

## Terms

1. **Atomic number** = number of protons in the atom
2. **Mass number** = number of protons + number of neutrons
3. **Isotopes** are atoms with the same number of protons but different numbers of neutrons.
4. **Relative atomic mass** of an element is the weighted average of the relative isotopic masses of its natural isotopes on the  $^{12}\text{C}=12.000\ 00$  scale.
8. **Ionic bond** is the attractive force which holds the oppositely charged ions together.
9. Covalent bond: the attraction between the bond pair electrons and the two nuclei.
10. **Dative covalent bond** is a covalent bond where bond pair electrons are contributed by the same atom. E.g.  $\text{H}_3\text{O}^+$  and  $\text{NH}_4^+$  .
11. **Metallic bond** is the attraction between delocalized electrons and metal ions. (Metals are malleable and ductile because the atoms in a metal are packed in layers. When we apply force to a piece of metal, the layers of atoms can slip over one another, the metallic bonds continue to hold the metal atoms together. )
12. One **mole** = the number atoms in exactly 12.0 g of carbon -12.
13. **Avogadro constant** ( $L$ ) is the number in one mole of any substance, i.e.  $6.02 \times 10^{23}$  .
14. The **molar mass** of a substance is the mass in grams of one mole of the substance. (Unit of molar mass:  $\text{g mol}^{-1}$ )
15. **Anodization** is an electrolytic process used to thicken the aluminium oxide layer on aluminium. Anodized aluminium is even more corrosion resistant, and can be easily dyed to give attractive colors.
17. **Cathodic protection**: the negative terminal of a chemical cell is connected to the iron , supplying electrons to prevent it from rusting.
18. **Sacrificial protection**: a more reactive metal (e.g. magnesium, zinc) is connected to the iron, the electrons flow from a Mg to Fe to prevent iron losing electrons.
19. **Tin-plating**: The tin coating protects the iron from oxygen and water. When the tin coating is damaged, the iron loses electrons more readily than Sn, Fe rusts more quickly .
20. **Zinc-plating**: The zinc coating protects the iron from oxygen and water. When the zinc coating is damaged, Zn is reactive than Fe, Zn loses electron more readily than Fe, Zn prevent Fe from rusting. sacrificial protection). Zinc ions are poisonous.

21. **pH** =  $-\log[H^+]$  ,  $[H^+] = 10^{-pH}$
22. **Neutralization** is the reaction between an acid and a base that produces a salt and water as products.
23. **Base** is a compound which reacts with an acid to form a salt and water.
24. A **salt** is a compound formed when the ionizable hydrogen atom(s) of an acid is/are replaced by metallic ion(s) (or ammonium ion(s))
26. The **basicity** of an acid is the number of hydrogen ions produced by one molecule of the acid.
27. **Alkalis** are soluble base. They react with an acid to form a salt and water.
28. A **strong acid** is one which completely ionizes in water.
29. A **weak acid** is one which ionizes only slightly in water.
31. **End point in titration:** The moment that the indicator changes in color in titrimetric experiments.
33. **Anode:** electrode where oxidation takes place / electrode that releases electrons.
34. **Fossil fuels:** Coal, petroleum and natural gas
35. **Formation of coal:** due to the movement of the Earth's crust, the remains of plants (lived millions of years ago) were covered by sand and mud. High temperature and pressure gradually changed the decaying plant into coal.
36. **Formation of petroleum:** After the sea animals and plants (lived millions of years ago) died, they fell to the bottom of the sea, and covered by sand and mud. High temperature and pressure gradually changed the decaying plant into coal.
37. Molecules with the same functional group are grouped in a **homologous series**. They have a gradual change in their physical properties. They have similar chemical properties.
28. **substitution reaction** is a chemical change in which an atom (or a group of atoms of an organic molecule is replaced by another atom (or group of atoms).
29. **Cracking** is the process of breaking down large molecules into smaller ones in the absence of air.
30. A **polymer** is a compound which consists of very large molecules formed by joining many small molecules repeatedly.  
**Addition polymerization** is a reaction in which without the elimination of small molecules (such as  $H_2O$  and  $HCl$ )
31. **Electronegativity** of an atom represents the power of that atom to attract bonding electrons in a covalent bond.
32. **Polar covalent bond** : In a covalent bond, the more electronegative atom has a greater share of the bonding electrons than the less electronegative atom. Hence one atom in the covalent bond has a partial negative charge where the other atom has a partial positive charge.

33. **Van der Waals' force** is the small electrostatic force of attraction between simple molecules.
34. **Hydrogen bonds** are attractions between the hydrogen atom of O-H, H-F, N-H and the lone pair electrons on a highly electronegative atom (i.e. fluorine, oxygen or nitrogen) of another molecules.
36. **octet rule:** The strong tendency of atoms to attain 8 electrons in the outer most shell .
37. **Chemical cell:** A device for generating electricity by *spontaneous* redox reactions.  
**Electrolytic cell:** A device for forcing redox reactions by electricity.
38. **Primary cells** are not rechargeable.
39. **Secondary cells** can be recharged.
40. **salt bridge** : It is a strip of filter paper soaked in an electrolyte (e.g. sodium chloride, potassium nitrate) It provides ions to balance the charges in the solutions of the two half-cells.
41. A **porous pot** : allows ions to pass through to complete the circuit
42. The heat change measured at constant pressure is the **enthalpy change** of the reaction.
43. **Standard condition:** 1atm, 298 K,
44. **Standard enthalpy change of neutralization** is the enthalpy change when one mole of water is formed from neutralization between an acid and an alkali under standard conditions.
45. **Standard enthalpy change of formation** of a substance is the enthalpy change when one mole of it is formed from its elements in standard conditions.
46. **Standard enthalpy change of combustion** of a substance is the enthalpy change when one mole of it is completely burnt in oxygen in standard conditions.
48. **Hess's Law** states that the enthalpy change of a chemical reaction is regardless of the route by which the reaction takes place.
49. **Rate of reaction:** The change of concentration (or amount) of a reactant (or a product) in a unit time.
50. **Instantaneous rate of reaction:** the rate at a particular instant of the reaction. Slope of tangent of concentration curve at that particular time.  
**Average rate of reaction:** Total change in amount of a product (or reactant) in the total time taken for the reaction.
51. **Dynamic equilibrium:** the rate of forward reaction is equal to the rate of backward reaction, rate  $\neq 0$ .
52. **Isomers** are compounds with the same molecular formula but different arrangements of atoms in space.

53. **Structural isomers** are compounds with different orders of arrangement of atoms.
- Stereoisomers** are compounds with the same structural formula but different spatial arrangement of atoms.
54. **Cis-trans isomerism** occurs when there are isomers that arise from the restricted rotation about a carbon-carbon double bond.
55. **Enantiomerism** occurs when there are two isomers that are mirror images of one another but are non-superimposable.
56. **Rate equation** can be expressed as:  $\text{rate} = k[\text{A}]^x[\text{B}]^y$  for the following equation
- $$a\text{A} + b\text{B} \rightarrow \text{products}$$
- where  $x$  and  $y$  are the **order of reaction** with respect to A and B respectively.
57. **Rate constant:** the constant of the reaction rate and the concentration of the reactant in the rate equation..
- Order of reaction:** The power of the concentration of a reactant in the rate equation.
- The **rate equation** shows the *quantitative relationship between concentration and reaction rate*.
58. **Activation energy  $E_a$**  is the minimum energy required to start a chemical reaction.
59. **catalyst** :it increases the rate of reaction by providing an alternative pathway with lower activation energy.