

01: Teaching High School Chemistry

Becoming a High School Chemistry Teachers

- There are many paths
- You can have a bachelor's or graduate degree in science or education (with a minor in the other area).
- You can work in industry first and then go back through a certification program.
- You will need to check with your state for requirements for emergency/temporary, probationary or permanent endorsements (including any standardized testing required).

This Tutorial Series

Tutorials 1-3 are written for the teacher

1. The High School Chemistry Course
2. Teaching Labs in Chemistry
3. Assessments in Chemistry

Tutorials 4-24 cover content that is typically found in the high school course with the following aides for teachers:

1. Introductory slide for teachers with background information.
2. Teaching tips and hints found in the notes section throughout the tutorials.
3. A slide at the end of each with common labs covering that content.

What content should we teach?

A survey of 96 college professors resulted in 7 topics that were most commonly included in their "top 5 student must-haves before coming to high school chemistry.

1. Basic skills (units, graphing, sig figs, etc.)
2. Moles
3. Dimensional Analysis
4. Stoichiometry
5. Naming/Writing formulas
6. Atomic structure
7. Balancing equations

Other skills they indicated are important are:

- Study skills
- Problem-solving
- Lack of fear of chemistry
- Appreciation of chemistry in everyday life

What content are teachers covering?

A survey of 571 high school teachers showed the following topics to be considered "appropriate" for the course by more than 96% of the teachers and were actually taught by a similar percentage

1. Basic lab skills
2. basic skills
3. dimensional analysis
4. classification of matter
5. writing/naming formulas
6. moles
7. types of reactions
8. balancing equations
9. stoichiometry
10. atomic structure (electron configuration)
11. periodic table & periodicity
12. types of bonds and properties
13. gas laws
14. solutions & concentrations

What topics are left out?

The following topics were considered appropriate by more than 90% of the 571 teachers but a significantly lower percentage of teachers were actually having time to cover them.

1. Scientific process skills (lab design)
2. History of atomic theory
3. Lewis dot structures
4. Acid/base (pH, strong/weak, simple titrations)

The following topics are thought to be appropriate by a far fewer percentage of teachers.

1. Equilibrium (qualitative)
2. Thermodynamics
3. Kinetics (qualitative)
4. Acid base (complex problems)
5. Equilibrium (quantitative)
6. Kinetics (quantitative)

The average number of topics thought appropriate by teachers was 20.8, however the average number actually covered is 18.1 topics—the vast majority doesn't have enough time to do all they'd like.

Applying Content To Students' Lives

Application of content increases motivation and interest, which in turn increases performance.

Textbooks that have true integration of application and introduce topics on a need-to-know basis

- Chemistry In the Community (ChemCom) <http://www.whfreeman.com/chemcom/>
- Living by Chemistry <http://www.keypress.com/chemistry/>
- Active Chemistry <http://www.its-about-time.com/htmls/ac/ac.html>
- Chemistry in Your World
- www.RealLifeChemistry.net

Ideas for research projects/presentations applying chemistry to students' lives:

- Fuel-cell cars
- Hair dyes
- Fireworks
- Luminol
- Glow in the dark algae
- Nuclear power plant
- Or anything else they or you can think of...

Articles with application:

- Newspapers
- Chemical & Engineering News
- ChemMatters

Lesson Plans

It's important to long-range plan to insure that all the topics you need to cover will fit.

Possible things to include in your unit/daily lesson plans:

- Lesson goals & outcomes for the student
- Correlation to district/state/national standards
- Correlations to various learning styles (visual, auditory, kinesthetic, etc.)
- Time estimate for each activity
- Materials needed for each activity
- Outline for lecture/discussion/notes
- Homework to assign

How to Use This Cheat Sheet: These are the keys related this topic. Try to read through it carefully twice then rewrite it out on a blank sheet of paper. Review it again before the exams