The Secret of the Charged Kingdom

A Story About Ions, Cations, and Anions

High above the clouds floated a mysterious kingdom called Ionora, where glowing particles filled the sky and electric sparks danced between crystal towers.

One afternoon, Riya and Kabir discovered a golden doorway hidden inside an ancient tree. Curious, they stepped through it and found themselves surrounded by floating atoms.



Kabir: "Look! Some particles are glowing blue, and others are glowing red!"

A tiny flying robot named Sparky appeared beside them.

Sparky: "Welcome to Ionora, the Kingdom of Ions!"

Riya: "What's an ion?"

Sparky: "An ion is an atom or group of atoms that carries an electric charge."

He pointed toward a glowing sodium atom.

Sparky: "But when atoms gain or lose electrons, their charges change!"

Suddenly, the sodium atom released an electron and began glowing bright blue.

Kabir: "It lost something!"

Sparky: "An electron! And now it has become a positively charged ion called a **cation.**"

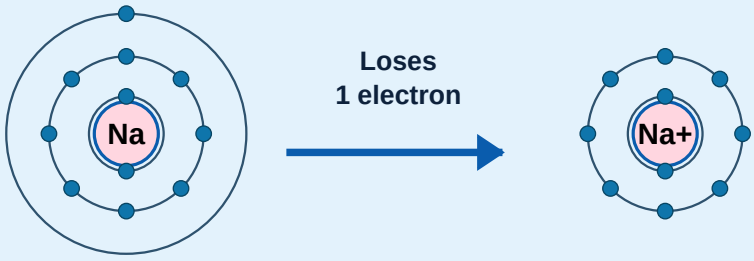
Nearby, a chlorine atom captured an electron and began glowing red.

Riya: "That one gained an electron!"

Sparky: "Exactly! It has become a negatively charged ion called an **anion.**"

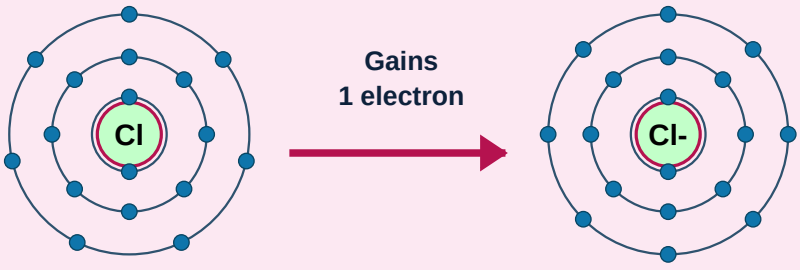
The explorers stared at the glowing particles in amazement. They had discovered the kingdom's first secret!

Loses an Electron -> Cation
(Positive Ion)



Sodium: 2,8,1 → 2,8

Gains an Electron -> Anion
(Negative Ion)



Chlorine: 2,8,7 → 2,8,8

Science Fact: An ion is a charged atom or group of atoms. Cations are positive ions, while anions are negative ions.

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The Great Electron Exchange

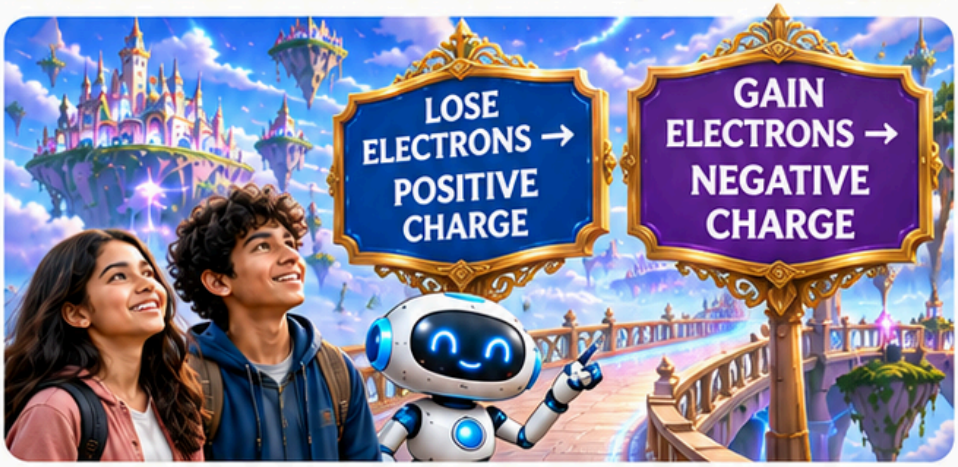
The Power of Losing and Gaining Electrons

Sparky guided the explorers toward a magnificent bridge called the Electron Exchange.

Floating above the bridge were two enormous signs:

LOSE ELECTRONS → POSITIVE CHARGE

GAIN ELECTRONS → NEGATIVE CHARGE



"Let's see how this works!" Sparky exclaimed.

A sodium atom floated forward with eleven protons and eleven electrons.

"It's neutral right now," Riya observed.

"Correct! But watch what happens when it loses one electron."

The atom released an electron, and its symbol changed from Na to Na^+.

"Now it has eleven protons but only ten electrons!" Kabir exclaimed.

"That's why it has a charge of +1," Sparky explained.

Next, a chlorine atom with seventeen protons gained an extra electron.

"It now has eighteen electrons but only seventeen protons!" Riya said.

"And that's why it becomes Cl^-," Sparky replied.

Suddenly, an oxygen atom gained two electrons, becoming O^{2-}. A nitrogen atom gained three, becoming N^{3-}.

"So the number of electrons gained or lost determines the charge!" Kabir realized.

Sparky nodded proudly.

Loses an Electron → Cation (Positive Ion)

Na → (Loses 1 electron) → Na^+

Sodium: 2,8,1 → 2,8

Gains an Electron → Anion (Negative Ion)

Cl → (Gains 1 electron) → Cl^-

Chlorine: 2,8,7 → 2,8,8

More Examples

Atom	Electron change	Ion formed
Hydrogen (H)	Loses 1 electron	H^+
Sodium (Na)	Loses 1 electron	Na^+
Chlorine (Cl)	Gains 1 electron	Cl^-
Oxygen (O)	Gains 2 electrons	O^{2-}
Nitrogen (N)	Gains 3 electrons	N^{3-}

Science Fact: Losing electrons forms cations (+), while gaining electrons forms anions (–). The number of protons does not change.

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The Mystery of the Traveling Groups

A Story About Polyatomic Ions

The explorers entered a beautiful garden filled with floating clusters of colorful atoms.

"Why are those atoms traveling together?" Riya wondered.

Sparky: "Because some ions contain more than one atom! We call them **polyatomic ions**."

A glowing group containing one oxygen and one hydrogen atom floated past them.

"Meet hydroxide, **OH^-**!" Sparky announced.

Another group appeared, containing one sulfur atom and four oxygen atoms.

"And this is sulfate, SO_4^{2-}. The entire group carries a charge of −2."

Kabir: "What about that one?"

"That's ammonium, NH_4^+. Unlike the others, it has a positive charge!" Sparky said.

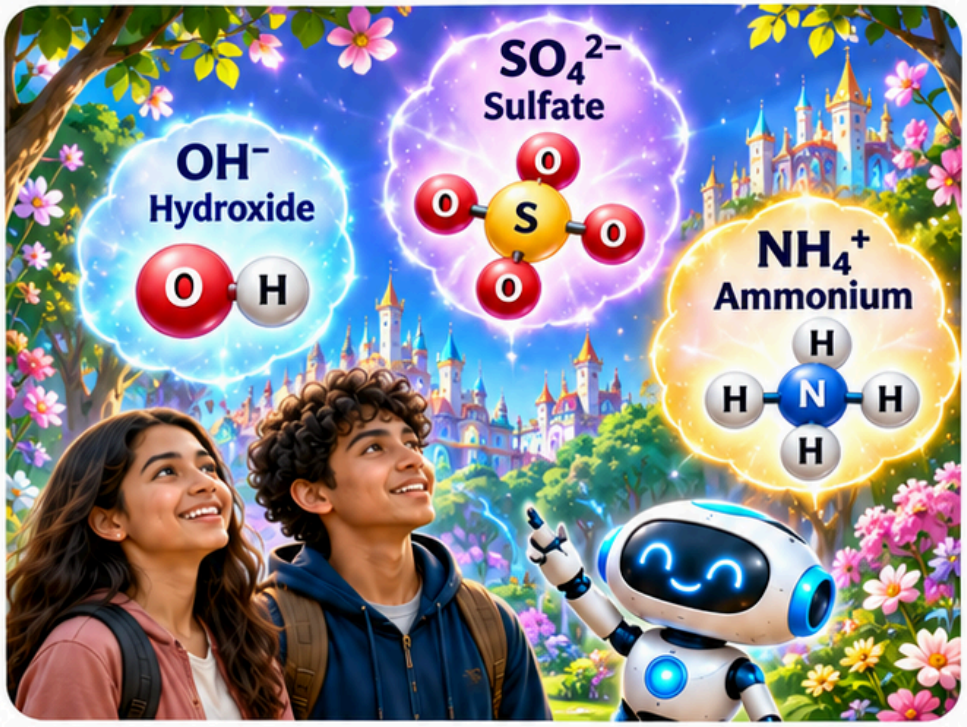
"So even a group of atoms can be a cation or an anion!" Riya exclaimed.

"Exactly!" Sparky said.

He showed them a small chart of the kingdom's most common traveling groups.

As the glowing groups drifted away, Kabir smiled.

"First we learned that individual atoms can become ions. Now we've discovered that groups of atoms can become ions too!"



Common Polyatomic Ions

Polyatomic ion	Formula	Charge
Hydroxide	OH^-	−1
Nitrate	NO_3^-	−1
Carbonate	CO_3^{2-}	−2
Sulfate	SO_4^{2-}	−2
Phosphate	PO_4^{3-}	−3
Ammonium	NH_4^+	+1

Science Fact: A polyatomic ion is a group of bonded atoms carrying an overall electric charge.

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The Hall of Changing Charges

A Story About Metals with More Than One Charge

Deep inside Ionora stood a silver castle with two enormous doors.

Above the entrance were the words:

THE HALL OF CHANGING CHARGES

Inside, two copper statues stood beside two iron statues.

Kabir: "Why are there two statues of each metal?"

Sparky: "Because some metals can form ions with different charges!"

The first copper statue glowed and displayed **Cu^{+}**.

"This is copper(I), also called **cuprous**. It has a charge of +1."

The second statue flashed and displayed **Cu^{2+}**.

"And this is copper(II), also called cupric. It has a charge of +2."

Riya: "So the Roman numeral tells us the charge!"

Sparky: "Exactly!"

Next, the iron statues illuminated. One displayed **Fe^{2+}**, while the other displayed **Fe^{3+}**.

"Iron(II) is also called ferrous, and iron(III) is called ferric," Sparky explained.

A golden chart appeared on the castle wall.

Kabir: "Now I understand! The same element can sometimes form different positive ions!"

Sparky nodded. "And that's why we must pay attention to the Roman numerals!"



Metal ion	Traditional name	Formula
Copper(I)	Cuprous	Cu^{+}
Copper(II)	Cupric	Cu^{2+}
Iron(II)	Ferrous	Fe^{2+}
Iron(III)	Ferric	Fe^{3+}
Lead(II)	Plumbous	Pb^{2+}
Lead(IV)	Plumbic	Pb^{4+}
Tin(IV)	Stannic	Sn^{4+}

Science Fact: Some metals form ions with different charges. Roman numerals in their names identify the charge, such as iron(II), Fe^{2+}, and iron(III), Fe^{3+}.

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The Great Ion Challenge!

A Final Test on Ions and Their Properties

Just as the explorers prepared to leave the castle, the floor began to tremble.

A giant crystal gate appeared, blocking their path.

A glowing message flashed above it:

ONLY THOSE WHO UNDERSTAND IONS MAY PASS!



"It's the **Great Ion Challenge!**" **Sparky** announced.

The gate displayed its first question.

What happens when an atom loses an electron?

Kabir: "It becomes positively charged, forming a cation!"

The first crystal turned green.

What happens when an atom gains an electron?

Riya: "It becomes negatively charged, forming an anion!"

Another crystal glowed.

Is SO_4^{2-} a single-atom ion or a polyatomic ion?

Kabir: "A polyatomic ion! It contains sulfur and oxygen atoms bonded together."

The third crystal lit up.

What is the charge of iron(III)?

Riya: "Positive three! Fe^{3+}!"

Finally, the gate displayed two floating ions: Na^+ and Cl^-.

What happens when these oppositely charged ions come together?

Kabir: "They attract each other!"

"And they can form sodium chloride, NaCl, through ionic bonding!" **Sparky** added.

The crystal gate burst into a thousand sparkling lights.

CHALLENGE COMPLETE!

"You've mastered the secrets of Ionora!" Sparky cheered.

As Riya and Kabir stepped back through the golden doorway, Riya smiled.

"Who knew that gaining or losing something as tiny as an electron could make such a big difference?"

Q	A
What happens when an atom loses an electron?	It becomes positively charged, forming a cation.
What happens when an atom gains an electron?	It becomes negatively charged, forming an anion.
Is SO_4^{2-} a single-atom ion or a polyatomic ion?	A polyatomic ion! It contains sulfur and oxygen atoms bonded together.
What is the charge of iron(III)?	Positive three! Fe^{3+}.
Na^+ – Cl^- What happens when these oppositely charged ions come together?	They attract each other and can form sodium chloride (NaCl) through ionic bonding.

CHALLENGE COMPLETE!

Science Fact: Oppositely charged ions attract one another. This electrostatic attraction forms ionic bonds in compounds such as sodium chloride (NaCl).

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Science Element: Remember!

1. What Is an Ion?

An ion is an atom or group of atoms with a net electric charge.

Type	How it forms	Charge	Example
Cation	Loses electrons	Positive (+)	**Na^+**
Anion	Gains electrons	Negative (–)	**Cl^-**

2. Common Positive Ions — Cations

Charge	Name	Formula
+1	Sodium	Na^+
+1	Potassium	K^+
+1	Silver	Ag^+
+1	Hydrogen	H^+
+1	Ammonium	NH_4^+
+1	Copper(I)	Cu^+
+2	Magnesium	Mg^{2+}
+2	Calcium	Ca^{2+}
+2	Barium	Ba^{2+}
+2	Zinc	Zn^{2+}
+2	Copper(II)	Cu^{2+}
+2	Iron(II)	Fe^{2+}
+2	Lead(II)	Pb^{2+}
+3	Aluminium	Al^{3+}
+3	Iron(III)	Fe^{3+}
+3	Chromium(III)	Cr^{3+}
+4	Tin(IV)	Sn^{4+}
+4	Lead(IV)	Pb^{4+}

3. Common Negative Ions — Anions

Charge	Name	Formula
–1	Chloride	Cl^-
–1	Fluoride	F^-
–1	Bromide	Br^-
–1	Iodide	I^-
–1	Hydroxide	OH^-
–1	Nitrate	NO_3^-
–1	Nitrite	NO_2^-
–1	Bicarbonate	HCO_3^-
–1	Bisulfate	HSO_4^-
–1	Chlorate	ClO_3^-
–1	Hypochlorite	ClO^-
–1	Permanganate	MnO_4^-
–2	Oxide	O^{2-}
–2	Sulfide	S^{2-}
–2	Sulfate	SO_4^{2-}
–2	Sulfite	SO_3^{2-}
–2	Carbonate	CO_3^{2-}
–2	Chromate	CrO_4^{2-}
–2	Dichromate	$Cr_2O_7^{2-}$
–2	Thiosulfate	$S_2O_3^{2-}$
–3	Nitride	N^{3-}
–3	Phosphate	PO_4^{3-}
–4	Carbide	C^{4-}

4. Monatomic vs. Polyatomic Ions

Monatomic ion	Polyatomic ion
Contains one atom	Contains multiple bonded atoms
Example: **Na^+**	Example: **NH_4^+**
Example: **Cl^-**	Example: **SO_4^{2-}**

5. The Golden Rule

Remember!

- **Cation:** Loses electrons → Positive charge (+)
- **Anion:** Gains electrons → Negative charge (–)
- **Polyatomic ion:** A charged group of bonded atoms
- **Roman numeral:** Identifies a metal ion's positive charge, such as copper(II) = Cu^{2+}.

Science Fables