

## Chemistry, 2006 EC, entrance exam

Grade 12 · Chemistry · 2006 E.C.

Time allowed: 120 minutes

Questions: 73

Total marks: 73

Name \_\_\_\_\_ Grade \_\_\_\_\_ ID No. \_\_\_\_\_ Date \_\_\_\_\_

1. Which of the following is NOT a conjugate acid-base pair? (1)
- A.  $\text{HNO}_3/\text{NO}_3^-$  B.  $\text{H}_2\text{SO}_4/\text{HSO}_4^-$   
C.  $\text{NH}_3/\text{NH}_2^-$  D.  $\text{H}_3\text{O}^+/\text{OH}^-$
- 
2. Which of the following is correct? (1)
- A.  $1\text{L} = 1\text{dm}^3$  B.  $1\text{L} = 10\text{dm}^3$   
C.  $10\text{L} = 1\text{dm}^3$  D.  $1\text{L} = 1\text{m}^3$
- 
3. Commercially, liquid vegetable oils are converted to solid fats such as margarine by: (1)
- A. Hydrogenation B. Hydration  
C. Saponification D. Oxidation
- 
4. What is the chemical name for Aspirin? (1)
- A. Acetyl salicylic acid B. Salicylic acid  
C. Methyl salicylate D. Sodium salicylate
- 
5. Which of the following statement(s) is (are) true of an ideal liquid-liquid solution? I. It obeys  $PV = nRT$  II. It obeys Raoult's law III. Solute-solute, solvent-solvent, and solute-solvent interactions are very similar. IV. Solute-solute, solvent-solvent, and solute-solvent interactions are quite different. (1)
- A. I, II and III B. I, II and IV  
C. II and III D. II and IV
- 
6. In a reaction,  $A + B \rightarrow \text{product}$ , the rate is doubled when the concentration of B is doubled, and the rate increases by a factor of 8 when the concentrations of both the reactants (A and B) are doubled, the rate law for the reaction can be written as: (1)
- A.  $\text{Rate} = k[A][B]$  B.  $\text{Rate} = k[A][B]^2$   
C.  $\text{Rate} = k[A]^2[B]$  D.  $\text{Rate} = k[A]^2[B]^2$

7. Answer the following question using the phase diagram below. At which point can only the solid and liquid phases coexist? (1)

[Figure: A hand-drawn pressure-temperature phase diagram. The vertical axis is labelled 'Pressure' and the horizontal axis is labelled 'Temperature'. Three curves meet at a single point marked with a small open circle and labelled 3, sitting low and left of centre. From point 3 a straight steep line runs up and to the left, leaving the top of the drawing (the solid-liquid boundary); a filled square marked 4 sits on this line part-way up, and a filled dot sits higher on the same line. From point 3 an almost horizontal, slightly curving line runs left towards the pressure axis (the solid-gas boundary). From point 3 a curve rises gently to the right and then steepens, ending at a small circle labelled 8 at the upper right (the liquid-gas boundary); a small circle labelled 5 sits on this curve near its upper end. A dot labelled 1 lies in the region to the left of the steep line and above the almost-horizontal line. A dot labelled 2 lies in the open area above the rising right-hand curve and to the right of the steep line. A dot labelled 6 lies below the rising right-hand curve, beneath point 5.]

A. 1  
B. 2  
C. 3  
D. 4

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8. Which electron transition in a hydrogen atom releases the largest energy? (1)

A.  $n = 2 \rightarrow n = 1$   
B.  $n = 4 \rightarrow n = 2$   
C.  $n = 6 \rightarrow n = 3$   
D.  $n = 7 \rightarrow n = 6$

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9. The simplest formula for a compound containing  $\text{Mn}^{4+}$  and  $\text{O}^{2-}$  is (1)

A.  $\text{MnO}$   
B.  $\text{MnO}_2$   
C.  $\text{Mn}_2\text{O}_4$   
D.  $\text{Mn}_4\text{O}_2$

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10. What is the ratio of the energy of a photon of 300 nm wavelength radiation to that of 600 nm radiation? (1)

A. 1:2  
B. 1:1  
C. 2:1  
D. 3:1

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11. Which one of the following chemicals is used to disinfect water? (1)

A. Fluorine  
B. Nitrogen  
C. Oxygen  
D. Chlorine

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12. During the titration of a known volume of a strong acid with a strong base, there is (1)

A. A steady increase in PH  
B. A sharp increase in PH around the end point  
C. A steady decrease in PH  
D. A sharp decrease in PH around the end point

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13. A solution with a PH of 7.5 would be described as: (1)

A. Very basic  
B. Slightly base  
C. Slightly acidic  
D. Very acidic

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14. The electrolysis of molten  $\text{NaCl}$  is an industrial process. What does the electrolysis produce? (1)

A.  $\text{Na}$  and  $\text{Cl}_2$   
B.  $\text{H}_2$  and  $\text{O}_2$   
C.  $\text{Na}^+$  and  $\text{Cl}^-$   
D.  $\text{NaOH}$  and  $\text{Cl}_2$

15. Butane burns in oxygen according to the equation below.  $2\text{C}_4\text{H}_{10}(\text{g}) + 13\text{O}_2(\text{g}) \rightarrow 8\text{CO}_2(\text{g}) + 10\text{H}_2\text{O}(\text{l})$ . If 11.6g of butane is burned in 11.6 g of oxygen, which is the limiting reagent? (1)
- A. Butane  
B. Oxygen  
C. Neither  
D. Both oxygen and butane
- 
16. A beaker filled to the 100mL mark with salt (the salt has a mass of 100g) and another beaker to the 100mL mark with water (the water has a mass of 100g) are mixed together in a bigger beaker until the salt is completely dissolved. What will be the mass of the solution? (1)
- A. It will be much more than 200g  
B. It will be much smaller than 200g  
C. It will be exactly 200g  
D. It will be slightly more than 200g
- 
17. Which one of the following is NOT an intensive property? (1)
- A. Mass  
B. Temperature  
C. Colour  
D. Density
- 
18. Which of the following is natural polymer? (1)
- A. Nylon  
B. PVC  
C. Cotton  
D. Dacron
- 
19. Which of the following metals forms a volatile compound during the extraction process? (1)
- A. Fe  
B. Co  
C. Ni  
D. Cu
- 
20. Which one of the following atoms in its ground state has the greatest number of unpaired electrons? (1)
- A.  $_{13}\text{Al}$   
B.  $_{14}\text{Si}$   
C.  $_{15}\text{P}$   
D.  $_{16}\text{S}$
- 
21. Which statement is true about chemical reactions at equilibrium? (1)
- A. A forward and backward reactions proceed at equal rates  
B. The forward and backward reactions have stopped  
C. The concentrations of the reactants and products are equal  
D. The forward reaction is exothermic
- 
22. Which compound contains both covalent and ionic bonds? (1)
- A. Sodium carbonate,  $\text{Na}_2\text{CO}_3$   
B. Magnesium bromide,  $\text{MgBr}_2$   
C. Dichloromethane,  $\text{CH}_2\text{Cl}_2$   
D. Ethanoic acid,  $\text{CH}_3\text{COOH}$
- 
23. Which set of quantum numbers (n, l,  $m_l$ ,  $m_s$ ) is not possible? (1)
- A. 1, 0, 0, 1/2  
B. 1, 1, 0, 1/2  
C. 1, 0, 0, -1/2  
D. 2, 1, -1, 1/2
- 
24. Which of the following particles contains more electrons than neutrons? I.  $^1_1\text{H}$  II.  $^{35}_{17}\text{Cl}^-$  III.  $^{39}_{19}\text{K}^+$  (1)
- A. I only  
B. II only  
C. I and II only  
D. II and III only
- 
25. Which molecule or ion does NOT have a tetrahedral shape? (1)
- A.  $\text{XeF}_4$   
B.  $\text{SiCl}_4$   
C.  $\text{BF}_4^-$   
D.  $\text{NH}_4^+$

26. Why are metals soft and malleable? (1)
- A. Because they are very shiny.  
B. Because they experience electrostatic repulsion  
C. Because of the presence of mobile electrons.  
D. Because the metal cations can slip over each other fairly easily.
- 
27. In which region of the Periodic Table would the element with the electronic structure below be located? (1)
- $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6 4d^6 5s^2$
- A. Group 6  
B. Noble gases  
C. S block  
D. D block
- 
28. Which factors will influence the rate of the reaction shown below?  $\text{NO}_2(\text{g}) + \text{CO}(\text{g}) \rightleftharpoons \text{NO}(\text{g}) + \text{CO}_2(\text{g})$  I. (1)
- The number of collisions per second II. The energy of the collisions III. The geometry with which the molecules collide
- A. I only  
B. II only  
C. I and II only  
D. I, II and III
- 
29. How many  $\pi$  bonds are present in  $\text{CO}_2$ ? (1)
- A. One  
B. two  
C. three  
D. four
- 
30. Which pair of monomers forms polyesters? (1)
- A. Difunctional alcohol, difunctional organic acid  
B. Difunctional alcohol, difunctional amino acid  
C. Ethylene, ethylene  
D. Amino acid, amino acid
- 
31. Which changes will increase the amount of  $\text{SO}_3(\text{g})$  at equilibrium?  $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{SO}_3(\text{g}) \Delta H^\circ = -197\text{kJ}$  I. Increasing the temperature II. Decreasing the volume III. Adding a catalyst (1)
- A. I only  
B. II only  
C. I and II only  
D. I, II and III
- 
32. Which compound is a carboxylic acid? (1)
- A.  $\text{CH}_3\text{COOH}$   
B.  $(\text{CH}_3\text{CO})_2\text{O}$   
C.  $(\text{CH}_3)_2\text{CHOOCH}_3$   
D.  $(\text{CH}_3)_2\text{O}$
- 
33. The mechanism of a reaction is shown below.  $\text{HOOH} + \text{I}^- \rightarrow \text{HOI} + \text{OH}^-$  (slow)  $\text{HOI} + \text{I}^- \rightarrow \text{I}_2 + \text{OH}^-$  (fast)  $2\text{OH}^- + 2\text{H}_3\text{O}^+ \rightarrow 4\text{H}_2\text{O}$  (fast) What is the rate law based on this mechanism? (1)
- A.  $\text{Rate} = k[\text{HOOH}][\text{I}^-]$   
B.  $\text{Rate} = k[\text{HOOH}]^2[\text{I}^-]$   
C.  $\text{Rate} = k[\text{HOOH}][\text{I}^-]^2$   
D.  $\text{Rate} = k[\text{HOOH}]$
- 
34. What is the equilibrium constant expression for the following reaction?  $2\text{Hg}(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{HgO}(\text{s})$  (1)
- A.  $K = 1/(\text{Hg})^2/(\text{O}_2)$   
B.  $K = [\text{Hg}]^2[\text{O}_2]$   
C.  $K = [\text{HgO}]^2/([\text{Hg}]^2[\text{O}_2])$   
D.  $K = [2\text{HgO}]/([2\text{Hg}][\text{O}_2])$

**35.** A triacylglycerol that is solid at room temperature is called: (1)

- A. Lecithin  
B. Fat  
C. Wax  
D. Oil

**36.** Which compound is an ester? (1)

- A. CH<sub>3</sub>COOH  
C. C<sub>2</sub>H<sub>5</sub>CHO
- B. CH<sub>3</sub>OC<sub>2</sub>H<sub>5</sub>  
D. HCOOCH<sub>3</sub>

**37.** How many moles of sodium hydroxide are present in 2.5L of 0.5M aqueous solution? (1)

- A. 0.2                      B. 0.5  
C. 1.25                     D. 12.5

38. Which species CANNOT act as a Lewis acid? (1)

- A.  $\text{NH}_3$   
C.  $\text{Fe}^{2+}$

39. Which of the following statements is true? (1)

- A. A universal indicator is a mixture of indicators that will give a different colour for a different PH.  
B. Phenolphthalein is a universal indicator.  
C. A universal indicator can only be used in either strongly acidic or basic solution.  
D. The colour of a universal indicator is red in a weak acid.

**40.** Three acids, HA, HB, HC have the following  $K_a$  values.  $K_a(\text{HA}) = 1 \times 10^{-5}$   $K_a(\text{HB}) = 2 \times 10^{-5}$   $K_a(\text{HC}) = 1 \times 10^{-6}$  What is the correct order of increasing acid strength (weakest first)? (1)

- A. HA, HB, HC      B. HC, HB, HA  
C. HC, HA, HB      D. HB, HA, HC

41. If the solute-solvent interactions are greater than the solute-solute and solvent-solvent interactions, what will be the total vapour pressure of the solution? (1)

- A. Greater than that calculated from Raoult's law
- B. Less than that calculated from Raoult's law
- C. The same as calculated from Raoult's law
- D. Raoult's law cannot be applied for such interactions.

**42.** For which conversion is an oxidizing agent required? (1)

- A.**  $2\text{H}^+(\text{aq}) \rightarrow \text{H}_2(\text{g})$                       **B.**  $2\text{Br}^-(\text{aq}) \rightarrow \text{Br}_2(\text{aq})$   
**C.**  $\text{SO}_3(\text{g}) \rightarrow \text{SO}_4^{2-}(\text{aq})$                       **D.**  $\text{MnO}_2(\text{s}) \rightarrow \text{Mn}^{2+}(\text{aq})$

43. What volume of 0.500M NaOH is required to neutralize 25.0 mL of 1.2 M  $\text{H}_2\text{SO}_4$ ? (Assume complete ionization of the acid).

- A. 60mL  
B. 90mL  
C. 100mL  
D. 120mL

**44.** A gas is confined to a cylinder under constant atmospheric pressure. When the gas undergoes a particular chemical reaction, it releases 135kJ of heat to its surroundings and does 63kJ of P-V work on its surroundings. What are the values of  $\Delta H$  and  $\Delta E$  for the process? (1)

- A.  $\Delta H = 135\text{kJ}, \Delta E = 63\text{kJ}$   
 B.  $\Delta H = -135\text{kJ}, \Delta E = -63\text{kJ}$   
 C.  $\Delta H = 135\text{kJ}, \Delta E = 198\text{kJ}$   
 D.  $\Delta H = -135\text{kJ}, \Delta E = -198\text{kJ}$

45. The oxidation numbers of nitrogen in  $\text{NH}_3$ ,  $\text{HNO}_3$  and  $\text{NO}_2$  are respectively. (1)
- A. -3, -5, +4  
B. +3, +5, +4  
C. -3, +5, -4  
D. -3, +5, +4
- 
46. Which statement about the following reaction is correct?  $2\text{FeS}(\text{s}) + 3\text{CO}_2(\text{g}) \rightarrow \text{Fe}_2\text{O}_3(\text{s}) + 3\text{CO}(\text{g})$   
 $\Delta H^\circ = +26.6\text{kJ}$  (1)
- A. 26.6kJ of energy are released for every mole of Fe reacted.  
B. 26.6kJ of energy are absorbed for every mole of Fe reacted.  
C. 53.2kJ of energy are released for every mole of Fe reacted.  
D. 13.3kJ of energy are absorbed for every mole of Fe reacted.
- 
47. The two standard electrode potentials involved in the nickel cadmium rechargeable cell are given below. (1)  
Calculate the  $\Delta G^\circ$  in kJ of the cells.  
 $\text{NiO}_2(\text{s}) + 2\text{H}_2\text{S}(\text{l}) + 2\text{e}^- \rightarrow \text{Ni}(\text{OH})_2(\text{s}) + 2\text{OH}^- \quad E^\circ = +0.49\text{V}$   
 $\text{Cd}(\text{OH})_2(\text{s}) + 2\text{e}^- \rightarrow \text{Cd}(\text{s}) + 2\text{OH}^- \quad E^\circ = -0.76\text{V}$
- A. -184  
B. -153  
C. -241  
D. -206
- 
48. Which of the following is a synthetic rubber produced from caprolactam (CPL)? (1)
- A. Nylon 6, 10  
B. Terylene  
C. Teflon  
D. Nylon6
- 
49. Which of the following reaction is NOT a redox reaction? (1)
- A.  $\text{Ag}^+(\text{aq}) + \text{Cl}^-(\text{aq}) \rightarrow \text{AgCl}(\text{s})$   
B.  $2\text{Na}(\text{s}) + \text{Cl}_2(\text{g}) \rightarrow 2\text{NaCl}(\text{s})$   
C.  $\text{Mg}(\text{s}) + 2\text{HCl}(\text{aq}) \rightarrow \text{MgCl}_2(\text{aq}) + \text{H}_2(\text{g})$   
D.  $\text{Cu}^{2+}(\text{aq}) + \text{Zn}(\text{s}) \rightarrow \text{Cu}(\text{s}) + \text{Zn}^{2+}(\text{aq})$
- 
50. The half-reaction for formation of magnesium metal upon electrolysis of molten  $\text{MgCl}_2$  is:  $\text{Mg}^{2+} + 2\text{e}^- \rightarrow \text{Mg}$  (1)  
What is the mass of magnesium formed upon passage of a current of 60.0A for a period of  $2.00 \times 10^3\text{S}$ ?
- A. 5.0g  
B. 10.0g  
C. 15.1g  
D. 30.2g
- 
51. An aqueous solution is 70% nitric acid ( $\text{HNO}_3$ ) by mass. What is the concentration of  $\text{HNO}_3$  expressed in molality? (1)
- A. 0.559m  
B. 8.62m  
C. 11.1m  
D. 37.0m
- 
52. Which of the following is a natural polymer? (1)
- A. Polythene  
B. Polysaccharides  
C. Nylon  
D. Terylene
- 
53. What is the ionization energy of an iron atom if it requires a radiation of 276nm to completely remove its outer most electron in the gaseous state? (Plank's constant,  $h=6.626 \times 10^{-34}\text{Js}$ , speed of light,  $c = 3 \times 10^8\text{ms}^{-1}$ ) (1)
- A.  $7.21 \times 10^{-19}\text{J}$   
B.  $7.21 \times 10^{-19}\text{kJ}$   
C.  $7.21 \times 10^{19}\text{J}$   
D.  $7.21 \times 10^{19}\text{kJ}$
- 
54. Which of the electron configurations describes the ground state electron configuration of  $\text{Cl}^-$ ? (1)
- A.  $1s^2 2s^2 2p^6 3s^2 3p^6$   
B.  $1s^2 2s^2 2p^6 3s^1$   
C.  $1s^2 2s^2 2p^6 3p^1$   
D.  $1s^2 2s^2 2p^6 3s^2 3p^2 3p^1$

55. When 0.68 is divided by 14.364, the actual answer is 0.0473405. What will be the correct answer? (1)
- A. 0.05  
B. 0.047  
C. 0.0473  
D. 0.04734
- 
56. What is the correct molecular electronic configuration for the molecular ion,  $B_2^+$ ? (1)
- A. [option image did not render in the source capture]  
B. [option image did not render in the source capture]  
C. [option image did not render in the source capture]  
D. [option image did not render in the source capture]
- 
57. Which of the following molecules or ions will exhibit delocalized bonding?  $NO_2^-$ ,  $NH_4^+$ ,  $N_3^-$  (1)
- A.  $NH_4^+$  and  $N_3^-$   
B.  $NH_4^+$  and  $N_3^-$   
C.  $NO_2^-$   
D.  $NO_2^-$  and  $NH_4^+$
- 
58. Based on molecular orbital theory, the bond orders of  $H_2$ ,  $H_2^+$  and  $H_2^-$  are, respectively. (1)
- A. 1, 0, and 0  
B. 1, 1/2, and 0  
C. 1, 0, and 1/2  
D. 1, 1/2, and 1/2
- 
59. How many 3d electrons are present in the ground state of chromium atom? (1)
- A. 4  
B. 5  
C. 6  
D. 10
- 
60. When the following substances are arranged in order of increasing melting point (lowest melting point first), the correct order is: (1)
- A.  $CH_3CH_2CH_3$ ,  $CH_3COCH_3$ ,  $CH_3CH_2CH_2OH$   
B.  $CH_3CH_2CH_3$ ,  $CH_3CH_2CH_2OH$ ,  $CH_3COCH_3$   
C.  $CH_3COCH_3$ ,  $CH_3CH_2CH_2OH$ ,  $CH_3CH_2CH_3$   
D.  $CH_3CH_2CH_2OH$ ,  $CH_3CH_2CH_3$ ,  $CH_3COCH_3$
- 
61. The half-life for the first order decomposition of nitromethane,  $CH_3NO_2$ , at 500K is 650 seconds. If the initial concentration of  $CH_3NO_2$  is 0.500M, what will its concentration be (M) after 1300 seconds have elapsed? (1)
- A. 0.125  
B. 0.140  
C. 0.250  
D. 0.425
- 
62. In a zero-order reaction for every  $10^0$  rise of temperature, the rate is doubled. If the temperature is increased from  $10^0C$  to  $100^0C$ , the rate of the reaction will become (1)
- A. 64 times  
B. 128 times  
C. 256 times  
D. 512 times
- 
63. Which of the following mathematical relationships between K,  $K_1$  and  $K_2$  is correct? (1)
- $CO_2(g) + H_2(g) \rightleftharpoons CO(g) + H_2O(g)$   $K$   
 $Fe(s) + CO_2(g) \rightleftharpoons FeO(s) + CO(g)$   $K_1$   
 $Fe(s) + H_2O(g) \rightleftharpoons FeO(s) + H_2(g)$   $K_2$
- A.  $K = K_1 + K_2$   
B.  $K = K_1 \times K_2$   
C.  $K = K_1/K_2$   
D.  $K = K_2/K_1$

64. The value of  $K_c$  for the following equilibrium reaction is 4.0 at a temperature of 373k. (1)  
 $\text{CH}_3\text{COOH} + \text{C}_2\text{H}_5\text{OH} \rightleftharpoons \text{CH}_3\text{COOC}_2\text{H}_5 + \text{H}_2\text{O}$  What mass of ethyl ester ( $\text{CH}_3\text{COOC}_2\text{H}_5$ ) would be present in the equilibrium mixture if 15g of acetic acid and 11.5 g of ethanol were mixed and equilibrium was established at this temperature?
- A. 5.2g  
 B. 10.1g  
 C. 12.6g  
 D. 22g
- 
65. Which one of the following is true about an open system? (1)
- A. A system that exchanges both energy and matter with its surroundings.  
 B. A system that cannot exchange both matter and energy with its surroundings.  
 C. A system that only exchanges matter with its surroundings  
 D. A system that only exchanges energy with its surroundings
- 
66. Which of the following statements is true about the percent ionization of a weak acid? (1)
- A. It decreases with increasing concentration  
 B. It increases with decreasing concentration  
 C. It increases with increasing concentration  
 D. It decreases with decreasing concentration
- 
67. What is the value of  $\Delta H$  for the reaction  $\text{S(s)} \rightarrow \text{S(g)}$ ?  $\text{S(s)} + \text{O}_2(\text{g}) \rightarrow \text{SO}_2(\text{f}) \Delta H = -395\text{kJ}$  (1)  
 $\text{S(g)} + \text{O}_2(\text{g}) \rightarrow \text{SO}_2(\text{g}) \Delta H = -6185\text{kJ}$
- A.  $-1013\text{kJ}$   
 B.  $-223\text{kJ}$   
 C.  $+223\text{kJ}$   
 D.  $+1013\text{kJ}$
- 
68. Which of these compounds is the ester formed from the reaction of acetic acid and 1-Propanol? (1)  
*[Figure: The four options are scanned images of condensed structural formulae rather than typed text; each is labelled with its letter to the left of the image. A: 'CH3CO' written on the main line, with a double bond drawn vertically upward from the carbon of CO to an O, and a single bond drawn vertically downward from the same carbon to 'OCH2CH2' written on the line below. B: 'CH3CH2COH' on the main line, with a double bond drawn vertically upward to an O above the C, and a single bond drawn downward from beneath the CH2 to 'OCH2CH2' on the line below. C: 'CH3CH2CH2OCH2' on the main line, with a double bond drawn vertically upward from the final CH2 carbon to an O, and a single bond drawn downward from beneath the second CH2 to 'OCH2CH2' on the line below. D: 'CH3COCH2CH2CH' on a single line, with a double bond drawn vertically upward from the second carbon (the C of CO) to an O. This is the ticked option.]*
- A. [structural formula image - see figure\_description]  
 B. [structural formula image - see figure\_description]  
 C. [structural formula image - see figure\_description]  
 D. [structural formula image - see figure\_description]
- 
69. A lab instructor is preparing 5.0 liters of a 0.10M  $\text{Pb}(\text{NO}_3)_2$  (molecular mass 331) solution. What is the mass required? (1)
- A. 165.5g of  $\text{Pb}(\text{NO}_3)_2$  and add 5.0kg of  $\text{H}_2\text{O}$   
 B. 165.5g of  $\text{Pb}(\text{NO}_3)_2$  and add  $\text{H}_2\text{O}$  until the solution has a volume of 5.0 liters.  
 C. 33.1g of  $\text{Pb}(\text{NO}_3)_2$  and add  $\text{H}_2\text{O}$  until the solution has a volume of 5.0 liters.  
 D. 33.1g of  $\text{Pb}(\text{NO}_3)_2$  and add 5.0 liters of  $\text{H}_2\text{O}$ .

- 
70. Which of the following is NOT a characteristic of the electrolytic cell containing aqueous solution of NaCl used in the manufacture of sodium hydroxide? (1)
- A. The sodium hydroxide solution is produced in the electrolytic cell.
  - B. The electrolyte must be a dilute solution of NaCl
  - C. Hydrogen is produced at the cathode.
  - D. The production of chlorine gas occurs at the anode
- 
71. The kinetic data are for the reaction:  $A + B \rightarrow C$  From these data what are the orders of the reaction with respect to A and B? (1)
- [Figure: A three-column data table sits between the stem and the options. Column headings: [A] | [B] | initial rate (mol dm<sup>-3</sup> sec<sup>-1</sup>). Rows: 0.1 / 0.1 /  $1 \times 10^{-5}$ ; 0.1 / 0.2 /  $4 \times 10^{-5}$ ; 0.2 / 0.1 /  $1 \times 10^{-5}$ .]*
- A. Order of A = 1 order of B = 0
  - B. Order of A = 0 order of B = 2
  - C. Order of A = 0 order of B = 4
  - D. Order of A = 1 order of B = 2
- 
72. Which of the following metals has the highest electrical and thermal conductivities of any metal? (1)
- A. Ag
  - B. Cu
  - C. Ni
  - D. Co
- 
73. Which of the following is the most important source for the extraction of iron? (1)
- A. Hematite
  - B. Bauxite
  - C. Chalcopyrite
  - D. Sphalerite

— END OF EXAMINATION —