

大葉大學 99 學年度 研究所博士班 招生考試試題紙

系所別	組別	考試科目 (中文名稱)	考試 日期	節次	備註
生物產業科技學系博士班	甲組	專業英文論文閱讀能力測驗	5月29日	第/節	第1頁 共2頁

說明 1：可否攜帶特殊作答輔助工具：■否 □是，考生可使用 _____ (如未註明，一律不准攜帶)。

說明 2：本考試由考生任選五題作答，每題 20 分。

說明 3：若作答超過五題，則以依序作答之前五題評分計算。

一、Two composite formulations, based on carboxymethyl derivatives of starch (formulation I) and chitosan (formulation II), used in the preparation of coating formulations to enhance post harvest shelf-life of fruits and vegetables, were evaluated for safety by single dose dietary (formulation I, coating on feed pellet-1.3% w/w and formulation II, coating on feed pellet-1% w/w) and oral (1 ml, 2% aqueous solution) administration to albino rats. Experiment was carried out for 4 weeks. No significant changes were observed in gain in weekly body weight, weight of vital organs and in parameters of haematology and histopathology among experimental groups, thus indicating safety (and nontoxicity) of the coating formulations.

二、In several yeast-related industries, continuous fermentation systems offer important economical advantages in comparison with traditional systems. Fermentation rates are significantly improved, especially when continuous fermentation is combined with cell immobilization techniques to increase the yeast concentration in the fermentor. Hence the technique holds a great promise for the efficient production of fermented beverages, such as beer, wine and cider as well as bio-ethanol. However, there are some important pitfalls, and few industrial-scale continuous systems have been implemented. Here, we first review the various cell immobilization techniques and reactor setups. Then, the impact of immobilization on cell physiology and fermentation performance is discussed. In a last part, we focus on the practical use of continuous fermentation and cell immobilization systems for beer production.

三、Alzheimer's disease (AD) is a neurologically degenerative disorder that affects more than 20 million people worldwide including 4.5 million Americans. This number is expected to double every 20 years as world populations continue to age. AD is now considered to be the third major cause of death in developed countries, after cardiovascular disease and cancer. The total worldwide cost of dementia care is estimated to be US\$315.4 billion annually, and 77% of these costs occurred in the world's more developed regions. The course of AD often takes a decade or more to progress, bringing with it a severe load to patients, families and society. There is currently no known cure for AD. However, several drugs for treatment of AD symptoms have been approved by the US Food and Drug Administration (FDA) in recent years.

四、The influence of aeration rate on *Cordyceps militaris* morphology and exo-biopolymer production was investigated in a 5-l jar fermentor. The mycelial morphology of *C. militaris* was characterized by image analysis, which included mean diameter, circularity, roughness, and compactness of the pellets. Cells were observed to form mainly pellets during the entire culture period irrespective of aeration conditions. There existed a notable variation in morphological parameters between the pellets grown on different aeration conditions, by which exo-biopolymer production yields were correspondingly altered. The mean diameter and compactness of the pellets indicated higher values at 2 vvm (volume of air per volume of culture per minute), which was closely related to exo-biopolymer biosynthesis. The more compact pelleted form was favourable for exo-biopolymer production. Under extremely low and high aeration conditions (e.g. 0.5 and 4 vvm), severe deformations of pellets (autolysis of core and shaving off the outer hairy region) were observed at the later stages of fermentation associated with a decrease in morphological parameters.

五、The highly reactive aldehyde acrolein is a very potent endogenous toxin with a long half-life. Acrolein is produced within cells after insult, and is a central player in slow and progressive "secondary injury" cascades. Indeed, acrolein-biomolecule complexes formed by cross-linking with proteins and DNA are associated with a number of pathologies, especially central nervous system (CNS) trauma and neurodegenerative diseases. Hydralazine is capable of inhibiting or reducing acrolein-induced damage. However, since hydralazine's principle activity is to reduce blood pressure as a common anti-hypertension drug, the possible problems encountered when applied to hypotensive trauma victims have led us to explore alternative approaches. This study aims to evaluate such an alternative - a chitosan nanoparticle-based therapeutic system. Hydralazine-loaded chitosan nanoparticles were prepared using different types of polyanions and characterized for particle size, morphology, zeta potential value, and the efficiency of hydralazine entrapment and release. Hydralazine-loaded chitosan nanoparticles ranged in size from 300 nm to 350 nm in diameter, and with a tunable, or adjustable, surface charge. We evaluated the utility of chitosan nanoparticles with an in-vitro model of acrolein-mediated cell injury using PC-12 cells. The particles effectively, and statistically, reduced damage to membrane integrity, secondary oxidative stress, and lipid peroxidation. This study suggests that a chitosan nanoparticle-based therapy to interfere with "secondary" injury may be possible.

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六、In studies of vadose zone flow and transport processes, there is a need for a multi-functional probe for small-scale measurements of different soil properties measured within identical soil volumes. The proposed multi-functional probe was designed for simultaneous measurement of temperature, volumetric water content, water flow, and salinity in small-scale soil volumes. The probe, without the heater element, will be a 21.4mm diameter by 50mm long cylinder. The proposed system includes signal processing circuits, a microcontroller, and a RF transceiver with ZigBee™ protocol. Heat-pulse simulations results showed a reasonably good agreement between measured and fitted data with small deviations at the tail of temperature response curves. In addition, results indicate that the Wenner array configuration provides an excellent tool for EC measurements in soil. In conclusion, results also show that it is possible to implement the multi-functional in a small-scale microsystem. © 2006 Elsevier B.V. All rights reserved.

七、The American hard red spring wheat was used as the raw material. Milled flours were divided, according to the extraction rates, into groups A (71 %), B (69 %) and C (64 %). Firstly, the Farinographic and Extensographic properties of these three flour samples were determined, and then three additives, including ascorbic acid, azodicarbonamide (ADA) and glucose oxidase, were selected and added by four dosages (25, 50, 100 and 200 mg/kg) to the flour sample with high extraction rate (Flour A). The loaf volume of toast made from Flour A was tested and used as a reference for selecting optimum additive and dosage. Finally, the flours with medium and low extraction rates (Flour B and C) were added with the optimum additive and by the optimum dosage to explore the effect of the additive on the dough rheological properties of the flours with different extraction rates and the quality of the toasts made from them. The results showed that the loaf volume of toast made from the flour added with 100 mg glucose oxidase/kg was the largest. The peak time, departure time, stability and valorimeter value of dough Farinographic properties increased as the glucose oxidase was added. The resistance of dough Extensographic properties also increased as the glucose oxidase was added, but the extensibility decreased as the glucose oxidase was added. The loaf volume of the toast bread apparently increased.

八、Studies of discordance in monozygotic twins have demonstrated that environmental effects play an important role in the pathogenesis of schizophrenia. DNA microarray analysis has revealed upregulation of the DRD2 gene in peripheral blood lymphocytes of schizophrenic patients. We hypothesized that this expression alteration could involve the DNA (CpG) methylation status that is implicated to the transcription status of the gene. In this study, we used bisulfited sequence analysis to determine the DNA methylation status of a typical CpGs island within the 5'-regulatory region of DRD2 in peripheral blood lymphocytes from 48 discordant sib pairs suffering from schizophrenia. We found that the methylated cytosines occurred mainly in three clusters. No statistically significant difference in frequency of site-specific cytosine methylation modification of DRD2 between patients and normal controls was found nor did we find any significant association between sex, age on admission or age at onset of schizophrenia and methylated cytosines of DRD2. Our study did not support the hypothesis that site-specific cytosine methylation of DRD2 plays a role in the psychopathology of schizophrenia.

九、A chitinase (CHT), a chitosanase (CHS) and a protease (PRO) were purified from the culture supernatant of *Serratia* sp. TKU020 with squid pen as the sole carbon/nitrogen source. The molecular masses of CHT, CHS and PRO determined by SDS-PAGE were approximately 65 kDa, 55 kDa and 55 kDa, respectively. CHT and CHS were inhibited by Mn^{2+} , EDTA and PRO was inhibited by Mg^{2+} , EDTA. The antioxidant activity of TKU020 culture supernatant was 78% (DPPH scavenging ability). N-Acetylglucosamine (GlcNAc) and N-acetyl chitobiose (GlcNAc)₂ were also produced from the culture supernatant by using TKU020 strain fermentation. The maximum production of GlcNAc and (GlcNAc)₂ was 1.3 mg/mL and 2.7 mg/mL, respectively, after 4 days of fermentation. With this method, we have shown that squid pen wastes can be utilized and it is effective in the production of enzymes, antioxidants, and N-acetyl chitooligosaccharides, facilitating its potential use in industrial applications and functional foods.

十、Many observational epidemiological studies have shown that a high fruit and vegetable intake is associated with a lower cancer incidence, especially cancers from the gastrointestinal tract. This is due in part to the dietary antioxidant content of fruit and vegetables. Dietary antioxidants are believed to be effective in the prevention of oxidative stress related diseases. Antioxidants have thus recently become a topic of increasing interest. However, results of randomized trials looking at the possible preventive effect of dietary antioxidant supplementation with one or more selected antioxidants have been contradictory. Plant foods provide a wide variety of dietary antioxidants, such as vitamins C and E, carotenoids, flavonoids and other phenolic compounds. The additive and synergistic effects of these antioxidants with other dietary compounds (e.g. minerals) may contribute to the health benefits of the diet. Due to the complexity of the antioxidant composition in foods, the study of single antioxidant compounds is costly and may be of limited value because the possible synergistic interaction among the antioxidant compounds in a food mixture is not considered. That is why antioxidant capacity assays are attracting more interest in the study of antioxidant properties of foods and diets.