



विद्या सर्वार्थ साधिका

ANANDALAYA ANNUAL EXAMINATION

Class : XI

Subject: Chemistry

Date: 19/02/2020

M.M : 70

Time : 3 Hours

General Instructions:

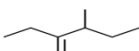
1. All questions are compulsory. There are 37 questions in all.
2. Question numbers 1 to 20 are objective type questions and carry 1 mark each.
3. Question number 21 to 27 are short answer questions and carry 2 marks each.
4. Question number 28 to 34 are short answer questions and carry 2 marks each.
5. Question number 35 to 37 are long answer questions and carry 5 marks each.

Read the given passage and answer the questions 1-5 that follow.

The four elements A, B, C and D have atomic numbers 11, 12, 17 and 18 respectively. Out of these four elements two are solids and two are gases. One of the gaseous elements does not show chemical reactivity while the other is highly reactive.

1. Which are the two solid elements? (1)
2. What is the group number of element C? (1)
3. Which is the most metallic element? (1)
4. Write the chemical formula of binary compound between B and C. (1)
5. What is the period of most reactive non-metal among these elements? (1)

Questions 6-10 are one word answers:

6. Predict the sign of entropy change for the following change of state: (1)
 $I_2(g) \rightarrow I_2(s)$
7. How many significant figures are there in 4.210 kg? (1)
8. One mole of sulphuric acid contains _____ oxygen atoms. (1)
9. Name the property of liquid which is responsible for the spherical shape of falling liquid drops. (1)
10. The IUPAC name of  is _____ (1)

Questions 11-15 are multiple choice questions

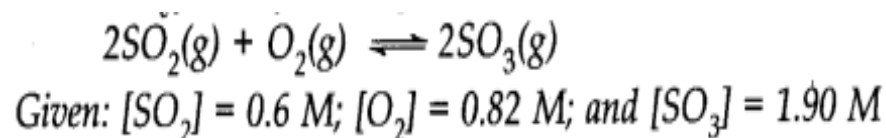
11. In the Lassaigne's test for nitrogen in an organic compound, the Prussian blue colour is obtained due to the formation of: (1)
(a) $Na_4[Fe(CN)_6]$ (b) $Fe_4[Fe(CN)_6]_3$
(c) $Fe_2[Fe(CN)_6]$ (d) $Fe_3[Fe(CN)_6]_4$
12. Which of the following salts when dissolve in water would give acidic solution(s)? (1)

- (a) Na_2SO_4 (b) CH_3COONa
 (c) $(\text{NH}_4)_2\text{SO}_4$ (d) KCl

13. In the organic compound $\text{CH}_2 = \text{CH} - \text{CH}_2 - \text{CH}_2 - \text{C} \equiv \text{CH}$ the pair of hybridised orbitals involved in the formation of: $\text{C}_2 - \text{C}_3$ bond is: (1)
 (a) $sp - sp^2$ (b) $sp - sp^3$
 (c) $sp^2 - sp^3$ (d) $sp^3 - sp^3$
14. Which of the following carbocation is most stable? (1)
 (a) $(\text{CH}_3)_3\text{CCH}_2^+$ (b) $(\text{CH}_3)_3\text{C}^+$
 (c) $\text{CH}_3\text{CH}_2\text{CH}_2^+$ (d) $\text{CH}_3\text{CH}^+\text{CH}_2\text{CH}_3$
15. The enthalpies of all elements in their standard state are: (1)
 (a) unity (b) zero
 (c) less than zero (d) different for each element

Questions 16 to 20 :

- (a) Both assertion and reason are correct statements, and reason is the correct explanation of the assertion.
 (b) Both assertion and reason are correct statements, but reason is not the correct explanation of the assertion.
 (c) Assertion is correct, but reason is wrong statement.
 (d) Assertion is wrong, but reason is correct statement.
16. Assertion: Molarity of pure water is 55.5 M. (1)
 Reason: Molarity is temperature dependent parameter.
17. Assertion: For adiabatic process $\delta q = 0$. (1)
 Reason: In adiabatic process no heat enters or leaves the system.
18. Assertion: The equation $PV = nRT$ does not apply to real gases. (1)
 Reason: a and b vander waal constants should be zero for ideal gases.
19. Assertion: H_2O_2 behaves as bleaching agent. (1)
 Reason: H_2O_2 liberates nascent oxygen on decomposition.
20. Assertion: Ethene as well as benzene are planar molecules. (1)
 Reason: Both ethene and benzene are aromatic compounds.
21. What is the K_c for the following reaction in a state of equilibrium? (2)



22. Account for the following : (2)
 (i) Benzene is extra-ordinarily stable though it contains three double bonds.
 (ii) Branching of alkane chain decreases boiling point.
 OR
 What happens when: [Give chemical equations]
 (i) Ethanol is heated with conc. H_2SO_4 .
 (ii) Phenol is treated with Zn dust.
23. Calculate the total pressure in a mixture of 8g of oxygen and 4g of hydrogen confined in a vessel of 1dm^3 at 27 degree celsius. (Molar mass of oxygen= 32, Hydrogen= 2, $R = 0.083\text{bar dm}^3 \text{ K}^{-1}\text{mol}^{-1}$) (2)
24. What is demineralised water? How is it obtained? (2)

25. Describe the shapes of AlCl_3 and $[\text{AlCl}_4]^-$. Assign the hybridization of Al in these species? (2)

OR

Explain with the help of diagram why BF_3 molecule has zero dipole moment although the B – F bonds are polar.

26. Calculate the mass of CH_3OH (methanol) required to make 2.5 Litre of its 0.25 M aqueous solution. (2)

27. Yellow light emitted from a sodium lamp has a wavelength (λ) of 580 nm. Calculate the frequency (ν) and wave number ($\bar{\nu}$) of the yellow light. (2)

28. (a) An atom of an element contains 29 electrons and 35 neutrons. Write : (3)

(i) The number of protons and (ii) The electronic configuration of the element.

(b) How many electrons in an atom may have the following quantum numbers?

(i) $n = 3, m_s = +1/2$ (ii) $n = 3, l = 0$

(c) Indicate the number of unpaired electron in Ne. ($Z=10$)

29. Calculate the enthalpy change for the process $\text{CCl}_4(\text{g}) \rightarrow \text{C}(\text{g}) + 4\text{Cl}_2(\text{g})$ and calculate bond enthalpy of C-Cl in $\text{CCl}_4(\text{g})$. (3)

Given $\Delta_{\text{vap}}H^\circ(\text{CCl}_4) = 30.5 \text{ KJmol}^{-1}$

$\Delta_f H^\circ(\text{CCl}_4) = -135.5 \text{ KJmol}^{-1}$

$\Delta_a H^\circ(\text{C}) = 715.0 \text{ KJmol}^{-1}$

$\Delta_a H^\circ(\text{Cl}_2) = 242 \text{ KJmol}^{-1}$

30. Draw molecular orbital diagram of N_2 and compare the relative stability of N_2 and N_2^+ . Also indicate their magnetic properties. (3)

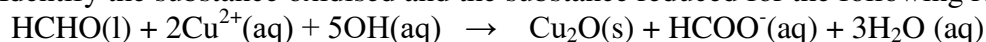
OR

(a) Out of o-nitrophenol and p-nitrophenol which has higher dipole moment and why?

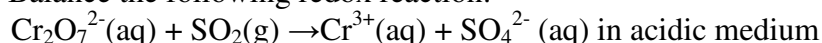
(b) Distinguish between a sigma and a pi bond. (any three points)

(c) What is the formal charge on S in HSO_4^- .

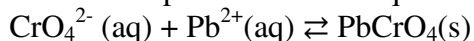
31. (a) Identify the substance oxidised and the substance reduced for the following reaction: (3)



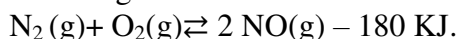
(b) Balance the following redox reaction:



32. (a) Write the expression for the equilibrium constant for the reaction (3)



(b) State Le-Chateliers principle. Discuss the effect of change of pressure and temperature on the following reaction :



33. (a) What are nucleophiles? Explain with an example. (3)

(a) Draw the resonance structure of $\text{CH}_3\text{CH}=\text{CHCH}_2^+$ and CH_3CONH_2 .

OR

An organic compound contains 69% carbon and 4.8% hydrogen, the remainder being oxygen. Calculate the masses of carbon dioxide and water produced when 0.20 g of this substance is subjected to complete combustion.

34. (a) What do you mean by Biochemical Oxygen Demand (BOD)? (3)

(b) Name the region of atmosphere where ozone is present? What is the function of ozone layer?

(c) What would have happened if green house gases were totally missing in the earth's atmosphere?

35. Give reasons for the following: (5)
- (a) $[\text{SiF}_6]^{2-}$ is known whereas $[\text{SiCl}_6]^{2-}$ is not known.
 - (b) PbX_2 is more stable than PbX_4 . (X = Cl, Br)
 - (c) Boric acid is considered a weak base.
 - (d) BF_3 behaves as Lewis acid.
 - (e) CO_2 is a gas while SiO_2 is a solid at room temperature.

OR

- (a) What do you understand by:
 - (i) Inert pair effect
 - (ii) Catenation
- (b) Write balanced chemical equation for:
 - (i) $\text{BF}_3 + \text{LiH} \rightarrow$
 - (ii) $\text{CaCO}_3 + \text{heat} \rightarrow$
 - (iii) $\text{B}_2\text{H}_6 + \text{O}_2 \rightarrow$

36. (a) How will you convert benzene into: (5)
- (i) p-nitrobromobenzene
 - (ii) m-nitrochlorobenzene
 - (iii) Acetophenone
- (b) Arrange the following compounds in order of their decreasing acidic character:
But-2-yne, ethyne, propyne
- (b) Write the names of the products obtained by the ozonolysis of 3-ethylpent-2-ene.

OR

- (a) How will you convert the following compounds into benzene :
 - (i) Ethyne
 - (ii) n-Hexane
- (b) Propanal and pentan-3-one are the ozonolysis product of an alkene. What is the structural formula of the alkene?
- (c) Draw geometrical isomers of hept-2-ene. Which isomer will have higher boiling point and why?

37. (a) What happens when: (5)
- (i) calcium nitrate is heated?
 - (ii) chlorine react with slaked lime?
 - (iii) sodium peroxide dissolve in water.
- (b) Why is Li_2CO_3 decomposes at lower temperature where as Na_2CO_3 at higher temperature?
- (c) Potassium carbonate cannot be prepared by Solvay process. Why?

OR

- (a) State as to why:
 - (i) A solution of Na_2CO_3 is alkaline.
 - (ii) The mobilities of alkali metal ions in aqueous solution are $\text{Li}^+ < \text{Na}^+ < \text{K}^+ < \text{Rb}^+$.
 - (iii) Lithium is the only alkali metal which forms nitride directly.
- (b) What happens when:
 - (i) Sodium is heated in free supply of air?
 - (ii) Quick lime is heated with silica?