1. Please transform the following procedures into <u>a flowchart in Chinese</u> that can be easily followed during the practice. (25%)

Extraction and fractionation of phenolics in developing rice grains for the determination of phenolic acids

The caryopsis (0.5 g) was pestled with 10 mL 80% ethanol twice by a glass homogenizer. After centrifugation, the combined supernatant (crude extract) was concentrated by using an evaporator under 40°C, and acidified to pH 2.0. The **<u>free phenolic acids</u>** were isolated from crude extract with ethyl acetate. The ethyl acetate extract was dehydrated with anhydrous sodium sulfate, filtrated, and evaporated to dryness. The dried extract was redissolved in 5 mL 80% ethanol, and stored at -20°C for analysis.

The aqueous layer of crude extract were mixed with 4 N sodium hydroxide (1:1, v/v), and stirred for hydrolyzing for 4 hr under nitrogen. After hydrolysis, the mixture was adjusted to pH 2.0, the **<u>soluble-ester phenolic acids</u>** were extracted with ethyl acetate as described above.

The residues from 80% ethanol extractions were hydrolyzed with 20 mL 2 N sodium hydroxide for 4 hr under nitrogen. The hydrolysates were adjusted to pH 5, and mixed with 95% ethanol (4 times of volume) overnight to precipitate the starch. The supernatant after centrifugation was evaporated to remove the ethanol, and then acidified to pH 2. The **<u>insoluble-bound phenolic acids</u>** were extracted with ethyl acetate as described above.

2. Please translate the following paragraphs into Chinese.

(1) Nanotechnology is the manipulation or self-assembly of individual atoms, molecules, or molecular clusters into structures to create materials and devices with new or vastly different properties. Nanotechnology can work from the top down (which means reducing the size of the smallest structures to the nanoscale) or the bottom up (which involves manipulating individual atoms and molecules into nanostructures and more closely resembles chemistry or biology). An engineered nanoparticle may be defined as any intentionally produced particle that has a characteristic dimension from 1 to 100 nm and has properties that are not shared by non-nanoscale particles with the same chemical composition. Nanotechnology could benefit the food industry and consumers in two main ways: by using engineered nanomaterials to reduce the amount of fat, salt or sugar in food without changing its taste; and by developing new packaging that keeps food fresher for longer and, possibly, tells the consumer if the food inside has gone off. Improved packaging might also allow more foods to be stored under ambient conditions, rather than in fridges and freezers, thus reducing energy consumption. (25 %)

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(2) The organic matter content of the tested materials was determined using the loss-on-ignition method. The dissolved organic carbon was extracted using distilled water (1:50, organic material: water ratio) for 24 h, filtered through a 0.45 μm membrane and then determined by TOC analyzer. The organic carbon and total nitrogen content were analyzed by CNS analyzer, and the 6.25-folds of total nitrogen were regarded as the crude protein content of the organic materials. The amount of crude lipid was determined by using the Soxhlet extraction with n-hexane for 24 h. After the Soxhlet extraction, the samples were extracted with H_2O in a 75∘C water bath for 24 h to determine the soluble sugar content. After the soluble sugar extraction, the contents of hemicellulose and cellulose were determined by the Nelson-Somogyi method. The lignin content was estimated by subtracting the crude protein, crude lipid, soluble sugar, hemicellulose, cellulose, and ash from the total weight of the organic materials. (25%)

(3) Chromium exists in two oxidation states, Cr(III) and Cr(VI), in the environment. Cr(III) is easily precipitated and adsorbed by soils while Cr(VI) exists as $Cr_2O_7^{2-}$ or CrO_4^{2-} and is more soluble and mobile than Cr(III). It is known that Cr(VI) is a carcinogen to mammals, whereas, cationic Cr(III) is an essential nutrient for human. Chromium is used in various industrial activities including electroplating, mining, pulp and paper production, timber treatment, and petroleum refining, and thus Cr is released into environment. Since the toxicity and mobility of Cr(III) is less than that of Cr(VI), the present remediation of Cr(VI)-contaminated sites usually involves the reduction of Cr(VI) into Cr(III) to reduce its mobility and toxicity. However, Cr(VI) reduction is slowed down when the pH is increased due to the decrease of consumable protons. Thus, the remediation methods that were feasible for Cr(VI)-contaminated sites in acid conditions may not be feasible for those in alkaline conditions. (25%)