CBSE Question Paper 2019 (Set-1)

Class 11 Chemistry

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Time: 3 hours

MM 60

GENERAL INSTRUCTIONS:

i. All Questions are compulsory
ii. Question no. 1 are very short answer questions and carry 1 marks each.
iii. Question 6 to 14 are short answer questions and carry 2 marks each.
iv. Question no 15 to 23 are also short answer questions and carry 3 marks each.
v. Question no 24 and 25 are long answer questions and carry 5 marks each.
vi. Use log table if necessary.

1. What is the formula of a compound in which element Y forms ccp lattice and atoms of X occupy 1/3rd of the octahedral voids?
2. Why do alkali metals give blue colour when dissolved in liquid ammonia?
3. On heating a crystal of KCl in potassium vapours, the crystal starts exhibiting a violet colour. What is this due to?
4. State the second law of thermodynamics.

OR

When 430 J of work was done on a system, it lost 120 J of energy as heat. Calculate the value of Internal energy change for the process.

5. Give the complete redox reaction for the cell representation:

   $Cu(s)/Cu^{2+}(aq)//Ag^{+}(aq)/Ag(s)$
6. The density of 1M solution of NaCI is 1.25 g ml^3. Calculate the molality of the solution (NaCI = 58.5).
7. Write the electronic configuration of Cr^{-1} and Sc^{+1} Ionic species. (Cr = 24, Sc = 2 1).
8. Calculate the velocity of a particle of matt 0.1mg which is associated with a wavelength of 3 3 $\times 10^{29}$ m (h = 6.6×10^{-34} M kgm^2s^1)

9. Give the molecular orbital configuration of N_2^+ and O_2^{2-}(At. No. O = 8, N = 7)

OR

Give the shapes of the following molecules:

PCl_5, SF_6, BeF_2, NH_4^+(At. No. P = 15, S = 16, Cl = 17, F = 9, Be = 4, N = 7, H = 1)

10. Arrange the following in decreasing order of ionic character of the bond and give reasons
NaCl, NaF, NaBr and NaI
11. Calculate the pH of 0.4 gm of NaOH dissolved in water to give 200 ml of solution.(NaOH = 40 g)

OR

Determine the solubility of Silver chromate, K_{sp} of $Ag_2CrO_4 = 1.1 \times 10^{-12}$.

12. How would you explain the following:
    a. Lil is more soluble in ethanol than KI.
    b. A solution of sodium carbonate is alkaline. why?
13. Account for the following(any two):
    a. Boron halides do not dimerise like boron hydride.
    b. $PbCl_4$ is a good oxidizing agent.
    c. $SiCl_4$ can be easily hydrolysed by water but CCl_4 does not.
14. What happens when(give equations) (any two):
    i. Borax is heated strongly.
    ii. B_2H_6 is reacted with ammonia.
    iii. Aluminium is treated with dilute NaOH.
15. Give reasons for the following:
    i. Halogens acts as good oxidizing agents.
    ii. Electron gain enthalpy of noble gas is almost zero.
    iii. Na and Mg^+ has same number of electrons but removal of electron from Mg^+ requires more energy.
16. An element occurs in bcc structure. It has a cell edge length of 250 pm. Calculate the molar mass if its density is 8.0 gm cm^{-3}. Also, calculate the radius of an atom of this element.

OR

Niobium crystallizes in bcc structure of the density 8.6 g/cm^3. Calculate the atomic radius of niobium using atomic mass = 93 μ.

17. Calculate the enthalpy change for the process $CCl_4(g) \rightarrow C(g) + 4Cl(g)$
and calculate bond enthalpy of C-Cl in $CCl_4(g)$.

$\Delta vapH^s(CCl_4)$ = 30.5 kJ mol^{-1}
$\Delta fH^\theta(CCl_4)$ = -135.5 kJ mol^{-1}
ΔaH^θ (C) = 715.0 kJ mol^{-1} .
$\Delta aH^\theta(Cl_2)$ = 242 kJ mol^{-1}, where ΔaH^θ is enthalpy of atomisation

18. Calculate the bond energy of C - H bond if $\Delta H^\circ_{combustion}$ of CH_4 =−891.6 kJmol^{-1}, ΔH of C(s) is 394 kJmol^{-1}, ΔH of H_2 is -286 kJmol^{-1} .heat of sublimation of C(s) if 717 kJmol^{-1}, heat of dissociation of H_2 is 416 kJmol^{-1}.
19. Dihydrogen gas is obtained from natural gas by partial oxidation with steam as per following endothermic reaction:
$CH_4(g) + H_2O(l) \rightleftharpoons CO_2(g) + 3H_2(g)$
    a. Write an expression of K_c for the above reaction
    b. How will the value of K_c and composition of equilibrium mixture be affected by
        i. Increasing pressure
        ii. increasing temperature
        iii. adding a catalyst
        iv. adding an inert gas
20. Balance the following redox reaction by ion electron method:
    a. $MnO_4^- + I^- \rightarrow MnO_4 + I_2$ (in basic medium)
    b. $Cr_2O_7^{2-} + SO_2 \rightarrow Cr^{3+} + HSO_4^-$ (in acidic medium)
21. i. Name the class of hydrides to which water and sodium hydride belong.
    ii. Give the names of different types of molecular hydrides.
    iii. Explain the term hydride gas.
22. Explain the following terms with suitable examples:

1. Metamerism
2. Electromeric Effect
3. R(Resonance)

23. Give reasons. (Give chemical equations to support your answer)
    i. Alkynes are acidic in nature.
    ii. What happens when 2 - bromobutane is treated with alcoholic KOH.
    iii. Effect of branching of an alkane on its boiling point.

OR

Explain the following with suitable examples:
    i. Saytzeff's Rule
    ii. Markovnikov's Rule
    iii. β-Elimination Reaction

24. Explain the following reaction:

OR

What happens when(give chemical equations)
    i. Wurtz reaction
    ii. Freidal Crafts Reaction
    iii. Decarboxylation
    iv. Kolbe's Electrolysis
    v. Nitration in Benzene
    vi. Benzene is reacted with chlorine in the presence of anhydrous $AlCl_3$.
    vii. Pent-2-ene is reacted with O_3 and the product is treated with Zn/H_2O.
    viii. Propyne is treated with Fe at 873 K.
    ix. Methane is reacted with oxygen in the presence of Mo_2O_3.
    x. Ethyne is hydrolysed in the presence of $HgSO_4/H_2SO_4$.

25. Give the condensed and bond - line structural formulae of the following:
    i. 2-hydroxy-1,2,3-propanetricaboxylic acid
    ii. Hexanedial
    iii. 2-(4-isobutylphenyl)propionic acid
    iv. 2-hydroxy-1,2-diphenylethan-1-one

v. 4-phenylbut-2-anal

OR

1. Identify the most stable species in the following ions and give reasons:
   1. CH_3^-, CH_2^-Br, C^-HBr_2, C^-Br_3
   2. CH_3^-, CH_2^-Cl, C^-HCl_2, C^-Cl_3
2. Arrange the following in order of increasing acidic strength giving reasons:
   1. CH_3CH_2COOH, $(CH_3)_2CHCOOH$ and $(CH_3)_2CCOOH$.
   2. CCl_3COOH, $CH_2ClCOOH$, $CHCl_2COOH$ and CH_3COOH.
   3. $CH_2ClCH_2CH_2COOH$, $CH_3CHClCH_2COOH$, $CH_3CH_2CHClCOOH$ and $CH_3CH_2CCl_2COOH$