

Unit 4

Atomic Structure, Periodic Trends, and Bonding

SOURCE LOCK

Built from SCH3U video-distilled notes, video range P52-P63, 12 lessons. No outside textbook text added.

Big idea

- Periodic patterns connect electron structure to element properties and bonding behavior.

Lesson map

- P52 Atomic Structure, Nuclides, and Isotopes (1h 3m)
- P53 The Periodic Table (19m 38s)
- P54 How to Memorize the Periodic Table (8m 3s)
- P55 Alkali Metals and Halogens (17m 53s)
- P56 Periodic Law, Part 1 (17m 4s)
- P57 Periodic Law, Part 2 (12m 7s)
- P58 Chemical Bonds, Part 1 (15m 53s)
- P59 Chemical Bonds, Part 2 (14m 39s)

Core Notes

What to know

- Atomic number identifies the element; mass number tracks protons plus neutrons.
- Nuclides and isotopes have the same proton count but different neutron counts.
- Period and group positions reveal electron-shell and valence-electron patterns.
- Periodic trends help compare radius, metallic character, non-metallic character, and common ion behavior.
- Bond type follows electron behavior: transfer for ionic bonding and sharing for covalent bonding.

Problem-solving workflow

- Extract the clue: atomic number, electron layers, valence electrons, group, or period.
- Translate the clue into a periodic-table position.
- Use nearby trends to compare properties.
- For inference questions, test one clue at a time instead of guessing.
- When a structure is shown, connect bonding pattern to element identity.

Common traps

- Do not mix up atomic number and mass number.
- Do not treat isotope identity as a change in the element.
- For short-period inference, special electron structures can narrow the answer quickly.
- Bonding questions often require both formula reading and periodic reasoning.

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

- Valence-electron clues are often the fastest way to identify main-group elements. | Source: P55 00:00:59, P56 00:01:15, P59 00:04:13.

Move 2

- Connect bonding type to electron transfer or sharing. | Source: P58 00:01:08, P59 00:02:15.

Move 3

- For periodic inference, translate each clue into group, period, or electron-shell information. | Source: P59 00:14:05, P61 00:00:07.

Move 4

- Molecular polarity needs both bond polarity and molecular shape. | Source: P59 00:02:49, P62 00:07:08.

Worked Example Cards

video-pattern example

Infer element identity from particles

Source: Unit 4 isotope and element inference, P52-P63

1. Atomic number is the proton count.
2. An atom with 17 protons is chlorine.
3. If the mass number is 35, neutrons = $35 - 17 = 18$.
4. Changing neutrons changes the isotope, not the element.

Answer: Chlorine-35, with 18 neutrons.

video-pattern example

Bond type from electron behavior

Source: Unit 4 bonding clips, P58-P59

1. Metal + non-metal usually indicates electron transfer.
2. Two non-metals usually indicates electron sharing.
3. Transfer gives ionic bonding; sharing gives covalent bonding.
4. Use the periodic-table position as the first clue.

Answer: NaCl is ionic; Cl₂ is covalent.

Practice prompts

- Identify an isotope from proton and neutron counts.
- Infer an element from period/group or electron-shell clues.
- Compare two elements using periodic trends.