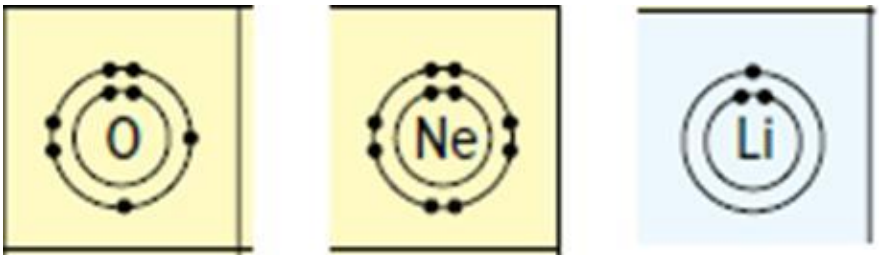
Textbook review for chemistry part 2 (KEY)

5. a) oxygen b) neon c) lithium



6. Atoms with a full valance shell of electrons are less reactive than elements without filled valance shells. Most reactive elements are those with one valence electron or one fewer valence electron from a full valence shell.

7. a) The element has atomic number 12 b) the full chemical name of the element is magnesium.

   c) and d) The element forms this ion because losing two electrons makes it have a filled valence shell.

8. a) If this model represents an atom, which is neutral, it is neon; it has 10 electrons and 10 protons. b) If this model represents an ion with a charge of 2+ it would be magnesium. Magnesium has 12 protons and with 10 electrons it would have a 2+ charge. c) If this model represents an ion with a charge of 1– it is fluorine. Fluorine has 9 protons so with 10 electrons it would have a 1– charge.

9. Properties of Neutral Atoms

Symbol	Atomic Number	Number of Electrons	Number of Protons
Ne	10	10	10
Li	3	3	3
Ca	20	20	20
Ar	18	18	18

10. Noble gases are relatively inert because they don't form chemical bonds. Atoms form chemical bonds by sharing or exchanging electrons so that they have a filled valence shell. As seen in the Bohr diagram for neon, the noble gases already have filled valence shells so they are stable without bonding.

11. One trend is that atoms get larger as you move down a group in the periodic table so sodium atoms are large than lithium atoms. Another trend is that the alkali metals become more reactive as you move down the group, so sodium is more reactive than lithium.

12. a) LiCl b) ZnS c) $CuCl_2$ d) NH_4CH_3COO e) $Mn(NO_3)_3$ f) $Co_3(PO_4)_2$

13. a) The name of the compound is calcium sulfate. b) $CaSO_4$ c) This compound should have a high melting point, be hard and brittle, and conduct electric current when liquid or dissolved.

14. a) SO_2 b) $SiBr_4$ c) PCl_5 d) N_2O_3

15. a) Multivalent means that chromium can form ions with more than one charge. b) Chromium can form 3+ and 2+ ions. c) Chromium and chlorine can form $CrCl_3$, which is chromium(III) chloride, and $CrCl_2$, which is chromium(II) chloride.

16. a) sulfur dichloride is a covalent compound b) aluminum bromide is an ionic compound c) nickel(II) sulfate is an ionic compound d) diphosphorus pentoxide is a covalent compound

17. Ionic bonds are formed by a strong attraction between oppositely charged ions. The metal element loses one or more electrons to the non-metal element so that they form positive and negative ions. This transfer of electrons results in full valence shells for each type of ion. Covalent bonds form when two or more non-metal atoms share valence electrons to result in full valence shells for each atom in the molecule. Both types of bonds are the same because they allow the atoms to have filled valence shells. The types of bonding are different because, in the case of ionic bonding the electrons are transferred, and in the case of covalent compounds the electrons are shared.

18. a) baking soda is ionic, cooking oil is covalent, table salt is ionic, lip balm is covalent, candle wax is covalent, sugar is covalent, dishwasher soap powder is ionic.

    b) Answers could include that baking soda decomposes so it is hard to know if it has a high melting point and sugar is soluble in water so it is different from the other covalent compounds.

20. a) Turning off the hot plate and/or unplugging the hot plate before checking to see if the container of liquid can be left on the hot plate before exiting the classroom and the building.

    b) First removing the test tube from the heat and allowing the liquid to cool. This would be followed by checking with the teacher and disposing of the contents of the test tube and then disposing of the chipped test tube in the broken glass container.

21. a) The first diagram on the left is beryllium Be. This is determined by the four dots shown representing the four electrons in a neutral beryllium atom. The second diagram from the left is carbon, C, as determined by its six electrons. The third diagram from the left is oxygen, O, as determined by the eight electrons. The diagram on the right is neon, Ne, as determined by the ten electrons shown.

    b) Each of these elements belongs to the same period but not the same group. They belong to the second period. You know they belong to the second period because they all have valence electrons in the second circle from the center in the diagram.

    c) A decrease in atomic size as you proceed from left to right across the period.

22. Diamond crystals have covalent bonds with shared electrons between the carbon atoms and sodium chloride crystals have ionic bonding with electrostatic attractions between the positive sodium ions and the negative chloride ions.

23. The chemical formula for nitrogen as it exists in air is N_2. Although nitrogen exists as a molecule it is an element, not a compound. Compounds are made up of two or more different types of atoms and nitrogen molecules only contain nitrogen atoms.

24. a) Answers could include a description of the tests for the melting point, electrical conductivity, solubility, or hardness of the solids.

    b) Answers could include the melting point as ionic solids melt at higher temperatures than covalent solids or the electrical conductivity as ionic substances conduct electric current in solution or when melted and covalent compounds usually don't conduct electric current.

25. Sucrose dissolves well in water but you would not expect a sugar-water solution to conduct electric current because sucrose is a covalent compound and covalent compounds usually don't conduct electric current.

26. Wearing gloves made from a covalent compound, such as rubber, would help prevent an electrician from being electrocuted because covalent compounds are not good conductors of electricity.

27. a) The chemical formula for sodium fluoride is NaF.

    b) Sodium fluoride is an ionic compound because it is made from a metal, sodium, and a non-metal, fluorine.

    c) This compound should have a high melting point, be hard and brittle, and conduct electric current when liquid or dissolved.

    d) When sodium and fluorine react to form sodium fluoride the sodium atom loses an electron to form a 1+ ion and the fluorine gains an electron to form the 1– fluoride ion. The oppositely charged ions are attracted together to form ionic bonds.

28. Covalent compounds are also appropriately called molecular compounds because the smallest particle of a covalent compound would be a molecule of that compound.