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Warm-Up | Metals

Lesson Question

How are metals identified?

Lesson Goals

Explore metals .

Describe the characteristic properties of metals.

Identify the location of metals in the periodic table.

Explain how and why the reactivity of metals changes in the periodic table.

Words to Know

Fill in this table as you work through the lesson. You may also use the glossary to help you.

lustrous	having a shiny appearance
thermal conductivity	a measure of how well a substance allows heat to pass through it
ductile	able to be stretched into long, thin shapes without breaking
opaque	does not allow light to pass through; unable to be seen through
malleable	able to be shaped (as with a mallet) without breaking
electrical conductivity	a measure of how well a substance allows electric current to flow through it

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Organization of the Periodic Table

- Columns of the periodic table are called [groups].
  - Elements in a group have similar chemical [properties].
- Rows of the periodic table are called [periods].
  - Elements in a period have the same [number] of electron shells.
  - The [atomic] number increases from left to right.

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Slide 2

Physical Properties of Metals: Shape

- Malleable :
  - Can be shaped
  - Does not break easily
- Ductile :
  - Can be pulled into long, thin shapes

Physical Properties of Metals: Conductivity

- Thermal conductivity :
  - Allows heat to pass easily
- Electrical conductivity:
  - Allows the easy flow of electric current

Slide 5

More Physical Properties of Metals

- Lustrous :
  - Shiny to the eye
- Opaque :
  - Does not allow light to pass through
- High melting points (with some exceptions)

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Slide 9

Metals and the Periodic Table

Periodic table groups include:

- alkali metals.
- alkaline earth metals.
- transition metals (many groups).

Alkali Metals

Group 1

- Shiny
- Soft
- Extremely reactive
- 1 valence electron
- Examples
  - Lithium
  - Sodium

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Slide 9

Alkaline Earth Metals

Group 2

- Very shiny, silvery
- Harder, more dense
- Less reactive
- 2 valence electrons
- Examples
  - Magnesium
  - Calcium

Slide 11

Comparison

Alkali Metals Group 1	Alkaline Earth Metals Group 2
Shiny appearance	Very shiny, silvery appearance
Soft	Harder, more dense
Extremely reactive	Less reactive
1 valence electron	2 valence electrons
Lithium, sodium	Magnesium, calcium

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Slide 11

Metals and the Periodic Table: Transition Metals

Transition metals:

- are in [groups] 3 to 12.
- begin in the 4th [period].
- can form more than one kind of [ion].
- are less reactive than metals in groups [1] and [2].

Metals and the Periodic Table: Colorful Compounds

- Colorful compounds of transition metals
  - Potassium [dichromate]
  - [Cobalt] chloride
  - [Copper] sulfate
- Colors result of electron structure of these elements

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Slide 14

Reactivity Trends in Periods of the Periodic Table

COMPARING GROUP 1 AND GROUP 2 ELEMENTS

- Chemical reactions are determined by gaining or losing valence electrons to form a complete shell.
- If it is easier for an atom to lose electrons than to gain them, then it will lose electrons and become a positive ion.
- The leftmost elements have the fewest valence electrons, so they are most reactive.
- A major chemical property of metals is that they form positive ions.

Reactivity Trends in Periods of the Periodic Table

COMPARING PERIOD 3 AND PERIOD 6 ELEMENTS

- Elements in the same group have the same number of valence electrons.
- Ions from the same group have the same charge and exhibit similar behavior.
- The farther valence electrons are from the nucleus, the easier it is to lose them.
- As you move down a group, an electron shell is added with each period.
- Elements at the bottom of the table are more reactive than those at the top.

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Lesson Question

How are metals identified?

Answer

(Sample answer) Metals are identified by many of their physical properties. Metals are malleable, ductile, lustrous, and opaque, and they have thermal conductivity, electrical conductivity, and high melting points. Metals can also be identified and sorted by their reactivity, which changes as you move across a period and down a group on the periodic table.

Slide 2

Review: Key Concepts

Properties of metals:

- Malleable, ductile
- Lustrous, opaque
- Good at thermal and electrical conduction

Groups containing metals:

- Alkali metals
- Alkaline earth metals
- Transition metals

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Trends in reactivity:

- Increase from right to left in a period
- Increase from top to bottom in a group

Use this space to write any questions or thoughts about this lesson.

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