

CHM1025 Review Topics Module 11

Module 11:

1. Identify if a substance is a strong acid, strong base, weak acid, weak base, soluble salt or insoluble salt. The solubility table will be provided but you need to know the strong acids and the strong bases. All other acids and bases are weak.
2. Know that a strong electrolyte is a strong acid, strong base, or soluble salt. They ionize 100% in water and you use a single arrow for the ionization reaction.
3. Know that a weak electrolyte is a weak acid, weak base or insoluble salt. They ionize only slightly and you use a double arrow (equilibrium) for the ionization reaction.
4. Know that a non-electrolyte is a substance that dissolves in water but does not ionize. Organic compounds that contain C, H, and O are usually nonelectrolytes (unless they are acids, in which case the formula starts with an H). The nonelectrolytes are just shown with (aq) written beside it on the right side of the arrow.
5. Double replacement reactions are where you have two compounds, each of which can be an acid or an ionic compound reacting so that the first part of each formula switches. The products could be an acid, and ionic compound, or water. These reactions occur in aqueous solution.
6. The triggers for a double replacement reaction can be:
 - a. Precipitation (formation of an insoluble solid)
 - b. Formation of water (neutralization reaction, acid reacting with base).
 - c. Any other reaction where there is a weak electrolyte as a reactant or product.
7. If one of the things mentioned in 6 does not occur there is no reaction. (If only strong electrolytes are reactants and products then no reaction occurs)
8. You need to be able to come up with the molecular, complete and net ionic forms of the reaction.
9. You need to be able to identify spectator ions.
10. Remember that only the strong electrolytes are ionized in a complete ionic equation. The weak electrolytes are left as a formula without ionizing even if soluble in water (e.g. weak acids like HF and NH_4OH , a weak base).
11. Single replacement reactions occur in aqueous solution and are either:
 - a. A metal or hydrogen reacts with an ionic compound, an acid or water to replace the first part of the formula (the positive part). This only occurs if the metal or hydrogen by itself is more reactive than the metal or hydrogen in the formula according to the activity series of metals. Know that some metals (bolded in the activity series) can replace H in water liquid or gas and in acids, others (bolded and underlined) can replace H in water gas and acids only and still others (double underlined) can replace H only in acids.

- b. A halogen replaces another halogen in an ionic compound. This only occurs if the halogen by itself is more reactive than the halogen in the formula.
12. Combustion reactions-A compound that contains C, H and sometimes also O reacts with O₂ to produce H₂O and CO₂.
 13. Combination reactions-Two substances combine to form one.
 14. Decomposition reactions-One substance decomposes to form two.
 15. Remember that ionization reactions and double replacement reactions are never redox reactions (no change in oxidation numbers). Single replacement and combustion reactions are always redox reactions. Combination and decomposition reactions may or may not be redox reactions. If an element is by itself on one side of a chemical equation and part of a compound in another then for sure the reaction is redox. However there are other instances of having redox reactions besides this.