

# 義守大學 101 學年度碩士班入學招生考試試題

系所別	生物技術與化學工程研究所	考試日期	101/3/18
考試科目	生物化學	頁碼/總頁數	1/4

※此為試題卷，請將答案填寫在答案卷內，未寫於答案卷內者，不予計分。

※本科目不可使用計算機。

## 一、單選題(1-20 題，每題 4 分，共 80 分)

1. Which of the following functional groups are not commonly seen in biomolecules?
  - a) Alkyl halides
  - b) Amides
  - c) Carboxylic acids
  - d) Ethers
2. Biological catalysts are
  - a) proteins exclusively
  - b) RNA exclusively
  - c) DNA exclusively
  - d) some proteins and some RNA
3. Energy-yielding oxidation reactions take place in eukaryotic
  - a) nuclei.
  - b) ribosomes.
  - c) mitochondria
  - d) endoplasmic reticula.
4. Which of the following acids would serve as a good buffer for a reaction at pH = 8.0?  $K_a$ 
  - a) acetic acid  $1.76 \times 10^{-5}$
  - b)  $H_2PO_4$   $6.31 \times 10^{-8}$
  - c) bicarbonate  $5.6 \times 10^{-11}$
  - d) TRIS  $5.01 \times 10^{-9}$
5. Which of the following correctly describes peptide bonds?
  - a) They are special type of amide bond.
  - b) They are formed when water is split out from an amino group and a carboxylic acid.
  - c) They are a bond which displays resonance.
  - d) All of the above.
6. The sequence of monomers in any polymer is this type of structure:
  - a) primary structure
  - b) secondary structure
  - c) tertiary structure
  - d) quaternary structure

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7. What happens when a protein is denatured?

- a) Its secondary structure is disrupted but its primary structure remains intact.
- b) Its primary structure is disrupted but its secondary structure remains intact.
- c) It is broken apart into its constituent amino acids.
- d) It becomes all  $\alpha$ -helix.

8. Which of the following statements regarding hemoglobin (Hb) and myoglobin (Mb) is true?

- a) Mb transports oxygen while Hb stores it.
- b) Mb has quaternary structure but Hb does not.
- c) Mb displays simple kinetics of binding while Hb displays cooperativity.
- d) Mb binds Fe(II) while Hb binds heme.

9. In allosteric interactions

- a) proteins that consist of a single polypeptide chain form aggregates.
- b) disulfide bonds are broken.
- c) changes that take place in one site of a protein cause drastic changes at a distant site.
- d) metal ions always bind to the protein.

10. The purity of an enzyme at various stages of purification is best measured by

- a) total protein.
- b) total enzyme activity.
- c) specific activity of the enzyme.
- d) percent recovery of the enzyme.

11. Which of the following are principles on which to base column chromatography?

- a) Molecular size
- b) Isoionic pH or pI
- c) Ion exchange
- d) All of the above

12. In the SDS-PAGE (sodium dodecylsulfate - polyacrylamide gel electrophoresis) method, separation takes place on the basis of

- a) charge only, because all particles have different charges, but the same mass.
- b) the sieving action of the gel, because all particles have the same charge, but different masses.
- c) the sieving action of the gel, because all particles have approximately the same charge/mass ratio, but different masses.
- d) the chemical nature of the buffer used as the electrolyte.

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13. Which of the following can function as coenzymes?
- lead ion, biotin, and lipoic acid.
  - copper ion, p-hydroxymercuribenzoate, diisopropylphosphofluoridate.
  - zinc ion, pyridoxal phosphate, and nicotinamide adenine nucleotides.
  - lead ion, p-hydroxymercuribenzoate, diisopropylphosphofluoridate.
14. Which of the following classes of compounds would be considered lipids?
- Steroids
  - Triglycerides
  - Terpenes
  - All of these are lipids.
15. Which of the following lipids is **not** found in biological membranes?
- triacylglycerols
  - phosphoacylglycerols
  - glycolipids
  - cholesterol
16. The fundamental differences between RNA and DNA are
- the organic bases only
  - bases, ribose units, and the phosphodiester linkage
  - bases, ribose units, and the glycosidic bond type
  - bases and the ribose units only
17. In the original Central Dogma, the ordinary flow of genetic information is:
- Replication    translation    transcription.
  - Replication    transcription    translation.
  - Transcription    translation    replication.
  - Transcription    replication    translation.
18. In bacterial cell walls
- polysaccharides form nonspecific mixtures with proteins
  - polysaccharides are hydrogen bonded together
  - peptides form crosslinks between polysaccharides
  - oligosaccharides form crosslinks between proteins
19. Which enzyme is the key regulatory enzyme in glycolysis?
- Glyceraldehyde-3-phosphate dehydrogenase
  - Enolase

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c) Phosphofructokinase

d) Aldolase

20. Electron flow in the mitochondria follows this pathway:

a) NADH FMN Coenzyme Q Cyt A Cyt B Cyt C O<sub>2</sub>

b) NADH FMN Cyt B Coenzyme Q Cyt C Cyt A O<sub>2</sub>

c) FMNH<sub>2</sub> NAD Coenzyme Q Cyt B Cyt C Cyt A O<sub>2</sub>

d) NADH FMN Coenzyme Q Cyt B Cyt C Cyt A O<sub>2</sub>

### 二、簡答題(1-4 題，每題 5 分，共 20 分)

1. Describe the characteristics used to define life.
2. Why is the study of biochemistry useful to you as an individual? Provide one specific example.
3. Describe the steps that are involved in genetic recombination.
4. Describe how certain bacteria can develop resistance to antibiotics.