

Unit 3

Moles, Concentration, and Stoichiometric Amounts

SOURCE LOCK

Built from SCH3U video-distilled notes, video range P32-P43, 12 lessons. No outside textbook text added.

Big idea

- The mole is the bridge between particles, mass, gas volume, solution concentration, and balanced equations.

Lesson map

- P32 Mole, Avogadro Constant, and Molar Mass (1h 5m)
- P33 Molar Volume of Gases (39m 1s)
- P34 Ideal Gas Equation and Avogadro Law (35m 28s)
- P35 Amount Concentration (35m 6s)
- P36 Preparing a Solution with a Fixed Concentration (16m 54s)
- P37 The Mole Map (14m 21s)
- P38 Avogadro Law Question Types (17m 44s)
- P39 Molar Mass and the Cross Method (16m 53s)

Core Notes

What to know

- Use n as the central amount variable: particles, mass, gas volume, and concentration all convert through n .
- Molar mass converts between mass and amount.
- Avogadro constant converts between number of particles and amount.
- Solution concentration follows $c = n / V$, with V in litres.
- Balanced equation coefficients give mole ratios for stoichiometry.

Problem-solving workflow

- Convert the given quantity into moles.
- Use the formula or mole ratio that matches the question type.
- Convert from moles into the requested final unit.
- Carry units through every line.
- Re-check whether volume is in L or mL.

Common traps

- Do not use gas-volume shortcuts unless the gas condition matches the problem.
- Do not leave solution volume in mL inside $c = n / V$.
- In stoichiometry, take the mole ratio only from the balanced equation.
- For Avogadro-constant questions, count atoms, molecules, and ions exactly as the formula indicates.

Teacher Moves

WHY THESE MATTER

These are the teacher-style moves distilled from the video notes: how to decide, not just what to memorize.

Move 1

- Convert through moles before jumping between particles, mass, volume, and concentration. | Source: P32 00:30:01, P33 00:21:52, P34 00:03:02.

Move 2

- Use amount of substance as the central bridge variable. | Source: P32 00:49:51, P34 00:03:26, P35 00:32:10.

Move 3

- For concentration, keep volume in litres and use $c = n / V$. | Source: P35 00:00:10, P36 00:00:20.

Move 4

- For Avogadro questions, count formula units, atoms, ions, and molecules separately. | Source: P38 00:00:27, P43 00:00:34.

Move 5

- Cancel spectator ions only after writing the complete ionic equation. | Source: P33 00:34:15.

Move 6

- Treat concentrated sulfuric acid as a special case; do not split it like dilute strong acid. | Source: P40 00:20:45.

Move 7

Move 7

- Look for the particles that actually react; those become the net ionic equation. | Source: P43 00:39:43.

Worked Example Cards

video-pattern example

Mass to particles through moles

Source: Unit 3 mole map, P32-P43

1. Convert mass to amount: $n = m / M$.
2. For 18.0 g H_2O , $M = 18.0 \text{ g/mol}$, so $n = 1.00 \text{ mol}$.
3. Convert amount to particles: $N = nN_A$.
4. $N = 1.00 \times 6.02 \times 10^{23}$ molecules.

Answer: 6.02×10^{23} H_2O molecules.

video-pattern example

Concentration from moles and volume

Source: Unit 3 concentration workflow, P35-P40

1. Use $c = n / V$.
2. Convert 250 mL to 0.250 L before substituting.
3. If $n = 0.500 \text{ mol}$, $c = 0.500 / 0.250$.
4. $c = 2.00 \text{ mol/L}$.

Answer: 2.00 mol/L.

Practice prompts

- Convert particles to moles, then to mass.
- Calculate concentration from moles and volume.
- Use a balanced equation to convert from one substance to another.