

Redox Reactions

Question 1

Match List-I with List-II

List-I (Types of redox reactions)	List-II (Examples)
a. Combination reaction	i. $\text{Cl}_{2(g)} + 2\text{Br}^-_{(aq)} \rightarrow 2\text{Cl}^-_{(aq)} + \text{Br}_{2(l)}$
b. Decomposition reaction	ii. $2\text{H}_2\text{O}_{2(aq)} \rightarrow 2\text{H}_2\text{O}_{(l)} + \text{O}_{2(g)}$
c. Displacement reaction	iii. $\text{CH}_{4(g)} + 2\text{O}_{2(g)} \xrightarrow{\Delta} \text{CO}_{2(g)} + 2\text{H}_2\text{O}_{(l)}$
d. Disproportionation reaction	iv. $2\text{H}_2\text{O}_{(l)} \xrightarrow{\Delta} 2\text{H}_{2(g)} + \text{O}_{2(g)}$

Choose the correct answer from the options given below.

KCET 2025

Options:

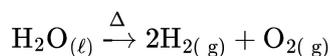
- A. a-iv, b-iii, c-i, d-ii
- B. a-ii, b-i, c-iv, d-iii
- C. a-iii, b-iv, c-i, d-ii
- D. a-iii, b-ii, c-i, d-iv

Answer: C

Solution:

Combination reaction - no example given

Decomposition reaction - $\text{H}_2\text{O}_{2(aq)} \rightarrow \text{H}_2\text{O}_{(l)} + \text{O}_{2(g)}$



Displacement reaction - $\text{Cl}_{2(g)} + 2\text{Br}^-_{(aq)} \rightarrow 2\text{Cl}^-_{(aq)} + \text{Br}_{2(g)}$

Disproportionation reaction - $2\text{H}_2\text{O}_{2(aq)} \rightarrow 2\text{H}_2\text{O}_{(l)} + \text{O}_{2(g)}$

Question2

In the reaction between hydrogen sulphide and acidified permanganate solution,

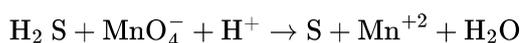
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Options:

- A. H_2S is reduced to S, MnO_4^- is oxidised to Mn^{2+}
- B. H_2S is oxidised to SO_2 , MnO_4^- is reduced to MnO_2
- C. H_2S is reduced to SO_2 , MnO_4^- is oxidised to Mn^{2+}
- D. H_2S is oxidised to S, MnO_4^- is reduced to Mn^{2+}

Answer: D

Solution:



Question3

In the titration of potassium permanganate (KMnO_4) against Ferrous ammonium sulphate (FAS) solution, dilute sulphuric acid but not nitric acid is used to maintain acidic medium, because

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Options:

- A. It is difficult to identify the end point
- B. Nitric acid doesn't act as an indicator
- C. Nitric acid itself is an oxidizing agent
- D. Nitric acid is a weak acid than sulphuric acid

Answer: C

Solution:

Nitric acid is not used in the redox titration because it is a strong OA itself.



Question4

In the reaction between moist SO_2 and acidified permanganate solution.

KCET 2024

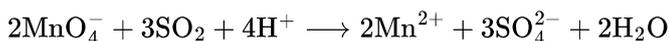
Options:

- A. SO_2 is oxidised to SO_4^{2-} . MnO_4^- is reduced to Mn^{2+} .
- B. SO_2 is reduced to S. MnO_4^- is oxidised to MnO_4 .
- C. SO_2 is oxidised to SO_3^{2-} . MnO_4^- is reduced to MnO_2 .
- D. SO_2 is reduced to H_2S . MnO_4^- is oxidised to MnO_4 .

Answer: A

Solution:

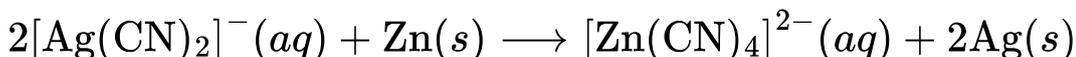
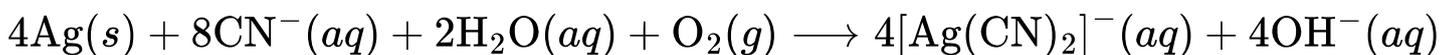
The reaction between moist SO_2 and acidified permanganate solution is as follows



Thus, from the reaction it is clear that SO_2 is oxidised to SO_4^{2-} while MnO_4^- is reduced to Mn^{2+} .

Question5

The reducing agent in the given equations



KCET 2023

Options:

- A. Zn
- B. O_2



C. H_2O

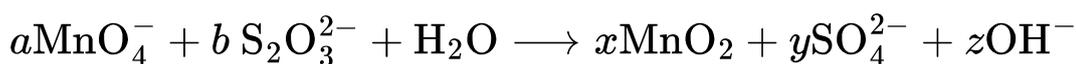
D. CN^-

Answer: A

Solution:

Zn acts as a reducing agent in the given reactions. It reduces Ag and itself gets oxidised.

Question6



a and *y* respectively are

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Options:

A. 8 ; 3

B. 8 ; 6

C. 3 ; 6

D. 8 ; 8

Answer: B

Solution:



From the reaction it is clear that, $a = 8$ and $y = 6$.

Question7

In which of the following compounds, an element exhibits two different oxidation states?

KCET 2022

Options:

- A. NH_4NO_3
- B. N_2H_4
- C. N_3H
- D. NH_2CONH_2

Answer: A

Solution:

In NH_4NO_3 , N exhibits two different oxidation states. Actually NH_4NO_3 exists as NH_4^+ and NO_3^- . Oxidation state of N in NH_4^+ is -3 and in NO_3^- is $+5$.

Question8

All Cu(II) halides are known, except the iodide, the reason for it is that

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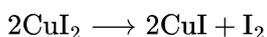
Options:

- A. Cu^{2+} oxidises iodide to iodine
- B. Cu^{2+} has much more negative hydration enthalpy
- C. Cu^{2+} ion has smaller size.
- D. iodide is bulky ion.

Answer: A

Solution:

This Cu (II) iodide immediately decomposes to liberate I_2 and insoluble copper (I) iodide.



Question9

Which of the following is not true for oxidation?



KCET 2021

Options:

- A. Addition of oxygen
- B. Addition of electronegative element
- C. Removal of hydrogen
- D. Removal of electronegative element

Answer: D

Solution:

From the given option only (d) option is not true for oxidation i.e. removal of electronegative element does not take place in case of oxidation.

Question 10

How many moles of acidified $K_2Cr_2O_7$ is required to liberate 6 moles of I_2 from an aqueous solution of I^- ?

KCET 2020

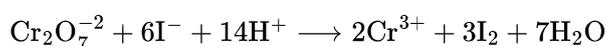
Options:

- A. 2
- B. 1
- C. 0.25
- D. 0.5

Answer: A

Solution:

We know,



Here, 3 moles of I_2 liberation requires one mol of $K_2Cr_2O_7$; for getting 6 moles of I_2 , we will require two moles of $K_2Cr_2O_7$.



Question11

The oxidation number of nitrogen atoms in NH_4NO_3 are

KCET 2020

Options:

A. +5, +5

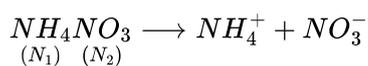
B. -3, +5

C. +3, -5

D. -3, -3

Answer: B

Solution:



For oxidation number of

$$N_1 \rightarrow x + 4 = +1$$

$$x = +1 - 4 = -3$$

So, oxidation state of first nitrogen is -3.

For oxidation state of second nitrogen (N_2) \rightarrow

$$x - 6 = -1$$

$$x = -1 + 6 = +5$$

So, the answer is -3 and +5.

Question12

In which of the following cases a chemical reaction is possible?

KCET 2020

Options:



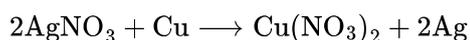
- A. $\text{ZnSO}_4(aq)$ is placed in a copper vessel
- B. AgNO_3 solution is stirred with a copper spoon
- C. Conc. HNO_3 is stored in a platinum vessel
- D. gold ornaments are washed with dil. HCl

Answer: B

Solution:

A chemical reaction is possible when AgNO_3 solution is stirred with copper spoon as copper has lesser positive value of standard electrode reduction potential as compared to Ag.

The reaction will be,



Question13

The number of moles of electron required to reduce 0.2 mole of $\text{Cr}_2\text{O}_7^{2-}$ to Cr^{+3} is

KCET 2019

Options:

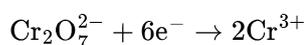
- A. 1.2
- B. 6
- C. 12
- D. 0.6

Answer: A

Solution:

The number of moles of electrons required to reduce 0.2 mole of $\text{Cr}_2\text{O}_7^{2-}$ to Cr^{3+} is explained below.

To find this, consider the reduction equation:



From this equation, we see that 1 mole of $\text{Cr}_2\text{O}_7^{2-}$ requires 6 moles of electrons for the reduction process.

Therefore, for 0.2 mole of $\text{Cr}_2\text{O}_7^{2-}$, the number of moles of electrons required can be calculated as:



$$6 \times 0.2 = 1.2 \text{ moles}$$

Thus, 1.2 moles of electrons are needed to reduce 0.2 mole of $\text{Cr}_2\text{O}_7^{2-}$ to Cr^{3+} .

Question14

Which of the following statement is correct?

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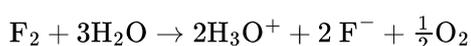
Options:

- A. Cl_2 oxidises H_2O to O_2 but F_2 does not
- B. Cl_2 is a stronger oxidising agent than F_2
- C. F_2 oxidises H_2O to O_2 but Cl_2 does not
- D. Fluoride is a good oxidising agent

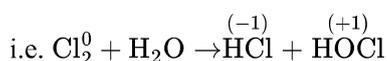
Answer: C

Solution:

Fluorine act as a strong oxidising agent that oxidises water to dioxygen. The reaction is spontaneous and strongly exothermic. Fluorine atoms are itself reduced to fluoride ions.



with chlorine, an alternate disproportionation reaction occur rapidly



Question15

In the reaction of gold with aquaregia, oxidation state of nitrogen changes from

KCET 2019

Options:

- A. +4 to +2



B. +6 to +4

C. +5 to +2

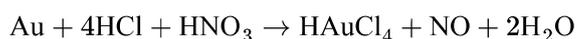
D. +3 to +1

Answer: C

Solution:

Aqua regia is a mixture of concentrated hydrochloric acid (HCl) and concentrated nitric acid (HNO₃). It has the capability to dissolve gold, which is insoluble in both acids alone.

Let's consider the reactions involved. The overall balanced chemical equation for the reaction of gold with aqua regia can be represented as:



In this reaction, gold (Au) achieves a +3 oxidation state in the product HAuCl₄. The nitric acid (HNO₃) acts as an oxidizing agent. To focus on the nitrogen in nitric acid, its oxidation state will change during the reaction.

In nitric acid (HNO₃), nitrogen has an oxidation state of +5. In the product NO (nitric oxide), nitrogen has an oxidation state of +2.

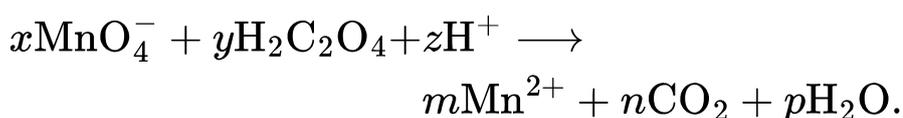
Thus, the oxidation state of nitrogen changes from +5 to +2.

The correct option is:

Option C: +5 to +2

Question 16

For the redox reaction



The values of x , y , m and n are

KCET 2018

Options:

A. 10, 2, 5, 2

B. 2, 5, 2, 10

C. 6, 4, 2, 4

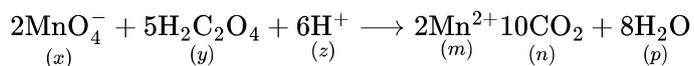
D. 3, 5, 2, 10



Answer: B

Solution:

The possible balance equation is



Hence,

$$x = 2$$

$$y = 5$$

$$m = 2$$

$$n = 10$$

∴ (b) is the correct option.

Question17

KMnO₄ acts as an oxidising agent in alkaline medium. When alkaline KMnO₄ is treated with KI , iodide ion is oxidised to

KCET 2018

Options:

A. I₂

B. IO⁻

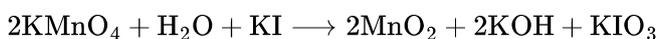
C. IO₃⁻

D. IO₄⁻

Answer: C

Solution:

In an alkaline medium, potassium permanganate (KMnO₄) acts as an oxidizing agent. When it is reacted with potassium iodide (KI), the iodide ions (I⁻) are oxidized. The reaction proceeds as follows:



In this reaction, the iodide ions (I⁻) are oxidized to iodate ions (IO₃⁻).

Question18

Extraction of chlorine from brine solution is based on



KCET 2017

Options:

- A. oxidation
- B. acidification
- C. chlorination
- D. reduction

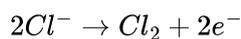
Answer: A

Solution:

The extraction of chlorine from a brine solution is based on the oxidation process. Here's a brief explanation:

In the chlor-alkali process, brine (a concentrated sodium chloride solution) is electrolyzed.

At the positive electrode (anode), chloride ions (Cl^-) lose electrons (i.e., they are oxidized) to form chlorine gas:



This oxidation of chloride ions is the key step in extracting chlorine.

Thus, the correct answer is:

Option A: oxidation.

Question19

$3ClO^-(aq) \longrightarrow ClO^- + 2Cl^-$ is an example of

KCET 2017

Options:

- A. oxidation reaction
- B. reduction reaction
- C. disproportionation reaction
- D. decomposition reaction

Answer: B

Solution:



