B. Cu. C. Mg. D. K.

30. Which method may increase the reactivity of mixed-metal pyrophosphates containing Fe^{3+}?
A. adding M in any concentration.
B. adding M at concentration higher than Fe^{3+}.
C. adding M at concentration lower than Fe^{3+}.
D. No addition of M.

31. How many phosphates are in the pyrophosphate?
A. one. B. two. C. three. D. six.

32. What might **not** be a key word for this abstract?
A. Reactivity.
B. Micronutrients.
C. Essential minerals.
D. Food colloids.

II、Answer questions 33-40 according to the following abstract which is published in International Journal of Food Microbiology 166 (2013) 280–293.

Salmonella can survive in low-moisture foods for long periods of time. Reduced microbial inactivation during heating is believed to be due to the interaction of cells and water, and is thought to be related to water activity (aw). Little is known about the role of water mobility in influencing the survival of *Salmonella* in low-moisture foods. The aim of this study was to determine how the physical state of water in low-moisture foods influences the survival of *Salmonella* and to use this information to develop mathematical models that predict the behavior of *Salmonella* in these foods.

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Whey protein powder of differing water mobilities was produced by pH adjustment and heat denaturation, and then equilibrated to aw levels between 0.19±0.03 and 0.54±0.02.Water mobility was determined by wide-line proton-NMR. Powders were inoculated with a four-strain cocktail of *Salmonella*, vacuum-sealed and stored at 21, 36, 50, 60, 70 and 80 °C. Survival data was fitted to the log-linear, the Geeraerd-tail, theWeibull, the biphasic-linear and the Baranyi models. The model with the best ability to describe the data over all temperatures, water activities and water mobilities ($f_{test} < F_{table}$) was selected for secondary modeling. The Weibull model provided the best description of survival kinetics for *Salmonella*. The influence of temperature, aw and water mobility on the survival of *Salmonella* was evaluated using multiple linear regression. Secondary models were developed and then validated in dry non-fat dairy and grain, and low-fat peanut and cocoa products within the range of the modeled data. Water activity significantly influenced the survival of *Salmonella* at all temperatures, survival increasing with decreasing aw. Water mobility did not significantly influence survival independent of aw. Secondary models were useful in predicting the survival of *Salmonella* in various low-moisture foods providing a correlation of R = 0.94 and an acceptable prediction performance of 81%. The % bias and % discrepancy results showed that the models were more accurate in predicting survival in non-fat food systems as compared to foods containing low-fat levels (12% fat). The models developed in this study represent the first predictive models for survival of *Salmonella* in low-moisture foods. These models provide baseline information to be used for research on risk mitigation strategies for low-moisture foods.

33. Where is the possible original source of the above article?
A. a publisher in an university.　B. a microbiology company.
C. a scientific publisher.　D. an international traveling agent called Food Microbiology.

34. What is the most likely topic of this abstract?
A. Effects of temperature, water activity and mobility in *Salmonella* model low-moisture foods.
B. Models of *Salmonella* affecting temperature, water activity and mobility in low-moisture foods.
C. Effects of temperature, water activity and mobility on *Salmonella* in low-moisture foods.
D. Modeling the influence of temperature, water activity and mobility on the persistence of *Salmonella* in low-moisture foods.

35. Which of following statement is **incorrect** regarding the publication of this article?
A. volume number is 166.　B. it was published in 2013.
C. we can find it in pages 280–293 of the book of "International Journal of Food Microbiology."
D. we can find it in the website of "International Journal of Food Microbiology."

36. What is not known about the influence on the survival of *Salmonella* in low-moisture foods?
A. pH.　B. temperature.　C. water activity.　D. water mobility.

37. Inactivation of *Salmonella* during heating is believed to be related to water activity (aw) by
A. survival decreasing with decreasing aw.　B. survival increasing with decreasing aw.
C. survival increasing with increasing aw.　D. survival is not related to aw.

38. What criterion is selected for the best model to describe the survival data?
A. $f_{test} < F_{table}$.　B. low-fat levels (<12% fat).　C. low-moisture levels.　D. all of above.

39. Which method **cannot** produce different water mobility of whey protein powder?
A. pH adjusting.　B. changing the fat content.　C. equilibrating to different aw.　D. heating.

40. What is the meaning of "risk mitigation strategies" in the last sentence?
A. risk reduction strategies.　B. risk termination strategies.
C. risk migration strategies.　D. risk transferring strategies.

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III、Select the best answer for each following question:

41. What is **incorrect** regarding water activity?
A. Moisture sorption isotherm plot shows food water activity values versus moisture content.
B. It is a measure of relative humidity.
C. Food stability decreases as water activity decreases.
D. The greater the free water content of a food, the higher the water activity.

42. The hydrogen bonds can be formed between
A. ethanol and ethanol.　　B. sodium cation and water.
C. a monosaccharide and water.　　D. an acid and water.

43. Which allows a protein to form a gel?
A. cooling soluble gelatin to entrapped water.　　B. heating a gelatin gel to sol.
C. cooling gelatinized starch.　　D. adding vinegar to meat.

44. Which two functional properties allow texturizing agents to affect food texture?
A. precipitation and solubility.　　B. viscosity and gelation .
C. gelatinization and denaturation.　　D. emulsion and encapsulation.

45. What reaction can let proteins change to amino acids or peptides?
A. composition.　B. oxidation.　C. reduction.　D. hydrolysis.

46. All of the following are **not** sugars **except**
A. gums.　B. dextrose.　C. starch.　D. cellulose.

47. _____ is a device that uses rotating screw technology within a barrel and has the ability to cook and shape foods:
A. Microwave heating.　B. Heat exchanger.　C. Extruder.　D. Steam cooker.

48. *Lactobacillus* is
A. tolerant of high pH.　　B. tolerant of high salt.
C. thermophiles.　　D. added to coagulate casein from milk.

49. What is the correct relationship between gluten strength and wheat protein content?
A. There is no clear relationship between gluten characteristics and wheat protein content.
B. Wheat flours that develop strong gluten are suited to cake making.
C. Wheat flours that high percentage of gluten (>12%) are suited to bread making.
D. Wheat flours that develop weak gluten are high in protein.

50. The neutralization of an aqueous alkaline solution by an acid can be done by
A. condensation.　B. reduction.　C. oxidation.　D. titration.