



CHEMISTRY

BOOKS - NAGEEN CHEMISTRY (ENGLISH)

SAMPLE QUESTION PAPER 4

Questions

1. Fill in the blanks by choosing the appropriate word/words from those given in the brackets: (increases, ionic radius, CH_2 , same, sigma, ionic, 14, 2, decreases, 16, CH_3 , pi, covalent, ionic)

An _____ bond is formed when the electronegativity difference in the combining atoms is more than _____



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2. In a homologous series, two successive members differ by a group and a molecular mass of amu.

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3. Fill in the blanks by choosing the appropriate word/words from those given in the brackets: (increases, ionic radius, CH_2 , same, sigma, ionic, 14, 2, decreases, 16, CH_3 , pi, covalent, ionic)

When N_2 goes to N_2^+ , the N-N bond distance ____ and when O_2 goes to O_2^+ the O-O bond distance _____

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4. Fill in the blanks by choosing the appropriate word/words from those given in the brackets: (increases, ionic radius, CH_2 , same, sigma, ionic, 14, 2, decreases, 16, CH_3 , pi, covalent, ionic)

The carbon-carbon triple bond in acetylene comprises of one _____ and two _____ bonds.

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5. What do the constants a and b signify in van der Waals' equation ?

- A. intermolecular repulsion
- B. intermolecular attraction
- C. volume occupied by the molecules
- D. intermolecular collisions per unit volume.

Answer: C

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6. At absolute zero, the entropy of a pure crystal is zero. This is

A. 0K

B. 15K

C. 50K

D. 100K

Answer: A



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7. A gaseous mixture contains oxygen and nitrogen in the ratio 1:4 by weight. Therefore, the ratio of the number of molecules is:

A. 1:4

B. 7:32

C. 1:8

D. 3:16

Answer: B

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8. But-1-ene may be converted to butane by reaction with

A. Zn-HCl

B. Sn-HCl

C. Zn-Hg

D. Pd/H_2

Answer: D

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9. Match the following

- | | |
|--------------------------------------|------------------------------------|
| (i) H_2O is liquid | (a) Green colouring matter of leaf |
| (ii) Non-metal displacement reaction | (b) Sulphur, Phosphorus |
| (iii) Magnesium | (c) Activity series of halogens |
| (iv) Carius method | (d) Due to hydrogen bonding |

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10. What are the laws of chemical combination ? State each law and explain it with suitable examples.

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11. Write the relation between atomic mass and equivalent weight?

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12. Which quantum number does not depend upon the value of n ?

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13. For a given value of l , how many values of m are permissible?

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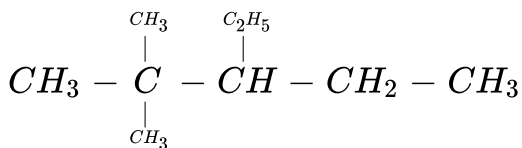
14. Name the alkali metals which form superoxides when heated in excess of air.

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15. Name the metal which floats on water without any apparent reaction with it.

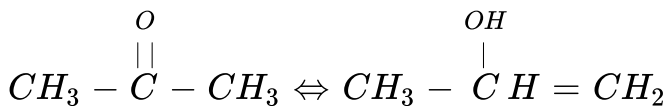
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16. Identify primary, secondary, tertiary and quaternary carbon atoms in the following compound:



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17. What type of isomerism is exhibited by the following equilibrium?



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18. 0.1092 g of a dibasic acid is exactly neutralized by 21cm^3 of 0.1N NaOH. Calculate the molecular mass of the acid.

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19. 0.500 g of the silver salt of an organic dibasic acid on ignition gives 0.325 g of pure silver. Find the molecular mass of the acid.

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20. What is oxidation number? Mention the working rules used to calculate the oxidation number of an atom in a given species. Calculate the oxidation number of S in Na_2S , Na_2SO_3 , Na_2SO_4 , $\text{Na}_2\text{S}_2\text{O}_3$ and $\text{Na}_2\text{S}_4\text{O}_6$.

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21. Find the oxidation number of:

Cr in $K_2Cr_2O_7$

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22. 7.00 g of a gas occupies a volume of 4.1 L at 300 K and 1 atm pressure. What is the molecular mass of the gas?

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23. Write the structural formula of the compounds having the following IUPAC names:

4-nitropent-1-yne

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24. Write the structural formula of the compounds having the following IUPAC names:

Butane-2, 3-dione

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25. Why are potassium and caesium rather than lithium used in photoelectric cells ?

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26. How will you convert methane to ethane

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27. How will you convert ethane to methane?



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28. A hydrocarbon decolourised bromine water. On ozonolysis it gives 3-methyl butanal and acetaldehyde. Write the structure of the hydrocarbon.



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29. Discuss the structure of aluminium chloride.



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30. Why does chromium have configuration of type $3d^5 4s^1$ instead of $3d^4 4s^2$?



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31. How many electrons possess anticlockwise spin in an atom of oxygen?

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32. At 27°C , a cylinder of 20 L capacity contains three gases He, O_2 and N_2 . Their masses are 0.502 g, 0.250 g and 1.00 g respectively. If all these gases behave ideally, calculate the partial pressure of each gas as well as the total pressure.

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33. 750 mL of nitrogen are collected over water at 25°C and 740 mm pressure. If the aqueous tension at this temperature is 23.8 mm Hg, calculate the mass of the dry gas.

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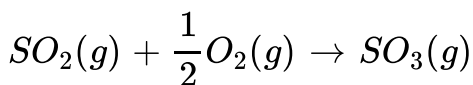
34. Out of 4s and 3d, which subshell is filled first and why?

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35. In potassium, the 19th electron enters into 4s subshells instead of 3d subshells.

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36. Calculate the entropy change (ΔS) for the following reaction at $25^\circ C$.



The absolute entropies at $25^\circ C$ and 1 atm pressure for $SO_2(g)$, $O_2(g)$ and $SO_3(g)$ are 248.5, 205.0 and 256.2 $J K^{-1} mol^{-1}$ respectively.



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37. Define heat of formation. How is it useful in the calculation of the heat of a reaction ?



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38. Calculate the calorific value of sugar if its heat of combustion is 5645 kJ mol^{-1} .



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39. Define air pollution. What are the main pollutants ?



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40. Distinguish between primary and secondary air pollutants.

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41. Indicate the σ and π bonds in the following molecules :

C_6H_6 , C_6H_{12} , CH_2Cl_2 , $CH_2 = C = CH_2$, CH_3NO_2 , $HCONHCH_3$

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42. Why is +I-effect of t-butyl group greater than that of isopropyl group?

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43. Give the electron dot structure of the following compounds :

SO_2 , H_2SO_4 , HNO_3 , $HClO_2$ and $HClO_4$

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44. Give the electron dot structure of the following compounds :

SO_2 , H_2SO_4 , HNO_3 , $HClO_2$ and $HClO_4$

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45. Give the electron dot structure of the following compounds :

SO_2 , H_2SO_4 , HNO_3 , $HClO_2$ and $HClO_4$

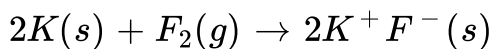
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46. Whenever a reaction between an oxidising agent and a reducing agent is carried out, a compound of lower oxidation state is formed if the reducing agent is in excess and a compound

of higher oxidation state is formed if the oxidising agent is in excess. Justify this statement giving three illustrations.

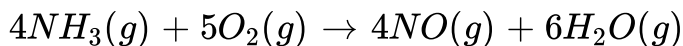
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47. Justify that the following reactions are redox reactions :



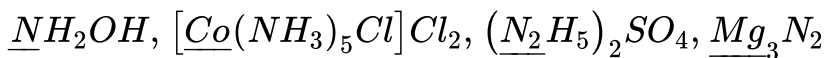
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48. Justify that the following reactions are redox reactions :



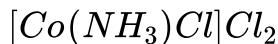
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49. Calculate the oxidation number of the underlined atoms in the following species.



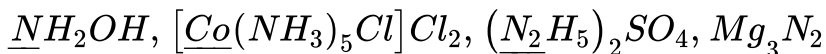
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50. Calculate the oxidation number of the underlined atoms in the following species.



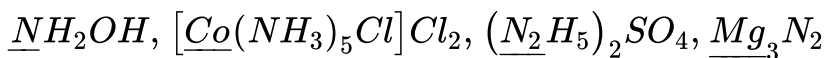
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51. Calculate the oxidation number of the underlined atoms in the following species.



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



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53. How do you account for the following observations ?

Though alkaline potassium permanganate and acidic potassium permanganate both are used as oxidants, yet in the manufacture of benzoic acid from toluene we use alcoholic potassium permanganate as an oxidant. Why? Write a balanced redox equation for the reaction.

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54. How do you account for the following observations ?

When concentrated sulphuric acid is added to an inorganic mixture containing chloride, we get colourless pungent smelling gas HCl, but if the mixture contains bromide then we get red vapour of bromine. Why?

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55. Explain why Alkanes with odd number of carbon atoms possess lower boiling points than those having even number of carbon atoms

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56. Explain why Teflon is used in making non-stick cooking utensils.

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57. How will you convert propene to propane

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58. How will you bring out the following conversions ?

Ethyne to but-2-yne

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59. How would you convert the following compounds into benzene?

(i) Ethyne

(ii) Ethene

(iii) Hexane

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60. Write IUPAC names of the products obtained by the ozonolysis of the following compounds:

(i) Pent-2-ene (ii) 3,4-Dimethyl-hept-3-ene

(iii) 2-Ethylbut-1-ene (iv) 1-Phenylbut-1-ene

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61. Write IUPAC names of the products obtained by the ozonolysis of the following compounds:

(i) Pent-2-ene (ii) 3,4-Dimethyl-hept-3-ene

(iii) 2-Ethylbut-1-ene (iv) 1-Phenylbut-1-ene

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62. How will you convert benzene into (a) p-nitrobromobenzene (b) m-nitrobromobenzene

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63. How will you convert benzene into

(i) p-nitrobromobenzene

(ii) m-nitrochlorobenzene

(iii) p -nitrotoluene

(iv) acetophenone

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64. The solubility of $Mg(OH)_2$ in pure water is $9.57 \times 10^{-3} gL^{-1}$

.Calculate its solubility I (gL^{-1}) in 0.02 M $Mg(NO_3)_2$ solutions.

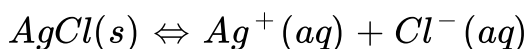
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65. Write the equilibrium constant expressions for the following reactions.



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67. Calculate the pH of a buffer solution containing 0.15 mole of CH_3COOH and 0.1 mole of CH_3COONa per litre. The dissociation constant for acetic acid 1.8×10^{-5}



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68. What is the condition for a salt to get precipitated from its saturated solutions?



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69. An acidic solution contains both Zn^{2+} and Hg^{2+} ions. Which ion will get precipitated passing H_2S into it ?



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70. The ionic product of water is 0.11×10^{-14} at 273 K. 1.0×10^{-14} at 298K and 5.1×10^{-14} at 373K Deduce from this data whether the ionisation of water to hydrogen and hydroxide ions is exothermic or endothermic.



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