1. Which reaction does not represent autoredox or disproportionation :-

(1) $Cl_2 + OH^- \longrightarrow Cl^- + ClO_3^- + H_2O$

(2) $2H_2O_2 \longrightarrow H_2O + O_2$

(3) $2Cu^+ \longrightarrow Cu^{+2} + Cu$

(4) $(NH_4)_2Cr_2O_7 \longrightarrow N_2 + Cr_2O_3 + 4H_2O$

2. Which of the following is not a redox reaction?

(1) $BaO_2 + H_2SO_4 \rightarrow BaSO_4 + H_2O_2$

(2) $2BaO + O_2 \rightarrow 2BaO_2$

(3) $2KClO_3 \rightarrow 2KCl + 3O_2$

(4) $SO_2 + 2H_2S \rightarrow 2H_2O + 3S$

3. H_2O_2 acts as a reducing agent in :

(1) $FeCl_2 + HCl + H_2O_2 \longrightarrow FeCl_3 + H_2O$

(2) $Cl_2 + H_2O_2 \longrightarrow HCl + O_2$

(3) $HI + H_2O_2 \longrightarrow I_2 + H_2O$

(4) $H_2SO_3 + H_2O_2 \longrightarrow H_2SO_4 + H_2O$

4. Match List-I (Compounds) with List-II (Oxidation states of nitrogen) and select answer using the codes given below the lists :-

	List-I	**List-II**
(a)	NaN_3	1. +5
(b)	N_2H_2	2. +2
(c)	NO	3. –1/3
(d)	N_2O_5	4. –1

Code :	(a)	(b)	(c)	(d)
(1)	3	4	2	1
(2)	4	3	2	1
(3)	3	4	1	2
(4)	4	3	1	2

5. In the reaction

$xHI + yHNO_3 \longrightarrow NO + I_2 + H_2O$

(1) x = 3, y = 2 (2) x = 2, y = 3

(3) x = 6, y = 2 (4) x = 6, y = 1

6. The number of electrons to balance the following equation :-

$NO_3^- + 4H^+ + e^- \rightarrow 2H_2O + NO$ is

(1) 5 (2) 4

(3) 3 (4) 2

7. Number of moles of electrons taken up when 1 mole of NO_3^- ions is reduced to 1 mole of NH_2OH is

(1) 2 (2) 4 (3) 5 (4) 6

8. For the redox reaction,

$MnO_4^- + C_2O_4^{2-} + H^+ \rightarrow Mn^{2+} + CO_2 + H_2O$

the correct coefficients of the reactants for the balanced reaction are :

	MnO_4^-	$C_2O_4^{2-}$	H^+
(1)	2	5	16
(2)	16	5	2
(3)	5	16	2
(4)	2	16	5

9. In a redox reaction, the equivalent weight of HNO_2 is found to be 23.5. The reaction products might contain

(1) NO_2 (2) NO

(3) NH_3 (4) HNO_3

10. When $KBrO_3$ ion reacts with Br^- ion in acid solution Br_2 is liberated. The equivalent weight of $KBrO_3$ in this reaction is

(1) M/8 (2) M/3

(3) M/5 (4) M/6

11. In the reaction $CrO_5 + H_2SO_4 \rightarrow Cr_2(SO_4)_3 + H_2O + O_2$ one mole of CrO_5 will liberate how many moles of O_2 :-

(1) 5/2 (2) 5/4

(3) 9/2 (4) 7/2

12. A solution of $KMnO_4$ is reduced to MnO_2. The normality of solution is 0.6. The molarity is:

(1) 1.8M (2) 0.6M

(3) 0.1M (4) 0.2M

13. 0.52 g of a dibasic acid required 100 mL of 0.2 N NaOH for complete neutralization.

The equivalent weight of acid is

(1) 26 (2) 52

(3) 104 (4) 156

14. The number of moles of $KMnO_4$ that will be required to react with 2 mol of ferrous oxalate is

(1) $\frac{6}{5}$ (2) $\frac{2}{5}$ (3) $\frac{4}{5}$ (4) 1

15. The mass of oxalic acid crystals ($H_2C_2O_4 . 2H_2O$) required to prepare 50 mL of a 0.2 N solution is :-

(1) 4.5 g (2) 6.3 g

(3) 0.63 g (4) 0.45 g

16. The minimum quantity of H_2S needed to precipitate 63.5 g of Cu^{2+} will be nearly.

(1) 63.5 g (2) 31.75 g (3) 34 g (4) 2.0 g

17. The volume of 1.5 MH_3PO_4 solution required to neutralize exactly 90 mL of a 0.5 M $Ba(OH)_2$ solution is :-

(1) 10 mL (2) 30 mL (3) 20 mL (4) 60 mL

18. The number of moles of $Cr_2O_7^{2-}$ needed to oxidize 0.136 equivalents of $N_2H_5^+$ by the reaction $N_2H_5^+ + Cr_2O_7^{2-} \rightarrow N_2 + Cr^{3+} + H_2O$ is

(1) 0.136 (2) 0.068 (3) 0.0227 (4) 0.272

19. As_2O_3 is oxidised to H_3AsO_4 by $KMnO_4$ in acidic medium. Volume of 0.02M $KMnO_4$ required for this purpose by 1mmol of As_2O_3 will be

(1) 10 mL (2) 20 mL (3) 40 mL (4) 80 mL

20. 0.3 g of an oxalate salt was dissolved in 100 mL solution. The solution required 90 mL of N/20 $KMnO_4$ for complete oxidation. The % of oxalate ion in salt is :-

(1) 33% (2) 66% (3) 70% (4) 40%

21. Equivalent weight of H_3PO_2 when it disproportionate into PH_3 and H_3PO_3 is :-

(1) M (2) M/2 (3) M/4 (4) 3M/4

22. 4 mole of a mixture of Mohr's salt and $Fe_2(SO_4)_3$ requires 500 mL of 1 M $K_2Cr_2O_7$ for complete oxidation in acidic medium. The mole % of the Mohr's salt in the mixture is :-

(1) 25 (2) 50 (3) 60 (4) 75

23. The oxidation number of sulphur in S_8, S_2F_2, H_2S and H_2SO_4 respectively are :-

(1) 0, + 1, –2 and 6 (2) +2, 0, + 2 and 6

(3) 0, + 1, +2 and 4 (4) –2, 0, + 2 and 6

24. In which of the following the oxidation number of oxygen has been arranged in increasing order :-

(1) $OF_2 < KO_2 < BaO_2 < O_3$

(2) $BaO_2 < KO_2 < O_3 < OF_2$

(3) $BaO_2 < O_3 < OF_2 < KO_2$

(4) $KO_2 < OF_2 < O_3 < BaO_2$

25. Which reaction does not represent auto redox or disproportionation :-

(1) $Cl_2 + OH^- \longrightarrow Cl^- + ClO_3^- + H_2O$

(2) $2Hl_2O_2 \longrightarrow H_2O + O_2$

(3) $2Cu^+ \longrightarrow Cu^{2+} + Cu$

(4) $(NH_4)_2Cr_2O_7 \longrightarrow N_2 + Cr_2O_3 + 4H_2O$

26. Equivalent weight of FeS_2 in the half reaction

$FeS_2 \longrightarrow Fe_2O_3 + SO_2$ is :-

(1) M/10 (2) M/11 (3) M/6 (4) M/1

27. $KMnO_4$ reacts with oxalic acid according to the equation :-

$$2MnO_4^- + 5C_2O_4^{2-} + 16H^+ \longrightarrow 2Mn^{2+} + 10CO_2 + 8H_2O$$

Here, 20 mL of 0.1 M $KMnO_4$ is equivalent to:-

(1) 120 mL of 0.25 $MH_2C_2O_4$

(2) 150 mL of 0.10 $MH_2C_2O_4$

(3) 25 mL of 0.20 $MH_2C_2O_4$

(4) 50 mL of 0.20 $MH_2C_2O_4$

28. $I_2 + OH^- \longrightarrow I^- + IO_3^- + H_2O$ η-factor of I_2 in the above reaction will be :

(1) 10 (2) $\frac{5}{6}$ (3) $\frac{5}{3}$ (4) 1

29. The oxidation state of chromium in the final product formed by the reaction between KI and acidied potassium dichromate solution is :-

(1) +3 (2) +2 (3) +6 (4) +4

30. Equivalents of MnO_4^- and $Cr_2O_7^{2-}$ per mole of the ion in acidic medium are in the ratio of :-

(1) 1 : 1 (2) 1 : 5 (3) 5 : 6 (4) 6 : 1

ANSWER KEY — Exercise-I

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	**4**	**1**	**2**	**1**	**3**	**3**	**4**	**1**	**4**	**3**
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	**4**	**4**	**1**	**1**	**3**	**3**	**3**	**3**	**3**	**2**
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	**4**	**4**	**1**	**2**	**4**	**2**	**3**	**3**	**1**	**3**

PREVIOUS YEARS' QUESTIONS EXERCISE-II

1. The oxidation states of the most electronegative element in the products of the reaction of BaO_2 with dilute H_2SO_4. **[JEE 1991]**
(1) 0 and –1 (2) –1 and –2
(3) –2 and 0 (4) –2 and +2

2. For the redox reaction, **[JEE 1992]**
$MnO_4^- + C_2O_4^{2-} + H^+ \rightarrow Mn^{2+} + CO_2 + H_2O$
the correct coefficients of the reactants for the balanced reaction are :

	MnO_4^-	$C_2O_4^{2-}$	H^+
(1)	2	5	16
(2)	16	5	2
(3)	5	16	2
(4)	2	16	5

3. A 5.0 cm^3 solution of H_2O_2 liberates 0.508 g of iodine from an acidified KI solution. Calculate the strength of H_2O_2 solution in terms of volume strength at STP. **[JEE' 1995]**
(1) 2.48 (2) 3.48 (3) 4.48 (4) 5.48

4. The number of mole of $KMnO_4$ that will need to react completely with one mole ferrous oxalate in acidic solution is : **[JEE 1997]**
(1) 2/5 (2) 3/5 (3) 4/5 (4) 1

5. The equivalent mass of $MnSO_4$ is half its molecular mass when it is converted to : **[JEE 1998]**
(1) Mn_2O_3 (2) MnO_2
(3) MnO_4^- (4) MnO_4^{2-}

6. How many millilitre of 0.5 M H_2SO_4 are needed to dissolve 0.5 g of copper II carbonate ? **[JEE 1999]**
(1) 7.097 (2) 8.097 (3) 10 (4) 12

7. Among the following species in which oxidation state of the element is +6 : **[JEE 2000]**
(1) MnO_4^- (2) $Cr(CN)_6^{3-}$
(3) NiF_6^{2-} (4) CrO_2Cl_2

8. Oxidation number of iron in $Na_2[Fe(CN)_5NO^{\oplus}]$ is: **[JEE 2001]**
(1) +2 (2) +3
(3) +8/3 (4) none of these

9. An aqueous solution of 6.3 g of oxalic acid dihydrate is made upto 250 mL. The volume of 0.1 N NaOH required to completely neutralise 10 mL of this solution is : **[JEE 2001]**
(1) 40 mL (2) 20 mL
(3) 10 mL (4) 4 mL

10. MnO_4^- is good oxidising agent in different medium changing to - **[AIEEE-02]**

$MnO_4^- \longrightarrow Mn^{2+}$
$\longrightarrow MnO_4^{2-}$
$\longrightarrow MnO_2$
$\longrightarrow Mn_2O_3$

Changes in oxidation number respectively are -
(1) 1, 3, 4, 5 (2) 5, 4, 3, 2
(3) 5, 1, 3, 4 (4) 2, 6, 4, 3

11. Oxidation number of Cl in $CaOCl_2$ (bleaching powder is) **[AIEEE-02]**
(1) Zero, since it contains Cl_2
(2) –1, since it contains Cl^-
(3) +1, since it contains ClO^-
(4) +1 and –1 since it contains ClO^- and Cl^-

12. Which of the following is a redox **[AIEEE-02]**
(1) $2NaAg(CN)_2 + Zn \longrightarrow Na_2Zn(CN)_4 + 2Ag$
(2) $BaO_2 + H_2SO_4 \longrightarrow BaSO_4 + H_2O_2$
(3) $N_2O_5 + H_2O \longrightarrow 2HNO_3$
(4) $AgNO_3 + KI \longrightarrow AgI + KNO_3$

13. In the coordination compound, $K_4[Ni(CN)_6]$, the oxidation state of nickel is **[AIEEE-03]**
(1) +1 (2) +2
(3) –1 (4) 0

14. The oxidation state of Cr in $[Cr(NH_3)_4Cl_2]^+$ is - **[AIEEE-05]**
(1) +2 (2) +3 (3) 0 (4) +1

15. The oxidation state of chromium in the final product formed by the reaction between KI and acidified potassium dichromate solution is - **[AIEEE-05]**
(1) +6 (2) +4 (3) +3 (4) +2

16. Reduction of the metal centre in aqueous permanganate ion involves - **[JEE-2011]**
(1) 3 electrons in neutral medium
(2) 5 electrons in neutral medium
(3) 3 electrons in alkaline medium
(4) 5 electrons in acidic medium

17. Which ordering of compounds is according to the decreasing order of the oxidation state of nitrogen- **[JEE- 2012]**
(1) HNO_3, NO, NH_4Cl, N_2
(2) HNO_3, NO, N_2, NH_4Cl
(3) HNO_3, NH_4Cl, NO, N_2
(4) NO, HNO_3, NH_4Cl, N_2

18. 25 mL of household bleach solution was mixed with 30 mL of 0.50 M KI and 10 mL of 4 N acetic acid. In the titration of the liberated iodine, 48 mL of 0.25 N $Na_2S_2O_3$ was used to reach the end point. The molarity of the household bleach solution is **[JEE- 2012]**
(1) 0.48 M (2) 0.96 M
(3) 0.24 M (4) 0.024 M

19. Given :
$X\ Na_2HAsO_3 + Y\ NaBrO_3 + ZHCl \rightarrow NaBr + H_3AsO_4 + NaCl$
The values of X, Y and Z in the above redox reaction are respectively : **[JEE(Main-online)-2013]**
(1) 2, 1, 3 (2) 3, 1, 6
(3) 2, 1, 2 (4) 3, 1, 4

20. Consider the following reaction:

[JEE(Main)-2013]

$$xMnO_4^- + yC_2O_4^{2-} + zH^+ \rightarrow$$

$$xMn^{2+} + 2yCO_2 + \frac{z}{2} H_2O$$

The values of x, y and z in the reaction are respectively :-

(1) 5,2 and 16 (2) 2,5 and 8

(3) 2, 5 and 16 (4) 5,2 and 8

21. How many electrons are involved in the following redox reaction ? **[JEE(Main-online)-2014]**

$Cr_2O_7^{2-} + Fe^{2+} + C_2O_4^{2-} \rightarrow Cr^{3+} + Fe^{3+} + CO_2$ (Unbalanced)

(1) 3 (2) 4

(3) 5 (4) 6

22. Consider the reaction

[JEE(Main-online)-2014]

$$H_2SO_{3(aq)} + Sn^{4+}_{(aq)} + H_2O_{(l)} \rightarrow Sn^{2+}_{(aq)} + HSO^-_{4(aq)} + 3H^+_{(aq)}$$

Which of the following statements is correct?

(1) H_2SO_3 is the reducing agent because it undergoes oxidation

(2) H_2SO_3 is the reducing agent because it undergoes reduction

(3) Sn^{4+} is the reducing agent because it undergoes oxidation

(4) Sn^{4+} is the oxidizing agent because it undergoes oxidation

23. In which of the following reaction H_2O_2 acts as a reducing agent ? **[JEE(Main)-2014]**

(a) $H_2O_2 + 2H^+ + 2e^- \rightarrow 2H_2O$

(b) $H_2O_2 - 2e^- \rightarrow O_2 + 2H^+$

(c) $H_2O_2 + 2e^- \rightarrow 2OH^-$

(d) $H_2O_2 + 2OH^- - 2e^- \rightarrow O_2 + 2H_2O$

(1) (a), (c) (2) (b), (d) (3) (a), (b) (4) (c), (d)

24. The molecular formula of a commercial resin used for exchanging ions in water softening is $C_8H_7SO_3Na$ (Mol. w.t 206). What would be the maximum uptake of Ca^{2+} ions by the resin when expressed in mole per gram resin ? **[JEE(Main)-2015]**

(1) $\frac{2}{309}$ (2) $\frac{1}{412}$ (3) $\frac{1}{103}$ (4) $\frac{1}{206}$

25. The volume of 0.1N dibasic acid sufficient to neutralize 1 g of a base that furnishes 0.04 mole of OH^- in aqueous solution is :

[JEE(Main)-OnLine-2016]

(1) 400 mL (2) 200 mL

(3) 600 mL (4) 800 mL

26. Which of the following reactions is an example of a redox reaction ? **[JEE(Main)-2017]**

(1) $XeF_4 + O_2F_2 \rightarrow XeF_6 + O_2$

(2) $XeF_2 + PF_5 \rightarrow [XeF]^+PF_6^-$

(3) $XeF_6 + H_2O \rightarrow XeOF_4 + 2HF$

(4) $XeF_6 + 2H_2O \rightarrow XeO_2F_2 + 4HF$

27. In which of the following reaction, hydrogen peroxide acts as an oxidizing agent ?

[JEE(Main)-OnLine-2017]

(1) $I_2 + H_2O_2 + 2OH^- \rightarrow 2I^- + 2H_2O + O_2$

(2) $HOCl + H_2O_2 \rightarrow H_3O^+ + Cl^- + O_2$

(3) $PbS + 4H_2O_2 \rightarrow PbSO_4 + 4H_2O$

(4) $2MnO_4^- + 3H_2O_2 \rightarrow 2MnO_2 + 3O_2 + 2H_2O + 2OH^-$

28. The pair of compounds having metal in their highest oxidation state is : **[JEE(Main)-OnLine-2017]**

(1) $[NiCl_4]^{2-}$ and $[CoCl_4]^{2-}$

(2) $[Fe(CN)_6]^{3-}$ and $[Cu(CN)_4]^{2-}$

(3) $[FeCl_4]^-$ and Co_2O_3

(4) MnO_2 and CrO_2Cl_2

29. In KO_2, the nature of oxygen species and the oxidation state of oxygen atom are, respectively

[JEE(Main)-OnLine-2018]

(1) Superoxide and –1/2

(2) Oxide and –2

(3) Peroxide and –1/2

(4) Superoxide and –1

30. To measure the quantity of $MnCl_2$ dissolved in an aqueous solution, it was completely converted to $KMnO_4$ using the reaction, **[JEE- 2018]**

$MnCl_2 + K_2S_2O_8 + H_2O \rightarrow KMnO_4 + H_2SO_4 + HCl$ (equation not balanced).

Few drops of concentrated HCl were added to this solution and gently warmed. Further, oxalic acid (225 g) was added in portions till the colour of the permanganate ion disappeard. The quantity of $MnCl_2$ (in mg) present in the initial solution is _____.

(Atomic weights in g mol^{-1} : Mn = 55, Cl = 35.5)

PREVIOUS YEARS QUESTIONS				ANSWER KEY						Exercise-II
Que.	1	2	3	4	5	6	7	8	9	10
Ans.	**2**	**1**	**3**	**2**	**2**	**2**	**4**	**1**	**1**	**3**
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	**4**	**1**	**2**	**2**	**3**	**1,2,4**	**2**	**3**	**2**	**3**
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	**4**	**1**	**2**	**2**	**1**	**1**	**3**	**2**	**1**	**126**