**Session Ending Examination (2015-16)**

**Chemistry**

**CBSE Class – XI**

Time: 3 Hrs. M.M: 70

**General Instructions:**

**(i)** Question 1 to 5 one mark.

**(ii)** Question 6 to 10 each two mark.

**(iii)** Question 11 to 22 each three mark.

**(iv)** Question 23 is value based question and carry four marks.

**(v)** Questions 24 to 26 each five mark.

## Section A

**1.** Arrange the following in the increasing order of their size $F^-$, $Li^+$, $Na^+$, $Cl^-$.

**2.** Why are liquids like ether and acetone kept in cool places?

**3.** Why do trihalides of group 13 elements fume in the moist air?

**4.** What experimental support is available for de-Broglie's equation?

**5.** Why is second electron gain enthalpy (electron affinity) negative (i.e., energy is absorbed)?

## Section B

**6.** Calculate the uncertainty in the velocity of a wagon of mass 3000 kg whose position is known to an accuracy of $\pm$ 10 pm. (Planck'sconstant = $6.63\times10^{-34}\,Js$ ).

**7.** Draw the possible resonance structures for $CH_3-\ddot{O}-\dot{C}H_2$ and predict which of the structures is more stable. Give reason for your answer.

**8.** On Illustrate the formation of bonding and antibonding molecular orbitals from atomic orbitals?

**9.** With the help of Le-Chatelier 's principle explain

**(i)** we sweat more on a humid day.

**(ii)** clothes dry quickly on a windy day.

**10.** What is the role of red phosphorus in the reduction of alkyl halide using hydroidic acid?

## Section C

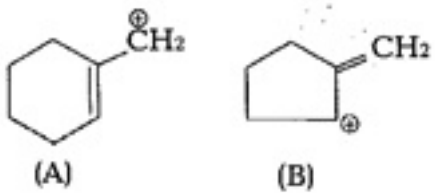
**11.** Calculate the number of moles of nitrogen dioxide, $NO_2$ that could be prepared from 0.35 mole of nitrogen oxide and 0.25 mole of oxygen.

$$2NO(g) + O_2(g) \longrightarrow 2NO_2(g)$$

Identify the limiting reagent and the excess reagent in the reaction. What would happen to the potential yield of $NO_2$ if the amount of NO were increased? What, if the amount of $O_2$ were increased?

**12. (i)** Which of the following ions is more stable?

Use resonance to explain your answer.




(A) (B)

**(ii)** What is the correct order of stability of the carbonium ion?

$$(CH_3)_3C^+,\ CH_3CH_2^+,\ CH_2^+,(CH_3)_2CH^+$$

Or

Resonance structures of propenal are given below. Which of these resonating structures is more stable? Give reason for your answer.

$$\underset{\text{I}}{CH_3}=\underset{\text{II}}{CH}-CH=O \longleftrightarrow \overset{\oplus}{C}H_2-CH=CH-O^{\ominus}$$

**13.** Draw the Lewis structures for the following ionic compounds.

**(i)** $Li_2O$

**(ii)** $CaCl_2$

**(iii)** LiF

**14.** The enthalpy change involved in the oxidation of glucose is - 2880 kJ $mol^{-1}$. 25% of this energy is available for muscular work. If 100 kJ of muscular work is needed to walk one kilometer, what is the maximum distance that a person will be able to walk after Eating 120 g of glucose?

**15.** 0.1 mole of $N_2O_4$ (g) was sealed in a tube under atmospheric conditions at $25°C$. Calculate the number of moles of $NO_2(g)$ present if the equilibrium $N_2O_4(g)2NO_2(g)$ is

reached after sometime ( $K_p$ = 0.14).

Or

Consider the reaction

$$2SO_2(g)+O_2(g)\rightleftharpoons 2SO_3(g)+189.4kJ$$

Indicate the direction in which the equilibrium will shift when

**(i)** temperature is increased

**(ii)** volume is increased

**(iii)** a catalyst is added

**(iv)** helium gas is added at constant volume so that the total pressure is increased

**(v)** helium gas is added at constant pressure.

**16.** Calculate the molar solubility of $Ni(OH)_2$ in0.10 M NaOH. The solubility product of $Ni(OH)_2$ is $2.0\times10^{-15}$.

**17.** Calculate the enthalpy of formation of HI(g) from the following data

**(i)** $H_2(g)+Cl_2(g)\rightleftharpoons 2HCl(g)$

$\therefore \Delta_r H^\circ = -184.6kJ$

**(ii)** $HCl(g)+aq\rightleftharpoons HCl(aq);$

$\Delta_r H^\circ = -72.43kJ$

**(iii)** $HI(g)+aq\rightleftharpoons HI(aq);$

$\Delta_r H^\circ = -80.37kJ$

**(iv)** $KOH(aq)+HCl(aq)\rightleftharpoons KCl(aq);$

$\Delta_r H^\circ = -57.49kJ$

**(v)** $KOH(aq)+HI(aq)\rightleftharpoons KI(aq);$

$\Delta_r H^\circ = -57.19kJ$

**(vi)** $Cl_2(g)+2KI(aq)\rightleftharpoons 2KCl(aq)+I_2(s);$

$\Delta_r H^\circ = -219.4kJ$

**18.** Write the half equations for the following reactions.

**(i)** $H_2S+Fe^{3+}\rightarrow Fe^{2+}+S+H^+$

**(ii)** $I^-+IO_3^-+H^+\rightarrow I_2+H_2O$

**(iii)** $Cu(s)+Au^+(aq)\rightarrow Au(s)+Cu^{2+}(aq)$

**(iv)** $I^-(aq) + O_2(g) + H_2O \rightarrow I_2 + OH^-(aq)$

**19.** How heavy water reacts with

**(i)** sodium metal

**(ii)** $Na_2O$

**(iii)** $CaC_2$

**20.** Calculate **(i)** First excitation energy of the electron in the hydrogen atom.

**(ii)** Ionization energy of the hydrogen atom.

**21.** How should the management of domestic waste be done?

**22.** Write expression for Boyle's temperature and critical temperature in terms of van der Waals' constants. Which one is large for a particular gas?

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## Section D

**23.** Mrs. Verma was found of using cosmetics. Someone told her about the silicone based cosmetics. She read more about these substances on internet and found that silicones are organosilicon polymers which have – $R_2SiO$ – as a repeating unit. Silicones are water repellant and have high thermal stability and resistant to oxidation and chemicals. They are used in surgical and cosmetic implants. Silicone rubber is used in nipples of feeding bottles of children. Actresses are using cosmetic implants made up of silicones. Sometime, these implants lead to health problems.

**(i)** Why are silicones thermally stable?

**(ii)** Why are silicones used for nipplesof feeding bottles?

**(iii)** Are silicones safe for environment?

**(iv)** What values are possessed by Mrs. Verma?

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## Section E

**24.** Three students, Manish, Ramesh and Rajni were determining the extra elements present in an organic compound given by their teacher. They prepared the Lassaigne's extract (LE) independently by the fusion of the compound with sodium metal. Then added solid $FeSO_4$ and dilute sulphuric acid to a part of Lassaigne's extract.

Manish and Rajni obtained prussian blue colour but Ramesh got red colour. Ramesh repeated the test with the same Lassaigne's extract, but again got red colour only. They were

surprised and went to their teacher and told him about their observation. Teacher asked them to think over the reason for this. Can you help them by giving the reason for this observation. Also, write the chemical equations to explain the formation of compounds of different colours.

**25. (i)** Write the steps for the chain mechanism ofthe chlorination of methane. What are the names of the steps?

**(ii)** What happens when (give chemical equation only)

**(a)** methane reacts with steam at 1273 K?

**(b)** methane reacts with oxygen in the presence of Cu at 573 K.

**(iii)** How can polychlorination of methane be minimized?

**Or**

**(i)** l-butyne has a larger dipole moment (0.80D) than l-butene (0.30D). Explain.

**(ii)** Identify X in the following reaction. $CH_3 - CH = CH_2 + HCl \xrightarrow[peroxide]{Benzoyl} X$

**(iii)** What happens when bromine is passed into propene in the presence of $CCl_4$? Give equation only.

**(iv)** Calculate the number of sigma bond in a product obtained when propyne is passed through red hot iron tube.

**(v)** Write the structures of compound 'X' and 'Y'.

**26. (i)** Which is the most abundant element in group 13?

**(ii)** What are the formulae of bauxite and cryolite?

**(iii)** Name two isotopes of boron.

**(iv)** Explain maximum covalency of boron and aluminium.

**(v)** Mention the state of hybridisation of B in $BH_4^-$.

**Or**

**(i)** $SiCl_4$ forms $SiCl_6^{2-}$ while $CCl_4$ does not form $CCl_6^{2-}$. Explain.

**(ii)** Carbon shows catenation property but lead does not. Explain.

**(iii)** Why does the element silicon, not form a graphite like structure whereas carbon does?

**(iv)** Name the carbide called carborundum?

**(v)** What is tin plague?