

建國補習班 私醫插大第二回模擬考試題

科目：普通化學

考試時間：八十分鐘

選擇題：

1. All example of pure substance is
(A)elements (B)compounds (C)pure water (D)CO₂ (E)all of these
2. The correct name for NaBr is
(A)mono sodium bromide (B)monosodium monobromide (C)sodium (D)bromide
(E)sodium bromide
3. When 20.0g C₂H₆ and 60.0g O₂ react to form CO₂ and H₂O. How many grams of water are formed?
(A)14.5 (B)18 (C)58.0 (D)20.0 (E)none of these
4. In which of the following does nitrogen have an oxidation number of +4?
(A)HNO₃ (B)NO₂ (C)N₂O (D)NH₄Cl (E)NaNO₂
5. Which gas has the highest density?
(A)He (B)Cl₂ (C)CH₄ (D)NH₃ (E)all gas the same
6. Calculate the ratio of the effusion rate of N₂ and N₂O?
(A)0.637 (B)1.57 (C)1.25 (D)0.789 (E)1.61
7. Which of the following pairs is isoelectronic?
(A)Li⁺, k⁺ (B)Na⁺, Ne (C)I⁻, Cl⁻ (D)S²⁻, Ne (E)Al⁺³, B⁺³
8. How many of the following molecules SF₂, SF₄, SF₆, SiO₂ are polar?
(A)0 (B)1 (C)2 (D)3 (E)4
9. What is the bond order of C₂⁺?
(A) $\frac{1}{2}$ (B)1 (C)1.5 (D)2 (E)2.5
10. Determine the molecularity of the following elementary reaction O₃ + O₂ + O
(A)unimolecular (B)bimolecular (C)termolecular (D)quadmolecular
(E)can't be determined
11. Which of the following shows a decrease in entropy?
(A)precipitation (B)gaseous reactants forming a liquid (C)a burning piece of wood
(D)melting ice (E)two of these
12. All the following are colligative properties except
(A)osmotic pressure (B)boiling point elevation (C)freezing point depression
(D)density elevation (E)none of these

13. The fact that O_2 is paramagnetic can be explained by
 (A) the Lewis structure (B) resonance (C) a violation of the octet rule
 (D) the molecular orbital diagram for O_2 (E) hybridization of atomic orbitals in O_2
14. A solution of hydrogen peroxide is 30% by mass and has a density of 1.11 g/cm^3 . The molarity of the solution is
 (A) 7.94 M (B) 8.82 M (C) 9.79 M (D) 0.98 M (E) none of these
15. The pH of a 0.100 M solution of an aqueous weak acid (HA) is 3.20. The K_a for the weak acid is
 (A) 6.3×10^{-4} (B) 7.2×10^{-5} (C) 4.0×10^{-6} (D) 3.2 (E) none of these
16. How many moles of solid NaF would have to be added to 1.0 L of 1.90 M HF solution to achieve a buffer of pH 3.35? Assume there is no volume change. (K_a for HF = 7.2×10^{-4})
 (A) 3.1 (B) 2.3 (C) 1.6 (D) 1.0 (E) 4.9
17. Which of the following compounds has the lowest solubility in water?
 (A) $Al(OH)_3$, $K_{sp} = 2 \times 10^{-32}$ (B) CdS , $K_{sp} = 1 \times 10^{-28}$ (C) $PbSO_4$, $K_{sp} = 1.3 \times 10^{-8}$
 (D) $Sn(OH)_2$, $K_{sp} = 3 \times 10^{-27}$ (E) MgC_2O_4 , $K_{sp} = 8.6 \times 10^{-5}$
18. At constant pressure, the following reaction $2NO_{2(g)} \rightleftharpoons N_2O_{4(g)}$ is exothermic.
 The reaction is
 (A) always spontaneous (B) spontaneous at low temperature, but not high temperature
 (C) spontaneous at high temperature, but not low temperature (D) never spontaneous
19. How many electrons are transferred in the following reaction?

$$2ClO_3^- + 12H^+ + 10I^- \rightarrow 5I_2 + Cl_2 + 6H_2O$$

 (A) 12 (B) 5 (C) 2 (D) 30 (E) 10
20. Which of the following is true for the cell shown here? $Zn_{(s)} \mid Zn^{2+}_{(aq)} \parallel Cr^{3+}_{(aq)} \mid Cr_{(s)}$
 (A) The electrons flow from the cathode to the anode
 (B) The electrons flow from the zinc to the chromium
 (C) The chromium is oxidized (D) The zinc is reduced (E) none of these
21. Which type of battery has been designed for use in space vehicles?
 (A) lead storage (B) alkaline dry cell (C) mercury cell (D) fuel cell (E) silver cell
22. The compound SiO_2 does not exist as a discrete molecule while CO_2 does. This can be explained because.
 (A) the Si - O bond is unstable
 (B) The Lewis structure of SiO_2 has an even number of electrons
 (C) The SiO_2 is a solid while CO_2 is a gas
 (D) the 3p orbital of the Si has little overlap with the 2p of the O
 (E) none of these
23. The process of transforming N_2 to a form usable by animals and plants is called
 (A) nitrogen fixation (B) fertilization (C) denitrification (D) nitrogenation (E) none of these

24. The bond angle in H_2Se is about
 (A) 120° (B) 60° (C) 180° (D) 109° (E) 90°
25. Which of the following metal ion is colorless in water ?
 (A) Fe() (B) Zn() (C) Mn() (D) Cu() (E) Co()
26. Which of the following molecules does not exhibit a net dipole moment of zero ?
 (A) CO_2 (B) BrF_4^- (C) I_3^- (D) N_2H_4 (E) C_2H_4
27. Which of the following molecules exhibits the strongest hydrogen bonding ?
 (A) CH_3COOH (B) CH_3CHO (C) CH_3OCH_3 (D) $\text{C}_2\text{H}_5\text{OH}$ (E) $\text{C}_2\text{H}_5\text{NH}_2$
28. If the ratio of e/m of X^{2+} is 1.16×10^4 coul/g, Find the molecular weight of X ?
 (A) 8.3 (B) 16.6 (C) 24.9 (D) 32.9 (E) none of these
29. Which of the following compounds is water soluble ?
 (A) magnesium carbonate (B) barium sulfate (C) strontium nitrate (D) plumbous sulfide
 (E) silver chloride
30. Element X has two isotopes existing in nature. Now in mass spectrometer, we learn that the e/m of X^{2+} are 4.82×10^3 , 4.59×10^3 and 4.38×10^3 coul/g respectively. Besides, the intensity of three peaks is 1 : 8 : 16, please find the average molecular weight of element X ?
 (A) 10.8 (B) 10.2 (C) 20.8 (D) 20.0 (E) none of the above
31. The state of matter for an objective that has a definite volume but not a definite shape is
 (A) solid state (B) liquid state (C) gaseous state (D) element state (E) mixed state
32. Naturally occurring copper exists in two isotopic forms : ^{63}Cu and ^{65}Cu . The atomic mass of copper is 63.55 amu. What is the approximate natural abundance of ^{63}Cu ?
 (A) 63% (B) 90% (C) 70% (D) 50% (E) 30%
33. Which of the following are state functions ?
 () energy () work () enthalpy () heat () electromotive force
 (A) , , (B) , , (C) , , (D) , (E) none of above
34. On a planet where the temperature is so high, the ground state of an electron in the hydrogen atom is $n=4$. What is the ratio of IE on this planet compared to earth ?
 (A) 1 : 4 (B) 4 : 1 (C) 1 : 16 (D) 16 : 1 (E) none of above
35. According to VSEPR theory, which of the following species has a square planar molecular structure ?
 (A) TeB_4 (B) BrF_3 (C) IF_5 (D) XeF_4 (E) SCl_2
36. Which of the following statements is true about p-type silicon ?
 (A) It is produced by doping Si with P or As (B) Electrons are the mobile charge carriers
 (C) It does not conduct electricity as well as pure Si (D) All are true (E) None is true
37. If the reaction $2\text{HI} \rightarrow \text{H}_2 + \text{I}_2$ is second order, which of the following will yield a linear plot ?
 (A) $\log[\text{HI}]$ vs time (B) $\frac{1}{[\text{HI}]}$ vs time (C) $[\text{HI}]$ vs time (D) $\ln[\text{HI}]$ vs time (E) none of above

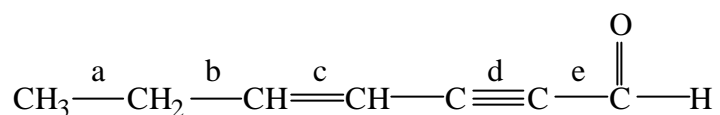
38. The line spectrum of hydrogen

- (A) indicates that H_2 is a gas
- (B) is identical to that of Neon and Xenon
- (C) shows that the electron in H atom can have only certain energies
- (D) shows that the electron moves in a circular orbital
- (E) none of the above

39. Which of the following is false ?

- (A) Zeolites are useful as water softeners
- (B) Ions become trapped in the cavities and tunnels of the zeolites
- (C) When hard water is passed over a zeolite structure, sodium ions present may be exchanged for other ions
- (D) Used up zeolite water softeners may be reused after being treated with a concentrated salt water solution
- (E) none of the above

40. Arrange the bonds in the molecule in order of increasing C-C bond length ?



- (A) $d < c < e < b < a$
- (B) $d < c < b < e < a$
- (C) $d < c < a < b < e$
- (D) $d < c < b < e < a$
- (E) none of the above

解答

1. (E) 2. (E) 3. (E) 4. (B) 5. (B) 6. (C) 7. (B) 8. (C) 9. (C) 10. (A)
11. (E) 12. (D) 13. (D) 14. (C) 15. (C) 16. (A) 17. (B) 18. (B) 19. (E) 20. (E)
21. (D) 22. (E) 23. (A) 24. (D) 25. (B) 26. (D) 27. (A) 28. (B) 29. (C) 30. (A)
31. (B) 32. (C) 33. (C) 34. (C) 35. (D) 36. (E) 37. (B) 38. (C) 39. (E) 40. (A)