CHAPTER 10

Conclusion

The first chapter provides a brief description on terpenoids and the historical development of quantitative structure-activity relationship. A concise account of review of literature is included in chapter two with a view to familiarize the readers about the development of QSAR study. Determination of molecular indexes, regression analysis and statistical parameters has been the subject matter of chapter three.

Chapter four describes QSAR study and Molecular docking of 23-hydroxybetulinic acid derivatives as RMGPa and HeLa cells inhibitors. This QSAR study has shown that topological indices (e.g. SIC, CIC) and quantum chemical descriptors (e.g. EH, EL, μ) are the important parameters for determining the activity of 23-hydroxybetulinic acid derivatives. Model 4.3 and model 4.6 are the best equation for predicting the inhibitory activity of RMGPa and the antiproliferative activities against HeLa cells respectively and these QSAR models may be used in prediction of activity of designed compounds. The docking study shows that the important interacting amino acids present in the active site are ILE68, GLN71, GLN72, TYR75, ARG81, TYR155, ARG193, ARG242, ARG310 and SER313. Most of the ligands can form hydrogen bonds with ARG193 and/or ARG310. The –OH group at C-3 and C-23 can increase the hydrogen bond interaction between ligands and enzyme. However, acetylation or esterification of the –OH group at the C-3 and C-23 not only decreases the number of hydrogen bond, but may also increase the unfavorable steric clashes. Thus binding energy may decrease. Large substituent at C-17 may increase the chance of steric bumps, thus lowering the inhibitory activity of the ligand.

Computational study on the redox reaction of puupehenone in aqueous solution has been given in chapter five. This study helps to predict the E^0 value of different lipoxygenases. Puupehedienone and puupehenone are capable of forming hydrogen bond with water; the absolute value of E^0 of P/PH_2 couple is highly dependent on the difference in the interaction energy and the difference in the solvation free energy.

Chapter six provides a theoretical investigation of cytotoxic activity of halogenated monoterpenoids from plocamium cartilagineum. Some compounds had selective activity against cancer cells versus CHO cells. Their selective cytotoxic activity depends mainly on the gap energy and the stereo chemical features of these compounds.

Chapter seven deals with the Molecular docking and DFT based QSAR study on oleanolic acid derivatives as Protein-tyrosine phosphatase 1B inhibitors. This QSAR study has shown that binding energy (EB), HOMO energy (EH), LUMO energy (EL), dipole moment (μ), molar refractivity (MR), molar volume (MV), solvent accessible surface area (SASA) and partition coefficient (logP) are the important parameters for determining the activity of oleanolic acid derivatives. Model 7.1 and model 7.2 are the best equation for predicting the inhibitory activity of Protein-tyrosine phosphatase 1B and these QSAR models may be used in prediction of activity of designed compound. The docking study shows that the important interacting amino acids present in the active site are TYR20, GLN21, ARG24, ALA27, SER28, TYR46, ASP48, VAL49, ASP181, PHE182, ALA217, ILE219, ARG254, MET258, GLY259, GLN262, THR263. Most of the ligands can form hydrogen bonds with ARG24 and/or ARG254. Binding energies and partion coefficient (logP) play an important role for predicting the activity of the inhibitors.

Chapter eight gives a quantum chemical study of Halomon by the DFT methods. The present study provides useful information about the structure of halomon. The harmonic vibrational frequencies for halomon were calculated at the B3LYP/6-31+G(d,p).

Chapter nine describes QSAR study of sesquiterpene lactones from Inula falconeri as potent anti-inflammatory agents. This QSAR study has been carried out different descriptor like first order SIC, first order CIC, HOMO energy, LUMO energy, dipole moment, entropy and electro negativity. These QSAR models may be used to find out the activity of the designed compounds.