# CLASS : 12th (Sr. Secondary) <br> 4379/4329 

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SET : A, B, C, \& D

## MARKING INSTRUCTIONS AND MODEL ANSWERS CHEMISTRY ACADEMIC/OPEN <br> (Only for Fresh/Re-appear Candidates)

उप-परीक्षक मूल्यांकन निरेदेशों का ध्यानपूर्वक अवलोकन करके उत्तरपुसित्काओं का मूल्यांकन करें। यदि परीक्षार्थी ने प्रश्न पूर्ण व सही हल किया है तो उसके पूर्ण अंक दें।

## General Instructions :

(i) Examiners are advised to go through the general as well as specific instructions before taking up evaluation of the answer-books.
(ii) Instructions given in the marking scheme are to be followed strictly so that there may be uniformity in evaluation.
(iii) Mistakes in the answers are to be underlined or encircled.
(iv) Examiners need not hesitate in awarding full marks to the examinee if the answer/s is/are absolutely correct.
(v) Examiners are requested to ensure that every answer is seriously and honestly gone through before it is awarded mark/s. It will ensure the authenticity as their evaluation and enhance the reputation of the Institution.
(vi) A question having parts is to be evaluated and awarded partwise.
(vii) If an examinee writes an acceptable answer which is not given in the marking scheme, he or she may be awarded marks only after consultation with the head-examiner.
(viii) If an examinee attempts an extra question, that answer deserving higher award should be retained and the other scored out.
(ix) Word limit wherever prescribed, if violated upto $10 \%$. On both sides, may be ignored. If the violation exceeds $10 \%, 1$ mark may be deducted.

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(x) Head-examiners will approve the standard of marking of the examiners under them only after ensuring the non-violation of the instructions given in the marking scheme.
(xi) Head-examiners and examiners are once again requested and advised to ensure the authenticity of their evaluation by going through the answers seriously, sincerely and honestly. The advice, if not headed to, will bring a bad name to them and the Institution.

## महत्त्वपूर्ण निर्देश :

(i) अंक-योजना का उद्देश्य मूल्यांकन को अधिकाधिक वस्तुनिष्ठ बनाना है। अंक-योजना में दिए गए उत्तर-बिन्दु अंतिम नहीं हैं। ये सुझावात्मक एवं सांकेतिक हैं। यदि परीक्षार्थी ने इनसे भिन्न, किन्तु उपयुक्त उत्तर दिए हैं, तो उसे उपयुक्त अंक दिए जाएँ।
(ii) शुद्ध, सार्थक एवं सटीक उत्तरों को यथायोग्य अधिमान दिए जाएँ।
(iii) परीक्षार्थी द्वारा अपेक्षा के अनुरूप सही उत्तर लिखने पर उसे पूर्णांक दिए जाएँ।
(iv) वर्तनीगत अभुद्धियों एवं विषयांतर की स्थिति में अधिक अंक देकर प्रोस्माहित न करें।
(v) भाषा-क्षमता एवं अभिव्यक्ति-कौशल पर ध्यान दिया जाए।
(vi) मुख्य-परीक्षकों/उप-परीक्षकों को उत्तर-पुस्तिकाओं का मूल्यांकन करने के लिए केवल Marking Instructions/Guidelines दी जा रही हैं, यदि मूल्यांकन निर्देश में किसी प्रकार की जुटि हो, प्रश्न का उत्तर स्पष्ट न हो, मूल्यांकन निर्देश में दिए गए उत्तर से अलग कोई और भी उत्तर सही हो तो परीक्षक, मुख्य-परीक्षक से विचार-विमर्श करके उस प्रश्न का मूल्यांकन अपने विवेक अनुसार करें।

## SET - A

1. (i) (C)
(ii) (D) 1
(iii) (B) 1
(iv) (A) 1

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(v) (A)

1
(vi) Frenkel defect 1
(vii)
 1
(viii) It is linkage (or bond) by which $\alpha$-amino acids are connected to each other in a protein. 1
(ix) Azeotropes are binary mixtures having same composition in liq. and vapour phase and boil at constant temp.
(x) $E=E^{\circ}-\frac{0.059}{2} \log \frac{\left[\mathrm{Sn}^{2+}\right]}{\left[H^{+}\right]^{2}}$
(xi) Second order 1
(xii) $2 \mathrm{Cl}_{2}+2 \mathrm{H}_{2} \mathrm{O} \rightarrow 4 \mathrm{HCl}+\mathrm{O}_{2} \quad 1$ or

$$
\mathrm{Cl}_{2}+\mathrm{H}_{2} \mathrm{O} \rightarrow 2 \mathrm{HCl}+[\mathrm{O}]
$$

P. T. O.
(xiii) 4-Nitroanisole 1
(xiv) $D=N O H$
2. Mass of $\mathrm{Na}^{+}$ions $=92 \mathrm{~g} \quad 1 / 2$

Moles of $\mathrm{Na}^{+}$ions $=\frac{92}{23}=4 \quad 1 / 2$
Mass of water $=1 \mathrm{Kg} \quad 1 / 2$
Molality $=\frac{4}{1}=4 \mathrm{~m} \quad 1 / 2$
3. Coulombs of electrons $=$ current $\times$ time

$$
0.5 \mathrm{~A} \times 2 \times 60 \times 60 \mathrm{~s}=3600 \mathrm{C}
$$

Now,
96500 C is equivalent to $=6.022 \times 10^{23}$ electrons $1 / 2$

3600 C is equivalent to $=\frac{6.022 \times 10^{23}}{96500} \times 3600 \quad 1 / 2$
$=2.246 \times 10^{22}$ electrons $\quad 1 / 2$
4. Cationic detergents : These are quaternary ammonium salt of amines with acetates, chlorides or bromides. $1 / 2$
e.g. cetyltrimethyl ammonium bromide. 1⁄2
(Any other example may also be given)
Anionic detergents : Anionic detergents are sod. salt of sulphonated long chain hydrocarbons or alcohols. $1 / 2$ e.g. Sod. laurylsulphate or any other example. $1 / 2$
5. Process in which two or more monomer combine to form a polymer.
e.g.
(i) 1, 3-Butadiene and styrene $1 / 2$
(ii) 1,3-Butadiene and acrylonitrile $1 / 2$
6. When a protein in its native form is subjected to physical or chemical change, the hydrogen bonds are disturbed. This is called Denaturation of a protein.

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P.T. O.
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Denaturation changes physical and biological properties but chemical properties remains the same.
7. During intravenous injections, the conc. of the solution to be injected should be comparable to blood plasma. If the solution is more conc. then water will flow out of cell \& they would shrink. If the solution is less conc. then water will flow into cell \& they would burst.
8.


Anode : $Z n(\mathrm{~s}) \rightarrow \mathrm{Zn}^{2+}+2 \mathrm{e}^{-} \quad 1 / 2$
Cathode : $\mathrm{MnO}_{2}+\mathrm{NH}_{4}^{+}+\mathrm{e}^{-} \rightarrow \mathrm{MnO}(\mathrm{OH})+\mathrm{NH}_{3}$ $1 / 2$
9. Single $N-N$ bond is weaker than single $P-P$ bond because of high inter electronic repulsion of the non bonding electrons, owing to the small bond length. As a result the catenation tendency is weaker in Nitrogen. 2
10. This is because in strongly acidic medium (conc. $\mathrm{HNO}_{3}+\mathrm{H}_{2} \mathrm{SO}_{4}$ ), the aniline is pronated to form anilinium ion which is meta directing. Thus in addition to $0-\&$ p-derivatives, significant amount of m -derivative is also formed.
11. This is a method for preparation of $1^{\circ}$ amines in which an amide is treated with bromine in an aq. or alc. solution of NaOH .

12. (a) Diborane $\left(\mathrm{BH}_{3}\right)_{2}$ reacts with alkene to give trialkyl boranes as addition product. This is oxidized to alcohol by $\mathrm{H}_{2} \mathrm{O}_{2}$ in the presence of aq. NaOH .
e.g.

$$
\mathrm{CH}_{3}-\mathrm{CH}=\mathrm{CH}_{2}+\left(\mathrm{H}-\mathrm{BH}_{2}\right)_{2} \rightarrow \mathrm{CH}_{3}-\mathrm{CH}_{2}-
$$



$$
\left(\mathrm{CH}_{3}-\mathrm{CH}_{2}-\mathrm{CH}_{2}\right)_{3} B \quad 1 / 2
$$

$\left(\mathrm{CH}_{3}-\mathrm{CH}_{2}-\mathrm{CH}_{2}\right)_{3} B \frac{3 \mathrm{H}_{2} \mathrm{O}_{2} / \mathrm{OH}^{-}}{\mathrm{H}_{2} \mathrm{O}} \downarrow$

$$
3 \mathrm{CH}_{3} \mathrm{CH}_{2} \mathrm{CH}_{2} \mathrm{OH}+\mathrm{B}(\mathrm{OH})_{3} \quad 1 / 2
$$


13. In the presence of strong ligand $\mathrm{NH}_{3}$, the $3 d$ electrons pair up leaving two $d$ orbitals to be involved in $d^{2} s p^{3}$ hybridization forming inner orbital complex.


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In $\left[\mathrm{Ni}\left(\mathrm{NH}_{3}\right)_{6}\right]^{2+}, \mathrm{Ni}$ is in +2 0.s and has $3 d^{8}$ configuration and hybridization involved is $s p^{3} d^{2}$ forming outer orbital complex.

$\mathrm{NH}_{3} \quad \mathrm{NH}_{3} \mathrm{NH}_{3} \quad \mathrm{NH}_{3} \quad \mathrm{NH}_{3} \mathrm{NH}_{3}$
14. (a) F-centres : In metal excess defect some anion vacancies are created by passing alkali metal vapour over alkali metal crystal. Electrons are entrapped in these vacancies and responsible for importing colour to crystal. $11 / 2$
(b) Antiferromagnetism : If the alignment of magnetic moments of domain is in a compensatory way so as to give zero net mag. moment e.g. MnO . $11 / 2$
15. (a) Activity : It is the ability of catalyst to increase the rate of chemical reaction. e.g. $\mathrm{H}_{2}$ and $\mathrm{O}_{2}$ to form water in the presence of platinum.
$2 \mathrm{H}_{2}(\mathrm{~g})+\mathrm{O}_{2}(\mathrm{~g}) \xrightarrow{\mathrm{Pt}} 2 \mathrm{H}_{2} \mathrm{O}(\mathrm{l})$
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(b) Selectivity : It means the ability of the catalyst to direct reaction to give particular product e.g.

1
$\mathrm{Co}(\mathrm{g})+3 \mathrm{H}_{2}(\mathrm{~g}) \xrightarrow{\mathrm{Ni}} \mathrm{CH}_{4}(\mathrm{~g})+\mathrm{H}_{2} \mathrm{O}(\mathrm{g}) \quad 1 / 2$
16. (a) $\log \frac{k_{2}}{k_{1}}=\frac{E a}{2.303 R}\left[\frac{T_{2}-T_{1}}{T_{1} T_{2}}\right]$ $\log \frac{0.07}{0.02}=\left(\frac{E a}{2.303 \times 8.314}\right)\left[\frac{700-500}{700 \times 500}\right] \quad 1 / 2$ $0.544=E a \times 5.714 \times 10^{4} / 19.15 \quad 1 / 2$
$E a=0.544 \times 19.15 / 5.714 \times 10^{-4}$
$=18230.8 \mathrm{~J}$
$1 / 2$
(b) A bimolecular Rx behaves kinetically 1st order $R x$ when one of the reactant is present in excess.
17. The graph of $\Delta_{r} G^{6}$ vs $T$ in Ellingham diagram for the formation of oxides shows that the $\mathrm{Cu}-\mathrm{CuO}$ line is almost at the top. Therefore it is very easy to reduce oxide ores of Cu directly to metal by heating with coke. This is because $\Delta_{r} G^{6}$ vs $T$ line for $C O$ has -ve slope at higher temp. of therefore can easily reduce $\mathrm{Cu}_{2} \mathrm{O}$ to Cu .

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However the Gibb's energies for formation of most sulphides are greater than that for $\mathrm{CS}_{2}$. In fact $\mathrm{CS}_{2}$ is an endothermic compound. Moreover there is no $C S$ analogous to $C O$. Therefore extraction of Cu from $\mathrm{Cu}_{2} \mathrm{~S}$ is difficult.
18. Chlorine withdraws electrons through inductive effect and releases electrons through resonance. Through inductive effect chlorine destabilizes the intermediate carbocation formed during $\mathrm{E}^{\oplus}$ substitution.


Inductive effect destabilises
the intermediate carbocation



Through resonance halogen tends to stabilize the carbocation and the effect is more pronounced at $0-\&$ p-position. The inductive effect is stronger than resonance effect \& causes net deactivation. Reactivity is thus controlled by inductive effect and orientation is controlled by resonance effect.
19. (a) Pentan-2-one forms yellow ppt of Iodoform with alkaline solution of iodine. Pentan-3one does not give this test

$$
\begin{gathered}
\mathrm{CH}_{3} \mathrm{COCH}_{2} \mathrm{CH}_{2} \mathrm{CH}_{3}+3 \mathrm{I}_{2}+4 \mathrm{NaOH}-\downarrow \\
\mathrm{CH}_{3} \mathrm{CH}_{2} \mathrm{CH}_{2} \mathrm{COONa}+\mathrm{CHI}_{3}+3 \mathrm{H}_{2} \mathrm{O}+3 \mathrm{NaI} 1 \\
\text { Iodoform }
\end{gathered}
$$

(b) (i)

(ii)

(iii)


OR By any Method

## OR

(a) Aldol condensation : Aldehydes and ketones having at least one $\alpha-H$ undergo a reaction in the presence of dilute alkali as catalyst to form $\beta$-hydroxy aldehydes or $\beta$ hydroxy ketones. The $\beta$-hydroxy aldehydes and ketones readily loose water to give $\alpha-\beta$ unsaturated carbonyl compounds. This Rx is called aldol condensation.


$$
-\mathrm{CH}=\mathrm{CH}-\mathrm{CHO} \quad 11 / 2
$$

(b) Decarboxylation : Carboxylic acids lose $\mathrm{CO}_{2}$ to form hydrocarbons when their sod. salt are heated with soda lime $(\mathrm{NaOH}+$ CaO ) in the ratio of $3: 1$. The reaction is known as decarboxylation.

2
RCOONa $\xrightarrow[\text { Heat }]{\mathrm{NaOH}+\mathrm{CaO}} R-\mathrm{H}+\mathrm{Na}_{2} \mathrm{CO}_{3} \quad 1 / 2$
20. (a)
(i) $I_{2}<\mathrm{F}_{2}<\mathrm{Br}_{2}<\mathrm{Cl}_{2}$ 1
(ii) $\mathrm{HI}>\mathrm{HBr}>\mathrm{HCl}>\mathrm{HF} 1$
(iii) $\mathrm{NH}_{3}>\mathrm{PH}_{3}>\mathrm{AsH}_{3}>\mathrm{SbH}_{3}>\mathrm{BiH}_{3} \quad 1$
(b) (i) Low temperature : But the temp. should not be very low otherwise rate of Rx will become slow. The optimum temp. 720 K should be maintained. 1
(ii) High pressure of 2 bar $1 / 2$
(iii) Presence of Catalyst, $\mathrm{V}_{2} \mathrm{O}_{5} \quad 1 / 2$
(a) (i)

(ii)

Distorted Octahedral


Square Pyramidal
(b) On large scale, ammonia is manufactured by Haber's process.

$$
N_{2}(g)+3 H_{2}(g) \rightleftharpoons 2 \mathrm{NH}_{3}(g) \quad \Delta_{f} 4=-46.1
$$

$$
K J / \mathrm{Mol}^{-1}
$$

The optimum conditions for the production of $\mathrm{NH}_{3}$ are a pressure of $200 \times 10^{5} \mathrm{~Pa}$, a temp. of $\sim 700 \mathrm{~K}$ and the use of catalyst such as Ironoxide with small amount of $\mathrm{K}_{2} \mathrm{O}$ and $\mathrm{Al}_{2} \mathrm{O}_{3}$ to increase the rate of attainment at equilibrium.
21. (a) Electronic configuration of $\mathrm{Mn}^{2+}$ is $[\mathrm{Ar}] 3 d^{5}$ which is half filled and it is stable. It means third $e^{\ominus}$ cannot be removed easily.

In case of $\mathrm{Fe}^{2+}$, the electronic configuration is $[A r] 3 d^{6}$. Therefore $F e^{2+}$ can easily loose one $e^{\ominus}$ to acquire $3 d^{5}$ stable electronic configuration.
(b) Interstitial compounds are those which are formed when small atoms like $H, C$ or $N$ are trapped inside crystal lattice of metals. 1

The transition metals can easily accommodate these small atoms because of space between metal atoms in crystal lattice.
(c) $[X e] 4 f^{4} 1$

## OR

(a) (i) $5 \mathrm{C}_{2} \mathrm{O}_{4}^{2-}+2 \mathrm{MnO}_{4}^{-}+16 \mathrm{H}^{+} \rightarrow 2 \mathrm{Mn}^{2+}+$

$$
8 \mathrm{H}_{2} \mathrm{O}+10 \mathrm{CO}_{2} \quad 1
$$

(ii) $5 \mathrm{~S}^{2-}+2 \mathrm{MnO}_{4}^{-}+16 \mathrm{H}^{+} \rightarrow 2 \mathrm{Mn}^{2+}+8 \mathrm{H}_{2} \mathrm{O}+5 \mathrm{~S}$

1
(iii) $5 \mathrm{SO}_{3}^{2-}+2 \mathrm{MnO}_{4}^{-}+6 \mathrm{H}^{+} \rightarrow 2 \mathrm{Mn}^{2+}+3 \mathrm{H}_{2} \mathrm{O}$
$+5 \mathrm{SO}_{4}^{2-} \quad 1$
(b) The actinoids are highly reactive metals, especially when finely divided. The action of boiling water on them e.g. gives a mixture of oxide and hybride and combination with most non metals takes place at moderate temp. HCl attacks all metals but most are slightly affected by $\mathrm{HNO}_{3}$. Alkalies have no action.

2

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## SET - B

1. (i) (B) 1
(ii) (A) 1
(iii) (C) 1
(iv) (A) 1
(v) (B) 1
(vi) Any two like $C u, A g, N i, Z n, A l$ etc. $1 / 2+1 / 2$
(vii) When a sequence of elementary reactions give us the product, the reactions are called complex reactions.

1
(viii) This is because aspartame is unstable at cooking temp. and decomposes.

1
(ix) The sugars which can reduce Tollen's reagent or Fehling solution are called reducing sugars. 1

4379/4329/(Set : A, B, C \& D) P. T. O.
(x) Controls blood clotting time.
(xi) Delibrately addition of impurities to a semiconductor to increase its conductivity is called doping.
(xii) The process of settling of colloidal particles is called coagulation.
(xiii) Potassium hexacyanomanganate (II).
(xiv) $\mathrm{CH}_{3}-\underset{\substack{\mathrm{C} \\ \mathrm{H}} \underset{\mathrm{l}}{\mathrm{C}} \mathrm{H}}{\mathrm{CH}_{2}} \xrightarrow[\text { Alc. }]{\mathrm{OH}^{-}} \mathrm{CH}_{3} \mathrm{CH}=\mathrm{CH}_{2}$
2. Aliphatic and aromatic $1^{\circ}$ amines on heating with $\mathrm{CHCl}_{3}$ and ethanolic KOH form isocynide or carbylamine, is called carbyl amine Rx.
e.g. $\mathrm{CH}_{3} \mathrm{CH}_{2} \mathrm{NH}_{2}+\mathrm{CHCl}_{3}+3 \mathrm{KOH} \xrightarrow{\text { heat }}$

$$
\begin{equation*}
\mathrm{CH}_{3} \mathrm{CH}_{2} \mathrm{NC}+3 \mathrm{KCl}+3 \mathrm{H}_{2} \mathrm{O} \tag{1}
\end{equation*}
$$

3. (a)

(b)

4. N because of having small size $\&$ high $\mathrm{e}^{\ominus}$-vity is able to form $P \pi-P \pi$ multiple bond $\&$ thus exist as $N_{2}$.

On the other hand size of $P$ is large it cannot form $P \pi-P \pi$ multiple bond and it satisfy its valency by forming single bond $\&$ thus exist as $P_{4}$.

$$
1
$$

5. $\frac{P^{\circ}-P}{P^{\circ}}=x_{2}=\frac{W_{B}}{M_{B}} \times \frac{M_{A}}{W_{A}}$

$$
\frac{17.535-P}{17.535}=\frac{25}{180} \times \frac{18}{450}
$$

$\frac{17.535-P}{17.535}=5.56 \times 10^{-3}$

$$
17.535-P=0.0975
$$

$P=17.438 \mathrm{~mm} \mathrm{Hg}$ $1 / 2$
6. The amount of a chemical compound deposited at any electrode during electrolysis is directly proportional to the quantity of electricity based.

$$
\begin{equation*}
W \propto \mathrm{Q}=W=Z Q \tag{2}
\end{equation*}
$$

7. $\wedge_{m}^{\circ}\left(H A_{C}\right)=\lambda_{H^{+}}^{\circ}+\lambda_{A C^{-}}^{\circ}=\lambda_{H^{+}}^{\circ}+\lambda_{C \tau^{+}}^{\circ}+\lambda_{A C^{-}}^{\circ}+\lambda_{N a^{+}}^{0}{ }^{-}$
$\lambda_{\mathrm{Cl}^{-}}-\lambda_{\mathrm{Na}^{+}}^{0}{ }^{1 / 2}$
$=\wedge_{m}^{\circ}(\mathrm{HCl})+\wedge_{m}^{\circ}(\mathrm{NaAC})-\wedge_{m}^{\circ}(\mathrm{NaCl}) \quad 1 / 2$
$=(425.9+91.0-126) \mathrm{S} \mathrm{cm}^{2} \mathrm{~mol}^{-1} \quad 1 / 2$
$=390.5 \mathrm{~S} \mathrm{~cm}^{2} \mathrm{~mol}^{-1} \quad 1 / 2$
8. Scuba divers cope with high conc. of dissolved gases while breathing air at high pressure under water. Increased pressure increases solubility of gases in blood. When the divers come towards surface, the pressure gradually decreases. This releases dissolved gases \& lead to formation of bubbles of $N_{2}$ in blood. This blocks capillaries and creates a medical condition known as bends.
9. Transquilizers are neurologically active drugs. 1

These are used for treatment of stress and mild or even severe mental diseases.

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10. Homopolymer : It is a polymer which is formed from one type of monomer. $1 / 2$
e.g. polythene.
$1 / 2$
Copolymer : It is a polymer formed from two or more different monomers. $1 / 2$
e.g. Nylon-6,6.

DNA
(i) It has double stranded $\quad \alpha$-helix structure
(ii) Sugar molecule is 2-Deoxyribose
(iii) It has unique property of replication
(iv) Nitrogeneous base uracil not present of

## RNA

It has single stranded $\alpha$-helix structure

Sugar molecule is ribose
RNA does not replicate f
$\qquad$ Nitrogeneous base thymine is not present

$$
1 / 2 \times 4=2
$$

12. (a) Density, $\rho=\frac{Z \times M}{a^{3} \times N_{0}}$ for fcc lattice, $Z=4$ Atomic mass, $M$ of $C u=63.5$

$$
\begin{array}{rlr}
a=3.61 \times 10^{-8} \mathrm{~cm} & 1 / 2 \\
\therefore \rho=\frac{4 \times 63.5}{\left(3.61 \times 10^{-8}\right) \times\left(6.022 \times 10^{23}\right)} & 1 / 2 \\
=8.96 \mathrm{~g} / \mathrm{cm}^{3} & \\
4379 / 4329 /(\text { Set }: \text { A }, \mathbf{B}, \mathbf{C} \& \mathbf{D}) & \text { P.T. О. }
\end{array}
$$

(b) In bcc arrangement number of lattice point are $=8$ (at corner) +1 (at centre) Lattice points are $=8 \times \frac{1}{8}+1=2$
13. A balanced chemical equation never gives us true picture of how a reaction takes place since rarely a reaction gets completed in one step. The reactions taking place in one step are called elementary Rx. When a sequence of elementary Rx give us the product, the Rx are called complex Rx. These may be consecutive Rx, reverse Rx \& side Rx.
e.g. Decomposition of $\mathrm{H}_{2} \mathrm{O}_{2}$ in the presence of $I^{-}$in an alkaline medium

$$
2 \mathrm{H}_{2} \mathrm{O}_{2} \xrightarrow{I^{-}} 2 \mathrm{H}_{2} \mathrm{O}+\mathrm{O}_{2}
$$

Actually it occurs in two steps

$$
\begin{align*}
& \mathrm{H}_{2} \mathrm{O}_{2}+\mathrm{I}^{-} \rightarrow \mathrm{H}_{2} \mathrm{O}+\mathrm{IO}^{-} \\
& \mathrm{H}_{2} \mathrm{O}_{2}+\mathrm{IO}^{-} \rightarrow \mathrm{H}_{2} \mathrm{O}+\mathrm{I}^{-}+\mathrm{O}_{2} \tag{1}
\end{align*}
$$

14. The variation in amount of gas absorbed by the adsorbent with pressure at constant temp. is expresed by cure termed as adsorption isotherm.

1
Freundlich adsorption isotherm : Variation of extent of adsorption $(x / m)$ with pressure at constant temp. is given by

$$
\begin{equation*}
\frac{x}{m}=K P^{1} / n \tag{i}
\end{equation*}
$$

Where $x=$ mass of gas adsorbed
$m=$ mass of adsorbent at pressure $P$
$K$ of $n$ are constants which depend upon nature of gas and adsorbent. The relationship is generally expressed in the form of curve where mass of gas adsorbed/gram of adsorbent is plotted against pressure.

Taking log of equ ${ }^{n}$ $\qquad$ (i)
$\log \frac{x}{m}=\log K+\frac{1}{n} \log P$

$\log P$
from slope value of $n$ can be calculated.
15. (i)

(ii)

(iii)


$$
1 \times 3=3
$$

16. (a) Alkyl halides are held together by dipoledipole forces. On the other hand $\mathrm{H}_{2} \mathrm{O}$ molecules are held together by H -bonds. When alkyl halides are added to $\mathrm{H}_{2} \mathrm{O}$, the new force of attraction is weaker than the already existing between $\mathrm{Rx}-\mathrm{Rx}$ of $\mathrm{H}_{2} \mathrm{O}-\mathrm{H}_{2} \mathrm{O}$ molecules. Hence alkyl halide are immiscible in water.
(b) Grignard reagents are very reactive \& reacts with moisture present in apparatus

$$
R M g X+\mathrm{H}_{2} \mathrm{O} \rightarrow \mathrm{R}-\mathrm{H}+\mathrm{Mg}(\mathrm{on}) \mathrm{X}
$$

$\therefore \quad \mathrm{RMgX}$ must be prepared under anhydrous conditions.
17. (a) In both the complexes iron is in +2 oxidation state having $3 d^{6}$ electronic configuration having 4 unpaired $e^{\ominus} \mathrm{s}$. But in $\left[\mathrm{Fe}(\mathrm{CN})_{6}\right]^{4-}$ these $\mathrm{e}^{\ominus} \mathrm{s}$ are paired up by strong $\mathrm{CN}^{-}$ligand. On the other hand they remain unpaired in $\left[\mathrm{Fe}\left(\mathrm{H}_{2} \mathrm{O}\right)_{6}\right]^{2+}$ as $\mathrm{H}_{2} \mathrm{O}$ is weak ligand. So due to difference in unpaired $e^{\ominus} s$, the complexes give different colours.


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P.T. O.
18. (a) Gold is leached with dilute solution of NaCN or $K C N$ in the presence of $O_{2}$ from which metal is obtained later by replacement. ½
$4 \mathrm{M}(\mathrm{s})+8 \mathrm{CN}^{-}(\mathrm{aq})+2 \mathrm{H}_{2} \mathrm{O}(\mathrm{aq})+\mathrm{O}_{2}(\mathrm{~g}) \rightarrow$
$4\left[\mathrm{M}(\mathrm{CN})_{2}\right]^{-}(\mathrm{aq})+4 \mathrm{OH}^{-}(\mathrm{aq}) \quad \mathrm{M}=\mathrm{A}_{4} \quad \frac{1}{2}$
$2\left[M(C N)_{2}\right]^{-}(\mathrm{aq})+\mathrm{Zn}(\mathrm{s}) \rightarrow\left[\mathrm{Zn}(\mathrm{CN})_{4}\right]^{2-}(\mathrm{aq})+2 M(\mathrm{~s})$
$1 / 2$
(b) The copper matte containing $\mathrm{Cu}_{2} \mathrm{~S}$ and FeS is put in silica lined converter. Some $\mathrm{SiO}_{2}$ is also added \& hot air blast is blown to convert remaining FeS to FeO which is removed us slag with silica. $\mathrm{Cu}_{2} \mathrm{~S}$ or CuO converted to Cu .

$$
\begin{aligned}
& 2 \mathrm{FeS}+\mathrm{O}_{2} \rightarrow 2 \mathrm{FeO}+2 \mathrm{SO}_{2} \\
& \mathrm{FeO}+\mathrm{SiO}_{2} \rightarrow \mathrm{FeSiO}_{3} \\
& 2 \mathrm{Cu}_{2} \mathrm{~S}+3 \mathrm{O}_{2} \rightarrow 2 \mathrm{Cu}_{2} \mathrm{O}+2 \mathrm{SO}_{2} \\
& 2 \mathrm{Cu}_{2} \mathrm{O}+\mathrm{Cu}_{2} \mathrm{~S} \rightarrow 6 \mathrm{Cu}+\mathrm{SO}_{2}
\end{aligned}
$$

19. (a) Ozone acts as powerful oxidizing agent because it is thermodynamically unstable and decomposes as

$$
\begin{equation*}
O_{3} \rightarrow O_{2}+O \tag{2}
\end{equation*}
$$

The nascent oxygen oxidizes a no. of compounds.
(b) The electron gain enthalpy of fluorine is less negative as compared to chlorine. It is due to small size of F atom. As a result there are strong inter electronic repulsions in relatively small 2 p orbitals of $F \&$ thus incoming $\mathrm{e}^{\ominus}$ does not feel much attraction. 2
(c) $\mathrm{XeF}_{2}+2 \mathrm{H}_{2} \mathrm{O} \rightarrow 2 \mathrm{Xe}(\mathrm{g})+4 \mathrm{HF}(\mathrm{aq})+\mathrm{O}_{2}(\mathrm{~g}) \quad 1$

## OR

(a) Helium is used as diluent for oxygen in diving apparatus because of its very low solubility in blood.
(b) $\mathrm{H}_{3} \mathrm{PO}_{4}$ contains three P-O-H bond. It has three ionisable hydrogen. Hence it is tribasic acid.


1
(c) Halogens have high electron affinities \& hence have strong tendency to accept electron. That is why halogens are strong oxidizing agent.
20. (a) (i) Oxoanion of transition metals have highest oxidation state e.g. O.S. of Mn in $\mathrm{MnO}_{4}{ }^{-}$is +7 . This is because of high electro negativity of oxygen and its high oxidizing property. 2
(ii) The $E_{M^{2+} / M}^{\circ}$ value for Cu is +ve. This show $C u$ is least reactive element of 1st T.S. This is because $C u$ has high enthalpy of atomization of enthalpy of ionization. It means I.E. required is not balanced by hydration enthalpy.2

## 4379/4329/(Set : A, B, C \& D)

(b) The principal O.S. of lanthanoids is $=+3$. In addition they exhibit oxidation states +2 $\mathrm{E}_{\mathrm{s}}+4$.

## OR

(a) (i) $2 \mathrm{MnO}_{4}^{-}+10 \mathrm{I}^{-}+16 \mathrm{H}^{+} \rightarrow 2 \mathrm{Mn}^{2+}+8 \mathrm{H}_{2} \mathrm{O}$

$$
+5 I_{2} 1
$$

(ii) $\mathrm{Cr}_{2} \mathrm{O}_{7}^{2-}+3 \mathrm{Sn}^{2+}+14 \mathrm{H}^{+} \rightarrow 2 \mathrm{Cr}^{3+}+3 \mathrm{Sn}^{4+}$ $+7 \mathrm{H}_{2} \mathrm{O} \quad 1$
(b) Cu exhibit +1 O.S most frequently because it has stable electronic configuration of $3 d^{10}$ in +1 oxidation state. $\quad 1 / 2+1 / 2$
(c) $\mathrm{La}(\mathrm{OH})_{3}$ is more basic than $\mathrm{Lu}(\mathrm{OH})_{3} \quad 1 / 2$ Due to lanthanoid contraction the size of lanthanoid ion decreases with increase in atomic no. As a result covalent character between lanthanoid ion of $\mathrm{OH}^{-}$increases.
$\therefore$ Basic character decreases from $\mathrm{La}(\mathrm{OH})_{3}$ to $\mathrm{Lu}(\mathrm{OH})_{3}$. $11 / 2$
P. T. O.
21. (a) Benzaldehyde forms silver mirror with Tollen's reagent. Acetophenone does not react.

1


$$
\begin{equation*}
+2 \mathrm{Ag} \downarrow+3 \mathrm{NH}_{3}+\mathrm{H}_{2} \mathrm{O} \tag{1}
\end{equation*}
$$

Silver mirror $\uparrow$
(b)

(c) Benzoic acid is stronger acid than phenyl acetic acid.

This is because in benzoic acid -COOH gp is attached to $S P^{2} C$ of benzene ring whereas in phenylacetic acid -COOH gp is attached to $S P^{3} C$.

## OR

(a) (i) Since the given compound on hydrolysis with dil. $\mathrm{H}_{2} \mathrm{SO}_{4}$ give carboxylic acid (B) and alcohol (C). It must be an ester.
(ii) Since the oxidation of alcohol(C) gives acid (B). Both alcohol and acid must contain same no. of carbon atoms. 1/2
(iii) Since ester contain 8 carbon atoms, $\therefore$ acid and alcohol must contain 4 carbon each. $1 / 2$
(iv) Alcohol (C) on dehydration gives but-1ene,
$\therefore$ C must be straight chain alcohol i.e. butan-1-ol. 1⁄2
(v) (B) is obtained by oxidation of C, $1 / 2$
$\therefore$ B must be butanoic acid.

(A) $\mathrm{CH}_{2}-\mathrm{CH}_{3} \xrightarrow{d_{i} \cdot \mathrm{H}_{2} \mathrm{SO}_{4}}$

$$
\mathrm{CH}_{3} \mathrm{CH}_{2} \mathrm{CH}_{2}-\mathrm{COOH}+\mathrm{CH}_{3} \mathrm{CH}_{2} \mathrm{CH}_{2} \mathrm{CH}_{2} \mathrm{OH} \quad 1 / 2
$$

(B)
(C)
$\mathrm{CH}_{3} \mathrm{CH}_{2} \mathrm{CH}_{2} \mathrm{COOH} \overleftarrow{\mathrm{CH}_{3} \mathrm{COOH}} \stackrel{\mathrm{CrO}_{3}}{\mathrm{CH}_{3} \mathrm{CH}_{2} \mathrm{CH}_{2} \mathrm{CH}_{2} \mathrm{OH}}$
(B)

$$
\xrightarrow{\text { dehydration }} \mathrm{CH}_{3} \mathrm{CH}_{2} \mathrm{CH}=\mathrm{CH}_{2}
$$ $1 / 2$

(b) Wolf Kishner reduction : Aldehydes or Ketones are heated with hydrazine and NaOH or KOH in ethylene glycol to give hydrocarbons. 1
$>\mathrm{C}=\mathrm{O} \xrightarrow[-\mathrm{H}_{2} \mathrm{O}]{\mathrm{NH}_{2} \cdot \mathrm{NH}_{2}}>\mathrm{C}=\mathrm{NNH}_{2} \xrightarrow[\text { glycol Heat }]{\mathrm{KOH}}$

$$
>\mathrm{CH}_{2}+\mathrm{N}_{2} \quad 1 / 2
$$

## SET - C

1. (i) (A)
(ii) (C)
(iii) (D)
(iv) (A)
(v) (B)
(vi) $\underset{\mathrm{CH}_{3}}{-\mathrm{C}}=\mathrm{NCH}_{2}-\mathrm{CH}_{3}$ 1
(vii) The reactions which takes place in one step are called elementary reactions.
(viii) P-type
(ix) $\frac{P^{\circ}-P}{P^{\circ}}=x_{2}$
(x) A method by which iron is protected from rusting by covering it with a layer of a metal more active than iron.
(xi) Critical Micelle concentration.
(xii) The main constituents of dettol are chloroxylenol and terpineol in suitable solvent.
(xiii) Ethylene glycol and phthalic acid.
(xiv) $C_{1}-C_{4}$ and $C_{1}-C_{6}$ glycosidic linkage. 1
2. Benzene diazonium chloride reacts with aromatic compound having active hydrogen to form azo compounds (dyes) is called coupling reaction.
e.g.

$$
\begin{array}{r}
\text { (O) } \mathrm{N}^{+} \equiv \mathrm{NCl}^{-}+\mathrm{H}-\mathrm{O}-\mathrm{OH} \rightarrow\langle\bigcirc- \\
\mathrm{N}=\mathrm{O}-\mathrm{O}-\mathrm{OH}+\mathrm{Cl}^{-}+\mathrm{H}_{2} \mathrm{O} \tag{1}
\end{array}
$$

3. Aromatic primary amines cannot be prepared by Gabriel Phthalimide reaction because aryl halides do not undergo nucleophilic substitution with the anion formed by phthalimide.
4. Conditions to form H -bond are small size and high electronegativity. Though chlorine has same electronegativity to that of oxygen but its size is large. That is why Cl does not form H bonding.
5. Rusting of iron is an electrochemical phenomenon because at a particular spot of an object made of iron, oxidation takes place and spot behave as anode \& we can write reaction : 1 Anode $2 \mathrm{Fe}(\mathrm{s}) \rightarrow 2 \mathrm{Fe}^{2+}+4 \mathrm{e}^{-} \mathrm{E}^{\circ}{ }_{\mathrm{Fe}}{ }^{2+} / \mathrm{Fe}=-0.44 \mathrm{~V}$ Electrons released at anodic spot move through metal and go to another spot on the metal and reduce oxygen in the presence of $H^{+}$. This spot behave as cathode.

$$
\text { Cathode }-\mathrm{O}_{2}(\mathrm{~g})+4 \mathrm{H}^{+}(\mathrm{aq})+4 e^{-} \rightarrow 2 \mathrm{H}_{2} \mathrm{O}(\mathrm{l})
$$

$$
E^{\circ} \mathrm{H}^{+} / \mathrm{O}_{2} / \mathrm{H}_{2} \mathrm{O}=1.23 \mathrm{~V}
$$

## 4379/4329/(Set : A, B, C \& D)

6. $E_{\text {cell }}^{\circ}=0.236 \mathrm{~V}$
$\left.\begin{array}{l}E_{\text {cell }}^{\circ}=0.236 V \\ \Delta G^{\circ}=-n F E_{\text {cell }}^{\circ}\end{array}\right\} \quad \begin{aligned} & \\ & 1 / 2\end{aligned}$

$$
\Delta G^{\circ}=-2 \times 96500 C \times 0.236 V=-45.55 \mathrm{KJ} \quad 1 / 2
$$

$$
\Delta G^{\circ}=-2.303 \mathrm{RT} \log \mathrm{~K}_{\mathrm{C}}
$$

$$
\begin{aligned}
\log \mathrm{K}_{\mathrm{C}}=\frac{-\Delta G^{\circ}}{2.303 \mathrm{RT}} & =\frac{-45.55}{2.303 \times 8.314 \times 10^{-3} \times 298} \\
& =7.953 \\
\mathrm{~K}_{\mathrm{C}}=\operatorname{antilog}(7.953) & =9.62 \times 10^{7}
\end{aligned}
$$

7. Mass of ethylene glycol $=222.6 \mathrm{~g}$

$$
\text { Molar mass of ethylene glycol }=62
$$

$$
\text { Moles }=\frac{222.6}{62}=3.59
$$

Molality $=\frac{3.59}{200} \times 1000=17.95 \mathrm{~m}$
Moles of ethylene glycol $=3.59$

$$
\begin{aligned}
& \text { Mass of solution }=200+222.6=422.6 \mathrm{~g} 1 / 2 \\
& \text { Vol. of solution }=\frac{\text { Mass }}{\text { Density }}=\frac{422.6}{1.072}=394.22 \mathrm{ml}
\end{aligned}
$$

$$
\text { Molarity }=\frac{3.59}{394.22} \times 1000=9.11 \mathrm{M}
$$

$$
1 / 2
$$

8. People taking a lot of salt or salty food experience water retention in tissue cells and intracellular space because of osmosis. The resulting puffiness or swelling is called edema.
9. Detergents having straight hydrocarbon chains are easily decomposed by microorganisms are called biodegradable detergents e.g. sod. lauryl sulphate. $1 / 2+1 / 2$

Detergents having branched hydrocarbon chain are not decomposed by microorganism and are called non biodegradable detergents e.g. sod. 4-(1,3,5,7-tetra-methyloctyl) benzene sulphonate. $1 / 2+1 / 2$
10. The amino acids which can not be synthesized in our body and must be present in our diet are called essential amino acids e.g. valine.

$$
1 / 2+1 / 2
$$

On the other hand the amino acids which can be synthesized in our body are called non essential amino acids e.g. alamine. $1 / 2+1 / 2$
11. Natural rubber is linear cis-1, 4 polyisoprene. The cis configuration does not allow chains to come closer due to weak intermolecular attraction. Therefore natural rubber is coiled, elastic \& non crystalline. 1

On the other hand trans configuration occurs in Gulta-Purcha. The zig-zag chain pack more closely, hence it is crystalline, non elastic, hard of brittle. 1
12. (i) The conc. zinc blende is roasted in the presence of excess of air at 1200 K

$$
2 \mathrm{ZnS}+3 \mathrm{O}_{2} \xrightarrow{\Delta} 2 \mathrm{ZnO}+2 \mathrm{SO}_{2}
$$

(ii) ZnO is reduced to Zn with crushed coke at 1673 K

$$
\mathrm{ZnO}+\mathrm{C} \rightarrow \mathrm{Zn}+\mathrm{CO}
$$

(iii) Impure Zn is refined by electro refining method. The reactions taking place at cathode and anode are :

At anode $\mathrm{Zn} \rightarrow \mathrm{Zn}^{2+}+2 e^{-}$
At cathode $\mathrm{Zn}^{2+}+2 e^{-} \rightarrow \mathrm{Zn}$

4379/4329/(Set : A, B, C \& D)
$1 \times 3=3$
P.T. O.
13. In an octahedral coordination entity the six ligands surrounding the metal atom/ion, these will be repulsion between metal $d$ orbitals and ligands. The $d x^{2}-y^{2}$ and $d z^{2}$ orbitals are repelled more as they are directed forwards the ligands and are raised in energy. $d x y, d y z$ and $d x z$ orbitals which are directed between the axes are lowered in energy. As a result degeneracy of $d$ orbitals is removed.

14. Smoke is a colloidal solution of solid particles such as $C$, As compounds, dust etc. The smoke before it comes out from chimney is led through a chamber containing plates having charge opposite to smoke particles. The particles on coming in contact with these plates loose their 4379/4329/(Set : A, B, C \& D)
charge and gets precipitated. The particle thus settle down on the floor of chamber.


1 mark for diagram
15. (a) Let the initial conc., $[A]_{0}=a$

> Final conc. $[A]=\frac{1}{16} a$ Rate constant $=60 S^{-1}$

$$
\begin{array}{ll}
t=\frac{2.303}{k} \cdot \log \frac{[A]_{0}}{[A]} & 1 / 2 \\
=\frac{2.303}{60} \log \frac{a}{a / 16}=\frac{2.303}{60} \log 16 & 1 / 2
\end{array}
$$

$$
=\frac{2.303}{60} \times 1.204
$$

$$
=0.046 \mathrm{sec} .
$$

(b) The energy required to form activated complex is known as activation energy. 1
16. In a conductor, the energy gap between valence band and conductance band is very small or there is overlapping between valence band and conductance band. Therefore under an applied electric field the electron can jump from V. B to C. B and substance show conductivity. But in a semiconductor there is always a small energy gap between V. B and C. B.


Conductor


Semi Conductor

1 mark for diagram
17. (a)

(b) $\mathrm{CH}_{3}-\mathrm{CH}_{2}-\mathrm{CH}=\mathrm{CH}_{2} \xrightarrow[\text { Mark.add. }]{\mathrm{HBr}} \mathrm{CH}_{3}-\mathrm{CH}_{2}$


4379/4329/(Set : A, B, C \& D)
(c)


18. (a) Williamson Ether Synthesis : It is an important lab. method for the prep. of symmetrical and unsymmetrical ethers. In this method an alkyl halide is allowed to react with sod. alkoxide. $11 / 2$ $R-X+R-O^{-}-N a^{+} \rightarrow R-O-R+N a X \quad 1 / 2$
(b) Kolbe's Reaction : Sod. phenoxide react with $\mathrm{CO}_{2}$ to form O-hydroxybenzoic acid as main Rx product.

19. (i) According to definition, transition elements are those which have partially filled $d$ orbitals in their elementary state or in their
one of oxidation state. Silver can exhibit +2 O-S. in which it has partially filled d-orbital $\left(4 d^{a}\right)$. Hence silver is regarded as transition element.
(b) Lanthanoids exhibits oxidation states of +2 , $+3 \&+4$. The reason behind this limited no. of O-S is large energy gap between $5 \mathrm{~d} \& 4 \mathrm{f}$ subshells. On the other hand actinoids show a no. of oxidation states of $+3,+4,+5,+6 \&$ +7 . This is because of small energy difference between 5f, 6d \& 7s orbitals.

## OR

(a) In third transition series 4 f orbitals are filled before 5d orbital. Due to poor shielding of 4 f orbitals there is regular decrease in atomic radii called lanthanoid contraction. That is why 2 nd $\& 3$ rd d series members have similar atomic radii.
(b) (i) Transition metals and their compounds are known for their catalytic activity. This is ascribed to their ability to adopt multiple O. States $\&$ to form complexes.
(ii) This is because of their high charge and small size of their ions.
20. (a) Acetophenone gives yellow ppt. with alkaline solution of Iodine. Benzophenone does not respond to this test. 1
$\mathrm{C}_{6} \mathrm{H}_{5} \mathrm{COCH}_{3} \xrightarrow{\mathrm{I}_{2}, \mathrm{NaOH}} \mathrm{CHI}_{3} \downarrow+\mathrm{C}_{6} \mathrm{H}_{5} \mathrm{COONa}$
Acetophenone Yellow ppt. 1
(b) (i) $3 \mathrm{CH}_{3} \mathrm{COOH}+\mathrm{PCl}_{3} \rightarrow 3 \mathrm{CH}_{3} \mathrm{COCl}+\mathrm{H}_{3} \mathrm{PO}_{3}$ 1
(ii)

(iii) $\mathrm{CH}_{3} \mathrm{COOH}+\mathrm{C}_{2} \mathrm{H}_{5} \mathrm{OH} \stackrel{\mathrm{H}^{+}}{\rightleftharpoons} \mathrm{CH}_{3} \mathrm{COOC}_{2} \mathrm{H}_{5}$

$$
+\mathrm{H}_{2} \mathrm{O} \quad 1
$$

## OR

(a) In 2, 2, 6 trimethyl cyclohexanone, there are three methyl gps at $\alpha$-position to keto gp. Thus $N u^{\ominus}$ attack of $C N^{\ominus}$ is not possible due to steric hindrance. But in case of cyclohexanone these is no such case. $11 / 2$




$\uparrow \prod_{\text {fast }}^{H^{+}}$step $=2$

(c) $0+\mathrm{C}_{6} \mathrm{H}_{5} \mathrm{COCl} \xrightarrow[\mathrm{CS}_{2}]{\text { Anhyd. } \mathrm{AlCl}_{3}}$ or $\stackrel{\stackrel{O}{\mathrm{C}}-\mathrm{C}_{6} \mathrm{H}_{5}}{+\mathrm{HCl}}$ 1
21. (a) $\mathrm{SO}_{2}$ dissolves in rain water and produces acid rain. The acid rain contains $\mathrm{H}_{2} \mathrm{SO}_{4}$. 1

$$
\mathrm{SO}_{2}+\frac{1}{2} \mathrm{O}_{2}+\mathrm{H}_{2} \mathrm{O} \rightarrow \mathrm{H}_{2} \mathrm{SO}_{4}
$$

(b) Aquaresia is three parts conc. HCl and one part conc. $\mathrm{HNO}_{3}$

$$
\begin{equation*}
\mathrm{Au}+4 \mathrm{H}^{+}+\mathrm{NO}_{3}^{-}+4 \mathrm{Cl}^{-} \rightarrow \mathrm{AuCl}_{4}^{-}+\mathrm{NO}+2 \mathrm{H}_{2} \mathrm{O} \tag{1}
\end{equation*}
$$

(c)


## OR

(a) $P$ can show max. O.S of +5 in its compounds. In $\mathrm{PCl}_{5}$ its $\mathrm{O} . \mathrm{S}$ is +5 so it can not increase its $O . S$ beyond +5 , it can not act as reducing agent. But it can act as oxidizing agent by decreasing its $O$. State from +5 to +3 e.g.

$$
2 \mathrm{Ag}+\mathrm{PCl}_{5} \rightarrow 2 \mathrm{AgCl}+\mathrm{PCl}_{3}
$$

(b) Size of chlorine $(99 \mathrm{pm})$ is larger than fluorine $(64 \mathrm{pm})$ so it can accommodate three fluorine around it. But F being smaller in size cannot accommodate three large sized chlorine.


