2016 Nov

DE MAZENOD COLLEGE
KANDANA

2016 December Term Test — Grade 13

CHEMISTRY (1) — Time : 2 hours

Part A

Answer all questions. Choose the correct or the most suitable answers for questions 1 -50 from the given choices and mark a cross (x) on the appropriate number given in the answer script.

Avogadro's constant (N_A) $= 6.022 \times 10^{23}$ mol $^{-1}$

Plank's constant $= 6.626 \times 10^{-34}$ J s

Speed of light $= 3 \times 10^{8}$ m s^{-1}

1. The scientist who is ***not*** related with the hydrogen spectrum is,
   1) J.J.Balmer 2) Peter Siemen 3) Linus Pauling 4) Theodore Lyman 5) Niels Bohr

2. The correct possible sets of quantum numbers for the two electrons of C which have got the highest energy are,
   1) [2,1,0, +1/2] [2,2,0,-1/2]
   2) [2,1,1, +1/2] [2,1,0,-1/2]
   3) [2,1,0,+1/2] [2,1,-1, +1/2]
   4) [2,1,-1,+1/2] [2,1,-1,-1/2]
   5) [2,1,1,-1/2] [2,1, 0,-1/2]

3. The correct increasing order of first ionization energy of the atoms/ions Na^+, F, Al, Cl^-, C and N is,
   1) $Na^+ < Al < C < N < F < Cl^-$ 2) $Al < C < N < F < Na^+ < Cl^-$ 3) $C < N < F < Al < Na^+ < Cl^-$
   4) $Cl^- < Al < C < N < F < Na^+$ 5) $Cl^- < Al < Na^+ < C < N < F$

4. Which one of the following statement is correct regarding a gas ?
   1) When ideal gas molecules collide with each other and bounce off, the total kinetic energy of the system remains constant.
   2) Volume of one mole of any gas at 0° C and standard pressure of 1×10^5 Pa is 22.4 dm^3
   3) The volume of an ideal gas is directly proportional to the absolute temperature which apply on the gas
   4) The molar mass of a gas does not affect the rate of diffusion of that gas
   5) The partial pressure of a constituent gas of a mixture of gases, is the pressure exert by it when occupies alone in the container.

5. A and B are two elements. Relative atomic mass of B is four times greater than A. Mass percentage of A in a mixture containing A and B is 20 %. Mole fraction of A in the mixture is,
   1) ¼ 2) ¾ 3) ⅔ 4) ⅝ 5) ½

6. In which of the following pairs of molecules London dispersion forces contribute highly for the change in their boiling points?
   1) CH_3OH, H_2O 2) NH_3, PH_3 3) Br_2, ICl 4) HCl, HBr 5) HCHO, CO_2

7. The correct descending order of the variation of the N–O bond length in NH_2OH, NO, NO_2^-, NO_3^- is,
   1) $NO_2^- > NO_3^- > NO > NH_2OH$
   2) $NO_3^- > NO_2^- > NO > NH_2OH$
   3) $NO > NO_2^- > NO_3^- > NH_2OH$
   4) $NH_2OH > NO_3^- > NO_2^- > NO$
   5) $NO > NO_3^- > NO_2^- > NH_2OH$

8. A certain salt gave a colourful solution by dissolving in water. When a small amount of dilute strong base is added to this solution, light green coloured precipitate was observed. When excess NH_4OH is added to this precipitate, blue colour solution was obtained. When a dilute acid is added to a portion of solid salt above, a brown colured gas was evolved. This salt can be,

1) $Fe(NO_3)_2$ 2) $Cu(NO_2)_2$ 3) $Ni(NO_3)_2$ 4) $Ni(NO_2)_2$ 5) $Cr(NO_3)_3$

9. Highest energy is produced due to a transition from n = 2 to n= 1 is,
1) H atom 2) D atom 3) He^+ 4) Li^{2+}
5) All of the given transitions have got equal energies

10. Products of a reaction between acidified $KMnO_4$ and $CH_3-\underset{\underset{CH_3}{|}}{C}=CH_2$ are,

1) $CH_3COCH_3 + CH_2O$ 2) $CH_3CHO + CH_3CHO$
3) $CH_3COCH_3 + CO_2$ 4) $CH_3COCH_3 + HCOOH$
5) $CH_3COCH_3 + CH_2OH$

11. When compound X is heated with, conc. H_2SO_4, dark coloured gas is liberated. This gas is lesser soluble in water forming a pale coloured solution. This solution gives a yellow coloured precipitate with a mixture of $AgNO_3$(aq) and dil. HNO_3. An aqueous solution of X gives a red coloured precipitate with $HgCl_2$(aq), and a blue coloured precipitate can be obtained , when an aqueous solution of X is treated with NH_4OH. When this solution is left for a while, a brown coloured, solution can be seen above the precipitate. X compound could be,

1) CoI_2 2) $FeBr_3$ 3) NiI_2 4) $CuBr_2$ 5) $CoBr_2$

12. 2-methylpentane will be resulted if hydrocarbon "X" is heated with H_2 and Pd. A compound where the molecular formula of $C_6H_{12}O$ can be obtained, if "X" is reacted with acidic $HgSO_4$. "X" does not react with ammoniacal $AgNO_3$. Compound "X" would be,
1) $CH_3-C\equiv C-C(CH_3)_3$ 2) $CH_3-CH=CH-(CH_2)_2-CH_3$
3) $(CH_3)_2C=CH-CH_2-CH_3$ 4) $(CH_3)_2CHC\equiv C-CH_3$ 5) none of the above

13. An aqueous solution contains Mg^{2+}, Al^{3+} and Zn^{2+} ions. Which of the following set of reagents can be used to distinguish each of these ions separately?
1) H_2SO_4, NaOH 2) HCl, NH_4OH 3) H_2SO_4, NH_4OH 4) NH_4OH, NaOH 5) HCl, NaOH

14. CO_2 was bubbled through a sample of 25.00 cm^3 of 0.1 mol dm^{-3} NaOH, until 50 % (w/w) of NaOH was completely reacted with CO_2. The resulted solution was completely reacted with 0.1 mol dm^{-3} HCl. Consumed volume of HCl (in cm^3) were,
1)12.50 2) 18.75 3) 25.00 4) 50.00 5) 100.00

15. The shortest bond length is represented by,

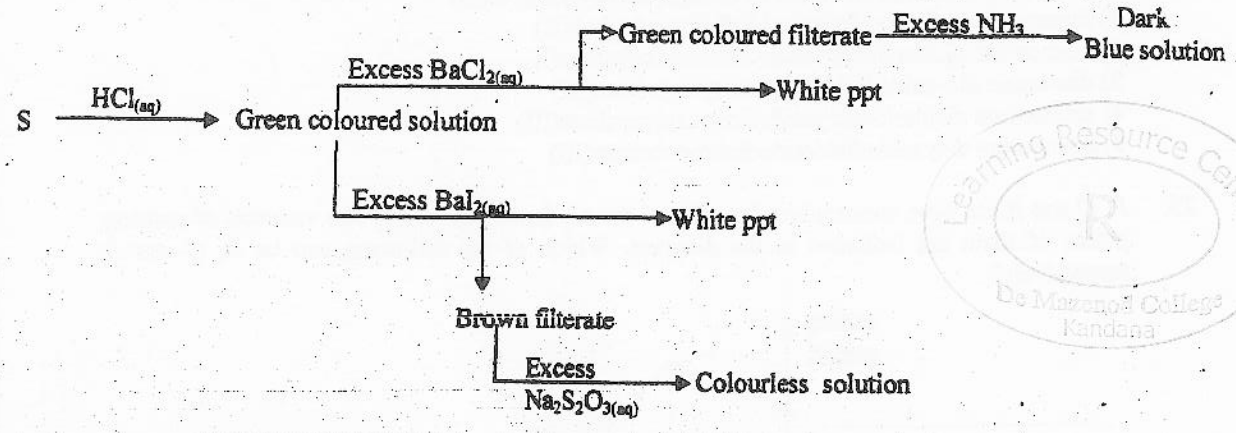
1) C – C 2) C – H 3) C = C 4) C ≡ C 5) C = N

16. A mixture consists with NaCl and NaBr has got a mass of 4.0g. Mass percentage of Na in this mixture was measured as 30%. Mass percentage of NaCl in this mixture is, (Br = 80, Cl= 35.5, Na = 23)
1) 45.14 2) 38.32 3) 52.44 4) 60.28 5) 12.42

17. An ideal gas sample at -123°C contains N number of molecules. And its mean kinetic energy of a molecule is measured as E. Another ideal gas sample at 27°C has got a mean kinetic energy of a molecule as 2E. Number of molecules present in the second sample is,

1) N/4 2) N/2 3) 2N 4) N 5) 4N

18. Some of the reactions carried out, using salt S is indicated in the below mentioned diagram.



Compound S could be,

1) $CrCl_2$ 2) $CuSO_3$ 3) $CrSO_4$ 4) Cu_2SO_4 5) $CuCl_2$

19. In the presence of sunlight, O_2 gas decomposes and produces O atoms. In here one oxygen atom is in ground state while other oxygen atom is in the excited state.

$O_2(g) \rightarrow O(g) + O^*(g)$, where $O^*(g)$ is the excited O atom

Wave length of radiation required for this is 174 nm. Energy required for the excitation of O atom,

$O(g) \rightarrow O^*(g)$ is 3.15×10^{-19} J. If both O atoms formed in bond dissociation are in ground state, what is the bond dissociation energy of oxygen in kJ mol^{-1} ?

1) 189 2) 249 3) 498 4) 686 5) 876

20. When excess NaOH(aq) is added to an aqueous solution containing $[Cr(H_2O)_6]^{3+}$ ions and small amount of H_2O_2 is added,

1) a purple coloured solution is obtained 2) a yellow coloured solution is obtained when heated 3) an orange coloured solution is obtained 4) a green coloured solution is obtained 5) a brown coloured precipitate is obtained

21. A white coloured paint contains Pb^{2+}. When this paint exposes to the atmosphere, it can be converted to black due to the S containing pollutant gases. Which chemical substance can be used to restore the original colour ?

1) $H_2S(g)$ 2) $H_2O_2(aq)$ 3) $Fe^{2+}(aq)$ 4) $NH_3(g)$ 5) $SO_2(g)$

22. Which of the following is a false statement?

1) Ali the metals of group 2 burns, forming the oxide and nitride when heated in air
2) SO_2 gas is less denser than air and has a pungent smell
3) SO_3 gas produces fumes with wet air while it reacts with water explosively forming sulphuric acid.
4) NaOCl subjected to disproportionate rapidly in a hot solution forming $NaClO_3$ and NaCl
5) Ions are not produced in gaseous hydrogen halides under dry conditions.

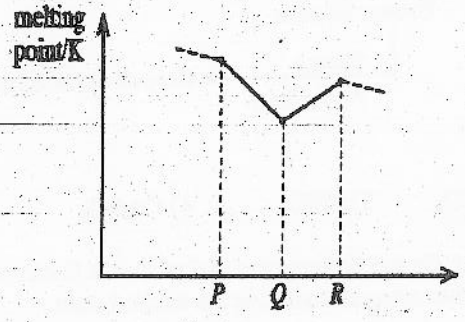
23. The pressure of a gaseous mixture containing NH_3 and N_2H_4 gases at 300 K is 5.0×10^4 Pa. When this mixture is heated to 1200 K without changing the volume, it is completely decomposed only to N_2 and H_2 gases. Then the total pressure of the system is 4.5×10^5 Pa. The mass of nitrogen gas formed by the reaction is 0.28 g. What is the molar ratio between NH_3 and N_2H_4 in the initial mixture? (N = 14, H = 1)

1) 1 : 1 2) 1 : 2 3) 3 : 1 4) 2 : 3 5) 3 : 2

24. What is the correct IUPAC name of $(NH_4)_2[Co(CN)_2Cl_2(NO)_2]$?

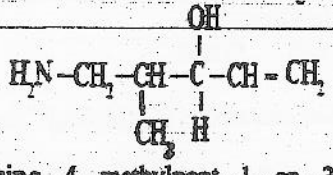
1) diammonium dichloridodicyanidodinitrosylcobalt(II)
2) ammonium dichloridodicyanidodinitrosylcobaltate(II)
3) diammine dicyanidodichloridonitrosylcobaltate(III)
4) ammonium dichloridodicyanidodinitrosylcobaltate(III)
5) ammonium dicyanidodichloridodinitrocobaltate(III)

25. *P*, *Q* and *R* are three consecutive elements of the 3d transition series. The variation of melting points of them are indicated in the diagram. Which of the following can be *P*, *Q* and *R* respectively?



1) Ti, V, Cr 2) V, Cr, Mn 3) Cr, Mn, Fe 4) Mn, Fe, Co 5) Fe, Co, Ni

26. IUPAC name of the following compound is,



1) 5 - amino - 4 - methylpent - 1 - en - 3 - ol
2) 1 - amino - 2 - methylpent - 4 - en - 3 - ol
3) 5 - amino - 3 - hydroxy - 4 - methylpent - 1 - ene
4) 5 - amino - 4 - methylpent - 1 - ene - 3- ol
5) 5 - amino - 4 - methyl - 3 - hydroxypent - 1 – ene

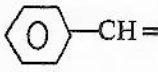
27. Which one of the following statements is incorrect regarding the Kinetic molecular theory equation

$PV = {}^1/_3 mNC^{\bar{2}}$?

1) The pressure of a gas is directly proportional to the number of gaseous molecules present per unit volume.
2) Mean square speed is represented by $C^{\bar{2}}$.
3) Mass of the gas is obtained from Nm.
4) The equation is only valid for ideal gases.
5) PV is equal to the total kinetic energy of gas molecule.

28. What is needed to perform the below mentioned organic conversion?
$C_2H_2 \rightarrow C_2Br_2$
1) dil.H_2SO_4 2) alcoholic KOH 3) Ni/H_2 4) Sodalime
5) None of the above mentioned is correct

29. "A" is a blackish brown amphoteric oxide of an element in the 4th period. When "A" is heated with KOH(aq), a green coloured solution B is obtained. When small amount of H_2O_2 is added to a portion of solution B again "A" is obtained. When "A" is reacted with concentrated HCl, green – yellow coloured solution is produced. A can be,
1) MnO_2 2) Mn_2O_3 3) CuO 4) CaO 5) ZnO

30. Which of the following statement is true regarding  molecule ?

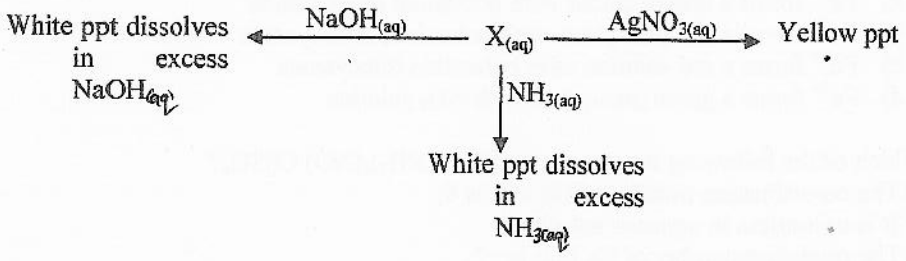
1) All the atoms lie on the same plane
2) All carbon atoms are sp^2 hybridized
3) Does not show sterio isomerism
4) It is soluble in water
5) Does not change the colour of $H^+/KMnO_4$

Instructions for questions 31-40 are mentioned below,

1	2	3	4	5
Only (a) and (b) are correct	Only(b) and (c) are correct	Only(c) and (d) are correct	Only(a) and (d) are correct	One or different number of answers are correct

31. Select the true statement/ s regarding the hydrocarbons.
(a) When an alkene undergoes an addition reaction with a molecule of HBr, the type of the hybridization of some of the carbon atoms of the alkene changes.
(b) CH_3 $CHBrCH_3$ is formed as the main product, when HBr reacts with CH_3 CH = CH_2, in the presence of peroxides.
(c) Under the normal conditions, all the hydrocarbons undergo electrophillic addition reactions.
(d)In the presence of Hg^{2+} ions as catalysts, all the alkynes react with dil.H_2SO_4 forming ketones.

32. Reaction shown by an inorganic salt X could be stated as follows,



X could be,

a) ZnI_2 b) $AlBr_3$ c) AlI_3 d) $CuBr_2$

33. Which of the following can be used to distinguish between SO_2 and CO_2 ?
a) Filter paper soaked in Lead acetate
b) Aqueous solution of $Ba(OH)_2$
c) damp red coloured hibiscus petal
d) Aqueous solution of H_2O_2

34. When considering correct Lewis structure where N—N bond length of CN_4 compound with the skeleton, N_1—C—N_2—N_3—N_4 approximately equal, which of the following is/are correct regarding electronegativity of atoms ?

a) $N_3 > N_2$ b) $N_2 > N_1$ c) $N_4 > N_3$ d) $C > N_3$

35. Which of the following is / are not non – polar molecular lattice/ lattices ?

a) $I_2(s)$ b) $SiO_2(s)$ c) $H_2O(s)$ d) naphthalene

36. Which statement/statements of the following can be **false** regarding an ideal gas ?

a) When increasing the temperature of a fixed massed gas sample, most probable speed of the gas increases
b) When increasing the temperature of a fixed massed gas sample, mole fraction with speed lower than most probable speed increases
c) Higher the values of the constants of Van der Waal's equation of a real gas, it is closer to ideal nature.
d) When pressure is constant in a constant mass of a dry gas sample, temperature is directly proportional to its volume

37. In which of the following situations, two gaseous products are obtained ?

a) Reaction between C(s) and conc. HNO_3
b) Reaction between S(s) and conc. HNO_3
c) Reaction between S(s) and conc. H_2SO_4
d) Reaction between Al(s) and conc. H_2SO_4

38. Which statement / statements of the following is/are true regarding spontaneity of a reaction ?

a) Exothermic reactions with (+) entropy change can happen spontaneously at low temperatures.
b) Reactions that take place under constant temperature , always can happen spontaneously.
c) Reactions that take place under constant volume, always can happen spontaneously.
d) Entropy change is the energy exchanged during changing of randomness of the system.

39. Which of the following statement/s is/are true about Fe^{2+} and Fe^{3+}?
a) Fe^{3+} forms a brown colour with potassium ferrocyanide
b) Fe^{2+} forms a red precipitate with potassium ferrocyanide
c) Fe^{3+} forms a red solution with potassium thiocyanate
d) Fe^{2+} forms a green precipitate with NH_3 soluiton

40. Which of the following is correct about $[Co(NH_3)_4(NO)Cl]SO_4$?
a) The co-ordination number of Co in it is 6.
b) It is colourless in aqueous solution.
c) The oxidation number of Co in it is +2.
d) It gives a white precipitate with an aqueous solution of $BaCl_2$