Regents Chemistry **Name** _____

Mr. Dolgos **Period** _____

"*In Terms Of…*" Review Activity

1. Explain, *in terms of* subatomic particles, why the radius of a chloride ion is larger than the radius of a chlorine atom.

2. Explain, *in terms of* atomic structure, why the radius of an Na atom is larger than the radius of an Na^+ ion

3. Explain, *in terms of* valence electrons, why the bonding in magnesium oxide, MgO, is similar to the bonding in barium chloride, $BaCl_2$.

4. State, *in terms of* the number of electron shells, why the radius of a strontium atom in the ground state is larger than the radius of a magnesium atom in the ground state.

5. Explain, *in terms of* atomic structure, why the elements in Group 2 have similar chemical properties.

In the gold foil experiment, a thin sheet of gold was bombarded with alpha particles. Almost all the alpha particles passed straight through the foil. Only a few alpha particles were deflected from their original paths.

6. Explain, *in terms of* charged particles, why some of the alpha particles were deflected.

7. An atom in an excited state has an electron configuration of 2-7-2. Explain, *in terms of* subatomic particles, why this excited atom is electrically neutral.

Some Properties of Three Compounds at Standard Pressure

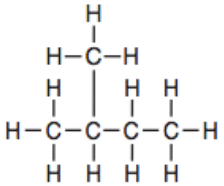
Compound	Boiling Point (°C)	Solubility in 100. Grams of H_2O at 20.°C (g)
ammonia	–33.2	56
methane	–161.5	0.002
hydrogen chloride	–84.9	72

8. Explain, *in terms of* molecular polarity, why hydrogen chloride is more soluble than methane in water at 20.°C and standard pressure.

9. Explain, *in terms of* intermolecular forces, why ammonia has a higher boiling point than the other compounds in the table.

10. In a laboratory, a student makes a solution by completely dissolving 80.0 grams of $KNO_3(s)$ in 100.0 grams of hot water. The resulting solution has a temperature of 60.°C. The room temperature in the laboratory is 22°C. Classify, *in terms of* saturation, the type of solution made by the student.

The formula below represents a hydrocarbon.



11. Explain, *in terms of* carbon-carbon bonds, why this hydrocarbon is saturated.

In a laboratory investigation, magnesium reacts with hydrochloric acid to produce hydrogen gas and magnesium chloride. This reaction is represented by the unbalanced equation below.

$$Mg(s) + HCl(aq) \rightarrow H_2(g) + MgCl_2(aq)$$

12. State, *in terms of* the relative activity of elements, why this reaction is spontaneous.

Carbon has three naturally occurring isotopes, C-12, C-13, and C-14. Diamond and graphite are familiar forms of solid carbon. Diamond is one of the hardest substances known, while graphite is a very soft substance. Diamond has a rigid network of bonded atoms. Graphite has atoms bonded in thin layers that are held together by weak forces. Recent experiments have produced new forms of solid carbon called fullerenes. One fullerene, C_{60}, is a spherical, cagelike molecule of carbon.

13. State, *in terms of* the arrangement of atoms, the difference in hardness between diamond and graphite.

The radioisotope uranium-238 occurs naturally in Earth's crust. The disintegration of this radioisotope is the first in a series of spontaneous decays. The sixth decay in this series produces the radioisotope radon-222. The decay of radon-222 produces the radioisotope polonium-218 that has a half life of 3.04 minutes. Eventually, the stable isotope lead-206 is produced by the alpha decay of an unstable nuclide.

14. Explain, *in terms of* electron configuration, why atoms of the radioisotope produced by the sixth decay in the U-238 disintegration series do not readily react to form compounds.

15. Explain, *in terms of* electronegativity difference, why the bond in a molecule of HF is more polar than the bond in a molecule of HI.

$$\mathbf{CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(\ell) + 890.4\ kJ}$$

16. Explain, *in terms of* collision theory, why a lower concentration of oxygen gas decreases the rate of this reaction.

In the early 1800s, John Dalton proposed an atomic theory that was based on experimental observations made by several scientists. Three concepts of Dalton's atomic theory are stated below.

- **Statement A:** Atoms are indivisible and cannot be destroyed or broken down into smaller parts.
- **Statement B:** Atoms of one element cannot be changed into atoms of another element.
- **Statement C:** All atoms of one element have the same mass.

17. Explain, *in terms of* particles, why statement A is no longer accepted.

18. Explain, *in terms of* particles in the atoms of an element, why statement C is false.

19. Explain, *in terms of* both electrons and energy, how the bright-line spectrum of an element is produced.

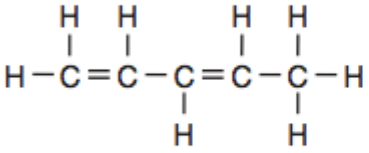
20. Explain, *in terms of* electron configuration, why an oxygen molecule is more stable than an oxygen atom.

Some carbonated beverages are made by forcing carbon dioxide gas into a beverage solution. When a bottle of one kind of carbonated beverage is first opened, the beverage has a pH value of 3.

21. State, *in terms of* the pH scale, why this beverage is classified as acidic.

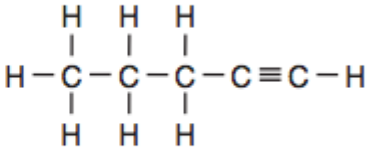
Two hydrocarbons that are isomers of each other are represented by the structural formulas and molecular formulas below:

Hydrocarbon 1



C_5H_8

Hydrocarbon 2

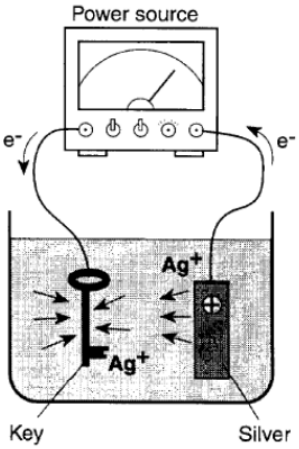


C_5H_8

22. Explain, *in terms of* bonds, why these hydrocarbons are unsaturated.

23. Explain, *in terms of* structural formulas and molecular formulas, why these hydrocarbons are isomers of each other

The diagram to the right represents an operating electrolytic cell used to plate silver onto a nickel key. As the cell operates, oxidation occurs at the silver electrode and the mass of the silver electrode decreases.



24. Explain, *in terms of* Ag atoms and $Ag^+(aq)$ ions, why the mass of the silver electrode decreases as the cell operates.

A scientist makes a solution that contains 44.0 grams of hydrogen chloride gas, HCl(g), in 200. grams of water, H2O(ℓ), at 20.°C. This process is represented by the balanced equation below:

$$HCl(g) \xrightarrow{H_2O} H^+(aq) + Cl\ (aq)$$

25. Explain, *in terms of* the distribution of particles, why the solution is a homogeneous mixture.

"*In Terms Of…*" Review Activity (KEY)

1. Chlorine gains an electron to become a chloride atom;
   The electrons outnumber the protons in a chloride ion.
2. The Na atom has one more (principal) energy level/electron shell than the Na^+ ion.
3. In both cases, the metal loses 2 valence electrons and the oxygen gains two valence electrons.
4. The strontium atom in the ground state has two more electron shells than the magnesium atom in the ground state.
5. Elements in Group 2 all have the same number of valence electrons.
6. Alpha particles are positively charged and were deflected by the positively charged protons because like charges repel.
7. The number of protons is still equal to the number of electrons.
8. Hydrogen chloride and water are both polar and like dissolves like;
   Hydrogen chloride is more polar than methane and dissolves in polar water because like dissolves like;
   The partial charges in polar hydrogen chloride molecules interact with the partial charges in polar water molecules.
9. Ammonia has stronger IMF's (H-bonds) than the other compounds which makes it more difficult to boil
10. The solution is unsaturated.
11. There are only single bonds between the carbons;
    There are no double or triple bonds between the carbons;
    there are no multiple bonds between the carbons.
12. Magnesium is more active than hydrogen, therefore it (Mg^{2+}) replaces H^+ in solution.
13. Diamond is a rigid network and graphite is made of thin sheets held together by weak forces.
14. Radon has a full octet;
    Radon has no unpaired valence electrons
15. There is a greater difference in electronegativity between H and F than there is between H and I.
16. Lower oxygen concentration means less reactant particles to collide with one another, which means less effective collisions, which means a decrease in rate of reaction.
17. Atoms can be broken down into their subatomic particles;
    Atoms can be broken down into protons and neutrons
18. Different isotopes of the same atom have a different number of neutrons giving them a different mass.
19. When excited electrons (or electrons in an excited state) fall back down to a lower energy level (or to the ground state), they give off energy in the form of light;
    Electrons falling to the ground state from different excited energy levels give off different amounts of energy in the form of different wavelengths of light.
20. The atoms in an oxygen molecule have a full octet;
    The atoms in an oxygen molecule have no unpaired electrons;
    The atoms in an oxygen molecule have both achieved a noble gas configuration.
21. A pH of 3 indicates that $[H^+] > [OH^-]$; Solutions with a pH below 7 are acidic
22. Each of the hydrocarbons contains at least one multiple bond between carbons;
    Each of the hydrocarbons contains either a double or triple bond between carbons;
    All of the carbon – carbon bonds are not single bonds.
23. They have the same molecular formula but different structural formulas.
24. Electrons are taken from the Ag atoms in the electrode, forming Ag^+ ions, which then dissolve into solution;
    Ag atoms are converted to Ag ions that dissolve in the solution.
25. The dissolved particles are distributed evenly/equally throughout the solution.