

國立中山大學九十一學年度轉學生招生考試試題

科目：普通生物【海資系二年級】

共 2 頁 第 1 頁

一. 下列選擇題為單選，每題 2 分，答錯者倒扣 0.5 分

- 1、 DNA 所含的不同基因可被轉錄為 (a) protein (b) mRNA (c) tRNA 與 rRNA (d) mRNA, tRNA 與 rRNA (e) 以上皆是
- 2、 Anticodon 可與何者配對 (a) mRNA (b) tRNA (c) DNA (d) amino acid (e) 以上皆非。
- 3、 在 chordates 生物中之特徵為何 (a) hair (b) skull (c) notochord (d) vertebral column (e) four-chambered heart。
- 4、 下列何者為 two-chambered heart (a) Osteichthyes (b) Amphibia (c) Reptilia (d) Aves (e) Mammalia。
- 5、 bony fish 在演化上之起源為 (a) in a marine environment (b) directly from lampreys and hagfish (c) early in the Cambrian (d) early in the cephalochordates (e) in the freshwater environment。
- 6、 stratified columnar 狀態會在動物的那一類組織上出現 (a) connective (b) stratified muscle (c) never (d) epithelium (e) bone。
- 7、 muscle 與 bone 之連結為 (a) ligaments (b) tendons (c) loose connective tissue (d) Haversian system (e) positive feedback。
- 8、 有 gastrovascular cavity 之生物為 (a) brida (b) hydra (c) mammal (d) insect (e) annelid。
- 9、 何者為非生產 digestive enzyme (a) duodenum (b) pancreas (c) salivary gland (d) gall bladder (e) liver。
- 10、 那一種動物之 heart rate 較高 (a) rat (b) cat (c) human (d) horse (e) elephant。
- 11、 protists 具有 contractile vacuoles 是 (a) in a marine environment (b) that are internal parasites (c) that are osmoregulators (d) that are osmoconformers (e) that are hypotonic to their environment
- 12、 protonephridia 之 excretory structures 是發生在 (a) flatworms (b) earthworm (c) insects (d) jellyfish (e) vertebrates。
- 13、 下列配對何者為不正確 (a) histamine—local regulator (b) estrogen—steroid hormone (c) prostaglandin—peptide hormone (d) ecdysone—steroid hormone (e) neurotransmitter—local regulator。

國立中山大學九十一學年度轉學生招生考試試題

科目：普通生物【海資系二年級】

共 2 頁 第 2 頁

- 14、何者為 endocrine gland (a) parathyroid gland (b) salivary gland (c) sweat gland (d) hypothalamus (e) gall bladder。
- 15、那一種 hormone 為 protein (a) epinephrine (b) cortisone (c) estrogen (d) androgen (e) insulin。
- 16、pancreas 分泌之 hormone (a) ecdysone (b) glucagon (c) thymosin (d) oxytocin (e) growth hormone
- 17、何者非 hermaphroditic (a) barnacle (b) earthworm (c) tapeworm (d) lobster (e) liver fluke。
- 18、何者不屬於 muscle cell 的 thin filaments (a) actin (b) troponin (c) tropomyosin (d) myosin (e) calcium-binding site。
- 19、phytoplankton 常在何處發現 (a) tidal (b) photic (c) benthic (d) abyssal (e) intertidal。
- 20、在生態上會同 abiotic factor 交互者為 (a) community (b) ecosystem (c) population (d) species (e) symbiosis。
- 21、當細菌為分解者時，在那一個 cycle 中為最重要 (a) nitrogen (b) hydrologic (c) carbon (d) phosphorous (e) energy。
- 22、在 photosynthesis 中需要 glucose 的是 (a) light reaction alone (b) the Calvin cycle alone (c) both the light reaction and the Calvin cycle (d) neither the light reaction nor the Calvin cycle (e) occurs in the chloroplast but is not part of photosynthesis。
- 23、在細胞分裂時兩個 centrosomes 排列在相對極時為 (a) telophase (b) anaphase (c) prometaphase (d) metaphase (e) prophase。
- 24、bacteria 是屬於那一個 Kingdom (a) Protista (b) Animalia (c) Plantae (d) Monera (e) Fungi。
- 25、amino acid 為酸性是因為具有那一類 functional group (a) amino (b) alcohol (c) carboxyl (d) sulfhydryl (e) aldehyde。

二. 問答題 (共 50 分)

1. 畫圖說明並比較人和蝦的血液循環系統。(20 分)
2. 詳述低等到高等動物呼吸方法的演化。(20 分)
3. 畫圖說明神經細胞的構造。(10 分)

國立中山大學九十一學年度轉學生招生考試試題

科目：普通化學【海資系二年級、生科系二年級、海工系二年級】 共 3 頁 第 1 頁

請注意：所有選擇題均為單選題，每題 4 分。答錯不計分，並倒扣 1 分；不作答則不計分亦不倒扣。

($\log 2 = 0.3010$ $\log 3 = 0.4771$)

- Which of the following processes is endothermic ?
(a) freezing water (b) boiling water (c) combustion
(d) condensing steam (e) none of above
- Which of the following molecules doesn't have a dipole moment ?
(a) H_2O (b) PF_3 (c) BF_3 (d) SO_2 (e) HCl
- Assuming that all volumes are additive, how much water should be added to 25.00 mL of 6.00 F HNO_3 to prepare 0.500 F HNO_3 ?
(a) 350mL (b) 325mL (c) 300mL (d) 275mL (e) 250mL
- In which of the following liquids would you expect the solubility of NaCl to be the smallest ?
(a) HF (b) CH_3OH (c) CH_3COCH_3 (acetone) (d) H_2O (e) CCl_4
- Which of the following ions has the largest radius ?
(a) Be^{2+} (b) Li^+ (c) N^{3-} (d) O^{2-} (e) F^-
- Which of the following has the smallest mass ?
(a) a hydrogen nucleus (b) an alpha particle (c) a neutron
(d) a helium nucleus (e) a beta particle
- At a given temperature the equilibrium constant for the reaction
$$\text{PCl}_{5(g)} \rightleftharpoons \text{PCl}_{3(g)} + \text{Cl}_{2(g)}$$
is 2.4×10^{-3} . What is the equilibrium constant for the reaction
$$\text{PCl}_{3(g)} + \text{Cl}_{2(g)} \rightleftharpoons \text{PCl}_{5(g)}$$
at the same temperature ?
(a) 2.4×10^{-3} (b) -2.4×10^{-3} (c) 4.2×10^{-2} (d) 4.2×10^2 (e) 2.4×10^5
- For the system $\text{NH}_4\text{Cl}_{(s)} \rightleftharpoons \text{NH}_{3(g)} + \text{HCl}_{(g)}$, if the concentration of NH_3 is doubled, the equilibrium constant will
(a) double (b) increase, but by less than a factor of 2 (c) be halved
(d) remain the same (e) decrease, but by less than a factor of 2.
- The pH of 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}

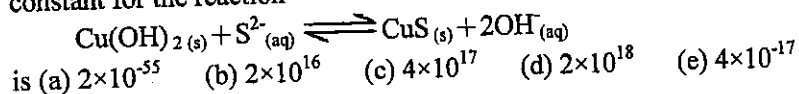
國立中山大學九十一年度轉學生招生考試試題

科目：普通化學【海資系二年級、生科系二年級、海工系二年級】 共 3 頁 第 2 頁

10. A buffer that is a mixture of acetic acid and potassium acetate has a $\text{pH} = 5.24$. The K_a of acetic acid is 4.75. The $[\text{acetate}] / [\text{acetic acid}]$ ratio in this buffer is
 (a) 1 : 1 (b) 3 : 1 (c) 5 : 1 (d) 1 : 3 (e) 1 : 5

11. At the temperature at which the molar solubility of PbBr_2 in water is $2.3 \times 10^{-2} \text{ M}$, what is the K_{sp} of PbBr_2 ?
 (a) 5.3×10^{-4} (b) 1.2×10^{-5} (c) 2.4×10^{-5} (d) 2.3×10^{-2} (e) 4.9×10^{-5}

12. If the K_{sp} of $\text{Cu}(\text{OH})_2$ is 2×10^{-19} and the K_{sp} of CuS is 8.7×10^{-36} , the equilibrium constant for the reaction



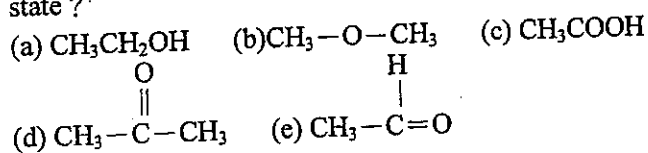
13. Which of the following has the highest percentage of ionic character in its bonding?
 (a) LiI (b) MgCl_2 (c) CsF (d) CsI (e) AlCl_3

14. 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

15. Which of the following diatomic species do you expect to have the longest bond length?
 (a) NO^+ (b) O^{2-} (c) CO (d) O^{2+} (e) N^{2+}

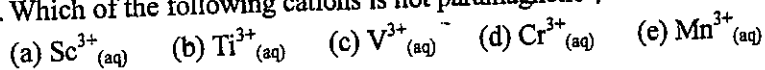
16. A sulfur-containing species that cannot be a reducing agent is
 (a) SO_2 (b) SO_3^{2-} (c) SO_4^{2-} (d) S^{2-} (e) $\text{S}_2\text{O}_3^{2-}$

17. In which of the following compounds is there a carbon atom in the +3 oxidation state?



18. Aluminum-25 decays by emitting a positron. The species immediately produced has
 (a) 12p, 13n, 13e⁻ (b) 13p, 12n, 13e⁻ (c) 12p, 13n, 12e⁻
 (d) 14p, 11n, 14e⁻ (e) 13p, 13n, 13e⁻

19. Which of the following cations is not paramagnetic?



國立中山大學九十一學年度轉學生招生考試試題

科目：普通化學【海資系二年級、生科系二年級、海工系二年級】 共 3 頁 第 3 頁

20. If concentrations are measured in moles per liter and time in minutes, the units for the rate of a third-order reaction are

- (a) min^{-1} (b) $\text{L}\cdot\text{mole}^{-1}\text{min}^{-1}$ (c) $\text{L}^2\text{mole}^{-2}\text{min}^{-1}$
(d) $\text{mole}\cdot\text{L}^{-1}\text{min}^{-1}$ (e) $\text{mole}^2\text{L}^{-2}\text{min}^{-1}$

21. For a hypothetical reaction $\text{A} + 2\text{B} \rightarrow 3\text{C} + \text{D}$, $d[\text{C}]/dt$ is equal to

- (a) $-d[\text{A}]/dt$ (b) $-d[\text{B}]/dt$ (c) $+3d[\text{A}]/dt$ (d) $(-3/2)d[\text{B}]/dt$ (e) $+d[\text{A}]/dt$

22. For the reaction $\text{A} + 2\text{B} \rightarrow 2\text{C}$, the rate law for formation of C is

- (a) $\text{rate} = k[\text{A}][\text{B}]^2$ (b) $\text{rate} = k[\text{A}][\text{B}]$ (c) $\text{rate} = k[\text{C}]^2 / [\text{A}][\text{B}]^2$
(d) $\text{rate} = k[\text{A}]^2[\text{B}]$ (e) impossible to state from the data given.

23. Consider the cell $\text{Cd}_{(s)}|\text{Cd}^{2+}(1.0\text{M})||\text{Cu}^{2+}(1.0\text{M})|\text{Cu}_{(s)}$. If we wanted to make a cell with a more positive voltage using the same substances, we should

- (a) Increase both the $[\text{Cd}^{2+}]$ and $[\text{Cu}^{2+}]$ to 2.00M.
(b) Increase only the $[\text{Cd}^{2+}]$ to 2.00M.
(c) Decrease both the $[\text{Cd}^{2+}]$ and $[\text{Cu}^{2+}]$ to 0.100M.
(d) Decrease only the $[\text{Cd}^{2+}]$ to 0.100M.
(e) Decrease only the $[\text{Cu}^{2+}]$ to 0.100M.

24. An adiabatic process is one in which there is no transfer of heat across the boundary between system and surroundings. For such a process

- (a) $P_{\text{ext}}\Delta V = 0$ (b) $q = w$ (c) $\Delta E = w$ (d) $\Delta H = 0$ (e) $\Delta E = q$

25. 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) $\Delta E = 0$