

高雄醫學大學九十學年度學士後醫學系招生考試試題

科目：化學

考試時間：八十分鐘

選擇題，請每列答五題號

.Choose the correct answer from the following questions. (each 2%, 40%)

- (B) 1. Order the following in increasing rate of effusion :
 (A) $\text{Cl}_2 < \text{F}_2 < \text{NO}_2 < \text{CH}_4 < \text{NO}$ (B) $\text{Cl}_2 < \text{NO}_2 < \text{F}_2 < \text{NO} < \text{CH}_4$
 (C) $\text{CH}_4 < \text{NO}_2 < \text{NO} < \text{F}_2 < \text{Cl}_2$ (D) $\text{CH}_4 < \text{NO} < \text{F}_2 < \text{NO}_2 < \text{Cl}_2$
 (E) $\text{F}_2 < \text{NO} < \text{Cl}_2 < \text{NO}_2 < \text{CH}_4$
- (A) 2. Which of the following statements is (are) incorrect?
 .The hybridization of boron in BF_3 is SP^2 .
 .The molecule XeF_4 is nonpolar.
 .The bond order of N_2 is three.
 .The molecule HCN has two pi bonds and two sigma bonds.
 (A) All four statements are correct . (B) is incorrect. (C) and are incorrect.
 (D) and are incorrect. (E) , and are incorrect.
- (E) 3. The hybridization of the central atom in KrF_4O is :
 (A) SP (B) SP^2 (C) SP^3 (D) dSP^3 (E) d^2SP^3
- (A) 4. Which of the following statements is false ?
 (A) C_2 is paramagnetic. (B) C_2 is diamagnetic. (C) The carbon-carbon bond in C_2^{2-} is stronger than the one in CH_3CH_3 . (D) The carbon-carbon bond in C_2^{2-} is shorter than the one in CH_3CH_3 . (E) none of these.
- (E) 5. Which if the following species has the largest dissociation energy?
 (A) O_2 (B) O_2^{2-} (C) O_2^- (D) O_2^+ (E) O_2^{2+}
- (C) 6. The unit cell in a certain lattice consists of a cube formed by an anion at each corner, an anion in the center, and a cation at the center of each face. The unit cell contains a net:
 (A) 5 anions and 6 cations (B) 5 anions and 3 cations (C) 2 anions and 3 cation
 (D) 3 anions and 4 cations (E) 2 anions and 2 cations
- (C) 7. A liquid-liquid solution is called an ideal solution if () it obeys $PV = nRT$. () it obeys Raoult's law. () solute-solute, solvent-solvent, and solute-solvent interactions are very similar. () solute-solute, solvent, and solute-solvent interactions are quite different.
 (A) , , (B) , , (C) , (D) , (E) , ,

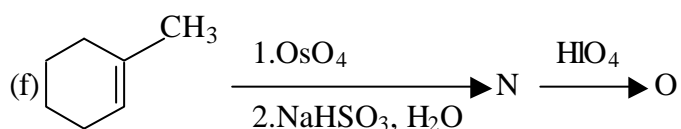
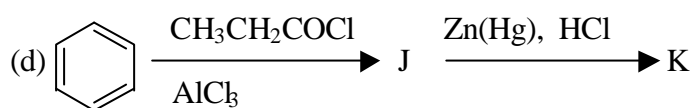
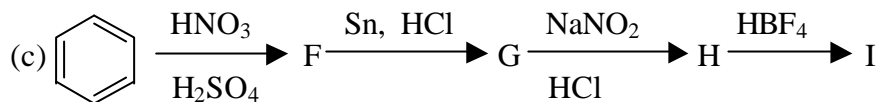
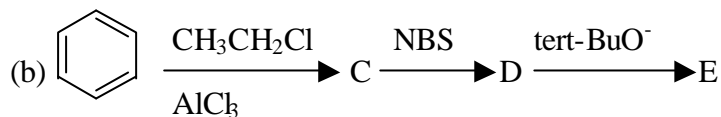
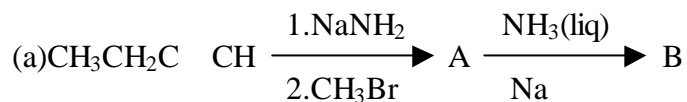
- (D) 8. For which order reaction is the half life of the reaction proportional to $1/k$ (k is the rate constant)?
 (A) zero order (B) first order (C) second order (D) all of the above
 (E) none of the above.
- (E) 9. Which of the following would produce a basic aqueous solution?
 (A) P_4O_{10} (B) KCl (C) CO_2 (D) NH_4Cl (E) none of these
- (D) 10. For a particular chemical reaction, $H = 5.0kJ$ and $S = -25J/K$. Under what temperature conditions is the reaction spontaneous?
 (A) When $T < -220K$ (B) When $T < 220K$ (C) When $T > 220K$
 (D) The reaction is not spontaneous at any temperature.
 (E) The reaction is spontaneous as all temperature.
- (B) 11. Which of the following is true for the cell shown here? $Zn_{(s)} | Zn_{(aq)}^{2+} || Cr_{(aq)}^{3+} | Cr_{(s)}$
 (A) The electrons flow from the cathode to the anode.
 (B) The electrons flow from the zinc to the chromium.
 (C) The electrons flow from the chromium to the zinc.
 (D) The chromium is oxidized.
 (E) The zinc is reduced.
- (O) 12. Determine ΔG for a cell that utilizes the following reaction:
 $Cl_{2(g)} + 2Br_{(aq)}^- \rightarrow 2Cl_{(aq)}^- + Br_{2(l)}$
 The standard reduction for the chlorine gas is 1.360 volts and the standard reduction for the bromine liquid is 1.077 volts.
 (A) 82.5kJ (B) 54.6kJ (C) 27.3kJ (D) 236kJ (E) 471kJ
- (D) 13. Give the number of geometrical isomers for the octahedral compound $[MA_2B_2C_2]$ where A, B and C represent ligands.
 (A) 1 (B) 2 (C) 3 (D) 4 (E) 5
- (D) 14. Which of the following is paramagnetic?
 (A) $[Zn(H_2O)_6]^{2+}$ (B) $[Co(NH_3)_6]^{3+}$ (strong field) (C) $[Cu(CN)_3]^{2-}$ (D) $[Mn(CN)_6]^{2-}$ (strong field) (E) non of these
- (C) 15. The rate constant for the beta decay of thorium-234 is $2.88 \times 10^{-2}/\text{day}$. What is the half-life of this nuclide?
 (A) 53.1days (B) 1.22days (C) 24.1days (D) 101days (E) 0.693days

- (C) 16. Which of the following would not be expected to undergo disproportionation?
 (A) Cl_2 (B) OCl^- (C) ClO_4^- (D) ClO_3^- (E) ClO_2^-
- (A) 17. Which of the following oxides is amphoteric?
 (A) Al_2O_3 (B) B_2O_3 (C) In_2O_3 (D) Tl_2O_3 (E) Tl_2O
- (B) 18. The ionization constants for the diprotic acid H_2S are 1.0×10^{-7} and 1.3×10^{-13} . For 0.1 molar solutions of sodium sulfide and sodium hydrogen sulfide, which of the following is true?
 (A) The solutions are neutral.
 (B) The sodium sulfide solution is the most basic.
 (C) Both the solutions are acidic.
 (D) The sodium hydrogen sulfide solutions is the most basic.
 (E) Both solutions have the same pH.
- (A) 19. For the reaction system $\text{N}_2\text{O}_{4(g)} \rightleftharpoons 2\text{NO}_{2(g)}$ at 90°C , $K_c = 0.27$. For this system, what is K_p ?
 (A) > 0.27 (B) < 0.27 (C) $= 0.27$ (D) We can not determine K_p without additional data.
 (E) none of these
- (D) 20. A second order reaction starts with an initial concentration of 0.020M of the reactant. If the rate constant is $10/(\text{M} \cdot \text{s})$, calculate the time required to decrease the initial concentration to 0.005M.
 (A) 0.069s (B) 10s (C) 15s (D) 0.139s (E) 20s

. Identify each of the following compounds from the ^1H NMR data and molecular formula. The number of hydrogens responsible for each signal is shown in parentheses. (5% each, 10%)

- (a) $\text{C}_5\text{H}_{10}\text{O}_2$
- 1.15ppm (3)triplet
 - 1.25ppm (3)triplet
 - 2.33ppm (2)quartrt
 - 4.13ppm (2)quartet
- (b) $\text{C}_{10}\text{H}_{12}\text{O}$
- 1.20ppm (6)doublet
 - 3.53ppm (1)septet
 - 7.20-7.60ppm (3)multiplet
 - 7.80-8.08ppm (2)multiplet

. Give the structures A through O for the following reactions. (2% each, 30%)



. Give an' example for each of the following name reactions, (2% each, 20%)

(a) Wolff-Kishner reduction

(b) Michael reaction

(c) Dieckmann condensation

(d) Gabriel amine synthesis

(e) Hofmann elimination

(f) Saytzeff elimination

(g) Wittig reaction

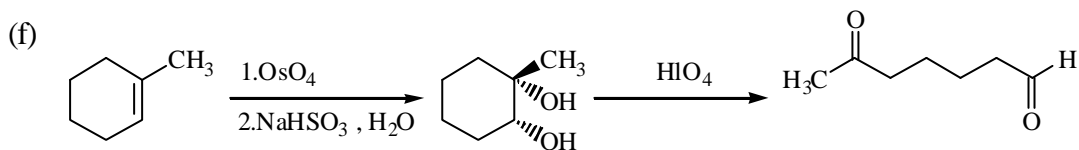
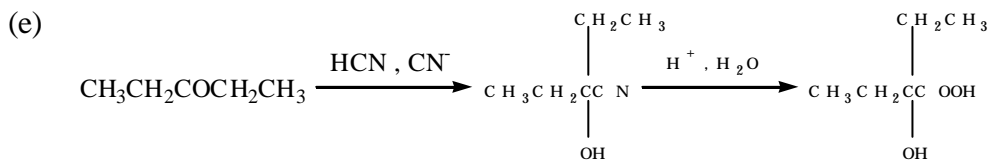
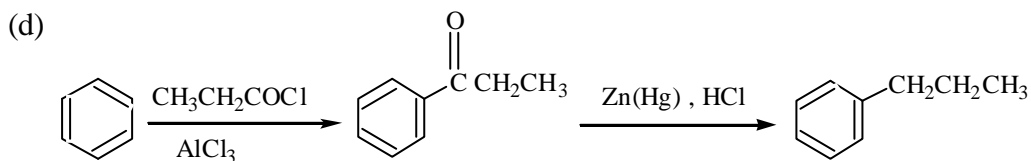
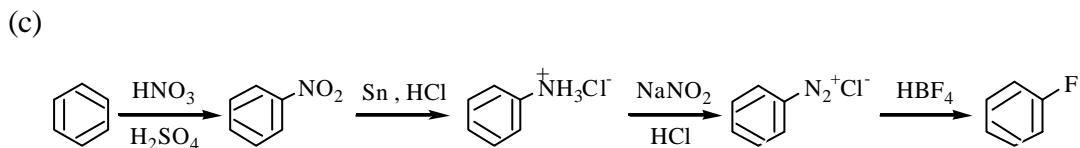
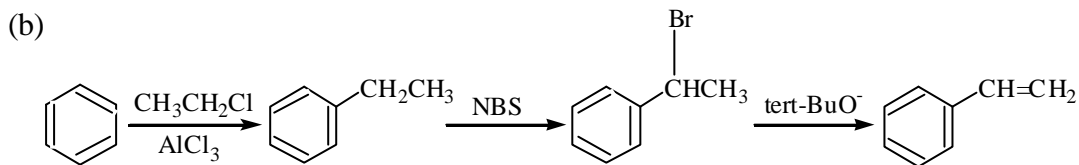
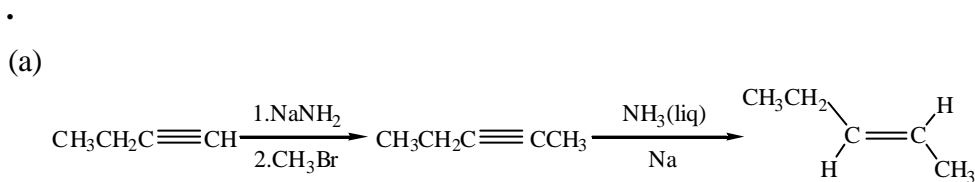
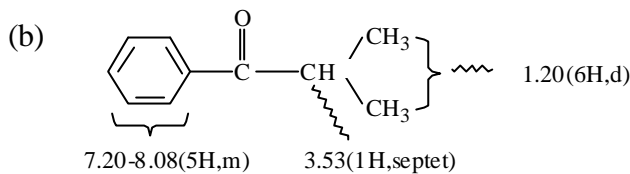
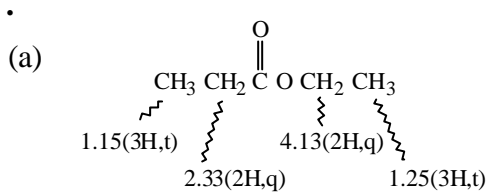
(h) Williamson ether synthesis

(i) Gatterman-Koch synthesis

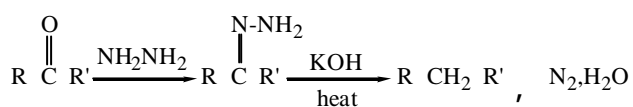
(j) Hell-Volhard-Zelinsky reaction

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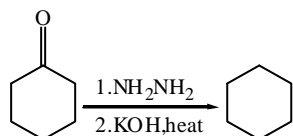
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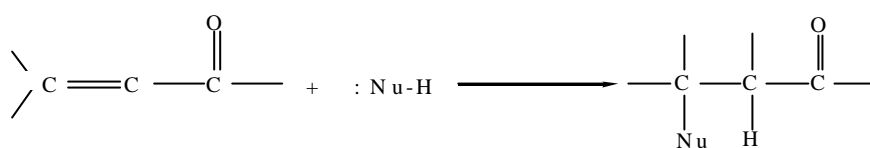
(a)



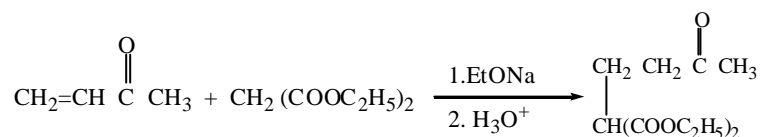
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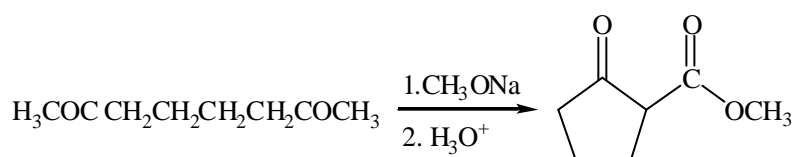
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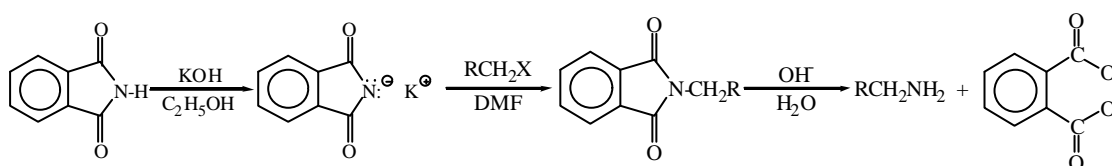
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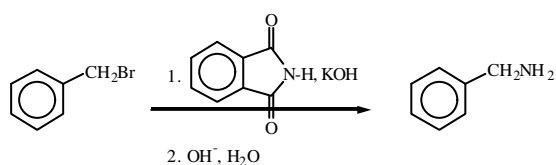
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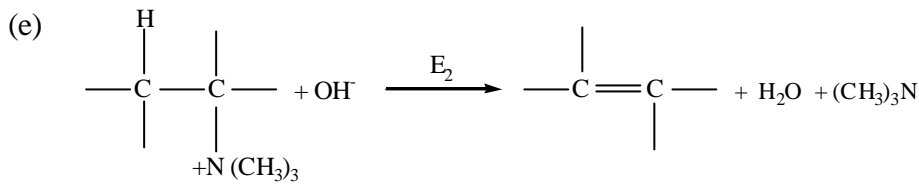


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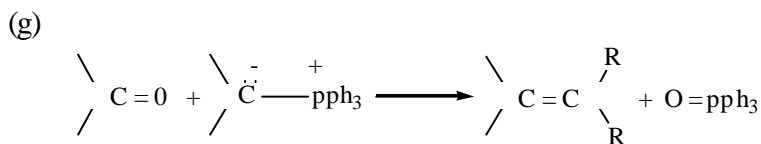
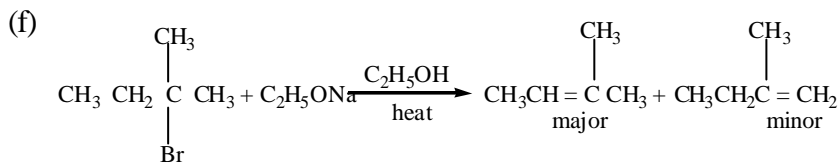
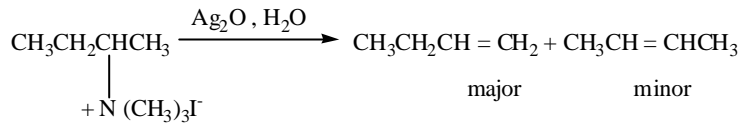


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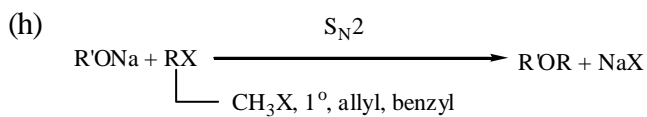
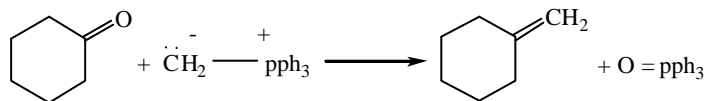




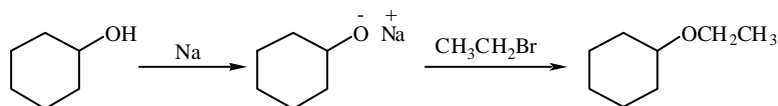
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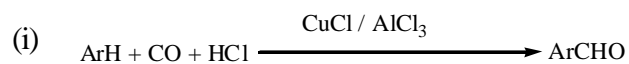


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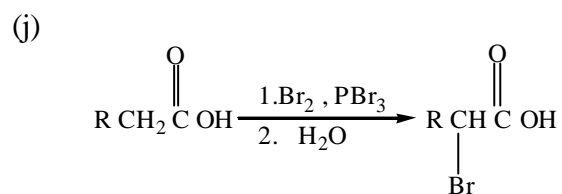
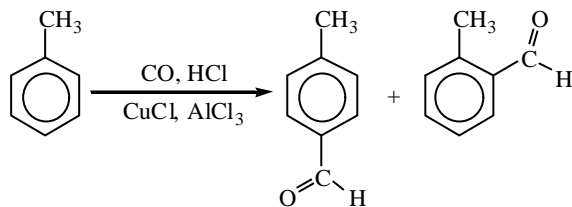


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