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THE MOTHER'S INTERNATIONAL SCHOOL
HALF YEARLY EXAMINATION 2017-2018
SUBJECT: CHEMISTRY
CLASS – XI - D

TIME: 3 Hours   M. M: 70

GENERAL INSTRUCTIONS:

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

1. What is the order of screening effect of electrons of s, p, d and f orbitals of a given shell of an atom on its outer shell electrons?   (1)

2. Arrange the bonds in order of increasing ionic character in the molecules: LiF, K_2O, N_2, SO_2 and ClF_3.   (1)

3. The process of formation of O^{2-} in gas phase is unfavourable even though O^{2-} is isoelectronic with neon. Give reason.   (1)

4. Calculate the compressibility factor for CO_2, if one mole of it occupies 0.4 litre at 300K and 40 atm. Comment on the result.   (1)

5. Arrange the following in order of increasing density : Oxygen at 25°C ,1atm; oxygen at 0°C ,2 atm; Oxygen at 273°C,1 atm.   (1)

6. One litre of oxygen at STP is made to react with three litres of Carbon monoxide at STP. Calculate the mass of each substance found after the reaction. Which one is the limiting reagent?   (2)

7. a) Out of 3d and 4s which is filled first and why?   (2)
   b)(i)How many subshells are associated with n=3?
   (ii)How many electrons will be present in subshells having m_s values of +1/2 for n=4?

8. Give reason.   (2)
   a) Hydrogen peroxide is stored in a plastic or wax lined glass bottle in lab.
   b) Interstitial hydrides are used for storing hydrogen

9. The heat of combustion of methane gas at constant volume is measured at 298K and is found to be -885389J/mol. Find the value of enthalpy change.   (2)

10. a)How does basic strength of hydroxides of group 1 and 2 elements vary down the group?Give reason.   (2)
    b)What is responsible for the blue colour of the solution of alkali metal in liquid ammonia?Give chemical equation also.

11. Give reason why? **(3)**
    a) Free rotation about pi bond is not possible.
    b) A non polar molecule can have polar bonds.
    c) A molecule of PCl_5 exists but that of NCl_5 does not.

12. Arrange the elements N, P, O and S in the order of- **(3)**
    a) Increasing first ionization enthalpy.
    b) Increasing non metallic character.   Give reason for the arrangements assigned.

13. a) Fe^{3+} ion is more stable than Fe^{2+} ion. Why? **(3)**
    b) Line emission spectra are useful for studying electronic structure. Why?
    c) What is the most important application of de Broglie concept?

14. a) At hills, use of pressure cooker is essential for cooking food. Why? **(3)**
    b) What is fire polishing of glass?
    c) Real gases show deviation from ideal behaviour. Why?

15. a) Give two differences between electron gain enthalpy and electro negativity. **(3)**
    b) Study the graphs given below .Write any four features that can be inferred from them.
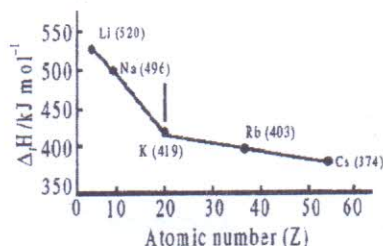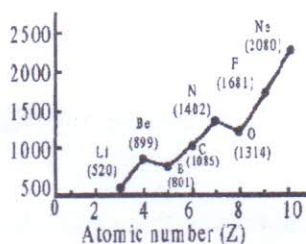
16. a) State Hess's Law of constant Heat summation. **(3)**
    b) Calculate the standard heat of formation of carbon disulphide(l).Given that the standard heats of combustion of Carbon(s), sulphur(s) and carbon disulphide (l)are -393.3,-293.72 and -1108.76 KJ mol^{-1} respectively.

17. a) In what ways lithium shows similarities to magnesium in its chemical behavior? Suggest any two. **(3)**
    b) What makes Be to show properties uncommon to the rest of its group members?
    c) What is the phenomenon discussed in(a) and (b) part due to? Define it and discuss its cause.

18. a) Why molality is preferred over molarity in expressing the concentration of a solution? **(1+2)**
    b) The density of 2M solution of acetic acid in water is 1.02 g/ml. Calculate the molality of the solution.

19. a) State any two salient features of hybridization. **(1+2)**
    b) Discuss the Hybridisation of C atom in propyne and show the orbital overlap.

20. a) How is pressure of a gas in a mixture related to the total pressure of the mixture? Derive the expression. **(3)**
    b) 1.22 g of a gas measured over water at 15°C and a pressure of 775 mm Hg occupied 900ml.Calculate the volume of dry gas at NTP. Vapour pressure of water at 15°C is 14mm Hg.

21 Give reason why: (3)

   a)Potassium carbonate can not be prepared by solvay's process.

   b)Lithium salts are hydrated to maximum extent.

   c)$MgSO_4$ is soluble in water while $BaSO_4$ is insoluble.

22   Answer any two: (3)

   a) Discuss shapes of following molecules using VSEPR : NCl_3 and ICl_4^-

   b) Which has a higher dipole moment and why? CH_3F or CH_3Cl.

   c) How does bond energy vary from N_2^- to N_2^{2-}? Why? Discuss using MOT.

23 Water had been flowing through the pipe shown in the photograph for some time .The (4)
pipe originally had no internal deposit.

   a) Give a possible reason for the formation of the deposit.

   b) How can this be treated using zeolite?

   c) In order to wash clothes with water through the pipe which cleansing agent is preferred & why, soap or detergent?

   d) Mention the values associated with the use of soap.

24 a) Calculate the mass of CO_2 which contain the same number of molecules as are (1+2+2)
contained in 40 g of oxygen.

   b)10 ml of HCl solution gave 0.1435g of AgCl when treated with excess of $AgNO_3$.Find the molarity of the acid solution. [Ag=108u]

   c)A chemical compound is found to have the following chemical composition:
C=19.57%,Fe=15.2%,N=22.83% and K=42.39%.Calculate the molecular formula of the compound if the molecular mass is 368. [Fe=56 u]

25 a)Derive relation between Cp and Cv for an ideal gas. (1+1+1.5+1.5)

   b)Is the bond energy of all four C-H bonds in methane equal? Comment.

   c)For a hypothetical reaction, X→Y,the enthalpy and entropy changes are 46.3KJ/mol and 108.80 JK^{-1} mol^{-1} respectively.Find the temperature above which this reaction is spontaneous.

   d)The standard free energy change for a reaction is -212.3KJ/mol.If the enthalpy change of the reaction is -216.7KJ/mol,calculate the entropy change for the reaction.

26 a) Why Bohr's orbits are called stationary states? (1+2+2)

   b) If the photon of the wavelength 150 pm strikes an atom and one of its inner bound electrons is ejected out with a velocity of 1.5×10^7 m s^{-1}, calculate the energy with which it is bound to the nucleus.

   c) Which electronic transition in Balmer series of hydrogen atom has same frequency as that of n=6 to n=4 transition in He^+ ?

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