

CLASS 10

SCIENCE

FORMULAS HANDBOOK

Class 10 Science Formulas Handbook (Chapter-wise)

Every key reaction, rule and result from the Class 10 Science NCERT syllabus, organised by chapter, in one place. Covering all 13 chapters of the current 2026-27 NCERT Class 10 Science textbook, each cross-linked to our full Chapter-wise Solutions.

Contents

Class 10 Science Key Reactions & Formulas Handbook

Every key reaction, rule and result from the Class 10 Science NCERT syllabus, organised by chapter, in one place. Covering all 13 chapters of the current 2026-27 NCERT Class 10 Science textbook, each cross-linked to our full [Chapter-wise Solutions](#).

Class 10 Science Key Reactions & Formulas Handbook

Chapter 1: Chemical Reactions and Equations

Balancing rule: number of atoms of each element must be equal on both sides of the equation (law of conservation of mass)

Combination reaction: $A + B \rightarrow AB$ (e.g. $\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca(OH)}_2$)

Decomposition reaction: $AB \rightarrow A + B$, may need heat (thermal), light (photolytic) or electricity (electrolytic) — e.g. $2\text{FeSO}_4 \rightarrow \text{Fe}_2\text{O}_3 + \text{SO}_2 + \text{SO}_3$ (thermal)

Displacement reaction: $A + BC \rightarrow AC + B$ (a more reactive element displaces a less reactive one, e.g. $\text{Fe} + \text{CuSO}_4 \rightarrow \text{FeSO}_4 + \text{Cu}$)

Double displacement reaction: $AB + CD \rightarrow AD + CB$, often forms a precipitate (e.g. $\text{Na}_2\text{SO}_4 + \text{BaCl}_2 \rightarrow \text{BaSO}_4\downarrow + 2\text{NaCl}$)

Oxidation: gain of oxygen / loss of hydrogen; **Reduction:** loss of oxygen / gain of hydrogen (both happen together in a redox reaction)

Corrosion: slow attack of metal surface by air/moisture/chemicals (e.g. rusting of iron); **Rancidity:** oxidation of fats/oils in food causing bad smell/taste

Chapter 2: Acids, Bases and Salts

Acid + Metal $\rightarrow$ Salt + $\text{H}_2 \uparrow$ (e.g. $\text{Zn} + \text{H}_2\text{SO}_4 \rightarrow \text{ZnSO}_4 + \text{H}_2$)

Metal carbonate/bicarbonate + Acid $\rightarrow$ Salt + $\text{CO}_2 \uparrow$ + H_2O

Acid + Base $\rightarrow$ Salt + Water (neutralisation); ionic form: $\text{H}^+ + \text{OH}^- \rightarrow \text{H}_2\text{O}$

Metallic oxide + Acid $\rightarrow$ Salt + Water | Non-metallic oxide + Base $\rightarrow$ Salt + Water

pH scale: 0–14; <7 acidic, =7 neutral, >7 basic

Chlor-alkali process (making NaOH): $2\text{NaCl} + 2\text{H}_2\text{O} \rightarrow (\text{electrolysis}) \rightarrow 2\text{NaOH} + \text{Cl}_2 \uparrow + \text{H}_2 \uparrow$

Bleaching powder: $\text{Ca(OH)}_2 + \text{Cl}_2 \rightarrow \text{CaOCl}_2 + \text{H}_2\text{O}$

Plaster of Paris: $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ (gypsum) heated at $\sim 373\text{K} \rightarrow \text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O} + 1\frac{1}{2}\text{H}_2\text{O}$

Common salt formulas: washing soda $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$, baking soda NaHCO_3 , blue vitriol $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$

More chapters (Metals and Non-metals, Carbon and its Compounds, and beyond) will be appended here as their Solutions are published.

Chapter 3: Metals and Non-metals

Reactivity series (high to low): $K > Na > Ca > Mg > Al > Zn > Fe > Pb > H > Cu > Ag > Au$

Metal + $O_2 \rightarrow$ basic oxide (amphoteric: Al_2O_3 , ZnO) | **Non-metal + $O_2 \rightarrow$ acidic oxide**

Displacement: more reactive metal + salt of less reactive metal $\rightarrow$ new salt + less reactive metal

Metal + dilute acid $\rightarrow$ Salt + $H_2 \uparrow$ (only above H in reactivity series)

Extraction (reactive metals): concentration $\rightarrow$ oxide (calcination/roasting) $\rightarrow$ reduction $\rightarrow$ electrolytic refining

Aqua regia: 3:1 conc. HCl : conc. HNO_3 — dissolves gold, platinum

See full [Chapter 3 Solutions](#)

Chapter 4: Carbon and its Compounds

Saturated (alkanes): C_nH_{2n+2} | **Unsaturated (alkenes):** C_nH_{2n} | **(alkynes):** C_nH_{2n-2}

Test for unsaturation: bromine water decolourised = unsaturated

Oxidation: alcohol $\rightarrow$ carboxylic acid (alkaline $KMnO_4$)

See full [Chapter 4 Solutions](#)

Chapter 5: Periodic Classification of Elements

Döbereiner's Triads / Newlands' Octaves: early (limited) attempts at classification by atomic mass

Mendeleev's law: properties are a periodic function of atomic mass; Modern law: periodic function of **atomic number**

Modern Periodic Table: 18 groups, 7 periods; group = valence electrons, period = number of shells

Trend across a period: atomic size $\downarrow$, metallic character $\downarrow$, valence electrons $\uparrow$

Trend down a group: atomic size $\uparrow$, metallic character $\uparrow$ (metals), reactivity of non-metals $\downarrow$

Not part of the current CBSE board syllabus (removed 2023-24), but see full [Chapter 5 Solutions](#)

Chapter 6: Life Processes

Photosynthesis: $6\text{CO}_2 + 12\text{H}_2\text{O} \rightarrow (\text{sunlight, chlorophyll}) \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 + 6\text{H}_2\text{O}$

Aerobic respiration: $\text{glucose} + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O} + \text{energy (much more ATP)}$

Anaerobic respiration: yeast: $\text{glucose} \rightarrow \text{ethanol} + \text{CO}_2 + \text{energy}$ | muscle: $\text{glucose} \rightarrow \text{lactic acid} + \text{energy}$

Double circulation: deoxygenated blood: $\text{body} \rightarrow \text{right atrium} \rightarrow \text{right ventricle} \rightarrow \text{lungs (pulmonary)}$ | oxygenated blood: $\text{lungs} \rightarrow \text{left atrium} \rightarrow \text{left ventricle} \rightarrow \text{body (systemic)}$

Basic functional units: alveoli (lungs, gas exchange) | nephron (kidney, filtration)

Xylem: water/minerals, upward, dead cells, passive | **Phloem:** food, bidirectional, living cells, active (ATP)

See full [Chapter 5 Solutions](#)

Chapter 7: Control and Coordination

Reflex arc: $\text{receptor} \rightarrow \text{sensory neuron} \rightarrow \text{relay neuron (spinal cord)} \rightarrow \text{motor neuron} \rightarrow \text{effector}$

Neuron: $\text{dendrite (receive)} \rightarrow \text{cell body} \rightarrow \text{axon (transmit)} \rightarrow \text{synapse (chemical gap)}$

Brain regions: cerebrum (thinking/voluntary), cerebellum (balance/precision), medulla (involuntary — heartbeat, breathing)

Plant hormones: auxin (growth/phototropism), gibberellin (stem growth), cytokinin (cell division), abscisic acid (inhibitor/stress), ethylene (ripening)

Tropisms (directional, growth-based): phototropism, geotropism, hydrotropism, chemotropism | **Nastic movements** (non-directional): e.g. touch-me-not (turgor-based, no growth)

See full [Chapter 6 Solutions](#)

Chapter 8: How do Organisms Reproduce?

Asexual: fission, budding, fragmentation, regeneration, spore formation, vegetative propagation.

Sexual: two parents, gametes, fertilisation, produces genetic variation.

Male system: $\text{testis} \rightarrow \text{vas deferens} \rightarrow \text{seminal vesicle/prostate} \rightarrow \text{urethra}$.

Female system: $\text{ovary} \rightarrow \text{fallopian tube} \rightarrow \text{uterus} \rightarrow \text{vagina}$.

Contraception: barrier, hormonal, IUD, surgical — see full [revision notes](#).

Chapter 9: Heredity and Evolution

Monohybrid F2 ratio: 3:1 (phenotypic), 1:2:1 (genotypic)

Dihybrid F2 ratio: 9:3:3:1

Sex determination: XX = female, XY = male; fathers sperm determines sex

Only germ-cell (egg/sperm) DNA changes are heritable; somatic/acquired traits are not

Chapter 10: Light: Reflection and Refraction

$f = R/2$ (spherical mirrors)

Mirror formula: $1/v + 1/u = 1/f$; magnification $m = -v/u$

Lens formula: $1/v - 1/u = 1/f$; magnification $m = v/u$

Power of lens: $P = 1/f$ (f in metres), unit dioptre (D); combined power in contact = sum of individual powers

Refractive index $n = c/v$

Chapter 11: The Human Eye and the Colourful World

Power of lens, $P = 1/f$ (f in metres, unit dioptre D)

Lens formula: $1/f = 1/v - 1/u$

Concave lens (myopia correction) → negative power/focal length

Convex lens (hypermetropia correction) → positive power/focal length

Normal near point ≈ 25 cm; normal far point = infinity

[Full Chapter 10 Solutions →](#)

Chapter 12: Electricity

Ohm's Law: $V = IR$

Resistance: $R = \rho L/A$

Series: $R_s = R_1 + R_2 + R_3 + \dots$

Parallel: $1/R_p = 1/R_1 + 1/R_2 + 1/R_3 + \dots$

Power: $P = VI = I^2R = V^2/R$

Energy: $E = Pt$; 1 kWh = 3.6×10^6 J

Heat (Joule's law): $H = I^2Rt$

Chapter 13: Magnetic Effects of Electric Current

Force on a conductor: $F = BIL \sin\theta$ (max at $\theta=90^\circ$)

Right-hand thumb rule: field around a straight current-carrying wire

Fleming's Left-Hand Rule: Field-Current-Motion (force direction)

Fleming's Right-Hand Rule: Motion-Field-Current (induced current direction)

India domestic supply: 220V, 50Hz AC

[Full Chapter 12 Solutions →](#)

Our Environment (Key Facts) — Legacy Chapter, Removed from Current Syllabus

10% Law: only ~10% of energy transfers to the next trophic level

Food chains rarely exceed 3-5 trophic levels

Ozone (O_3) in the stratosphere absorbs UV radiation; CFCs deplete it

Montreal Protocol (1987) — global CFC phase-out agreement

3 R's of waste management: Reduce, Reuse, Recycle

[Legacy Chapter Content \(Removed from Syllabus\) →](#)