

THE PERIODIC TABLE

Do now: How are the elements on the periodic table arranged today? Do you think it was always like this?

Part A: Development of the periodic table:

1. Johann Doberiner (1829):

2. John Newland (1865):

3. Lothar Meyer (1867):

4. Dmitri Mendelyev (1869):

e. **Henry Gwyn Mosley (1913):**

Do now: How are the elements on the periodic table arranged today? Do you think it was always like this?

f. **Present Arrangement:**

Part A: Development of the periodic table:

1. Johann Dobereiner (1829):

2. John Newland (1865):

3. Lothar Meyer (1869):

4. Dmitri Mendeleev (1869):

Ionic Radii: **ATOMIC AND IONIC RADII**

Do now: Define the following terms:

Atomic radii:

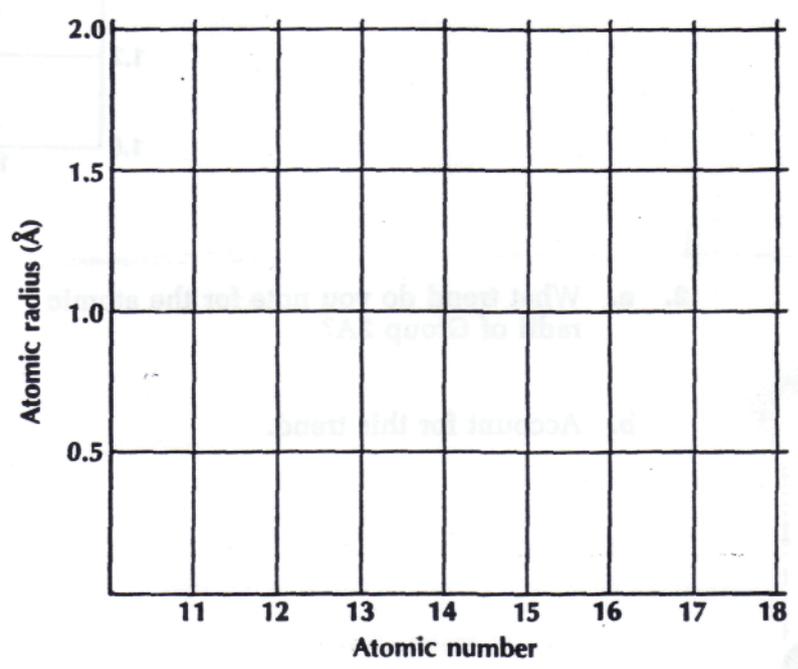
Ionic Radii:

Activity: Graph the following data and answer the following questions:

Using the grids below and the given data, graph atomic radius versus atomic number for the third period and for Group 2A of the periodic table. Then answer the questions that follow.

THIRD PERIOD

Element	Atomic Number	Atomic Radius (Å)
Na	11	1.86
Mg	12	1.60
Al	13	1.43
Si	14	1.17
P	15	1.10
S	16	1.04
Cl	17	0.99
Ar	18	0.94



Summary:

1. a. What trend do you note for the atomic radii of the third period?

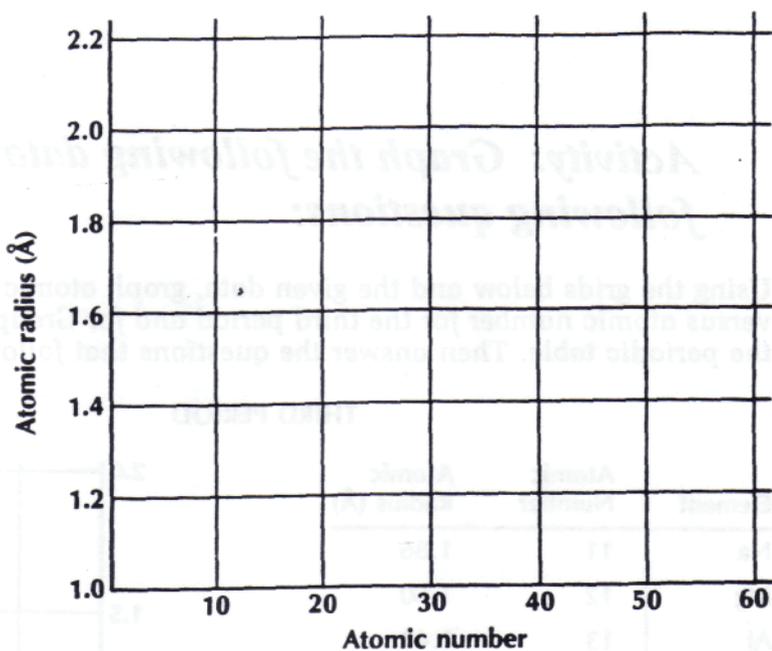
1a. _____

b. Account for this trend.

b. _____

GROUP 2A

Element	Atomic Number	Atomic Radius (Å)
Be	4	1.11
Mg	12	1.60
Ca	20	1.97
Sr	38	2.15
Ba	56	2.17



2. a. What trend do you note for the atomic radii of Group 2A?

2a. _____

b. Account for this trend.

b. _____

Ionic Radii: ATOMIC AND IONIC RADII

Closure:

For each set of elements circle the one with the smallest radius and give a reason for your choice.

a. Metals:

b. Nonmetals:

Graph the following data and answer the following questions:

Using the graph above and the given data, graph atomic radius versus atomic number for the third period and for Group 17. The period is 3A. Then answer the questions that follow.

Element	Atomic Number	Atomic Radius (Å)
Na	11	186
Mg	12	135
Al	13	118
S	16	104
Cl	17	99
Ar	18	94



Summary:

3. a. What trend do you note for the atomic radii of the third period?

Closure:
For each set of elements circle the one with the smallest radius and give a reason for your choice

SET REASON

C N O F

F Cl Br I

Element	Atomic Number	Atomic Radius (Å)
Be	4	1.11
Mg	12	1.73
Ca	20	1.97
Sr	38	2.15

Na K Na⁺ K⁺

Na⁺ K⁺ Mg⁺⁺ Ca⁺⁺

F F⁻ Na Na⁺



2. a. What trend do you note for the atomic radii of Group 2A?

b. Account for this trend.

METALS, NONMETALS, and METALLOIDS

Do now: Define the following terms:

metal:

nonmetal:

metalloid:

Activity: Complete the following table:

Characteristic	Metal	Nonmetal	Metalloid
Location			
Lose/gain			
I.E.			
E.N.			

Characteristic	Metals	Nonmetals	Metalloids
E.A.			
Other properties:			
Physical state and examples:			

Closure: Complete the following set of questions in your base group:

The Periodic Table

Origin and arrangement

1. The first periodic law and table of the elements was proposed by the Russian scientist _____

2. How was the early periodic law different from today's modern periodic law? _____

What discovery permitted this revision of the earlier periodic law? _____

3. The horizontal rows of the periodic table are called _____. The number of a period is the same as the number of the _____ principal energy level containing electrons.

4. The vertical columns of the periodic table are called _____ or _____.

5. Why do members of a group exhibit similar chemical properties? _____

Metals

6. Where are the metals found in the periodic table? _____

7. What names are given to these groups of metals? Group IA _____
Group IIA _____

8. Which groups contain the most reactive metals? _____

9. What are some general physical and chemical properties of metals? _____

Nonmetals

10. Where are the nonmetals found in the periodic table? _____

11. Which groups contain the most reactive nonmetals? _____

12. What name is given to the Group VIIA nonmetals? _____

13. What are some general physical and chemical properties of the nonmetals? _____

Other categories

14. What is a metalloid? _____

15. Which four elements are the best examples of the metalloids? _____,
_____, _____, _____
16. Where are the transition elements found in the periodic table? _____

17. What characteristic of atomic structure distinguishes the transition elements from the A groups of elements? _____

18. What is a distinguishing physical property of the compounds of the transition elements? _____

19. Why are the elements of Group 0 called the noble (or "inert") gases? _____

20. Why is "inert" an inappropriate designation for the Group 0 elements? _____

Group 13 Boron CHEMISTRY OF A GROUP Group 14 (A) Group 15 (VA) Group 16 (VIA)

Directions: Jigsaw cooperative learning

Step 1: Break up into 4 expert groups

Group 1: Studies group 1 and 2 (s block)

Group 2: Studies group 13, 14, 15, 16 (pt. of p block)

Group 3: Studies group 17 and 18 (pt. of d block)

Group 4: Transition elements (d block)

Lanthanide Series } f block
Actinide Series }

Step 2: Using your textbook and your review book describe the properties the groups you are an expert group. Fill in the appropriate section on the accompanying charts.

(discuss your project with the members of your expert group)

Step 3: Go back to your base group and share the information with the members of your base group.

Step 4: Do the closure activity. Hand in 1 copy per group to be graded.

Group 1 (1A)
Alkali metals

Group 2 (11A)

Group 13
Boron

Group 14

Group 15

Group 16

Group 17 (V11A)
Halogen Family

Group 18 (V111A)

Transition elements: (d-block)

Directions: Jigsaw cooperative learning

Step 1: Break up into 4 expert groups

Group 1: Studies groups 1 and 2 (s-block)

Group 2: Studies groups 13, 14, 15, 16 (pt. of p-block)

Group 3: Studies groups 17 and 18 (pt. of d-block)

Group 4: Transition elements (d-block)

Step 2: Assign each student to a base group

Step 3: Using your textbook and your jigsaw

Lanthanide Series: (f-block)

Directions: Jigsaw cooperative learning

(discuss your project with the members of your expert group)

Step 1: Do back on your base group and share the information with the members of your base group

Step 2: Do the class activity. Hand in a copy of your group to be graded

Actinide Series: (f-block)

The Periodic Table

Choose words from the list to fill in the blanks in the paragraphs.

Word List

- | | |
|----------------------|--------------------|
| actinide series | metal |
| alkali metal | metalloid |
| alkaline earth metal | noble gas |
| atomic mass | nonmetal |
| atomic number | period |
| family | periodic law |
| group | periodic table |
| halogen | transition element |
| lanthanide series | |

Dmitri Mendeleev developed a chartlike arrangement of the elements called the (1). He stated that if the elements were listed in order of increasing (2), their properties repeated in a regular manner. He called this the (3) of the elements. The arrangement used today differs from that of Mendeleev in that the elements are arranged in order of increasing (4). Each horizontal row of elements is called a(n) (5). Each vertical column is called a(n) (6), or, because of the resemblance between elements in the same column, a(n) (7).

In rows 4 through 7, there is a wide central section containing elements, each of which is called a(n) (8). Rows 6 and 7 also contain two other sets of elements that are listed below the main chart. These are called the (9) and the (10), respectively. Each of these elements, as well as those in the first two columns at the left end of the chart, is classified as a(n) (11). Each of the elements at the right side of the chart is classified as a(n) (12). Each of the elements between these two main types, having some properties like one type and other properties like the other type, is called a(n) (13).

Each of the elements in the column labeled 1A is called a(n) (14). Each of the elements in the column labeled 2A is called a(n) (15). Each of the elements in column 7A is called a(n) (16). Each of the elements in column 0 is called a(n) (17).

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____

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Characteristics of Elements

Use a periodic table of the elements to help you answer the following questions.

- | | |
|--|-----------|
| <p>1. a. How many protons does an atom of bromine (Br) have?</p> | 1a. _____ |
| <p>b. In which Group is bromine found?</p> | b. _____ |
| <p>c. What is the name of its chemical family?</p> | c. _____ |
| <p>d. How many valence electrons does it have?</p> | d. _____ |
| <p>e. Is it a metal, a nonmetal, or a metalloid?</p> | e. _____ |
| <p>f. How does its atomic radius compare to chlorine's (Cl)?</p> | f. _____ |
| <p>g. How does its atomic radius compare to arsenic's (As)?</p> | g. _____ |
| <p>h. What ion is it most likely to form in compounds?</p> | h. _____ |
| <p>2. a. How many protons does an atom of argon (Ar) have?</p> | 2a. _____ |
| <p>b. In which Group is argon found?</p> | b. _____ |
| <p>c. What is the name of its chemical family?</p> | c. _____ |
| <p>d. How many valence electrons does it have?</p> | d. _____ |
| <p>e. Is it a metal, a nonmetal, or a metalloid?</p> | e. _____ |
| <p>f. How does its atomic radius compare to krypton's (Kr)?</p> | f. _____ |
| <p>g. How does its atomic radius compare with that of sulfur (S)?</p> | g. _____ |
| <p>h. What ion is it most likely to form in compounds?</p> | h. _____ |
| <p>3. a. How many protons does an atom of potassium (K) have?</p> | 3a. _____ |
| <p>b. In which Group is potassium found?</p> | b. _____ |
| <p>c. What is the name of its chemical family?</p> | c. _____ |
| <p>d. How many valence electrons does it have?</p> | d. _____ |
| <p>e. Is it a metal, a nonmetal, or a metalloid?</p> | e. _____ |
| <p>f. How does its atomic radius compare to sodium's (Na)?</p> | f. _____ |
| <p>g. How does its atomic radius compare with that of selenium (Se)?</p> | g. _____ |
| <p>h. What ion is it most likely to form in compounds?</p> | h. _____ |

Periodic Table & Trends

On the table below

1. fill in the names of groups 1,2, 17 & 18.
2. indicate where H is
3. draw in the step & put a bracket for metals & nonmetals
4. indicate group number & period number in the proper place
5. on the arrows below indicate the trend going left to right across a period for

atomic mass
nonmetallic properties

atomic (covalent) radius
ionization energy

electronegativity
of valence electrons

of principal energy levels

6. on the arrows below indicate the trend going down a group for
- atomic mass
nonmetallic properties

atomic (covalent) radius
ionization energy

electronegativity
of valence electrons

of principal energy levels

