

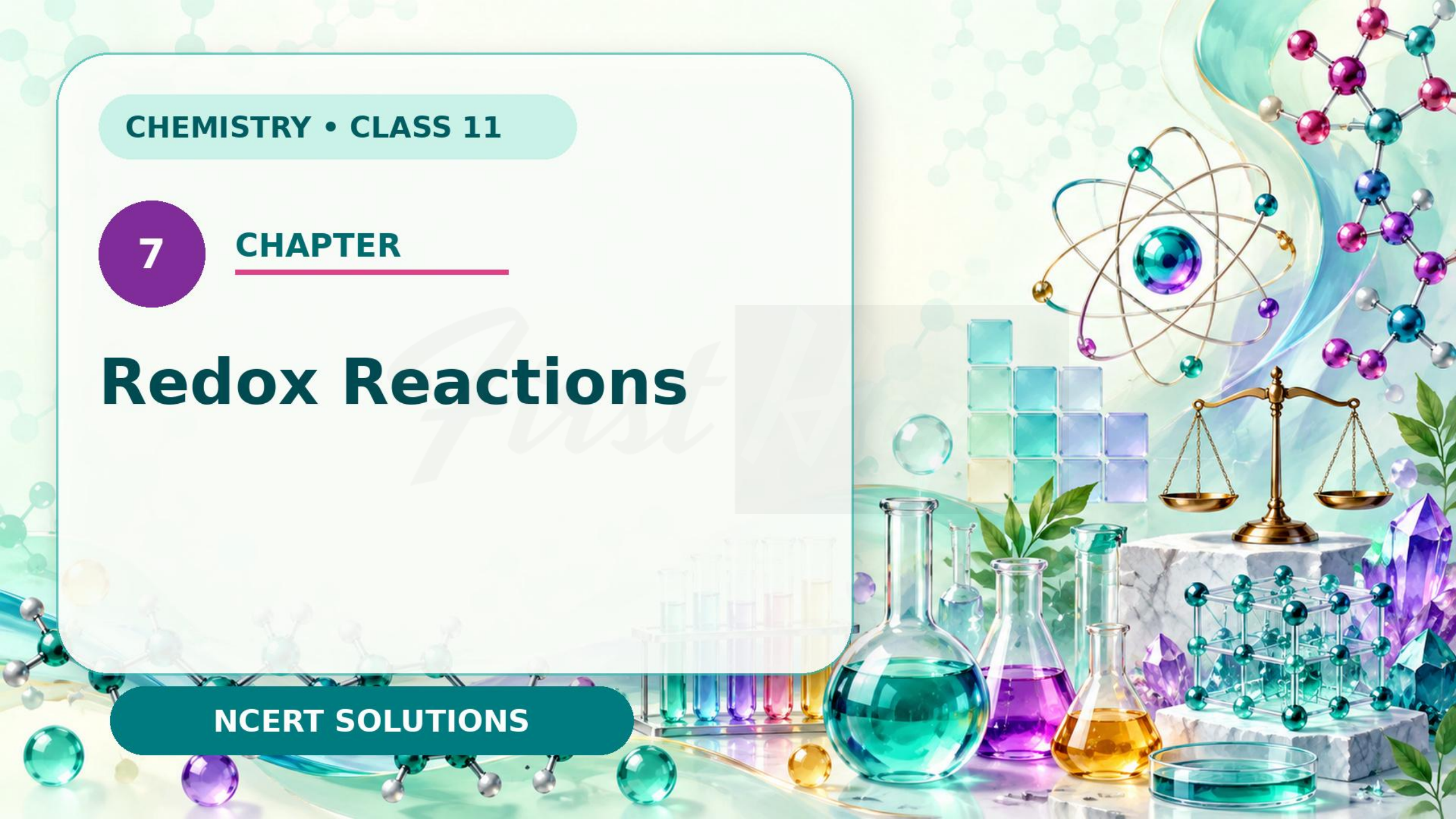
CHEMISTRY • CLASS 11

7

CHAPTER

Redox Reactions

NCERT SOLUTIONS



EXERCISE SOLUTIONS: 7.1a-d

7.1 (a-d) Assign the oxidation number of the indicated element.

Let the required oxidation number be x . The sum of oxidation numbers equals the total charge.

(a) Phosphorus in NaH_2PO_4

Answer: Let the oxidation number of P be x .
The sum of oxidation numbers equals the total charge.

$$+1 + 2(+1) + x + 4(-2) = 0$$

$$x = +5$$

(c) Phosphorus in $\text{H}_4\text{P}_2\text{O}_7$

Answer: Let the oxidation number of P be x .
The sum of oxidation numbers equals the total charge.

$$4(+1) + 2x + 7(-2) = 0$$

$$2x = 10; \quad x = +5$$

(b) Sulphur in NaHSO_4

Answer: Let the oxidation number of S be x .
The sum of oxidation numbers equals the total charge.

$$+1 + 1 + x + 4(-2) = 0$$

$$x = +6$$

(d) Manganese in K_2MnO_4

Answer: Let the oxidation number of Mn be x .
The sum of oxidation numbers equals the total charge.

$$2(+1) + x + 4(-2) = 0$$

$$x = +6$$

EXERCISE SOLUTIONS: 7.1e-h

7.1 (e-h) Assign the oxidation number of the indicated element.

(e) Oxygen in CaO_2

Answer:

$$\text{Ca} = +2$$

$$+2 + 2x = 0$$

$$\text{O} = -1$$

Calcium peroxide contains peroxide oxygen, not oxide oxygen.

(f) Boron in NaBH_4

Answer:

$$\text{Na} = +1; \text{H} = -1$$

$$+1 + x + 4(-1) = 0$$

$$\text{B} = +3$$

Hydrogen is hydridic in the borohydride ion.

(g) Sulphur in $\text{H}_2\text{S}_2\text{O}_7$

Answer:

$$2(+1) + 2x + 7(-2) = 0$$

$$\text{S} = +6$$

(h) Sulphur in $\text{KAl}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$

Answer:

$$\text{For } \text{SO}_4^{2-}: x + 4(-2) = -2$$

$$\text{S} = +6$$

Water of crystallisation is neutral and does not change the sulphate calculation.

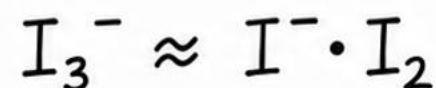
EXERCISE SOLUTIONS: 7.2a-c

7.2 (a-c) Find and explain the oxidation numbers in KI_3 , $\text{H}_2\text{S}_4\text{O}_6$ and Fe_3O_4 .

(a) KI_3

Answer: KI_3 : $+1 + 3x = 0$; average $\text{I} = -\frac{1}{3}$

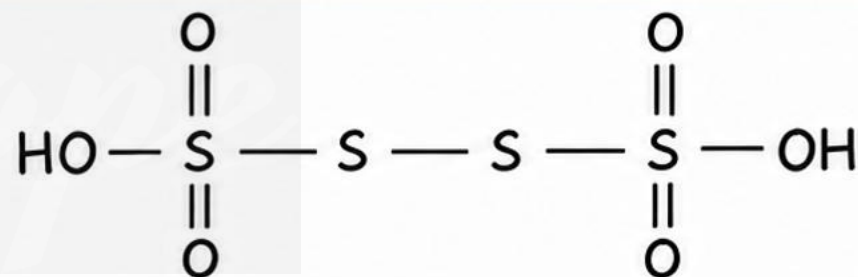
Triiodide can be described formally as iodide associated with iodine. The fraction is an average; it is not a literal fractional charge on each atom.



(b) $\text{H}_2\text{S}_4\text{O}_6$

Answer: $\text{H}_2\text{S}_4\text{O}_6$: $2 + 4x - 12 = 0$; average $\text{S} = +2.5$

The four sulphur atoms are not equivalent.



S (left to right): +5, 0, 0, +5

(c) Fe_3O_4

Answer: Fe_3O_4 : $3x - 8 = 0$; average $\text{Fe} = +\frac{8}{3}$



It contains one iron(II) and two iron(III) ions per formula unit.

$$(2 + 3 + 3)/3 = 8/3$$

EXERCISE SOLUTIONS: 7.2d-e

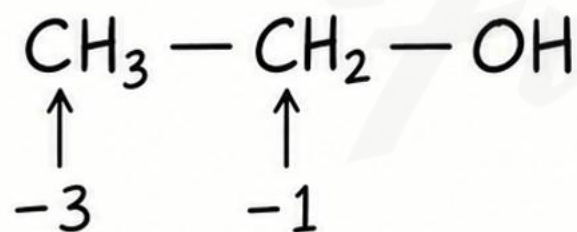
7.2 (d-e) Find and explain the carbon oxidation numbers in ethanol and ethanoic acid.

(d) $\text{CH}_3\text{CH}_2\text{OH}$

Answer:

$$\text{Average: } 2x + 6(+1) - 2 = 0$$

$$\text{Average C} = -2$$



Methyl C: three C-H bonds $\rightarrow -3$

CH_2OH carbon: $-2 + 1 = -1$

$$\text{Average} = \frac{-3 - 1}{2} = -2$$

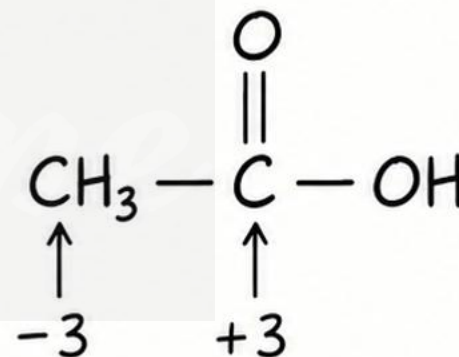
Each C-H bond contributes minus one to carbon; each C-O bond contributes plus one per bond order. A C-C bond contributes zero. Different carbon sites can have different values.

(e) CH_3COOH

Answer:

$$\text{Average: } 2x + 4(+1) + 2(-2) = 0$$

$$\text{Average C} = 0$$



Methyl C = -3

Carboxyl C: $+2 + 1 = +3$

$$\text{Average} = \frac{-3 + 3}{2} = 0$$

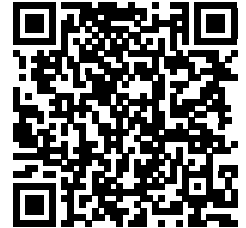


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