CHEMISTRY

BOOKS - NAGEEN CHEMISTRY (ENGLISH)

SELF ASSESSMENT PAPER 1

Questions

1. Fill in the blanks by choosing the appropriate word/words from those given in the brackets:

(nuclear, P_2O_5, ΔH, non-polar, $NaNH_2$, geometrical, ΔS, polar , two, skeletal, ΔU, one, ΔG)

CO_2 molecule is regarded as a _____molecule although it contains _____ bonds.

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2. Fill in the blanks by choosing the appropriate word/words from those given in the brackets:

(nuclear, P_2O_5, ΔH, non-polar, $NaNH_2$, geometrical, ΔS, polar , two, skeletal, ΔU, one, ΔG)

For a chemical process, $q_p =$ _____but $q_v =$ _____

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3. Fill in the blanks by choosing the appropriate word/words from those given in the brackets:

(nuclear, P_2O_5, ΔH, non-polar, $NaNH_2$, geometrical, ΔS, polar , two, skeletal, ΔU, one, ΔG)

Chain isomerism is also referred as _____ isomerism

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4. Fill in the blanks by choosing the appropriate word/words from those given in the brackets:

(KOH, $NaNH_2$,)

_____is a better dehydrohalogenating agent as compared to _____

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5. For the following reaction in gaseous phase,

$CO + \frac{1}{2}O_2 \rightarrow CO_2, \frac{K_c}{K_p}$ is

A. $(RT)^{1/2}$

B. $(RT)^{-1/2}$

C. RT

D. $(RT)^{-1}$

Answer:

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6. In van der Waals' equation of state, the constant 'b' is a measure of

A. intermolecular repulsion

B. intermolecular attraction

C. volume occupied by the molecules

D. intermolecular collisions per unit volume

Answer:

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7. Is the entropy of the universe constant ?

A. is increasing and tending towards a maximum value

B. is decreasing and tending towards zero

C. remains constant

D. decreasing and increasing with a periodic rate.

Answer:

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8. Nitration of benzene by nitric acid and sulphuric acid is

A. electrophilic substitution

B. electrophilic addition

C. nucleophilic substitution

D. free radical substitution

Answer:

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9. Match the following

(i)	Beilstein test	(a)	Loss of electrons
(ii)	Purest and densest form of carbon	(b)	Acidic buffer
(iii)	Oxidation	(c)	Halogens
(iv)	Solution of acetic acid and sodium acetate	(d)	Diamond

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10. Which of the following are iso-electronic species?

$Na^+, Mg^{2+}, Ca^{2+}, S^{2-}$

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11. Which atom (X) is indicated by the following configuration?

$X \to [Ne]3s^2 3p^3$

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12. Which atoms are indicated by the following configuration?

$[Ar]4s^2 3d^1$

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13. Which element in each of the following pairs of elements would you expect to have lower first ionisation energy? Explain.

Cl, F

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14. Which element do you think would have been named by Lawrence Berkley Laboratory ?

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15. What is common in the electronic configuration of H and alkali metals?

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16. Why is LiH least reactive of all the saline hydrides?

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17. What happens when acetylene is treated with hypochlorous acid

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18. How would you prepare acetylene from CaC_2

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19. 1.5 g of an organic compound in a quantitative determination of phosphorus gave 2.5090 g of $Mg_2P_2O_7$. Calculate the percentage of phosphorus in the compound.

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20. 0.1170g of an organic compound on heating with conc. HNO_3 and silver nitrate in Carius furnace gave 0.42g of AgCl. Find the percentage of chlorine in the sameple.

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21. Complete and balance the following equations:

$BCl_3(g) + H_2(g) \xrightarrow{1270K}$ ____+____

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22. Complete and balance the following equations:

$H_3BO_3 + C_2H_5OH \xrightarrow{\Delta}$ _____+_____

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23. 0.05 g of a gas at 750 mm pressure and 25°C occupy a volume of 46.5 mL. Calculate the molecular mass of the gas.

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24. Draw the structures of the following compounds:

2-keto-3-methylbutanamide

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25. Write the structural formula of following compounds:

1-bromo-3-chlorocyclohexane

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26. Why does hydrogen occur in a diatomic form rather than in a monoatomic form under normal conditions?

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27. How would you convert n-butane to iso-butane?

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28. Name the product obtained on addition of a water molecule of propene in the presence of dil. H_2SO_4

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29. What happens when benzene is treated with ozone and the product is subjected to hydrolysis

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30. What happens when phenol is heated with zinc dust

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31. Describe the shapes of BF_3 and BH_4^-. Assign the hybridisation of boron in these species.

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32. Which hybrid orbitals are used by carbon atoms in the following molecules?

CH_3-CH_3, (b) $CH_3-CH=CH_2$, (c) CH_3-CH_2-OH, (d) CH_3-CHO (e) CH_3COOH

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35. Hydrogen and oxygen combine to form two compounds, water and hydrogen peroxide. If the percentage of oxygen is 88.89 in water and 94.12 in hydrogen peroxide, show that the data support law of multiple proportions.

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36. $1470cm^3$ of a gas is collected over water at 303 K and 74.4 cm of Hg. If the gas weighs 1.98 g and vapour pressure of water at $30^\circ C$ is 3.2 cm of Hg, calculate the molecular weight of the gas.

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37. State any three limitations of Bohr.s model?

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38. Calculate the heat of formation of anhydrous Al_2Cl_6 from the following data:

(i)

$2Al + 6HCl(aq) \rightarrow Al_2Cl_6(aq) + 3H_2(g), \Delta H = -239.76kcal$

(ii) $Al_2Cl_6(s) + aq \rightarrow Al_2Cl_6(aq), \Delta H = -153.69kcal$

(iii) $H_2(g) + Cl_2(g) \rightarrow 2HCl(g), \Delta H = -44kcal$

(iv) $HCl(g) + aq \rightarrow HCl(aq), \Delta H = -17.31kcal$

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42. What do you understand by a spontaneous process ? Give two examples

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43. Define Gibb.s free energy and free energy change.

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44. What are green chemicals?

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45. What do you understand by COD?

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46. Name three green house gases.

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47. What are Grignard reagents and how are they prepared ? What happens when a Grignard reagent is treated with water ?

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48. Compare atomic orbitals with molecular orbitals.

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49. Balance the following equation in basic medium.

$Cr(OH)_3 + IO_3^- \rightarrow CrO_4^{2-} + I^-$

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50. Calculate the oxidation number of the underlined atom in the following species.

$K_4\underline{Fe}(CN)_6$

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51. Calculate the oxidation number of the underlined atom in the following species.

$\underline{Fe}(H_2O)_6Cl_3$

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52. Calculate the oxidation number of the underlined atom in the following species.

$K\underline{Ag}(CN)_2$

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53. Calculate the oxidation number of the underlined atom in the following species.

$\left[\underline{Co}(NH_3)_6\right]^{3+}$

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54. The compound AgF_2 is unstable compound. However, if formed, the compound acts as a very strong oxidising agent. Why ?

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55. Balance the following equations.

$C_2H_5OH + l_2 + OH^- \rightarrow CHl_3 + HCOO^- + I^- + H_2O$

(basic medium)

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56. Name the substance oxidised and the substance reduced, and also identify the oxidising agent and reducing agents in the following reactions :

(a) $3MnO_2 + 4Al \rightarrow 3Mn + 2Al_2O_3$

(b) $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$

(c) $SO_2 + 2H_2S \rightarrow 3S + 2H_2O$

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57. Identify the substance undergoing oxidation, the substance undergoing reduction, the oxidising agent and the reducing agent in each of the following reactions.

$Cr_2O_7^{2-} + 6Fe^{2+} + 14H^+ \rightarrow 2Cr^{3+} + 6Fe^{3+} + 7H_2O$

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58. Write formulas for the following compounds :

Iron (III) sulphate

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59. Write formulas for the following compounds :

Chromium (III) oxide

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60. Why is benzene extra ordinarily stable though it contains three double bonds?

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61. Explain why Alkanes do not possess much chemical reactivity under ordinary conditions?

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62. State how the following conversions can be carried out:

Ethyl alcohol to ethene.

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63. How will you convert propene to 2, 3-dimethylbutane?

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64. How will you convert

Ethyne to ethane

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65. An organic compound (A) having molecular formula C_2HCl_3O reduces Fehling's solution and on oxidation gives a monocarboxylic acid (B) with molecular formula $C_2HCl_3O_2$. Upon distillation with sodalime, (B) gives a sweet smelling liquid (C) containing 89.12% chlorine. (C) can also be obtained by heating (A) with alkali. Identity (A), (B) and (C) and explain the reactions involved.

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66. How much PCI_5 must be taken in a 9.2 L vessel to get 0.5 moles of Cl_2 at a particular temperature? The value of equilibrium constant (K_c) at the given temperature is 0.0414.

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67. How much CH_3COONa should be added to 1 litre of 0.01 M CH_3COOH to make . A buffer of pH = 4.1 ?

$\left(K_a \text{ for } CH_3COOH = 1.8 \times 10^{-5}\right)$

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68. Write the equilibrium constant expressions for the following reactions.

$Cr_2O_4^{2-}(aq) + Pb^{2+}(aq) \Leftrightarrow PbCrO_4(s)$

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69. Write the equilibrium constant expressions for the following reactions.

$NH_3(aq) + H_2O(l) \Leftrightarrow NH_4^+(aq) + OH^-(aq)$

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70. If $25.\, cm^3$ of 0.050 M $Ba(NO_3)_2$ are mixed with $25.0 cm^3$ of 0.020 M NaF, will any BaF_2 precipitated K_{sp} of BaF_2 is 1.7×10^{-6} at $298K$.

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