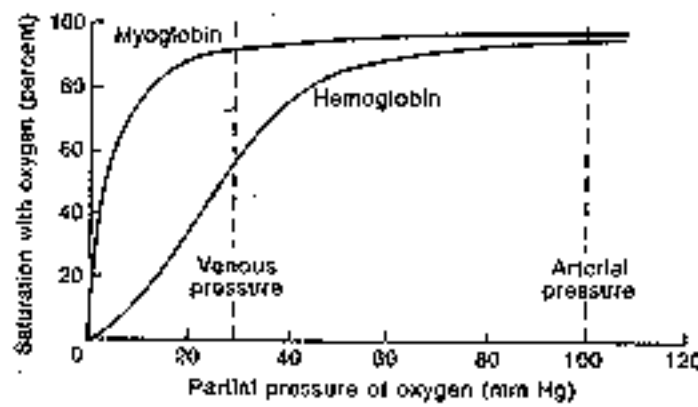


1. 在 pH = 7.4 水溶液下，下列何種 amino acid(s) 帶負電性？(2%)
 Leucine, Glutamate, Tyrosine, Lysine, Histidine, Aspartate
2. 在 pH = 5.0 水溶液下，下列何種 amino acid(s) 帶正電性？(2%)
 Leucine, Glutamate, Tyrosine, Lysine, Histidine, Aspartate
3. 何種 amino acid(s) 可經由細胞內 NO synthase 催化而產生 NO？(2%)
4. The following equilibrium curves measure the affinity for oxygen of hemoglobin and of the simpler myoglobin molecules. Please explain why hemoglobin is a better oxygen transporter than myoglobin. (10%) Which interaction is under allosteric regulation? (2%)



5. () is transcribed directly from genomic DNA in bacteria. It may be processed from hnRNA by () in eukaryotic cells. (2%)
6. () carry amino acids to the ribosome and help to incorporate them into proteins. (2%)
7. Which amino acid is often used as an initiator in protein synthesis? (2%)
8. If the percentage of G in genomic DNA of one organism is 30%, what will be the percentage of A in the genomic DNA? (2%)
9. Please describe in detail how a molecule of glucose generated 36 molecules of ATP in the typical eukaryotic cell. (10%)
10. DNA replication starts from a specific DNA sequence in prokaryotes, lower eukaryotes and possible higher eukaryotes. This specific sequence is generally called (). (2%)

(背面仍有題目,請繼續作答)

11. A novel aerobic bacteria has just been discovered that possesses five previously unknown electron carriers, designated as *n*, *o*, *p*, *q*, and *r*.

- a. When the transport chain is isolated, provided with NADH as the electron donor, and then treated with one of several different respiratory inhibitors, spectrophotometric assay shows each carrier to be either in the fully reduced (+) or fully oxidized (-) form, as indicated in the following table:

Inhibitor	Oxidation State of Carriers				
	<i>n</i>	<i>o</i>	<i>p</i>	<i>q</i>	<i>r</i>
Antimycin	+	+	+	-	+
Cyanide	+	+	+	+	+
Rotenone	-	-	+	-	-
Barbiturate	+	-	+	-	-

Please indicate the order of the carriers in the transport chain and the direction of electron flow, as well as the point at which each inhibitor acts. (10%)

- b. When succinate is substituted for NADH as the electron donor, the following data were obtained using the same inhibitors:

Inhibitor	Oxidation State of Carriers				
	<i>n</i>	<i>o</i>	<i>p</i>	<i>q</i>	<i>r</i>
Antimycin	-	+	-	-	+
Cyanide	-	+	-	+	+
Rotenone	-	-	-	-	-
Barbiturate	-	-	-	-	-

What more can you now say about electron transport in this organism? (2%)

12. Please describe the pathophysiology of insulin deficiency in terms of glucose uptake, glucose production, protein and lipid metabolisms. (10%)

13. What are the two main hormones and how are they involve in calcium homeostasis? (10%)

14. What are the four levels of protein structure? (4%)

15. Triacylglycerol (TAG) is stored in much greater quantities in the body than is glycogen. Why is this so? (4%)

16. Which digestive enzymes are produced in an inactive zymogen form? (4%)
17. What are the three major phases involved in the oxidation of glucose and where do they occur? (3%)
18. Explain in everyday language what is meant by a 5' → 3' direction in a linear DNA molecule. (2%)
19. What is a replicon? (2%)
20. What is a voltage-gated Ca^{2+} channel? Give an example? (4%)
21. What are the biochemical differences between fast twitch muscle fibers and slow twitch ones? What are their biological roles? (5%)
22. Please compare by drawing a diagram the relationship between substrate concentration and rate of enzyme catalysis in a nonallosteric enzyme and a typical allosteric enzyme. (2%)