KECUDO

HIGH SCHOOL CHEMISTRY

Matter & Atoms

Class 1 · Concepts, Labs & Structures



PREMIUM
I
EDITION

2026 EDITION · STUDENT SERIES

About this book

Welcome to **High School Chemistry, Class 1: Matter & Atoms** — the first of eight Kecudo classes that take you from “what is matter?” to the chemistry of our planet.

How each chapter works

- **Depth dots** show the level: Foundation ●○○, Core ●●○, Advanced ●●●.
- **Concepts** with worked examples and figures drawn from real data.
- **Kecudo Lab** boxes: one hands-on experiment per chapter.
- **Try it** questions with answers, plus a 25-question scored self-assessment at the end.

Our running example

The fictional **Kecudo Chem Co.** lab receives a mystery metal, “Sample K”. Chapter by chapter you will measure it, count its particles, see its flame colour and place it on the periodic table.

Data sources

IUPAC standard atomic weights & isotopic abundances; NIST Atomic Spectra Database (emission lines, ionization energies); CRC Handbook of Chemistry and Physics (densities, atomic radii); Pauling electronegativity scale. Kecudo company names and Sample K are fictional teaching examples.

> **Safety & use.** Educational content only. Perform experiments only with a qualified teacher, proper safety equipment and your school's safety rules. Steps marked “teacher demonstration” or “teacher-supervised” are not for students alone.

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FOUNDATION

Chapter 1

Welcome to Chemistry & Lab Safety

Chemistry is the study of **matter** (anything that has mass and takes up space) and the **changes** it goes through. Everything you touch, eat and breathe is chemistry in action.

The five branches

Branch	Studies	Example
Organic	Carbon compounds	Plastics, medicines
Inorganic	Non-carbon compounds	Metals, salts
Physical	Energy & motion of particles	Batteries
Analytical	What is in a sample, and how much	Water testing
Biochemistry	Chemistry of living things	Digestion, DNA

How chemists think: the scientific method

Observe › Question › Hypothesis › Experiment › Analyze › Conclude

An experiment changes one **independent variable**, measures the **dependent variable**, and keeps everything else **controlled**. That is a *fair test*.

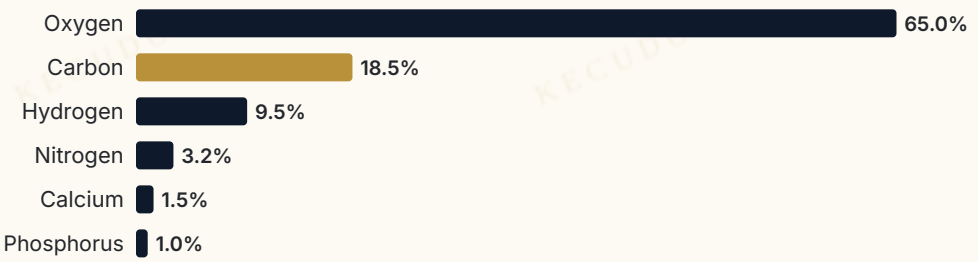


FIG 1.2 · Elements in the human body (% by mass)

Source: standard biochemistry references (rounded).

Safety first: hazard pictograms

Chemical labels use the international GHS symbols. Learn them before you touch any bottle.

🔥 Flammable	⚠ Irritant / harmful	☣ Health hazard
☠ Acutely toxic	🧪 Corrosive	💥 Explosive

Six rules that never change

1. Goggles on whenever chemicals or heat are out.
2. Never taste; smell only by **wafting** vapour toward your nose with your hand.
3. Tie back hair; no open-toed shoes.
4. Know where the eyewash, shower and fire blanket are.
5. Report every spill, cut or burn to the teacher at once.
6. Dispose of waste only where your teacher tells you.

⚗ Kecudo Lab · Safety Scavenger Hunt

Goal: locate and sketch every safety device in your lab, then read one Safety Data Sheet (SDS) and record its hazard symbols, first-aid steps and storage rules.

Analysis: which item would you need first if a classmate splashed acid in their eye? Why?

✎ Try it

1. Which variable do you deliberately change in an experiment?
2. What is the safe way to smell a chemical?
3. Which branch studies DNA?

Answers: **1.** independent · **2.** wafting · **3.** biochemistry

FOUNDATION

Chapter 2

Measurement, Units & Significant Figures

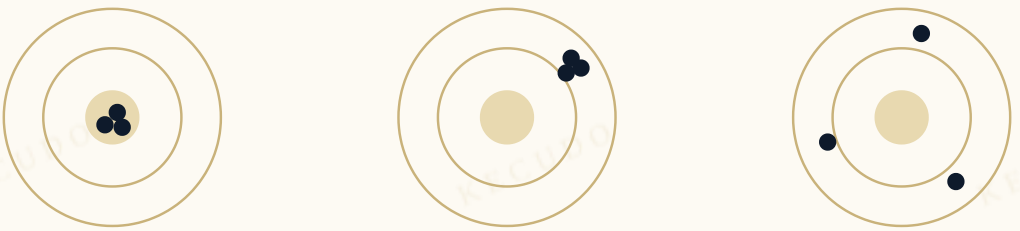
Every result in chemistry is a **number with a unit**. Scientists worldwide use the International System of Units (SI), built on powers of ten so conversions are easy.

Quantity	SI unit
Length	metre (m)
Mass	kilogram (kg)
Time	second (s)
Temperature	kelvin (K)
Amount	mole (mol)

Prefix	Factor
kilo (k)	10^{3}
centi (c)	10^{-2}
milli (m)	10^{-3}
micro (μ)	10^{-6}
nano (n)	10^{-9}

Accuracy vs. precision

Accuracy = how close to the true value. **Precision** = how close repeated results are to each other.



Accurate + precise | Precise, not accurate | Neither

FIG 2.1 · Accuracy and precision

FOUNDATION

Chapter 3

Dimensional Analysis & Density

Dimensional analysis converts units by multiplying by *conversion factors* — fractions equal to 1. Units you don't want cancel out, like train cars uncoupling.

$$2.5\ \text{km} \times \frac{1000\ \text{m}}{1\ \text{km}} \times \frac{100\ \text{cm}}{1\ \text{m}} = 2.5 \times 10^5\ \text{cm}$$

$$65\ \text{mi/h} \times \frac{1609.344\ \text{m}}{1\ \text{mi}} \times \frac{1\ \text{h}}{3600\ \text{s}} = 29\ \text{m/s}$$

Density

Density is how much mass is packed into a given volume: **D = m ÷ V** (g/cm^3 or g/mL; 1 mL = 1 cm^3). Density is a *characteristic property*: it identifies a substance no matter how big the sample is.

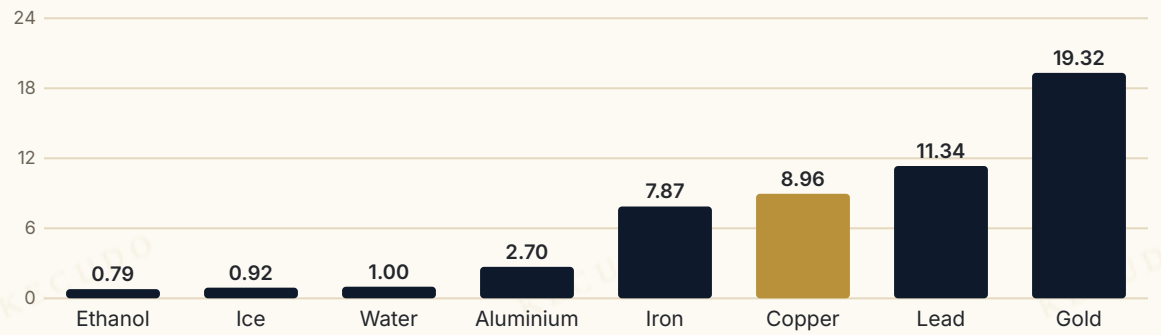


FIG 3.1 · Densities of common substances at about 20 °C (g/cm^3)

Source: CRC Handbook of Chemistry and Physics (ice at 0 °C).

SELF-ASSESSMENT

Part A · Basics

Choose one answer per question. Your choice locks, and your score updates at the top of the screen.

A1. Which particle has a negative charge?

- A. Proton
- B. Neutron
- C. Electron
- D. Nucleus

A2. Salt dissolved in water is a...

- A. Homogeneous mixture
- B. Element
- C. Compound
- D. Heterogeneous mixture

A3. Which is a chemical change?

- A. Ice melting
- B. Sugar dissolving
- C. Glass breaking
- D. Paper burning

A4. The atomic number equals the number of...

- A. Neutrons
- B. Protons
- C. Protons + neutrons
- D. Energy levels

A5. Elements in the same group share the same number of...

- A. Neutrons
- B. Energy levels
- C. Valence electrons
- D. Isotopes

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Thank you for learning with Kecudo.

Next in the series

Class 2 — Chemical Bonding & Molecular Structure

Ionic, covalent & metallic bonds · Lewis structures · VSEPR shapes · naming compounds

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