The Mystery of the Electron Shells

A Story About Bohr's Atomic Model, Electronic Configuration, and Valency

Tara and Neil stepped into the Atomic Explorer, a space station filled with glowing scientific displays.

Captain Nova: "Welcome aboard! Today, we're exploring the structure of atoms!"

A giant hologram of an atom appeared.

Tara: "What are those circles around the center?"

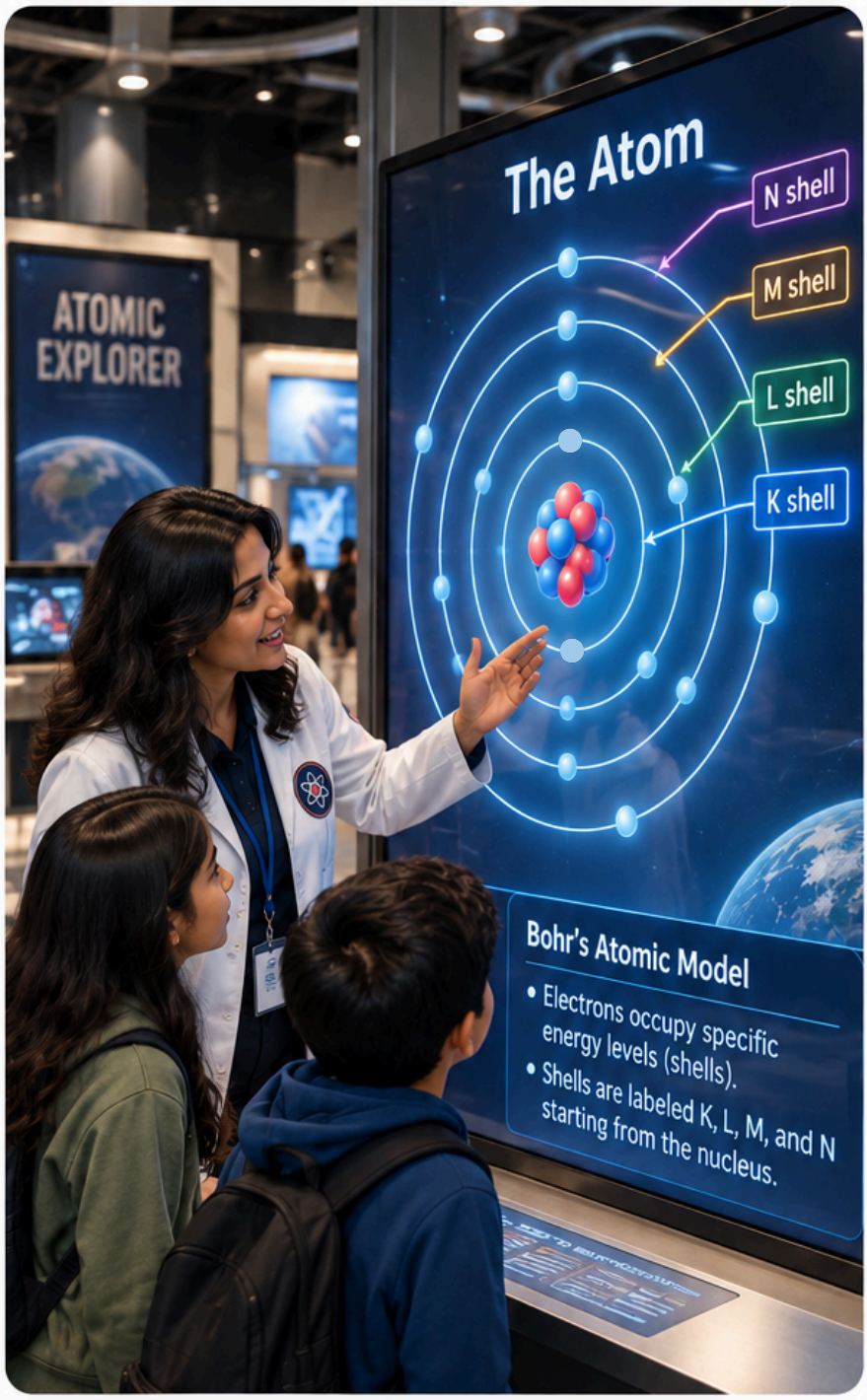
Captain Nova: "Those represent electron shells. In Bohr's model, electrons occupy specific energy levels around the nucleus."

Neil: "Do the shells have names?"

Captain Nova: "Yes! They're called K, L, M, and N, starting from the nucleus."

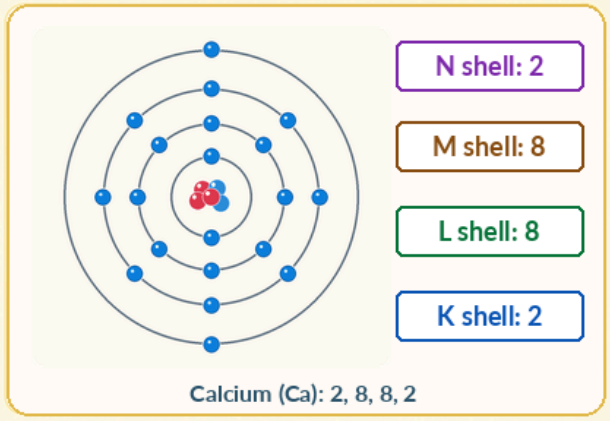
Tara: "So electrons are arranged in different shells!"

Captain Nova: "Exactly! Let's discover how they fill up."



Science Fact:

In Bohr's model, electrons are arranged in energy levels called shells, labeled K, L, M, and N.



Science Fables

The Electron Shell Challenge!

Captain Nova activated a glowing display.

Captain Nova: "Each shell has a maximum electron capacity. We calculate it using the formula $2n^2$, where n is the shell number."

She showed them a chart.

Shell	n	Maximum electrons
K	1	2
L	2	8
M	3	18
N	4	32

Neil: "Wow! The shells farther from the nucleus can hold more electrons!"

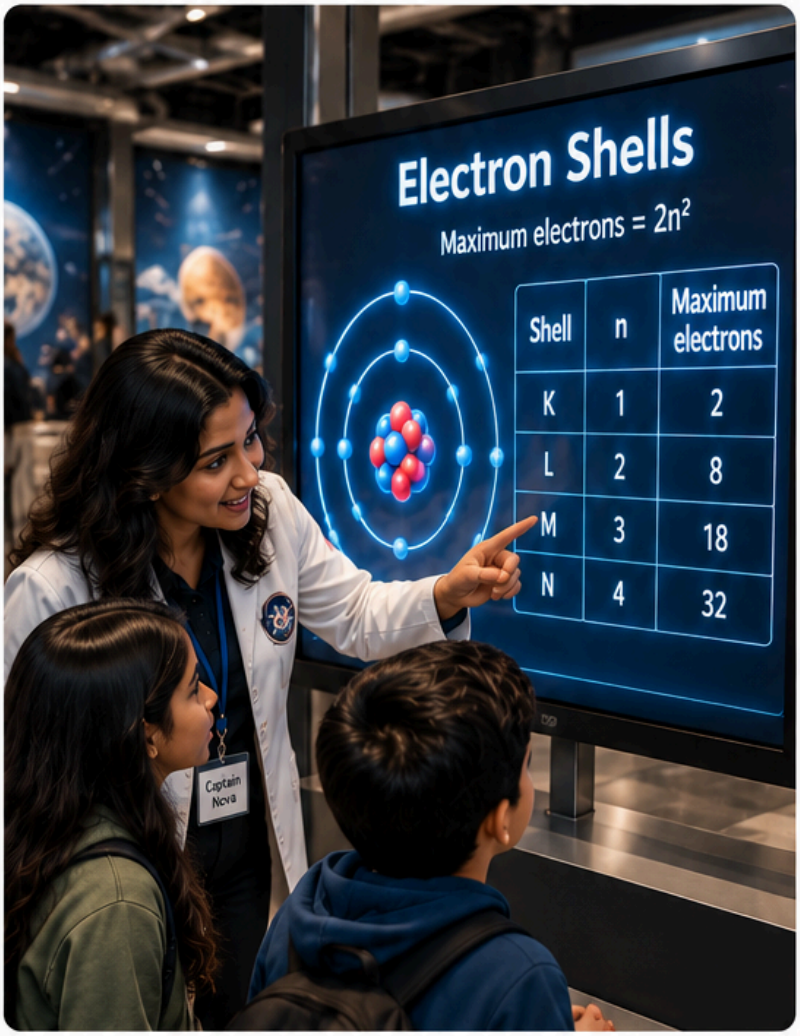
Captain Nova: "Yes, but electrons fill lower-energy levels first."

She displayed a lithium atom with three electrons.

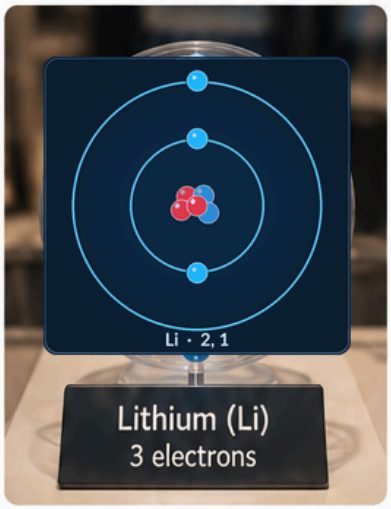
Captain Nova: "Two electrons go into the first shell, and the third goes into the second shell."

Tara: "So lithium's electronic configuration is 2,1!"

Captain Nova: "Perfect!"



Example: Lithium (Li)



Electronic configuration:

2,1

2 electrons in the first shell (K)

1 electron in the second shell (L)

Science Fact:

The maximum capacity of shell n is $2n^2$. Electrons generally occupy lower-energy levels before higher ones.

Science Fables

The Electronic Configuration Mission!

A holographic screen flashed:

MISSION: ARRANGE THE ELECTRONS!

Captain Nova: "Let's start with oxygen. It has eight electrons in a neutral atom."

Neil: "Two go into the K shell," Neil answered.

Tara: "And the remaining six go into the L shell!" Tara added.

Captain Nova: "Correct! Oxygen's electronic configuration is 2,6."

Next came sodium, with eleven electrons.

Neil: "Two in K, eight in L, and one in M!" Neil exclaimed.

Captain Nova: "Excellent! Sodium's configuration is 2,8,1."

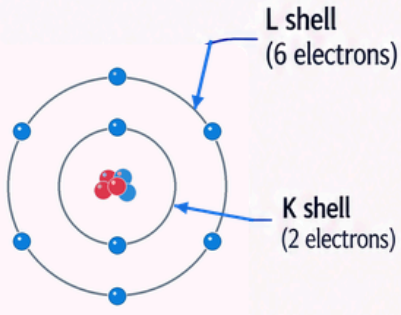
Tara: Tara smiled. "Electronic configuration tells us how electrons are distributed!"



Oxygen (O)

Atomic number = 8
(8 electrons)

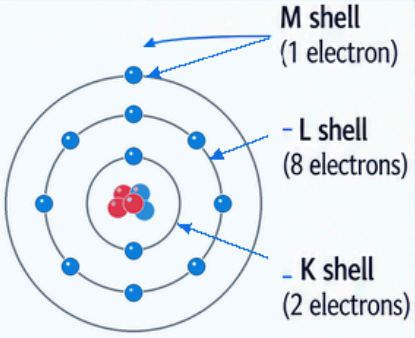
Electronic configuration:
2,6



Sodium (Na)

Atomic number = 11
(11 electrons)

Electronic configuration:
2,8,1



Science Fact:

Electronic configuration describes the arrangement of electrons in an atom's energy levels.

Science Fables

The Secret of the Outer Shell!

Captain Nova displayed two atoms: neon and sodium.

Tara: "Why is neon so unreactive?" Tara asked.

Captain Nova: "Neon has eight electrons in its outermost shell, making it very stable."

Neil: "What about sodium?" Neil wondered.

Captain Nova: "Sodium has just one electron in its outermost shell. It can lose that electron to form a positive ion."

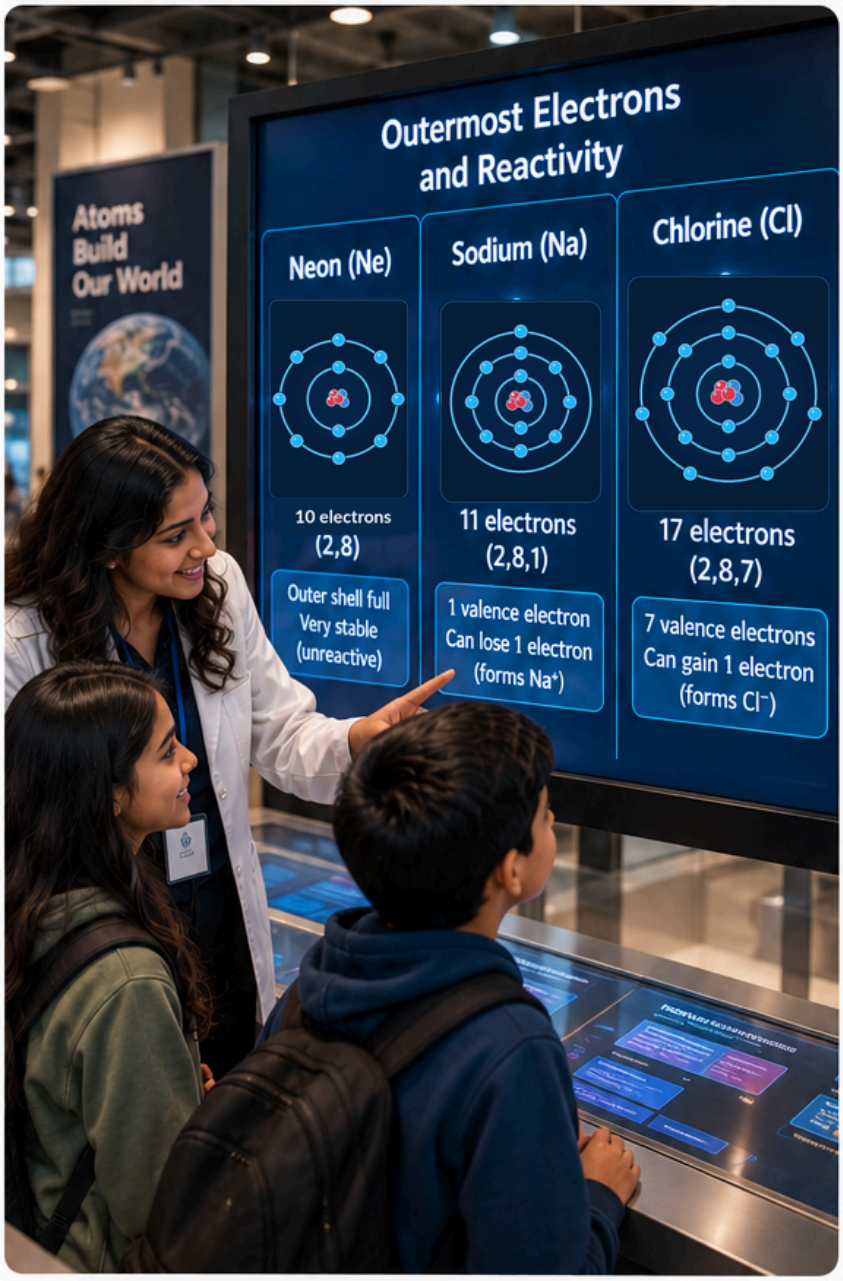
Tara: "So the outermost electrons affect how atoms react!" Tara exclaimed.

Captain Nova: "Exactly! They're called valence electrons."

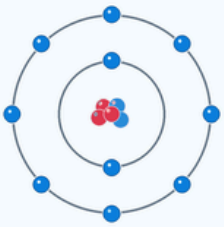
Captain Nova showed them chlorine, with seven outermost electrons.

Tara: "Chlorine can gain one electron to complete its outer shell."

Neil: "So sodium and chlorine can form sodium chloride!"



Neon (Ne)

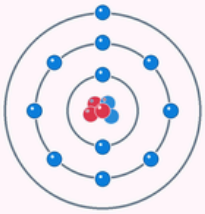


Atomic number = 10
(10 electrons)

Electronic configuration: 2,8

Outer shell full (8 electrons)
Very stable (unreactive)

Sodium (Na)

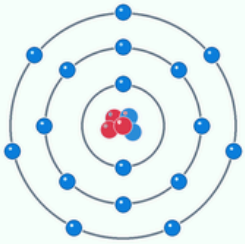


Atomic number = 11
(11 electrons)

Electronic configuration: 2,8,1

1 valence electron
Can lose 1 electron
(forms Na^+)

Chlorine (Cl)



Atomic number = 17
(17 electrons)

Electronic configuration: 2,8,7

7 valence electrons
Can gain 1 electron
(forms Cl^-)

Science Fact:

Valence electrons are electrons in an atom's outermost occupied shell. They strongly influence chemical bonding and reactivity.

Science Fables

The Final Space Challenge!

The space station's screen lit up.

FINAL MISSION:
BECOME AN ATOM EXPERT!

Captain Nova smiled. "Ready?"

Tara and Neil shouted, "Ready!"

Captain Nova: "What is the maximum capacity of the K shell?"

Tara: "Two electrons!"

Captain Nova: "What is oxygen's electronic configuration?"

Neil: "2,6!"

Captain Nova: "And sodium?"

Tara: "2,8,1!"

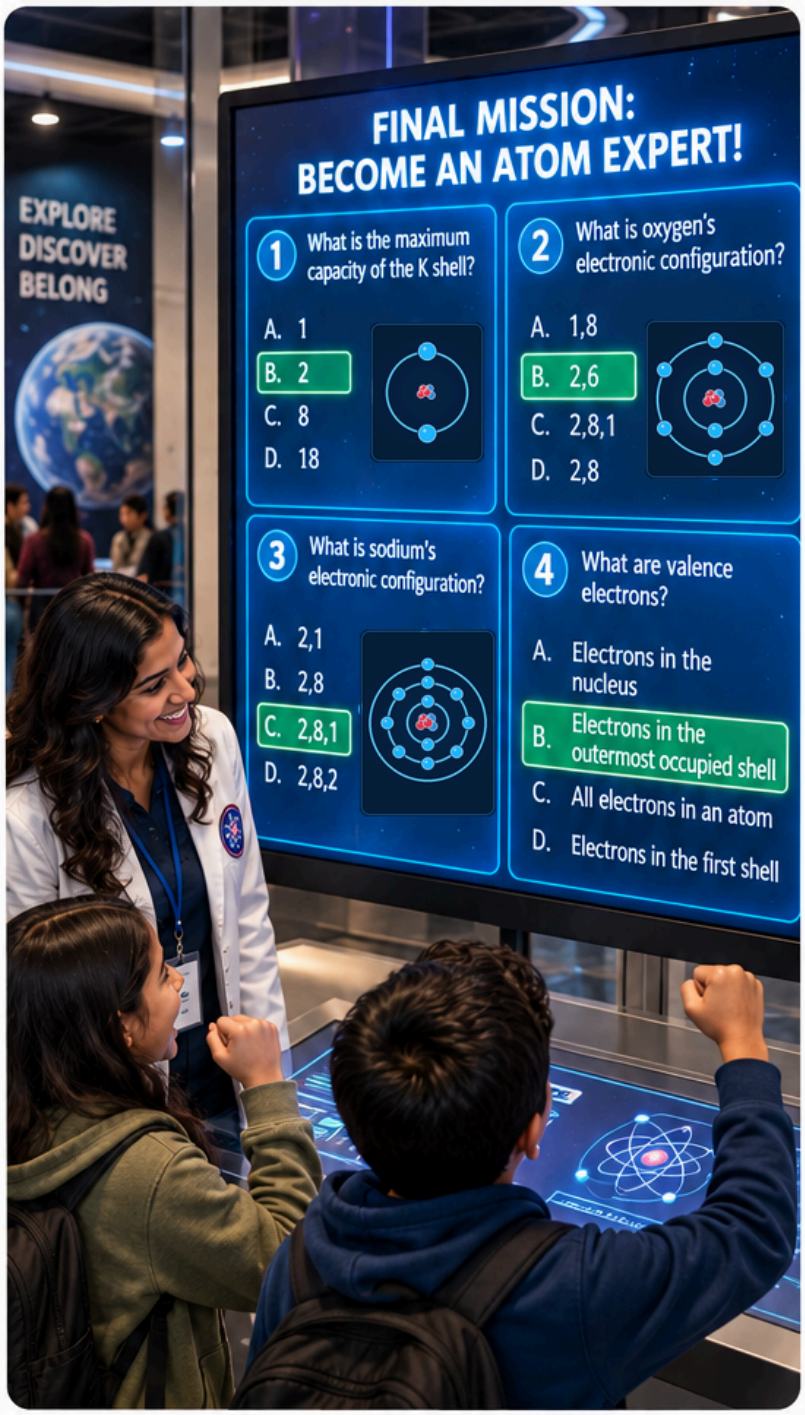
Captain Nova: "Excellent! What are valence electrons?"

Neil: "The electrons in the outermost occupied shell!"

The screen flashed:

MISSION COMPLETE!

Captain Nova smiled. "You've discovered how electron arrangements help explain the behavior of elements!"





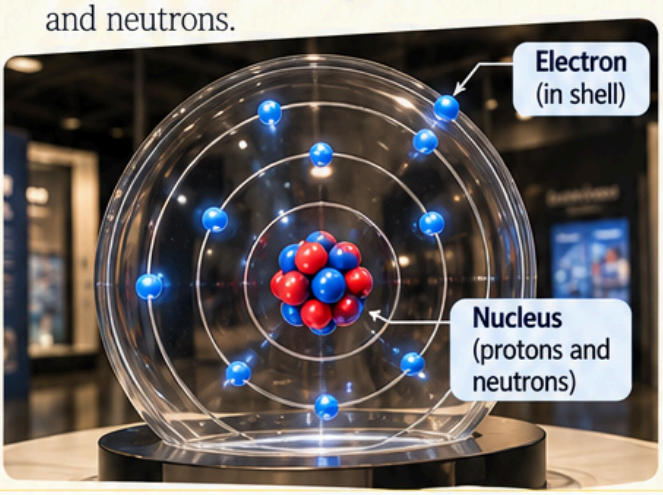
Science Fact: An atom's electron arrangement helps determine its chemical properties and bonding behavior.

Science Fables

Science Element: Remember!

1 Bohr's Atomic Model

- Electrons occupy specific energy levels called shells.
- Shells are labeled K, L, M, and N.
- The nucleus contains protons and neutrons.



2 Maximum Electron Capacity

The maximum number of electrons in a shell is calculated using the formula:

Maximum electrons = $2n^2$

where n is the shell number.

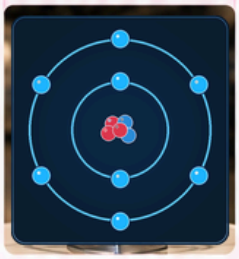
Shell	n	Maximum electrons
K	1	2
L	2	8
M	3	18
N	4	32

3 Electronic Configuration

Electronic configuration describes the arrangement of electrons in an atom's energy levels.

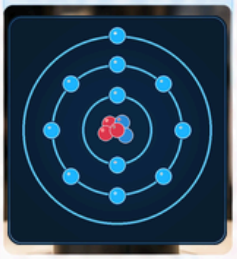
Element	Atomic Number	Shell Configuration
Hydrogen	1	1
Carbon	6	2,4
Oxygen	8	2,6
Neon	10	2,8
Sodium	11	2,8,1
Chlorine	17	2,8,7
Calcium	20	2,8,8,2

Oxygen (O)



8 electrons
Electronic configuration:
2,6

Sodium (Na)



11 electrons
Electronic configuration:
2,8,1

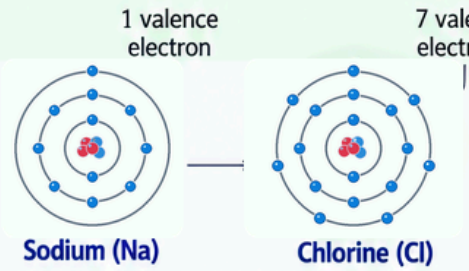
Chlorine (Cl)



17 electrons
Electronic configuration:
2,8,7

4 Valence Electrons and Valency

- **Valence electrons:** Electrons in the outermost occupied shell.
- **Valency:** The combining capacity of an atom.
- Many atoms gain, lose, or share electrons to achieve a more stable outer-shell arrangement.



The Golden Rule

Electron Shells:	Where are electrons arranged?
Electronic Configuration:	How many electrons are in each shell?
Valence Electrons:	How many electrons occupy the outermost shell?
Valency:	How does an atom combine with other atoms?

Remember!

The arrangement of electrons helps explain why different elements have different chemical properties.

Science Fables