

FIRST TERMINAL EXAMINATION—2016-17**CLASS-XI****SUBJECT—CHEMISTRY****Time : 3 Hours****M.M. : 70****Please check the total marks****General Instructions :**

- All questions are compulsory.
- Q. No. 1 to 5 carry 1 mark each.
- Q. No. 6 to 10 carry 2 marks each.
- Q. No. 11 to 22 carry 3 marks each.
- Q. No. 23 carries 4 marks.
- Q. No. 24 to 26 carry 5 marks each.

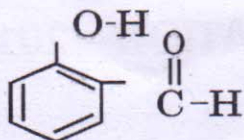
- State the law of multiple proportions. (1)
- How many unpaired e^- are present in Co^{3+} ? (Atomic number of cobalt = 27) (1)
- Electron gain enthalpy of inert gases is zero. Why? (1)
- Give an example of molecule having expanded octet and draw its Lewis structure. (1)
- Explain, why $-273^\circ C$ is the lowest possible temperature. (1)
- The heat of combustion of benzene (C_6H_6) in a bomb calorimeter (i.e. constant volume) was found to be 3263.9 kJ/mol at $25^\circ C$. Calculate the heat of combustion of benzene at constant pressure. (2)
- Two half cells are $Al^{3+} / Al_{(s)}$ and $Mg^{2+} / Mg_{(s)}$. The reduction potentials (standard) of these half cells are -1.66 V and -2.36 V respectively. Calculate the cell potential and give cell notation. ? (1+1)
- The first and second ionisation enthalpies in (kJ/mol) and electron gain enthalpy (in kJ/mol) of a few elements are :

Element	$\Delta_i H_1$	$\Delta_i H_2$	$\Delta_{eg} H$
I	419	3051	-48
II	1681	3374	-328
III	2371	5251	+48
IV	738	1451	-40

Which of the following elements is likely to be :

- The most reactive metal ?
- The most reactive non metal ?
- The metal which can form a stable binary halide of the formula MX_2 ($X = \text{halogen}$).
- Which one is the least reactive element ? (2)

9. (a) What is the total number of sigma and pi bonds in the following molecule? (2)



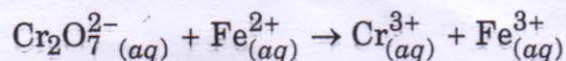
- (b) Give two differences between a sigma bond and pi bond.

10. 10.0 g of O_2 were introduced into an evacuated vessel of 5 L capacity maintained at $27^\circ C$. Calculate the pressure of the gas in the container. [$R = 0.0821 \text{ L atm k}^{-1} \text{ mol}^{-1}$] (2)

OR

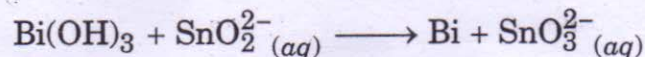
One litre flask containing vapours of methyl alcohol (Mol. mass = 32) at a pressure of 1 atm and $25^\circ C$ was evacuated till the final pressure was 10^{-3} mm. How many molecules of methyl alcohol were left in the flask?

11. Balance the following equation in acidic medium by half reaction method: (3)



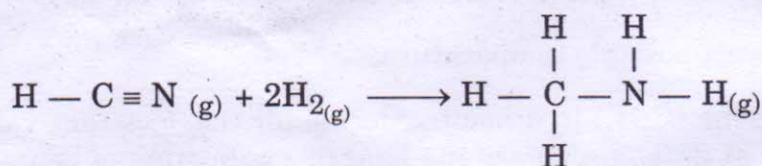
OR

Balance the following equation in basic medium by half reaction method:



(Write all the steps involved)

12. ΔH for the reaction:



is -150 kJ/mol . Calculate the bond enthalpy of $C \equiv N$.

[Given bond enthalpy of $C-H = 414 \text{ kJ/mol}$

$H-H = 435 \text{ kJ/mol}^{-1}$, $C-N = 293 \text{ kJ/mol}$

$N-H = 396 \text{ kJ/mol}$]

(3)

13. The density of 3M solution of NaCl is 1.25 g mL^{-1} . Calculate the molality and mole fraction of each component. (3)

OR

1.5 g of an impure sample of sodium sulphate dissolved in water was treated with excess of Barium chloride solution when 1.74 g of $BaSO_4$ were obtained as a dry precipitate. Calculate the percentage purity of the sample. [Atomic mass of Ba = 137, Cl = 35.5, S = 32, Na = 23]

14. (a) Calculate the mass of a photon with wave length 3.6 \AA .

- (b) Calculate the velocity of electron in the first Bohr orbit of hydrogen atom. Given that Bohr radius = 0.528 \AA , Planck's constant = $6.6 \times 10^{-34} \text{ Js}$, $m_e = 9.1 \times 10^{-31} \text{ kg}$ & $1 \text{ J} = 1 \text{ kg m}^2 \text{ s}^{-2}$. (3)

15. A student forgot to add the reaction mixture to the round bottom flask at 27°C instead he/she placed the flask on the flame. After a lapse of time, he realised his mistake, using a thermometer he found that the temperature of the flask was 477°C . What fraction of air would have been expelled out? (3)

16. Explain why :

- (a) falling rain drops are spherical in shape.
- (b) When we increase the temperature of honey it starts flowing rapidly. Why?
- (c) Define standard boiling point of a liquid. (3)

OR

- (a) Why is it difficult to cook food at higher altitude?
- (b) Write Van der Waal's equation for one mole of a gas.
- (c) Define critical temperature.

17. (a) Draw a properly labelled orbital overlap diagram of propene. 1+2

(b) Show hybridisation in SF_6 molecule. Draw its structure.

18. (a) Write two important reasons for the anomalous behaviour of second period elements. *SS MP.P.*

(b) What do you understand by the term 'diagonal relationship' of elements?

(c) Why are there fourteen elements in the lanthanoid series? (3)

19. (i) State 'Aufbau principle.'

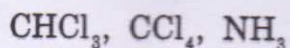
(ii) Why does the ball hit with a hockey stick by a player, not show wave character?

(iii) How long would it take a radiowave of frequency $6 \times 10^{-3} \text{ s}^{-1}$ to travel from Mars to the Earth, a distance of $8 \times 10^7 \text{ km}$? (3)

20. A solution of oxalic acid $((\text{COOH})_2 \cdot 2\text{H}_2\text{O})$ is prepared by dissolving 0.63 g of the acid in 250 cm^3 of the solution. Calculate (a) molarity (b) normality of the solution. (3)

21. (i) NH_3 and BF_3 are both tetraatomic molecules but have different shapes. Explain on the basis of VSEPR theory.

(ii) Which molecule has zero dipole moment and why?



(iii) All carbon oxygen bond lengths in carbonate anion are same. Why? (3)

22. Account for the following :

(i) Electron gain enthalpy of oxygen is less negative than sulphur.

(ii) Anions are always bigger than neutral atoms.

(iii) The trend of first ionisation enthalpies in Be & B is not as expected. Explain. (3)

23. Different types of electromagnetic radiations play very important role in our daily life. Microwaves heat up our food. Cellphones work by emitting and catching radiations. Though helpful, there are strong views that these radiations are harmful, if we are exposed for a long time.

(i) What values are expressed in the above paragraph ?

(ii) Should microwave oven be used for heating or cooking food at home, Comment with two points each in favour and against.

(iii) Arrange X-rays, ultraviolet rays and radiowaves in order of increasing frequency. (1+2+1)

24. (i) Give an example of disproportionation reaction.

(ii) What is the oxidation number of sulphur in $H_2S_2O_7$ and Mn in MnO_4^- ?

(iii) $Zn_{(s)} / Zn^{2+}_{(aq)} // Ag^+_{(aq)} / Ag_{(s)}$

In this electrochemical cell, write which electrode is negatively charged, what are current carriers in the cell ? Write individual reactions taking place in the cell.

(1+2+3)

OR

(i) What is the role of standard hydrogen electrode ? Draw a well labelled diagram and write the reaction when it acts as cathode.

(ii) Is it possible to store $CuSO_4$ solution in zinc container ?

$[E^\circ Zn^{2+}/Zn = -0.76 V, \quad E^\circ Cu^{2+}/Cu = +0.34 V]$

(iii) What are oxidising and reducing agents ? Give example. (2+1+2)

25. (a) Calculate the enthalpy of formation of sucrose ($C_{12}H_{22}O_{11}$) from the following data :

(i) $C_{12}H_{22}O_{11} + 12O_2 \rightarrow 12CO_2 + 11H_2O \quad \Delta H = -5200.7 \text{ kJ/mol}$

(ii) $H_2 + \frac{1}{2}O_2 \rightarrow H_2O, \quad \Delta H = -285.8 \text{ kJ/mol}$

(iii) $C + O_2 \rightarrow CO_2, \quad \Delta H = -394.5 \text{ kJ/mol}$ (3)

(b) What are state functions? Give example. (1)

(c) What are intensive properties ? (1)

OR

(a) What is an isothermal process ? (1)

(b) Find out the value of log K for the following reaction of 298 K :

$2NH_{3(g)} + CO_{2(g)} \rightleftharpoons 4NH_2CONH_{2(aq)} + H_2O_{(l)}$

Standard Gibb's energy change of the given temperature is -13.6 kJ/mol . (3)

(c) Write the sign of entropy change in the following chemical reactions :

(i) $CaCO_{3(s)} \rightarrow CaO_{(s)} + CO_{2(g)}$

(ii) $2N_2O_{5(g)} \rightarrow 4NO_{2(g)} + O_{2(g)}$

26. (a) Explain why ice floats over water ?
- (b) Name two factors which affect ionisation enthalpy of an isolated gaseous atom.
- (c) Draw the molecular orbital diagram of N_2^+ . Write its configuration. Calculate its bond order. What is its magnetic character.

OR

- (a) Under what condition do gases show maximum deviation from ideal behaviour ?
- (b) To which block (s, p, d or f) does the element with atomic no. 50 belongs ?
- (c) Draw the molecular orbital diagram of O_2 . Write its configuration. Calculate its bond order. What is its magnetic character ? (1+1+3)

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