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SAMPLE QUESTION PAPER - TERM – II: SESSION 2021-22

Class : XI   **Max. Marks: 35**

Subject : CHEMISTRY   **Time: 2 HRS**

GENERAL INSTRUCTIONS:

Read the following instructions carefully.

1. There are 12 questions in this question paper with internal choice.
2. SECTION A - Q. No. 1 to 3 are very short answer questions carrying 2 marks each.
3. SECTION B - Q. No. 4 to 11 are short answer questions carrying 3 marks each.
4. SECTION C- Q. No. 12 is case based question carrying 5 marks.
5. All questions are compulsory.
6. Use of log tables and calculators is not allowed.
7. This question paper contains 4 pages.

SECTION A

1.	Calculate pH when 9.8 g of H_2SO_4 is dissolved in 2 L solution.	2
2.	What happens when (write equations involved) a) $LiNO_3$ is heated b) KNO_3 is heated	(1+1)
3.	The solubility product A_2B is 32×10^{-9}. Calculate its solubility.	2

SECTION B

4.	a) Arrange the following compounds in decreasing order of their reactivity towards an electrophile: toluene, 4- Nitrotoluene, 2,4-Dinitrotoluene (b) Convert tert- Butyl bromide to isobutyl bromide. (c) But-1-yne liberates hydrogen gas on reaction with sodium metal while But-2-yne does not. Explain.	(1+1+1)

OR

4.   a)Write the structure of the products of ozonolysis of -
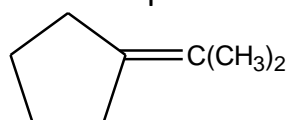
(b) Explain the mechanism of Nitration of benzene.

5.   (a) Beryllium and magnesium do not give colour to flame whereas other alkaline earth metals do so. Why ?   (1+2)

(b) Compare reducing nature of Lithium and Sodium with proper explanation.   (1+2)

OR

5.   (a) Name one chloride of alkaline earth metals which is covalent and soluble in ethanol.

(b) Give reasons:

(i) Li_2CO_3 decomposes at a lower temperature than Na_2CO_3.

(ii) $BeSO_4$ is soluble in water but $BaSO_4$ is not.   (1+2)

6.   Explain

(a) The +1 oxidation state in group 13 and +2 oxidation state in group 14 becomes more and more stable with increasing atomic number.

(b) Gallium has higher ionization enthalpy than aluminium.

(c) Aluminium forms $[AlF_6]^{3-}$ ion but boron does not form $[BF_6]^{3-}$ ion.

   (1+1+1)

7.   What happens when: (give complete chemical equations)-

(a)Benzene reacts with chlorine in presence of UV light at 500K.

(b)Ethyne is heated in an iron tube at 873K.

(c) Propene reacts with cold concentrated sulphuric acid.   (1+1+1)

8.   Give reasons :

(a) Conc. HNO_3 can be transported in aluminium container.

(b) A mixture of dilute NaOH and aluminium pieces is used to open drain.

(c) Graphite is used as lubricant.

   (1+1+1)

9.   (a) Write the conjugate base for each of the following:

        HSO_4^-, CH_3COOH

(b) pH of 0.08 mol dm^{-3} HOCl solution is 2.85. Calculate its ionisation constant.(antilog of -2.85 = 1.41 X10^{-3})   (1+2)

OR

9. (a) State Le Chatelier's principle.
(b) Formation of ammonia by the Haber's process is an exothermic reaction. Explain the effect of –
(i) increasing temperature
(ii) decreasing pressure ,
on the yield of ammonia. (1+2)

10. How will you convert
(a) benzene to m-nitrochlorobenzene
(b) benzene to p – nitrotoluene
(c) phenol to acetophenone? (1+1+1)

11. Write van der Waals equation for n moles of gas and write the significance of van der Waal's constants a and b (3)

OR

11. a) Using the equation of state pV=nRT; show that at a given temperature density of a gas is proportional to gas pressure p.
(b) Calculate the weight of CH_4 in a 9 litres cylinder at 16 atm and 27 ^{0}C. (1+2)

SECTION C

12. Enthalpy is a thermodynamic property of a system. It is the sum of the internal energy added to the product of the pressure and volume of the system. It reflects the capacity to do non-mechanical work and the capacity to release heat. Enthalpy is denoted as **H**
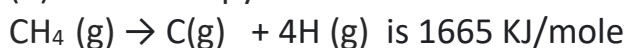
The standard enthalpy of reaction is the enthalpy change for a reaction when all the participating substances are in their standard states. The standard state of a substance at a specified temperature is its pure form at 1 bar.

The standard enthalpy change for the formation of one mole of a compound from its elements in their most

stable states of aggregation (also known as reference states) is called Standard Molar Enthalpy of Formation. Its symbol is $\Delta_f H^0$, where the subscript 'f' indicates that one mole of the compound in question has been formed in its standard state from its elements in their most stable states of aggregation.
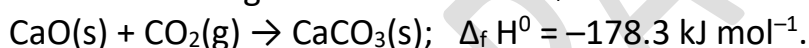
(a) State any one condition in which change in enthalpy is equal to change in internal energy.

(b) The enthalpy of atomization for the reaction :
CH_4 (g) → C(g) + 4H (g) is 1665 KJ/mole
What is the bond energy of C-H bond ?

(c)) Standard molar enthalpy of formation, $\Delta_f H^0$ is just a special case of enthalpy of reaction, $\Delta_r H^0$. Is the $\Delta_r H^0$ for the following reaction same as $\Delta_f H^0$?
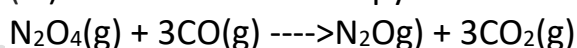$CaO(s) + CO_2(g) → CaCO_3(s)$; $\Delta_f H^0 = -178.3$ kJ mol^{-1}.
Give reason for your answer.

(d)The combustion of benzene *(l)* gives $CO_2(g)$ and H_2O *(l)* .Given that heat of combustion at constant volume is -3263.9 kJ/mole at 25 °C, Calculate heat of combustion in kJ/mol at constant pressure.

OR

(d) Calculate the enthalpy of the reaction:
$N_2O_4(g) + 3CO(g) ----> N_2O g) + 3CO_2(g)$
Given that; $\Delta_f H^0 CO(g) = -110$ kJ mol^{-1},
$\Delta_f H CO_2(g) = -393$ kJ mol^{-1} , $\Delta_f H N_2O(g) = 81$ kJmol^{-1};
$\Delta_f N_2O_4(g) = 9.7$ kJmol^{-1}

(1+1+1+2)