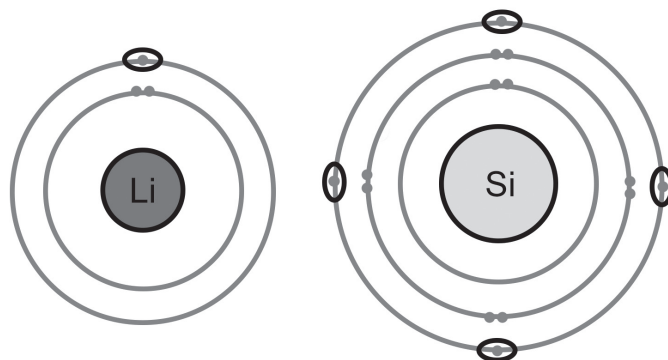


FUNDAMENTALS OF CHEMISTRY TEST #2 (Chapters 4–6)

1. True or False? Solids and liquids can be elements, but gases cannot. **False.**
2. True or False? H_2O and CH_4 are good examples of elements. **False.**
3. Identify the areas of the “little box” information from the Periodic Table. **A is the atomic number, B is the element name, C is the atomic mac mass (weight) and D is the element symbol.**
4. State the number of outer shell electrons for magnesium, boron, neon and carbon. **Magnesium has 2, boron has 3, neon has 8 and carbon has 4.**
5. True or False? The columns in the Periodic Table are called “groups.” **True.**
6. True or False? Even though phosphorus and arsenic are in the same Group, based upon the Periodic Table snapshot below, germanium and arsenic may be more chemically and physically alike than phosphorus and arsenic. **True.**
7. True or False? There is only one correct way to color code the Periodic Table. **False.**
8. What is the significance of the term “period” in the Periodic Table of Elements? **Period reflects the periodicity—or repetitious nature—of the physical and chemical properties of the elements as they are arranged in the Periodic Table, which then allows one to make usually accurate predictions of the chemical and physical properties of an element based only upon its position in the Periodic Table. For example, the Elements on either end of the Table have lower melting points than the element sin the middle of the Table. As another example, as one moves from the left side of the Table to the right, the elements become less and less like metals.**
9. How many protons do iridium, antimony and scandium have? **77, 51 and 21, respectively.**
10. Between neptunium, iodine, cesium and tennessine, which element has the most electrons? **Tennessine.**
11. How many neutrons do aluminum, bromine and calcium have? **14, 45 and 20, respectively.**
12. True or False? How many electrons does an element with an atomic weight of 101 and 55 neutrons have? **46.**
13. What is the atomic number of an element with an atomic weight of 77 and 44 neutrons? **33.**
14. True or False? Even though I is atomic number 53 and Te is atomic number 52, Te has more neutrons than I. **True.**
15. What is a Noble gas? **The elements in Group 8/18 are considered Noble gases because they are generally inert and are all gases.**
16. What do you call two or more atoms bonded together? **A molecule.**
17. How many valence electrons do chlorine, sulfur and sodium have? **7, 6 and 1, respectively.**
18. True or False? Even though helium has only 2 valence electrons, its outer shell is full. **True.**
19. Draw the Bohr model for lithium and silicon and circle the valence electrons.



20. In the 18 Group Periodic Table numbering system, which Groups represent the main group elements? **Groups 1, 2, 13, 14, 15, 16, 17 and 18.**
21. What is the benefit of focusing on the main group elements when starting to learn chemistry? **The main group elements are the ones that follow the rules—periodicity rules, bonding rules, electron configurations, etc.—better than the other elements, so focusing on them allows one to become more familiar with these properties.**
22. Select the true statements regarding valence electrons. **All statements are true**
23. Draw electron dot structures for carbon, fluorine and magnesium.



24. Which one of the elements below do you expect to be the most stable/least likely to participate in a chemical reaction? Why? **Neon would be the least reactive, because it already fulfills the octet rule, so it is already as stable as it can get. The other elements all have less than 8 valence electrons, so they are "looking" to participate in a chemical reaction to fill their outer shells.**
25. True or False? Since carbon, boron, nitrogen and oxygen are all in the same Period, and we know that carbon reacts with 4 atoms of chlorine to form CCl_4 , you would be very safe to predict that boron, nitrogen and oxygen will each also react with 4 atoms of chlorine to form BCl_4 , NCl_4 and OCl_4 , respectively. **False.**
26. True or False? Both diagrams below are ways to represent the same molecule. **True.**
27. Which of the structures in question 26, the one on the left or the right, is the structural model of water? **The one on the right.**
28. In which type of bond, covalent or ionic, does one atom donate at least one electron and another atom accept at least one electron to form a bond? **Ionic.**
29. Select the statement that are true concerning covalent bonds. **b and c are true statements.**
30. True or False? These diagrams are equivalent to one another in that they each accurately show the molecule that forms when one atom of hydrogen combines with one atom of chlorine. **False (the Bohr model for chlorine is incorrect and shows only 10 electrons, rather than 17).**
31. Count the electrons in the following covalently bonded molecules and clearly describe how each atom involved in the bond fulfills the octet (or duet) rule. **In a covalent bond, the pair of electrons "counts toward" the octet/duet rule for each of the atoms involved in the bond/sharing the electrons. Hydrogen bromide is held together with a single bond. Counting the electrons around the hydrogen (H), we see that the duet rule is fulfilled because the two shared electrons between it and the bromine (Br) count as the H's electrons. For the bromine, the octet rule is fulfilled because it has 6 electrons not involved in the bond and the two shared electrons between it and the H count as Br's electrons, so it has 8 electrons. The oxygen molecule, O_2 , is held together with a double bond, which means that 2 pairs of electrons (4 total) are shared between the 2 O's. Also, each O has 4 electrons not involved in the bond. Therefore, the left oxygen has those 4 not involved in the bond, plus the 4 shared electrons, for a total of eight, just as the right oxygen has 4 electrons not involved in the bond and the 4 shared electrons, giving each oxygen 8 electrons; the octet rule is fulfilled for each. The nitrogen molecule, N_2 , is held together with a triple bond, so each nitrogen in the bond shares 3 pairs of electrons (6 total). The left nitrogen has 2 electrons not involved in the bond and, adding those to the 6 shared electrons, gives the left nitrogen 8 electrons. The same reasoning holds for the right nitrogen, so the octet rule is fulfilled for each one.**
32. Why does a cation have a positive charge and an anion a negative charge? **A cation is positively charged because it has lost at least 1 electron, which means that it has fewer negative charges than positive charge, so it is overall charged positively. An ion has gained 1 or more electrons, which means that it has more negative charged than positive ones; therefore, it is negatively charged.**