



Protons, Neutrons, & Electrons

Video Workbook with Dr. B

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Structure of the Atom

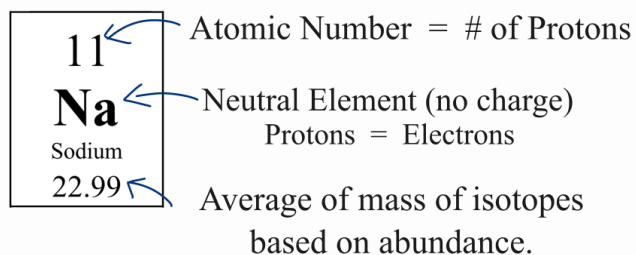
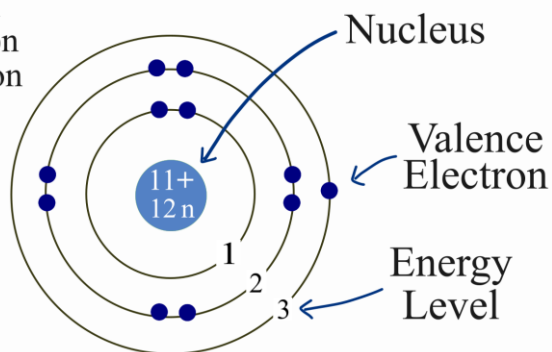
You need to know:

- Atoms consist of protons, neutrons, and electrons.
- Protons and neutrons are in the nucleus.
- Electrons are around the atom.
- Protons are positive, Electrons are negative, and Neutrons are neutral.
- Almost all of the mass of an atom is in the nucleus.

Key Videos

- [How to find protons, neutrons, and electrons for *elements*.](#)
- [How to find protons, neutrons, and electrons for *ions*.](#)

- + Proton
- n Neutron
- Electron



Key Idea: *Based on this information you can answer almost all exam and quiz questions about the number of protons, neutrons, electrons and mass number for an element.*

Atomic Number = Number of Protons in Element

For elements on the Periodic Table, which are neutral, **Protons = Electrons**

Mass Number = Protons + Neutrons

Example of typical problems (using the Periodic Table):

Element Symbol	Atomic Number	Mass Number	Number of Electrons	Number of Protons	Number of Neutrons
Si					15

Explanation: On the Periodic Table Si has an atomic number of 14. So it has 14 protons and 14 electrons. The mass number is the number of protons + neutrons (14 + 15) so this isotope of Si has a mass number of 19.

Element Symbol	Atomic Number	Mass Number	Number of Electrons	Number of Protons	Number of Neutrons
	1	2			

Explanation: On the Periodic Table Si has an atomic number of 14. So it has 14 protons and 14 electrons. The mass number is the number of protons + neutrons (14 + 15) so this isotope of Si has a mass number of 19.



Element Symbol	Atomic Number	Mass Number	Number of Electrons	Number of Protons	Number of Neutrons
		50	24		

Explanation: On the Periodic Table Si has an atomic number of 14. So it has 14 protons and 14 electrons. The mass number is the number of protons + neutrons (14 + 15) so this isotope of Si has a mass number of 19.

Note: if you need the mass number but none is given, round the average atomic mass on the Periodic Table.

Ions have a + or – charge.

Examples are Na⁺, Cl⁻, Mg²⁺, O²⁻, Al³⁺, N³⁻

- When we have a *negative ion* (called an anion) we *add* electrons.
- For a *positive ion* (a cation) we *subtract* electrons.

For example:

O²⁻ means we have two more electrons. So neutral O on the Periodic Table has an Atomic Number of 8 (8 protons, 8 electrons). But the oxide ion, O²⁻, has 8 protons and 10 electrons.



[How to find protons, neutrons, and electrons for ions.](#)

Practice

Element Symbol	Atomic Number	Number of Protons	Number of Electrons
Na	11		
Na ⁺	11		
Al ³⁺	13		
S ²⁻	16		
H ⁺	1		

Answers

Na: 11, 11, 11
 Na⁺: 11, 11, 10
 Al³⁺: 13, 13, 10
 S²⁻: 16, 16, 18
 H⁺: 1, 1, 0

More Practice

1. What element has 26 protons? https://youtu.be/dO_SZw_YM3k
2. What element has 1 proton and 2 neutrons? <https://youtu.be/RdOCOkkgJEM>
3. What element has 9 protons 11 neutrons? https://youtu.be/uTuh3VWX_AQ
4. What element has 11 protons 12 neutrons? <https://youtu.be/2jPijbc8rb0>
5. Find Protons, Electrons, Neutrons for Carbon (C) <https://youtu.be/PrwMw7ahfK8>
6. Find Protons, Electrons, Neutrons for Kr (Krypton)? <https://youtu.be/IUw0uVKjf9w>
7. Find Protons & Electrons for F⁻ (the Fluoride ion) https://youtu.be/4Bu_EvSEww4
8. Find Protons & Electrons for the K⁺ (Potassium ion) <https://youtu.be/IZeh2mLI-Ew>
9. Find Protons & Electrons for Fe²⁺ and Fe³⁺ (Iron II and III ions) <https://youtu.be/GYSSouLOm1M>
10. Find Protons & Electrons for the Aluminum ion (Al³⁺) <https://youtu.be/ul-tvacoZJ4>
11. What is the difference between ions and isotopes? <https://youtu.be/n1rrMrEpGn4>

11. See video <https://youtu.be/n1rrMrEpGn4>

1. Fe 2. H 3. F 4. Na 5. 6, 6, varies 6. 36, 36, varies 7. 7, 8 8. 19, 18 9. Fe²⁺ is 26, 24 Fe³⁺ is 26, 23 10. 13, 10



Help with Isotopes:

[Introduction to Isotopes](#)

[Isotopes of Hydrogen](#)

[Isotopes vs. Ions](#)

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