Session Ending Examination (2015-16)

Chemistry

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. Is the law of constant composition true for all types of compounds? Mention why or why not?

2. What was the necessity for the classification of the elements?

3. Water decomposes by absorbing 286.2 kJ of electrical energy per mole. When H_2 and O_2 combine to form one mole of H_2O, 286.2 kJ of heat is produced. Which law is proved? What statement of the law follows from it?

4. Which d-orbital does not have four lobes and what is its shape called?

5. Which species is the smallest aromatic substance?

Section B

6. Give two reactions to show acidic character of alkynes?

7. Calculate the mass of

(i) an atom of silver (atomic mass = 108).

(ii) 1 molecule of naphthalene $(C_{10}H_8)$.

8. (i) What did Thomson's experiment on the deflection of cathode rays yield?

(ii) What experiment neglected Thomson's model of the atom as an intimate mixture of

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negative and positive part?

9. Rank the following in the order of increasing entropy.

(i) 1 mole of $H_2O(l)$ at $25°C$ and 1 atm pressure.

(ii) 2 moles of $H_2O(s)$ at $0°C$ and 1 atm pressure.

(iii) 1 mole of $H_2O(v)$ at $100°C$ and 1 atm pressure.

(iv) 1 mole of $H_2O(l)$ at $0°C$ and 1 atm pressure.

10. Radius of the fourth orbit in hydrogen atom is 0.85 nm. Calculate the velocity of the electron in this orbit (mass of electron $9.1\times10^{-31}kg$).

Section C

11. Calculate the wavelength of the spectral line obtained in the spectrum of Li^{2+} ion when transition takes place between two levels whose difference is 2 and the sum is 4?

12. Calculate the oxidation number of

(i) N in NO_3^-

(ii) P in $H_3P_2O_7^-$

(iii) C in CO_3^{2-}

(iv) O in OF_2

(v) Cl in ClO_4

(vi) Cr in $Cr_2O_7^{2-}$

13. (i) Name the classes of hydrides to which H_2O, B_2H_6, CrH and NaH belong.

(ii) What do you mean by hydride gap?

14. Calculate the work of expansion when 100 g of water is electrolysed at a constant pressure of 1 atm and temperature of $25°C$.

15. Standard enthalpy of vaporisation of benzene at its boiling point is 30.8 kJ mol^{-1}. For how long would a 100 W electric heater have to operate in order to vaporise a 100 g sample of benzene at its boiling temperature (power = $\frac{energy}{time}$ =1W = $1Js^{-1}$)?

16. Discuss the various reactions that occur in the Solvay process.

17. Write three physical and three chemical properties of carbon monoxide.

18. What are cycloalkanes? Give the name, structural and the condensed formula of the first

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four members of the cycloalkane series.

19. One mole of a hydrocarbon (A) reacts with one mole of bromine giving a dibromo compound, $C_{10}H_5Br_2$. Substance (A) on treatment with cold dilute alkaline $KMnO_4$ solution forms a compound $C_5H_{12}O_2$. On ozonolysis (A) gives equimolar quantities of propanone and ethanal. Deduce the structural formula of (A).

20. Write chemical equations only involved in the preparation of each of the following.

(i) Plaster of Paris

(ii) Quicklime

(iii) Slaked lime

Also write any one use of each.

Or

Describe the importance of the following.

(i) Limestone

(ii) Cement

(iii) Borax

21. (i) Emeralds are gem-quality forms of the mineral beryl, $Be_3Al_2(SiO_3)_6$. Calculate the percentage by mass of silicon in beryl.

(ii) The oxygen-carrying protein, known as haemoglobin, have 0.0335% Fe by mass and contains four Fe atoms per haemoglobin molecule. Calculate the molecular weight of this protein.

22. Calculate the number of moles of hydrogen gas present in500 cm3 of the gas taken at 300 K and 760 mm pressure. If this sample of hydrogen is found to have a mass equal to $4.09 \times 10^{-2} g$, calculate the molar mass of hydrogen.

Section D

23. Syn gas is major source for the production of dihydrogen. Earlier it was obtained only by coal gasification. But scientists of many developed countries now a days obtained it from biomass gasification.

(i) Write the main difference between coal gasification and biomass gasification.

(ii) Why is biomass gasification is more advantageous over coal gasification for the

generation of syn gas?

(iii) Write the balanced reaction showing production of dihydrogen from syn gas.

(iv) What values are associated with the scientists of developed countries.

Section E

24. Compound X on reduction with $LiAlH_4$ gives a hydride Y containing 21.72% hydrogen along with other products. The compound Y reacts with air explosively resulting in boron trioxide. Identify X and Y. Give balanced equations involved in the formation of Y and its reaction with air. Draw the structure of Y

Or

Give the preparation of borax from the mineral colemanite. Briefly describe its properties and uses.

25. (i) Give two industrial applications of distillation under reduced pressure.

(ii) Why is it necessary to use acetic acid and not hydrochloric acid for acidification of sodium extract for testing sulphur by lead acetate test?

Or

(i) How is sulphur estimated in organic compound?

(ii) On heating 0.1245 g of the organic substance with HNO_3 and $BaCl_2$, we get 0.1292 g of $BaSO_4$. Find the percentage of sulphur in the organic substance.

26. 896 mL vapour of a hydrocarbon 'A' having carbon 87.80% and hydrogen 12.19% weighs 3.28 g at STP Hydrogenation of 'A' gives 2-methylpentane. Also 'A' on hydration in the presence of H_2SO_4 and $HgSO_4$ gives a ketone 'B' having molecular formula $C_6H_{12}O$. The ketone 'B' gives a positive iodoform test. Find the structure of 'A' and give the reactions involved.