



## DPP – 5 [Balancing of redox reaction]

### Chapter: Redox Reactions

*“You don’t need motivation for 100 questions. You only need courage to start Question 1.”*

## TYPE–1 : Balancing Half-Reactions & Finding Number of Electrons

- The value of  $n$  in :  $\text{MnO}_4^- + 8\text{H}^+ + n\text{e}^- \rightarrow \text{Mn}^{2+} + 4\text{H}_2\text{O}$  is :**  
(1) 5                      (2) 2                      (3) 3                      (4) 4
- In the reaction :  $\text{MnO}_4^- + x\text{H}^+ + n\text{e}^- \rightarrow \text{Mn}^{2+} + y\text{H}_2\text{O}$ , what is the value of  $n$  :**  
(1) 5                      (2) 8                      (3) 6                      (4) 3
- The number of electrons required to balance the following equation :  $\text{NO}_3^- + 4\text{H}^+ \rightarrow 2\text{H}_2\text{O} + \text{NO}$**   
(1) 2 on right side              (2) 3 on left side              (3) 3 on right side              (4) 3 on left side
- The number of electrons required to balance the following equation :  $\text{NO}_3^- + 4\text{H}^+ + \text{e}^- \rightarrow 2\text{H}_2\text{O} + \text{NO}$  is**  
(1) 5                      (2) 3                      (3) 2                      (4) 4
- In the following reaction, the value of  $X$  is :  $\text{H}_2\text{O} + \text{SO}_3^{2-} \rightarrow \text{SO}_4^{2-} + 2\text{H}^+ + X$**   
(1)  $4\text{e}^-$                       (2)  $2\text{e}^-$                       (3)  $3\text{e}^-$                       (4)  $1\text{e}^-$
- What is the value of  $n$  in the following equation :  $\text{Cr}(\text{OH})_4^- + \text{OH}^- \rightarrow \text{CrO}_4^{2-} + \text{H}_2\text{O} + n\text{e}^-$  ?**  
(1) 3                      (2) 5                      (3) 2                      (4) 4
- In the reaction  $\text{CH}_3\text{OH} \rightarrow \text{HCOOH}$ , the number of electrons that must be added to the right side is :**  
(1) 4                      (2) 3                      (3) 2                      (4) 1
- The number of electrons lost or gained during the change  $3\text{Fe} + 4\text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + 4\text{H}_2$  is**  
(1) 2                      (2) 4                      (3) 6                      (4) 8  
[NCERT Pg. 268]
- Balance the following given half reaction for the unbalanced whole reaction :  $\text{CrO}_4^{2-} \rightarrow \text{CrO}_2^- + \text{OH}^-$  is :**  
(1)  $\text{CrO}_4^{2-} + 2\text{H}_2\text{O} + 3\text{e}^- \rightarrow \text{CrO}_2^- + 4\text{OH}^-$   
(2)  $2\text{CrO}_4^{2-} + 8\text{H}_2\text{O} \rightarrow \text{CrO}_2 + 4\text{H}_2\text{O} + 8\text{OH}^-$   
(3)  $\text{CrO}_4^{2-} + \text{H}_2\text{O} \rightarrow \text{CrO}_2^- + \text{H}_2\text{O} + \text{OH}^-$   
(4)  $3\text{CrO}_4^{2-} + 4\text{H}_2\text{O} + 6\text{e}^- \rightarrow 2\text{CrO}_2^- + 8\text{OH}^-$
- Choose the set of coefficients that correctly balances the following equation :  $x\text{Cr}_2\text{O}_7^{2-} + y\text{H}^+ + z\text{e}^- \rightarrow a\text{Cr}^{3+} + b\text{H}_2\text{O}$**

	$x$	$y$	$z$	$a$	$b$
(1)	2	14	6	2	7
(2)	1	14	6	2	7
(3)	2	7	6	2	7
(4)	2	7	6	1	7

## TYPE-2 : Balancing Complete Redox Equations (Find Coefficients)

11. In the balanced equation  $[\text{Zn} + \text{H}^+ + \text{NO}_3^- \rightarrow \text{NH}_4^+ + \text{Zn}^{2+} + \text{H}_2\text{O}]$ , coefficient of  $\text{NH}_4^+$  is :
- (1) 4                      (2) 3                      (3) 2                      (4) 1
12. In the balanced equation  $\text{MnO}_4^- + \text{H}^+ + \text{C}_2\text{O}_4^{2-} \rightarrow \text{Mn}^{2+} + \text{CO}_2 + \text{H}_2\text{O}$ , the moles of  $\text{CO}_2$  formed are :
- (1) 2                      (2) 4                      (3) 10                      (4) 3
13. In oxidation-reduction reaction  $\text{MnO}_4^- + \text{C}_2\text{O}_4^{2-} + \text{H}^+ \rightarrow \text{Mn}^{2+} + \text{CO}_2 + \text{H}_2\text{O}$ , the balanced equation coefficients for  $\text{MnO}_4^-$ ,  $\text{C}_2\text{O}_4^{2-}$ ,  $\text{H}^+$  are :-
- (1) 2, 5, 16              (2) 16, 5, 2              (3) 2, 16, 5              (4) 5, 2, 16
14. For the reaction  $\text{MnO}_4^- + \text{C}_2\text{O}_4^{2-} + \text{H}^+ \rightarrow \text{Mn}^{2+} + \text{CO}_2 + \text{H}_2\text{O}$ , the correct coefficients of the reactants for the balanced equation are
- (1) 16, 5, 2              (2) 2, 5, 16              (3) 2, 16, 5              (4) 5, 16, 2
15. For the redox reaction  $\text{Zn} + \text{NO}_3^- \rightarrow \text{Zn}^{2+} + \text{NH}_4^+$  in basic medium, coefficients of  $\text{Zn}$ ,  $\text{NO}_3^-$  and  $\text{OH}^-$  in the balanced equation respectively are :
- (1) 4, 1, 7              (2) 2, 7, 4, 1              (3) 4, 1, 10              (4) 1, 4, 10

16. Consider the given reaction [NCERT Pg. 276]



The balanced equation for the given reaction is

- (1)  $4\text{Zn} + \text{NO}_3^- + \text{H}_2\text{O} \rightarrow 4\text{Zn}^{2+} + \text{NH}_4^+ + 10\text{OH}^-$   
 (2)  $4\text{Zn} + \text{NO}_3^- + 10\text{H}^+ \rightarrow 4\text{Zn}^{2+} + \text{NH}_4^+ + 3\text{H}_2\text{O}$   
 (3)  $4\text{Zn} + \text{NO}_3^- + 7\text{H}_2\text{O} \rightarrow 4\text{Zn}^{2+} + \text{NH}_4^+ + 10\text{OH}^-$   
 (4)  $\text{Zn} + \text{NO}_3^- + \text{H}_2\text{O} \rightarrow \text{Zn}^{2+} + \text{NH}_4^+$
17. Consider the given reaction as balanced equation in acidic medium :  $a\text{Cr}(\text{OH})_3 + b\text{IO}_3^- + c\text{OH}^- \rightarrow d\text{I}^- + a\text{CrO}_4^{2-} + e\text{H}_2\text{O}$   
 The ratio of  $b$  to  $a$  is
- (1) 2 : 1                      (2) 1 : 2                      (3) 5 : 2                      (4) 2 : 5

## TYPE-3 : N-Factor, Equivalent Weight & Oxidation State Change

18. n-factor of  $\text{HCl}$  in the given reaction is :  $\text{K}_2\text{Cr}_2\text{O}_7 + \text{HCl} \rightarrow \text{KCl} + \text{CrCl}_3 + \text{Cl}_2 + \text{H}_2\text{O}$
- (1)  $\frac{7}{3}$                       (2)  $\frac{3}{7}$                       (3) 1                      (4) 6

19. In alkaline solution  $\text{KMnO}_4$  reacts as follows :  $2\text{KMnO}_4 + 2\text{KOH} \longrightarrow 2\text{K}_2\text{MnO}_4 + \text{H}_2\text{O} + \text{O}$   
Therefore, its equivalent weight will be –  
(1) 31.6                      (2) 52.7                      (3) 79.0                      (4) 158.0
20. When  $\text{SO}_2$  is passed in acidified potassium dichromate solution, the oxidation state of S is changed from  
(1) +4 to zero              (2) +4 to +2              (3) +4 to +6              (4) +6 to +4

## TYPE-4 : Mole Ratio & Stoichiometry Using Redox Equivalence

21. In the reaction  $2\text{KMnO}_4 + 5\text{H}_2\text{S} + 6\text{H}^+ \longrightarrow 2\text{Mn}^{2+} + 2\text{K}^+ + 5\text{S} + 8\text{H}_2\text{O}$ , how many electrons would be involved in the oxidation of 1 mole of reductant?  
(1) Two                      (2) Five                      (3) Ten                      (4) One
22. The number of moles of  $\text{KMnO}_4$  that will be needed to react with one mole of sulphite ion in acidic solution is : [AIPMT-2007]  
(1) 1                      (2)  $\frac{3}{5}$                       (3)  $\frac{4}{5}$                       (4)  $\frac{2}{5}$
23. How many moles of  $\text{KMnO}_4$  are reacted with one mole of ferrous oxalate in acidic medium? [NCERT Pg. 274]  
(1)  $\frac{1}{5}$                       (2)  $\frac{5}{3}$                       (3)  $\frac{3}{5}$                       (4)  $\frac{2}{5}$
24. Number of moles of  $\text{MnO}_4^-$  required to oxidize one mole of ferrous oxalate completely in acidic medium will be:  
(1) 7.5 moles              (2) 0.2 moles              (3) 0.6 moles              (4) 0.4 moles
25. How many moles of  $\text{FeSO}_4$  reacted with one mole of  $\text{KMnO}_4$  in acidic medium?  
(1)  $\frac{2}{5}$                       (2) 5                      (3)  $\frac{1}{5}$                       (4)  $\frac{1}{2}$
26. Assuming complete ionization, same moles of which of the following compounds will require the least amount of acidified  $\text{KMnO}_4$  for complete oxidation?  
(1)  $\text{FeC}_2\text{O}_4$               (2)  $\text{Fe}(\text{NO}_3)_2$               (3)  $\text{FeSO}_4$               (4)  $\text{FeSO}_3$
27. 2 g  $\text{FeSO}_4$  is completely oxidised by acidic 0.05 M  $\text{KMnO}_4$  solution. What will be the volume of  $\text{KMnO}_4$  required? (Fe = 56, S = 32, O = 16)  
(1) 0.10 L                      (2) 0.05 L                      (3) 0.30 L                      (4) 0.40 L