高雄醫學大學 111 學年度學生轉系考試【普通化學】試題	第	頁,共3頁
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試場。		

1. How many significant figures does the difference 218.7201 – 218.61 contain? [A] 1 [B] 2 [C] 3 [D] 4 [E] 5

2. Which one of the following elements is most likely to form a 1+ ion?[A] aluminum [B] indium [C] thallium [D] boron [E] gallium

3. Name the compound CuSO₄

[A] Copper (I) sulfate [B] Copper (II) sulfate [C] Copper (II) sulfate [D] Cobalt (II) sulfate [E] Cobalt (II) sulfate

- 4. A mass spectrometer works by ionizing atoms or molecules, and then accelerating them through oppositely charged plates. The mass is obtained by
- [A] measuring the force of impact on a detecting screen, and then calculating the mass using force = mass \times acceleration.
- [B] suspending the ions in an applied electric field, and then calculating mass by the setting the downward gravitational force equal to the upward electrostatic force.
- [C] measuring the magnitude of deflection as the ions pass through a magnetic field to obtain the charge-to-volume ratio, and then calculating the mass from that ratio.
- [D] measuring the time it takes for the ions to hit the detector at a known distance to calculate the acceleration, and then calculating mass from force = mass \times acceleration.
- [E] all are not correct.
- 5. Which of the following compounds is a *strong acid*?[A] HF [B] HI [C] HClO₂ [D] H₂SO₃ [E] HNO₂

6. How many total electrons are transferred in the following reaction? $B_2H_{6(g)} + 3O_{2(g)} \rightarrow B_2O_{3(s)} + 3H_2O_{(l)}$ [A] 2 [B] 3 [C] 4 [D] 6 [E] 12

- 7. A 45 mL sample of nitrogen gas is cooled from 135°C to 15°C in a container that can contract or expand at constant pressure, what is the new volume of the nitrogen gas?
 [A] 64 mL [B] 5.0 mL [C] 410 mL [D] 32 mL [E] 41 mL
- 8. Styrene, C₈H₈, is one of the substances used in the production of synthetic rubber. When styrene burns in oxygen to form carbon dioxide and liquid water under standard-state conditions at 25°C, 42.62 kJ are released per gram of styrene. Find the standard enthalpy (kJ/mol) of formation of styrene at 25°C. (Given: ΔH°_f[CO₂(g)] = -393.5 kJ/mol, ΔH°_f[H₂O(l)] = -285.8 kJ/mol, ΔH°_f[H₂O(g)] = -241.8 kJ/mol)
 [A] ~141.28 [B] ~317.28 [C] ~636.7 [D] ~4249 [E] ~8730

9. What is the maximum number of electrons in an atom that can have the following quantum numbers? n = 3l = 2[E] 1 [A] 18 [B] 10 [C] 5 [D] 2 10. Which of the following make an *isoelectronic pair*: Cl⁻, O²⁻, F, Ca²⁺, Fe³⁺? [C] F and Cl^{-} [A] Ca^{2+} and Fe^{3+} [B] O^{2-} and F [D] Cl⁻ and Ca²⁺ [E] None of the above. 11. The cobalt(III) complex, Co^{3+} , has how many 3*d* electrons? [A] 0 [B] 7 [C] 6 [D] 5 [E] 4 12. Which of the atoms listed below has the smallest radius? [A] Al [B] P [C] As [D] Te [E] Na 13. If the radius of atom X is greater than the radius of atom Y, then it is also likely that [A] X has a larger electron affinity than Y does. [B] X has a larger effective nuclear charge than Y does. [C] X has greater metallic character than Y does. [D] X has a larger first ionization energy than Y does. [E] X is a poorer conductor of electricity than Y when in the solid state. 14. Which one of the following ionic solids would have the largest lattice energy? [A] NaCl [B] NaF [C] CaBr₂ [D] CsI [E] CaCl₂ 15. Which of the following substances is/are bent? (i) H_2S (ii). CO_2 (iii) N_3^- (iv) $NH_2^ (v) O_3$ [A] only (iii) [B] (i) and (v) [C] (i), (iii), and (v) [D] (i), (ii), (iii), and (v) [E] (i), (iv), and (v) 16. Which are the properties of ionic compounds? 1. They are liquids or solid at room temperature. 2. They have high melting points. 3. Solids do not conduct electricity, but liquids do. 4. All of ionic compounds can dissolve in water. [E] 2 and 4 [A] all [B] 1, 2, and 3 [C] 1, 3, and 4 [D] 2, 3, and 4 17. Which of the following liquids would make a good solvent for iodine, I₂? [A] HC1 [B] H₂O [C] CH₃OH [D] NH₃ $[E] CS_2$ 18. For the overall chemical reaction shown below, which one of the following statements can be rightly $2H_2S_{(g)} + O_{2(g)} \rightarrow 2S_{(s)} + 2H_2O_{(1)}$ assumed? [A] The reaction is third-order overall. [B] The reaction is second-order overall. [C] The rate law is, rate = $k[H_2S]^2[O_2]$. [D] The rate law is, rate = $k[H_2S][O_2]$. [E] The rate law cannot be determined from the information given. 19. Which one of these statements about strong acids is *true*? [A] All strong acids have H atoms bonded to electronegative oxygen atoms. [B] Strong acids are 100% ionized in water. [C] The conjugate base of a strong acid is itself a strong base. [D] Strong acids are very concentrated acids. [E] Strong acids produce solutions with a higher pH than weak acids. 20. You have 500.0 mL of a buffer solution containing 0.20 M acetic acid (CH₃COOH) and 0.30 M sodium

acetate (CH₃COONa). What will the pH of this solution be after the addition of 20.0 mL of 1.00 M NaOH solution? $[K_a = 1.8 \times 10^{-5}]$

[A] 4.41 [B] 4.74 [C] 4.56 [D] 4.92 [E] 5.07

21. Which one of the following reactions would you expect to have the lowest ΔS° ?

[A] $\mathrm{CH}_{4(g)} + 2\mathrm{O}_{2(g)} \rightarrow \mathrm{CO}_{2(g)} + 2\mathrm{H}_2\mathrm{O}_{(g)}$ [B] $C_2H_{2(g)} + \frac{5}{2}O_{2(g)} \rightarrow 2CO_{2(g)} + H_2O_{(g)}$ $\mathrm{C_2H_{6(g)}} + {^7/_2\mathrm{O}_{2(g)}} \rightarrow 2\mathrm{CO}_{2(g)} + 3\mathrm{H_2O}_{(g)}$ $C_2H_{4(g)} + O_{2(g)} \rightarrow 2CO_{2(g)} + 2H_2O_{(g)}$ [C] [D] [E] All the above reactions have the same ΔS° 22. The formula "C_nH_{2n}" should be a. Alkanes; b. Alkenes; c. Alkynes; d. Cycloalkane b or c c or d [E] b or d [A] a or b [B] [C] [D] a or d 23. Which of the following is most soluble in water [A] ^tBuOH [B] ^tBu-O-^tBu [C] ^tBu-C(=O)-^tBu [D] ^tBuC(=O)OH [E] $^{t}BuC(=O)O^{-t}Bu$ 24. In the complex ion $[Co(en)_2Br_2]^+$, the oxidation number of Co is [A] +1+2[C] +3[D] [B] -2 [E] -1 25. Which complex has the less unpaired electrons

 $[A] [Mn(CN)_6]^{4-}; [B] [Pd(PPh_3)_4]^{2+}; [C] Na_3[CoCl_6]; [D] [Cr(NH_3)_3(H_2O)Cl_2]Cl; [E] [Cr(en)_3]^{2+}; [C] Na_3[CoCl_6]; [C] Na_3[C$