

國立中山大學九十三年度轉學生招生考試試題

科目：普通生物【海資系二年級】

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一、選擇題 50%

下列選擇題為單選，每題 2 分，答錯者倒扣 0.5 分

- 1、 Anabolism 是 (a) 生物分解 (b) 生物合成 (c) 把簡單物質合成較複雜物質 (d) 把複雜物質加以分解 (e) 以上皆非
- 2、 Chemosynthetic autotrophs 是 (a) 以水、二氧化碳及光合成 (b) 以氫或硫化氫及光合成 (c) 以有機物分解、自行合成 (d) 以醣分解能量自行合成蛋白質 (e) 以上皆非
- 3、 80s 之核糖體，其 s 是表示 (a) 分子量 (b) 重量 (c) 沈降率 (d) 運動速率 (e) 以上皆非
- 4、 Lysosomes 之功能 (a) 蓄存能量 (b) 含有水解酵素 (c) 蛋白質合成處 (d) 核酸合成處 (e) 脂合成處
- 5、 Genetic drift 是表現在 (a) 大族群上 (b) 小族群上 (c) 個體上 (d) 細胞上 (e) 以上皆非
- 6、 Adaptive radiation 是因為 (a) 食物競爭 (b) 空間競爭 (c) 突變造成 (d) a 及 b (e) a、b 及 c
- 7、 海洋中 euphotic zone 是指 (a) 大陸棚區 (b) 深海區 (c) 透光區 (d) 潮間區 (e) 潮下區
- 8、 在 noncyclic photophosphorylation 中可形成 (a) ADP (b) NADPH (c) glucose (d) CO₂ (e) 以上皆非
- 9、 由 phage 傳遞細菌之基因稱為 (a) transformation (b) conjugation (c) transduction (d) translation (e) 以上皆非
- 10、 下列何者不存在 DNA 中 (a) oxygen (b) nitrogen (c) carbon (d) sulfur (e) phosphorus
- 11、 下列何者與 essential amino acid 相關 (a) 在水果及蔬菜中缺少者 (b) 只在人類蛋白質中才有 (c) 通常存在蔬菜中較肉類多 (d) 是一種 vitamin 可協助神經系統之發生 (e) 動物本身無法合成須來自於食物
- 12、 那一種 enzyme 在低 pH 下才能活化 (a) amylase (b) pepsin (c) lipase (d) trypsin (e) sucrase
- 13、 那一種物質消化後非由小腸血管所吸收 (a) protein (b) polysaccharides (c) lipid (d) nucleic acid (e) amino acid
- 14、 Shrimp (蝦) 屬於 (a) Mollusca (b) Annelida (c) Arthropoda (d) Echinodermata (e) Cnidaria
- 15、 何者非 virus 繁殖週期之步驟 (a) attachment (b) budding (c) replication (d) synthesis (e) assembly
- 16、 侷限於極端惡心劣環境，很可能類似早期盛行在地球上的生物是 (a) eubacteria (b) archaeobacteria (c) virus (d) protistans (e) cyanobacteria
- 17、 四十億年前的地球大氣中並非大量存在的氣體是 (a) H₂ (b) O₂ (c) N₂ (d) CO₂ (e)

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CO

- 18、下列何者非 plasmid 之特性 (a) 為細菌一個額外的環狀 DNA (b) 可複製且獨立於細菌染色體 (c) 為細菌營養控制基因 (d) 含 bacterial conjugation 的基因 (e) 以上皆非
- 19、緊密連接的細胞與一個自由面的組織是 (a) epithelium (b) connective (c) nervous (d) muscle (e) bone
- 20、對器官活動運用負回饋調控中將不同位元資訊呈現在一起並選擇一個適當的反應是 (a) effector (b) integrator (c) stimulus (d) receptor (e) 以上皆非
- 21、人類眼球的外層構造包含：(a) cornea (b) lens (c) iris (d) retina (e) 以上皆非
- 22、何者為肌肉收縮時不需要 (a) action potential (b) sodium ion (c) calcium ion (d) ATP (e) 以上皆非
- 23、何者非為血液的成份？(a) plasma (b) platelet (c) blood cell (d) gas (e) 以上皆非
- 24、人類肺部氣體交換區是 (a) alveolus (b) bronchiole (c) bronchus (d) larynx (e) pharynx
- 25、腎臟將水及小分子溶質送回血液的方法是 (a) tubular reabsorption (b) tubular secretion (c) filtration (d) urine formation (e) 以上皆非

二、申論題 50%

- 1、說明生物體體溫的意義(10分)。
- 2、畫圖說明 cell membrane 間的 gap junction(10分)。
- 3、繪圖並詳述由低等到高等動物 cardiovascular system 的演化(20分)。
- 4、如何複製豬，請詳述(10分)。

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請注意：所有題目均為選擇題(單選)，答對每題得 4 分，答錯每題倒扣 1 分，不作答不予計分亦不倒扣

原子量：F(19)，S(32)，Ne(20)，Xe(131)

- The element with atomic number $Z=117$ has not yet been discovered or synthesized. It should be
(a) a transition metal (b) a member of the oxygen family
(c) a representative metal (d) a noble gas (e) a halogen
- A sample of a pure gas has a density of $1.60 \text{ g} \cdot \text{L}^{-1}$ at 26.5°C and 680.2 mmHg . Which of the following could the sample be?
(a) CH_4 (b) C_2H_6 (c) CO_2 (d) Xe (e) SF_6
- The average molecular speed is greatest in which of the following gas samples?
(a) 1.0 mol of N_2 at 560 K (b) 0.5 mol of Ne at 500 K
(c) 0.2 mol of CO_2 at 440 K (d) 2.0 mol of He at 140 K
(e) 0.4 mol of O_2 at 480 K
- An aqueous solution of ethanol, $\text{CH}_3\text{CH}_2\text{OH}$, that is 12.00% ethanol by weight, has a density of $0.9808 \text{ g} \cdot \text{mL}^{-1}$ at 20°C . What is the molality of ethanol in this solution?
(a) 0.05063 (b) 0.1200 (c) 2.555 (d) 2.960 (e) 12.00
- The concentration of a saturated solution of a certain polypeptide is $1.0 \times 10^{-3} \text{ M}$ at 25°C . The osmotic pressure of this solution, in millimeters of mercury, is
(a) 0.0245 (b) 0.760 (c) 18.6 (d) 24.5 (e) 156
- For which of the following reactions are the numerical values of K_p and K_c the same?
(a) $2\text{NOCl}(\text{g}) \rightleftharpoons 2\text{NO}(\text{g}) + \text{Cl}_2(\text{g})$ (b) $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$
(c) $\text{H}_2(\text{g}) + \text{Cl}_2(\text{g}) \rightleftharpoons 2\text{HCl}(\text{g})$ (d) $\text{H}_2(\text{g}) + \text{I}_2(\text{s}) \rightleftharpoons 2\text{HI}(\text{g})$
(e) $\text{COCl}_2(\text{g}) \rightleftharpoons \text{CO}(\text{g}) + \text{Cl}_2(\text{g})$
- Which of the following species is an ampholyte?
(a) CH_3COO^- (b) H_2O (c) NH_4^+ (d) $\text{C}_6\text{H}_5\text{COOH}$ (e) S^{2-}
- The pH of a 0.050 F HA solution is 5.35. What is K_a for HA?
(a) 2.0×10^{-11} (b) 4.0×10^{-10} (c) 4.5×10^{-6} (d) 8.9×10^{-5} (e) 5.0×10^{-2}
- If a process is both endothermic and spontaneous then
(a) $\Delta S > 0$ (b) $\Delta S < 0$ (c) $\Delta H < 0$ (d) $\Delta G > 0$ (e) $\Delta E = 0$

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10. Which of the following mixtures will be a buffer solution when dissolved in 500.00 mL of water ?
 (a) 0.200 mol of aniline and 0.200 mol of HCl
 (b) 0.200 mol of aniline and 0.400 mol of NaOH
 (c) 0.200 mol of NaCl and 0.100 mol of HCl
 (d) 0.200 mol of NaCl and 0.100 mol of NaOH
 (e) 0.200 mol of aniline and 0.100 mol of HCl
11. The solubility product expression for Hg_2Cl_2 is
 (a) $[\text{Hg}^+][\text{Cl}^-]^2$ (b) $[\text{Hg}_2^{2+}][\text{Cl}^-]^2$ (c) $[\text{Hg}^+][\text{Cl}^-]$ (d) $[\text{Hg}_2^{2+}]+2[\text{Cl}^-]$
 (e) $[\text{Hg}_2^{2+}][2\text{Cl}^-]^2$
12. If $K_{sp}(\text{PbSO}_4)=1.8\times 10^{-8}$ and $K_a(\text{HSO}_4^-)=1.0\times 10^{-2}$, the equilibrium constant for the reaction

$$\text{PbSO}_4(\text{s}) + \text{H}^+(\text{aq}) \rightleftharpoons \text{HSO}_4^-(\text{aq}) + \text{Pb}^{2+}(\text{aq})$$
 is (a) 1.8×10^{-6} (b) 1.8×10^{-10} (c) 2.8×10^{-10} (d) 1.0×10^{-2} (e) 3.2×10^{-14}
13. Which of following wave properties is proportional to energy for electromagnetic radiation?
 (a) velocity (b) wave number (c) wavelength (d) amplitude
 (e) time for one cycle to pass a given point in space
14. Which of the following best describes the emission spectrum of atomic hydrogen?
 (a) A discrete series of lines of equal intensity and equally spaced with respect to wavelength.
 (b) A series of only four lines.
 (c) A continuous emission of radiation of all frequencies.
 (d) Several discrete series of lines with both intensity and spacings between lines decreasing as the wave number increases within each series.
 (e) A discrete series of lines with both intensity and spacings between lines decreasing as the wavelength increases.
15. The amount of energy required to remove the electron from a Li^{2+} ion in its ground state is how many times greater than the amount of energy needed to remove the electron from an H atom in its ground state?
 (a) 2 (b) 3 (c) 4 (d) 6 (e) 9
16. Which of the following sets of the four quantum numbers n , l , m_l , and m_s describes one of the outermost electrons in a ground state strontium atom?
 (a) 5,1,1,1/2 (b) 5,0,0,-1/2 (c) 5,0,1,1/2 (d) 5,1,0,1/2 (e) 5,2,1,-1/2
17. The crystal field stabilization energy of a low-spin octahedral complex of a d^7 ion is
 (a) $1.6\Delta_o$ (b) $1.8\Delta_o$ (c) $2.0\Delta_o$ (d) $2.2\Delta_o$ (e) $2.4\Delta_o$

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18. The heat of formation of $C_2H_6(g)$ is by definition the enthalpy change for the reaction
- (a) $C_2H_4(g) + H_2(g) \rightarrow C_2H_6(g)$ (b) $2C(g) + 6H(g) \rightarrow C_2H_6(g)$
(c) $2C(s) + 6H(g) \rightarrow C_2H_6(g)$ (d) $2CH_4(g) \rightarrow C_2H_6(g) + H_2(g)$
(e) $2C(s) + 3H_2(g) \rightarrow C_2H_6(g)$
19. How much heat, in joules, must be added to 0.250 mol of $Ar(g)$ to raise its temperature from 20.0 to 36.0°C at constant pressure?
- (a) 50.0 (b) 83.2 (c) 187 (d) 200 (e) 333
20. A weak base, B, has basicity constant $K_b = 2 \times 10^{-5}$. The pH of any solution in which $[B] = [BH^+]$ is (a) 4.7 (b) 7.0 (c) 9.3 (d) 9.7 (e) 10.
21. When a dilute aqueous solution of Li_2SO_4 is electrolyzed, the products formed at the anode and cathode, respectively, are
- (a) S and Li (b) O_2 and Li (c) SO_2 and H_2 (d) O_2 and H_2 (e) SO_2 and Li
22. Which of the following statements about the order of a reaction is TRUE ?
- (a) The order of a reaction must be a positive integer.
(b) A second-order reaction is also bimolecular.
(c) We can determine the order of the reaction from the correctly balanced net ionic equation for the reaction.
(d) The order of a reaction increases with increasing temperature.
(e) The order of a reaction can only be determined by experiment.
23. The reaction $A(g) + 2B(g) \rightarrow C(g) + D(g)$ is an elementary process. In an experiment, the initial partial pressures of A and B are $P_A = 0.60$ atm and $P_B = 0.80$ atm. When $P_C = 0.20$ atm, the rate of the reaction, relative to the initial rate, is
- (a) 1/48 (b) 1/24 (c) 9/16 (d) 3/4 (e) 1/6
24. A compound contains two types of atoms, X and Y. Its crystal structure is a cubic lattice with X atoms at the corners of the unit cells and Y atoms at the body centers. The simplest formula of this compound is
- (a) X_8Y (b) X_2Y (c) XY (d) XY_2 (e) XY_8
25. A racemic mixture contains
- (a) Equal amounts of cis and trans isomers.
(b) Both straight-chain and branched-chain alkanes.
(c) A catalyst to increase the rate of reaction.
(d) Equal amounts of a primary and a secondary amine.
(e) Equal amounts of a pair of enantiomers.