

Exercise Questions

1. Spontaneous chemical reactions take place in:

- (a) Electrolytic cell (b) Galvanic cell (c) Nelson's cell, (d) Down's cell

(a) Redox reaction (b) Acid-base reaction

- (c) Neutralization (d) Decomposition

(a) Downs cell (b) Galvanic cell (c) Nelson's cell (d) Both a and c

(a) +2 (b) +6 (c) +7 (d) +14

(a) Sugar solution (b) Sulphuric acid solution

- (c) Lime solution (d) Sodium chloride solution

(a) Chemical decay (b) Rusting of iron

- (c) Rusting of aluminium (d) Rusting of tin

(a) Cl_2 (b) H_2 (c) O_3 (d) O_2

- ring the formation of water from hydrogen and oxygen, which of the following does not occur:

(c) Oxygen gains electrons

(a) $\text{Fe}_2\text{O}_3 \cdot n\text{H}_2\text{O}$ (b) Fe_2O_3 (c) $\text{Fe}(\text{OH})_3 \cdot n\text{H}_2\text{O}$ (d) $\text{Fe}(\text{OH})_3$

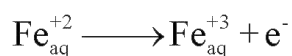
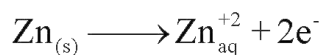
(a) Zn (b) H⁺ (c) Cl⁻ (d) H

1	b	2	a	3	d	4	b	5	a	6	b	7	b
8	d	9	a	10	b								

Exercise Short Question Answers

Q.1 Define oxidation in terms of electrons. Give an example.

Ans: Oxidation is the loss of electron by an atom or an ion e.g,

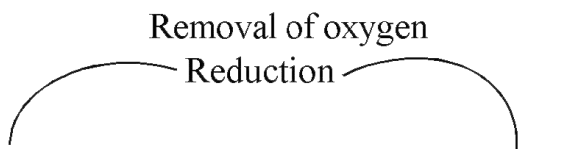


Q.2 Define reduction in terms of loss or gain of oxygen or hydrogen. Give an example.

Ans: Reduction:

“The addition of hydrogen or removal of oxygen during a chemical reaction.”

Examples:



i.



ii.



Q.3 What is difference between valency and oxidation state?

Ans:

Valency	Oxidation Number or state
The combining capacity of an element with other element is called value of	The apparent charge assigned to an atom of an element in a molecule or ion is called oxidation state.
While assigning valency the sign is followed by the number i.e 2+	No sign
For example valency of sodium is 1+	For example oxidation number of sodium is +1

Q.4 Differentiate between oxidizing and reducing agents

Ans:

Oxidizing agent	Reducing Agent
i. A species that oxidizes a substance by taking electrons from it, is called an oxidizing agent. ii. Non metals are good oxidizing agents. iii. They are more electronegative in nature. iv. Its oxidation number decreases. v. Examples vi. $\text{S} + \text{O}_2 \longrightarrow \text{SO}_2$	i. A species that reduces a substance by donating electrons to it is called reducing agent. ii. Metals are good reducing agents. iii. They are more electropositive. iv. Its oxidation number decreases. vii. Examples - viii.

Q.5 Differentiate between strong and weak electrolytes.

Ans:

Strong electrolyte	Weak electrolyte
<i>The electrolyte which ionize completely in solution and produce more ions, are called strong electrolyte.</i>	<i>The electrolytes which ionize to a small extent when dissolve in water and could not produce more ions are called weak electrolytes.</i>
Examples: NaCl, NaOH, H ₂ SO ₄ etc.	Examples: Ca(OH) ₂ , CH ₃ COOH $\text{CH}_3\text{COOH}_\ell + \text{H}_2\text{O}_\ell \longrightarrow \text{CH}_3\text{COO}^-_{\text{aq}} + \text{H}_3\text{O}^+$

Q.6 How electroplating of tin on steel is carried out?

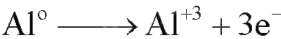
Ans: In electroplating of silver, when current is passed through the cell. A.g. ions present in the electrolyte solution migrate towards the cathode and deposit after picking up electrons. The anode consists of silver bar or sheet. Which is oxidized to Ag ions which dissolve in solution and migrate towards the cathode where they are discharged and deposited on the object



Q.7 Why steel is plated with nickel before the electroplating of chromium.

Ans: The steel is usually plated first with nickel or copper then by chromium because it does not adhere well on the steel surface. Moreover, it allows moisture to pass through it and metal is stripped off.

Q.8 How can you explain, that following reaction is oxidation in terms of increase of oxidation number Al"



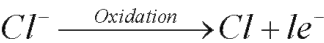
Ans: Increase in oxidation number is called oxidation oxidation number of Al in creases from zero to + 3 as given below $\text{Al} \longrightarrow \text{Al}^{+3} + 3\text{e}^-$

Q.9 How can you prove so it is an oxidation reaction with an example that conversion of an ion to an atom is an oxidation process?

Ans: Conversion of anion into an atom is an oxidation process.

Example:

When anions (negatively charged ions) lose electron, they are converted into atoms and oxidized.



Q.10 Why does the anode carries negative charge in galvanic cell but positive charge in electrolytic cell? Justify with comments.

Ans: In Gavanic cell, electrons are lost by the atoms at anode plate which makes it electron efficient therefore it carries negative charge. In electrolytic cell, electrons are gained by cations from anode which makes it electron deficient therefore it carries positive charge.

Q.11 Where do the electrons flow from Zn electrode in Daniel's cell?

Ans: In Daniel cell, the electrons takes flow from Zn electrode (anode) towards the cathode made up of copper through the external circuit.

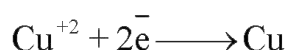
Q.12 Why do electrodes get their names 'anode' and cathode in galvanic cell?

Ans: In galvanic cell anode and cathode get their names depending upon the process taking place on them.

Anode: is an electrode where oxidation takes place

e.g.
$$\text{Zn} \longrightarrow \text{Zn}^{+2} + 2\text{e}^{-}$$

Cathode: is an electrode where reduction takes place



In galvanic cell, oxidation takes place at anode while reduction takes place at cathode. And oxidation always takes place at anode while reduction always takes place at cathode.

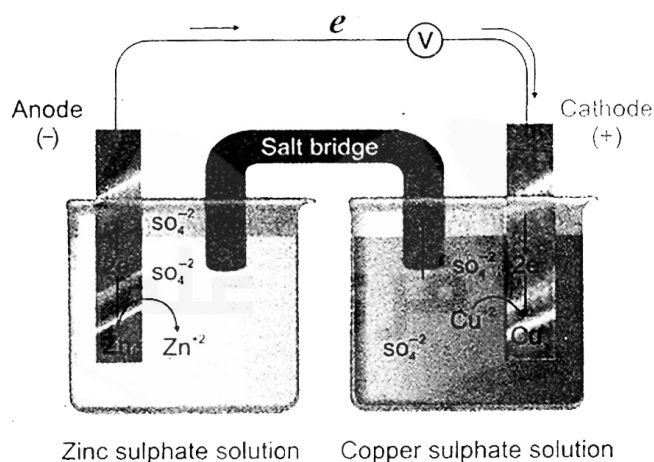
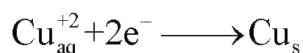


Fig. 7.3 A Daniel Cell

Q.13 What happens at the cathode in a galvanic cell?

Ans: In galvanic cell, reduction takes place at the cathode as:

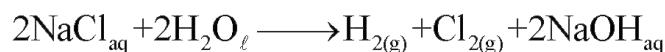


Q.14 Which solution is used as an electrolyte in Nelson's cell?

Ans: An (aqueous solution of NaCl called brine) is used as electrolyte in Nelson's cell.

Q.15 Name the by-products produced in Nelson's cell?

Ans: Hydrogen gas (H₂) and chlorine gas (Cl₂) are the by-product of Nelson's cell as



Q.16 Why galvanizing is done?

Ans: The process of coating a thin layer of zinc on iron is called galvanizing. Galvanizing is done to protect the iron against corrosion even after the required coating surface is broken.

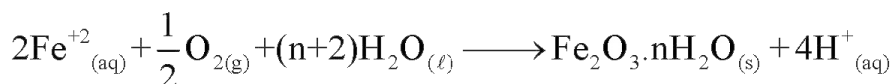
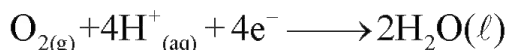
Q.17 Why an iron grill is painted frequently?

Ans: Iron grill is painted frequently to protect it from rusting. Paint layer protect iron from attack of moisture and oxygen.

Q.18 Why O₂ is necessary for rusting?

Ans: O₂ is necessary for rusting because it acts as oxidizing agent. It accepts electrons from Fe which is covered to Fe⁺² and then to Fe⁺³. Oxygen combines with Fe⁺³ to form rust (Fe₂O₃ · nH₂O)

The overall cell reaction for corrosion of iron is



Q.19 In electroplating of chromium, which salt is used as an electrolyte?

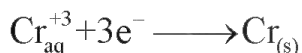
Ans: Chromium sulphate with few drops of H₂SO₄ acts as electrolyte.

Q.20 Write the redox reaction taking place during the electroplating of chromium?

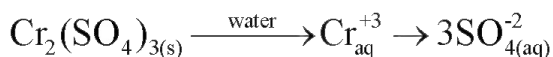
Ans: At anode:



At cathode:



Overall reaction:



Q.21 In electroplating of silver, from where Ag⁺ come and where they deposit?

Ans: In electroplating of silver Ag⁺ ion come from anode while they deposit at cathode.

Q.22 What is the nature of electrode used in electroplating of chromium?

Ans: In electroplating of chromium, anode is made of antimonial lead while the object to be electroplated acts as cathode.

Exercise Long Question Answers

Q.1 Describe the rules for assigning the oxidation state

Ans: See Q. No. 4 (Subjective Part, Long Questions Answers)

Q.2 Find out the oxidation numbers of the underlined elements in the following compounds.

(a) $\text{Na}_2\underline{\text{S}}_2\underline{\text{O}}_4$

(b) $\text{K}_2\underline{\text{Cr}}_2\underline{\text{O}}_7$

(c) $\text{Ag}\underline{\text{N}}\underline{\text{O}}_3$

(d) $\underline{\text{H}}\underline{\text{N}}\underline{\text{O}}_3$

(e) $\underline{\text{K}}\underline{\text{Mn}}\underline{\text{O}}_4$

Ans:

Q.3 How can a non-spontaneous reaction be carried out in an electrolytic cell. Discuss in detail.

Ans: See Q. No. 7 (Subjective Part, Long Questions Answers)

Q.4 Discuss the electrolysis of water.

Ans: See Q. No. 8 (Subjective Part, Long Questions Answers)

Q.5 Discuss the construction and working of a cell in which electricity is produced.

Ans: See Q. No. 9 (Subjective Part, Long Questions Answers)

Q.6 How we can prepare NaOH on commercial scale. Discuss its chemistry along with the diagram.

Ans: See Q. No. 12 (Subjective Part, Long Questions Answers)

Q.7 Discuss the redox reaction taking place in the rusting of iron in detail.

Ans: See Q. No. 13 (Subjective Part, Long Questions Answers)

Q.8 Discuss, why galvanizing is considered better than that of tin plating.

Ans: See Q. No. 14 (Subjective Part, Long Questions Answers)

Q.9 What is electroplating? Write down procedure of electroplating.

Ans: See Q. No. 15 (Subjective Part, Long Questions Answers)

Q.10 What is the principle of electroplating? How electroplating of chromium is carried out?

Ans: See Q. No. 16 (Subjective Part, Long Questions Answers)