***Chemistry End of Topic Test Revision***

1. Complete the following table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Ions/atoms** | **Atomic number** | **Mass number** | **Number of electrons** | **Number of neutrons** |
| Ca | 20 | 40 | 20 | 20 |
| K+ | 19 | 39 | 18 | 20 |
| S2- | 16 | 32 | 18 | 16 |
| Cu | 29 | 63 | 29 | 34 |

1. Complete the following table by writing the correct chemical formula for each compound formed.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | FLUORIDE | NITRIDE | CARBONATE | PHOSPHATE |
| POTASSIUM | KF | K3N | K2CO3 | K3PO4 |
| MAGNESIUM | MgF2 | Mg3N2 | MgCO3 | Mg3(PO4)2 |
| AMMONIUM | NH4F | (NH4)3N | (NH4)2CO3 | (NH4)3PO4 |
| ALUMINIUM | AlF3 | AlN | Al2(CO3)3 | AlPO4 |
| LEAD IV | PbF4 | Pb3N4 | Pb | Pb3(PO4)4 |

1. Construct a table to show the properties of ionic, covalent and metallic substances.

|  |  |  |  |
| --- | --- | --- | --- |
| Property/Bond Type | Ionic | Covalent | Metallic |
| Melting/ Boiling Points | high | Low | high |
| Strength/hardness | Hard but brittle | Soft and weak | Hard, malleable, ductile |
| Conductivity of heat/electricity | No unless molten/aqueous | No except graphite | Good |

Your table could look very different but should have similar information!

1. Complete the table below to show the electron configuration of the following substances.

|  |  |  |
| --- | --- | --- |
| Substance | Electron configuration | Electron configuration diagram |
| Mg | 2, 8, 2 |  |
| Al3+ | 2, 8 |  |

1. Balance the following equations
2. 2HgO ® 2Hg + O2
3. 6HCl + 2Al ® 2AlCl3 + 3H2
4. 2Na2O2 + 2H2O ® 4NaOH + O2
5. 4NH3 + 5O2 ® 4NO + 6H2O
6. 3Na2CO3 + 2H3PO4 ® 2Na3PO4 + 3H2O + 3CO2
7. Complete the general equations listed here.
8. ACID + METAL ® SALT + HYDROGEN GAS
9. ACID + BASE ® SALT + WATER
10. ACID + CARBONATE ® SALT + WATER + CARBON DIOXIDE

1. Complete and balance these equations
   1. H2SO4 + Zn **®** ZnSO4 + H2
   2. 2HNO3 + CaCO3 **®** Ca**(**NO3)2 + H2O + CO2
   3. 2Al(OH)3 + 3H2SO4 **®**  Al2(SO4)3 + 6H2O
2. Classify the following as acids, bases or salts.
   1. NaOH base
   2. CaO base
   3. CH3COOH acid
   4. CaCl2  salt
   5. HNO3 acid
   6. CuSO4 salt
   7. Mg(OH)2 base
   8. H2CO3  salt
   9. Zn(NO3)2 salt
   10. H3PO4 acid
3. Write complete balanced chemical equations for these reactions
4. hydrochloric acid is added to calcium hydroxide solution

2HCl + Ca(OH)2 ® CaCl2 + 2H2O

1. magnesium is added to phosphoric acid

3Mg + 2H3PO4 ® Mg3(PO4)2 + 3H2

1. sodium carbonate is added to nitric acid

Na2CO3 + 2HNO3 ® 2NaNO3 + H2O + CO2

1. Use your solubility table to classify the following salts as either soluble, insoluble or slightly soluble. Place a tick in the correct column.

|  |  |  |  |
| --- | --- | --- | --- |
| Salt | Soluble | Insoluble | Slightly soluble |
| AgBr |  | ü |  |
| BaSO4 |  | ü |  |
| NaCl | ü |  |  |
| Mg(OH)2 |  | ü |  |
| PbCl2 |  |  | ü |
| ZnCO3 |  | ü |  |
| Na2CO3 | ü |  |  |
| AgCl |  | ü |  |
| K3PO4 | ü |  |  |
| MgSO4 | ü |  |  |
| CaSO4 |  |  | ü |

1. Write the formula for the precipitate formed when the following solutions are mixed. If no precipitate forms then write “no reaction”.

* 1. sodium chloride solution and lead iodide solution. PbCl2
  2. potassium hydroxide solution and magnesium nitrate solution Mg(OH)2
  3. sodium sulphate solution and barium chloride solution BaSO4
  4. zinc chloride solution and silver nitrate solution. AgCl

1. What is collision theory? State the two requirements that allow reactants to form products.

The collision theory states that for a reaction to take place the particles in the reaction must collide

For product to form the reactants must collide with:

* + sufficient energy to break bonds and form new ones
  + correct orientation to allow particles to rearrange themselves into new compounds

1. What factors can increase the rate of a chemical reaction?

* Increase in temperature of reactants
* increase in concentration of reactants
* increase in surface area of reactants
* use of a catalyst

1. In each of the following situations, circle the correct explanation.
   1. A mug of hot water and a mug of cold water dissolve a teaspoon of coffee.
      1. The mug of hot water will dissolve the coffee faster, due to the increased temperature and greater kinetic energy.
      2. The cold water will dissolve the coffee faster because the lower temperature will cause the particles to move or shiver with cold.
   2. A whole cube of sugar and a teaspoon of granulated sugar dissolve in a cup of room-temperature water
      1. The whole cube of sugar will dissolve more quickly because it is larger so it has a larger surface.
      2. Granulated sugar will dissolve faster as it has a greater surface area. This means there is more reactant to collide with and there will be more collisions.
   3. Two teabags are placed in two cups of hot water. One is stirred, one is not.
      1. The stirred tea will dissolve faster as particles have more kinetic energy. This makes particles move faster and therefore have more successful collisions.
      2. The unstirred tea will dissolve faster because the particles are slower in the water. This means the tea particles can move faster and have more collisions.
2. Match each explanation to the observation that it best explains in terms of collision theory.

|  |  |  |
| --- | --- | --- |
| **Observation** |  | **Explanation** |
| A strip of magnesium dissolves faster in 3M HCl than in 1M HCl. (temp = controlled variable) |  | This is due to the lowering of the activation energy for the reaction, so that less energy is needed by the colliding particles when they break the existing bonds. |
| Milk goes sour much faster if it is left out on a bench, than if is kept cool in a refrigerator. |  | A higher surface area will mean an increase in the rate of collision as more of the surface is exposed, this increases the rate of successful collisions, thus reaction rate increases. |
| A teaspoon of powdered calcium carbonate reacts faster with 1 M HCl than the same amount of marble chips reacts with the same 1 M HCl. |  | An increase in concentration causes an increase in rate of collision between reacting particles and therefore increases the rate of successful collisions. |
| To keep chemical reactions in the human body occurring at a high rate without the body being warmer than 360C important chemical catalysts called enzymes are needed. |  | The collisions are occurring with much higher energy, therefore there is an increase in the proportion of successful collisions, this increases the rate of successful collisions. |