

# CHEMISTRY

## CHEMISTRY 2010/2011

1. The solubilities of different solutes in a particular solvent at different temperatures is a principle best applied in.....  
(a) Fractional distillation (b) Simple distillation (c) Crystallization (d) Fractional crystallization
2. The group to which an element with the electronic configuration  $1S^2 2S^2 2P^6 3S^2 3P^1$  belongs is.....  
(a) 2 (b) 3 (c) 1 (d) 6
3. Group 1 elements are regarded as alkali metals mainly because.....  
(a) They ionized readily, thereby forming positive ions (b) Their chlorides are soluble in water  
(c) They form strong alkaline solutions in water (d) They liberate hydrogen gas when dissolved in water
4. Which of the following physical properties decreases across the period in the periodic table?  
(a) Ionization Energy (b) Electron Affinity (c) Electronegativity (d) Atomic radius
5.  $20.00\text{cm}^3$  of a solution containing  $0.53\text{g}$  of anhydrous  $\text{Na}_2\text{CO}_3$  in  $100\text{cm}^3$  required  $25.00\text{cm}^3$  of  $\text{H}_2\text{SO}_4$  for complete neutralization. The concentration of the acid solution in moles per  $\text{dm}^3$  is ( $\text{H} = 1, \text{C} = 12, \text{O} = 16, \text{Na} = 23, \text{S} = 32$ )  
(a)  $0.02$  (b)  $0.04$  (c)  $0.06$  (d)  $0.08$
6. In electrolysis, oxidation always takes place at the anode because the anode has.....  
(a) a deficiency of protons (b) a deficiency of electrons (c) an excess of electrons (d) an attraction for positive ions
7. The minimum volume of oxygen required for the complete combustion of a mixture of  $10\text{cm}^3$  of  $\text{CO}$  and  $15\text{cm}^3$  of  $\text{H}_2$  is (a)  $25.0\text{cm}^3$  (b)  $12.5\text{cm}^3$  (c)  $10.0\text{cm}^3$  (d)  $5.0\text{cm}^3$
8. The atomic radius of  $\text{Li}, \text{Na}$  and  $\text{K}$  are  $1.33\text{\AA}, 1.54\text{\AA}$  and  $1.96\text{\AA}$  respectively. Which of the following explains this gradation in atomic radius?  
(a) Electropositivity decreases from  $\text{Li} \rightarrow \text{Na} \rightarrow \text{K}$  (b) The number of shells increases from  $\text{Li} \rightarrow \text{Na} \rightarrow \text{K}$   
(c) Electronegativity decreases from  $\text{Li} \rightarrow \text{Na} \rightarrow \text{K}$  (d) The elements are in the same period
9. An element  $\text{X}$  forms an anion whose formula is  $[\text{X}(\text{CN})_6]^{y-}$ . If  $\text{X}$  has an oxidation number of  $+4$ , what is the value of  $Y$ ? (a)  $-3$  (b)  $-2$  (c)  $+2$  (d)  $-6$
10. At equilibrium, the value of the free energy change is.....  
(a) positive (b) negative (c) zero (d) at minimum
11. Solute spreading throughout solvent from region of higher concentration to region of lower concentration means that (a) change in entropy is negative (b) change in entropy is positive (c)  $\Delta S = \text{zero}$  (d)  $\Delta S$  is at equilibrium
12. Which of the following metals will react with cold water to produce hydrogen gas?.....  
(a) aluminium (b) calcium (c) copper (d) magnesium
13. The catalyst used in contact process for the manufacture of tetraoxosulphate (VI) acid is.....  
(a) manganese (IV) oxide (b) manganese tetraoxosulphate (IV) (c) vanadium (V) oxide (d) iron metal
14. The volume occupied by  $1.58\text{g}$  of a gas at s.t.p is  $5. \text{m}^3$ . What is the relative molecular mass of the gas?.....  
(a) 28 (b) 32 (c) 44 (d) 71 (G.M.V. at s.t.p  $22.4 \text{ dm}^3$ )
15. Elements  $\text{X}$  and  $\text{Y}$  have electronic configurations  $1S^2 2S^2 2P^4$  and  $1S^2 2S^2 2P^6 3S^2 3P^1$  respectively. When they combine, the formula of the compound formed is.....  
(a)  $\text{XY}$  (b)  $\text{YX}$  (c)  $\text{X}_2\text{Y}_3$  (d)  $\text{Y}_2\text{X}_3$
16. The ions  $\text{X}^-$  and  $\text{Y}^+$  are isoelectronic, each containing a total of 10 electrons. How many protons are in the nuclei of the neutral atoms of  $\text{X}$  and  $\text{Y}$  respectively?.....  
(a) 10 and 10 (b) 9 and 9 (c) 11 and 9 (d) 9 and 11
17.  $30 \text{ dm}^3$  of oxygen at 10 atmospheres pressure is placed in a  $20\text{dm}^3$  container. Calculate the new pressure if temperature is kept constant.....  
(a)  $6.7 \text{ atm}$  (b)  $15.0 \text{ atm}$  (c)  $60.0 \text{ atm}$  (d)  $66.0 \text{ atm}$
18. Which of the following equilibria is unaffected by a pressure change?.....  
(a)  $2\text{NaCl}_{(s)} \rightleftharpoons 2\text{Na}_{(l)} + \text{O}_{2(g)}$  (b)  $\text{H}_{2(g)} + \text{I}_{2(g)} \rightleftharpoons 2\text{HI}_{(g)}$  (c)  $2\text{O}_{3(g)} \rightleftharpoons 3\text{O}_{2(g)}$  (d)  $2\text{NO}_{2(g)} \rightleftharpoons \text{N}_2\text{O}_{4(g)}$
19. The compound  $\text{CH}_3\text{CH}(\text{CH}_3)\text{CH}_2\text{Cl}$  is known as.....  
(a) 1-chloro-2-methylbutane (b) 1-chloro-2-methylpropane (c) 2-chloromethylpropane (d) 1-chloro-2,2-dimethylethane
20. One of the advantage of detergents over soap is that detergents.....  
(a) are easier to manufacture (b) foam more than soap  
(c) form soluble salts with hard water (d) are able to deter germs more than soap
21. The final products for the reaction between methane and chlorine in the presence of uv-light are hydrogen chloride and

- (a) chloroethane (b) tetrachloromethane (c) trichloromethane (d) dichloromethane
22. In which of the following compounds can geometrical isomers exist?.....  
 (a) 2-methylbut-2-ene (b) but-2-ene (c) but-1-ene (d) butane
23. The quantum number that divides orbitals into their degenerates is.....  
 (a) principal (b) azimuthal (c) magnetic (d) spin
24. If an atom is represented as  $^{23}\text{X}$  which of the following deductions is correct?.....  
 (a) it contains 12 protons (b) it forms a covalent chloride (c) its atomic number is 23 (d) it is an alkali metal
25. The percentage of water of crystallization in  $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$  is {Zn = 65, S = 32, O = 16, H = 1}  
 (a) 33% (b) 44% (c) 55% (d) 87%

#### CHEMISTRY SET C 2011

1. A mixture of sugar and sulphur can be separated by  
 (a) Dissolution in water, evaporation and filtration (b) Filtration, evaporation and dissolution in water  
 (c) Dissolution in water, filtration and evaporation (d) Evaporation, dissolution in water and filtration
2. Which of the following is a physical change?  
 (a) Freezing ice-cream (b) Dissolving calcium in water (c) Burning kerosene (d) Exposing white phosphorus to air
3. The percentage of water of crystallization in  $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$  is  
 (a) 33% (b) 44% (c) 55% (d) 87% [Zn = 65, S = 32, O = 16, H = 1]
4. 0.0075 mole of calcium trioxocarbonate (IV) is added to 0.015 mole of a solution of hydrochloric acid. The volume of gas evolve at s.t.p is  
 (a)  $224\text{cm}^3$  (b)  $168\text{cm}^3$  (c)  $112\text{cm}^3$  (d)  $100\text{cm}^3$  [Molar volume of a gas]
5. A gas exerts pressure on its container because  
 (a) The molecules of a gas collide with the walls of the container (b) Some of the molecule are moving faster than others.  
 (c) Of the collisions of the molecules with each other (d) Of the mass of the molecules of the gas
6. The basic assumption in the kinetic theory of gases that the collisions of the gaseous molecules are perfectly elastic implies that the  
 (a) forces of attraction and repulsion are in equilibrium (b) gaseous molecules can occupy any available space  
 (c) gaseous molecules will continue their motion indefinitely (d) gases can be compressed
7. If an atom is represented as  $^{23}_{11}\text{X}$ , which of the following deductions is correct?  
 (a) It contains 12 protons (b) It forms a covalent chloride (c) Its atomic number is 23 (d) It is an alkali metal
8. If the relative molecular mass of an element is not a whole number, it can be deduced that the element is  
 (a) Naturally radioactive (b) Abundant in nature (c) A transition metal (d) An isotopic element
9. Cathode rays cause an object placed behind a perforated anode to cast a shadow on the screen. This observation shows that the rays  
 (a) Are positively charged (b) Are negatively charged (c) Have mass (d) Travel in straight lines
10. Which quantum number divides shells into orbitals?  
 (a) Principal (b) Azimuthal (c) Magnetic (d) Spin
11. The type of bonding in  $[\text{Cu}(\text{NH}_3)_4]^{2+}$  is  
 (a) Coordinate (b) Electrovalent (c) Metallic (d) Covalent
12. The mixture of gases used in a photographer's flash tube is  
 (a) Argon and krypton (b) Krypton and xenon (c) Helium and argon (d) Argon and xenon
13. When sodium trioxocarbonate (IV) decahydrate loses its water of crystallization to the atmosphere, the process is  
 (a) Deliquescence (b) Efflorescence (c) Hygroscopic (d) Effervescence
14. Water can be obtained as the only product during the  
 (a) Combustion of hydrocarbons (b) Neutralization of an acid by a base  
 (c) Combustion of hydrogen (d) Electrolysis of brine
15. If 10.5g of lead (II) trioxonitrate (V) is dissolved in  $20\text{cm}^3$  of distilled water at  $18^\circ\text{C}$ , the solubility of the solute in  $\text{mol dm}^{-3}$  is  
 (a) 1.60 (b) 5.25 (c) 16.00 (d) 525.00 [Pb = 207, N = 14, O = 16]
16. For a given solute, the concentration of its saturated solution in different solvents are

- (a) The same at the same temperature (b) Different at the same temperature  
 (c) The same at different temperature (d) Constant
7. The major sources of oxides of nitrogen is from the burning of  
 (a) Coal (b) Wood (c) Fuel (d) Chlorofluorocarbons
8. The acid used in electrolysis of water is dilute  
 (a)  $\text{HNO}_3$  (b)  $\text{CH}_3\text{COOH}$  (c)  $\text{H}_2\text{SO}_4$  (d)  $\text{HCl}$
9. What volume of 1.5M solution of KOH would contain 0.045 mole?  
 (a)  $67.50\text{cm}^3$  (b)  $30.00\text{cm}^3$  (c)  $6.75\text{cm}^3$  (d)  $3.00\text{cm}^3$
10. The salt formed from a reaction between citric and sodium hydroxide in solution will be  
 (a) Acidic (b) Basic (c) Complex (d) Neutral
11. The colour change observed when testing of reducing agents using acidified potassium hexaoxodichromate (VI) solution is  
 (a) Yellow to purple (b) Orange to green (c) Green to yellow (d) Purple to yellow
12. The oxidation state of Cr in  $\text{K}_2\text{Cr}_2\text{O}_7$  is  
 (a) +7 (b) +6 (c) +5 (d) +4
13. Which of the following metals is purified commercially by electrolysis?  
 (a) Zn (b) Fe (c) Sn (d) Cu
14. What current will deposit 3.25g of zinc in 2 hours  
 (a) 3.25A (b) 2.00A (c) 1.34A (d) 0.67A  $\{\text{Zn} = 65, \text{F} = 96,500\text{Cmol}^{-1}\}$
15.  $\text{C}_{(s)} + \text{H}_2\text{O}_{(g)} + \text{CO}_{(g)}$   $\Delta G$  for the reaction above at 1300K is -43KJ. At this temperature, the reaction is  
 (a) Not feasible (b) At equilibrium (c) Feasible (d) Exothermic

#### Chemistry 2010/2011

- 1 b  
 2 b  
 3 a  
 4 a  
 5 b  
 6 c  
 7 d  
 8 d  
 9 a  
 10 d  
 11 c  
 12 c  
 13 a  
 14 a  
 15 d  
 16 c  
 17 b  
 18 c  
 19 c  
 20 d  
 21 b  
 22 c  
 23 b  
 25 b

ANSWERS CHEMISTRY SET C 2011

1. Option C
2. Option A
3. Option B
4. Option B
5. Option A
6. Option A
7. Option D
8. Option A
9. Option C
10. Option A
11. Option D
12. Option B
13. Option C
14. Option D
15. Option A
16. Option C
17. Option C
18. Option B
19. Option D
20. Option B
21. Option B
22. Option D
23. Option C

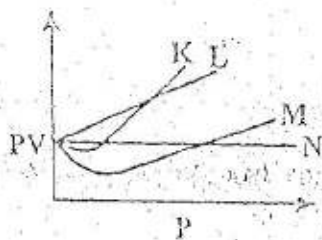
Chemistry 2012/2013

2. What is the concentration of a solution containing 2g of NaOH in 100cm<sup>3</sup> of solution?

- A. 0.30 mol dm<sup>-3</sup>    B. 0.40 mol dm<sup>-3</sup>    C. 0.50 mol dm<sup>-3</sup>    D. 0.05 mol dm<sup>-3</sup>

[Na 23, O= 16, H=11]

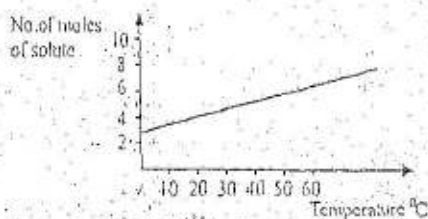
3. Which of the following properties is NOT peculiar to matter
  - A. Random motion of particles. increases from gas to solid.
  - B. Kinetic energy of particles increases from solid to gas.
  - C. Random motion of particles. increases from liquid to gas.
  - D. Orderliness of particles increases from gas to liquid.
4. The principle of column chromatography is based on the ability of the constituents to
  - A. react with each in the column
  - B. move at different speeds in the column
  - C. dissolve in each other in the column
  - D. react with the solvent in the column.



From the diagram above, an ideal gas can be represented by

- A. L    B. M    C. N    D. K
6. Which of the following statements is correct about the periodic table?
    - A. Elements in the same period have the same number of valence electrons.
    - B. The non-metallic properties of the elements tend to decrease across each period.

- C. The valence electrons of the elements increase progressively across the period.  
 D. Elements in the same group have the same number of electron shells.
7. The relative atomic mass of a naturally occurring lithium consisting of 90%  ${}^7\text{Li}$  and 10%  ${}^6\text{Li}$  is  
 A. 6.8 B. 6.9 C. 7.1 D. 6.2
8. An isotope has an atomic number of 15 and a mass number of 31. The number of proton it contains is  
 A. 31 B. 16 C. 15 D. 46
9. The molecular lattice of iodine is held together by  
 A. van der Waal's forces B. dative bond C. metallic bond D. hydrogen bond
10. The arrangement of particles in crystal lattices can be studied using  
 A. P-rays B. X-rays C.  $\gamma$ -rays D.  $\alpha$ -rays
- 11.



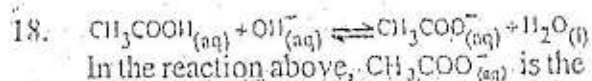
From the diagram above, find the amount of solute deposited when 200cm<sup>3</sup> of the solution is cooled from 55°C to 40°C

- A. 0.02 mole B. 0.10mole C. 0.20 mole D. 0.01 mole
12. The importance of sodium aluminates in the treatment of water is to  
 A. kill germs B. cause coagulation C. neutralize acidity D. prevent goitre and tooth decay.
13. What type of bond exist between an element X with atomic number 12 and with atomic number 17?  
 A. Dative. B. Electrovalent. C. Metallic. D. Covalent.
14. Hardness of water is mainly due to the presence of  
 A. calcium chloride or sodium chloride salts B. calcium hydroxide or magnesium hydroxide.  
 C. calcium trioxocarbonate (IV) or calcium tetraoxosulphate (VI) D. sodium hydroxide or magnesium hydroxide.
15. A suitable solvent for iodine and naphthalene is  
 A. benzene B. carbon (IV) sulphide C. ethanol D. water.
16. Which of the following noble gases is commonly found in the atmosphere?  
 A. Argon. B. Xenon. C. Neon. D. Helium



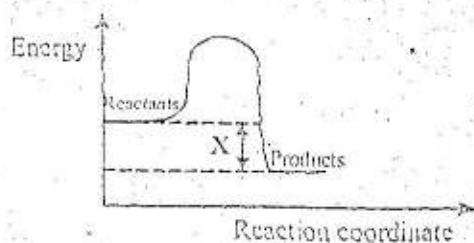
In the reaction above, an increase in temperature will

- A. shift the equilibrium to the left B. increase the value of the equilibrium constant  
 C. decrease the value of the equilibrium constant D. increase the reactant production.



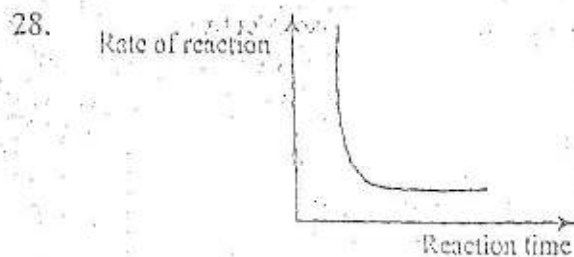
- A. conjugate acid  
 B. conjugate base  
 C. acid  
 D. base.
19. How many cations will be produced from a solution of potassium aluminum tetraoxosulphate(VI)?  
 A. 2 B. 3 C. 4 D. 1
20. Which of the following is NOT an alkali?  
 A. NaOH B.  $\text{NH}_3$  C.  $\text{Mg}(\text{OH})_2$  D.  $\text{Ca}(\text{OH})_2$
21. An effect of thermal pollution on water bodies is that the

- A. level of oxygen reduces      B. volume of water reduces  
 C. volume of chemical waste increases      D. level of oxides of nitrogen increases.
22. Which of the following is a deliquescent compound?  
 A.  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$     B.  $\text{Na}_2\text{CO}_3$       C.  $\text{CaCl}_2$       D.  $\text{CuO}$
23. A chemical reaction in which the hydration energy is greater than the lattice energy is referred to as  
 A. a reversible reaction  
 B. a spontaneous reaction  
 C. an endothermic reaction  
 D. an exothermic reaction.
24. The function of zinc electrode in a galvanic cell is that it  
 A. uses up electrons      B. undergoes reduction      C. serves as the positive electrode      D. produces electrons.
25.  $\text{CH}_4(\text{g}) + \text{Cl}_2(\text{g}) \rightarrow \text{CH}_3\text{Cl}(\text{g}) + \text{HCl}(\text{g})$   
 The major factor that influences the rate of the reaction above is  
 A. light      B. catalyst      C. temperature      D. concentration.
26. The condition required for corrosion to take place is the presence of  
 A. water and oxygen.      B. water and carbon (IV) oxide  
 C. water carbon (IV) oxide and oxygen      D. oxygen and carbon (IV) oxide.



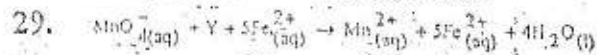
In the diagram above, X is the

- A. activated complex      B. enthalpy      C. enthalpy change      D. activation energy.



The diagram above best illustrates the effect decrease in

- A. pressure      B. concentration      C. temperature      D. surface area.



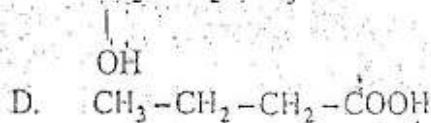
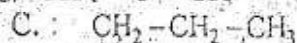
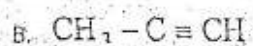
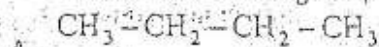
In the equation, Y is

- A.  $8\text{H}^+ (\text{aq})$     B.  $5\text{H}^+ (\text{aq})$       C.  $4\text{H}^+ (\text{aq})$       D.  $10\text{H}^+ (\text{aq})$
30. Given that M is the mass of a substance deposited during electrolysis and Q is the quantity of electricity consumed, then Faraday's first law can be written as

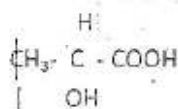
- A.  $M = \frac{E}{2Q}$   
 B.  $M = \frac{E}{Q}$   
 C.  $M = EQ$   
 D.  $M = \frac{Q}{E}$

[E = Electrochemical equivalent]

31. The impurities formed during the laboratory preparation of chlorine gas are removed by  
 A. HCl B. H<sub>2</sub>O C. NH<sub>3</sub> D. H<sub>2</sub>SO<sub>4</sub>
32. The effect of the presence of impurities such as carbon and sulphur on iron is that they  
 A. lower its melting point B. give it high tensile strength  
 C. make it malleable and ductile D. increase its melting point.
33. A few drops of concentrated HNO<sub>3</sub> is added to an unknown solution and boiled for a while. If this produces a brown solution, the cation present is likely to be  
 A. Fe<sup>2+</sup> B. Pb<sup>2+</sup> C. Cu<sup>2+</sup> D. Fe<sup>3+</sup>
34. The bleaching action of chlorine gas is effective due to the presence of  
 A. oxygen B. hydrogen chloride C. water D. air
35. In the laboratory preparation of oxygen, dried oxygen is usually collected over  
 A. dehydrating property B. boiling point C. density oxidizing property. D. calcium chloride
36. The property of concentrated H<sub>2</sub>SO<sub>4</sub> that makes it suitable for preparing HNO<sub>3</sub> is its  
 A. dehydrating property B. boiling point C. density D. oxidizing property.
37. Bronze is preferred to copper in the making of medals because it  
 A. has low tensile strength. & is stronger. C. can withstand low temperature D. is lighter
38. The constituent of baking powder that makes the dough to rise is  
 A. NaCl B. NaHCO<sub>3</sub> C. NaOH D. Na<sub>2</sub>CO<sub>3</sub>
39. Which of the following compounds is used as a gaseous fuel?

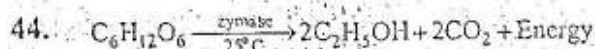


40. The ability of carbon to form long chains is referred to as  
 A. carbonation B. alkylation c. acylation d. catenation.
41. Which of the following compounds will undergo polymerization reaction?  
 A. C<sub>2</sub>H<sub>5</sub>OH B. C<sub>2</sub>H<sub>4</sub> C. C<sub>3</sub>H<sub>7</sub>COOH D. C<sub>2</sub>H<sub>6</sub>
41. Which of the following compounds will undergo polymerization reaction?  
 A. C<sub>2</sub>H<sub>5</sub>OH B. C<sub>2</sub>H<sub>4</sub> C. C<sub>2</sub>H<sub>5</sub>COOH D. C<sub>2</sub>H<sub>6</sub>



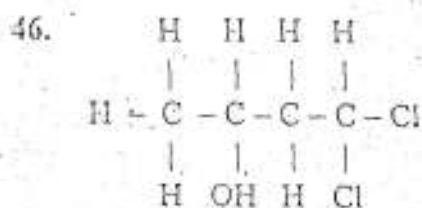
The compound above exhibits

- A. positional isomerism B. geometric isomerism  
 C. optical isomerism D. structural isomerism.
43. An organic compound has an empirical formula CH<sub>2</sub>O and vapour density of 45. What is its molecular formula?  
 A. C<sub>2</sub>H<sub>4</sub>O<sub>2</sub> B. C<sub>3</sub>H<sub>7</sub>OH C. C<sub>2</sub>H<sub>5</sub>OH D. C<sub>3</sub>H<sub>6</sub>O<sub>3</sub>
- [C= 12, H= 1, O= 16]



The reaction represented by the equation above is useful in the reduction of

- A. ethanol B. propanol C. butanol D. methanol.
45. The number of isomers that can be obtained from C<sub>4</sub>H<sub>10</sub> is  
 A. 2 B. 3 C. 4 D. 1



The functional groups present in the compound above are

- A. hydroxyl and halo-group  
 B. alkene and halo-group  
 C. hydroxyl and chloro-group  
 D. alkene and chloro-group.

47. Which of the following is primary amine?

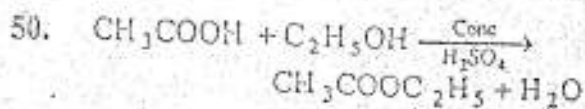
- A.  $(\text{CH}_3)_2\text{NH}$   
 B.  $(\text{CH}_3)_3\text{N}$   
 C.  $\text{CH}_3\text{NH}_2$   
 D.  $\text{CH}_3\text{C}(\text{O})\text{NH}_2$

48. Two organic compounds K and L were treated with a few drops of Fehling's solution respectively. K formed a brick red precipitate while L remains unaffected. The compound K is an

- A. alkanone  
 B. alkanol  
 C. alkane  
 D. alkanal.

49. Which of the following statements is true about 2-methylpropane and butane?

- A. They have the same chemical properties.  
 B. They are members of the same homologous series.  
 C. They have the same boiling points.  
 D. They have different number of carbon atoms.



The reaction above is best described as

- A. neutralization  
 B. esterification  
 C. condensation  
 D. saponification.

### CHEMISTRY

#### QUESTION PAPER TYPES: C

1. C	14. C	27. C	40. D
2. C	15. C	28. C	41. B
3. A	16. C	29. A	42. C
4. B	17. B	30. C	43. D
5. A	18. C	31. B	44. A
6. C	19. A	32. A	45. A
7. B	20. B	33. C	46. A
8. C	21. C	34. C	47. C
9. A	22. C	35. C	48. D
10. B	23. C	36. D	49. B
11. C	24. B	37. B	50. B
12. B	25. A	38. B	
13. B	26. A	39. B	