



வடமாகாணக் கல்வித் திணைக்களத்துடன் இணைந்து
தொண்டைமானாறு வெளிக்கள நிலையம் நடாத்தும்
மூன்றாம் தவணைப் பரீட்சை,- 2020
Conducted by Field Work Centre, Thondaimanaru.
In Collaboration with Provincial Department of Education
Northern Province
3rd Term Examination - 2020

இரசாயனவியல் - I
Chemistry - I

One Hours

02

E

I

Gr. 12 (2021)

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.

01. The highest oxidation state and ground state electronic configuration of an element with atomic number 24 are

- 1) +4, [Ar] 3d⁴ 4s¹ 2) +3, [Ar] 3d⁴ 4s² 3) +5, [Ar] 3d⁵ 4s¹
4) +6, [Ar] 3d⁵ 4s¹ 5) +6, [Ar] 3d⁴ 4s²

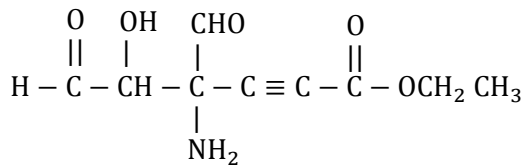
02. Which of the following molecules / ions have the same electron pair geometry

- A) SF₄ B) XeOF₄ C) ICl₄⁻ D) XeF₄ E) PCl₄⁺
1) A, B 2) B and C 3) B, C, D and E
4) A, B, C and D 5) B, C and D

03. Which of the following set of quantum numbers denotes electron with the highest energy

- 1) $n = 3 \quad l = 1 \quad ml = 0$ 2) $n = 4 \quad l = 0 \quad ml = 0$ 3) $n = 4 \quad l = 2 \quad ml = 1$
4) $n = 5 \quad l = 0 \quad ml = 0$ 5) $n = 3 \quad l = 2 \quad ml = -1$

04. What is IUPAC name of given compound?



- 1) ethyl 4 - amino - 4, 5 - diformyl - 5 - hydroxy - 2 - hexynoate.
2) ethyl 4 - amino - 4 -formyl - 5 - hydroxy - 6 - oxo - 2 - hexynoate.
3) Ethyl 4 - amino - 4 -formyl - 5 - hydroxy - 6 - oxo - 2 - hexynoate.
4) ethyl - 4 - amino - 4,5 - diformyl - 5 - hydroxy - 2 - hexynoate.
5) ethyl 4 - amino - 4,6 - diformyl - 5 - hydroxy - 2 - hexynoate.

05. Which of the following compounds gives precipitate with ammoniacal AgNO₃ and gives a gas that changes the colour of red litmus paper to blue when heater with Ca(OH)₂?

- 1) NH₄Cl 2) CH₃C ≡ CH 3) NaI 4) NH₄I 5) NH₄NO₃

06. What is the minimum volume of 0.02 mol dm⁻³ acidic KMnO₄ needed to oxidise completely 25 cm³ of 0.064 mol dm⁻³ NaNO₂ solution.

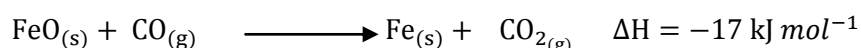
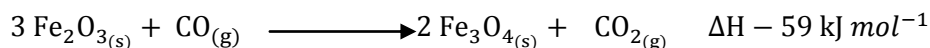
- 1) 32 cm³ 2) 16 cm³ 3) 64 cm³ 4) 20 cm³ 5) 30 cm³

07. Which of the following statement regarding 3d - block element is false?
- 1) Their electronegativity is higher than that of 4s – block elements.
 - 2) of the 3d block elements Cu has the highest second ionization energy.
 - 3) The height oxidation number of the first five 3d elements is equal to the total number of electrons in 4s and 3d.
 - 4) Transition metals and their compounds act as catalysts.
 - 5) The first ionization energy of 3d – block elements is higher than that of S – block elements.
08. Which of the following statements is true regarding the sample of an ideal gas.
- 1) At constant temperature molecules of this gas has kinetic energy and potential energy.
 - 2) At the same temperature their kinetic energy is constant.
 - 3) When the temperature of the sample is increased by 273.15°C the average kinetic energy of the molecules may be doubled.
 - 4) When gaseous molecules collide, their velocity do not change.
 - 5) During the collision of gaseous molecules there will be no change in their energy.
09. Consider the thermal decomposition of the following compounds.
- A) NH_4NO_2 B) NH_4NO_3 C) $(\text{NH}_4)_2\text{CO}_3$ D) NH_4Cl
- During the decomposition the compound / s that produce product without change in oxidation number in N atom.
- 1) A and B 2) C and D 3) B and C
 - 4) A, B and C 5) B, C and D
10. Which of the following statements is false regarding the chlorination of alkanes
- 1) UV radiation induces the homolytic cleavage of chlorine gas.
 - 2) The carbon radicals formed during the reaction chain, is known as reactive intermediates.
 - 3) Chain termination steps produce carbon free radicals.
 - 4) In methane's chlorination progressive steps, CCl_4 is produced via eight steps reactions.
 - 5) C – H bonds react with free radicals by homolytic cleavage.
11. Which of the following statements is true regarding group 16 elements and their compounds.
- 1) All hydrides of group 16 elements are poisonous.
 - 2) Ozone is odorless gas.
 - 3) H_2O_2 is a molecule without polarity.
 - 4) Sulphur forms the strong oxy acids H_2SO_4 and H_2SO_3
 - 5) Ozone is used as antiseptic.
12. Which of the following intermediates is formed in large quantity in the reaction between propene and HBr
- 1) $\text{CH}_3 - \text{CH} - \text{CH}_2$
 $\quad \quad \quad \diagdown \quad \diagup$
 $\quad \quad \quad \text{Br}^{(+)}$
 - 2) $\text{CH}_3 \text{CH}_2 \overset{(+)}{\text{CH}_2}$
 - 3) $\text{CH}_3 \overset{(+)}{\text{CH}} \text{CH}_3$
 - 4) $\text{CH}_3 - \text{CH} - \text{CH}_2$
 $\quad \quad \quad |$
 $\quad \quad \quad \text{Br}$
 - 5) $\text{CH}_3 - \text{CH} - \text{CH}_2$
 $\quad \quad \quad \diagdown \quad \diagup$
 $\quad \quad \quad \text{H}^{(+)}$

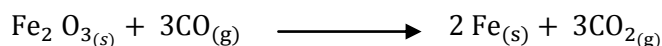
13. Which of the following statements is true regarding the compound $\text{CH}_2 = \text{CH} - \underset{\text{Br}}{\text{CH}} - \text{CH}_3$

- 1) It has four stereo isomers.
- 2) The product formed by the reaction with $\text{KOH}_{(aq)}$ does not show optical isomerism.
- 3) The product formed by the reaction with $\text{C}_2\text{H}_5\text{OH}/\text{KOH}$ shows stereo isomerism.
- 4) The product formed by the reaction with HBr shows four stereo isomers.
- 5) It does not react with bayers reagent.

14. Consider the following thermo chemical data.



Calculate ΔH of the following reaction (kJ mol^{-1})



- 1) -28.3 2) -85 3) -27.2 4) -16.8 5) -29

15. A container of capacity $V \text{ dm}^3$ contains 13g of Xe gas at $t^\circ\text{C}$ and $1 \times 10^5 \text{ Pa}$ pressure. When the temperature of the container was raised by 10°C , the pressure increased by 10%. Assuming that the gas behaves ideally calculate the volume of the container (in dm^3)

($\text{Xe} = 130 \text{ g mol}^{-1}$)

- 1) 0.527 2) 0.4157 3) 8.314 4) 0.8314 5) 0.16628

❖ Follow the instructions for questions from 16 to 20

1	2	3	4	5
(a) and (b) are correct	(b) and (c) are correct	(c) and (d) are correct	(a) and (d) are correct	Other combinations correct

16. Which of the following statements is / are true regarding a reaction that takes place at temperature T.

- a) If the enthalpy of a reaction is negative, then the reaction is spontaneous.
- b) If the entropy change of a reaction is negative then the reaction is spontaneous.
- c) If the entropy change of a reaction is positive and the enthalpy change is negative then the reaction is spontaneous.
- d) If the entropy change is negative and the enthalpy change is negative the reaction will not be spontaneous always.

17. Which of the following statements is / are false regarding propyne.

- a) Gives red precipitate with ammoniacal CuCl_2
- b) Reacts with NaNH_2 and produce ammonia gas as one of the produce.
- c) Reacts with CH_3MgBr and produces a gas and propynyl magnesium bromide.
- d) Reacts with $\text{HgSO}_4 \text{ dil } \text{H}_2\text{SO}_4$ to produce an aldehyde.

18. Which of the following gives a precipitate with NH_4OH and soluble in excess NH_4OH , precipitate with NaOH and with excess NaOH gives insoluble precipitate

- a) Ni^{2+} , Cr^{3+} , Ag^+ b) Ni^{2+} , Co^{2+} , Ag^+ c) Cu^{2+} , Ni^{2+} , Ag^+ d) Fe^{2+} , Zn^{2+} , Co^{2+}

19. Which of the following thermo chemical equations is / are correct

- a) Lattice enthalpy of $\text{MgBr}_{2(s)}$ $\text{Mg}^{2+}_{(g)} + 2\text{Br}^{-}_{(l)} \longrightarrow \text{MgBr}_{2(s)}$
 b) atomization of iodine $\text{I}_{2(s)} \longrightarrow \text{I}_{2(g)}$
 c) electron affinity of chlorine $\text{Cl}_{(g)} + e \longrightarrow \text{Cl}^{-}_{(g)}$
 d) enthalpy of formation of $\text{NaI}_{(s)}$ $\text{Na}_{(s)} + \text{I}_{(s)} \longrightarrow \text{NaI}_{(s)}$

20. Which of the following statements is / are correct

- a) Electronegativity of S $\text{SCl}_2 < \text{SO}_3^{2-} < \text{SO}_2 < \text{SO}_3$
 b) Melting point $\text{LiI} < \text{LiBr} < \text{LiCl} < \text{LiF}$
 c) Bond angle $\text{NH}_3 < \text{NF}_3 < \text{NO}^+$
 d) $\text{N}-\text{O}$ bond length $\text{NO}^+ < \text{NOCl} < \text{NH}_2\text{OH}$

❖ Instructions for questions from 21 to 25.

First statement	Second statement
1) Correct	Correct and correctly explains
2) Correct	Correct, does not explain correctly
3) Correct	Not correct
4) Wrong	Correct
5) Wrong	Wrong

21)	In aqueous state MnO_4^- , CrO_4^{2-} . Oxo anions are coloured	When d subshells are partially filled, in aqueous state they are coloured.
22)	2 – chloro but -2-ene shows diastereo isomerism	2-chlorobut-2-ene may have two structures which are not mirror images of one another
23)	Decomposition of H_2O_2 is an example for disproportionation.	A chemical species undergoing oxidation and reduction at the same time is called disproportionation.
24)	At STP, ideal gases occupy the same volume	There is no intermolecular attraction in ideal gas.
25)	CCl_4 is more volatile than CBr_4	Both CCl_4 and CBr_4 possess non polar covalent bonds.