

Sample Question Paper

CHEMISTRY

STANDARD - XII

Development of Question papers for Higher Secondary Classes

General Guidelines

1. Question paper may be prepared in accordance with the design and blue print so as to ensure fair distribution of Curriculum Objectives/ content areas and types of questions.
2. Question should be based on the Curriculum Objectives.
3. Curriculum Objectives can be clubbed or can be split into shorter chunks, whenever necessary, for framing questions.
4. Questions for assessing higher order mental processes should be framed, focusing on the ability to apply, analyse, evaluate and think creatively.
5. Different types of questions - objective type, short answer type, essay type etc., shall be included in the question paper.
6. There need not be separate sections in the question paper for different types of questions.
7. Questions that test mere recalling and rote learning shall be avoided.
8. A fair distribution of open-ended questions shall be included to promote divergent and creative thinking.
9. Question texts and the directions given shall be simple, clear and comprehensive.
10. Objective type questions should aim at testing higher order mental processes.
11. There shall not be a rigid pattern regarding the type of questions, number of questions and order of questions.
12. Questions shall be life-related
13. Questions shall be in accordance with the learning activities.
14. Care shall be taken to avoid gender bias, communal sentiments etc. in the questions framed.
15. Adequate hints for answering the questions shall be given, wherever necessary.

16. Choice of questions may be given only upto a maximum of 20% of the total score. While giving the choice, due attention shall be given to select the same content area/ curriculum objective, scores, mental processes involved etc.
17. The duration of the examination will be 2 hrs for subjects having 60 scores and 2½ hrs for those having 80 scores, in addition to the *cool off time* for 15 mts.
18. Question paper shall be bilingual (English and Malayalam) except in languages. Technical terms can be transliterated wherever necessary.
19. Scores for objective type questions shall not exceed 20% of the total score.
20. Maximum score for a question shall not exceed 10% of the total score. However in Botany and Zoology a maximum of 5 score can be given to a question. Fractions may be avoided.
21. All questions should have an entry level, so that all learners who have undergone the learning process can get the minimum score. However, the possibility of applying higher order mental process, considering the different levels of the learners shall be taken into account.
22. Score should be noted in the question paper against each question and word limit may be specified wherever necessary.
23. Score shall be given to a question in accordance with the mental processes involved in answering it.
24. The possibility of using a single question text as the question text for other questions can be explored.
25. While setting a question paper, the time allocation shall be in accordance with the time for reading the questions and thinking, planning and writing time of the answer.

Guidelines for developing scoring key

1. Scoring indicators should reflect the mental processes involved in answering that question.
2. Concepts to be evaluated should be clear and specific.
3. Scoring key for open-ended questions shall give due consideration to a fairly wide range of possible responses. It may include sequencing of ideas, relevance, originality, creativity, level of thinking, presentation etc.
4. The scoring key should indicate the split up scores for the essential lower order mental processes and the higher order mental processes involved in the answer.
5. Reasonable split up may be given for the scores.
6. While evaluating the ability to express the knowledge constructed by the learner, limitations in language shall be ignored.

Curriculum Objectives

1. To understand the concept of dual nature of matter and radiation, de Broglie relation and Heisenberg's Uncertainty Principle through discussion and problem solving etc.
2. To familiarize the quantum mechanical model of atom and to understand the concept of atomic orbitals and the shapes of s, p and d orbitals through discussion, charting, multimedia, model making and assignment.
3. To understand Quantum numbers and the electronic configuration of atoms through discussion and problem solving.
4. To understand the molecular orbital method of chemical bonding, the concept of bond order and M-O diagram of simple diatomic molecules through discussion, making tables and charts and problem solving.
5. To familiarize the theories of Metallic bonding such as electron sea model and band model through discussion, charting and multimedia.
6. To understand the hybridization involving s, p and d orbitals through discussion, role play, making models, charts & tables and multimedia.
7. To familiarize different types of solids, space lattice, units cell and different types of cubic crystal systems through discussion, charting, model making and multimedia.
8. To understand X-ray studies of crystals and Bragg's equation through discussion and problem solving.
9. To understand the close packing in crystalline solids, types of voids, co-ordination number and radius ratio through discussion, charting, model making and multimedia.
10. To familiarize the structure of simple ionic compounds of AB and AB₂ type such as NaCl, CsCl, ZnS, Na₂O, CaF₂ and density calculations of cubic crystals through discussion, charting, model making and problem solving.
11. To understand the imperfections in solids through discussion and chart making.
12. To understand the magnetic & electric properties of solids through discussion & chart making.
13. To understand the various concept of acids and bases through discussion and experimentation.
14. To familiarize pH scale through discussion, experimentation, problem solving and project.
15. To understand Oswald's dilution law through discussion, experimentation and problem solving.
16. To understand the theory of indicators through discussion and experimentation.

17. To develop the idea of salt hydrolysis through discussion.
18. To understand the concept of solubility product, common ion effect and buffer solutions through discussion, experimentation and problem solving.
19. To understand the concept of entropy and second law of thermodynamics through discussion, simple experiments and problem solving.
20. To familiarize spontaneous and non spontaneous process through discussion and experimentation.
21. To attain the concept of free energy and criterion for spontaneity through discussion and problem solving.
22. To understand the relation of free energy with emf and equilibrium constant through discussion, reference and problem solving.
23. To understand third law of thermodynamics through discussion, reference and problem solving.
24. To familiarize electrolytic and galvanic cells, laws of electrolysis, quantitative aspects of electrolysis through discussion, problem solving and experimentation.
25. To understand the variation of molar conductance with dilution through discussion, experimentation and charting.
26. To understand the types of electrolytic conduction, Kohlrausch's law and its applications through discussion and problem solving.
27. To familiarise the concept of electrode potential, electromotive force and Daniel Cell through discussion, experimentation, project and problem solving.
28. To understand Nernst equation through discussion and problem solving.
29. To familiarize the concept of primary and secondary cells and fuel cell through discussion, experimentation and charting.
30. To familiarise the chemistry of corrosion and its prevention through discussion and seminar.
31. To develop an idea about average rate and instantaneous rates through discussion and graph plotting.
32. To understand the rate law, order & molecularity through discussion assignments and graphical analysis.
33. To familiarize the integrated rate law expression for zero order and first order reactions and half life period through discussion, reference & problem solving.
34. To develop an idea about the temperature dependance of rate constant, Arrhenius equation and activation energy through discussion, graphical analysis and problem solving.
35. To develop an idea about elementary & complex reactions through discussion, charting, assignments and problem solving.

36. To familiarize the concept of physical adsorption and chemical adsorption through discussion.
 37. To understand the factors influencing adsorption, Freundlich and Langmuir adsorption isotherms through discussion, and graphical analysis.
 38. To familiarize the concept of catalysis, Enzyme catalysis and Zeolites through discussion and experimentation.
 39. To familiarize colloids and their classification through discussion, demonstration and charting.
 40. To familiarize the methods for the preparation of colloids and their properties through discussion, charting and experimentation.
 41. To understand the concept of protection of colloids, Gold Number and Hardy - Schulze rule through discussion, experimentation and problem solving.
 42. To familiarize emulsions through discussion and experimentation.
 43. To understand the general properties of p-block elements through discussion, experimentation, assignments and seminar.
 44. To familiarize the uses and structure of silica and different silicates through discussion, charting, model making and assignments.
 45. To understand the preparation, properties and structure of phosphorus and its compounds through discussion, experimentation, charting and model making.
 46. To understand the preparation of phosphine through discussion and charting.
 47. To understand the preparation and structure of important oxides, halides and oxo acids of phosphorus through discussion, charting, experimentation, model making and assignment.
 48. To compare the properties of halides, oxides and hydrides of group 15 elements through discussion, charting and reference.
 49. To familiarize the production of sulphur, allotropes of sulphur and its oxides and halides through discussion, experimentation, model making, charting, assignment and project.
 50. To familiarize the preparation and properties H_2S and its uses in qualitative analysis through discussion, experimentation, charting, multimedia, seminar and project.
 51. To understand the manufacture, properties and uses of H_2SO_4 and $Na_2S_2O_3$ through discussions, experimentation, charting, assignment and project.
 52. To compare the properties of oxides, halides and hydrides of group 16 elements through discussion, reference, assignment, seminar and charting.
 53. To familiarise the hydrides, oxides and oxo acids of chlorine, preparation and properties of Bleaching powder and Inter halogen compounds through discussion, experimentation, seminar, charting, model making and assignment.
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54. To familiarize the occurrence, isolation, properties and uses of noble gases through discussion and seminar.
55. To understand the preparation, properties and structure of Fluorides and Oxides of Xenon and reaction with water through discussion, model making, charting and assignment.
56. To understand the general characteristics of transition elements through discussion, simple experiments, charting, assignments, table making, seminar and multimedia.
57. To understand preparation and properties of KMnO_4 , $\text{K}_2\text{Cr}_2\text{O}_7$, $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$, AgNO_3 and halides of Hg & Ag through discussion, experimentation and assignment.
58. To develop the idea of chemistry photography through discussion, demonstration and seminar.
59. To understand the occurrence and general characteristics of f-block elements through discussion, table formation and assignment.
60. To compare the properties of lanthanoids and actinoids through discussion, assignment and seminar.
61. To understand the occurrence and concentration of ores through discussion, assignment and multimedia.
62. To understand the principles of extraction of metals through discussion.
63. To understand the different methods of refining of metals through discussion and experimentation.
64. To familiarize the methods of extraction of the metals Na, Al, Fe & Cu through discussion, charting and model making.
65. To understand the manufacture of steel and properties of steel through discussion and charting.
66. To familiarize the different types of steel, properties and their uses through discussion and demonstration.
67. To familiarize the heat treatment of steel through discussion, demonstration, assignment and field trip.
68. To develop an idea about co-ordination compounds, different types of ligands, co-ordination number through discussion, charting and demonstration.
69. To familiarize the IUPAC nomenclature of co-ordination compounds through discussion & assignments.
70. To understand Werner's Coordination Theory through discussion.
71. To develop an idea about valence bond approach of octahedral, tetrahedral & square planar complexes, their geometry & magnetic properties through discussion, problem solving and assignment.

72. To develop a qualitative idea about crystal field theory through discussion.
73. To understand the isomerism (structural & stereo) in co-ordination compounds through discussion, charting and model making.
74. To understand the importance of co-ordination compounds in qualitative analysis & biological systems (chlorophyll, haemoglobin & Vitamin B₁₂) through discussion and assignment.
75. To develop an idea about organo metallic compounds, their classification and uses through discussion, reference, charting and assignment.
76. To familiarize stereo (Geometrical and Optical) isomerism of organic compounds through discussion, charting and model making.
77. To understand the concept of specific rotation, chirality and asymmetric carbon atom through discussion and problem solving.
78. To familiarize the configurations (D & L and R & S) and different projection formulae of stereo isomers through discussion, assignments, multimedia, model making and problem solving.
79. To understand the elements of symmetry of organic molecules through discussion, charting, model making, multimedia and assignment.
80. To familiarize Enantiomers and Racemic mixtures through discussion and assignments.
81. To understand the optical isomerism of compounds containing two chiral carbon atoms (such as tartaric acid) Diastereomers and mesoform through discussion, charting & multimedia.
82. To familiarize the concept of resolution through discussion and charting.
83. To understand the importance of stereo chemistry through discussion, reference and assignment.
84. To understand the nomenclature, classification and preparation of alcohols through discussion, reference and charting.
85. To familiarise the properties of alcohols through discussion and experimentation.
86. To distinguish primary, secondary and tertiary alcohols through discussion and experimentation.
87. To understand the methods of manufacture of ethanol and its grades through discussion, experimentation, seminar and project.
88. To understand the nomenclature, preparation and properties of phenols through discussion and experimentation.
89. To understand the nomenclature, preparation and properties of ethers through discussion and charting.

90. To familiarize the nomenclature, preparation and properties of glycol and glycerol through discussion, experimentation and seminar.
91. To understand the electronic structure of carbonyl group and nomenclature of aldehydes and ketones through discussion, charting and assignments.
92. To familiarize the preparation & properties of aldehydes and ketones through discussion, experimentation and assignments.
93. To understand the electronic structure of carboxyl group and the nomenclature, preparation and properties of carboxylic acids through discussion and experimentation.
94. To understand the acidity of carboxylic acids and the factors influencing the acidity through discussion and assignments.
95. To familiarize the nomenclature, preparation and properties of functional derivatives of carboxylic acids through discussion, assignment and experimentation.
96. To familiarize important methods of preparation of commercially important compounds containing the functional groups $-\text{CHO}$, $-\text{CO}$ and $-\text{COOH}$ through discussion, reference and assignment.
97. To understand the nomenclature, preparation and properties of nitrocompounds through discussion and experimentation.
98. To understand the nomenclature, preparation and properties of aliphatic amines through discussion and experimentation.
99. To understand the basic nature of amines through discussion, reference and assignment.
100. To understand the preparation and properties of aniline through discussion and experimentation.
101. To distinguish between primary, secondary and tertiary amines through discussion, experimentation and assignment.
102. To understand the structure of nitro group and cyano group through discussion and charting.
103. To familiarize the preparation and properties of Cyanides and Isocyanides through discussion charting and assignment.
104. To understand the preparation, properties & uses of benzene diazonium salts through discussion, demonstration and assignment.
105. To understand the classification of different types of polymers based on structure, origin and molecular forces through discussion, charting, seminar, demonstration and project.
106. To familiarize the preparation and uses of addition polymers and condensation polymers through discussion, assignment and experimentation.

107. To understand the preparation and uses of some commercially important polymers through discussion and assignment.
108. To familiarize biopolymers and biodegradable polymers through discussion and assignment.
109. To understand the classification, function and structure of carbohydrates through discussion, charting and model making.
110. To understand the nature and function of aminoacids and formation of peptide bond through discussion, assignment and multimedia.
111. To familiarize the structure of proteins through discussion, model making, assignment and multimedia.
112. To familiarize the structure and functions of nucleic acids through discussion, model making, seminar and multimedia.
113. To familiarize the characteristics of enzymes and their action through discussion and seminar.
114. To understand the classification and functions of lipids, hormones and vitamins through discussion and assignment.
115. To understand the application of chemistry in medicine such as analgesics, tranquilizers, antiseptics, antacids, hypnotics, antibiotics through discussion, charting and assignment.
116. To understand the classification of dyes by giving special emphasis on azodyes, vat dyes and mordant dyes through discussion and exhibits.
117. To develop a general idea about Creams, Perfumes, Talcum powder & Deodorants, Carbon fibres & Ceramics and about the chemicals used in food preservatives, artificial sweetening agents, edible colours and antioxidants through discussion, charting and seminar.
118. To familiarize a few examples of insect repellants, pheromones and sex attractants through discussion and reference.
119. To familiarize the different types of rocket propellants and the chemicals used in them and the important space programmes through general discussion, seminar and assignment.

Mental Process

- 1 Retrieves /recollects/retells information.
- 2 Readily makes connections to new information based on past experiences and formulates initial ideas/concepts.
- 3 Detects similarities and differences.
- 4 Classifies/categories/organises information appropriately.
- 5 Translates/transfers knowledge or understanding and applies them in new situations.
- 6 Establishes cause effect relationships.
- 7 Makes connections/relates prior knowledge to new information/applies reasoning and draw inferences.
- 8 Communicates knowledge /understanding through different media.
- 9 Imagines/fantasies/designs/predicts based on received information.
- 10 Judges/appraises/evaluates the merits or demerits of an idea/ develops own solutions to a problem.

Design of the test - Model Question - I

WEIGHTAGE TO CONTENT/ CO

Sl. No.	Unit/ CO	No.of Questions	Score	% Score
1	Atomic Structure and Chemical Bonding	1	4	6.6
2	The Solid State	1	3	5
3	Chemical Equilibrium -II	1	3	5
4	Thermodynamics -II	1	4	6.6
5	Electro chemistry	1	4	6.6
6	Chemical Kinetics	1	3	5
7	Surface Chemistry	1	3	5
8	The p-block Elements	1	5	8.3
9	d- and f- block Elements	1	4	6.6
10	Metallurgy	1	3	5
11	Co-ordination Compounds and Organometallics	1	3	5
12	Stereochemistry	1	3	5
13	Organic Compounds with Functional Groups containing Oxygen - I	1	3	5
14	Organic Compounds with Functional Groups containing Oxygen - II	1	5	8.3
15	Organic Compounds with Functional Groups containing Nitrogen	1	3	5
16	Polymers	1	3	5
17	Biomolecules	1	2	3.3
18	Chemistry in Everyday Life	1	2	3.3
	Total	18	60	100

WEIGHTAGE TO TYPE OF QUESTIONS

Sl. No.	Type of Questions	No. of Questions	Score	% Score
1	Objective	10	10	16.6
2	Short answer	19	30	50
3	Essay	5	20	33.3
4	Others	-	-	-
TOTAL		34	60	100

BLUE PRINT

Sl. No	Unit/ CO	Type of questions			
		Objective	Short Answer	Essay	Total
		Score	Score	Score	Score
1	Atomic Structure and Chemical Bonding			4	4
2	The Solid State		3		3
3	Chemical Equilibrium -II	1	2		3
4	Thermodynamics -II			4	4
5	Electro chemistry	1	3		4
6	Chemical Kinetics			3	3
7	Surface Chemistry	1	2		3
8	The p-block Elements	1	4		5
9	d- and f- block Elements			4	4
10	Metallurgy	1	2		3
11	Co-ordination Compounds and Organometallics	1	2		3
12	Stereochemistry		3		3
13	Organic Compounds with Functional Groups containing Oxygen - I		3		3
14	Organic Compounds with Functional Groups containing Oxygen - II			5	5
15	Organic Compounds with Functional Groups containing Nitrogen	1	2		3
16	Polymers	1	2		3
17	Biomolecules	2			2
18	Chemistry in Everyday Life		2		2
	Total	10	30	20	60

HIGHER SECONDARY COURSE
SAMPLE QUESTION PAPER - I

CHEMISTRY

Total Score: 60

Time 2 Hrs

Std. XII

INSTRUCTIONS

1. Answer all questions.
2. Read carefully the instructions given against each question before answering it.
3. Calculations, figures and graphs should be shown in the answer sheet itself.
4. Give equations where ever needed.

നിർദ്ദേശങ്ങൾ

1. എല്ലാ ചോദ്യങ്ങൾക്കും ഉത്തരം എഴുതണം.
2. ഉത്തരങ്ങൾ എഴുതുന്നതിനു മുമ്പ് ഓരോ ചോദ്യത്തിനും നേരെ തന്നിരിക്കുന്ന നിർദ്ദേശങ്ങൾ ശ്രദ്ധിച്ച് വായിക്കണം.
3. കണക്കുകൂട്ടലുകൾ, ചിത്രങ്ങൾ, ഗ്രാഫുകൾ എന്നിവ ഉത്തരപേപ്പറിൽ തന്നെ ഉണ്ടായിരിക്കണം.
4. ആവശ്യമുള്ള സ്ഥലത്ത് സമവാക്യങ്ങൾ കൊടുക്കണം.

1 In a class room discussion about chemicals in medicines, a student says "certain substances can be used as both antiseptic as well as disinfectant." Substantiate the statement with an example. 2

മരുന്നുകളിൽ ഉപയോഗിക്കുന്ന രാസവസ്തുക്കളെപ്പറ്റിയുള്ള ക്ലാസ്സ് റൂം ചർച്ചയിൽ ഒരു വിദ്യാർത്ഥിയുടെ അഭിപ്രായം ഇങ്ങനെയാണ്. “ചില വസ്തുക്കളെ ആന്റി സെപ്റ്റിക്കായും ഡിസ്ഇൻഫെക്റ്ററായും ഉപയോഗിക്കാം.” ഈ പ്രസ്താവന ഒരു ഉദാഹരണത്തിന്റെ സഹായത്തോടെ വ്യക്തമാക്കുക. 2

2 In blast furnace the iron ore, coke and limestone are ground up and mixed before they are fed into the furnace.

- a. Find the advantage of processing the raw materials in this way 1
- b. Lime stone is added into the blast furnace. Explain the reason. 1
- c. What steps can be taken to save energy resources when running a blast furnace 1

ബ്ലാസ്റ്റ് ഫർണസിൽ ഇടുന്നതിനു മുമ്പ് ഇരുമ്പിന്റെ അയിരും കോക്കും ചുണ്ണാമ്പുകല്ല് നന്നായി പൊടിച്ച് മിശ്രിതമാക്കുന്നു.

- a. ഇപ്രകാരം അസംസ്കൃത വസ്തുക്കൾ പൊടിച്ച് ചേർക്കുന്നതിന്റെ ഗുണമെന്ത്? 1
- b. ബ്ലാസ്റ്റ് ഫർണസിലേക്ക് ചുണ്ണാമ്പ് കല്ല് ചേർക്കുന്നു. കാരണം വിശദമാക്കുക. 1
- c. ഒരു ബ്ലാസ്റ്റ് ഫർണസ് പ്രവർത്തിക്കുമ്പോൾ ഊർജ്ജ സംരക്ഷണത്തിന് എന്തെല്ലാം കാര്യങ്ങൾ ചെയ്യാം? 1

3 a. Unit cell and space lattice are the terms related to crystal structure. Then which of the following figures is conceptually correct? Justify your answer.

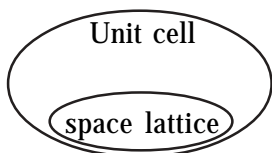
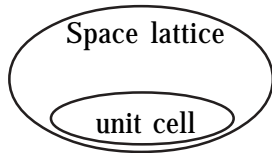


fig (i)



fig(ii)

1

b. The radii of two oppositely charged ions forming a crystal lattice are 95 pm and 181 pm.

Predict the type of structural arrangement of that crystal. Substantiate your answer. 2

- a. യൂണിറ്റ് സെൽ, സ്പെയ്സ് ലാറ്റിസ് എന്നിവ ക്രിസ്റ്റൽ ഘടനയുമായി ബന്ധപ്പെട്ട പദങ്ങളാണ്. എങ്കിൽ ആശയപരമായി ശരിയായ ചിത്രം ഏതാണ്? നിങ്ങളുടെ ഉത്തരം സാധൂകരിക്കുക. 1
- b. ഒരു ക്രിസ്റ്റൽ ലാറ്റിസിലെ വ്യത്യസ്ത ചാർജ്ജുള്ള രണ്ട് അയോണുകളുടെ ആരങ്ങൾ 95 pm, 181 pm എന്നിവയാണ്. ഈ ക്രിസ്റ്റലിന്റെ ക്രമീകരണ ഘടന ഏതു തരത്തിലുള്ളതായിരിക്കും? ഉത്തരം സാധൂകരിക്കുക. 2

4 'Paramagnetism is related to number of unpaired electrons? Draw the MO diagrams for O_2 & O_2^- . Using MO diagrams, findout which is more paramagnetic O_2 or O_2^- ? Also compare their stabilities. 4

4 പാരാമാഗ്നറ്റിസം എന്നത് ജോടിയല്ലാത്ത ഇലക്ട്രോണുകളുടെ എണ്ണവുമായി ബന്ധപ്പെട്ടിരിക്കുന്നു. O_2 , O_2^- എന്നിവയുടെ MO ഡയഗ്രാമുകൾ വരയ്ക്കുക. ഈ MO ഡയഗ്രാമുകൾ ഉപയോഗിച്ച് O_2 ആണോ O_2^- ആണോ കൂടുതൽ പാരാമാഗ്നറ്റിക് എന്ന് കണ്ടെത്തുക. ഇവയുടെ സ്ഥിരതയും താരതമ്യം ചെയ്യുക. 4

5 A student prepares alcohol by treating alkyl halide with aq.NaOH at room temperature and 1 atm. pressure.

- a. Can the student prepare phenol from halo benzene and aq.NaOH at the same condition? Justify. 1
- b. Phenol turns blue litmus red. Sketch the resonance structures of phenol and phenoxide ion to explain the above property of phenol. 2

ആൽക്കൈൽ ഹാലൈഡും ജലീയ സോഡിയം ഹൈഡ്രോക്സൈഡും ഉപയോഗിച്ച് സാധാരണ അന്തരീക്ഷ ഊഷ്മാവിലും മർദ്ദത്തിലും ഒരു വിദ്യാർത്ഥി ആൽക്കഹോൾ ഉണ്ടാക്കുന്നു.

- a. മേൽപ്പറഞ്ഞ ഊഷ്മാവിലും മർദ്ദത്തിലും ഹാലോ ബെൻസീനും ജലീയ സോഡിയം ഹൈഡ്രോക്സൈഡും ഉപയോഗിച്ച് കുട്ടിക്ക് ഫീനോൾ ഉല്പാദിപ്പിക്കാൻ കഴിയുമോ? സമർത്ഥിക്കുക. 1
- b. ഫീനോൾ നീല ലിറ്റ്മസിനെ ചുവപ്പാക്കുന്നു. ഫീനോളിന്റെ ഈ സ്വഭാവത്തെ വ്യക്തമാക്കുന്നതിന് വേണ്ടി ഫീനോളിന്റേയും ഫീനോക്സൈഡ് അയോണിന്റേയും റെസൊണൻസ് ഘടനകൾ വരയ്ക്കുക. 2

6 "Gelatin in ice-cream prevents the formation of large crystals of ice."

- a. Jusitify the property of gelatine here as a lyophilic colloid. 1
- b. For coagulation of $AS_2 S_3$ Sol, which is more effective Al^{3+} or Na^+ ? 1
- c. Viscosity of a lyophilic colloid is higher than that of its dispersion medium. Why? 1

6 ഐസ്ക്രീമിൽ ചേർത്തിരിക്കുന്ന ജെലാറ്റിൻ, വലിയ ഐസ് ക്രിസ്റ്റൽസ് രൂപീകൃതമാകുന്നതിനെ തടസ്സപ്പെടുത്തുന്നു.

- a. ഇവിടെ ഒരു ലയോഫിലിക് കൊളോയിഡ് ആയ ജെലാറ്റിന്റെ ഏതു ഗുണമാണ് ഉപയോഗിച്ചിരിക്കുന്നത്? 1
- b. $AS_2 S_3$ സോൾ കൊയാഗുലേറ്റ് ചെയ്യുന്നതിന് Al^{3+} ആണോ Na^+ ആണോ കൂടുതൽ ഗുണപരം? 1
- c. ഒരു ലയോഫിലിക് കൊളോയിഡിന്റെ വിസ്കോസിറ്റി അതിന്റെ ഡിസ്പേർഷൻ മീഡിയത്തേക്കാൾ ഉയർന്നതാണ് എന്തുകൊണ്ട്? 1

7 You are provided with the following reactants and reagents.

Reactant	Reagent
$CH_3-CO-CH_3$	Amalgamated Zn/conc.HCl
CH_3-CHO	dilute NaOH

You can use the reagent given at the right side of the reactant.

- a. Name the product formed in each case 2

- b. Name the reaction and write the chemical equations involved. 2
- c. If you are treating formaldehyde with dil. NaOH, what will be the products formed? 1
7. താഴെ കൊടുത്തിരിക്കുന്ന അഭികാരകങ്ങളെ അവയ്ക്കു വലതുവശം നൽകിയിരിക്കുന്ന രാസവസ്തുക്കളുപയോഗിച്ച് രാസപ്രവർത്തനം നടത്തുകയാണെങ്കിൽ
- a. ഓരോ രാസപ്രവർത്തനത്തിലും ഉണ്ടാകുന്ന ഉൽപന്നത്തിന്റെ പേരെഴുതുക. 2
- b. ഓരോന്നിലും ഉൾപ്പെട്ടിരിക്കുന്ന രാസവാക്യങ്ങളും രാസപ്രവർത്തനത്തിന്റെ പേരും എഴുതുക. 2
- c. നിങ്ങൾ ഫോർമാൽഡിഹൈഡും നേർപ്പിച്ച സോഡിയം ഹൈഡ്രോക്സൈഡുമാണ് രാസപ്രവർത്തനത്തിന് ഉപയോഗിക്കുന്നതെങ്കിൽ ഉണ്ടാകുന്ന ഉൽപന്നങ്ങളേത്? 1

അഭികാരകം രാസവസ്തു

CH₃-CO-CH₃ അമാൽഗമേറ്റഡ്. Zn/ഗാഢ.HCl

CH₃-CHO ജലീയ NaOH

8. The following are the equations for dissociations of two compounds.
- i. $NH_3(aq) + H_2O(l) \rightleftharpoons NH_4^+(aq) + OH^-(aq)$
- ii. $NH_4Cl(aq) \rightarrow NH_4^+(aq) + Cl^-(aq)$
- a. Using the equations, identify the conjugate acid -base pair in a buffer solution containing ammonia and ammonium chloride. 1
- b. Explain how the ammonia-ammonium chloride buffer solution minimises changes in pH on adding dilute aqueous solutions of
- (A) HCl (B) NaOH 2

8. രണ്ടു സംയുക്തങ്ങളുടെ വിധോജന സമവാക്യങ്ങൾ തന്നിരിക്കുന്നു.
- a. ഈ സമവാക്യങ്ങൾ ഉപയോഗിച്ച് അമോണിയ-അമോണിയം ക്ലോറൈഡ് ബഫർ ലായനിയിലെ കോൻജുഗേറ്റ് ആസിഡ് - ബേസ് ജോടി കണ്ടെത്തുക. 1
- b. അമോണിയ-അമോണിയം ക്ലോറൈഡ് ബഫർ ലായനിയിലേക്ക് ഇനി പറയുന്നവയുടെ നേർപ്പിച്ച ജലീയലായനി ചേർത്താൽ ഉണ്ടാകാവുന്ന pH മാറ്റങ്ങൾ ബഫർ ലായനി കുറച്ചു കൊണ്ടുവരുന്നത് എങ്ങനെയാണ്?
- (A) HCl (B) NaOH 2

9. Two physical properties of ammonia and phosphine are gives in the table.

	Boiling Temp. / °C	Solubility in water/mol / ⁻¹
Ammonia	- 33	31.1
Phosphine	- 88	8.88 × 10 ^{- 4}

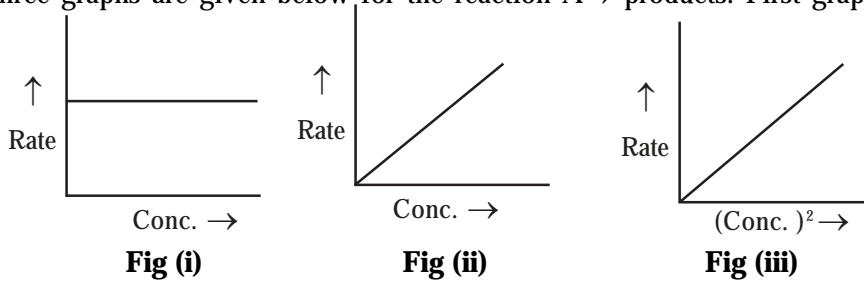
- a. Suggest the reason for the difference in boiling temp. 1
- b. Which is more soluble in water, ammonia or phosphine? Why? 2
- c. Outline the preparation of phosphine and give its structure. 2

9. അമോണിയയുടെയും ഫോസ്ഫൈന്റേയും രണ്ട് ഭൗതിക ഗുണങ്ങൾ പട്ടികയായി കൊടുത്തിരിക്കുന്നു.

	തിളനില (ഡിഗ്രി സെൽഷ്യസിൽ)	ജലത്തിലെ ലേയതാം (മോൾ/ലിറ്റർ)
അമോണിയ	- 33	31.1
ഫോസ്ഫൈൻ	- 88	8.88 × 10 ^{- 4}

- a. തിളനിലയിൽ കാണുന്ന ഈ വ്യത്യാസത്തിന് കാരണം നിർദ്ദേശിക്കുക. 1

- b. അമോണിയ ആണോ ഫോസ്ഫൈൻ ആണോ ജലത്തിൽ കൂടുതൽ ലയിക്കുന്നത്? എന്തുകൊണ്ട്? 2
- c. ഫോസ്ഫൈൻ നിർമ്മിക്കുന്നത് എങ്ങനെ? എന്താണ് ഇതിന്റെ ഘടന? 2
10. A student arranges the following amines in the increasing order of their basic strength as follows.
 $\text{CH}_3\text{NH}_2 < (\text{CH}_3)_2\text{NH} < (\text{CH}_3)_3\text{N}$.
- a. Is it the correct order? Justify. 2
- b. Ethylamine is more basic than aniline. Give reason. 1
10. ഒരു വിദ്യാർത്ഥി അമീനുകളെ അവയുടെ ബേസിസിറ്റിയുടെ അടിസ്ഥാനത്തിൽ താഴെ കൊടുത്തിരിക്കുന്ന പ്രകാരം ക്രമീകരിക്കുന്നു.
- a. മേൽ കൊടുത്തിരിക്കുന്ന ക്രമം ശരിയാണോ? സമർത്ഥിക്കുക. 2
- b. ഈമൈൽ അമീനിന്റേയും അനിലീനിന്റേയും ബേസിസിറ്റി കാര്യകാരണ സഹിതം താരതമ്യം ചെയ്യുക. 1
11. Three graphs are given below for the reaction $\text{A} \rightarrow \text{products}$. First graph is for zero order.



- a. Identify order of reaction from second & third graphs 1
- b. Write the rate law expression for second and third case. 1
- c. For a first order reaction, how many half lives does it take for the concentration to reach one eighth of its original value? 1
11. $\text{A} \rightarrow$ ഉല്പന്നം. ഈ പ്രവർത്തനത്തിന്റെ മൂന്ന് ഗ്രാഫുകൾ കൊടുത്തിരിക്കുന്നു. ഒന്നാമത്തേത് സീറോ ഓർഡർ പ്രവർത്തനത്തെ കാണിക്കുന്നു.
- a. മറ്റ് ഗ്രാഫുകളിൽ നിന്ന് ഓരോ പ്രവർത്തനത്തിന്റേയും ഓർഡർ കണ്ടുപിടിക്കുക. 1
- b. രണ്ടാമത്തേതിനും മൂന്നാമത്തേതിനും റേറ്റ് ലോ എക്സ്പ്രഷൻ എഴുതുക. 1
- c. ഒരു ഫസ്റ്റ് ഓർഡർ പ്രവർത്തനത്തിൽ ഒരു വസ്തുവിന്റെ ഗാഢത അതിന്റെ തുടക്കത്തിലെ ഗാഢതയുടെ $\frac{1}{8}$ ആകാൻ എത്ര അർദ്ധായുസ്സുകൾ വേണ്ടിവരും? 1
12. During a medical diagnosis, it is found that copper content in blood of a patient is more.
- a. Suggest a medicine to cure this metal poisoning 1
- b. $[\text{Fe}(\text{CN})_6]^{4-}$ is a low spin complex. Justify. 1
- c. Ambidentate ligand can determine the colour of co-ordination complexes. Illustrate. 1
12. ഒരു വൈദ്യപരിശോധനയിൽ, ഒരു രോഗിയുടെ രക്തത്തിൽ ചെമ്പിന്റെ അംശം കൂടുതലായി കാണപ്പെട്ടു.
- a. ഈ ലോഹവിഷാംശം നീക്കം ചെയ്യാൻ ഒരു മരുന്ന് നിർദ്ദേശിക്കുക. 1
- b. $[\text{Fe}(\text{CN})_6]^{4-}$ ഒരു ലോസ്പിൻ കോംപ്ലക്സ് ആണ് സാധ്യകരിക്കുക. 1
- c. ഒരു കോ-ഓർഡിനേഷൻ കോംപ്ലക്സിൽ ആംബിഡെന്റേന്റ് ലിഗാന്റ് ഉണ്ടെങ്കിൽ ആ കോംപ്ലക്സിന്റെ നിറം നിർണ്ണയിക്കാൻ അതിന് സാധിക്കും. ഉദാഹരിച്ച് വിശദമാക്കുക. 1
13. At atmospheric pressure ice melts only if the temperature rises above 0°C .
 Give the signs of ΔH and ΔS during melting. Ice does not melt at a temperature below 0°C by

itself. Why? When NaHCO₃ is added to dilute HCl, the temperature of the reaction mixture drops. Despite this the reaction is spontaneous. Give reason. 4

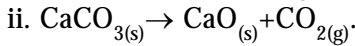
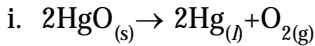
അന്തരീക്ഷമർദ്ദത്തിൽ ഊഷ്മാവ് 0°C ൽ കൂടുതലായാൽ മാത്രമേ ഐസ് ഉരുകുന്നുള്ളൂ. ഉരുകുന്ന അവസ്ഥയിൽ ΔH, ΔS എന്നിവയുടെ ചിഹ്നം എന്താണ്? 0°C ൽ താഴെ ഐസ് സ്വയം ഉരുകുന്നില്ല എന്തുകൊണ്ട്? നേർപ്പിച്ച HCl ലായനിയിലേക്ക് NaHCO₃ ചേർത്താൽ മിശ്രിതത്തിന്റെ ഊഷ്മാവ് താഴുന്നു. എന്നിരുന്നാലും ഈ പ്രവർത്തനം സ്‌പോണ്ടേനിയസ് ആണ്. കാരണമെന്ത്? 4

OR

a. Heat cannot, by itself pass from a colder to a hotter body.

Which law of thermodynamics is applied here?

b. The following reactions are spontaneous though they are endothermic. Justify.

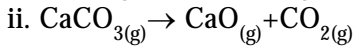
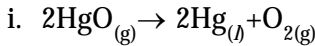


1

c. For a process ΔH is -115 kJ/mol and ΔS is -140 J/K. Calculate the temperature at which the process is in equilibrium state.

a. തണുത്ത വസ്തുവിൽ നിന്നും ചൂടുള്ള വസ്തുവിലേക്ക് താപോർജ്ജം തനിയെ പ്രവഹിക്കുകയില്ല. ഇത് തെർമോ ഡൈനാമിക്സിലെ ഏത് തത്വവുമായി ബന്ധപ്പെട്ടിരിക്കുന്നു? 1

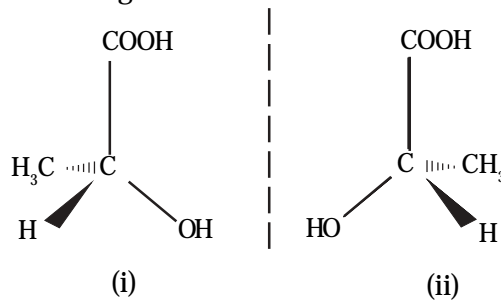
b. താഴെ തന്നിരിക്കുന്ന പ്രവർത്തനങ്ങൾ താപശോഷകങ്ങളാണെങ്കിലും സ്വയം നടക്കുന്നവയാണ്. സാധ്യകരിക്കുക.



1

c. ഒരു പ്രവർത്തനത്തിന്റെ ΔH is -115 kJ/molഉം ΔS -140 J/K ഉം ആണെങ്കിൽ ഈ പ്രവർത്തനം സന്തുലനാവസ്ഥയിൽ സ്ഥിതി ചെയ്യുന്ന ഊഷ്മാവ് എന്തായിരിക്കും? 2

14. Enantiomers of lactic acid are given below.



How to make a racemic mixture of lactic acid? Draw the 'D' and 'L' configurations of lactic acid molecule. Assign 'R' and 'S' configurations for the above enantiomers. 3

14. ലാക്ടിക ആസിഡിന്റെ എനാൽഷിയോമറുകൾ തന്നിരിക്കുന്നു. ലാക്ടിക ആസിഡിന്റെ റസമിക് മിശ്രിതം എങ്ങനെ ഉണ്ടാക്കാം? ലാക്ടിക ആസിഡ് തന്മാത്രയുടെ 'D' ഉം 'L' ഉം കോൺഫിഗറേഷനുകൾ വരയ്ക്കുക. മുകളിൽ കൊടുത്ത എനാൽഷിയോ മെറുകൾക്ക് 'R' ഉം 'S' ഉം കോൺഫിഗറേഷനുകൾ നിശ്ചയിക്കുക. 3

15. Buna - S is a substitute for natural rubber.

a. Name another synthetic rubber and give its use 1

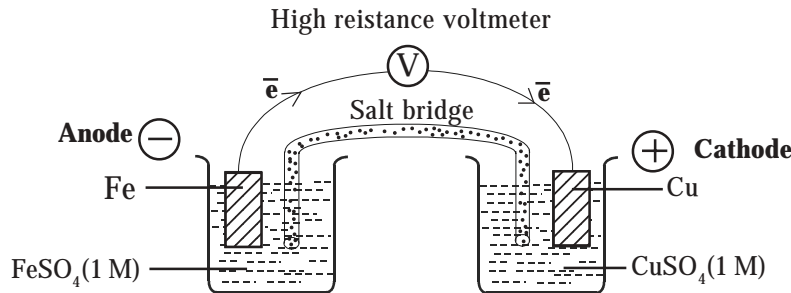
b. Natural rubber obtained from rubber latex is soft and sticky. Suggest a method to improve stiffness of rubber. Indicate the chemistry involved in the process. 2

15. സ്വാഭാവിക റബ്ബറിന് പകരം ഉപയോഗിക്കാവുന്ന ഒരു പോളിമർ ആണ് ബ്യൂണ - എസ്. 3

a. കൃത്രിമ റബ്ബറായി ഉപയോഗിക്കാവുന്ന വേറൊരു പോളിമറിന്റെ പേരും ഉപയോഗവും എഴുതുക. 1

- b. റബ്ബർ ലാറ്റക്സിൽ നിന്നും ഉണ്ടാക്കുന്ന സ്വാഭാവിക റബ്ബറിന്റെ കാഠിന്യം കൂട്ടുന്നതിനുള്ള ഒരു രീതി നിർദ്ദേശിക്കുക. അതിൽ ഉൾപ്പെട്ടിരിക്കുന്ന രാസമാറ്റം വ്യക്തമാക്കുക. 2

16. An arrangement of apparatus and chemicals is given below.



- a. Here the salt bridge cannot be substituted by a metallic wire. Given reason. 1
- b. Give the representation of the cell. 1
- c. The emf of the cell is +0.78 V. Given that the standard electrode potentials of Cu^{2+}/Cu electrode is +0.34 V. Calculate the standard electrode potentials of the Fe^{2+}/Fe electrode. 2

കുറച്ച് ഉപകരണങ്ങളുടേയും രാസവസ്തുക്കളുടേയും ക്രമീകരണം ചിത്രത്തിൽ തന്നിരിക്കുന്നു.

- a. ഇവിടെ സാൾട്ട് ബ്രിഡ്ജിനു പകരം ലോഹക്കമ്പി ഉപയോഗിക്കപ്പെടുന്നില്ല. കാരണമെന്ത്? 1
- b. സെൽ റപ്രസന്റേഷൻ എഴുതുക. 1
- c. ഒരു സെല്ലിന്റെ emf +0.78 V ആണ്. Cu^{2+}/Cu ഇലക്ട്രോഡിന്റെ സ്റ്റാൻഡേർഡ് ഇലക്ട്രോഡ് പൊട്ടെൻഷ്യൽ +0.34 V ആണെന്ന് തന്നിരിക്കുന്നു. Fe^{2+}/Fe ഇലക്ട്രോഡിന്റെ സ്റ്റാൻഡേർഡ് ഇലക്ട്രോഡ് പൊട്ടെൻഷ്യൽ കാണുക. 2

17. One of the properties of transition metals is formation of coloured compounds. State the colour of aq. solution of Fe(II) salts. Give the formula and shape of complex ion responsible for the colour. Identify the colour change that occurs if a solution containing Fe (II) ion is allowed to stand, give reason. State one feature of transition metals which makes them able to act as catalysts? 4

17. സംക്രമണ മൂലകങ്ങളുടെ ഒരു ഗുണമാണ് നിറമുള്ള സംയുക്തങ്ങൾ രൂപീകരിക്കുക എന്നത്. Fe(II) ലവണങ്ങളുടെ ജലീയ ലായനികളുടെ നിറം എന്ത്? ഈ പറഞ്ഞ നിറത്തിനു കാരണമായ കോംപ്ലക്സ് അയോണിന്റെ രാസസൂത്രവും (ഫോർമുല) ആകൃതിയും കൊടുക്കുക. Fe(II) അയോൺ അടങ്ങിയ ലായനി കുറച്ചു നേരം വെച്ചിരുന്നാൽ ഉണ്ടാകുന്ന നിറം മാറ്റം എന്താണ്? ഇതിന് കാരണമെന്ത്? സംക്രമണ ലോഹങ്ങളെ ഉൽപ്രേരകങ്ങളായി പ്രവർത്തിക്കാൻ പര്യാപ്തമാക്കുന്ന അവയുടെ ഒരു സവിശേഷ ഗുണം എന്താണ്? 4

18. A freshly prepared aq. solution of α - D glucose and β -D glucose when allowed to stand, their specific rotation attains a value of +52.5°.

- a. Suggest the reason for this phenomenon. 1
- b. Mention the structural change that happens to glucose in this phenomenon. 1

18. പുതുതായി നിർമ്മിക്കപ്പെട്ട ആൽഫാ ഡി - ഗ്ലൂക്കോസിന്റെയും ബീറ്റാ-ഡി- ഗ്ലൂക്കോസിന്റെയും ജലീയ ലായനി കുറെ നേരം അനക്കാതെ വെച്ചിരുന്നാൽ, അവയുടെ സ്പെസിഫിക് റൊട്ടേഷൻ +52.5° ആയി മാറുന്നു.

- a. ഈ പ്രതിഭാസത്തിന് കാരണം നിർദ്ദേശിക്കുക. 1
- b. ഈ പ്രതിഭാസത്തിൽ ഗ്ലൂക്കോസിനുണ്ടാകുന്ന ഘടനാ വ്യത്യാസം സൂചിപ്പിക്കുക. 1

SCORING INDICATORS

Qn. No.	Scoring Indicators	Score	Total Score
1	Phenol 1% phenol - disinfectant 0.2 % phenol - Antiseptic	1 $\frac{1}{2}$ $\frac{1}{2}$	2
2	a. Increases surface area, so speeding the process b. To remove acidic gangue, SiO ₂ as neutral slag. Reactions c. Capture leaving hot gas to preheat the incoming blast of air OR Any suitable answer like this	1 1 1	3
3.	a. Fig.2 differentiating space lattice and unit cell b. Octahedral Justification based on radius ratio $\frac{r^+}{r^-} = \frac{95}{181}$	$\frac{1}{2}$ $\frac{1}{2}$ 1 1	3
4	MO diagram of O ₂ MO diagram of O ₂ ⁻ O ₂ is more paramagnetic - reason Comparison of BO, O ₂ more stable	1 1 1 1	4
5	a. No Only at high temp and pressure phenol can be prepared b. Resonance structures of phenol Resonance structures of phenoxide ion	$\frac{1}{2}$ $\frac{1}{2}$ 1 1	3
6.	a. As a protective colloid-protecting nature b. Al ³⁺ - reason based on Hardy-Schulze rule c. Reason based on force of attraction	1 1 1	3
7	a. CH ₃ CH ₂ CH ₃ , CH ₃ -CH(OH)-CH ₂ -CHO b. Clemmensen Reduction Equation Aldol condensation Equation	1 1 $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	

Qn. No.	Scoring Indicators	Score	Total Score
c.	Methanol Sodium formate	$\frac{1}{2}$ $\frac{1}{2}$	5
8. a.	conjugated acid - NH_4^+ conjugate base - NH_3	$\frac{1}{2}$ $\frac{1}{2}$	3
b.	A. When dil.HCl is added H^+ ions are accepted by NH_3 B. When dil.NaOH is added equilibrium shift to the left, trapping OH^- ions	1 1	
9. a.	Ammonia molecules can associates through hydrogen bond but phosphine cannot	1	5
b.	Ammonia can form H-bond with water but phosphine cannot	1+1	
c.	Preparation	1	
d.	Structure	1	
10. a.	No Justification - Inductive & steric effect	1 1	3
b.	Reason - In aniline benzene ring is electron withdrawing	1	
11. a.	Fig - 2 - for first order Fig - 3- for second order	$\frac{1}{2}$ $\frac{1}{2}$	3
b.	Fig-2 - rate = $K[A]$ Fig-3 - rate = $K[A]^2$	$\frac{1}{2}$ $\frac{1}{2}$	
c.	Three half lives (calculation)	1	
12. a.	D - penicillamine	1	3
b.	Justification by using VBT	1	
c.	$[\text{Co}(\text{NO}_2)(\text{NH}_3)_5]\text{Cl}_2$ - yellow brown $[\text{Co}(\text{ONO})(\text{NH}_3)_5]\text{Cl}_2$ - red Explanation	1	
13.	ΔH_f° is +ve, ΔS_f° is +ve Below 0°C , $T\Delta S < \Delta H$. So ΔG is +ve and the reaction is not spontaneous ΔH is +ve, ΔS is also +ve (as gas is released) $T\Delta S > \Delta H$, So ΔG is -ve OR	1 2	4
a.	Second law of TD	1	4
b.	Entropy increases	1	
c.	At 821.43 K, ΔG is zero	2	
14	By mixing equimolar d & l D & L configuration R & S configuration	1 1 1	3
15. a.	Buna-N or Neoprene or any one	1	3
b.	Valcunisation and explanation	2	

Qn. No.	Scoring Indicators	Score	Total Score
16 a.	It is the ions in the solution which are charge carriers, not free electrons as in metal wire.	1	
b.	$\text{Fe}_{(s)}/\text{Fe}^{2+}_{(aq)}/\text{Cu}^{2+}_{(aq)}/\text{Cu}_{(s)}$	1	
c.	$E^0_{\text{Fe}^{2+}/\text{Fe}} = -0.44\text{V}$	2	4
17	Green colour $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$ – Octahedral Turns brown (depending on p^{H}), Fe^{2+} changes to Fe^{3+} by aerial oxidation Variable oxidation state OR can provide large surface area.	1 1 1 1	4
18 a.	Muta rotation	1	
b.	Open - ring structure	1	2
	Total	60	120

QUESTION WISE ANALYSIS

Sl. No	Cluster of COs/ Content area	Type of Questions	Mental Process	Score	Time (minutes)
1	115	Short answer	2, 3, 4, 5, 6	2	2
2	64	Ob, SA, SA	2, 4, 5, 6, 9	3	8
3	7, 11	SA, SA	2, 3, 4, 5, 6, 7, 8	3	7
4	4	Essay	2, 3, 4, 6, 7, 8	4	9
5	84, 88	SA, SA	2, 3, 5, 6, 7, 9	3	8
6	39, 40, 41	Ob, SA	4, 5, 6, 7	3	5
7	92	Essay	1, 2, 3, 5, 7	5	9
8	13, 14, 18	Ob, SA	1, 2, 4, 6	3	5
9	46, 48	Ob, SA	2, 3, 4, 6, 7	5	9
10	99	Ob, SA	1, 2, 4, 6, 7	3	6
11	32, 33	Essay	1, 2, 3, 4, 7	3	7
12	71, 73, 74	Ob, SA, SA	1, 2, 4, 5	3	5
13	19, 20, 21	Essay	1, 2, 3, 4, 5, 6, 7	4	8
14.	78, 80	SA	1, 2, 4, 5, 7, 9	3	7
15	105, 107	Ob, SA	1, 2, 5, 7, 9	3	7
16	24,. 27	Ob, SA, SA	2, 3, 4, 5, 6, 7	4	7
17	56	Essay	1, 2, 3, 4, 5, 7	4	8
18	109	Ob, Ob	2, 5, 7	2	3
	Total			60	120

SA - Short Answer

Ob- Objective