COMMON ENTRANCE TEST - 2010

DATE	SUBJECT	TIME
29-04-2010	CHEMISTRY	02.30 PM to 03.50 PM

MAXIMUM MARKS	TOTAL DURATION	MAXIMUM TIME FOR ANSWERING
60	80 MINUTES	70 MINUTES

MENTION YOUR CET NUMBER					QUESTION BOOKLET DETAILS	
					VERSION CODE	SERIAL NUMBER
					A - 1	715377

DOs :

1. Check whether the CET No. has been entered and shaded in the respective circles on the OMR answer sheet.
2. This Question Booklet is issued to you by the Invigilator after the **2nd Bell**, i.e., after **02.30 p.m.**
3. The Serial Number of this question booklet should be entered on the OMR answer sheet.
4. The Version Code of this question booklet should be entered on the OMR answer sheet and the respective circles should also be shaded completely.
5. Compulsorily sign at the bottom portion of the OMR answer sheet in the space provided.

DON'Ts :

1. **THE TIMING AND MARKS PRINTED ON THE OMR ANSWER SHEET SHOULD NOT BE DAMAGED/ MUTILATED / SPOILED.**
2. Until the **3rd Bell** is rung at **02.40 p.m.** :
   - Do not remove the seal/staple present on the right hand side of this question booklet.
   - Do not look inside this question booklet.
   - Do not start answering on the OMR answer sheet.

IMPORTANT INSTRUCTIONS TO CANDIDATES

1. This question booklet contains 60 questions and each question will have four different options / choices.
2. After the **3rd Bell** is rung at **02.40 p.m.**, remove the seal/staple present on the right hand side of this question booklet and start answering on the OMR answer sheet.
3. During the subsequent 70 minutes :
   - Read each question carefully.
   - Choose the correct answer from out of the four available options / choices given under each question.
   - **Completely darken/shade the relevant circle with a BLUE OR BLACK INK BALLPOINT PEN against the question number on the OMR answer sheet.**

CORRECT METHOD OF SHADING THE CIRCLE ON THE OMR SHEET IS AS SHOWN BELOW :

(1) (2) ● (4)

4. Please note that even a minute unintended ink dot on the OMR sheet will also be recognized and recorded by the scanner. Therefore, avoid multiple markings of any kind on the OMR answer sheet.
5. Use the space provided on each page of the question booklet for Rough Work. Do not use the OMR answer sheet for the same.
6. After the **last bell** is rung at **03.50 p.m.,** stop writing on the OMR answer sheet and affix your LEFT HAND THUMB IMPRESSION on the OMR answer sheet as per the instructions.
7. Hand over the OMR ANSWER SHEET to the room Invigilator as it is.
8. After separating and retaining the top sheet (KEA Copy), the Invigilator will return the bottom sheet replica (Candidate's copy) to you to carry home for self-evaluation.
9. Preserve the replica of the OMR answer sheet for a minimum period of ONE year.

CHEMISTRY

1. In the electrolytic refining of Zinc, ...
   1) the impure metal is at the cathode.
   2) graphite is at the anode.
   3) acidified zinc sulphate is the electrolyte.
   4) the metal ion gets reduced at the anode.

2. The wave number of the spectral line in the emission spectrum of hydrogen will be equal to $\frac{8}{9}$ times the Rydberg's constant if the electron jumps from .....
   1) $n = 10$ to $n = 1$
   2) $n = 3$ to $n = 1$
   3) $n = 2$ to $n = 1$
   4) $n = 9$ to $n = 1$

3. Consider the following gaseous equilibria with equilibrium constants K_1 and K_2 respectively.

   $SO_{2(g)} + \frac{1}{2}O_{2(g)} \rightleftharpoons SO_{3(g)}$

   $2SO_{3(g)} \rightleftharpoons 2SO_{2(g)} + O_{2(g)}$

   The equilibrium constants are related as .....
   1) $2K_1 = K_2^2$
   2) $K_1^2 = \frac{1}{K_2}$
   3) $K_2^2 = \frac{1}{K_1}$
   4) $K_2 = \frac{2}{K_1^2}$

4. Enthalpy of vapourization of benzene is +35.3 kJ mol^{-1} at its boiling point of 80^0C. The entropy change in the transition of the vapour to liquid at its boiling point [in JK^{-1} mol^{-1}] is .....
   1) –100
   2) –441
   3) +100
   4) +441

5. Which one of the following conversions involve change in both hybridization and shape?
   1) $NH_3 \longrightarrow NH_4^+$
   2) $CH_4 \longrightarrow C_2H_6$
   3) $H_2O \longrightarrow H_3O^+$
   4) $BF_3 \longrightarrow BF_4^-$

(Space for Rough Work)

6. In chromite ore, the oxidation number of iron and chromium are respectively .....

1) +3, +6
2) +3, +2
3) +2, +3
4) +2, +6

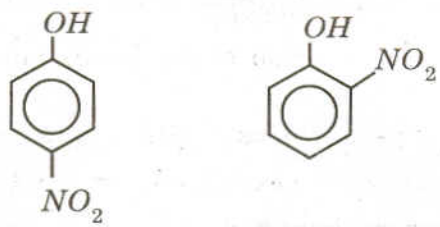
7. For the reversible reaction

$A_{(s)} + B_{(g)} \rightleftharpoons C_{(g)} + D_{(g)} : \Delta G^0 = -350\,\text{kJ}.$

Which one of the following statements is true?

1) Equilibrium constant is greater than one.
2) The entropy change is negative.
3) The reaction is thermodynamically not feasible.
4) The reaction should be instantaneous.

8. Out of the below two compounds, the vapour pressure of (B) at a particular temperature is .....



(A) (B)

1) lower than that of (A)
2) higher than that of (A)
3) same as that of (A)
4) higher or lower than (A), depending on the size of the vessel.

9. The amount of heat evolved when 500 cm^3 of 0.1 M HCl is mixed with 200 cm^3 of 0.2 M $NaOH$ is .....

1) 1.292 kJ
2) 2.292 kJ
3) 3.392 kJ
4) 0.292 kJ

10. During the adsorption of krypton on activated charcoal at low temperature, ...

1) $\Delta H < 0$ and $\Delta S < 0$
2) $\Delta H > 0$ and $\Delta S < 0$
3) $\Delta H < 0$ and $\Delta S > 0$
4) $\Delta H > 0$ and $\Delta S > 0$

(Space for Rough Work)

11. The set of quantum numbers for the outermost electron for copper in its ground state is .....

1) 3, 2, 2, +½
2) 4, 1, 1, +½
3) 4, 2, 2, +½
4) 4, 0, 0, +½

12. Peroxide ion .....

a) is diamagnetic.
b) has five completely filled antibonding molecular orbitals.
c) is isoelectronic with neon.
d) has bond order one.

Which one of these is correct?

1) a), b) and d)
2) d) and c)
3) a) and d)
4) a), b) and c)

13. Which one of these is NOT true for benzene?

1) There are three carbon-carbon single bonds and three carbon-carbon double bonds.
2) It forms only one type of monosubstituted product.
3) The bond angle between the carbon-carbon bonds is 120^0.
4) The heat of hydrogenation of benzene is less than the theoretical value.

14. A mixture of $CaCl_2$ and $NaCl$ weighing 4.44 g is treated with sodium carbonate solution to precipitate all the Ca^{+2} ions as calcium carbonate. The calcium carbonate so obtained is heated strongly to get 0.56 g of CaO. The percentage of $NaCl$ in the mixture (atomic mass of Ca = 40) is .....

1) 30.6
2) 75
3) 69.4
4) 25

15. For one mole of an ideal gas, increasing the temperature from 10^0C to 20^0C .....

1) increases the rms velocity by $\sqrt{2}$ times.
2) increases the average kinetic energy by two times.
3) increases both the average kinetic energy and rms velocity, but not significantly.
4) increases the rms velocity by two times.

(Space for Rough Work)

16. Generally, the first ionization energy increases along a period. But there are some exceptions. One which is NOT an exception is .....

1) *Na* and *Mg*
2) *N* and *O*
3) *Be* and *B*
4) *Mg* and *Al*

17. 50 cm^3 of 0.2 N *HCl* is titrated against 0.1 N *NaOH* solution. The titration is discontinued after adding 50 cm^3 of *NaOH*. The remaining titration is completed by adding 0.5 N *KOH*. The volume of *KOH* required for completing the titration is .....

1) 10 cm^3
2) 12 cm^3
3) 10.5 cm^3
4) 25 cm^3

18. In which one of the following, does the given amount of chlorine exert the least pressure in a vessel of capacity 1 dm^3 at 273K?

1) 0.071 g
2) 0.0355 g
3) 0.02 mole
4) 6.023×10^{21} molecules

19. Based on the first law of thermodynamics, which one of the following is correct?

1) For an adiabatic process : $\Delta U = -w$
2) For an isochoric process : $\Delta U = -q$
3) For a cyclic process : $q = -w$
4) For an isothermal process : $q = +w$

20. For alkali metals, which one of the following trends is INCORRECT?

1) Ionization energy : $Li > Na > K > Rb$
2) Hydration energy : $Li > Na > K > Rb$
3) Atomic size : $Li < Na < K < Rb$
4) Density : $Li < Na < K < Rb$

(Space for Rough Work)

21. One gram of silver gets distributed between 10 cm^3 of molten zinc and 100 cm^3 of molten lead at 800^0C. The percentage of silver in the zinc layer is approximately .....

1) 91
2) 89
3) 94
4) 97

22. One mole of an organic compound '*A*' with the formula C_3H_8O reacts completely with two moles of *HI* to form *X* and *Y*. When '*Y*' is boiled with aqueous alkali forms *Z*. *Z* answers the iodoform test. The compound '*A*' is .....

1) Propan–1–ol
2) Propan–2–ol
3) methoxyethane
4) ethoxyethane

23. The IUPAC name of $K_2\left[Ni\ (CN)_4\right]$ is .....

1) Potassium tetracyanatonickelate (II)
2) Potassium tetracyanonickelate (II)
3) Potassium tetracyanonickel (III)
4) Potassium tetracyanatonickel (II)

24. The spin only magnetic moment of Mn^{+4} ion is nearly .....

1) 6 BM
2) 3 BM
3) 5 BM
4) 4 BM

25. In Kjeldahl's method, ammonia from 5 g of food neutralizes 30 cm^3 of 0.1 N acid. The percentage of nitrogen in the food is .....

1) 8.4
2) 0.84
3) 1.68
4) 16.8

(Space for Rough Work)

26. Carbon can reduce ferric oxide to iron at a temperature above 983 K because .....

1) carbon has a higher affinity towards oxidation than iron.
2) carbon monoxide formed is thermodynamically less stable than ferric oxide.
3) iron has a higher affinity towards oxygen than carbon.
4) free energy change for the formation of carbon dioxide is less negative than that for ferric oxide.

27. An oxygen containing organic compound upon oxidation forms a carboxylic acid as the only organic product with its molecular mass higher by 14 units. The organic compound is .....

1) a primary alcohol
2) an aldehyde
3) a ketone
4) a secondary alcohol

28. The compound obtained when acetaldehyde reacts with dilute aqueous sodium hydroxide exhibits .....

1) optical isomerism
2) geometric isomerism
3) both optical and geometric isomerism
4) neither optical nor geometric isomerism

29. The activation energy for a reaction at the temperature TK was found to be 2.303 RT J mol^{-1}. The ratio of the rate constant to Arrhenius factor is .....

1) 10^{-2}
2) 10^{-1}
3) 2×10^{-2}
4) 2×10^{-3}

30. A dibromo derivative of an alkane reacts with sodium metal to form an alicyclic hydrocarbon. The derivative is .....

1) 2, 2–dibromobutane
2) 1, 1–dibromopropane
3) 1, 4–dibromobutane
4) 1, 2–dibromoethane

(Space for Rough Work)

31. Time required for 100 percent completion of a zero order reaction is .....

1) $\frac{a}{2k}$
2) $\frac{2k}{a}$
3) $a\,k$
4) $\frac{a}{k}$

32. 0.023 g of sodium metal is reacted with 100 cm^3 of water. The pH of the resulting solution is .....

1) 11
2) 10
3) 12
4) 9

33. Which one of the following is wrongly matched?

1) $[Ni(CO)_4]$ – neutral ligand
2) $[Cu(NH_3)_4]^{+2}$ – square planar
3) $[Co(en)_3]^{+3}$ – follows EAN rule
4) $[Fe(CN)_6]^{-3}$ – sp^3d^2

34. Which one of the following conformations of cyclohexane is the least stable?

1) Boat
2) Half-chair
3) Chair
4) Twisted-boat

35. Which one of the following is a molecular crystal?

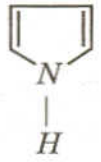
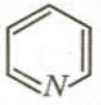
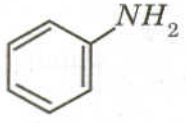
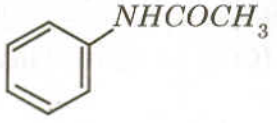
1) Quartz
2) Rock salt
3) Diamond
4) Dry ice

(Space for Rough Work)

36. A buffer solution contains 0.1 mole of sodium acetate dissolved in 1000 cm^3 of 0.1 M acetic acid. To the above buffer solution, 0.1 mole of sodium acetate is further added and dissolved. The pH of the resulting buffer is equal to .....

1) pK_a
2) $pK_a - Log\,2$
3) $pK_a + Log\,2$
4) $pK_a + 2$

37. Which one of the following has the most nucleophilic nitrogen?

1) 
2) 
3) 
4) 

38. Chloroacetic acid is a stronger acid than acetic acid. This can be explained using .....

1) –I effect
2) –M effect
3) +I effect
4) +M effect

39. The correct sequence of reactions to convert p-nitrophenol into quinol involves .....

1) hydrolysis, diazotization and reduction
2) reduction, diazotization and hydrolysis
3) diazotization, reduction and hydrolysis
4) hydrolysis, reduction and diazotization

40. $CH_3CH_2Br \xrightarrow[\Delta]{Aq\ KOH} A \xrightarrow[\Delta]{KMnO_4/H^+} B \xrightarrow[\Delta]{NH_3} C \xrightarrow[\text{alkali}]{Br_2} D$; "D" is .....

1) CH_3CONH_2
2) CH_3Br
3) $CHBr_3$
4) CH_3NH_2

(Space for Rough Work)

41. The letter 'D' in D–glucose signifies .....
   1) dextrorotatory
   2) configuration at all chiral carbons
   3) configuration at a particular chiral carbon
   4) that it is a monosaccharide

42. Reaction of methyl bromide with aqueous sodium hydroxide involves .....
   1) S_N1 mechanism
   2) racemisation
   3) S_N2 mechanism
   4) inversion of configuration

43. 9.65 C of electric current is passed through fused anhydrous magnesium chloride. The magnesium metal thus obtained is completely converted into a Grignard reagent. The number of moles of the Grignard reagent obtained is .....
   1) 1×10^{-4}
   2) 5×10^{-4}
   3) 1×10^{-5}
   4) 5×10^{-5}

44. Which one of the following does NOT involve coagulation?
   1) Peptization
   2) Formation of delta regions
   3) Clotting of blood by the use of ferric chloride
   4) Treatment of drinking water by potash alum

45. In alkaline medium, alanine exists predominantly as/in .....
   1) zwitterion
   2) anion
   3) covalent form
   4) cation

(Space for Rough Work)

46. The standard emf of a galvanic cell involving 3 moles of electrons in its redox reaction is 0.59 V. The equilibrium constant for the reaction of the cell is .....

1) 10^{20}
2) 10^{25}
3) 10^{30}
4) 10^{15}

47. Benzaldehyde and acetone can be best distinguished using .....

1) sodium hydroxide solution
2) Fehling's solution
3) Tollens' reagent
4) 2, 4-DNPH

48. Which one of the following statements is true?

1) Drying of oil involves hydrolysis
2) Saponification of oil yields a diol.
3) Refining of oil involves hydrogenation
4) Addition of antioxidant to oil minimizes rancidity

49. The following data is obtained during the first order thermal decomposition of $2A_{(g)} \longrightarrow B_{(g)} + C_{(s)}$, at constant volume and temperature.

Sr. No.	Time	Total pressure in Pascal
1.	At the end of 10 minutes	300
2.	After completion	200

The rate constant in min^{-1} is .....

1) 6.93
2) 0.0693
3) 69.3
4) 0.00693

50. Phenol $\xrightarrow{X}$ forms a tribromo derivative. "X" is .....

1) bromine in water
2) bromine in benzene
3) bromine in carbon tetrachloride at 0^0C.
4) potassium bromide solution

(Space for Rough Work)

51. The correct sequence of steps involved in the mechanism of Cannizzaro's reaction is .....

1) transfer of H^-, transfer of H^+ and nucleophilic attack
2) nucleophilic attack, transfer of H^- and transfer of H^+
3) electrophilic attack by OH^-, transfer of H^+ and transfer of H^-
4) transfer of H^+, nucleophilic attack and transfer of H^-

52. Which one of the following is an example for homogeneous catalysis?

1) Manufacture of ammonia by Haber's process
2) Manufacture of sulphuric acid by contact process
3) Hydrogenation of oil
4) Hydrolysis of sucrose in presence of dilute hydrochloric acid

53. The empirical formula of a nonelectrolyte is $C_1H_2O_1$. A solution containing 6 g of the compound exerts the same osmotic pressure as that of 0.05 M glucose solution at the same temperature. The molecular formula of the compound is .....

1) $C_3H_6O_3$
2) $C_2H_4O_2$
3) $C_4H_8O_4$
4) $C_5H_{10}O_5$

54. A white crystalline salt A reacts with dilute HCl to liberate a suffocating gas B and also forms a yellow precipitate. The gas B turns potassium dichromate acidified with dilute H_2SO_4 to a green coloured solution C. A, B and C are respectively .....

1) $Na_2S_2O_3$, SO_2, $Cr_2(SO_4)_3$
2) Na_2SO_3, SO_2, $Cr_2(SO_4)_3$
3) Na_2SO_4, SO_2, $Cr_2(SO_4)_3$
4) Na_2S, SO_2, $Cr_2(SO_4)_3$

55. Molecules of a noble gas do not possess vibrational energy because a noble gas .....

1) is chemically inert
2) is monoatomic
3) is diamagnetic
4) has completely filled shells

(Space for Rough Work)

56. One dm^3 solution containing 10^{-5} moles each of Cl^- ions and CrO_4^{-2} ions is treated with 10^{-4} mole of silver nitrate. Which one of the following observations is made?

$\left[K_{SP}\ Ag_2CrO_4 = 4\times10^{-12}\right]$

$\left[K_{SP}\ AgCl = 1\times10^{-10}\right]$

1) Silver chromate gets precipitated first.
2) Precipitation does not occur.
3) Both silver chromate and silver chloride start precipitating simultaneously.
4) Silver chloride gets precipitated first.

57. pH value of which one of the following is not equal to one?

1) 0.05 M H_2SO_4
2) 0.1 M HNO_3
3) 50 cm^3 of 0.4 M HCl + 50 cm^3 of 0.2 M $NaOH$
4) 0.1 M CH_3COOH

58. E_1, E_2 and E_3 are the emf values of the three galvanic cells respectively.

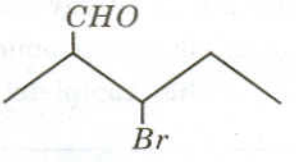
a) $Zn \mid Zn^{+2}_{1M} \parallel Cu^{+2}_{0.1M} \mid Cu$

b) $Zn \mid Zn^{+2}_{1M} \parallel Cu^{+2}_{1M} \mid Cu$

c) $Zn \mid Zn^{+2}_{0.1M} \parallel Cu^{+2}_{1M} \mid Cu$

Which one of the following is true?

1) $E_3 > E_2 > E_1$
2) $E_2 > E_3 > E_1$
3) $E_1 > E_3 > E_2$
4) $E_1 > E_2 > E_3$

59. The IUPAC name of 

is .....

1) 3–bromo–2–methylbutanal
2) 2–methyl–3–bromohexanal
3) 3–bromo–2–methylpentanal
4) 2–methyl–3–bromobutanal

60. Which one of the following forms propanenitrile as the major product?

1) Propyl bromide + alcoholic KCN
2) Ethyl bromide + alcoholic KCN
3) Ethyl bromide + alcoholic $AgCN$
4) Propyl bromide + alcoholic $AgCN$

(Space for Rough Work)