සියලු ම හිමිකම් ඇවිරිණි/முழுப் பதிப்புரிமையுடையது/All Rights Reserved]

ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව
இலங்கைப் பரீட்சைத் திணைக்களம்
Department of Examinations, Sri Lanka

අධ්‍යයන පොදු සහතික පත්‍ර (උසස් පෙළ) විභාගය, 2022(2023)
கல்விப் பொதுத் தராதரப் பத்திர (உயர் தர)ப் பரீட்சை, 2022(2023)
General Certificate of Education (Adv. Level) Examination, 2022(2023)

රසායන විද්‍යාව I இரசாயனவியல் I **Chemistry I**	**02 E I**	පැය දෙකයි இரண்டு மணித்தியாலம் ***Two hours***

Instructions:

- *Periodic Table is provided.*
- *This paper consists of* **09** *pages.*
- *Answer* ***all*** *the questions.*
- ***Use of calculators is not allowed.***
- *Write your* ***Index Number*** *in the space provided in the answer sheet.*
- *Follow the instructions given on the back of the answer sheet carefully.*
- *In each of the questions* **1** *to* **50**, *pick one of the alternatives from* (1), (2), (3), (4), (5) *which is* ***correct or most appropriate*** *and* ***mark your response on the answer sheet with a cross*** (×) ***in accordance with the instructions given on the back of the answer sheet.***

Universal gas constant $R = 8.314\ J\ K^{-1}\ mol^{-1}$ Planck's constant $h = 6.626 \times 10^{-34}\ J\ s$

Avogadro constant $N_A = 6.022 \times 10^{23}\ mol^{-1}$ Velocity of light $c = 3 \times 10^{8}\ m\ s^{-1}$

1. Which of the following electronic transitions belongs to the visible region of the line spectrum of atomic hydrogen? (n = Principal quantum number)

(1) $n = 5 \rightarrow n = 3$
(2) $n = 4 \rightarrow n = 2$
(3) $n = 1 \rightarrow n = 2$
(4) $n = 3 \rightarrow n = 1$
(5) $n = 2 \rightarrow n = 1$

2. Select the **incorrect** statement.

(1) Pauli exclusion principle excludes the possibility of the presence of a third electron in an orbital.
(2) In a potassium atom, the number of electrons having quantum numbers n (principal quantum number) = 3 and m_l (magnetic quantum number) = 0 is 4.
(3) The effective nuclear charge felt by a valence electron in nitrogen (N), is greater than the effective nuclear charge felt by a valence electron in carbon (C).
(4) Among the ions Na^+, Mg^{2+}, K^+ and Ca^{2+}, the two ions closest to each other in size are K^+ and Mg^{2+}.
(5) Electron gain energy of carbon is negative.

3. The **increasing** order of the second ionization energy $(X^+(g) \rightarrow X^{2+}(g) + e)$ of Be, B and O is,

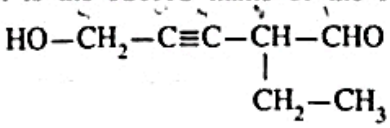
(1) Be < B < O
(2) Be < O < B
(3) B < O < Be
(4) B < Be < O
(5) O < Be < B

4. The shapes of F_3ClO, $FClO_2$ and $FClO_3$ are respectively,

(1) tetrahedral, trigonal planar and see-saw.
(2) square planar, trigonal planar and tetrahedral.
(3) see-saw, trigonal pyramidal and square planar.
(4) tetrahedral, trigonal pyramidal and see-saw.
(5) see-saw, trigonal pyramidal and tetrahedral.

[*See page two*

5. What is the IUPAC name of the following compound?



(1) 5-hydroxy-2-ethylpent-3-ynal
(2) 3-formylhex-4-yn-6-ol
(3) 2-ethyl-5-hydroxypent-3-ynal
(4) 4-formyl-1-hydroxy-2-hexyne
(5) 4-formylhex-2-yn-1-ol

6. A saturated aqueous solution of a sparingly soluble salt AB_2 was prepared at 25 °C. Solubility product of AB_2 at 25 °C is 3.20×10^{-8} mol^3 dm^{-9}. The concentration of ion B^- (mol dm^{-3}) in the saturated solution is,

(1) $(1.6)^{\frac{1}{2}} \times 10^{-4}$ (2) $(3.2)^{\frac{1}{2}} \times 10^{-4}$ (3) $(3.2)^{\frac{1}{3}} \times 10^{-3}$ (4) 2.0×10^{-3} (5) 4.0×10^{-3}

7. Select the correct statement.
(1) The polarizability of F^-, Cl^- and S^{2-} ions increases in the order $F^- < S^{2-} < Cl^-$.
(2) The polarizing power of Li^+, Na^+ and Mg^{2+} decreases in the order $Mg^{2+} > Na^+ > Li^+$.
(3) The electronegativity of O, F, Cl and S decreases in the order F > O > S > Cl.
(4) The boiling points of Xe, CH_4, CH_3NH_2 and CH_3OH increase in the order $CH_4 < Xe < CH_3NH_2 < CH_3OH$.
(5) The interatomic bond distances of N_2, O_2, F_2 and HF increase in the order $N_2 < O_2 < F_2 < HF$.

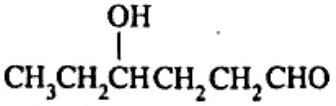
8. Compounds **P** and **Q** are diastereoisomers of each other. Which of the following could be the molecular formula of compounds **P** and **Q**?

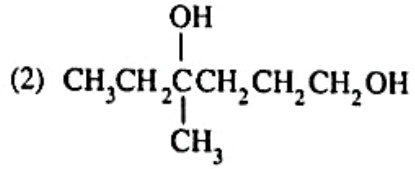
(1) C_5H_{10} (2) C_3H_6 (3) C_4H_6 (4) $C_4H_{10}O$ (5) C_4H_{10}

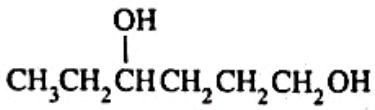
9. The **increasing** order of electronegativity of the carbon (C) atom in CH_4, CH_3Cl, H_2CO, HCN and NCO^- is

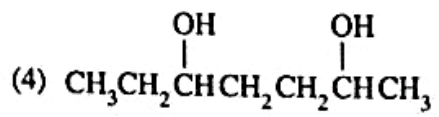
(1) $CH_4 < H_2CO < CH_3Cl < HCN < NCO^-$
(2) $CH_3Cl < CH_4 < H_2CO < HCN < NCO^-$
(3) $CH_4 < CH_3Cl < H_2CO < HCN < NCO^-$
(4) $CH_4 < CH_3Cl < NCO^- < H_2CO < HCN$
(5) $NCO^- < HCN < H_2CO < CH_4 < CH_3Cl$

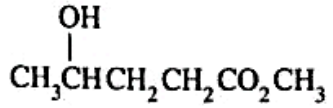
10. The organic compound **X** does not give a coloured precipitate when treated with 2,4-DNP. When compound **X** is treated with acidic $K_2Cr_2O_7$ product **Y** is formed. The product **Y** gives a coloured precipitate with 2,4-DNP. **Y** liberates CO_2 when treated with aqueous Na_2CO_3 solution. Compound **X** could be,

(1) 

(2) 

(3) 

(4) 

(5) 

[See page three

11. Consider the following equilibrium that exists in a closed rigid container at 500 K.

$$A(g) + B(g) \rightleftharpoons 2C(g) : \Delta H < 0$$

Which of the following describes/explains the effect on the equilibrium constant K_P when the temperature is increased to 750 K?

(1) K_P does not change because the pressure does not change.
(2) K_P will increase because the activation energy of the forward reaction is decreased.
(3) K_P does not change because the number of reactant molecules and the number of product molecules are equal to each other.
(4) K_P will decrease because the backward reaction is endothermic which favours the forward reaction.
(5) K_P will decrease because the forward reaction is exothermic which favours the backward reaction.

12. The details of an initial rate measuring experiment carried out for the reaction $X(aq) + Y(aq) \longrightarrow Z(aq)$ at a given temperature are given in the table below.

Experiment	$[X(aq)]_0$/mol dm^{-3}	$[Y(aq)]_0$/mol dm^{-3}	Initial rate/mol dm^{-3} s^{-1}
①	0.40	0.10	R
②	0.20	0.20	?

The initial rate of formation of Z(aq) in experiment ① is R. The reaction is first order with respect to X(aq) and second order with respect to Y(aq). The initial rate of formation of Z(aq) in experiment ② is,

(1) $\frac{R}{4}$ (2) $\frac{R}{2}$ (3) R (4) 2R (5) 4R

13. A 0.4314 g sample of pure iron(II) oxalate (FeC_2O_4) was dissolved in excess dilute H_2SO_4. The entire solution was titrated with 0.060 mol dm^{-3} $KMnO_4$ solution. The burette reading at the end point is (relative molecular mass of FeC_2O_4 = 143.8)

(1) 20.00 cm^3 (2) 25.00 cm^3 (3) 30.00 cm^3 (4) 40.00 cm^3 (5) 50.00 cm^3

14. At a given temperature a certain number of moles of $H_2S(g)$ was inserted into an evacuated 1.0 dm^3 closed rigid container and the system was allowed to reach the equilibrium shown below.

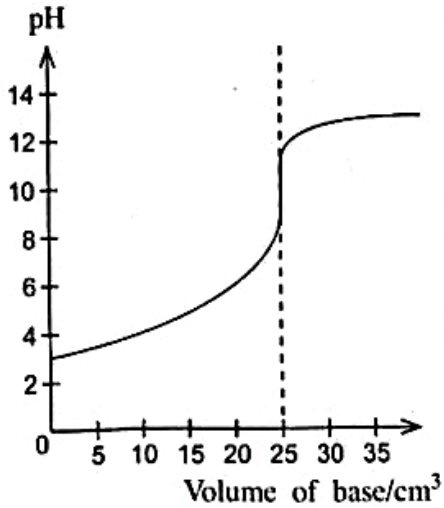
$$2H_2S(g) \rightleftharpoons 2H_2(g) + S_2(g)$$

At equilibrium, it was found that a fraction x of $H_2S(g)$ has dissociated. At equilibrium the total pressure in the container was P. Which of the following gives the equilibrium constant K_P of the system?

(1) $\frac{x^2P}{(2+x)(1-x)^2}$ (2) $\frac{(2+x)(1-x)^2P}{x^3}$ (3) $\frac{x^3P}{(2+x)(1-x)^2}$

(4) $\frac{(1-x)P}{x^2(1-x)^2}$ (5) $\frac{(2+x)(1-x)^2}{x^3P}$

15. The pH curve obtained for a titration of 25.00 cm^3 of 0.10 mol dm^{-3} unknown acid with 0.10 mol dm^{-3} unknown base at a given temperature is shown on the right.



Which of the following is most appropriate regarding the acid and base used in this titration?

(1) Mono-basic strong acid with a mono-protic strong base
(2) Mono-basic strong acid with a mono-protic weak base
(3) Di-basic strong acid with a mono-protic strong base
(4) Mono-basic weak acid with a mono-protic weak base
(5) Mono-basic weak acid with a mono-protic strong base

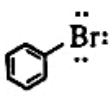
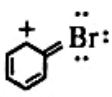
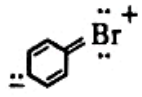
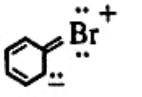
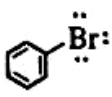
[See page four

16. Which of the following statements is **false** with regard to the elements in the s and p blocks?
(1) Although xenon (Xe) is an inert gas, it forms compounds with oxidation numbers +2, +4 and +6.
(2) Among the hydrogen halides, HF has the highest bond dissociation energy.
(3) The solubility of the hydroxides of Group two (II) elements in water decreases on descending the group, while the solubility of their sulfates increases.
(4) Among the Group one (I) metals (Li to Cs) cesium has the lowest melting point.
(5) The oxidation number of nitrogen in NH_2OH is -1.

17. At 25 °C, to V_1 cm^3 of x mol dm^{-3} $CH_3COOH(aq)$ solution in a beaker, V_2 cm^3 ($V_2 > V_1$) of y mol dm^{-3} ($y > x$) NaOH(aq) solution was added. The pH of the final mixture is,
(K_w is the dissociation constant of water at 25 °C)
(1) $pK_w - \log\left\{\frac{V_2y - V_1x}{V_1 + V_2}\right\}$ (2) $pK_w + \log\left\{\frac{V_2y - V_1x}{V_1 + V_2}\right\}$ (3) pK_w
(4) $-pK_w - \log\left\{\frac{V_2y - V_1x}{V_1 + V_2}\right\}$ (5) $-pK_w + \log\left\{\frac{V_2y - V_1x}{V_1 + V_2}\right\}$

18. Which of the following statements is **incorrect** with regard to the reaction given below under standard conditions?
$$2H_2(g) + O_2(g) \rightarrow 2H_2O(g) : \Delta H^\circ = -483.7 \text{ kJ mol}^{-1}$$
(1) For one mole of reaction 483.7 kJ heat energy is evolved.
(2) For two moles of $H_2(g)$ consumed, 483.7 kJ heat energy is evolved.
(3) For two moles of $H_2O(g)$ produced, 483.7 kJ heat energy is evolved.
(4) For the reaction $4H_2(g) + 2O_2(g) \rightarrow 4H_2O(g)$, 967.4 kJ heat energy is evolved.
(5) For one mole of $O_2(g)$ consumed, 241.85 kJ heat energy is evolved.

19. Which of the following statements is **incorrect** with regard to a galvanic cell?
(1) Cell reaction is spontaneous.
(2) Cell produces electrical energy.
(3) Cathode is negatively charged.
(4) Reduction half-reaction occurs at the cathode.
(5) Oxidation half-reaction occurs at the anode.

20. Which of the following is **not** a resonance structure of bromobenzene?
(1)  (2)  (3)  (4)  (5) 

21. Under which of the following conditions of temperature and pressure, would a real gas tend to behave as an ideal gas?

	Temperature	Pressure
(1)	Very high	Very high
(2)	Very high	Very low
(3)	Very low	Very high
(4)	Very low	Very low
(5)	all temperatures	Very low

22. Two identical closed rigid containers at standard temperature and pressure contain 1.0 mol of $H_2(g)$ and 2.0 mol of $O_2(g)$. Which of the following is true of the above two systems?
(1) Both $H_2(g)$ and $O_2(g)$ have the same average kinetic energy.
(2) Both $H_2(g)$ and $O_2(g)$ have the same average speed.
(3) Both $H_2(g)$ and $O_2(g)$ have the same mass.
(4) Both $H_2(g)$ and $O_2(g)$ have the same density.
(5) Both $H_2(g)$ and $O_2(g)$ have the same effusion rate.

[See page five

23. At 25 °C the molar entropy change of dissolution $\Delta S^{\circ}_{dissol}$ of the solid X(s) is 70 J K^{-1} mol^{-1}, and the molar entropy of X(s) is 100 J K^{-1} mol^{-1}. Which of the following gives the molar entropy (J K^{-1} mol^{-1}) of X(aq)?

(1) −170 (2) −30 (3) 0 (4) +30 (5) +170

24. Consider the major product of the electrophilic addition reaction between $CH_3-CH=CH_2$ and HBr. Which of the following shows a correct step in the mechanism of the reaction which gives the major product?

(1) $CH_3-CH_2-\overset{+}{C}H_2 \quad \ddot{Br}^{-} \longrightarrow CH_3-CH_2-CH_2-Br$

(2) $CH_3-CH=CH_2 \quad H^{+} \longrightarrow CH_3-CH_2-\overset{+}{C}H_2$

(3) $CH_3-CH=CH_2 \quad H-Br \longrightarrow CH_3-\overset{+}{C}H-CH_3 + \ddot{Br}^{-}$

(4) $CH_3-CH=CH_2 \quad H-Br \longrightarrow CH_3-CH_2-\overset{+}{C}H_2 + \ddot{Br}^{-}$

(5) $CH_3-\overset{+}{C}H-CH_3 \quad \ddot{Br}^{-} \longrightarrow CH_3-\underset{Br}{\underset{|}{C}}H-CH_3$

25. Consider a gaseous equilibrium reaction at constant temperature taking place in a closed system. When doubling the pressure and volume of the system the equilibrium constant of the system,

(1) becomes one-fourth $\left(\frac{1}{4}\right)$. (2) becomes halved $\left(\frac{1}{2}\right)$.

(3) remains the same. (4) becomes doubled.

(5) becomes four times.

26. Magnesium nitride and lithium nitride react with water according to the following equations.

$$Mg_3N_2(s) + 6H_2O(l) \rightarrow 3Mg(OH)_2(aq) + 2NH_3(g)$$

$$Li_3N(s) + 3H_2O(l) \rightarrow 3LiOH(aq) + NH_3(g)$$

A mixture containing three moles of magnesium metal and an unknown amount of lithium metal was reacted completely with excess N_2 gas. When the product mixture resulting from this reaction was completely reacted with excess water, 44.2 g of NH_3 gas was produced. The mass of lithium in the metal mixture is,

(H = 1, Li = 7, N = 14, Mg = 24)

(1) 1.8 g (2) 4.2 g (3) 12.6 g (4) 14.2 g (5) 20.2 g

27. Ammonia can be synthesized at high temperatures as shown by the following unbalanced chemical equation.

$$NO(g) + H_2(g) \rightarrow NH_3(g) + H_2O(g)$$

The maximum amount of NH_3 in grams that can be synthesized from 45.0 g of NO and 12.0 g of H_2 is

(Relative molecular mass: H_2 = 2, NO = 30, NH_3 = 17)

(1) 2.4 (2) 4.8 (3) 12.8 (4) 25.5 (5) 40.8

28. At a temperature of 25 °C, the E°_{cell} of the reaction $2H_2O_2(aq) \rightarrow 2H_2O(l) + O_2(g)$ occurring in an electrochemical cell is +0.55 V while the half-reactions of this process are,

$$O_2(g) + 4H^+(aq) + 4e \rightarrow 2H_2O(l) \text{ ---------- (1), } E^{\circ}_1 = 1.23\ V$$

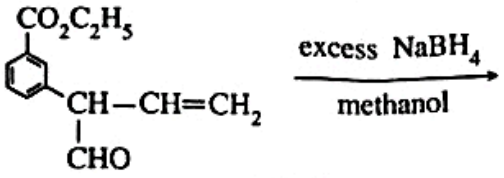
$$O_2(g) + 2H^+(aq) + 2e \rightarrow H_2O_2(aq) \text{ ---------- (2), } E^{\circ}_2 = ?$$

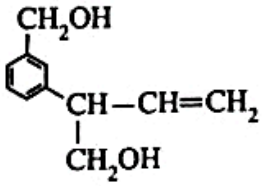
The standard reduction potential E°_2 of reaction (2) is

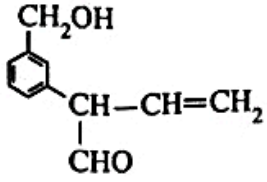
(1) −1.78 V (2) −0.68 V (3) 0.00 V (4) +0.68 V (5) +1.78 V

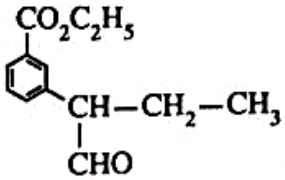
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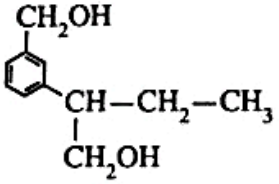
29. What could be the major product of the following reaction?

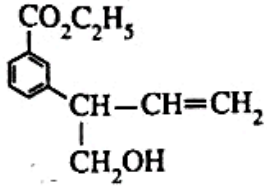


(1) 

(2) 

(3) 

(4) 

(5) 

30. Consider the reaction $3O_2(g) \rightleftharpoons 2O_3(g)$, ($K_C = 2.0 \times 10^{-56}$ mol^{-1} dm^3) at temperature 25 °C. $O_2(g)$ 0.30 mol and $O_3(g)$ 0.005 mol were inserted into an evacuated closed rigid 1.0 dm^3 container at 25 °C and the system was allowed to reach the equilibrium above. Which of the following best describes the system approaching equilibrium at 25 °C?
(Q_C is the reaction quotient)

(1) The amount of $O_3(g)$ increases to reach the equilibrium because $Q_C < K_C$
(2) The amount of $O_3(g)$ decreases to reach the equilibrium because $Q_C < K_C$
(3) The amount of $O_3(g)$ decreases to reach the equilibrium because $Q_C > K_C$
(4) The amount of $O_3(g)$ increases to reach the equilibrium because $Q_C > K_C$
(5) The amount of $O_3(g)$ does not change because $Q_C = K_C$

● For each of the questions **31** to **40**, one or more responses out of the four responses (*a*), (*b*), (*c*) and (*d*) given is/are correct. Select the correct response/responses. In accordance with the instructions given on your answer sheet, mark

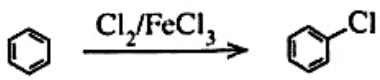
(1) if only (*a*) and (*b*) are correct.
(2) if only (*b*) and (*c*) are correct.
(3) if only (*c*) and (*d*) are correct.
(4) if only (*d*) and (*a*) are correct.
(5) if **any other** number or combination of responses is correct.

Summary of above Instructions

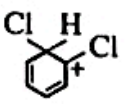
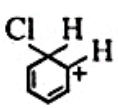
(1)	(2)	(3)	(4)	(5)
Only (*a*) and (*b*) are correct	Only (*b*) and (*c*) are correct	Only (*c*) and (*d*) are correct	Only (*d*) and (*a*) are correct	**Any other** number or combination of responses is correct

31. For a given chemical reaction, which of the following is/are affected by the temperature?
(*a*) Collision frequency of reactant molecules (*b*) Kinetic energy of colliding molecules
(*c*) Standard enthalpy change of the reaction at 25 °C (*d*) Activation energy of the reaction

32. Consider the mechanism of the following reaction.



Which of the following ions is/are formed while this reaction is taking place?

(*a*) $\bar{F}eCl_4$ (*b*) $\overset{+}{F}eCl_4$ (*c*)  (*d*) 

[See page seven

33. At 25 °C, a 1.0 dm^3 aqueous solution of lead iodide (PbI_2) in equilibrium with an excess of solid lead iodide contains a mol of $Pb^{2+}(aq)$ ions. Which of the following is/are correct for this system?

(a) The amount of $Pb^{2+}(aq)$ will be $2a$ mol when the volume is doubled.

(b) The concentration of $Pb^{2+}(aq)$ will be $2a$ mol dm^{-3} when the volume is doubled.

(c) The amount of $Pb^{2+}(aq)$ will decrease when a small amount of solid NaI(s) is added.

(d) The amount of $Pb^{2+}(aq)$ will be $\frac{a}{2}$ mol when the volume is doubled.

34. Which of the following statements is/are correct with regard to the compounds/ions formed by d block elements that belong to the fourth period?

(a) Cr_2O_3 is expected to react with strong acids and strong bases.

(b) When NaOH(aq) is added to solutions containing $Fe^{2+}(aq)$, $Fe^{3+}(aq)$, $Mn^{2+}(aq)$ and $Ni^{2+}(aq)$ precipitates which are insoluble in excess NaOH(aq) are formed.

(c) Both $KMnO_4$ and $K_2Cr_2O_7$ are strong oxidizing agents capable of converting H_2O_2 to O_2 gas under acidic conditions.

(d) The IUPAC name of $[CuCl_4]^{2-}$ is tetrachlorocuprate(II) ion.

35. Which of the following statements is/are correct?

(a) The boiling point of propanoic acid is higher than that of 1-butanol.

(b) The boiling point of pentane is higher than that of 2-methylbutane.

(c) The boiling point of butanal is higher than that of 1-butanol.

(d) The boiling point of hexane is higher than that of 1-pentanol.

36. Which of the following statements is/are correct with regard to nitric acid (HNO_3) and its salts?

(a) Both dilute and concentrated HNO_3 act as oxidizing agents.

(b) Thermal decomposition of NH_4NO_3 gives N_2O and water.

(c) N—O bonds of HNO_3 are all equal in length.

(d) Carbon does not react with concentrated HNO_3 even when heated.

37. Which of the following statements is/are correct regarding the ozone layer?

(a) It is a region in the upper atmosphere (stratosphere) where only ozone is present.

(b) It is a region in the atmosphere where atomic oxygen is abundant.

(c) It is a region that prevents ultra-violet radiation that is emitted from the sun from reaching the earth surface.

(d) It is a region where ozone breakdown only occurs via a chlorine free radical mechanism.

38. A 100.00 cm^3 volume of 0.135 mol dm^{-3} aqueous solution of methylamine (CH_3NH_2) was shaken thoroughly with 75.00 cm^3 of water immiscible organic solvent in a closed bottle at 25 °C, and allowed to reach equilibrium. When 50.00 cm^3 of the aqueous layer was titrated with 0.200 mol dm^{-3} HCl solution, the end-point was 15.00 cm^3. No reaction occurs between methylamine and organic solvent. Which of the following is/are correct?

(a) Partition coefficient K_D of CH_3NH_2 between organic and aqueous layers is 1.67.

(b) Partition coefficient K_D of CH_3NH_2 between organic and aqueous layers is 4.67.

(c) CH_3NH_2 is more soluble in the aqueous layer.

(d) CH_3NH_2 is more soluble in the organic layer.

39. Which of the following statements is/are correct with regard to dissolved oxygen level of water in water bodies.

(a) Composition of dissolved oxygen in water is the same as that of atmospheric oxygen.

(b) Dissolved oxygen level in water decreases due to eutrophication.

(c) H_2S could be produced in water when the dissolved oxygen level in water is high.

(d) Aquatic plants contribute to the dissolved oxygen level in water via photosynthesis.

[*See page eight*

40. Which of the following statements is/are correct regarding the given industrial processes?

(*a*) Coke, a raw material used in the extraction of iron by the Blast Furnance, functions only as a reducing agent.

(*b*) A raw material used in the extraction of magnesium (Dow Process) can be regenerated utilizing a by-product formed during the electrolysis step.

(*c*) In the manufacture of high purity TiO_2 using rutile, inorganic impurities are removed in the chlorination step.

(*d*) The manufacture of nitric acid using Ostwald method uses Fe as the catalyst.

- In question Nos. **41** to **50**, two statements are given in respect of each question. From the Table given below, select the response, out of the responses (1), (2), (3), (4) and (5), that **best** fits the two statements and mark appropriately on your answer sheet.

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

	First Statement	Second statement
41.	The decreasing order of the acid strengths of oxoacids of chlorine is $HClO_4 > HClO_3 > HClO_2 > HOCl$	When the oxidation number of the chlorine atom in the oxoacids of chlorine increases, the acidity of the oxoacid increases.
42.	When H_2S gas reacts with an acidic solution of $K_2Cr_2O_7$, elemental sulphur is formed.	H_2S gas can act as a reducing agent in acidic medium.
43.	An electrochemical cell based on the reaction $Cl_2(g) + 2I^-(aq) \rightarrow 2Cl^-(aq) + I_2(s)$ can be used to generate electricity.	$Cl_2(g)$ is a stronger reducing agent than $I_2(s)$.
44.	Grignard reagents react with water to give alcohols.	The carbon atom of the carbon-magnesium bond in a Grignard reagent has a partial negative charge.
45.	While diazonium salts formed from aniline are stable at low temperatures (0–5 °C), diazonium salts formed from primary aliphatic amines are unstable at these temperatures.	The lone pair of electrons on the nitrogen atom of aniline is delocalized on the benzene ring.
46.	The enthalpy change would be zero when an ideal binary liquid mixture is formed by two completely miscible liquids at a given temperature.	At a given temperature, all intermolecular forces that exist in an ideal binary liquid mixture are equal.
47.	When a pH value of 6.5 is reported in rain water, it is considered as acid rain.	Lowering of pH to below 7 in rain water occurs only due to the dissolution of the acidic gases SO_3 and NO_2.
48.	At a given temperature, the half-life $t_{1/2}$ of a first order reaction is given by the equation $t_{1/2} = 0.693/k$ where k is the first order rate constant.	In a first order reaction with $t_{1/2} = 50$ s, 87.5% of the reaction is completed after 150 s.
49.	In the manufacture of NH_3 gas by the Haber-Bosch process temperatures higher than 600 °C are used.	The activation energy of NH_3 gas producing equilibrium reaction in the Haber-Bosch process decreases with increasing temperature.
50.	Bakelite is classified as an addition polymer.	Bakelite has a three dimensional network structure.

* * *

[*See page nine*