

MEDICINAL CHEMISTRY-I – BP402T

UNIT: 1

CLASS: 4

TOPIC: COVALENT BONDING**COVALENT BONDING:**

Most commonly drug action is initiated by interaction of the small molecules of the drug with macromolecular system of the receptor..

This interaction is promoted and maintained by different kinds of binding forces include

- vanderwalls forces
- hydrophobic interaction
- hydrogen bonding
- charge transfer
- dipole-dipole interaction
- covalent bonding

Covalent bonding:

Covalent bonds which are formed by sharing of the electrons between the atoms are strongest of all bonds.

- Most of the bonds have bond energies of the order of 140 – 800 KJ/ mole.
- The majority of the drugs combine with their receptors by weak molecular interactions.
- These interactions collectively form a strong link between the drug and its receptor but individually the interactions are reversible.
- As such the covalent bonds are less important in drug receptor interaction with exceptions.
- **Eg:** Antiparasitic drugs containing heavy metals like Arsenic/ Antimony act by forming a covalent bond between the heavy metal and the sulphur atom of the sulphydryl group of the enzyme of the parasite.
- Alkylation of the amino groups of guanine bases in DNA and cross linking of the two strands of DNA double helix is the underlying mode of action

of antineoplastic agents- nitrogen mustards.

- Penicillin exerts its antibacterial activity by acylating a transpeptidase enzyme which is vital to bacterial cell wall synthesis.
- Inhibition of cholinesterases by organic phosphates is another example.

6. REDOX POTENTIAL:

The redox potential of a system can be calculated from the equation

$$E = E^1 - 0.06 / \left[\frac{\text{concn of reductant}}{\text{conc'nof oxidant}} \right]$$

Eg: cancer drugs with metal ions like Cisplatin possess reducing activity which is the mode of action in this category of drugs.

Tumour cells have a hypoxic environment when compared to non tumour cells/ normal cells due to their characteristic multiplying behavior. Due to the presence of a reducing environment in these tissues the drugs namely cisplatin will cause a rise in their reducing potential causing death of the cells (selective action on tumour cells).