

國立嘉義大學九十七學年度
生化科技學系碩士班招生考試試題

科目：專業英文

A : Please indicate whether the following statements are true (T) or false (F). If statement is false, explain why. (20%)

- (1) When a gene encoding a secretory protein is transferred to a secretory cell that normally does not make the protein, the foreign protein is not packaged into secretory vesicles.
- (2) The most efficient way to generate a pure RNA species is to overexpress it in cells and purify it.
- (3) All glycosylation of membrane and exposed protein occurs in the Golgi apparatus.
- (4) In some vertebrate cells, the clusters of genes encoding 28S rRNA are transcribed independently of the clusters of genes that encode 18S rRNA and 5.8S rRNA.
- (5) Ribosomal RNAs are produced in the nucleolus and are then transported into the cytoplasm where they are packaged with ribosomal proteins to form ribosomes.
- (6) Telomerase synthesizes a new copy of the telomere repeat using an RNA template that is a component of the enzyme itself.
- (7) If a variation in the DNA sequence is a rare one in the population, it is called a mutation; if it is a common one, it is called a polymorphism.
- (8) Nuclease-hypersensitive sites in chromatin are located in the linker DNA between nucleosomes.
- (9) Like most proteins, histones are synthesized continuously throughout interphase, but they are deposited on DNA to make new chromatin only during S phase.
- (10) A mutator is a mutation or mutated gene that increases the basal level of mutation.

B : After you read the article below, please transcribe to your words and write about 100 words article in Chinese. (20%)

Cells are grown and maintained at an appropriate temperature and gas mixture in a cell incubator. Culture conditions vary widely for each cell type, and variation of conditions for a particular cell type can result in different phenotypes being expressed.

Aside from temperature and gas mixture, the most commonly varied factor in culture systems is the growth medium. Recipes for growth media can vary in pH, glucose concentration, growth factors, and the presence of other nutrient components. The growth factors used to supplement media are often derived from animal blood, such as calf serum. These blood-derived ingredients pose the potential for contamination of derived pharmaceutical products with viruses or prions. Current practice is to minimize or eliminate the use of these ingredients where possible.

Some cells naturally live without attaching to a surface, such as cells that exist in the bloodstream. Others require a surface, such as most cells derived from solid tissues. Cells grown unattached to a surface are referred to as suspension cultures. Other adherent cultures cells can be grown on tissue culture plastic, which may be coated with extracellular matrix components to increase its adhesion properties and provide other signals needed for growth. Organotypic cultures involves growing cells in a 3-dimensional environment as opposed to 2-dimensional culture dishes. This 3D culture system is biochemically and physiologically more similar to in vivo tissue, but is technically challenging to maintain. Although cell culture is a basic technique in the area of bioscience and biotechnology, the development of cell culture technique is still promised growing.

C. Please describe the main points in Chinese from the following paragraph. (20%)

Researchers have designed a new type of DNA computer that works in human cells, perhaps paving the way for a distant technology capable of picking out diseased cells from otherwise healthy tissue. The system runs on a

process called RNA interference (RNAi) in which small molecules of RNA prevent a gene from producing protein. The goal is to inject human cells with DNA that can determine whether a cell is cancerous or otherwise diseased, based solely on the mix of molecules inside the cell. Sensing disease, the DNA might trigger a pinpoint dose of treatment in response. RNAi is something that cells do naturally. Cells produce what are known as short interfering RNA (siRNA) molecules, which recognize corresponding DNA sequences in genes and cause them to shut down. Benenson and colleagues engineered a target gene to be sensitive to several different siRNAs of their own design. In the simplest case, they introduced a single siRNA molecule to switch off a target gene that encoded a fluorescent protein. In more complex cases, a pair of siRNAs or either of two siRNAs switched off another target gene, which in turn switched off a gene for a fluorescent protein. To make sure the system worked as intended, the researchers based their siRNAs on those of other species, they report in a paper published online by *Nature Biotechnology*. In principle, the RNAi technique can reach great heights of complexity, Benenson says, by making genes sensitive to more and more siRNAs in various combinations. "The scalability is very important, because eventually you want to make complex decisions," he says.

D : Please translate the paragraph in Chinese and write your impression. (20%)

Job mobility is a key trait for anyone pursuing a career in science. A willingness to switch disciplines, change labs, relocate to a different country or move between the worlds of academia and business can be crucial to success. But for many, that last transition can prove to be fairly problematic.

In Britain, for example, biomedical scientists face several barriers should they consider moving from academia to industry, according to a report from the Academy of Medical Sciences. The problem is fuelled in part by fears among academics that a move into business will rob them of some autonomy and divorce them from academic networks. This in turn is caused by a lack of information — both about what life in business is like and about the opportunities that exist in the industrial sector. Among the solutions to this information gap, the report suggests organizing introductory programmes to allow academics to gain industrial experience, and an increase in 'industry open days' at universities (*Amended Ruso G., Nature 450, 315, 2007*).

E : Please read the following text and answer the questions of I, II, III and IV. (20%)

Life depends on the existence of powerful and specific catalysts: the enzymes. Almost every biochemical reaction is catalyzed by an enzyme. With the exception of a few catalytic RNAs, all known enzymes are proteins. Many require nonprotein coenzymes or cofactors for their catalytic function. Enzymes are classified according to the type of reaction they catalyze. All enzymes have formal E.C. numbers and names, and most have trivial names.

- (I) Please translate the sentence of "With the exception of a few catalytic RNAs, all known enzymes are proteins. Many require nonprotein coenzymes or cofactors for their catalytic function." into Chinese. (7%)
- (II) Please translate the sentence of "Life depends on the existence of powerful and specific catalysts: the enzymes. Almost every biochemical reaction is catalyzed by an enzyme." into Chinese. (7%)
- (III) Cofactors are used for (a) making the enzyme more popular, (b) producing more enzymes, (c) helping enzymes to be functional, (d) helping the degradation of enzymes. (3%)
- (IV) Catalytic RNAs (a) are proteins, (b) catalyze reactions, (c) are not required for cells, (d) all of the above are correct. (3%)