



G.C.E. A/L Examination March - 2020

Conducted by Field Work Centre, Thondaimanaru

In Collaboration with

Provincial Department of Education Northern Province.

Chemistry I

Grade :- 12 (2021)

Time :- Three hours and 10 minutes

Part - I

$$N_A = 6.022 \times 10^{23} \text{ mol}^{-1} \quad h = 6.626 \times 10^{-34} \text{ Js} \quad c = 3 \times 10^8 \text{ ms}^{-1} \quad R = 8.314 \text{ J mol}^{-1} \text{ K}^{-1}$$

❖ Answer all the questions

1) Consider statements I and II given below.

I - atom or atomic model or atomic particles.

II - Related to energy of atoms.

The pairs of scientists, who are not related to the statements I and II.

- | | | |
|------------------------|-----------------------|---------------------|
| 1. Einstein, Plank | 2. Dalton, De Broglie | 3. Stoney, Einstein |
| 4. Crookes, De Broglie | 5. Thomson, Max plank | |

2) The total number of resonance structures that could be drawn to NO_2Cl $\left[\begin{array}{c} \text{O} - \text{N} - \text{O} \\ | \\ \text{Cl} \end{array} \right]$

- | | | | | |
|------|------|------|------|------|
| 1. 2 | 2. 3 | 3. 4 | 4. 5 | 5. 6 |
|------|------|------|------|------|

3) The number of atomic orbitals having quantum numbers $n = 3$ and $m_l = 0$

- | | | | | |
|------|------|------|------|------|
| 1. 1 | 2. 2 | 3. 3 | 4. 4 | 5. 5 |
|------|------|------|------|------|

4) The electron pair geometry and shape around C_2 and N_3 in the molecule H_3CCONH_2 $\left[\begin{array}{c} \text{H} \quad \text{O} \quad \text{H} \\ | \quad | \quad | \\ \text{H} - \text{C}_1 - \text{C}_2 - \text{N}_3 - \text{H} \\ | \\ \text{H} \end{array} \right]$ are respectively

- | C_2 | | N_3 | |
|-------------------------|----------------------|----------------------|----------------------|
| 1. tetrahedral | Triangular planar | tetrahedral | Triangular planar |
| 2. tetrahedral | Triangular pyramidal | Triangular pyramidal | Triangular planar |
| 3. Triangular planar | Triangular pyramidal | Triangular planar | Triangular pyramidal |
| 4. Triangular planar | Triangular planar | tetrahedral | Triangular pyramidal |
| 5. Triangular pyramidal | Triangular pyramidal | Triangular pyramidal | Triangular planar |

5) In the following compounds the correct ascending order of electro negativity of N is

- | | |
|---|---|
| 1. $\text{NO}_2\text{F} < \text{NO}_4^{3-} < \text{NH}_3 < \text{NH}_2^-$ | 2. $\text{NH}_2^- < \text{NH}_3 < \text{NO}_2\text{F} < \text{NO}_4^{3-}$ |
| 3. $\text{NO}_4^{3-} < \text{NO}_2\text{F} < \text{NH}_2^- < \text{NH}_3$ | 4. $\text{NH}_3 < \text{NH}_2^- < \text{NO}_2\text{F} < \text{NO}_4^{3-}$ |
| 5. $\text{NH}_2^- < \text{NH}_3 < \text{NO}_4^{3-} < \text{NO}_2\text{F}$ | |

- 6) 0.214 g of a sample of KIO_3 was dissolved in water and, excess of KI and HCl added. Find the volume of $\text{Na}_2\text{S}_2\text{O}_3$ solution of concentration 0.5 mol dm^{-3} needed to completely react with the I_2 liberated (0 – 16, K- 39, I – 127)
1. 60 cm^3 2. 120 cm^3 3. 24 cm^3 4. 6 cm^3 5. 12 cm^3
- 7) Which one of the following equations correctly indicates the lattice enthalpy of dissociation of $\text{NaCl}_{(s)}$
1. $\text{Na}_{(g)}^+ + \text{Cl}_{(g)}^- \rightarrow \text{NaCl}_{(g)}$ 2. $\text{Na}_{(g)}^+ + \text{Cl}_{(g)}^- \rightarrow \text{NaCl}_{(s)}$
 3. $\text{NaCl}_{(g)} \rightarrow \text{Na}_{(g)}^+ + \text{Cl}_{(g)}^-$ 4. $\text{NaCl}_{(s)} \rightarrow \text{Na}_{(g)}^+ + \text{Cl}_{(g)}^-$
 5. $\text{Na}_{(s)} + \frac{1}{2} \text{Cl}_{2(g)} \rightarrow \text{NaCl}_{(s)}$
- 8) Which one of the following statements is incorrect regarding the chemistry of (Na) sodium and its compounds
1. Na reacts with oxygen to produce Na_2O and Na_2O_2 only.
 2. All the compounds of Na are easily soluble in water.
 3. In flame test, salts of sodium produce red – purple colour.
 4. Na_2CO_3 is a carbonate of basic metal and not decomposed by heat
 5. Na_2O_2 dissolves in hot water to produce NaOH and O_2
- 9) The correct statement regarding the oxidation numbers of the two sulphur atoms in the $\text{Na}_2\text{S}_2\text{O}_3$ molecule.
1. The oxidation number of the S atoms is +4
 2. The oxidation number of the S atoms is +2
 3. The oxidation number of the S atoms is 0
 4. The average oxidation number of the S atoms is +2
 5. All the above statements are incorrect
- 10) Which of the following statements regarding Al belonging to group 13 is incorrect.
1. Al reacts with dilute HCl, dilute NaOH to produce hydrogen gas.
 2. Aluminium chloride exists as Al_2Cl_6 in gaseous state.
 3. In aqueous state aluminium ion exists as $[\text{Al}(\text{H}_2\text{O})_6]^{3+}$ only.
 4. Al is used as an alloy in air craft manufacture
 5. The oxide, hydroxide of Al are amphoteric.
- 11) 8.6 g of liquid hexane (C_6H_{14}) is mixed with 1 mol of O_2 . When the hexane is ignited it produced CO and CO_2 . The total mol of gas after the CO and CO_2 are reacted with excess O_2 is 0.9 at room temperature. (assume that the gases that dissolves in liquid water is negligible). What is the number of moles of CO produced.
1. 0.1 2. 0.2 3. 0.3 4. 0.4 5. 0.5
- 12) Which of the following statements is correct regarding an isolated system?
1. Boundary of the system allows matter to pass through the boundary
 2. While the system allows matter through the boundary, heat is not allowed to pass through the boundary,
 3. The boundary allows both matter and heat through the boundary
 4. While the system does not permit matter through the boundary, heat is allowed through the boundary.
 5. Boundary of the system does not permit both matter and heat to pass through

- 13) Which of the following statements is incorrect regarding halogens
- +7 oxidation state of element bromine is unstable.
 - bond dissociation energy of fluorine is less than the bond dissociation energy of chlorine.
 - NaOBr, NaOI are unstable even at low temperature.
 - The acidity of the oxo acids of Cl is of the order $HClO < HClO_2 < HClO_3 < HClO_4$
 - The electron pair geometry around chlorine in the oxoacids of Cl $HClO, HClO_2, HClO_3, HClO_4$ is tetrahedral.
- 14) Out of the following statements select the one which is incorrect.
- C exists in three allotropic forms.
 - CO is used as a catalyst in the manufacture of iron.
 - Due to the presence of lone pair of electron in C atom. CO acts as ligand
 - While the bond angle in NF_3 is 102° , the bond angle in NH_3 is 107° .
 - The repulsion between bonded pairs in NF_3 is stronger than that in NH_3
- 15) The name of the compound $Na_2[CoCl_4]$ according to IUPAC is
- disodium tetrachloridocobaltate(II)
 - disodium tetrachlorocobaltate(II)
 - sodium tetrachlorocobaltate III
 - sodium tetrachloridocobaltate(II)
 - sodium tetrachloridocobaltate (III)

❖ For each of the question 16 to 20 one or more response out of four responses (a), (b), (c) and (d) given is / are correct. Select the correct response / responses. In accordance with the instruction given on your answer sheet mark.

1	2	3	4	5
Only (a) (b) are correct	Only (b) (c) are correct	Only (c) (d) are correct	Only (a) (d) are correct	The other numbers correct

- 16) The information / s that could be obtained indirectly from the lewis structure is /are
- bond pair electrons
 - charge on the atom
 - shape
 - hybridization
- 17) Which of the following statement / s is / are incorrect regarding thermodynamics of a reaction.
- $\Delta H_{rxn}^\theta - ve, \Delta S_{rxn}^\theta + ve$ spontaneous at all temperature.
 - $\Delta H_{rxn}^\theta + ve, \Delta S_{rxn}^\theta + ve$ spontaneous at low temperature
 - $\Delta H_{rxn}^\theta - ve, \Delta S_{rxn}^\theta - ve$ spontaneous at high temperature
 - $\Delta H_{rxn}^\theta + ve, \Delta S_{rxn}^\theta - ve$ at all temperatures, does not take place spontaneously.
- 18) In physical chemistry standard state is
- defined **generally** as 101325 Pa pressure.
 - defined **generally** as 101325 Pa and in the case of solutions, concentration is 1 mol dm^{-3}
 - pressure of 101325 Pa and temperature of 299 K are defined as standard.
 - pressure of 101325 Pa and temperature of 273 K are defined as standard.

19) Of the solutions of the ions given below, which is / are the ions that give precipitate/s with H_2S after adding NH_4OH and NH_4Cl

- a) Ag^+ b) Bi^{3+} c) Co^{2+} d) Zn^{2+}

20) Out of the following statements which is / are correct

- a) Only the solubilities of hydroxides and oxides increase along group
 b) Solubility of the halides of Na increases along group
 c) The energy change of dissolution of halides of Na increases negatively along the group down wards.
 d) Some nitrates of metals are insoluble in water.

❖ **Instructions for questions 21 – 25.**

Response	First statement	Second statement
1)	True	True and correctly explains the first statement.
2)	True	True, but not explain the first statement correctly
3)	True	False
4)	False	True
5)	False	False

	First statement	Second statement
21)	Though the molecular masses of O_2 and NO are almost equal, the boiling point of NO is higher.	The intermolecular force in O_2 is only London force. Where as in NO there is dipole – dipole attraction also.
22)	$\text{PV} = \text{nRT}$ is an ideal gas equation	$\text{PV} = \text{nRT}$ is an equation of state
23)	Ionization energy is always positive. But first electron gain energy is mostly negative.	To remove electron for an atom in gaseous state always energy has to be given. But when electron is added to an atom in gaseous state, energy is released or absorbed.
24)	The reaction between H_2S and SO_2 is the reverse of disproportionation	The change of one type of atoms in different oxidation states to another oxidation state of the intermediate of the above two states is reverse of disproportionation (Comproportionation)
25)	At different temperatures, two different ideal gases can have the same average kinetic energy.	At the same temperature all ideal gases will have the same average kinetic energy