

Chemistry

Unit 3

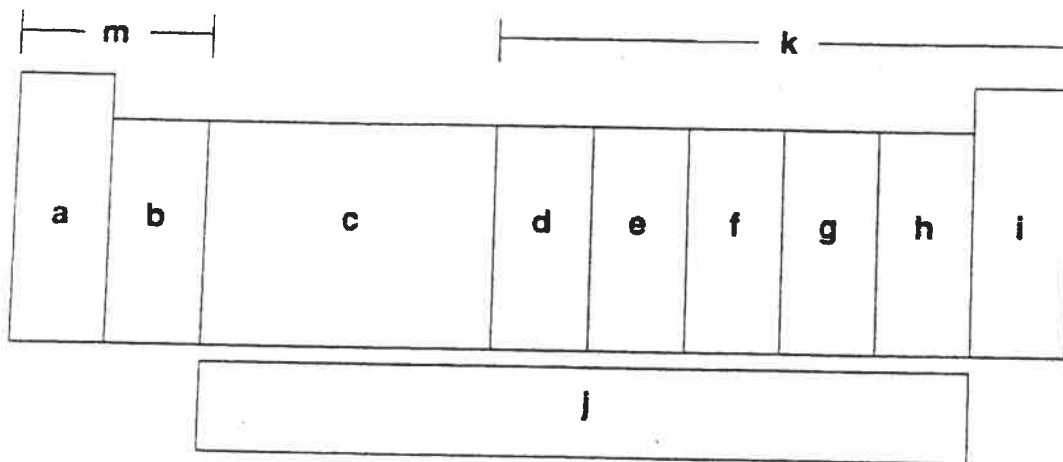
Periodic Table & Periodicity

5-2 Review and Reinforcement

Reading the Periodic Table

On the line at the left, write the letter of the appropriate location of each group of elements on the periodic table below. Some letters will be used more than once.

- | | | | |
|-------|----------------------------|-------|--------------------------------------------|
| _____ | 1. carbon family | _____ | 8. f-block elements |
| _____ | 2. alkaline earth metals | _____ | 9. noble gases |
| _____ | 3. inner transition metals | _____ | 10. p-block elements |
| _____ | 4. halogens | _____ | 11. nitrogen family |
| _____ | 5. d-block elements | _____ | 12. s-block elements |
| _____ | 6. oxygen group | _____ | 13. transition metals |
| _____ | 7. alkali metals | _____ | 14. group of one semimetal and four metals |



Use the skills you developed in Section 5-2 to answer each of the following questions.

Below is the abbreviated electron configuration for sodium. Explain each part of this configuration in the space provided.

- [Ne] 3s¹
15. _____
16. _____
17. _____
18. _____

5-2 Review and Reinforcement (continued)

Identify each of the following elements as a metal (M), nonmetal (NM), or semimetal (SM).

- _____ 19. sodium
- _____ 20. silicon
- _____ 21. neon
- _____ 22. calcium
- _____ 23. nitrogen

Write the family names that have been given to each of the following groups.

- 24. Group 1A
- 25. Group 2A
- 26. Group 7A
- 27. Group 8A

Answer each of the following questions in the space provided.

28. What information is contained in each of the 109 squares on the periodic table?

29. What properties distinguish metals from nonmetals?

30. What is an electron configuration, and what does it tell you about an element?

Name: _____

Hour: _____ Date: _____

Chemistry: *The Periodic Table and Periodicity*

Directions: Answer each of the following questions. You need not use complete sentences.

1. Who first published the classification of the elements that is the basis of our periodic table today?
2. By what property did Mendeleev arrange the elements?
3. By what property did Moseley suggest that the periodic table be arranged?
4. What is the periodic law?
5. What is a period? How many are there in the periodic table?
6. What is a group (also called a family)? How many are there in the periodic table?
7. State the number of valence electrons in an atom of:
a. sulfur b. calcium c. chlorine d. arsenic
8. Give the names and chemical symbols for the elements that correspond to these atomic numbers:
a. 10 b. 18 c. 36 d. 90
9. List, by number, both the period and group of each of these elements.

	<u>Symbol</u>	<u>Period</u>	<u>Group</u>
a. beryllium	Be		
b. iron	Fe		
c. lead	Pb		
10. Which of the following pairs of elements belong to the same period?
a. Na and Cl b. Na and Li c. Na and Cu d. Na and Ne
11. Which of the following pairs of elements belong to the same group?
a. H and He b. Li and Be c. C and Pb d. Ga and Ge
12. How does an element's period number relate to the number of the energy level of its valence electrons?

13. What are the transition elements?
14. In what type of orbitals are the actinide and lanthanide electrons found?
15. Would you expect strontium to be, chemically, more similar to calcium or rubidium and WHY?
16. What are the coinage elements?
17. What is the heaviest noble gas? What is the heaviest alkaline earth metal?
18. In going from top to bottom of any group, each element has _____ more occupied energy level(s) than the element above it.
19. What are the Group 1 elements called?
20. What are the Group 2 elements called?
21. What are the Group 17 elements called?
22. What are the Group 18 elements called?
23. What is the name given to the group of elements that have the following valence shell electron configurations?
 - a. s^2
 - b. s^2p^6
 - c. s^2p^5
 - d. s^1
24. List the three lightest members of the noble gases.
25. List all of the alkali metals.
26. Which alkali metal belongs to the sixth period?
27. Which halogen belongs to the fourth period?
28. What element is in the fifth period and the eleventh group?
29. Why do all the members of a group have similar properties?
30. What do we mean by the "atomic radius?"
31. Within a group, what happens to the atomic radius as you go down the column?

32. Explain your answer to Question 31: Why does the atomic radius change?
33. What is coulombic attraction?
34. Within a period, what happens to the atomic radius as the atomic number increases?
35. Explain your answer to Question 34: Why does the atomic radius change?
36. What two factors determine the strength of coulombic attraction?
37. What is the shielding effect?
38. How are the shielding effect and the size of the atomic radius related?
39. How are neutral atoms converted into cations? How are neutral atoms converted into anions?
40. Metals usually form what type of ions? Nonmetals usually form what type of ions?
41. What is ionization energy?
42. What is the equation that illustrates ionization energy, and what does each symbol represent?
43. What do we mean by the first, second, and third ionization energies for a particular atom?
44. Why does each successive ionization require more energy than the previous one?
45. What is the general trend of ionization energy as you go from left to right across the periodic table?
46. What is the general trend of ionization energy as you go down a group on the periodic table?

47. Which of these elements has the highest first ionization energy: Sn, As, or S?
48. When an atom becomes an anion, what happens to its radius?
49. When an atom becomes a cation, what happens to its radius?
50. For each of the following pairs, circle the atom or ion having the larger radius.
- | | | |
|---------------------------|----------------------------------------|---------------------------------------|
| a. S or O | c. Na^{1+} or K^{1+} | e. S^{2-} or O^{2-} |
| b. Ca or Ca^{2+} | d. Na or K | f. F or F^{1-} |
51. For each of the following pairs, identify the smaller ion.
- | | | |
|----------------------------------------|---------------------------------------|-----------------------------------------|
| a. K^{1+} or Ca^{2+} | c. C^{4+} or C^{4-} | e. O^{2-} or F^{1-} |
| b. F^{1-} or Cl^{1-} | d. S^{2-} or F^{1-} | f. Fe^{2+} or Fe^{3+} |
52. Where, generally, are the metals located on the periodic table?
53. Where, generally, are the nonmetals located on the periodic table?
54. A. List some properties of metals.
- B. List some properties of nonmetals.
- C. What kinds of properties do metalloids have?
55. What is electronegativity?
56. Who determined the scale of electronegativity most often used today?
57. List the following atoms in order of increasing electronegativity: O, Al, Ca
58. List the following atoms in order of decreasing electronegativity: Cl, K, Cu
59. What is the general trend of electronegativity as you go down the periodic table?
60. What is the general trend of electronegativity as you go left to right across the periodic table?

Periodic Table Worksheet

Name _____ Per. _____

1. Periodic means _____

Examples of periodic properties:

2. What is a group (or family)? _____ What is a period? _____

3. How can you determine the number of electrons in an element's outer energy level by the group it's in?

4. What is the octet rule?

5. Why do elements that make positive ions occur on the left side of the periodic table while those that make negative ions occur on the right?

6. What is the common name for group 18? _____

Why do the elements of this group usually not form ions?

7. Complete the following table.

Group	Common Name	Charge on Ions of this Group
1		
2		
13 / 3A	-----	
16 / 6A	-----	
17 / 7A		

8. Predict the charges on ions of the following atoms.

Ra _____ As _____ Te _____ Cs _____ In _____ At _____ Ga _____

9. a) In group 1, which element is the most active? _____

b) Metallic activity tends to (increase, decrease) as one goes down Group 1.

10. a) Which element is most active in group 17? _____

b) Nonmetal activity tends to (increase, decrease) as one goes down Group 17.

11. Compare and contrast ionization energy and atomic radius.

Ionization Energy

Radius

Definition: _____

Largest values
 (metal or nonmetal side) _____

Largest values
 (top or bottom of group) _____

12. Choose the element in each pair that has the largest radius:

- a) K or Br b) F or Br c) He or Rn d) Mg or Cl e) O or S f) Be or O

13. Choose the element in each pair that has the highest ionization energy:

- a) Na or Cl b) Na or Cs c) F or I d) K or F e) Mg or S f) N or Sb

14. When elements have a large radius, they tend to have a (large, small) ionization energy. WHY???

15. Name all the elements called metalloids. _____

Periodic Table Scavenger Hunt

- _____ 1. Which element is a metal: Ba (56) or At (85)?
- _____ 2. Which period is Ca (20) in?
- _____ 3. What is the number of the group N (7) is in?
- _____ 4. Which element is an alkali metal: Rb (37) or Al (13)?
- _____ 5. Which element is a halogen: Na (11) or Cl (17)?
- _____ 6. Which element is a noble gas: Ne (10) or Br (35) or O (8)?
- _____ 7. Which element is the most active nonmetal?
- _____ 8. Which element is the most active metal?
- _____ 9. Which element has the largest radius: Na (11) or Cs (55)?
- _____ 10. Which element would be a positive ion in a compound: Sr (38) or Te (52)?
- _____ 11. How many electron dots should As (33) have?
- _____ 12. Which element has the highest ionization energy: K (19) or Kr (36)?
- _____ 13. When Te (52) is an ion in a compound, what charge does it have?
- _____ 14. How many is an octet of electrons?
- _____ 15. Which element has the largest radius: Rb (37) or Xe (54)?
- _____ 16. Which element has the largest ionization energy: K (19) or Cl (17)?
- _____ 17. Which element has 5 valence electrons? B (5) or P (15)?
- _____ 18. Which element has 18 electrons when it is an ion with a -1 charge?
- _____ 19. What atomic number would an isotope of U (92) have?
- _____ 20. How many neutrons does bromine-80 have?

Characteristics of Elements

Name _____

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

1. a. How many protons does an atom of bromine (Br) have? a. _____
b. In which group number is bromine found? b. _____
c. What is the common name of this chemical family? c. _____
d. How many valence electrons does it have? d. _____
e. Is it a metal, a nonmetal, or a metalloid? e. _____
f. How does its atomic radius compare to that of chlorine (Cl)? f. _____
g. How does its atomic radius compare to that of arsenic (As)? g. _____
h. What ion is it most likely to form in compounds? h. _____

2. a. How many protons does an atom of argon (Ar) have? a. _____
b. In which group number is argon found? b. _____
c. What is the common name of this chemical family? c. _____
d. How many valence electrons does it have? d. _____
e. Is it a metal, a nonmetal, or a metalloid? e. _____
f. How does its atomic radius compare to that of krypton (Kr)? f. _____
g. How does its atomic radius compare to that of sulfur (S)? g. _____
h. What ion is it most likely to form in compounds? h. _____

3. a. How many protons does an atom of potassium (K) have? a. _____
b. In which group number is potassium found? b. _____
c. What is the common name of this chemical family? c. _____
d. How many valence electrons does it have? d. _____
e. Is it a metal, a nonmetal, or a metalloid? e. _____
f. How does its atomic radius compare to that of sodium (Na)? f. _____
g. How does its atomic radius compare to that of selenium (Se)? g. _____
h. What ion is it most likely to form in compounds? h. _____

Periodic Table Puzzle

Can you place these elements in their proper positions on the Periodic Table without knowing their identity? Instead of the usual chemical symbol, each element is represented by a code letter, and some clues to the element's identity are listed below. In addition, the elements fall into these families or groups:

JKQ, WNVG, IAL, EPFZ, YBR, ODS, CXU, THM

Place each code letter in its proper space in the table below, then indicate the actual chemical symbol that corresponds to each letter.

<p>W is an inert gas. P is an alkali metal. X is a halogen. D is an element that needs three electrons to become stable. K is an atom that readily yields a 2+ ion. M is an element found in the group to the right of S. B would probably form a 3+ ion. A has six protons in its nucleus. R has an atomic number one less than A. O has an atomic number one more than A. S has 18 more protons in its nucleus than has D. F has only one proton in each atom. Y has atoms that are larger than the atoms of B. I has the largest atomic number in its group.</p>	<p>T is found in the fourth period (or row). C has atoms that are larger than those of U, but smaller than those of X. V has one more proton in its nucleus than U. H has the smallest atomic number in its group. G has two protons in each atom. N is a third period element. J is a second period element. Q has an atomic mass greater than that of J and less than that of K. E has an atomic number less than that of Z but greater than that of P. Z has more protons than other elements in its group. U is found in the second period.</p>
----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

1							2	
3	4	Transition Metals	5	6	7	8	9	10
11	12		13	14	15	16	17	18
19	20		31	32	33	34	35	36

