

Redox Reactions — NEET Chemistry PYQ (2005-2021)

Class 11 Chemistry · 12 real NEET & AIPMT questions, year-tagged · answers checked by RankUp

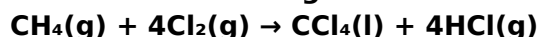
NEET 2021

1. Which of the following reactions is the metal displacement reaction ? Choose the right option.

- (A) $2\text{KClO}_3 \xrightarrow{\Delta} 2\text{KCl} + 3\text{O}_2$
- (B) $\text{Cr}_2\text{O}_3 + 2\text{Al} \xrightarrow{\Delta} \text{Al}_2\text{O}_3 + 2\text{Cr}$
- (C) $\text{Fe} + 2\text{HCl} \rightarrow \text{FeCl}_2 + \text{H}_2 \uparrow$
- (D) $2\text{Pb}(\text{NO}_3)_2 \rightarrow 2\text{PbO} + 4\text{NO}_2 + \text{O}_2 \uparrow$

NEET 2020 · Q125

2. What is the change in oxidation number of carbon in the following reaction ?



- (A) +4 to +4
- (B) 0 to +4
- (C) -4 to +4
- (D) 0 to -4

NEET 2018 · Q46

3. The correct order of N-compounds in its decreasing order of oxidation states is

- (A) HNO_3 , NH_4Cl , NO , N_2
- (B) HNO_3 , NO , NH_4Cl , N_2
- (C) HNO_3 , NO , N_2 , NH_4Cl
- (D) NH_4Cl , N_2 , NO , HNO_3

NEET 2018 · Q82

4. For the redox 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 (MnO_4^- , $\text{C}_2\text{O}_4^{2-}$, H^+)

- (A) 2, 16, 5
- (B) 2, 5, 16
- (C) 16, 5, 2
- (D) 5, 16, 2

AIPMT 2015

5. Which of the following processes does not involve oxidation of iron?

- (A) Liberation of H_2 from steam by iron at high temperature
- (B) Rusting of iron sheets
- (C) Decolourization of blue CuSO_4 solution by iron
- (D) Formation of $\text{Fe}(\text{CO})_5$ from Fe

AIPMT 2014

6. The pair of compounds that can exist together is:

- (A) HgCl_2 , SnCl_2
- (B) FeCl_2 , SnCl_2
- (C) FeCl_3 , KI
- (D) FeCl_3 , SnCl_2

AIPMT 2012 Prelims

7. In which of the following compounds, nitrogen exhibits highest oxidation state?

- (A) NH_2OH
- (B) N_2H_4
- (C) NH_3
- (D) N_3H

8. Oxidation states of P in $\text{H}_4\text{P}_2\text{O}_5$, $\text{H}_4\text{P}_2\text{O}_6$, $\text{H}_4\text{P}_2\text{O}_7$, are respectively

- (A) +3, +4, +5
- (B) +3, +5, +4
- (C) +5, +3, +4
- (D) +5, +4, +3

9. Oxidation numbers of P in PO_4^{3-} , of S in SO_4^{2-} and that of Cr in $\text{Cr}_2\text{O}_7^{2-}$, are respectively :

- (A) +3, +6 and +5
- (B) +5, +3 and +6
- (C) -3, +6 and +6
- (D) +5, +6 and +6

10. Number of moles of MnO_4^- required to oxidize one mole of ferrous oxalate completely in acidic medium will be

- (A) 0.2 moles
- (B) 0.6 moles
- (C) 0.4 moles
- (D) 7.5 moles

11. The number of moles of KMnO_4 that will be needed to react with one mole of sulphite ion in acidic solution is

- (A) 4/5
- (B) 2/5
- (C) 1
- (D) 3/5

12. The number of moles of KMnO_4 reduced by one mole of KI in alkaline medium is :

- (A) one fifth
- (B) five
- (C) one
- (D) two

Answer key and explanations

1. Answer: (B) $\text{Cr}_2\text{O}_3 + 2\text{Al} \xrightarrow{\Delta} \text{Al}_2\text{O}_3 + 2\text{Cr}$

In $\text{Cr}_2\text{O}_3 + 2\text{Al} \rightarrow \text{Al}_2\text{O}_3 + 2\text{Cr}$, aluminium displaces chromium metal from its oxide, a metal displacement reaction. $\text{Fe} + 2\text{HCl}$ displaces hydrogen, not a metal, and the other two are decomposition reactions.

2. Answer: (C) -4 to +4

In CH_4 , carbon is bonded to four less electronegative H atoms, so $x + 4(+1) = 0$ gives -4; in CCl_4 , $x + 4(-1) = 0$ gives +4. Carbon is oxidised from -4 to +4.

3. Answer: (C) HNO_3 , NO, N_2 , NH_4Cl

Oxidation states of N: HNO_3 +5, NO +2, N_2 0, NH_4Cl -3. So the decreasing order is $\text{HNO}_3 > \text{NO} > \text{N}_2 > \text{NH}_4\text{Cl}$; the reverse sequence is increasing order.

4. Answer: (B) 2, 5, 16

Mn goes from +7 to +2 (gain $5e^-$) and each $\text{C}_2\text{O}_4^{2-}$ loses $2e^-$. Equalising electrons: $2\text{MnO}_4^- + 5\text{C}_2\text{O}_4^{2-}$; balancing O and H gives $2\text{MnO}_4^- + 5\text{C}_2\text{O}_4^{2-} + 16\text{H}^+ \rightarrow 2\text{Mn}^{2+} + 10\text{CO}_2 + 8\text{H}_2\text{O}$.

5. Answer: (D) Formation of $\text{Fe}(\text{CO})_5$ from Fe

In $\text{Fe}(\text{CO})_5$ iron is in the zero oxidation state, as in the free metal, so no oxidation occurs. Iron is oxidised in rusting, in liberating H_2 from steam (to Fe_3O_4) and in displacing Cu from CuSO_4 (to Fe^{2+}).

6. Answer: (B) FeCl_2 , SnCl_2

FeCl_2 and SnCl_2 are both reducing agents, so they do not react with each other. SnCl_2 reduces HgCl_2 and FeCl_3 , and FeCl_3 oxidises I^- to I_2 , so those pairs cannot coexist.

7. Answer: (D) N_3H

Oxidation states of N: NH_2OH -1 , N_2H_4 -2 , NH_3 -3 , and in N_3H (hydrazoic acid) $3x + 1 = 0$, so $x = -1/3$. The highest (least negative) is $-1/3$ in N_3H . NH_2OH at -1 is the nearest trap.

8. Answer: (A) $+3$, $+4$, $+5$

With $\text{H} = +1$ and $\text{O} = -2$: $\text{H}_4\text{P}_2\text{O}_5$: $4 + 2x - 10 = 0$, $x = +3$; $\text{H}_4\text{P}_2\text{O}_6$: $x = +4$; $\text{H}_4\text{P}_2\text{O}_7$: $x = +5$. So $+3$, $+4$, $+5$.

9. Answer: (D) $+5$, $+6$ and $+6$

PO_4^{3-} : $x - 8 = -3$, $x = +5$. SO_4^{2-} : $x - 8 = -2$, $x = +6$. $\text{Cr}_2\text{O}_7^{2-}$: $2x - 14 = -2$, $x = +6$. So $+5$, $+6$ and $+6$.

10. Answer: (B) 0.6 moles

In FeC_2O_4 both parts are oxidised: $\text{Fe}^{2+} \rightarrow \text{Fe}^{3+}$ (1 e^-) and $\text{C}_2\text{O}_4^{2-} \rightarrow 2\text{CO}_2$ (2 e^-), so 3 electrons per mole. Each $\text{MnO}_4^- \rightarrow \text{Mn}^{2+}$ takes 5 electrons, so $3/5 = 0.6$ mol MnO_4^- is needed. 0.4 mol counts only the oxalate electrons.

11. Answer: (B) $2/5$

$\text{SO}_3^{2-} \rightarrow \text{SO}_4^{2-}$ loses 2 electrons, while $\text{MnO}_4^- \rightarrow \text{Mn}^{2+}$ gains 5 in acidic medium. So 1 mol sulphite needs $2/5$ mol KMnO_4 . $4/5$ counts the sulphite change twice.

12. Answer: (D) two

In alkaline medium $\text{MnO}_4^- \rightarrow \text{MnO}_2$ (gain 3e^-) and $\text{I}^- \rightarrow \text{IO}_3^-$ (loss 6e^-): $2\text{MnO}_4^- + \text{I}^- + \text{H}_2\text{O} \rightarrow 2\text{MnO}_2 + \text{IO}_3^- + 2\text{OH}^-$. So one mole KI reduces two moles KMnO_4 . 'One fifth' wrongly assumes MnO_4^- goes to Mn^{2+} (5 electrons) with I^- giving only 1 electron.

Questions as set in the AIPMT/NEET papers conducted by CBSE and NTA. Answers checked and explanations written by the RankUp team. RankUp is not affiliated with CBSE or NTA.