Series : AABB3/1

SET-1

प्रश्न–पत्र कोड
Q.P. Code **56/1/1**

रोल नं.
Roll No.

परीक्षार्थी प्रश्न–पत्र कोड को उत्तर–पुस्तिका के मुख–पृष्ठ पर अवश्य लिखें ।
Candidates must write the Q.P. Code on the title page of the answer-book.

- कृपया जाँच कर लें कि इस प्रश्न–पत्र में मुद्रित पृष्ठ **12** हैं ।
- प्रश्न–पत्र में दाहिने हाथ की ओर दिए गए प्रश्न–पत्र कोड नम्बर को छात्र उत्तर–पुस्तिका के मुख–पृष्ठ पर लिखें ।
- कृपया जाँच कर लें कि इस प्रश्न–पत्र में **12** प्रश्न हैं ।
- **कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, उत्तर–पुस्तिका में प्रश्न का क्रमांक अवश्य लिखें ।**
- इस प्रश्न–पत्र को पढ़ने के लिए 15 मिनट का समय दिया गया है । प्रश्न–पत्र का वितरण पूर्वाह्न में 10.15 बजे किया जाएगा । 10.15 बजे से 10.30 बजे तक छात्र केवल प्रश्न–पत्र को पढ़ेंगे और इस अवधि के दौरान वे उत्तर–पुस्तिका पर कोई उत्तर नहीं लिखेंगे ।

- Please check that this question paper contains **12** printed pages.
- Q.P. Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
- Please check that this question paper contains **12** questions.
- **Please write down the Serial Number of the question in the answer-book before attempting it.**
- 15 minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the candidates will read the question paper only and will not write any answer on the answer-book during this period.

रसायन विज्ञान (सैद्धांतिक)
CHEMISTRY (Theory)

निर्धारित समय : 2 घण्टे
Time allowed : 2 hours

अधिकतम अंक : 35
Maximum Marks : 35

सामान्य निर्देश :

निम्नलिखित निर्देशों को ध्यान से पढ़ें और उनका सख़्ती से पालन करें ।

(i) *इस प्रश्न-पत्र में कुल **12** प्रश्न हैं । **सभी** प्रश्न अनिवार्य हैं ।*

(ii) *यह प्रश्न-पत्र **तीन** खंड़ों में विभाजित है – खंड **क, ख** एवं **ग** ।*

(iii) ***खंड क** – प्रश्न संख्या **1** से **3** तक अति लघु उत्तरीय प्रकार के प्रश्न हैं । प्रत्येक प्रश्न **2** अंक का है ।*

(iv) ***खंड ख** – प्रश्न संख्या **4** से **11** तक लघु उत्तरीय प्रकार के प्रश्न हैं । प्रत्येक प्रश्न **3** अंक का है ।*

(v) ***खंड ग** – प्रश्न संख्या **12** केस आधारित प्रश्न है । यह प्रश्न **5** अंक का है ।*

(vi) *लॉग टेबल एवं कैल्क्युलेटर का प्रयोग वर्जित है ।*

*

खण्ड–क

1. अभिक्रिया दर को परिभाषित कीजिए । दो कारकों को लिखिए जो अभिक्रिया की दर को प्रभावित करते हैं । **2**

2. दिए गए निर्देश के अनुसार निम्नलिखित यौगिकों को व्यवस्थित कीजिए : (कोई **दो**)

   (i) जलीय विलयन में क्षारकीय सामर्थ्य के घटते क्रम में :

   $C_2H_5NH_2$, $(C_2H_5)_2$ NH, $(C_2H_5)_3$ N

   (ii) जल में विलेयता के बढ़ते क्रम में :

   $(C_2H_5)_2$ NH, $C_2H_5NH_2$, $C_6H_5NH_2$

   (iii) pKb मान के घटते क्रम में :

   $C_6H_5NH_2$, $C_2H_5NH_2$, NH_3 **1 × 2 = 2**

General Instructions :

Read the following instructions very carefully and strictly follow them.

(i) *This question paper contains **12** questions. **All** questions are compulsory.*

(ii) *This question paper is divided into **three** Sections – **Section A**, **B** and **C**.*

(iii) ***Section - A** Q. Nos. **1** to **3** are very short answer type questions carrying **2** marks each.*

(iv) ***Section - B** Q. Nos. **4** to **11** are short answer type questions carrying **3** marks each.*

(v) ***Section - C** Q. No. **12** is case based question carrying **5** marks.*

(vi) *Use of log tables and calculators is NOT allowed.*

SECTION – A

1. Define rate of reaction. Write two factors that affect the rate of reaction. **2**

2. Arrange the following compounds as directed : (any **Two**)

   (i) In decreasing order of basic strength in aqueous solution :

   $C_2H_5NH_2$, $(C_2H_5)_2$ NH, $(C_2H_5)_3$ N

   (ii) In increasing order of solubility in water :

   $(C_2H_5)_2$ NH, $C_2H_5NH_2$, $C_6H_5NH_2$

   (iii) In decreasing order of their pKb values :

   $C_6H_5NH_2$, $C_2H_5NH_2$, NH_3 **1 × 2 = 2**

3. निम्नलिखित सेल अभिक्रिया के लिए नेर्न्स्ट समीकरण लिखिए :

$Zn(s) + Cu^{2+}(aq.) \rightarrow Zn^{2+}(aq.) + Cu(s)$

E_{cell} किस प्रकार प्रभावित होगा जब

(i) Cu^{2+} आयनों की सान्द्रता में वृद्धि हो और

(ii) Zn^{2+} आयनों की सान्द्रता में वृद्धि हो ? **1 × 2 = 2**

खण्ड–ख

4. 3d–संक्रमण श्रेणी के निम्नलिखित आयन दिए गए हैं :

Ti^{4+}, V^{3+}, Cr^{3+}, Mn^{3+}

(परमाणु क्रमांक : Ti = 22, V = 23, Cr = 24, Mn = 25)

इनमें से उस आयन को पहचानिए जो

(i) जलीय विलयन में अति स्थायी है ।

(ii) एक प्रबल ऑक्सीकारक है ।

(iii) जलीय विलयन में रंगहीन है ।

प्रत्येक के लिए उपयुक्त कारण दीजिए । **1 × 3 = 3**

5. (क) (i) क्रिस्टल फील्ड सिद्धांत के आधार पर यदि $\Delta_0 < P$ हो तो d^4 आयन के लिए इलेक्ट्रॉनिक विन्यास लिखिए ।

(ii) संयोजकता आबंध सिद्धांत का उपयोग करते हुए $[Ni(CN)_4]^{2-}$ के संकरण एवं चुम्बकीय लक्षण की प्रागुक्ति कीजिए । (परमाणु क्रमांक : Ni = 28)

(iii) IUPAC नियमों के आधार पर निम्नलिखित संकुल का सूत्र लिखिए :

डाइक्लोरिडोबिस (एथेन-1,2-डाइऐमीन) कोबाल्ट (III) **1 × 3 = 3**

अथवा

(ख) जब एक उपसहसंयोजक यौगिक $NiCl_2 \cdot 6H_2O$ को $AgNO_3$ के साथ मिलाया जाता है तो यौगिक के एक मोल के साथ $AgCl$ के दो मोल अवक्षेपित होते हैं । लिखिए :

(i) संकुल का संरचना सूत्र ।

(ii) संकुल में 'Ni' की द्वितीयक संयोजकता ।

(iii) संकुल का IUPAC नाम । **1 × 3 = 3**

3. Write the Nernst equation for the following cell reaction :

$Zn(s) + Cu^{2+}(aq) \rightarrow Zn^{2+}(aq) + Cu(s)$

How will the E_{cell} be affected when concentration of

(i) Cu^{2+} ions is increased and

(ii) Zn^{2+} ions is increased ? **1 × 2 = 2**

SECTION – B

4. Following ions of 3d-transition series are given :

Ti^{4+}, V^{3+}, Cr^{3+}, Mn^{3+}

(Atomic number : Ti = 22, V = 23, Cr = 24, Mn = 25)

Identify the ion which is

(i) most stable in aqueous solution.

(ii) a strong oxidising agent.

(iii) colourless in aqueous solution.

Give suitable reason in each. **1 × 3 = 3**

5. (a) (i) On the basis of crystal field theory, write the electronic configuration for d^4 ion if $\Delta_0 < P$.

(ii) Using valence bond theory, predict the hybridization and magnetic character of $[Ni(CN)_4]^{2-}$.

(Atomic number of Ni = 28)

(iii) Write the formula of the following complex using IUPAC norms :

Dichloridobis (ethane-1,2-diamine) cobalt (III) **1 × 3 = 3**

OR

(b) When a co-ordination compound $NiCl_2 \cdot 6H_2O$ mixed with $AgNO_3$, 2 moles of $AgCl$ are precipitated per mole of the compound. Write

(i) Structural formula of the complex.

(ii) Secondary valency of 'Ni' in the complex.

(iii) IUPAC name of the complex. **1 × 3 = 3**

6. एक प्रथम कोटि की अभिक्रिया के 50% पूर्ण होने में 40 मिनट लगते हैं । कितने समय में अभिक्रिया 90% पूर्ण होगी ?

[दिया है : $\log 2 = 0.3010$, $\log 10 = 1$] **3**

7. (क) प्रत्येक केस के लिए एक उपयुक्त उदाहरण देते हुए निम्न अभिक्रियाओं को प्रदर्शित कीजिए :

(i) गैब्रिल थैलिमाइड संश्लेषण

(ii) कार्बिलएमीन अभिक्रिया

(iii) हॉफमान ब्रोमेमाइड निम्नीकरण अभिक्रिया **1 × 3 = 3**

अथवा

(ख) निम्न अभिक्रियाओं में A, B तथा C की संरचना दीजिए :

(i) $CH_3CH_2Cl \xrightarrow{KCN} A \xrightarrow{LiAlH_4} B \xrightarrow[0\ °C]{HNO_2} C$

(ii) $CH_3COOH \xrightarrow[\Delta]{NH_3} A \xrightarrow[(b)\ H_2O]{(a)\ LiAlH_4} B \xrightarrow{C_6H_5SO_2Cl} C$ **1½ × 2 = 3**

8. (क) निम्नलिखित के लिए कारण दीजिए :

(i) संक्रमण तत्त्वों की कणीकरण की एन्थैल्पियाँ उच्चतर होती हैं ।

(ii) लैन्थेनॉयड तत्त्वों के मिश्रण का पृथक्करण कठिन होता है ।

(iii) कॉपर के लिए $E^{\circ}_{M^{2+}/M}$ का मान धनात्मक है । **1 × 3 = 3**

अथवा

(ख) संक्रमण धातुओं को परिभाषित कीजिए । d-ब्लॉक के तत्त्वों में कौन सा तत्त्व संक्रमण श्रेणी के तत्त्व नहीं कहे जा सकते ? संक्रमण धातुएँ सामान्यतः रंगीन यौगिक क्यों बनाती हैं ? **3**

9. एक कार्बनिक यौगिक 'X' जिसका अणुसूत्र $C_5H_{10}O$ है 2,4-DNP व्युत्पन्न बनाता है, टॉलेन अभिकर्मक को अपचयित नहीं करता है लेकिन NaOH की उपस्थिति में I_2 के साथ गर्म करने पर आयोडोफार्म परीक्षण देता है । यौगिक 'X' प्रबल ऑक्सीकरण पर एथेनॉइक तथा प्रोपेनॉइक अम्ल देता है । लिखिए :

(i) यौगिक 'X' की संरचना ।

(ii) 2, 4-DNP अभिकर्मक के साथ यौगिक 'X' की अभिक्रिया होने से प्राप्त उत्पाद की संरचना ।

(iii) यौगिक 'X' को NaOH की उपस्थिति में I_2 के साथ गर्म करने से प्राप्त उत्पादों की संरचनाएँ ।

1 × 3 = 3

6. A first order reaction is 50% complete in 40 minutes. Calculate the time required for the completion of 90% of reaction.

[Given : log 2 = 0.3010, log 10 = 1] **3**

7. (a) Illustrate the following reactions giving suitable example in each case :

(i) Gabriel phthalimide synthesis.

(ii) Carbylamine reaction.

(iii) Hoffmann bromamide degradation reaction. **1 × 3 = 3**

OR

(b) Write the structures of A, B and C in the following reactions :

(i) $CH_3CH_2Cl \xrightarrow{KCN} A \xrightarrow{LiAlH_4} B \xrightarrow[0\ °C]{HNO_2} C$

(ii) $CH_3COOH \xrightarrow[\Delta]{NH_3} A \xrightarrow[(b)\ H_2O]{(a)\ LiAlH_4} B \xrightarrow{C_6H_5SO_2Cl} C$ **1½ × 2 = 3**

8. (a) Account for the following :

(i) Transition elements have higher enthalpies of atomisation.

(ii) Separation of a mixture of Lanthanoid elements is difficult.

(iii) The $E^{o}_{M^{2+}/M}$ value for copper is positive. **1 × 3 = 3**

OR

(b) Define transition elements. Which of the d-block elements may not be regarded as the transition elements ? Why transition metals generally form coloured compounds ? **3**

9. An organic compound 'X' with the molecular formula $C_5H_{10}O$ forms 2,4-DNP derivative, does not reduce Tollens' reagent but gives positive iodoform test on heating with I_2 in the presence of NaOH. Compound 'X' gives ethanoic acid and propanoic acid on vigorous oxidation. Write the

(i) Structure of the compound 'X'.

(ii) Structure of the product obtained when compound 'X' reacts with 2,4-DNP reagent.

(iii) Structures of the products obtained when compound 'X' is heated with I_2 in the presence of NaOH. **1 × 3 = 3**

10. (क) भौतिक–अधिशोषण और रासायनिक–अधिशोषण के बीच कोई तीन अंतर लिखिए। **1 × 3 = 3**

अथवा

(ख) प्रत्येक के लिए उपयुक्त उदाहरण देकर निम्नलिखित पदों को परिभाषित कीजिए :

(i) द्रवरागी सॉल

(ii) वृहदाण्विक कोलॉइड

(iii) स्कंदन **1 × 3 = 3**

11. (a) निम्नलिखित सेल अभिक्रिया के लिए मानक गिब्ज़ ऊर्जा $-300\ kJ\ mol^{-1}$ है :

$$Zn(s) + 2Ag^{+}(aq) \rightarrow Zn^{2+}(aq) + 2Ag(s)$$

अभिक्रिया के लिए E^{o}_{cell} का परिकलन कीजिए।

(दिया है : $1\ F = 96500\ mol^{-1}$)

(b) $MgCl_2$ के लिए λ^{o}_{m} का परिकलन कीजिए यदि Mg^{2+} आयन एवं Cl^{-} आयन के लिए λ^{o} के मान क्रमशः $106\ S\ cm^2mol^{-1}$ एवं $76.3\ S\ cm^2mol^{-1}$ हैं। **2 + 1 = 3**

खण्ड – ग

12. नीचे दिए गए अनुच्छेद को पढ़िए और नीचे दिए गए प्रश्नों के उत्तर दीजिए :

ऐल्डिहाइड, कीटोन एवं कार्बोक्सिलिक अम्ल, कार्बनिक यौगिकों के कुछ महत्त्वपूर्ण वर्ग हैं जिनमें कार्बोनिल समूह उपस्थित हैं। कार्बोनिल समूह में कार्बन की अपेक्षा ऑक्सीजन की विद्युत–ऋणात्मकता उच्च होने के कारण ये अत्यधिक ध्रुवीय अणु होते हैं। ऐल्डिहाइडों को प्राथमिक ऐल्कोहॉलों के विहाइड्रोजनन या नियंत्रित ऑक्सीकरण और ऐसिल हैलाइडों के नियंत्रित अपचयन द्वारा विरचित किया जाता है। कीटोनों को द्वितीयक ऐल्कोहॉलों के ऑक्सीकरण और ऐल्काइनों के जलयोजन से विरचित किया जाता है।

ऐल्डिहाइड एवं कीटोन कार्बोनिल समूह पर नाभिकरागी योगज अभिक्रियाएँ देते हैं लेकिन कार्बोक्सिलिक अम्ल नाभिकरागी योगज अभिक्रियाएँ नहीं देते हैं। ऐल्डिहाइड एवं कीटोनों में उपस्थित α-हाइड्रोजन अम्लीय होते हैं। अतः कम से कम एक α-हाइड्रोजन युक्त ऐल्डिहाइड एवं कीटोन ऐल्डोल संघनन देते हैं।

10. (a) Write any three differences between physisorption and chemisorption. **1 × 3 = 3**

OR

(b) Define the following terms with a suitable example in each :

(i) Lyophilic sol

(ii) Macromolecular colloid

(iii) Coagulation **1 × 3 = 3**

11. (a) The standard Gibbs energy (ΔrG°) for the following cell reaction is -300 kJ mol^{-1} :

$$Zn(s) + 2Ag^+(aq) \rightarrow Zn^{2+}(aq) + 2Ag(s)$$

Calculate E°_{cell} for the reaction. (Given: 1F = 96500 mol^{-1})

(b) Calculate λ°_m for $MgCl_2$ if λ° values for Mg^{2+} ion and Cl^- ion are 106 S cm^2mol^{-1} and 76.3 S cm^2mol^{-1} respectively. **2 + 1 = 3**

SECTION – C

12. Read the passage given below and answer the questions that follow :

Aldehydes, ketones and carboxylic acids are some of the important classes of organic compounds containing carbonyl group. These are highly polar molecules due to higher electro-negativity of oxygen relative to carbon in the carbonyl group. Aldehydes are prepared by dehydrogenation or controlled oxidation of primary alcohols and controlled reduction of acyl halides. Ketones are prepared by oxidation of secondary alcohols and hydration of alkynes.

Aldehydes and ketones undergo nucleophilic addition reactions onto the carbonyl group but carboxylic acid does not undergo nucleophilic addition reaction. The alpha (α) – hydrogens of aldehydes and ketones are acidic. Therefore aldehydes and ketones having at least one α-hydrogen undergo Aldol condensation.

टॉलेन अभिकर्मक एवं फेलिंग विलयन के समान मृदु ऑक्सीकरण अभिकर्मक ऐल्डिहाइडों को आसानी से ऑक्सीकृत कर देते हैं । कार्बोक्सिलिक अम्लों का विरचन प्राथमिक ऐल्कोहॉलों, ऐल्डिहाइडो के ऑक्सीकरण, नाइट्राइलों के जल-अपघटन के द्वारा किया जाता है । ऐरोमैटिक कार्बोक्सिलिक अम्लों को पार्श्व शृंखला वाले ऐल्किल बेन्ज़ीन के ऑक्सीकरण से विरचित किया जा सकता है । कार्बोक्सिलिक अम्ल ऐल्कोहॉलों एवं अधिकतर अतिसरल फ़ीनालों से काफी अधिक अम्लीय होते हैं ।

(a) निम्न को नाभिकरागी योगज अभिक्रिया के प्रति उनकी अभिक्रियाशीलता के बढ़ते हुए क्रम में व्यवस्थित कीजिए : **1**

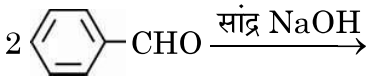
CH_3COCH_3, CH_3CHO, HCHO, $C_6H_5COCH_3$

(b) एथेनैल एवं प्रोपेनोन के बीच विभेद करने के लिए एक सरल रासायनिक परीक्षण दीजिए । **1**

(c) ऐल्डिहाइडों एवं कीटोनों की तरह कार्बोक्सिलिक अम्ल नाभिकरागी योगज अभिक्रियाएँ क्यों नहीं देते हैं ? **1**

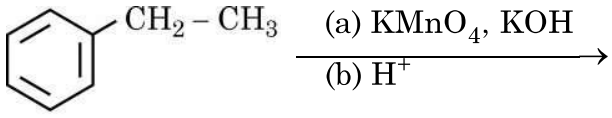
(d) (i) ऐल्डिहाइडों एवं कीटोनों के ऐल्फा (α) हाइड्रोजन की अम्लीय प्रकृति क्यों होती है ?

(ii) निम्नलिखित में उत्पादों को लिखिए : **1 + 1 = 2**

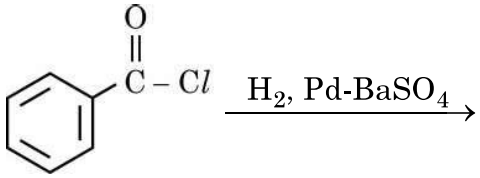


अथवा

निम्नलिखित अभिक्रियाओं के मुख्य उत्पाद लिखिए :

(i) 

1

(ii) 

1

1+1+1+2=5

Aldehydes are easily oxidised by mild oxidising agents such as Tollens' reagent and Fehling's reagent. Carboxylic acids are prepared by the oxidation of primary alcohols, aldehydes and by hydrolysis of nitriles. Aromatic carboxylic acids are prepared by side-chain oxidation of alkyl benzenes. Carboxylic acids are considerably more acidic than alcohols and most of simple phenols.

(a) Arrange the following in the increasing order of their reactivity towards nucleophilic addition reaction. : **1**

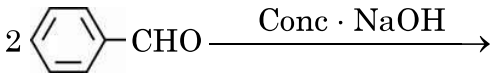
CH_3COCH_3, CH_3CHO, HCHO, $C_6H_5COCH_3$

(b) Give a simple chemical test to distinguish between Ethanal and Propanone. **1**

(c) Why carboxylic acid does not give nucleophilic addition reactions like aldehydes and ketones ? **1**

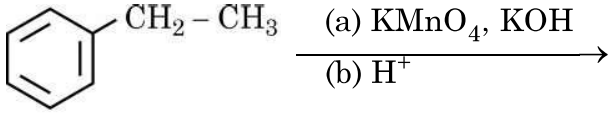
(d) (i) Why α-hydrogen of aldehydes and ketones are acidic in nature ?

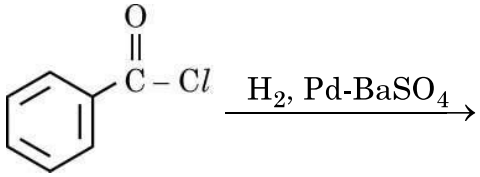
(ii) Write the products in the following : **1 + 1 = 2**



OR

Write the major products of the following reactions :

(i)  **1**

(ii)  **1**

1+1+1+2=5

*

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Senior Secondary School Term–II Examination, 2022

Marking Scheme: CHEMISTRY (Subject Code: 043)

[Paper Code: 56/1/1]

General Instructions: -

1. You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and teaching profession. To avoid mistakes, it is requested that before starting evaluation, you must read and understand the spot evaluation guidelines carefully.
2. **"Evaluation policy is a confidential policy as it is related to the confidentiality of the examinations conducted, Evaluation done and several other aspects. Its' leakage to public in any manner could lead to derailment of the examination system and affect the life and future of millions of candidates. Sharing this policy/document to anyone, publishing in any magazine and printing in News Paper/Website etc may invite action under IPC."**
3. Evaluation is to be done as per instructions provided in the Marking Scheme. It should not be done according to one's own interpretation or any other consideration. Marking Scheme should be strictly adhered to and religiously followed. **However, while evaluating, answers which are based on latest information or knowledge and/or are innovative, they may be assessed for their correctness otherwise and marks be awarded to them. In class-X, while evaluating two competency-based questions, please try to understand given answer and even if reply is not from marking scheme but correct competency is enumerated by the candidate, marks should be awarded.**
4. The Head-Examiner must go through the first five answer books evaluated by each evaluator on the first day, to ensure that evaluation has been carried out as per the instructions given in the Marking Scheme. The remaining answer books meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.
5. Evaluators will mark(√) wherever answer is correct. For wrong answer 'X" be marked. Evaluators will not put right kind of mark while evaluating which gives an impression that answer is correct and no marks are awarded. **This is most common mistake which evaluators are committing.**
6. If a question has parts, please award marks on the right-hand side for each part. Marks awarded for different parts of the question should then be totalled up and written in the left-hand margin and encircled. This may be followed strictly.
7. If a question does not have any parts, marks must be awarded in the left-hand margin and encircled. This may also be followed strictly.
8. If a student has attempted an extra question, answer of the question deserving more marks should be retained and the other answer scored out.
9. No marks to be deducted for the cumulative effect of an error. It should be penalized only once.
10. A full scale of marks 0-35 has to be used. Please do not hesitate to award full marks if the answer deserves it.
11. Every examiner has to necessarily do evaluation work for full working hours i.e., 8 hours every day and evaluate 30 answer books per day in main subjects and 35 answer books per day in other subjects (Details are given in Spot Guidelines). This is in view of the reduced syllabus and number of questions in question paper.
12. Ensure that you do not make the following common types of errors committed by the Examiner in the past:-
    - Leaving answer or part thereof unassessed in an answer book.

- Giving more marks for an answer than assigned to it.
- Wrong totaling of marks awarded on a reply.
- Wrong transfer of marks from the inside pages of the answer book to the title page.
- Wrong question wise totaling on the title page.
- Wrong totaling of marks of the two columns on the title page.
- Wrong grand total.
- Marks in words and figures not tallying.
- Wrong transfer of marks from the answer book to online award list.
- Answers marked as correct, but marks not awarded. (Ensure that the right tick mark is correctly and clearly indicated. It should merely be a line. Same is with the X for incorrect answer.)
- Half or a part of answer marked correct and the rest as wrong, but no marks awarded.

13. While evaluating the answer books if the answer is found to be totally incorrect, it should be marked as cross (X) and awarded zero (0) Marks.

14. Any unassessed portion, non-carrying over of marks to the title page, or totalling error detected by the candidate shall damage the prestige of all the personnel engaged in the evaluation work as also of the Board. Hence, in order to uphold the prestige of all concerned, it is again reiterated that the instructions be followed meticulously and judiciously.

15. The Examiners should acquaint themselves with the guidelines given in the Guidelines for spot Evaluation before starting the actual evaluation.

16. Every Examiner shall also ensure that all the answers are evaluated, marks carried over to the title page, correctly totalled and written in figures and words.

17. The Board permits candidates to obtain photocopy of the Answer Book on request in an RTI application and also separately as a part of the re-evaluation process on payment of the processing charges.

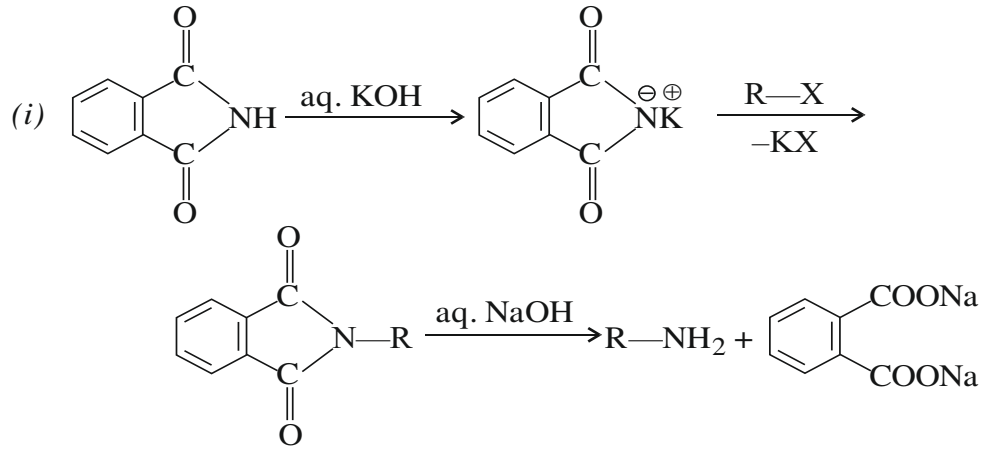
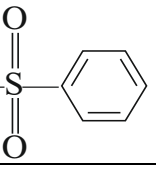
MARKING SCHEME

Senior Secondary School Examination TERM–II, 2022

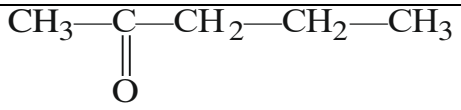
CHEMISTRY (Subject Code–043)

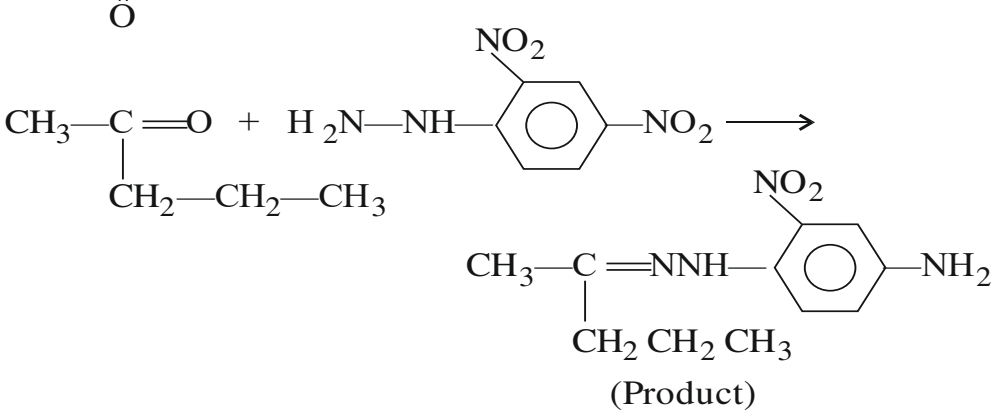
[Paper Code: 56/1/1]

Q. No.	EXPECTED ANSWER / VALUE POINTS	Marks
	SECTION—A	
1.	Decrease in concentration of reactant with time or increase in concentration of product with time. Factors: Concentration, temperature (or any other two factors).	1 ½ + ½
2.	*(i)* $(C_2H_5)_2NH > (C_2H_5)_3N > C_2H_5NH_2$ *(ii)* $C_6H_5NH_2 < (C_2H_5)_2NH < C_2H_5NH_2$ *(iii)* $C_6H_5NH_2 > NH_3 > C_2H_5NH_2$ (Any *two*)	1×2
3.	$E_{cell} = E^{\circ}_{cell} - \frac{0{\cdot}059}{2}\log\frac{[Zn^{2+}]}{[Cu^{2+}]}$ or any other correct mathematical expression of Nernst equation. *(i)* E_{cell} will increase *(ii)* E_{cell} will decrease	1 ½+½
	SECTION—B	
4.	*(i)* Cr^{3+}, due to stable t_{2g}^3 configuration. *(ii)* Mn^{3+}, as Mn is more stable in +2 oxidation state / stable half-filled d^5 configuration of Mn^{2+}. *(iii)* Ti^{4+}, no unpaired electrons / no d-d transition / d^0 configuration.	½+½ ½+½ ½+½
5.	*(a) (i)* $t_{2g}^3 e_g^1$ *(ii)* $d\,sp^2$, diamagnetic *(iii)* $[CoCl_2(en)_2]^+$	1 ½+½ 1
5.	**OR**	
	(b) (i) $[Ni(H_2O)_6]Cl_2$ *(ii)* 6 *(iii)* hexaaquanickel(II) chloride	1 1 1
6.	$t_{1/2} = 0.693/k$ $k = 0.693/t_{1/2} = 0.693/40\ min^{-1}$ 90% completion $t = 2.303/k \log [R_0]/[R]$ $= 2.303/0.693 \times 40 \times \log 100/10$ $= 2.303/0.693 \times 40 = 132.9$ min (Deduct ½ marks if no or incorrect unit) (or any other correct method)	½ ½ 1 1

7.	*(a)*  *(ii)* $R-NH_2 + CHCl_3 + 3KOH \xrightarrow[\text{alc.}]{\triangle} RNC + 3KCl + 2H_2O$ *(iii)* $R-CONH_2 + Br_2 + 4KOH \xrightarrow[\text{alc./aq.}]{} R-NH_2 + K_2CO_3 + 2KBr + 2H_2O$ (Balancing of equation is not necessary)	1×3
7.	**OR** *(b) (i)* $A = CH_3CH_2CN$ $B = CH_3CH_2CH_2NH_2$ $C = CH_3CH_2CH_2OH$ *(ii)* $A = CH_3CONH_2$ $B = CH_3CH_2NH_2$ $C =$ 	½ x 3 ½ x 3
8.	*(a)(i)* Because of greater number of unpaired electrons which cause strong metallic bonding / strong interatomic interaction forces. *(ii)* Because of lanthanoid contraction / similar atomic or ionic radii / similar properties. *(iii)* Because of high $\Delta_a H^\circ$ and low $\Delta_{hyd} H^\circ$	1 1 1
8.	**OR** *(b)* The elements with partially filled or incompletely filled d-subshell either in the ground state or in the oxidation state. Zinc, cadmium and mercury are not considered as transition elements. Due to d-d transition or presence of unpaired d electrons.	1 1 1

9.

(i) 

(ii) 

(Product)

(iii) $CH_3—CH_2CH_2COONa + CHI_3$

1

1

½+½

10. *(a)*

	Physisorption	***Chemisorption***
1.	Arise from weak van der Waals forces	Strong chemical bonds
2.	Reversible	Irreversible
3.	Multimolecular layers	Unimolecular layer

(or any other correct difference)

1×3

10. **OR**

(b) (i) The colloids in which the particles of dispersed phase have more affinity towards dispersion medium. Example: Gum. ½+½

(ii) The colloids obtained by dissolving macromolecules in suitable solvents. Example: Starch. ½+½

(iii) The settling of colloidal particles / conversion of colloidal sol into precipitate. Example: Electrophoresis. ½+½

(Any other suitable example in each case)

11. *(a)* $\Delta_r G^\circ = -nFE^\circ_{cell}$ ½

$= +300\times10^3 \text{ J mol}^{-1} = +2\times96500 \text{ C mol}^{-1}\times E^\circ_{cell}$ ½

$E^\circ_{cell} = \dfrac{3\cancel{00}\times10^3}{2\times965\cancel{00}} \text{ V}$

$E^\circ_{cell} = 1{\cdot}55 \text{ V}$ 1

(Deduct ½ mark for incorrect unit or no unit)

(b) $\Lambda^\circ_m = \lambda^\circ_{Mg^{2+}} + 2\lambda^\circ_{Cl^-}$ ½

$\Lambda^\circ_m = (106 + 2\times76{\cdot}3) \text{ S cm}^2 \text{ mol}^{-1}$

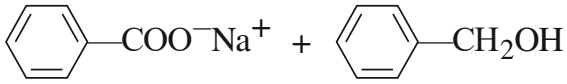
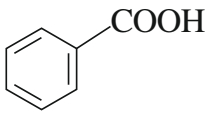
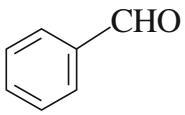
$\Lambda^\circ_m = (106 + 152{\cdot}6) \text{ S cm}^2 \text{ mol}^{-1}$

$\Lambda^\circ_m = 258{\cdot}6 \text{ S cm}^2 \text{ mol}^{-1}$ ½

12. *(a)* $C_6H_5COCH_3 < CH_3COCH_3 < CH_3CHO < HCHO$ 1

(b) On heating with Tollens' reagent, ethanal forms silver mirror whereas propanone does not. (Or any other correct chemical test) 1

(c) Because of resonance by —OH of COOH which reduces the electrophilicity of carboxyl carbon / Because of resonance in COOH group due to which carbon loses its carbonyl nature. 1

	(d) *(i)* Due to strong electron withdrawing effect of the carbonyl group and resonance stabilization of the conjugate base. *(ii)*  **OR** *(i)*  *(ii)* 	1+ 1 1 1

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