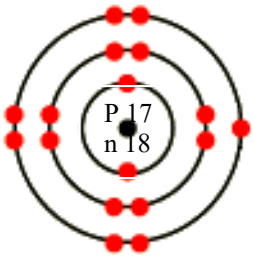
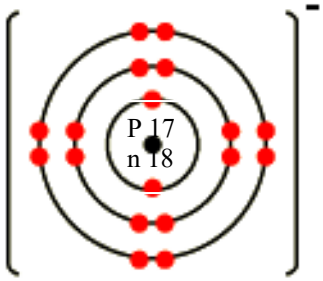
Chemistry Review ANSWERS

1. What are the rows of the periodic table called?
   Periods
2. What do all atoms in a group of the periodic table have in common?
   Number of valence electrons
3. What do all atoms in a period of the periodic table have in common?
   Number of electron orbits/shells
4. What trends occur as you move across the periodic table? Down the periodic table?
   Across → increasing # of valence electrons
   Down → increasing # of electron orbits
5. How many electrons, neutrons and protons does a neutral phosphorus atom have?
   Electrons = 15, Neutrons = 16, Protons = 15
6. What is the difference between an atom and an ion?
   An atom has equal number of protons and electrons, an ion has a full outer electron shell and is charged either positively (lost electrons) or negatively (gained electrons)
7. What is an anion, cation, and polyatomic ion?
   Anion is a negatively charged ion (gained electrons)
   Cation is a positively charged ion (lost electrons)
   Polyatomic ion has more than one element as part of the ion (ie CO_3^{2-}, SO_4^{2-})
8. How many electrons, neutrons and protons does a bromine <u>anion</u> have?
   Electrons = 36, Neutrons = 45, Protons = 35
9. Draw a bohr diagram for the chlorine atom and chlorine ion.

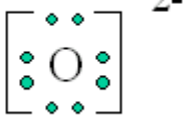


chlorine atom,



chloride ion,

10. Draw an Lewis dot diagram for an oxygen atom and oxygen ion.



11. How is the bonding in calcium oxide different from the bonding in carbon tetrahydride?
    CaO is an ionic bond between two ions (give & take of ions), CF_4 is covalent bond between atoms (sharing of electrons)
12. What is the difference between a covalent bond and an ionic bond?
    ionic bond (give & take of ions), covalent bond (sharing of electrons)
13. What is the difference between a compound and a molecule?
    Compound is a substance consisting of atoms or ions of two or more different elements in definite proportions joined by chemical bonds. Molecule is a compound with covalent bonds

14. What observations can you make to determine if a substance is molecular or ionic?
Ionic bonds are between metals & non-metals. They are hard, brittle and have high melting points. Some dissolve in water and are electrolytes. Molecules do not conduct electricity or make electrolytes and have low melting points.
15. Which types of elements combine to form molecular compounds?
Non-metals
16. Name the following compounds.
    a) $MgBr_2$ magnesium bromide
    b) NH_3 ammonia
    c) $PbSO_4$ lead (II) sulfate
    d) Na_2CO_3 sodium carbonate
15. Write the chemical formula for each of the following.
    a) Iron(ll) nitrate $Fe(NO_3)_2$
    b) Copper(ll) hydroxide $Cu(OH)_2$
    c) Diphosphorus pentaoxide P_2O_5
    d) Iodine hexachloride ICl_6
    e) Sodium nitride Na_3N

16. Given the following word equations, write a skeleton and balanced chemical equation
a) Gaseous sulfur dioxide reacts with oxygen gas to produce gaseous sulfur trioxide.
skeleton: $SO_{2\,(g)} + O_{2\,(g)} \rightarrow SO_{3\,(g)}$
balanced: $4\ SO_{2\,(g)} + 2\ O_{2\,(g)} \rightarrow 4\ SO_{3\,(g)}$

b) Solid aluminum chloride reacts with solid potassium to produce potassium chloride and solid aluminum.
skeleton: $AlCl_{3\,(s)} + K_{(s)} \rightarrow KCl_{(s)} + Al_{(s)}$
balanced: $AlCl_{3\,(s)} + 3\ K_{(s)} \rightarrow 3\ KCl_{(s)} + Al_{(s)}$

17. Suppose that you measure the mass of a chemical in an open container, and then heat it for a few minutes over a Bunsen burner flame. After the container and contents have cooled, you find that the mass is larger than before. If you accept the law of conservation of mass, how can you explain your observation?
Some atoms from the environment have bonded to the original substance increasing the mass. Since they were no originally massed it seems as if the reaction caused an increase in mass compared to the reactants.
18. Balance each skeleton equation and identify the type of reaction in each case.
    a) $2\ NaBr + \_\_\_\ Ca(OH)_2 \rightarrow \_\_\_\ CaBr_2 + 2\ NaOH$
    Type of reaction: double displacement
    b) $2\ NH_3 + \_\_\_\ H_2SO_4 \rightarrow \_\_\_\ (NH_4)_2SO_4$
    Type of reaction: synthesis
    c) $4\ C_5H_9O + 27\ O_2 \rightarrow 20\ CO_2 + 18\ H_2O + energy$
    Type of reaction: combustion
    d) $3\ Pb + 2\ H_3PO_4 \rightarrow 3\ H_2 + Pb_3(PO_4)_2$

Type of reaction: single displacement

19. Identify the type of reaction, predict the products, and write the balanced equation. If it is a single displacement, determine if the reaction is possible

sodium chloride + potassium nitrate → sodium nitrate + potassium chloride

$NaCl + KNO_3 \rightarrow NaNO_3 + KCl$

potassium iodide + chlorine → potassium chloride + iodine

$2KI + Cl_2 \rightarrow 2KCl + I_2$

zinc hydroxide + sulfuric acid → zinc sulfate + water

$Zn(OH)_2 + H_2SO_4 \rightarrow ZnSO_4 + H_2O$

aluminum + hydrochloric acid → hydrogen + aluminum chloride

$2\ Al + 6\ HCl \rightarrow 3\ H_2 + 2\ AlCl_3$

lead (II) hydroxide + hydrochloric acid → lead (II) chloride + water

$Pb(OH)_2 + 2\ HCl \rightarrow PbCl_2 + 2\ H_2O$

zinc + magnesium nitrate → No reaction (magnesium is more reactive than zinc)

zinc + iron (III) sulfate → zinc sulfate + iron

$3\ Zn + Fe_2(SO_4)_3 \rightarrow 3\ ZnSO_4 + 2\ Fe$

magnesium + oxygen → magnesium oxide

$2\ Mg + O_2 \rightarrow 2\ MgO$

20. What is a chemical change?
    A change that a substance goes through and produces one or more new substances
21. What are indicators of a chemical change?
    Change of colour, energy release, energy absorbed, bubbles formed, a precipitate formed, very difficult to reverse
22. Explain the difference between complete combustion and incomplete combustion.
    Complete combustion only produces CO_2, water, and energy because there is enough oxygen to react with the other reactant. Incomplete combustion also produces CO because there is not enough oxygen to completely react with the reactant.
23. What is the difference between an acid and a base?
    Acids are proton donators, bases are proton acceptors (or hydroxide donators
24. What type of compound is needed to make a base and acid in water?
    Non-metals + water → acid
    Metal + water → base
25. What is an indicator? Give 3 examples of indicators and the effect that acids and bases have on the indicator.
    Indicators are substances that gives a visible sign (ie colour change) of the presence or concentration of a particular substance (ie acid or base)
26. What is the pH scale? What does it measure?
    pH stands for power of hydrogen and is used to determine the strength of acids and bases. It measure the concentration of hydrogen ions
27. Write a balanced equation showing the ionization for NaOH.
    $NaOH + H_2O \rightarrow Na^+ + OH^- + H_2O$
28. What is a neutralization reaction?
    A reaction between an acid and a base producing a salt and water