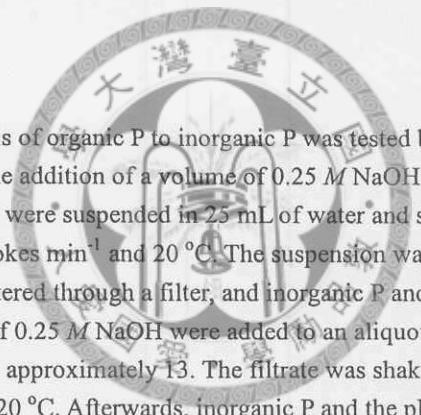


請將下列各題中之英文翻譯成中文，每題 25 分

1. The results of chemical analyses have widespread practical applications. To cite just a few examples of the way in which quantitative data influence the life of modern man, consider the following. Information as to the parts per million of hydrocarbons, nitrogen oxides, and carbon monoxide in exhaust gases serves as a means of defining the quality of smoke-control devices for the automobile. Determination of the concentration of ionized calcium in blood serum is an important method for the diagnosis of hyperparathyroidism in human patients. Quantitative data on nitrogen in breakfast cereals and other foods are directly related to their nutritional qualities. Periodic quantitative analyses during the production of a steel permit the manufacture of a product having a desired strength, hardness, ductility, or corrosion resistance. The continuous analysis for mercaptans in the household gas supply assures the presence of an odorant which warns of dangerous leaks in the gas-distribution system. The analysis of soil for phosphorus, nitrogen, sulfur, and moisture throughout the growing season makes it possible for the farmer to tailor fertilization and irrigation schedules to meet plant needs most efficiently; significant reductions in costs for fertilizer and water as well as increases in yield result.
2. The chemical composition of living organisms is qualitatively quite different from that of the physical environment in which they live. Most of the chemical components of living organisms are organic compounds of carbon, in which the carbon is relatively reduced, or hydrogenated; many organic biomolecules also contain nitrogen. In contrast, the elements carbon and nitrogen are rather scarce in nonliving matter; moreover, they occur in the atmosphere and the earth's crust only in such simple inorganic forms as carbon dioxide, molecule nitrogen, carbonates, and nitrates. The organic compounds present in living matter occur in extraordinary variety, and most of them are extremely complex. Even the simplest and smallest cells, the bacteria, contain a very large number of different organic molecules. The bacterium *Escherichia coli* is estimated to contain about 5,000 different kinds of compounds, including some 3,000 kinds of proteins and 1,000 different kinds of nucleic acids. Moreover, most of the organic matter in living cells consists of macromolecules, with very large molecular weights, including not only the proteins and nucleic acids but also such polymeric substances as starch and cellulose.

3. The biological availability of nitrogen, phosphorus, and potassium is of considerable economic importance because they are major plant nutrients derived from the soil. Of the three, nitrogen stands out as the most susceptible to microbial transformations. This element is a key building block of the protein molecule upon which all life is based, and it is thus an indispensable component of the protoplasm of plants, animals, and microorganisms. Because of the critical position of the nitrogen supply in crop production and soil fertility, a deficiency markedly reduces yield as well as quality of crops; and because this is one of the few soil nutrients that is lost by volatilization as well as leaching, it requires continual conservation and maintenance.



4. Alkaline hydrolysis of organic P to inorganic P was tested by measuring inorganic P before and after the addition of a volume of 0.25 M NaOH to a soil water extract. Five grams of soil were suspended in 25 mL of water and shaken reciprocally for 16 hr at 85 strokes min^{-1} and 20 °C. The suspension was centrifuged at 2100 x g for 10 min and filtered through a filter, and inorganic P and the pH were measured. Three milliliters of 0.25 M NaOH were added to an aliquot of 10 mL of filtrate to increase the pH to approximately 13. The filtrate was shaken again for 16 hr at 85 strokes min^{-1} and 20 °C. Afterwards, inorganic P and the pH were measured.

試題隨卷繳回