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2023

CLASS XII

Questions & Solutions

Date: 27 March 2023 | TIME : (08:30 a.m. to 11:45 a.m)

Duration: 3 hours 15 Minutes | Max. Marks: 56

SUBJECT: CHEMISTRY

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SS/41/Chem.

Roll No. | | | | | | | |

उच्च माध्यमिक परीक्षा 2023

SENIOR SECONDARY EXAMINATION, 2023

CHEMISTRY

रसायन विज्ञान

Time allowed : 3 hr, 15 Min. **Maximum Marks : 56**

GENERAL INSTRUCTIONS TO THE EXAMINEES:

परीक्षार्थियों के लिए सामान्य निर्देश :

1. Candidate 'must write first his / her Roll No. on the question paper compulsorily.
परीक्षार्थी सर्वप्रथम अपने प्रश्न–पत्र पर नामांक अनिवार्यतः लिखें ।
2. All the questions are compulsory.
सभी प्रश्न अनिवार्य हैं ।
3. Write the answer to each question in the given answer-book only.
प्रत्येक प्रश्न का उत्तर दी गई उत्तर–पुस्तिका में ही लिखें ।
4. For questions having more than one part, the answers to those parts are to be written together in continuity.
जिन प्रश्नों के आन्तरिक खण्ड हैं, उन सभी के उत्तर एक साथ ही लिखें ।
5. If there is any error / difference / contradiction in Hindi & English version of the question paper, the question of Hindi version should be treated valid.
प्रश्न–पत्र के हिन्दी व अंग्रेजी रूपांतरण में किसी प्रकार की त्रुटि / अंतर / विरोधाभास होने पर हिन्दी भाषा के प्रश्न को ही मानें।
6. Write down the serial number of the question before attempting it.
प्रश्न का उत्तर लिखने से पूर्व प्रश्न का क्रमांक अवश्य लिखें।
7. Question No. 19 to 20 have internal choice.
प्रश्न क्रमांक 19 से 20 में आन्तरिक विकल्प हैं ।

SECTION A

खण्ड A

Multiple Choice Questions:

1. Write the answer of following multiple choice questions in the given answer book: **[9×1=9]**

निम्नांकित प्रश्नों में दिये गये सही विकल्प का चयन कर उत्तर पुस्तिका में लिखिए :

(i) When concentration of Zn^{2+} and Cu^{2+} ions is unity (1 mol dm^{-3}), then electrical potential of Daniel cell will be – **[1]**

डेन्यल सेल में Zn^{2+} and Cu^{2+} आयनों की सान्द्रता एक इकाई (1 मोल डेसी मीटर$^{-3}$) हो तो विद्युतीय विभव का मान होगा –

(A) 0.00 V (E) 1.10 V (C) 1.35 V (D) 2.00 V

Sol. (B) 1.10 V

(ii) Expression $k = \frac{2.303}{t}\log\frac{[R]_0}{[R]}$ is integrated rate equation of order of reaction- **[1]**

(A) Zero order (B) First order (C) Second order (D) Third order

व्यंजक $k = \frac{2.303}{t}\log\frac{[R]_0}{[R]}$ कोटि की अभिक्रिया का समाकलित वेग समीकरण है

(अ) शून्य कोटि (ब) प्रथम कोटि (स) द्वितीय कोटि (द) तृतीय कोटि

Sol. (B) First order

(iii) To express the rate at a particular moment of time we determine the_____. **[1]**

(A) Initial rate (B) Instantaneous rate (C) Average rate (D) Standard rate

समय के किसी क्षण पर वेग व्यक्त करने के लिए.....ज्ञात किया जाता है –

(अ) प्रारंभिक वेग (ब) तात्क्षणिक वेग (स) औसत वेग (द) मानक वेग

Sol. (B) Instantaneous rate

(iv) Colloidal antimony is used in curing of - **[1]**

(A) Kalaazar (B) Stomach disorders (C) Skin disease (D) Sexual disease

कोलाइड़ी एन्टीमनी का उपयोग किस रोग के इलाज में होता है –

(अ) कालाजार (ब) पेट की गड़बड़ी (स) त्वचा संबंधी रोग (द) लैंगिक रोग

Sol. (A) Kalaazar

(v) Calamine is ore of - **[1]**

कैलामाइन अयस्क है –

(A) Al (B) Fe (C) Cu (D) Zn

(A) Al का (B) Fe का (C) Cu का (D) Zn का

Sol. (D) Zn

(vi) Didentate Ligand is – [1]
द्विदंतुर लिगण्ड है.

(A) $C_2O_4^{2-}$ (B) SCN^- (C) NH_3 (D) Cl^-

Sol. (A) $C_2O_4^{2-}$

(vii) The name of CF_2Cl_2 in freon method is- [1]
CF_2Cl_2का फ्रिऑन पद्धति में नाम है –

(A) Freon फ्रिऑन 112 (B) Freon फ्रिऑन 12 (C) Freon फ्रिऑन 122 (D) Freon फ्रिऑन 11

Sol. (C) Freon फ्रिऑन 122

(viii) In reaction of manufacturation of phenol from cumene the by-product is- [1]
(A) Tribromophenol (B) Benzoquinone (C) Picric acid (D) Acetone
क्यूमीन से फिनॉल प्राप्त करने की अभिक्रिया में उपोत्पाद है।
(अ) ट्राइब्रोमोफिनॉल (ब) बेन्जोक्विनोन (स) पिक्रिक अम्ल (द) ऐसीटोन

Sol. (D) Acetone

(ix) The nitrogeneous base not present in DNA - [1]
(A) Adenine (B) Cytosine (C) Guanine (D) Uracil
नाइट्रोजनी क्षारक DNA में नहीं पाया जाता –
(अ) ऐडेनीन (ब) साइटोसिन (स) ग्वानीन (द) यूरेसिल

Sol. (D) Uracil

2. Fill in the blanks - **[4 × 1 = 4]**
रिक्त स्थानों की पूर्ति कीजिए –

(i) When the added substance reduces the rate of reaction, then it called _____ in place of catalyst. [1]
जब मिलाया गया पदार्थ अभिक्रिया की दर को कम करता है, तो उत्प्रेरक के स्थान पर उसे _____ कहते है।

Sol. Inhibitor

(ii) The accumulation of molecular species at the surface rather than in the bulk of a solid or liquid is termed _____. [1]
अणुक स्पीशीज का किसी ठोस या द्रव की स्थूल की अपेक्षा पृष्ठ पर संचित होना_____कहलाता है।

Sol. Adsorption

(iii) In Williamson synthesis the_____ reacts with sodium alkoxide and give dialkyl ether. [1]
विलियमसन संश्लेषण में_____ की सोडियम ऐल्कोक्साइड के साथ अभिक्रिया से डाइ ऐल्किल ईथर बनता है। .

Sol. Alkylhalide

(iv) The aqueous solution of_____ is called fehling solution A. [1]
_____का जलीय विलयन फेलिंग विलयन A कहलाता है।

Sol. copper sulphate

3. Very short answer type questions: **[8 x 1 = 8]**
अति लघुत्तरात्मक प्रश्न :

(i) Write order of reaction of natural and artificial nuclear (radioactive) decay. **[1]**
प्राकृतिक एवं कृत्रिम नाभिकीय (रेडीयोऐक्टिव) क्षय की कोटि लिखिए ।

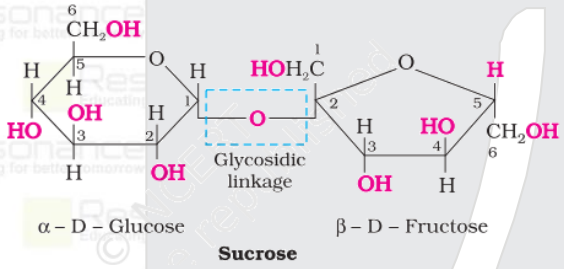
Sol. First order

(ii) Write the name of enzyme used in decomposition of urea into ammonia and carbondioxide. **[1]**
युरिया का अमोनिया एवं कार्बन डाइअक्साइड में अपघटन में प्रयुक्त एन्जाइम का नाम लिखिए।

Sol. Urease

(iii) Represent sucrose by Haworth structure. **[1]**
सुक्रोस को हावर्थ संरचना द्वारा निरूपित कीजिए ।

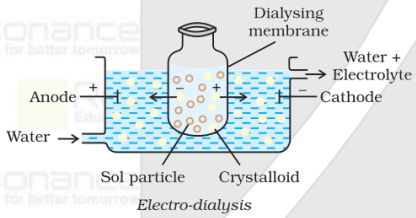
Sol.



Sucrose

(iv) Draw labelled diagram of electro-dialysis. **[1]**
वैद्युत अपोहन का नामांकित चित्र बनाइये ।

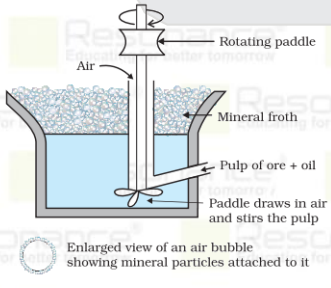
Sol.



Electro-dialysis

(v) Draw labelled diagram of froth floatation process. **[1]**
फेन प्लवन विधि का नामांकित चित्र बनाइये ।

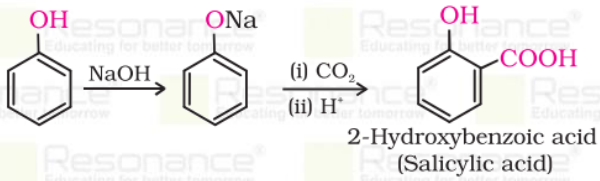
Sol.



Froth floatation process

(vi) Write chemical equation to prepare salicylic acid from phenol. **[1]**
फिनॉल से सेलिसिलिक अम्ल बनाने की रासायनिक समीकरण लिखिए।

Sol. Kolbe's reaction



2-Hydroxybenzoic acid
(Salicylic acid)

(vii) Write IUPAC name of isobutyl alcohol. **[1]**
आइसो ब्युटिल ऐल्कोहल का IUPAC नाम लिखिए।

Sol. 2- methyl propanol

(viii) Write chemical formula of benzene diazonium chloride. **[1]**
बेन्जीन डाइऐजोनियम क्लोराइड़ का रासायनिक सूत्र लिखिए।

Sol. $C_6H_5N_2^+Cl^-$

SECTION B
खण्ड B

Short answer type questions : **[12 × 1½ = 18]**
लघुत्तरात्मक प्रश्न :

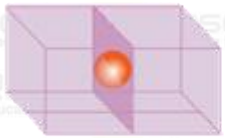
4. Calculate number of particles in face centred cubic unit cell. **[1½]**
फलक केन्द्रित घनीय एकक कोष्टिका में कुल कणों की संख्या परिकलित कीजिए।

Sol. A face-centred cubic (fcc) unit cell contains atoms at all the corners and at the centre of all the faces of the cube. each atom located at the face-centre is shared between two adjacent unit cells and only $\frac{1}{2}$ of each atom belongs to a unit cell. Thus, in a face-centred cubic (fcc) unit cell:

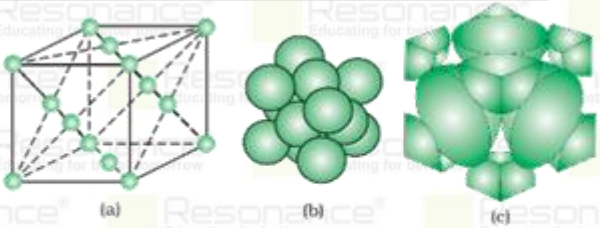
(i) 8 corners atoms × $\frac{1}{8}$ atom per unit cell = 8 × $\frac{1}{8}$ = 1 atom

(ii) 6 face-centred atoms × $\frac{1}{2}$ atom per unit cell = $6 \times \frac{1}{2}$ = 3 atoms

∴ Total number of atoms per unit cell = 4 atoms



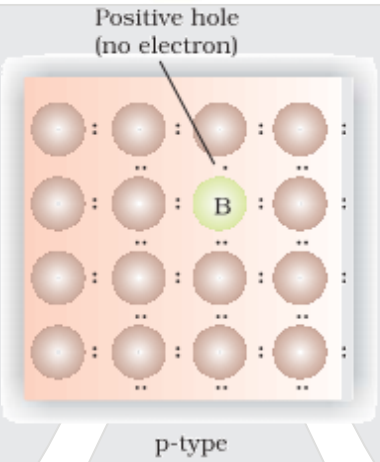
An atom at face centre of unit cell is shared between 2 unit cells



A face-centred cubic unit cell (a) open structure (b) space filling structure (c) actual portions of atoms belonging to one unit cell.

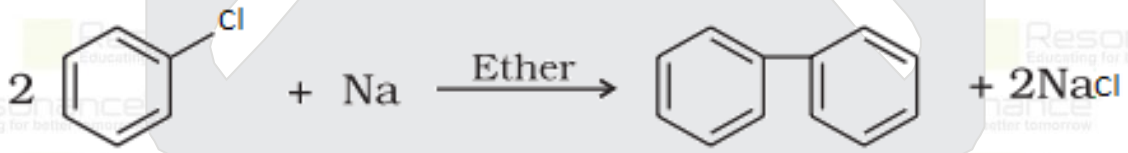
5. Explain P - type semiconductor by one example. **[1½]**
P प्रकार के अर्धचालक को एक उदाहरण देकर समझाइये।

Sol. Silicon or germanium can also be doped with a group 13 element like B, Al or Ga which contains only three valence electrons. The place where the fourth valence electron is missing is called electron hole or electron vacancy (Fig.). An electron from a neighbouring atom can come and fill the electron hole, but in doing so it would leave an electron hole at its original position. If it happens, it would appear as if the electron hole has moved in the direction opposite to that of the electron that filled it. Under the influence of electric field, electrons would move towards the positively charged plate through electronic holes, but it would appear as if electron holes are positively charged and are moving towards negatively charged plate. This type of semi conductors are called p-type semiconductors.



6. Write chemical equation to prepare diphenyl from chlorobenzene. **[1½]**
क्लोरो बेन्जीन से डाइफेनिल बनाने की रासायनिक अभिक्रिया की रासायनिक समीकरण लिखिए।

Sol. Aryl halides give analogous compounds when treated with sodium in dry ether, in which two aryl groups are joined together. It is called Fittig reaction.



7. A 35% (V/V) solution of ethylene glycol is used in vehicle for cooling the engine. Determine the volume of water in Millilitre **[1½]**
एथिलीन ग्लाइकल का 35% (V/V) विलयन वाहनों के इंजन को ठण्डा करने के काम आता है। इसमें जल का आयतन मिलीलीटर में ज्ञात कीजिए ।

Sol.

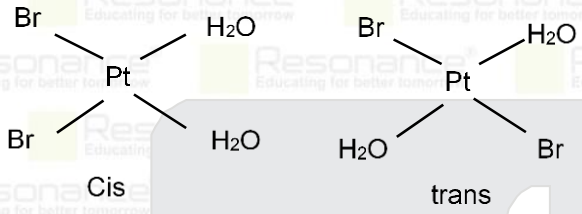
Volume	Volume of ethylene glycol	volume of water
100 L	35 L	65 L
1000 ML	350 ML	650 ML

8. Write definition of osmosis. Write name of method used in desalination of sea water. **[1½]**
परासरण की परिभाषा लिखिए। समुद्री जल के विलवणीकरण में प्रयुक्त विधि का नाम लिखिए।

Sol. When semipermeable membrane is placed between the solvent and solution as, the solvent molecules will flow through this membrane from pure solvent to the solution. This process of flow of the solvent is called osmosis. Reverse osmosis process is the method used in desalination of sea water.

9. Draw the geometries of geometrical isomers of $[Pt(H_2O)_2Br_2]$ and write their configurations. **[1½]**
$[Pt(H_2O)_2Br_2]$ के ज्यामितीय समावयवियों की ज्यामिति बनाकर विन्यास लिखिए।

Sol.



Geometrical isomers
(cis and trans) of $Pt(H_2O)_2Br_2$)

10. Write IUPAC name of the following **[3 ×1^1/2 =]**
निम्नांकित के IUPAC नाम लिखिए।

(i) $[Cu(H_2O)_4]^{2+}$

Sol. Tetraaqua copper (II) ion.

(ii) $[Co(NH_3)_6]Br_3$

Sol. Hexaammine cobalt (III) bromide

(iii) $[Fe(CN)_6]^{3-}$

Sol. Hexacyanido ferrate (III) ion.

11. Write short note on Hoffmann bromamide degradation reaction. **[1^1/2]**
हफमान ब्रोमामाइड निम्नीकरण अभिक्रिया पर टिप्पणी लिखिए।

Sol. Hoffmann bromamide degradation reaction is a method for preparation of primary amines by treating an amide with bromine in an aqueous or ethanolic solution of sodium hydroxide. In this degradation reaction, migration of an alkyl or aryl group takes place from carbonyl carbon of the amide to the nitrogen atom. The amine so formed contains one carbon less than that present in the amide.

$$R-\overset{\overset{O}{\|}}{C}-NH_2 + Br_2 + 4NaOH \longrightarrow R-NH_2 + Na_2CO_3 + 2NaBr + 2H_2O$$

12. Give reason that trimethyl amine is less basic than methyl amine- **[1^1/2]**
कारण दीजिए कि ट्राइमेथिल एमीन, मेथिल एमीन से कम क्षारीय है।

Sol. Solvation effect and steric hinderance of the alkyl group which decides the basic strength of alkyl amines in the aqueous state. Trimethyl amine is less basic than methyl amine as it has more steric hinderance due to three methyl groups.

13. Explain artificial sweetening agents by any two examples - **[$1^{1/2}$]**
कृत्रिम मधुरक को कोई उदाहरण समझाइये।

Sol. These are the chemicals compounds which give sweetening effect to the food without adding calories. These are good for diabetic patients.
E.g. aspartame, saccharin,

14. Give any one example of following - **[3 ×$1^{1/2}$ =]**
निम्ननांकित के कोई एक उदाहरण दीजिए–

(i) Antibiotics / प्रतिजैविक औषध

Sol. Penicillin , Ofloxacin

(ii) Narcotic analgesics / स्वापक पीड़ाहारी

Sol. Morphine , Heroin

(iii) Antacids/ प्रतिअम्ल औषध

Sol. Histamine, ranitidine (zantac)

15. Explain swarts reaction by any one example. **[$1^{1/2}$]**
स्वार्ट अभिक्रिया को एक उदाहरण देकर समझाइये।

Sol. The synthesis of alkyl fluorides is best accomplished by heating an alkyl chloride/bromide in the presence of a metallic fluoride such as AgF, Hg_2F_2, CoF_2 or SbF_3. The reaction is termed as Swarts reaction.
$R–Cl + AgF \longrightarrow R–F + AgBr$

SECTION C
खण्ड C

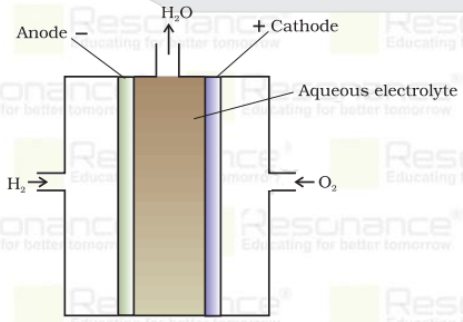
Long answer type question: **[3 × 3 = 9]**
दीर्घ उत्तरात्मक प्रश्नः

16. (i) Describe structure of fuel cell. **[2 + 1 = 3]**
ईंधन सेल की संरचना का वर्णन कीजिए।

Sol. In the cell, hydrogen and oxygen are bubbled through porous carbon electrodes into concentrated aqueous sodium hydroxide solution. Catalysts like finely divided platinum or palladium metal are incorporated into the electrodes for increasing the rate of electrode reactions.

(ii) Draw labelled diagram of fuel cell.
ईंधन सेल की संरचना का नामाकित चित्र बनाइये।

Sol.



Fuel cell using H_2 and O_2 produces electricity.

17. (i) Calculate the 'Spin only' magnetic moment of $Cu^{2+}_{(aq)}$ ion. **[1+1+1=3]**

(i) $Cu^{2+}_{(aq)}$ आयन के लिए 'प्रचरण मात्र चुम्बकीय आघुर्ण' की गणना कीजिए।

Sol. $Cu^{2+} = 3d^9$, n=1 $\mu = \sqrt{n(n+2)}$

$\mu = \sqrt{1(1+2)} = 1.73BM$

(ii) Give reason that Zn, Cd, Hg, and Cn are not transition elements.
कारण दीजिए Zn, Cd, Hg, व Cn संक्रमण तत्व नहीं है।

Sol. Zinc, cadmium and mercury of group 12 have full d^{10} configuration in their ground state as well as intheir common oxidation states and hence, are not regarded as transition metals.

(iii) Write names of components of brass.
मिश्र धातु पीतल के अवयवों के नाम लिखिए।

Sol. Cu & Zn

18. Write differences - **[1+1+1=3]**
अन्तर लिखिए–

(i) Low density polythene and High density polythene.
अल्प घनत्व पॉलिथिन व उच्च घनत्व पॉलिथिन

Sol. Low density polythene: It is obtained by the polymerisation of ethene under high pressure of 1000 to 2000 atmospheres at a temperature of 350 K to 570 K in the presence of traces of dioxygen or a peroxide initiator (catalyst). The low density polythene (LDP) is obtained through the free radical addition and H-atom abstraction. It has highly branched structure. These polymers have straight chain structure with some branches.
It is flexible used in insulation of electricity carrying wires and manufacture of squeeze bottles, toys and fiexible pipes.
High density polythene: It is formed when addition polymerisation of ethene takes place in a ydrocarbon solvent in the presence of a catalyst such as triethylaluminium and titanium tetrachloride (Ziegler-Natta catalyst) at a temperature of 333 K to 343 K and under a pressure of 6-7 atmospheres. High density polythene (HDP) thus produced, consists of linear molecules as shown below and has a high density due to close packing. Such polymers are also called linear polymers. High density polymers are also chemically inert and more tough and hard. It is used for manufacturing buckets, dustbins, bottles, pipes, etc.

(ii) Homopolymers and copolymers.
समबाहु व सहबहुलक

Sol. Addition polymers formed by the polymerisation of a single monomeric species are known as homopolymers, e.g. polythene
Addition polymers formed by the polymerisation of a different monomeric species are known as copolymers, e.g, Buna-S, Buna –N, etc.

(iii) Natural polymers and synthetic polymers.
प्राकृतिक बहुलक व संश्लेषित बहुलक।

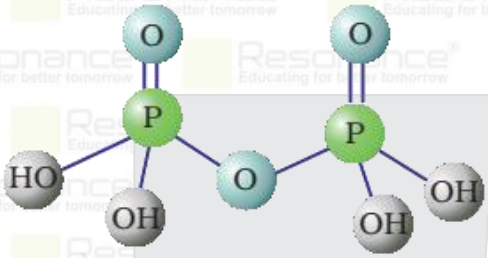
Sol. Natural polymers are found in plants and animals. Examples are proteins, cellulose, starch, some resins and rubber. Plastic (polythene), synthetic fibres (nylon 6,6) and synthetic rubbers (Buna - S) are examples of man-made polymers extensively used in daily life as well as in industry.

SECTION D
खण्ड D

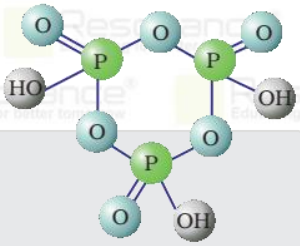
Essay type question: **[2 × 4 = 8]**

19. (i) Write structural formula of pyrophosphoric acid and cyclo trimetaphosphoric acid. **[2+2=4]**
(i) पाइरोफस्फोरिक अम्ल व साइक्लो ट्राईमेटाफस्फोरिक अम्ल के संरचना सूत्र लिखिए।

Sol.



$H_4P_2O_7$
Pyrophosphoric acid



Cyclotrimetaphosphoric acid, $(HPO_3)_3$

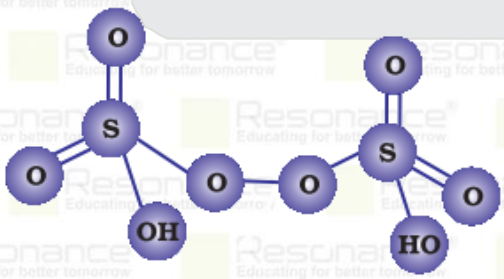
(ii) Write any two differences between rhombic sulphur and monoclinic sulphur.
विषमलंबाक्ष गंधक व एकनताक्ष गंधक में कोई दो अंतर लिखिए।

Sol. Rhombic sulphur (α-sulphur) This allotrope is yellow in colour, m.p. 385.8 K and specific gravity 2.06. Rhombic sulphur crystals are formed on evaporating the solution of roll sulphur in CS2. It is insoluble in water but dissolves to some extent in benzene, alcohol and ether. It is readily soluble in CS2. Monoclinic sulphur (β-sulphur) Its m.p. is 393 K and specific gravity 1.98. It is soluble in CS2. This form of sulphur is prepared by melting rhombic sulphur in a dish and cooling, till crust is formed. Two holes are made in the crust and the remaining liquid poured out. On removing the crust, colourless needle shaped crystals of β-sulphur are formed. It is stable above 369 K and transforms into α-sulphur below it.

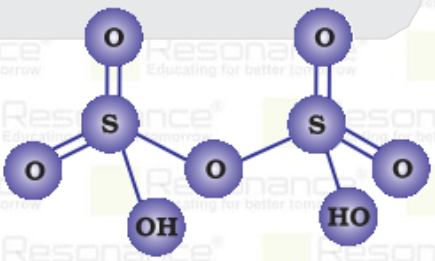
OR / अथवा

(i) Write structural formula of peroxodisulphuric acid and pyrosulphuric acid.
परअक्सोडाइसल्फ्युरिक अम्ल व पाइरोसल्फ्युरिक अम्ल के संरचना सूत्र लिखिए।

Sol.



Peroxodisulphuric acid
$(H_2S_2O_8)$



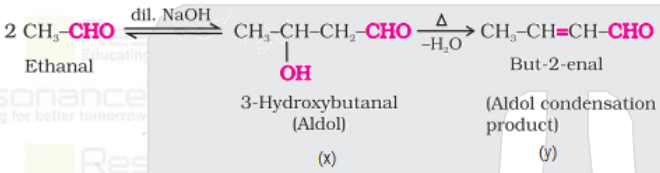
Pyrosulphuric acid (Oleum)
$(H_2S_2O_7)$

(ii) Write any two differences between white phosphorus and red phosphorus.
श्वेत फॉस्फोरस व लाल फस्फोरस में कोई दो अंतर लिखिए।

Sol. White phosphorus is a translucent white waxy solid. It is poisonous, insoluble in water but soluble in carbon disulphide and glows in dark (chemiluminescence). It dissolves in boiling NaOH solution in an inert atmosphere giving PH_3.ed phosphorus is obtained by heating white phosphorus at 573K in an inert atmosphere for several days. When red phosphorus is heated under high pressure, a series of phases of black phosphorus is formed.Red phosphorus possesses iron grey lustre. It is odourless, nonpoisonous and insoluble in water as well as in carbon disulphide.
Chemically, red phosphorus is much less reactive than white phosphorus. It does not glow in the dark.

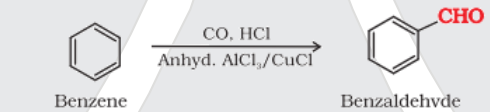
20. (i) $2CH_3CHO \xrightarrow{\text{dil.NaOH}} x \xrightarrow[-H_2O]{\Delta} y$ Write chemical formula and IUPAC name of X and y in above chemical sequence.

Sol.



(ii) Write short note on Gattermann - Koch reaction.
गाटरमान कॉख पर टिप्पणी लिखिए।

Sol. By Gatterman – Koch reaction When benzene or its derivative is treated with carbon monoxide and hydrogen chloride in the presence of anhydrous aluminium chloride or cuprous chloride, it gives benzaldehyde or substituted benzaldehyde.

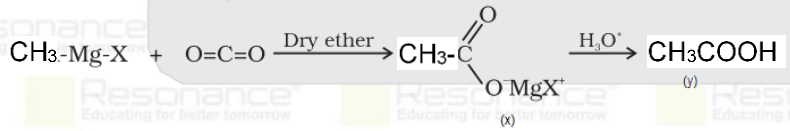


This reaction is known as **Gatterman-Koch** reaction.

OR / अथवा

(i) $CH_3MgBr + CO_2 \xrightarrow{\text{dry ether}} x \xrightarrow{+H_3^+O} y$ Write chemical formula and name of X and y in above chemical sequence.

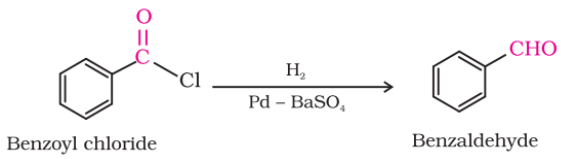
$CH_3MgBr + CO_2 \xrightarrow{\text{शुष्क ईथर}} x \xrightarrow{+H_3^+O} y$ उपरोक्त अभिक्रिया अनुक्रम में x व y के रासायनिक सूत्र लिखकर नाम लिखिए।



Sol. Salt of acid Acetic acid

(ii) Write short note on Rosenmund reduction
रोजेनमुण्ड अपचयन पर टिप्पणी लिखिए।

Sol. Acyl chloride (acid chloride) is hydrogenated over catalyst, palladium on barium sulphate. This reaction is called Rosenmund reduction.



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CUET (UG) 2023

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- CUET (UG) is organized by National Testing Agency (NTA).
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Points to Remember: CUET (UG) 2023

- Candidates can choose any Language/Domain Specific Subjects/General Test or a combination as per the requirements of the course in the specific University.
- The choice of Tests/Subjects depend on the course/s chosen by the candidate and the University/ies where admission is sought.
- A Candidate can take a maximum of **10 tests**.

S.No.	SECTION	NO. OF QUESTIONS	QUESTIONS TO ATTEMPT	DURATION
1.	SECTION-I (A+B)	50	40	45 Minutes
2.	SECTION-II	50/45	40/35	45 Minutes*
3.	SECTION-III	60	50	45 Minutes*

*Not yet announced by NTA.

- **Section IA – 13 Languages (As a medium and "Language")**
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  There are 27 Domains specific Subjects being offered under this Section. Candidate may choose a maximum of Six (06) Domains as desired by the applicable University/Universities.
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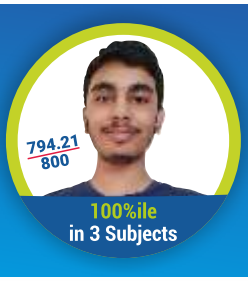

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