Name _____ Honors Chemistry ___/___/___

Chapter 3 Practice Test

Part I: For each of the following, write the symbol of the element that best fits the description given. You may use an element more than once; you may even use it more than twice. (2 point each)

1. _____ The alkali metal with the greatest ionization energy.
2. _____ The halogen with the greatest electronegativity.
3. _____ The noble gas with the greatest atomic radius.
4. _____ The fourth period element with the highest electron affinity.
5. _____ The synthetic rare-earth element with the smallest atomic number.
6. _____ The alkaline-earth element with the greatest second ionization energy.
7. _____ The fifth period metalloid with the largest atomic radius.
8. _____ The element on the periodic table with the smallest atomic radius.
9. _____ The third period non-metal with the highest ionization energy.
10. _____ The second period non-metal with the fewest valence electrons.
11. _____ The naturally occurring element with the greatest atomic mass.
12. _____ The second period element with the greatest ionization energy.
13. _____ The element with the greatest ionization energy.
14. _____ The chalcogen non-metal with the greatest number of protons.
15. _____ The third period metal with a 3+ oxidation number.
16. _____ The element with the lowest ionization energy.
17. _____ The alkaline-earth element with the smallest atomic radius.
18. _____ The element with the greatest electronegativity.
19. _____ The sixth period element with the greatest electronegativity.
20. _____ The metalloid with the fewest valence electrons.
21. _____ The p block element with the smallest atomic radius.
22. _____ The inert fourth period element.
23. _____ The alkaline earth element with the smallest ionization energy.
24. _____ The actinide with the lowest atomic mass.
25. _____ The sixth period element with the fewest valence electrons.

Part II: Choose the BEST answer for each of the following multiple-choice questions. (1 point each)

26. _____ Which of the following represents the ground state electron configuration for the Mn^{3+} ion?
(A) $1s^2\ 2s^2 2p^6\ 3s^2 3p^6 3d^4$ (B) $1s^2\ 2s^2 2p^6\ 3s^2 3p^6 3d^5\ 4s^2$ (C) $1s^2\ 2s^2 2p^6\ 3s^2 3p^6 3d^2\ 4s^2$
(D) $1s^2\ 2s^2 2p^6\ 3s^2 3p^6 3d^8\ 4s^2$ (E) $1s^2\ 2s^2 2p^6\ 3s^2 3p^6 3d^3\ 4s^1$

27. _____ The electron configuration: $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6$ corresponds to the electron configuration of:
(A) S^{2-} (B) Ca^{2+} (C) Cl^- (D) K^+ (E) all of these

28. _____ Which of the following has the largest value for the second ionization energy?
(A) sodium (B) chlorine (C) sulfur (D) aluminum (E) magnesium

29. _____ Which of the following has the largest electron affinity?
(A) sodium (B) chlorine (C) sulfur (D) aluminum (E) magnesium

30. _____ In which of the following are the elements listed in order of increasing ionization energy?
(A) B, Be, C, N (B) F, Cl, Br, I (C) O, N, C, B
(D) Mg, Al, Si, P (E) N,O, F, Ne

Ionization Energies for element X (kJ mol^{-1})				
First	Second	Third	Fourth	Five
580	1815	2740	11600	14800

31. _____ The ionization energies for element X are listed in the table above. On the basis of the data, element X is most likely to be:
(A) Na (B) Mg (C) Al (D) Si (E) P

32. _____ In which of the following are the elements listed in order of increasing Electronegativity?
(A) Ba, Zn, C, Cl (B) N, O, S, Cl (C) N, P, As, Sb
(D) K, Ba, Si, Ga (E) Li, K, Na, Ca

33. _____ In the periodic table, as the atomic number increases from 11 to 17, what happens to the atomic radius?
(A) It remains constant. (B) It increases only. (C) It increases, then decreases.
(D) It decreases only. (E) It decreases, then increases.

34. _____ Which of the following elements has one valence electron?
(A) helium (B) chlorine (C) chromium (D) aluminum (E) zinc

Part III: Match each scientist on the left with the most fitting description on the right. (1 point each)

35. _____ Johann Dobereiner
36. _____ Dmitri Mendeleev
37. _____ A. Beguyer de Chancourtois
38. _____ Hennig Brand
39. _____ Lothar Meyer
40. _____ John Newlands
41. _____ Glenn T. Seaborg
42. _____ Henry Moseley

a. The scientist who wrote the first periodic table.
b. This man had written a table similar to Mendeleev's but published it a year later.
c. The youngest of 17 children and the Father of the Periodic Table.
d. He wrote Law of Octaves.
e. The scientist who wrote the Law of Triads.
f. The first person to organize the periodic table by increasing atomic number.
g. This scientist discovered the first element, Phosphorus.
h. This scientist whose team created elements 94-102

Part IV: Write the correct electron configurations for each of the following ions. (2 points each)

43. As^{3+}

44. Cu^{1+}

45. Mn^{6+}

Part V: Write the Lewis Dot Diagram and ion for each of the following elements. (1 point for each answer)

Element:	46. Phosphorus	47. Indium	48. Helium	49. Vanadium	50. Cr^{3+}
Dot Diagram:					
Oxidation Number:					

Part VI: For each of the following statements, determine which term it best describes. Use: alkali, halogen, chalcogen, metalloid, alkaline earth, lanthanide, actinide, noble gas. You will use some terms more than once.(1 point each)

51. _____ This group contains a metal, metalloid and non-metals.
52. _____ This group of elements that contains one synthetic element.
53. _____ This group of elements loses 2 electrons when they form ions.
54. _____ This group reacts with water and air.
55. _____ This term refers to elements that have properties of both metals and non-metals.
56. _____ The elements in this group are inert.
57. _____ This group contains solid, liquid & gaseous elements are room temperature.
58. _____ The elements in this group are harder and denser than the alkali metals.
59. _____ This group has a one valence electron.
60. _____ This group of elements is composed of mostly synthetic elements.
61. _____ This group contains the most reactive non-metals.

Part VII: Put the following species in an isoelectric set in order from smallest to largest. (2 points)

62. Sr^{2+}, As^{3-}, Y^{3+}, Mo^{6+}, Kr, Br^{1-}

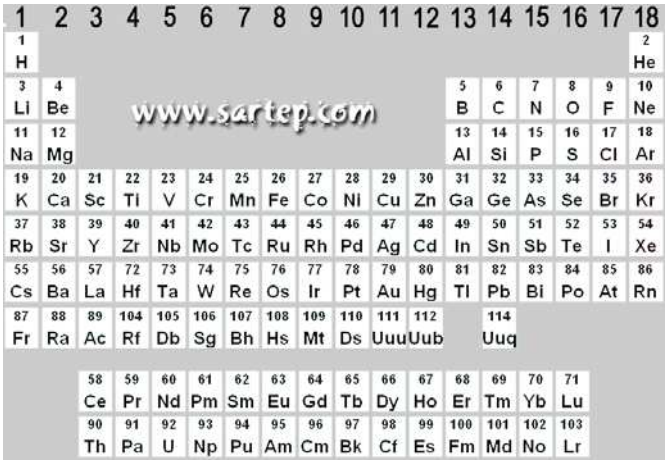
63. Ce^{4+}, I^{1-}, Cs^{1+}, Te^{2-}, Sb^{3-}, La^{3+}

Part VIII: Free Response (2 points)

64. Explain the reason for the observed trend in atomic radius across a period.

Part IX: Coloring (0 points – completely optional)

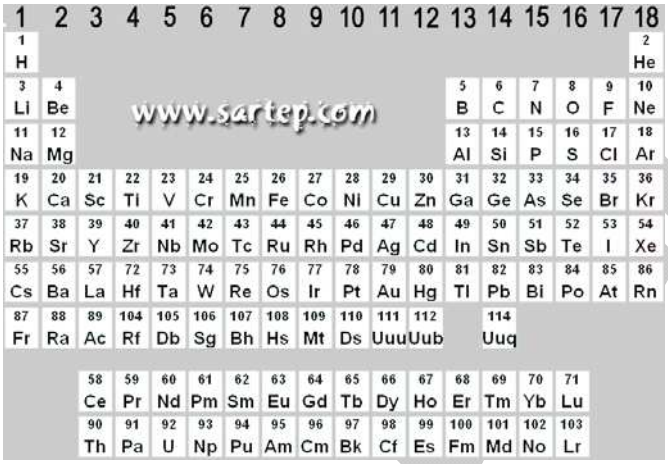
Periodic Table Blocks



Key: Periodic Table Blocks

☐ **s block**
☐ **p block**
☐ **d block**
☐ **f block**

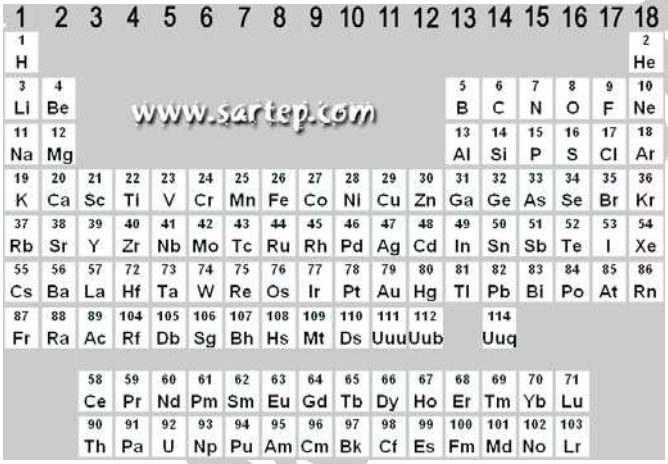
Periodic Table State at 298 K



Key: Periodic Table State at 298 K

☐ **gas**
☐ **liquid**
☐ **solid**

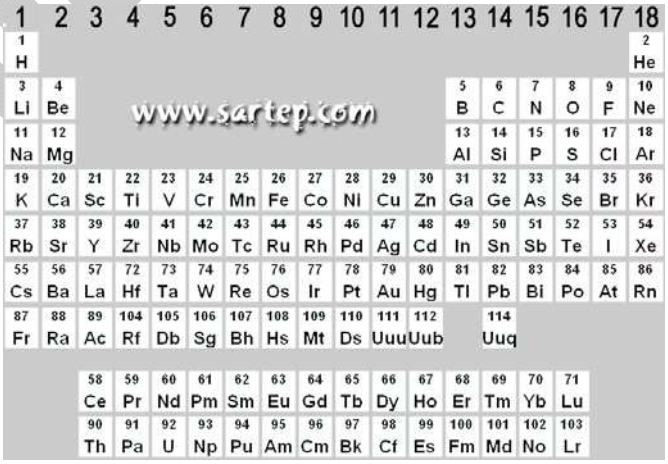
Periodic Table Metallic Character



Key: Periodic Table Metallic Character

☐ **metal**
☐ **metalloid**
☐ **nonmetal**

Periodic Table Groups



Key: Periodic Table Groups

☐ **alkali metals**
☐ **transition elements**
☐ **alkaline earth elements**
☐ **lanthanides**
☐ **actinides**
☐ **chalcogens**
☐ **halogens**
☐ **noble gases**
☐ **synthetic elements**