

Chapter 6

Periodic Table

The Periodic Law

How is the modern periodic table organized?

In the modern periodic table, elements are arranged in order of increasing atomic number.

Mendeleev's Periodic Table

How did Mendeleev organize his periodic table?

- Mendeleev arranged the elements in his periodic table in order of *increasing atomic mass*.
- The periodic table can be used to predict the properties of undiscovered elements.

The **periodic law**:

When elements are arranged in order of increasing atomic number, there is a periodic repetition of their physical and chemical properties.

Test
Exam

- The properties of the elements within a period change as you move across a period from left to right. ↳ [rows]
- The pattern of properties within a period repeats as you move from one period to the next. ↳ [columns]

Metals, Nonmetals, and Metalloids

What are three broad classes of elements?

1. metals
2. nonmetals
3. metalloids.

Across a period, the properties of elements become less metallic and more nonmetallic

Electron Configuration	# outer e ⁻	Group#	period
Na ^[11p⁺] 1s ² 2s ² 2p ⁶ 3s ¹	1	1 [IA]	3
P ^[15p⁺] 1s ² 2s ² 2p ⁶ 3s ² 3p ³	5	15 [VA]	3
K ^[19p⁺] 1s ² 2s ² 2p ⁶ 3s ² 3p ⁶ 4s ¹	1	1 [IA]	4

Metals

Metals are good conductors of heat and electric current.

- 80% of elements are metals.
- Metals have a high luster, are ductile, and are malleable. [can be hammered]

In general, nonmetals are poor conductors of heat and electric current.

- Most nonmetals are gases at room temperature.
- A few nonmetals are solids, such as sulfur and phosphorus.
- One nonmetal, bromine, is a dark-red liquid.

Metalloids

- A **metalloid** generally has properties that are similar to those of metals and nonmetals.
- The behavior of a metalloid can be controlled by changing conditions.

The Noble Gases

The **noble gases** are the elements in Group 8A of the periodic table.

Electron Configurations.	#e- in highest energy level	# outer electrons
He $1s^2$	2	2
Ar $1s^2 2s^2 2p^6 3s^2 3p^6$	8	8

The Representative Elements

Elements in groups 1A through 7A are often referred to as representative elements [1, 2, 13-17]

because they display a wide range of physical and chemical properties.

- The *s* and *p* sublevels of the highest occupied energy level are not filled.
- The group number equals the number of electrons in the highest occupied energy level

	Elec. Config.	Period #	Group #	# outer e ⁻	Highest energy level
Li	1s ² 2s ¹	2	IA	1	2
N	1s ² 2s ² 2p ³	2	VA	5	2
Mg	1s ² 2s ² 2p ⁶ 3s ²	3	IIA	2	3
S	1s ² 2s ² 2p ⁶ 3s ² 3p ⁴	3	VIA	6	3
Br	1s ² 2s ² 2p ⁶ 3s ² 3p ⁴ 4s ² 3d ¹⁰ 4p ⁵ <i>low → high</i>	4	VIIA	7	4

Classwork

Read
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Attachments

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