

注意：考試開始鈴響前，不得翻閱試題，
並不得書寫、畫記、作答。


國立清華大學 114 學年度碩士班考試入學試題

系所班組別：分析與環境科學研究所

科目代碼：3004

考試科目：生物化學

—作答注意事項—

1. 請核對答案卷（卡）上之准考證號、科目名稱是否正確。
2. 考試開始後，請於作答前先翻閱整份試題，是否有污損或試題印刷不清，得舉手請監試人員處理，但不得要求解釋題意。
3. 考生限在答案卷上標記「由此開始作答」區內作答，且不可書寫姓名、准考證號或與作答無關之其他文字或符號。
4. 答案卷用盡不得要求加頁。
5. 答案卷可用任何書寫工具作答，惟為方便閱卷辨識，請儘量使用藍色或黑色書寫；答案卡限用 2B 鉛筆畫記；如畫記不清（含未依範例畫記）致光學閱讀機無法辨識答案者，其後果一律由考生自行負責。
6. 其他應考規則、違規處理及扣分方式，請自行詳閱准考證明上「國立清華大學試場規則及違規處理辦法」，無法因本試題封面作答注意事項中未列明而稱未知悉。

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*請在【答案卷】作答

1. What are the following cofactors involved reactions? (a) Pyridoxal phosphate (PLP) (b) Thiamine pyrophosphate (c) tetrahydrobiopterin (d) biotin (e) vitamin C (f) folate (12 分)
2. (Glutamate dehydrogenase/Glutamin synthase) and (glutamate synthase / glutamate : oxoglutarate amino transferase) are both the major pathways of ammonium assimilation. Please describe their differential roles in ammonium assimilation? (8 分)
3. What is the oxidation number of N in nitrate, nitrite, NO, N₂O and N₂? (10 分)
4. Please compare the carbamoyl-phosphate I and II according to their substrate; intracellular locations; involved pathways; regulators? (8 分)
5. What are the biological roles of S-adenosylmethionine? (4 分)
6. How the organic sulfide is assimilated from sulfate? (10 分)
7. What is the committed enzyme in purine synthesis? What is the committed enzymes in pyrimidine synthesis in animal and in bacteria? (8 分)
8. How is the reciprocal control of AMP and GMP levels in cells? (8 分)
9. Indicate which pathways / key enzymes of purine or pyrimidine metabolism are affected by the inhibitors (a) azaserine (b) methotrexate (c) sulfonamides (d) allopurinol (e) 5-fluorouracil (10 分)
10. What is the key enzyme for the biosynthesis of deoxyribonucleotides? How the catalytic activity of the enzyme is turned on and off in response to need for dNTPs? In general, this reaction involved oxidation-reduction cycle through two redox-regulatory enzymes which deliver reducing equivalents. Please write down the names of these two enzymes? (9 分)
11. What are the composition of ketone bodies? (6 分)

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12. Glucose-6-phosphate is an important metabolic intermediate in liver. What is the metabolic roles / fates of Glucose-6-phosphate? (7 分)