



# Anand Niketan

## Maninagar Campus

<b>Grade : XI</b>	<b>Subject : Chemistry</b>	<b>Marks :</b>
<b>Date :</b>	<b>Empower-1 Worksheet</b>	<b>Time :</b>

### 1 MARK QUESTIONS

1. Define mole fraction.
2. What is the relationship between wavelength and the momentum?
3. What do you mean by electron affinity?
4. What is formal charge?
5. Calculate the oxidation number of Mn in  $\text{KMnO}_4$ .
6. Sodium forms  $\text{Na}^+$  ions but it does not form  $\text{Na}^{2+}$  because of .....
  - a) very low value of 1<sup>st</sup> and 2<sup>nd</sup> ionisation energy
  - b) very high value of 1<sup>st</sup> and 2<sup>nd</sup> ionisation energy
  - c) high value of 1<sup>st</sup> ionization energy and low value of 2<sup>nd</sup> ionisation energy
  - d) low value of 1<sup>st</sup> ionization energy and high value of 2<sup>nd</sup> ionization energy
7. Assertion: Superoxides of alkali metals are paramagnetic.  
Reasons : Superoxides contain the ion  $\text{O}^{2-}$  ion which has one unpaired electron.
  - a) Both assertion and reason are true, and reason is correct explanation of assertion.
  - b) Both assertion and reason are true, but reason is not correct explanation of assertion
  - c) Assertion is correct but reason is incorrect
  - d) Assertion is incorrect but reason is correct
8. What is the electronic configuration of an element of group - 1 (I - A) whose atomic number is 37?
  - a)  $[\text{Ne}]3s^1$
  - b)  $[\text{Kr}]5s^1$
  - c)  $[\text{Xe}]6s^1$
  - d)  $[\text{Ar}]4s^1$
9. Select the pair of elements which does not illustrate a diagonal relationship in the periodic table.
  - a) Li and Mg
  - b) Be and Al
  - c) B and Si
  - d) Li and K
10. The set representing the correct order of ionic radius is .....
  - a)  $\text{Li}^+ > \text{Na}^+ > \text{Mg}^{2+} > \text{Be}^{2+}$
  - b)  $\text{Mg}^{2+} > \text{Be}^{2+} > \text{Li}^+ > \text{Na}^+$
  - c)  $\text{Li}^+ > \text{Be}^{2+} > \text{Na}^+ > \text{Mg}^{2+}$
  - d)  $\text{Na}^+ > \text{Li}^+ > \text{Mg}^{2+} > \text{Be}^{2+}$
11. With which of the following elements does dihydrogen reacts as an oxidizing agent?
  - a) Nitrogen
  - b) Sulphur
  - c) Potassium
  - d) Fluorine
12. Assertion : The position of hydrogen is not certain in periodic table.  
Reason : Physical properties of hydrogen are similar to those of metals while some chemical properties are similar to those of metals and non - metals.
  - a) Both assertion and reason are true, and reason is correct explanation of assertion
  - b) Both assertion and reason are true, but reason is not correct explanation of assertion.
  - c) Assertion is correct but reason is incorrect.
  - d) Assertion is incorrect but reason is correct.
13. In industry,  $\text{H}_2\text{O}_2$  is used as.....
  - a) Catalyst
  - b) coolant
  - c) power agent
  - d) bleaching agent
14. What is the molarity of pure water at 298 K?
  - a) 5.55 M
  - b)  $10^{-14}$  M
  - c)  $10^{-7}$  M
  - d) 55.55 M
15. Which one of the following is a case of reduction?
  - (a)  $\text{Sn}^{4+} \rightarrow \text{Sn}^{2+}$
  - (b)  $\text{Sn}^{2+} \rightarrow \text{Sn}^{4+}$
  - (c)  $\text{Fe}^{2+} \rightarrow \text{Fe}^{3+}$
  - (d)  $\text{Cl}^- \rightarrow \text{Cl}^0$
16. The oxidation number of iron in reaction:  
 $[\text{Fe}(\text{CN})_6]^{4-} \rightarrow [\text{Fe}(\text{CN})_6]^{3-}$  changes from :
  - (a) -4 to -3
  - (b) -3 to -2
  - (c) +2 to +3
  - (d) +3 to +2
17. The reaction :  $3\text{ClO}^- (\text{aq}) \rightarrow \text{ClO}_3^- (\text{aq}) + 2\text{Cl}^- (\text{aq})$  is an example of :
  - (a) Oxidation
  - (b) Reduction
  - (c) Disproportionation
  - (d) Decomposition

18. Hybridisation in methane (CH<sub>4</sub>), ethene (C<sub>2</sub>H<sub>4</sub>), ethyne (C<sub>2</sub>H<sub>2</sub>) involves s and p orbitals. Choose the correct hybrid orbitals in the options given below for CH<sub>4</sub>, C<sub>2</sub>H<sub>4</sub> and, C<sub>2</sub>H<sub>2</sub> respectively

- a) sp<sup>3</sup>, sp, sp<sup>2</sup>sp<sup>3</sup>, sp, sp<sup>2</sup>                      b) sp<sup>2</sup>, sp, sp<sup>3</sup>sp<sup>2</sup>, sp, sp<sup>3</sup>  
 c) sp, sp<sup>3</sup>, sp<sup>2</sup>sp, sp<sup>3</sup>, sp<sup>2</sup>                      d) sp<sup>3</sup>, sp<sup>2</sup>, sp

19. Change in hybridisation affects the carbon's and the organic compound's

- a) Electronegativity                      b) bond length                      c) bond strength                      d) bond enthalpy

20. Which of the following is the correct IUPAC name?

- a) 4, 4-Bi(methyl)-3-ethylheptane                      b) 4, 4-Dimethyl-3-ethylheptane  
 c) 5-Ethyl-4, 4-dimethylheptane                      d) 3-Ethyl-4,4-dimethylheptane

21. A gaseous hydrocarbon gives upon combustion 0.72 g of water and 3.08 g of CO<sub>2</sub>. The empirical formula of the hydrocarbon is:

- a) C<sub>2</sub>H<sub>4</sub>                      b) C<sub>3</sub>H<sub>4</sub>                      c) C<sub>6</sub>H<sub>5</sub>                      d) C<sub>7</sub>H<sub>8</sub>

22. The volume of oxygen evolved at STP, by decomposition of 0.68 g '20 volume' hydrogen peroxide solution, is

- a) 2.24 mL                      b) 22.4 mL                      c) 224 mL                      d) 2240 mL

23. The system that contains the maximum number of atoms is

- a) 4.25 g of NH<sub>3</sub>                      b) 8 g of O<sub>2</sub>                      c) 2 g of H<sub>2</sub>                      d) 4 g of He

24. The general formula of alkane is \_\_\_\_\_.

- a) C<sub>n</sub>H<sub>2n+2</sub>                      b) C<sub>n</sub>H<sub>2n</sub>                      c) C<sub>n</sub>H<sub>2n-2</sub>                      d) None of these

26. Alkane are almost \_\_\_\_\_ molecule.

- a) Polar                      b) Non-polar                      c) Both a and b                      d) None

27. At which temperature water possesses anomalous volume expansion ?

- a) 273 K to 277 K                      b) 0 K                      c) 173 K                      d) - 108 K

28. Which of the following elements has disputed position in periodic table ?

- a) Hydrogen                      b) Silicon                      c) Nitrogen                      d) Carbon

29. A : Calgon is used to remove Mg<sup>+2</sup> and Ca<sup>+2</sup> ions from solution.

R : Calgon reacts with Ca<sup>+2</sup> and Mg<sup>+2</sup> ions and gives precipitates of Ca<sup>+2</sup> and Mg<sup>+2</sup> ions.

- a) Both assertion and reason are true, and reason is correct explanation of assertion.  
 b) Both assertion and reason are true, but reason is not correct explanation of assertion.  
 c) Assertion is correct but reason is incorrect.  
 d) Assertion and Reason both are incorrect.

30. Normally with which acid, Zn metal reacts to give dihydrogen ?

- a) dil. H<sub>2</sub>SO<sub>4</sub>                      b) dil. HCl                      c) con. H<sub>2</sub>SO<sub>4</sub>                      d) dil. H<sub>2</sub>SO<sub>4</sub> and dil. HCl

31. Which of the following is correct matching of Column A with Column B.

Column A	Column B
(1) Ionic hydride	(4) LiH
(2) Metallic hydride	(5) TiH
(3) Molecular hydride	(6) HF

- a) 1 - 4, 2 - 5, 3 - 6                      b) 1 - 5, 2 - 6, 3 - 4                      c) 1 - 6, 2 - 4, 3 - 5                      d) 1 - 4, 2 - 6, 3 - 5

32. State the general formula of the compound that can be formed between the elements of group 2 and group 17.





- a) MX                      b) M<sub>2</sub>X<sub>3</sub>                      c) MX<sub>2</sub>                      d) MX<sub>4</sub>

33. Which of the following is the correct increasing order of the atomic radius of O, C, F, Cl and Br?

- a) F > Cl > Br > O > C                      b) O < F < Cl < Br < C                      c) Br < C < Cl < O < F                      d) F < O < C < Cl < F

34. While arranging elements in the same Periodic table, which other characteristic did Mendeleev consider other than the atomic mass?

- a) Elements having same properties should be in same group.  
 b) Elements having same physical state should be in same group  
 c) Elements having same electron configuration should be in same group  
 d) On the basis of stoichiometry of metal oxide

35. .... is hybridisation of all carbon atoms in the molecule prop - 1- yne.  
 a)  $sp$  and  $sp^2$     b)  $sp$  and  $sp^3$     c)  $sp$ ,  $sp^2$  and  $sp^3$     d)  $sp^2$  and  $sp^3$
36. How many resonating structures does  $CO_2$  exhibit?  
 a) 1    b) 2    c) 3    d) 4
37. Select the correct bond line structure of 1, 3- pentadiene.  
 a)     b)     c)     d) 
38. Which of the following product obtained by heterolytic fission?  
 a) Only cation    b) Only anion    c) Free radical    d) Cation and anion

## 2 MARKS QUESTIONS

27. Which of the following species will have the largest and the smallest size?  
 $Mg$ ,  $Mg^{2+}$ ,  $Al$ ,  $Al^{3+}$
28. Calculate the amount of carbon dioxide that could be produced when  
 i. 1 mole of carbon is burnt in air.  
 ii. 1 mole of carbon is burnt in 16 g of dioxygen.
29. What is the basic difference in approach between Mendeleev's Periodic Law and the Modern Periodic Law?
30. Arrange the following:  
 i.  $CaH_2$ ,  $BeH_2$  and  $TiH_2$  in order of increasing electrical conductance.  
 ii.  $NaH$ ,  $MgH_2$  and  $H_2O$  in order of increasing reducing property.
31. Write the chemical reactions to show amphoteric nature of water.
32. Write the state of hybridisation of carbon in the following compounds and shapes of each of the molecules.  
 i.  $CH_3F$   
 ii.  $HCN$
33. Calculate the total number of atoms in 5.0g  $CaCO_3$ .
34. Hydrogen shows resemblance with both halogens and also with alkali metals. Give two points in favor of each.
35. Calculate the mass of a photon with wavelength  $3.6 \text{ \AA}$ .
36. Emission transitions in the Paschen series end at orbit  $n=3$  and start from orbit  $n$  and can be represented as  $\nu = 3.29 \times 10^{15} \text{ Hz} [1/3^2 - 1/n^2]$ . Calculate the value of  $n$  if the transition is observed at 1285nm. Find the region of the spectrum.
37. Justify that the reaction:  
 $2Cu_2O(s) + Cu_2S(s) \rightarrow 6Cu(s) + SO_2(g)$  is a redox reaction. Identify the species oxidized/reduced, which acts as an oxidant and which acts as a reductant.
38. Write the structural formula of:  
 (a) o-Ethylanisole,    (b) p-Nitroaniline,  
 (c) 2,3-Dibromo-1-phenylpentane,    (d) 4-Ethyl-1-fluoro-2-nitrobenzene.
39. Write structures of different chain isomers of alkanes corresponding to the molecular formula  $C_6H_{14}$ . Also write their IUPAC names.

## 3 MARKS QUESTIONS

40. List the difference between Orbit and Orbital. (at least 3 points)
41. (i) An atomic orbital has  $n=3$ . What are the possible values of  $l$  and  $m_l$  ?  
 (ii) List the quantum numbers ( $m_l$  and  $l$ ) of electrons for 3d orbital.  
 (iii) Which of the following orbitals are possible? 1p, 2s, 2p and 3f.
42. A golf ball has a mass of 40 g, and a speed of  $45\text{ms}^{-1}$ . If the speed can be measured within accuracy of 2%. Calculate the uncertainty in the position.
43. Write the definition of following with one example each.  
 i. Disproportionation reactions.  
 ii. Decomposition reaction.  
 iii. Displacement reaction.
44. Comment on the reactions of dihydrogen with (i) Chlorine, (ii) Sodium and (iii) Copper (II) oxide.

45. Justify the position of hydrogen in the periodic table on the basis of its electronic configuration.
46. List the differences between a sigma and a pi bond. (atleast 3 points)
47. Describe the hybridisation in case of  $\text{PCl}_5$ . Why are the axial bonds longer as compared to equatorial bonds?
48. Write the important conditions required for the linear combination of atomic orbitals to form molecular orbitals.
49. Permanganate ion reacts with bromide ion in basic medium to give manganese dioxide and bromate ion. Write the balanced ionic equation for the reaction.
50. Write the net ionic equation for the reaction of  $\text{K}_2\text{Cr}_2\text{O}_7$  with  $\text{Na}_2\text{SO}_3$  in an acid solution to give chromium (III) ion and the sulphate ion.
51. (a)  $\text{CO}_2$  and  $\text{H}_2\text{O}$  are both triatomic molecules but dipole moment of  $\text{CO}_2$  is zero whereas that of  $\text{H}_2\text{O}$  is 1.83D. Why?  
 (b) Define dipole moment.
52. Calculate the number of atoms in each of the following:  
 (i) 52 moles of He      (ii) 52u of He      (iii) 52g of He
53. Explain why cations are smaller and anions are larger in radii than their parent atoms.
54. Explain the difference between electron gain enthalpy and electronegativity.
55. Write the resonating structures for  $\text{SO}_3$ ,  $\text{NO}_2$  and  $\text{NO}^{3-}$ .
56. Give chemical reactions of  
 (i) Wurtz reaction (ii) Clemmensen reduction (iii) Decarboxylation reaction of carboxylic acid.
57. Define the following:  
 (i) Aufbau principle      (ii) Pauli exclusion principle      (iii) Hund's rule.

## 5 MARKS QUESTIONS

58. (a) Dinitrogen and dihydrogen react with each other to produce ammonia according to the following chemical equation:  $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightarrow 2\text{NH}_3(\text{g})$   
 (i) Calculate the mass of ammonia produced if  $2.00 \times 10^3\text{g}$  dinitrogen reacts with  $1.00 \times 10^3\text{g}$  dihydrogen.  
 (ii) Will any one of the two reactants remain unreacted?  
 (iii) If yes, which one and what would be its mass?  
 (b) How are 0.50 mol  $\text{Na}_2\text{CO}_3$  and 0.50M  $\text{Na}_2\text{CO}_3$  different?
59. (a) What is ionisation enthalpy?  
 (b) Among the second period elements, the actual ionisation energies are in the order:  $\text{Li} < \text{Be} < \text{C} < \text{O} < \text{N} < \text{F} < \text{Ne}$ . Explain why  
 (i) Be has higher  $\Delta_i H$  than B      (ii) O has lower  $\Delta_i H$  than N and F?
60. Write structures of different chain isomers of alkanes corresponding to the molecular formula  $\text{C}_6\text{H}_{14}$ . Also write their IUPAC names.
61. What is isomerism? Explain its different types with example of one each.
62. Complete the following chemical reactions:  
 (i)  $\text{PbS}_{(\text{s})} + \text{H}_2\text{O}_{2(\text{aq})} \longrightarrow$   
 (ii)  $\text{MnO}_4^-_{(\text{aq})} + \text{H}_2\text{O}_{2(\text{aq})} + \text{H}^+_{(\text{aq})} \longrightarrow$   
 (iii)  $\text{CaO}_{(\text{s})} + \text{H}_2\text{O}_{(\text{g})} \longrightarrow$   
 (iv)  $\text{AlCl}_3_{(\text{g})} + \text{H}_2\text{O}_{(\text{l})} \longrightarrow$   
 (v)  $\text{Ca}_3\text{N}_2_{(\text{s})} + \text{H}_2\text{O}_{(\text{l})} \longrightarrow$
63. Balance the following redox reaction  
 a)  $\text{MnO}_4^-_{(\text{aq})} + \text{I}^-_{(\text{aq})} \longrightarrow \text{MnO}_2_{(\text{s})} + \text{I}_{2(\text{s})}$  (basic medium)  
 b)  $\text{H}_2\text{O}_{2(\text{aq})} + \text{Fe}^{2+}_{(\text{aq})} \longrightarrow \text{Fe}^{3+}_{(\text{aq})} + \text{H}_2\text{O}_{(\text{l})}$  (acidic medium)