1. Please translate the following paragraphs into Chinese.

(1) Paddy rice is a staple foodstuff in Asia and is characterized by iron plaque on root surfaces. Ferrous ions form from the reduction of ferric ions under the reducing conditions such as paddy fields. Paddy rice roots can release oxygen and oxidants into the rhizosphere, thereby oxidize the ferrous ions transported to roots from paddy soils into ferric irons with the precipitation of iron oxides or hydroxides. Therefore, in paddy fields, the toxicity of iron to rice can be reduced through the formation of iron plaque on root surfaces. Iron plaque is mainly composed of ferric hydroxides, goethite, and lepidocrocite; aside from iron, an element almost as important is manganese. Iron plaque is characterized by having both amorphous and crystalline iron (hydr) oxides. Under field conditions, iron plaque has also served as a restraint on the uptake of metal(loids) such as As by plants. This is probably due to its adsorption or co-precipitation processes. At the same time, the sink-like characteristic of iron plaque leads to the concentrated metal(loid)s in the rhizosphere. In some cases, iron plaque may release these metal(loid)s and subsequently enhance uptake. For example, iron plaque can diminish the inhibition effect of phosphate on paddy rice's arsenate uptake. (30%)

(2) A distinct spectral feature, the pre-edge peak, occurs in the X-ray absorption near edge structure (XANES) spectra for Cr(VI), which is used to quantify the proportion of total Cr as Cr(VI) in soil. The pre-edge peak at 5992 eV in the Cr K-edge XANES spectra is a unique characteristic of Cr(VI) but not of Cr(III). As reported in many previous studies, XANES spectroscopy has been successfully applied to identify the oxidation state of Cr. It was suggested that XANES spectroscopy provides a nondestructive measurement of the oxidation states of chromium on the soil surface and is a useful tool to estimate the degree of Cr(VI) reduction. Thus, XANES spectroscopy has been used to examine the extent of Cr(VI) reduction after amendment by organic materials by determining the amounts of Cr(VI) remaining in soils. (20%)

(3) Most food constituents are molecules that can be organized in crystalline or amorphous structures. In general, a crystalline structure is highly organized and comprises almost exclusively bonds between molecules of the specific component: that is, it has a high degree of purity. The high level of molecular organization corresponds to a stable matrix with minimum entropy, which is relatively little affected by temperature. The essentially pure nature of crystalline structures implies that almost no water molecules are present, except at the surface of crystals due to hydration (in solution) or physical adsorption (in solids). Amorphous structures have a much lower level of organization, that is, higher entropy. They are composed not only of molecules of the specific component, but involve many other molecules that are linked to the structure at several points and may even create intermolecular links. Of these "impurities" that may be trapped in an amorphous matrix, water is the most generally relevant and can be involved in different types of bonds (e.g., ionic, covalent, polar, hydrogen bonds, physical adsorption). Due to this variety of possible links, amorphous structures are much more sensitive to temperature, and entropy

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decreases significantly with cooling.

Complex macromolecules may show partly crystalline, partly amorphous structures. The most typical case is starch, broadly described as composed of a (partly) crystalline amylopectin part and an amorphous amylose part. (20%)

2. Please answer the questions in Chinese after reading the following paragraphs.

Food scientists have long suspected that all sugar is not created equal. Now, a study has shown for the first time that fructose, a sugar found in thousands of food products, could be more harmful than other types of sugar.

Specifically, brain Magnetic Resonance Imaging (MRI) tests conducted during the study by Page et al., published in Journal of American Medical Association in January 2, 2013, indicated that fructose can trigger brain changes that may lead to overeating. After drinking a beverage containing 75 g fructose in 300 mL cherry-flavored water (300 calories), the scans show that the brain doesn't register the feeling of being full as it does when simple glucose is consumed. The results showed that the ingestion of glucose but not fructose reduced cerebral blood flow and thus activity in specific brain regions that regulate appetite and reward processing.

This was a small study (twenty (10 men,10 women) normal-weight healthy volunteers without diabetes and with a mean age of 31 (SD, 7)) and it can't be considered definitive proof of the effects of consuming fructose. But it does add evidence to the growing belief that fructose – especially high-fructose corn syrup, of HFCS – is a significant contributor to the rising rate of obesity in the United States. If so, this finding could provide a key to significantly reducing the epidemic of overeating and obesity that has occurred over the past four decades.

While HFCS, made from converting the sucrose in corn syrup or starch into fructose, has been proven to have adverse effects on our metabolism and also our calorie intake, it is not the sole culprit of the obesity epidemic. The fact is that with HFCS present in the majority of processed foods, we must be careful with what we consume. Larger portions, cheaper products and the inevitable increased consumption of the substance can explain the increase of obesity rates, but it is not directly responsible. What we choose to consume, and how well we are informed of what we are consuming, is far more important. The reality is that HFCS is now an ever present substance within our foods and we must choose how much of it we consume.

Questions:

(a) What is High-Fructose Corn Syrup (HFCS)? Where can you find it? (5%)

(b) What are the Page et al. (2013) discovered the effects of fructose and glucose on the human satiety? (10%)

(c) Does HFCS directly responsible for obesity? Why? (10%)

(d) Is HFCS dangerous? What are your opinions? (5%)

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