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QSPR Studies on Aqueous Solubility of Drug- Like Compounds.

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Abstract:-

In the present research Quantitative structure–activity relationship (QSPR) model for 100 compounds analysed using multiple linear regression analysis (MLRA) followed by statistical evaluation by NCSS software (IBM). The prediction of aqueous solubility of drugs compounds from their molecular structure is a growing area of modern Pharmaceutical research. For the drug to be Pharmacologically active should also causes certain properties like bioavailability and toxicity Adsorption, Distribution, Metabolism, And Elimination / Toxicological (ADME/Tox) in silico is used as a tool to determine whether a drug candidate reach its site of action and do not cause toxic effect. The degree of adsorption depends upon dose, solubility and permeability of the drug.The main purpose of present study is to achieve good predictive QSPR models for aqueous solubility of heterogeneous organic chemicals. The best model since have the values **R = 0.9245, R^2 = 0.8546 , R^2A = 0.8438 , R^2cv = 0.0.8546** are the best as compared to all the models. The calculated F value is greater than F theoretical value, the value of standard error of estimate is the lowest , **SE = 0.5503, PRESS/SSY = 0.1453** confirms that it is statistically significant and excellent model and it has been found to be having outstanding predictive power.

Keywords:-

QSPR Studies on Aqueous Solubility , Elimination / Toxicological (ADME/Tox) in silico , Solubility and permeability of the drug.

1. Introduction :-

Nowadays the prediction of aqueous solubility of drugs sized compounds from their molecular structure is a growing area of modern Pharmaceutical research. For the drug to be Pharmacologically active should also causes certain properties like bioavailability and toxicity [1-5] Adsorption, Distribution, Metabolism, And Elimination / Toxicological (ADME/Tox) in silico is used as a tool to determine whether a drug candidate reach its site of action and do not cause toxic effect [6]. The degree of adsorption depends upon dose, solubility and permeability of the drug the lipinski “rule of five” is applied to know the orally bioavailability of drug [7]. This rule is obeyed if the molecular weight is below 500, hydrogen bond donor less than 5 and hydrogen bond acceptors less than 10 and calculated log P below 5. Oral bioavailability maintain a balance between aqueous solubility and diffusing ability to pass through different biological barriers. In medicinal chemistry aqueous solubility is important parameter for short metabolism ration and illumination times and the solubilization of drug being tested in hydrophilic solvents [8-10].

In the past a large number of Theoretical models have been proposed to predict aqueous solubility from structure. Theoretical models have been proposed using thermodynamics calculations and QSPR [11-16]. The main purpose of present study is to achieve good predictive QSPR models for aqueous solubility of heterogeneous organic chemicals.

The calculated Physico Chemical indices and indicator parameters recorded in Table- 2.

Physicochemical parameters for 100 compounds [table 2] have been calculated using Chem Sketch of ACD Lab and Marvin Chemaxon software. The parameters includes MR, MV, PC, IR, ST, D, POLY, RDBE, MW, NW, AW, M+: , M-: , [M+H]+: , [M+H]-: , [M-H]+: , [M-H]**.**

(Description of all these parameters are given in previous research paper Manish Rao Ambedkar et all IJCRT (ISSN : 2320-2882) volume 10, Issue 1 January 2022)

2. Research Methodology :-

2.1. Data Set :-

All data of the present investigation were obtained from the reference *(Balakin* K V et all *)*. The data set for this investigation consisted 100 compounds is analysed using multiple linear regression analysis (MLRA) followed by statistical evaluation by NCSS software (IBM).

2.2. Molecular Descriptor Generation :-

To obtain a QSAR model, compounds are often represented by the molecular descriptors. The calculation process of the molecular descriptors was described as below: The two-dimensional molecular structures for 100 compounds were drawn by Chem Sketch 12.0 then calculated some parameters. Then this optimize structure files were exported into software Dragon 6.0 to calculate all kinds of descriptors. The software Dragon 6.0 can calculate Physicochemical parameters, constitutional, topological, geometrical, descriptors and has been successfully used in various QSAR researches .

3. RESULTS AND DISCUSSION :-

By using the multiple linear regression analysis (MLRA) method of 2D-QSAR, regression models were developed for 100 compounds.

Table 2 Physio-Chemical Calculations

Log S (mol/L)	MR	MV	PC	IR	ST	D	POL	RDBE:	MW	NW	AW	M+:	M-:	[M+H]+:	[M+H]-:	[M-H]+:	M-H
-1.4000	40.5200	122.5000	311.0000	1.5750	41.5000	1.1030	16.0600	5.0000	135.0684	135.0000	135.1632	135.0679	135.0690	136.0757	136.0768	134.0600	134.0611
-1.7300	59.9500	128.1000	412.8000	1.9070	107.0000	2.0800	23.7600	7.0000	267.0968	267.0000	267.2413	267.0962	267.0973	268.1040	268.1051	266.0884	266.0895
-2.2600	33.5500	71.9000	222.5000	1.9020	91.4000	1.9100	13.3000	5.0000	138.0542	138.0000	138.1273	138.0536	138.0547	139.0614	139.0625	137.0458	137.0469
-1.3700	37.4100	104.2000	295.2000	1.6370	64.3000	1.3150	14.8300	5.0000	137.0477	137.0000	137.1360	137.0471	137.0482	138.0550	138.0561	136.0393	136.0404
-1.9600	39.3000	102.6000	310.2000	1.6910	83.3000	1.4910	15.5700	5.0000	153.0426	153.0000	153.1354	153.0420	153.0431	154.0499	154.0510	152.0342	152.0353
-2.9500	75.5100	220.8000	574.0000	1.5990	45.6000	1.3100	29.9300	8.0000	290.1379	290.0000	290.3177	290.1373	290.1384	291.1452	291.1463	289.1295	289.1306
0.4800	54.5500	162.7000	416.1000	1.5850	42.7000	1.1560	21.6200	7.0000	188.0950	188.0000	188.2258	188.0944	188.0955	189.1022	189.1033	187.0866	187.0877
-2.4400	47.7300	110.5000	349.2000	1.8100	99.3000	2.0000	18.9200	6.0000	221.9881	222.0000	222.2454	221.9876	221.9887	222.9954	222.9965	220.9798	220.9809
-1.5800	33.1800	101.9000	269.4000	1.5640	48.7000	1.1970	13.1500	5.0000	122.0368	122.0000	122.1213	122.0362	122.0373	123.0441	123.0452	121.0284	121.0295
-1.2200	63.3500	200.5000	514.6000	1.5440	43.3000	1.1230	25.1100	4.0000	225.1365	225.0000	225.2842	225.1359	225.1370	226.1438	226.1449	224.1281	224.1292
-2.8100	95.7800	266.3000	728.7000	1.6380	56.0000	1.2100	37.9700	10.0000	324.1838	324.0000	324.4168	324.1832	324.1843	325.1911	325.1922	323.1754	323.1765
-0.9500	35.0100	110.4000	282.6000	1.5460	42.8000	1.0900	13.8800	5.0000	121.0528	121.0000	121.1366	121.0522	121.0533	122.0600	122.0611	120.0444	120.0455
-2.1500	81.0600	234.5000	651.4000	1.6070	59.4000	1.5800	32.1300	7.0000	370.9997	371.0000	372.2216	370.9992	371.0003	372.0070	372.0081	369.9913	369.9924
-1.3000	67.5900	214.2000	543.8000	1.5430	41.5000	1.1700	26.9000	5.0000	252.1474	252.0000	252.3095	252.1468	252.1479	253.1547	253.1558	251.1390	251.1401
1.7000	28.8500	91.1000	252.9000	1.5450	59.3000	1.8140	11.4300	0.0000	163.9199	164.0000	165.4030	163.9193	163.9204	164.9271	164.9282	162.9115	162.9126
-3.6000	70.7000	198.2000	526.0000	1.6310	49.5000	1.2700	28.0300	6.0000	252.1157	252.0000	252.3392	252.1152	252.1163	253.1230	253.1241	251.1073	251.1084
-2.1100	71.1600	201.7000	564.1000	1.6230	61.1000	1.6000	28.2100	6.0000	322.0123	322.0000	323.1294	322.0118	322.0129	323.0196	323.0207	321.0040	321.0051
-3.7600	58.1600	178.6000	449.2000	1.5640	40.0000	1.3000	23.0500	5.0000	232.0170	232.0000	233.0945	232.0165	232.0176	233.0243	233.0254	231.0086	231.0097
-6.7500	90.4500	239.5000	647.3000	1.6790	53.3000	1.1740	35.8600	10.0000	281.1238	281.0000	281.4152	281.1233	281.1244	282.1311	282.1322	280.1154	280.1165
-2.2500	80.1000	235.4000	644.2000	1.5950	56.0000	1.2900	31.7500	8.0000	304.1423	304.0000	304.3410	304.1418	304.1429	305.1496	305.1507	303.1339	303.1350
-3.2400	85.0100	266.8000	701.2000	1.5490	47.6000	1.2000	33.7000	6.0000	320.1988	320.0000	320.4232	320.1982	320.1993	321.2060	321.2071	319.1904	319.1915
-4.5000	61.8800	174.9000	466.1000	1.6250	50.3000	1.2350	24.5300	8.0000	216.0786	216.0000	216.2326	216.0781	216.0792	217.0859	217.0870	215.0703	215.0714
-4.8300	85.8200	243.9000	644.9000	1.6210	48.8000	1.2500	34.0200	9.0000	305.0738	305.0000	306.2296	305.0733	305.0744	306.0811	306.0822	304.0654	304.0665
-1.1600	27.3000	71.5000	206.3000	1.6880	69.2000	1.5500	10.8200	4.0000	111.0433	111.0000	111.1020	111.0427	111.0438	112.0505	112.0516	110.0349	110.0360
-3.0900	67.5100	182.3000	513.0000	1.6620	62.6000	1.3610	26.7600	10.0000	248.0619	248.0000	248.3009	248.0614	248.0625	249.0692	249.0703	247.0536	247.0547
-5.1900	62.4300	155.9000	465.2000	1.7320	79.2000	1.5400	24.7400	11.0000	240.0423	240.0000	240.2109	240.0417	240.0428	241.0495	241.0506	239.0339	239.0350
-3.2700	85.0500	261.8000	706.7000	1.5630	53.1000	1.2770	33.7100	7.0000	334.1780	334.0000	334.4067	334.1775	334.1786	335.1853	335.1864	333.1697	333.1707
-3.7500	80.9100	225.8000	588.6000	1.6350	46.1000	1.2600	32.0700	11.0000	284.0716	284.0000	284.7402	284.0711	284.0722	285.0789	285.0800	283.0633	283.0644
-5.0000	96.2200	256.7000	731.4000	1.6720	65.9000	1.3800	38.1400	13.0000	356.0882	356.0000	356.4106	356.0877	356.0888	357.0955	357.0966	355.0799	355.0810
-2.6400	60.9000	177.2000	466.2000	1.6030	47.8000	1.2300	24.1400	7.0000	218.1055	218.0000	218.2518	218.1050	218.1061	219.1128	219.1139	217.0972	217.0983
-3.9500	78.0400	232.1000	604.7000	1.5870	46.0000	1.1640	30.9400	8.0000	270.1620	270.0000	270.3661	270.1614	270.1625	271.1693	271.1704	269.1536	269.1547
-2.9700	62.8800	197.3000	518.1000	1.5500	47.5000	1.6780	24.9200	9.0000	330.9908	331.0000	331.2920	330.9903	330.9914	331.9981	331.9992	329.9825	329.9836
-3.1300	57.9300	180.9000	466.7000	1.5530	44.2000	1.2520	22.9600	6.0000	226.0397	226.0000	226.6562	226.0391	226.0402	227.0469	227.0480	225.0313	225.0324

-4.1500	66.5800	203.6000	524.5000	1.5670	44.0000	1.1990	26.3900	9.0000	244.0900	244.0000	244.2609	244.0894	244.0905	245.0972	245.0983	243.0816	243.0827
-2.6500	79.0600	183.5000	576.5000	1.8080	97.3000	1.8300	31.3400	7.0000	337.0449	337.0000	337.4454	337.0444	337.0455	338.0522	338.0533	336.0366	336.0377
-5.3500	67.5300	201.5000	519.9000	1.5850	44.3000	1.3950	26.7700	9.0000	281.0664	281.0000	281.2299	281.0658	281.0669	282.0736	282.0747	280.0580	280.0591
-1.0300	26.1900	76.9000	232.7000	1.5960	83.6000	1.6900	10.3800	4.0000	130.0179	130.0000	130.0772	130.0173	130.0184	131.0251	131.0262	129.0095	129.0106
-5.2800	77.4700	218.7000	590.6000	1.6260	53.1000	1.2200	30.7100	9.0000	268.1463	268.0000	268.3502	268.1458	268.1469	269.1536	269.1547	267.1380	267.1391
-3.2500	85.2700	255.1000	686.9000	1.5830	52.5000	1.3800	33.8000	9.0000	352.0714	352.0000	352.7663	352.0708	352.0719	353.0786	353.0797	351.0630	351.0641
-2.6900	62.7100	175.8000	493.3000	1.6320	62.0000	1.6930	24.8600	9.0000	296.9645	297.0000	297.7391	296.9639	296.9650	297.9718	297.9728	295.9561	295.9572
-3.4600	53.7100	190.2000	445.5000	1.4760	30.0000	1.2200	21.2900	5.0000	232.0823	232.0000	232.2023	232.0818	232.0829	233.0896	233.0907	231.0740	231.0751
-1.0200	41.4300	131.1000	332.0000	1.5440	41.1000	1.1500	16.4200	5.0000	151.0633	151.0000	151.1626	151.0628	151.0639	152.0706	152.0717	150.0550	150.0561
-3.6000	60.7700	200.3000	497.6000	1.5180	38.0000	1.0290	24.0900	5.0000	206.1307	206.0000	206.2808	206.1301	206.1312	207.1380	207.1391	205.1223	205.1234
-3.4900	78.9800	237.1000	606.1000	1.5800	42.6000	1.0930	31.3100	7.0000	259.1572	259.0000	259.3434	259.1567	259.1578	260.1645	260.1656	258.1489	258.1500
-2.1900	47.1400	154.2000	374.9000	1.5230	34.9000	0.9740	18.6800	4.0000	150.1045	150.0000	150.2176	150.1039	150.1050	151.1117	151.1128	149.0961	149.0972
-1.8000	76.0600	205.2000	560.0000	1.6630	55.4000	1.4900	30.1500	10.0000	306.1041	306.0000	306.2708	306.1035	306.1046	307.1113	307.1124	305.0957	305.0968
-0.5600	74.2800	211.2000	563.2000	1.6200	50.5000	1.3100	29.4400	7.0000	278.1379	278.0000	278.3070	278.1373	278.1384	279.1452	279.1463	277.1295	277.1306
-3.4700	63.0300	199.2000	486.4000	1.5450	35.5000	0.9650	24.9800	4.0000	192.1626	192.0000	192.3006	192.1621	192.1632	193.1699	193.1710	191.1543	191.1554
-3.5600	39.0300	86.7000	255.1000	1.8580	74.7000	1.7100	15.4700	6.0000	149.0701	149.0000	149.1533	149.0696	149.0707	150.0774	150.0785	148.0618	148.0629
-3.0200	67.9600	199.9000	519.3000	1.5950	45.4000	1.3010	26.9400	9.0000	260.0685	260.0000	260.2421	260.0679	260.0690	261.0758	261.0768	259.0601	259.0612
-3.2400	53.1300	131.0000	403.2000	1.7440	89.5000	1.8100	21.0600	8.0000	238.0338	238.0000	238.1570	238.0333	238.0344	239.0411	239.0422	237.0254	237.0265
-1.1200	49.2500	134.2000	401.8000	1.6540	80.2000	1.4680	19.5200	0.0000	197.0688	197.0000	197.1879	197.0683	197.0694	198.0761	198.0772	196.0604	196.0615
-4.8200	77.7000	214.9000	596.3000	1.6420	59.2000	1.3080	30.8000	11.0000	281.1052	281.0000	281.3059	281.1046	281.1057	282.1125	282.1136	280.0968	280.0979
-3.5700	82.5700	257.8000	663.3000	1.5530	43.8000	1.1620	32.7300	5.0000	299.1401	299.0000	299.7964	299.1395	299.1406	300.1473	300.1484	298.1317	298.1328
-1.2200	40.9800	117.8000	328.6000	1.6120	60.4000	1.4500	16.2400	4.0000	171.0644	171.0000	171.1540	171.0638	171.0649	172.0717	172.0728	170.0560	170.0571
-3.8700	102.9000	306.3000	780.6000	1.5860	42.1000	1.1530	40.8000	11.0000	353.1627	353.0000	353.4116	353.1622	353.1633	354.1700	354.1711	352.1543	352.1554
-3.6100	60.0700	174.4000	484.1000	1.6040	59.3000	1.3310	23.8100	8.0000	232.0848	232.0000	232.2353	232.0842	232.0853	233.0921	233.0932	231.0764	231.0775
-1.9800	45.9700	121.9000	326.1000	1.6770	51.0000	1.1810	18.2200	7.0000	144.0575	144.0000	144.1699	144.0570	144.0581	145.0648	145.0659	143.0491	143.0502
-3.2400	88.4100	226.4000	613.7000	1.7090	53.9000	1.3800	35.0500	11.0000	312.1142	312.0000	312.7967	312.1136	312.1147	313.1215	313.1225	311.1058	311.1069
-4.6300	85.5500	258.0000	683.1000	1.5770	49.0000	1.1500	33.9100	8.0000	298.1933	298.0000	298.4192	298.1927	298.1938	299.2006	299.2017	297.1849	297.1860
-0.8500	31.2700	95.1000	263.5000	1.5700	58.7000	1.2930	12.3900	5.0000	123.0320	123.0000	123.1094	123.0315	123.0326	124.0393	124.0404	122.0237	122.0248
-4.5900	65.6200	194.7000	514.1000	1.5890	48.5000	1.4490	26.0100	9.0000	282.0616	282.0000	282.2180	282.0611	282.0622	283.0689	283.0700	281.0532	281.0543
-2.9500	102.7000	226.6000	736.2000	1.8670	111.0000	2.0300	40.7400	12.0000	462.1387	462.0000	462.4101	462.1381	462.1392	463.1460	463.1471	461.1303	461.1314
-8.8000	83.2700	207.4000	569.5000	1.7350	56.8000	1.2260	33.0100	14.0000	254.1096	254.0000	254.3252	254.1090	254.1101	255.1168	255.1179	253.1012	253.1023
-4.1600	114.2000	322.3000	861.0000	1.6260	50.9000	1.2530	45.2800	10.0000	403.1485	403.0000	403.9686	403.1480	403.1491	404.1558	404.1569	402.1401	402.1412
-2.2900	60.9000	177.2000	466.2000	1.6030	47.8000	1.2100	24.1400	8.0000	216.0899	216.0000	216.2359	216.0893	216.0904	217.0972	217.0983	215.0815	215.0826
-1.4900	40.1100	114.4000	331.5000	1.6170	70.3000	1.4510	15.9000	6.0000	166.0266	166.0000	166.1308	166.0261	166.0272	167.0339	167.0350	165.0182	165.0193
-3.8600	72.3700	197.9000	534.8000	1.6520	53.3000	1.2700	28.6900	11.0000	252.0899	252.0000	252.2680	252.0893	252.0904	253.0972	253.0983	251.0815	251.0826
-3.7900	73.4100	215.4000	565.7000	1.5960	47.5000	1.1520	29.1000	6.0000	248.1525	248.0000	248.3208	248.1519	248.1530	249.1598	249.1609	247.1441	247.1452
-4.4200	90.9500	288.9000	731.9000	1.5420	41.1000	1.0800	36.0500	7.0000	314.2246	314.0000	314.4617	314.2240	314.2251	315.2319	315.2330	313.2162	313.2173
0.0200	36.4600	96.4000	287.6000	1.6800	79.1000	1.3690	14.4500	7.0000	132.0436	132.0000	132.1228	132.0430	132.0441	133.0509	133.0520	131.0352	131.0363
-2.3700	51.0000	171.7000	415.2000	1.5050	34.1000	1.0400	20.2100	5.0000	179.0946	179.0000	179.2157	179.0941	179.0952	180.1019	180.1030	178.0863	178.0874
-6.1800	72.4600	161.9000	449.6000	1.8510	59.4000	1.2480	28.7200	12.0000	202.0783	202.0000	202.2506	202.0777	202.0788	203.0855	203.0866	201.0699	201.0710
-0.9100	35.4800	105.6000	270.3000	1.5860	42.8000	1.1400	14.0600	5.0000	121.0640	121.0000	121.1399	121.0634	121.0645	122.0713	122.0724	120.0556	120.0567
-1.9400	35.0600	100.3000	284.4000	1.6150	64.4000	1.3750	13.9000	5.0000	138.0317	138.0000	138.1207	138.0311	138.0322	139.0390	139.0401	137.0233	137.0244
-1.8400	35.8700	107.8000	288.3000	1.5790	51.0000	1.2700	14.2200	5.0000	137.0477	137.0000	137.1360	137.0471	137.0482	138.0550	138.0561	136.0393	136.0404
-5.4600	121.3000	345.1000	922.2000	1.6200	50.9000	1.2800	48.1000	13.0000	443.1879	443.0000	443.5591	443.1873	443.1884	444.1952	444.1963	442.1795	442.1806
-5.4900	76.5300	206.8000	570.7000	1.6610	57.9000	1.4310	30.3300	9.0000	295.0167	295.0000	296.1486	295.0161	295.0172	296.0240	296.0251	294.0083	294.0094
-2.7000	62.4500	173.1000	502.3000	1.6410	70.9000	1.4620	24.7500	9.0000	253.0521	253.0000	253.2776	253.0516	253.0527	254.0594	254.0605	252.0437	252.0448
-2.7300	72.3900	199.8000	580.9000	1.6440	71.4000	1.3920	28.6900	10.0000	278.0837	278.0000	278.3302	278.0832	278.0843	279.0910	279.0921	277.0754	277.0765
-1.5100	52.2500	151.0000	414.6000	1.6080	56.7000	1.4100	20.7100	7.0000	214.0412	214.0000	214.2416	214.0407	214.0418	215.0485	215.0496	213.0328	213.0339
-1.3600	42.8000	120.6000	340.9000	1.6270	63.7000	1.4270	16.9700	6.0000	172.0306	172.0000	172.2049	172.0301	172.0312	173.0379	173.0390	171.0223	171.0234

-2.7300	63.1400	167.2000	504.4000	1.6790	82.6000	1.4960	25.0300	10.0000	250.0524	250.0000	250.2770	250.0519	250.0530	251.0597	251.0608	249.0441	249.0452
-4.0700	84.5100	225.4000	622.0000	1.6720	57.9000	1.4300	33.5000	9.0000	323.1304	323.0000	323.4105	323.1298	323.1309	324.1376	324.1387	322.1220	322.1231
-1.0000	85.7400	260.0000	679.5000	1.5730	46.6000	1.1890	33.9900	5.0000	309.1940	309.0000	309.4006	309.1935	309.1946	310.2013	310.2024	308.1856	308.1867
-4.4400	40.9300	125.2000	314.8000	1.5670	39.9000	1.4480	16.2200	4.0000	179.9300	180.0000	181.4470	179.9295	179.9306	180.9373	180.9384	178.9217	178.9228
-3.7000	65.2200	161.0000	468.4000	1.7440	71.6000	1.6000	25.8500	10.0000	258.0641	258.0000	258.2295	258.0635	258.0646	259.0713	259.0724	257.0557	257.0568
-5.2000	91.8400	289.6000	743.2000	1.5460	43.3000	1.0400	36.4100	6.0000	301.2406	301.0000	301.4662	301.2400	301.2411	302.2478	302.2489	300.2322	300.2333
-1.5000	31.0900	84.6000	261.4000	1.6550	90.8000	1.7300	12.3200	4.0000	145.9883	146.0000	146.5318	145.9878	145.9889	146.9956	146.9967	144.9799	144.9810
-2.6600	95.7600	301.2000	751.1000	1.5480	38.6000	1.0930	37.9600	8.0000	329.1991	329.0000	329.4333	329.1985	329.1996	330.2064	330.2075	328.1907	328.1918
-6.7300	79.7800	191.7000	518.7000	1.7710	53.5000	1.1900	31.6200	13.0000	228.0939	228.0000	228.2879	228.0934	228.0944	229.1012	229.1023	227.0855	227.0866
-1.4900	26.1900	72.7000	225.5000	1.6390	92.5000	1.5400	10.3800	4.0000	112.0273	112.0000	112.0868	112.0267	112.0278	113.0346	113.0357	111.0189	111.0200
-3.4000	38.4400	76.8000	298.1000	2.0010	226.0000	2.1880	15.2400	6.0000	168.0283	168.0000	168.1103	168.0278	168.0289	169.0356	169.0367	167.0200	167.0211
-2.0000	80.7800	242.4000	646.1000	1.5800	50.4000	1.1900	32.0200	7.0000	289.1678	289.0000	289.3694	289.1672	289.1683	290.1751	290.1762	288.1594	288.1605
-3.5200	59.5500	185.1000	468.4000	1.5560	40.9000	1.3400	23.6000	5.0000	248.0119	248.0000	249.0939	248.0114	248.0125	249.0192	249.0203	247.0036	247.0047
-6.7400	72.2000	200.5000	538.0000	1.6390	51.7000	1.2030	28.6200	9.0000	241.1103	241.0000	241.2851	241.1097	241.1108	242.1176	242.1187	240.1019	240.1030
-5.7500	125.0000	356.1000	973.7000	1.6190	55.8000	1.2000	49.5500	13.0000	430.2620	430.0000	430.5818	430.2615	430.2626	431.2693	431.2704	429.2537	429.2548
-3.4700	71.6400	222.5000	574.1000	1.5560	44.2000	1.2100	28.4000	7.0000	270.1038	270.0000	270.3479	270.1033	270.1044	271.1111	271.1122	269.0954	269.0965
-1.5600	89.3800	259.5000	691.9000	1.6040	50.5000	1.2100	35.4300	8.0000	315.1834	315.0000	315.4067	315.1829	315.1840	316.1907	316.1918	314.1751	314.1762
-3.3300	93.1500	234.8000	674.1000	1.7240	67.9000	1.4200	36.9200	12.0000	334.1681	334.0000	334.4116	334.1676	334.1687	335.1754	335.1765	333.1598	333.1609

Table 3: Correlation of Physico-Chemical

	Log S(mol/L)	*MR*	*MV*	*PC*	*IR*	*ST*	*D*	*POL*	*RDBE:*	*MW*	*NW*	*AW*	*MPLUS*	*MMINUS*	*MH*	*MHMINUS*	*MHPLUS*	*M-H*
Log S (mol/L)	1																	
MR	-0.5710	1																
MV	-0.5004	0.9604	1															
PC	-0.5101	0.9861	0.9836	1														
IR	-0.1710	-0.0316	-0.2856	-0.1480	1													
ST	0.1003	-0.2349	-0.4068	-0.2684	0.7880	1												
D	0.1876	-0.2709	-0.4392	-0.3070	0.7130	0.8008	1											
POL	-0.5709	1.0000	0.9603	0.9860	-0.0315	-0.2347	-0.2708	1										
RDBE:	-0.6605	0.6976	0.5533	0.6195	0.3139	0.0009	-0.0381	0.6976	1									
MW	-0.4493	0.9350	0.8869	0.9387	0.0084	-0.1106	-0.0106	0.9350	0.6360	1								
NW	-0.4493	0.9348	0.8867	0.9385	0.0085	-0.1104	-0.0102	0.9348	0.6360	1.0000	1							
AW	-0.4492	0.9346	0.8866	0.9383	0.0078	-0.1109	-0.0100	0.9346	0.6351	1.0000	1.0000	1						
MPLUS	-0.4493	0.9350	0.8869	0.9387	0.0084	-0.1106	-0.0106	0.9350	0.6360	1	1.0000	1.0000	1					
MMINUS	-0.4493	0.9350	0.8869	0.9387	0.0084	-0.1106	-0.0106	0.9350	0.6360	1	1.0000	1.0000	1	1				
MH	-0.4493	0.9350	0.8869	0.9387	0.0084	-0.1106	-0.0106	0.9350	0.6360	1	1.0000	1.0000	1	1	1			
MHMINUS	-0.4493	0.9350	0.8869	0.9387	0.0084	-0.1106	-0.0106	0.9350	0.6360	1	1.0000	1.0000	1	1	1	1		
MHPLUS	-0.4493	0.9350	0.8869	0.9387	0.0084	-0.1106	-0.0106	0.9350	0.6360	1	1.0000	1.0000	1	1	1	1	1	
M-H	-0.4493	0.9350	0.8869	0.9387	0.0084	-0.1106	-0.0106	0.9350	0.6360	1	1.0000	1.0000	1	1	1	1	1	1

Table 4: Regression Physico-Chemical

Mono Parametric

Model No	Parameter Used	AI	B	SE	R	R2	R2A	F Ratio	Q=r/se
1	MR	-0.0439 (±0.0064)	-0.1403	1.4008	0.5710	0.3260	0.3191	47.4041	0.4076
2	MV	-0.0131 (±0.0023)	-0.5729	1.4773	0.5004	0.2504	0.2428	32.7376	0.3387
3	PC	-0.0052 (±0.0009)	-0.3898	1.4676	0.5101	0.2602	0.2527	34.4739	0.3476
4	IR	-3.1370 (±1.8262)	2.0997	1.6812	0.1710	0.0292	0.0193	2.9508	0.1017
5	ST	0.0072 (±0.0072)	-3.4398	1.6977	0.1003	0.0101	0.0000	0.9968	0.0591
6	D	1.2975 (±0.6861)	-4.7788	1.6760	0.1876	0.0352	0.0254	3.5762	0.1119
7	POL	-0.1108 (±0.0161)	-0.1413	1.4008	0.5709	0.3260	0.3191	47.3965	0.4076
8	RDBE	-0.4079 (±0.0468)	-0.0008	1.2811	0.6605	0.4363	0.4305	75.8496	0.5156
9	MW	-0.0097 (±0.0020)	-0.6305	1.5243	0.4493	0.2019	0.1938	24.7924	0.2948
10	NW	-0.0097 (±0.0020)	-0.6307	1.5244	0.4493	0.2019	0.1937	24.7841	0.2947
11	AW	-0.0097 (±0.0019)	-0.6313	1.5245	0.4492	0.2018	0.1936	24.7719	0.2947
12	MPLUS	-0.0097 (±0.0020)	-0.6305	1.5243	0.4493	0.2019	0.1938	24.7924	0.2948
13	NMINUS	-0.0097 (±0.0020)	-0.6305	1.5243	0.4493	0.2019	0.1938	24.7924	0.2948
14	MH	-0.0097 (±0.0020)	-0.6207	1.5243	0.4493	0.2019	0.1938	24.7924	0.2948
15	MHMINUS	-0.0097 (±0.0020)	-0.6207	1.5243	0.4493	0.2019	0.1938	24.7924	0.2948
16	MHPLUS	-0.0097 (±0.0020)	-0.6403	1.5243	0.4493	0.2019	0.1938	24.7924	0.2948
17	M-H	-0.0097 (±0.0020)	-0.6403	1.5243	0.4493	0.2019	0.1938	24.7924	0.2948

Bi- Parametric

Model No	Parameter Used	AI	B	SE	R	R2	R2A	F Ratio	Q=r/se
18	RDBE MR	-0.3155(±0.0643) -0.0165 (±0.0080)	0.3973	1.2604	0.6782	0.4599	0.4488	41.3055	0.5381
19	RDBE MV	-0.3415(±0.0552) -0.0051 (±0.0023)	0.4583	1.2574	0.6801	0.4625	0.4515	41.7384	0.5409
20	RDBE PC	-0.3453(±0.0591) -0.0017 (±0.0010)	0.3798	1.2687	0.6729	0.4528	0.4415	40.1366	0.5304
21	RDBE POL	-0.3155(±0.0643) -0.0416 (±0.0202)	0.3968	1.2604	0.6782	0.4599	0.4488	41.3029	0.5381

Tri Parametric

Model No	Parameter Used	AI	B	SE	R	R2	R2A	F Ratio	Q=r/se
22	RDBE MV MR	-0.3474(±0.0795) -0.0060 (±0.0087) 0.0031 (±0.0296)	0.4623	1.2638	0.6801	0.4626	0.4458	27.5455	0.5381
23	RDBE MV PC	-0.4065(±0.0627) -0.0286 (±0.0116) 0.0099 (±0.0048)	0.3190	1.2366	0.6968	0.4855	0.4694	30.1952	0.5635
24	RDBE MV POL	-0.3475(±0.0794) -0.0060 (±0.0087) 0.0079 (±0.0746)	0.4624	1.2638	0.6801	0.4626	0.4458	27.5457	0.5381
25	RDBE MV ST	-0.3472(±0.0581) -0.0047 (±0.0027) 0.0020 (±0.0061)	0.2992	1.2632	0.6806	0.4632	0.4464	27.6076	0.5388
26	RDBE MV D	-0.3613(±0.0572) -0.0034 (±0.0027) 0.7518 (±0.5939)	-0.7346	1.2535	0.6866	0.4714	0.4548	28.5326	0.5477

Tera Parametric

Model No	Parameter Used	AI	B	SE	R	R2	R2A	F Ratio	Q=r/se
27	RDBE MV PC D	-0.4123(±0.0643) -0.0355 (±0.0193) 0.0124 (±0.0074) 0.0124 (±0.9068)	0.9273	1.2418	0.6975	0.4866	0.4650	22.5078	0.5617
28	RDBE MV PC MR	-0.2912(±0.0779) -0.0307 (±0.0113) 0.0234 (±0.0073) 0.0234 (±0.0443)	-0.0080	1.2073	0.7174	0.5147	0.4942	25.1854	0.5942
29	RDBE MV PC POL	-0.2914(±0.0779) -0.0307 (±0.0113) 0.0234 (±0.0073) 0.0234 (±0.1118)	-0.0094	1.2074	0.7174	0.5146	0.4942	25.1795	0.5942
30	RDBE MV PC ST	-0.4326(±0.0628) -0.0629 (±0.0198) 0.0225 (±0.0076) 0.0225 (±0.0095)	1.7109	1.2148	0.7132	0.5086	0.4879	24.5838	0.5871

Penta Parametric

Model No	Parameter Used	AI	B	SE	R	R2	R2A	F Ratio	Q=r/se
31	RDBE MV PC MR ST	-0.3162(±0.0772) -0.0656 (±0.0193) 0.0364 (±0.0093) 0.0364 (±0.0435) -0.0656 (±0.0093)	1.4038	1.1834	0.7339	**0.5386**	0.5141	21.9465	0.6202
32	RDBE MV PC MR POL	-0.2852(±0.0788) -0.0288 (±0.0118) 0.0231 (±0.0074) 0.0231 (±11.5051) -0.0288 (±29.0033)	0.1103	1.2113	0.7187	0.5166	0.4909	20.0897	0.5933
33	RDBE MV PC MR D	-0.2964(±0.0797) -0.0359 (±0.0189) 0.0252 (±0.0090) 0.0252 (±0.0446) -0.0359 (±0.8867)	0.4535	1.2130	0.7178	0.5153	0.4895	19.9854	0.5918

Hexa Parametric

Model No	Parameter Used	AI	B	SE	R	R2	R2A	F Ratio	Q=r/se
34	RDBE MV PC MR ST POL	-0.3091(±0.0778) -0.0643 (±0.0194) 0.0364 (±0.0093) 0.0364 (±11.3048) -0.0643 (±0.0093) 23.5095 (±28.4981)	1.6085	1.1854	0.7362	**0.5420**	0.5124	18.3401	0.6211

Table 5 Regression Model

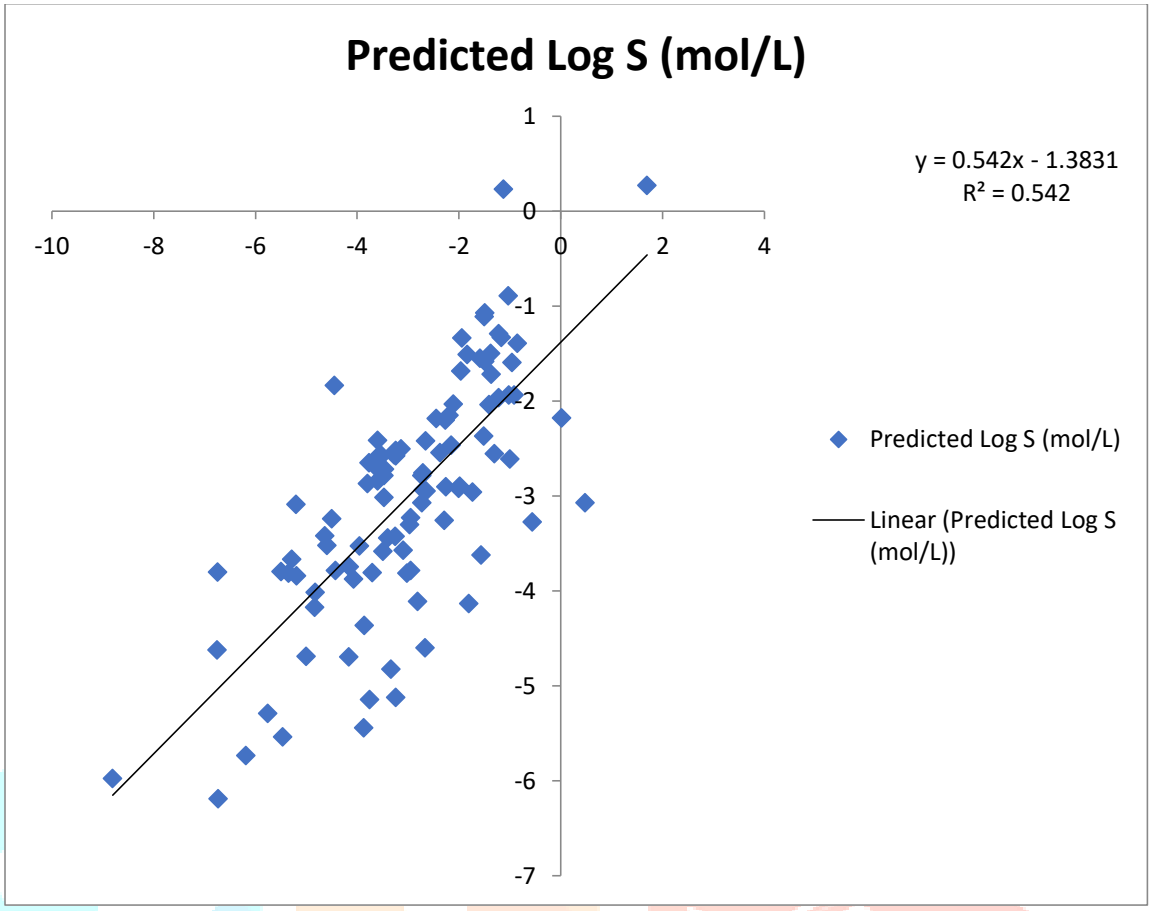
Model No	Parameter Used	AI	B	SE	R	R2	R2A	F Ratio	Q=r/se
8	RDBE	-0.4079 (±0.0468)	-0.0008	1.2811	0.6605	0.4363	0.4305	75.8496	0.5156
19	RDBE MV	-0.3415(±0.0552) -0.0051 (±0.0023)	0.4583	1.2574	0.6801	0.4625	0.4515	41.7384	0.5409
23	RDBE MV PC	-0.4065(±0.0627) -0.0286 (±0.0116) 0.0099 (±0.0048)	0.3190	1.2366	0.6968	**0.4855**	0.4694	30.1952	0.5635
28	RDBE MV PC MR	-0.2912(±0.0779) -0.0307 (±0.0113) 0.0234 (±0.0073) 0.0234 (±0.0443)	-0.0080	1.2073	0.7174	**0.5147**	0.4942	25.1854	0.5942
31	RDBE MV PC MR ST	-0.3162(±0.0772) -0.0656 (±0.0193) 0.0364 (±0.0093) 0.0364 (±0.0435) -0.0656 (±0.0093)	1.4038	1.1834	0.7339	**0.5386**	0.5141	21.9465	0.6202
34	RDBE MV PC MR ST POL	-0.3091(±0.0778) -0.0643 (±0.0194) 0.0364 (±0.0093) 0.0364 (±11.3048) -0.0643 (±0.0093) 23.5095 (±28.4981)	1.6085	1.1854	0.7362	**0.5420**	0.5124	18.3401	0.6211

Table 6: Observed and Estimated Model Physico-Chemical of model no 34

SN	Observed Log S (mol/L)	*Predicted Log S (mol/L)*	*Residuals*
1	-1.4	-2.0406	0.640599
2	-1.73	-2.96348	1.233478
3	-2.26	-2.20275	-0.05725
4	-1.37	-1.50125	0.131252
5	-1.96	-1.68628	-0.27372
6	-2.95	-3.79103	0.841032
7	0.48	-3.07758	3.557583
8	-2.44	-2.18739	-0.25261
9	-1.58	-1.55588	-0.02412
10	-1.22	-1.97123	0.751234
11	-2.81	-4.11719	1.307194
12	-0.95	-1.59777	0.64777
13	-2.15	-2.47007	0.320074
14	-1.3	-2.56087	1.260871
15	1.7	0.268341	1.431659

16	-3.6	-2.84419	-0.75581
17	-2.11	-2.03499	-0.07501
18	-3.76	-2.65478	-1.10522
19	-6.75	-4.62674	-2.12326
20	-2.25	-2.90496	0.654958
21	-3.24	-2.52619	-0.71381
22	-4.5	-3.24434	-1.25566
23	-4.83	-4.17432	-0.65568
24	-1.16	-1.33352	0.173523
25	-3.09	-3.57386	0.483858
26	-5.19	-3.84576	-1.34424
27	-3.27	-2.57211	-0.69789
28	-3.75	-5.14792	1.397918
29	-5	-4.69238	-0.30762
30	-2.64	-2.95071	0.310712
31	-3.95	-3.52971	-0.42029
32	-2.97	-3.30554	0.335539
33	-3.13	-2.50962	-0.62038
34	-4.15	-3.74755	-0.40245
35	-2.65	-2.4265	-0.2235
36	-5.35	-3.81433	-1.53567
37	-1.03	-0.89764	-0.13236
38	-5.28	-3.67108	-1.60892
39	-3.25	-3.42722	0.177224
40	-2.69	-2.93996	0.249962
41	-3.46	-2.72261	-0.73739
42	-1.02	-1.94127	0.921271
43	-3.6	-2.41627	-1.18373
44	-3.49	-3.58793	0.097935
45	-2.19	-2.15652	-0.03348
46	-1.8	-4.1395	2.339497
47	-0.56	-3.27838	2.718381
48	-3.47	-2.78705	-0.68295
49	-3.56	-2.60127	-0.95873
50	-3.02	-3.81625	0.796253
51	-3.24	-2.579	-0.661
52	-1.12	0.230238	-1.35024
53	-4.82	-4.02025	-0.79975
54	-3.57	-2.72517	-0.84483
55	-1.22	-1.29613	0.076126
56	-3.87	-5.44718	1.577178
57	-3.61	-2.59992	-1.01008
58	-1.98	-2.90211	0.922107
59	-3.24	-5.12857	1.888572
60	-4.63	-3.42418	-1.20582
61	-0.85	-1.39494	0.544942
62	-4.59	-3.5269	-1.0631
63	-2.95	-3.23047	0.280467
64	-8.8	-5.97751	-2.82249

65	-4.16	-4.69846	0.538458
66	-2.29	-3.2598	0.969802
67	-1.49	-1.58601	0.096011
68	-3.86	-4.36758	0.507582
69	-3.79	-2.87114	-0.91886
70	-4.42	-3.78706	-0.63294
71	0.02	-2.18006	2.200056
72	-2.37	-2.54928	0.179278
73	-6.18	-5.73712	-0.44288
74	-0.91	-1.93892	1.028922
75	-1.94	-1.34159	-0.59841
76	-1.84	-1.51599	-0.32401
77	-5.46	-5.54249	0.082492
78	-5.49	-3.79849	-1.69151
79	-2.7	-2.76044	0.060438
80	-2.73	-3.07378	0.343778
81	-1.51	-2.37342	0.863419
82	-1.36	-1.72289	0.362891
83	-2.73	-2.78766	0.057664
84	-4.07	-3.8786	-0.1914
85	-1	-2.61738	1.617379
86	-4.44	-1.83899	-2.60101
87	-3.7	-3.81037	0.11037
88	-5.2	-3.09021	-2.10979
89	-1.5	-1.11459	-0.38541
90	-2.66	-4.60579	1.945786
91	-6.73	-6.19506	-0.53494
92	-1.49	-1.07824	-0.41176
93	-3.4	-3.44474	0.044744
94	-2	-2.92532	0.925321
95	-3.52	-2.57463	-0.94537
96	-6.74	-3.80821	-2.93179
97	-5.75	-5.29236	-0.45764
98	-3.47	-3.02088	-0.44912
99	-1.56	-3.6268	2.066803
100	-3.33	-4.8255	1.495496



The cross validated parameters have been calculated for these models and recorded in table 7 on the basis of cross validated parameters The Hexa parametric model discussed above has been formed to be the best model.

Table 7: Cross validation of Physico-Chemical

Model No	Parameter Used	press	Ssy	Press/SSY	R²CV	PSE	Spress
8	RDBE	160.8371	285.3212	0.563705	0.436295	1.268216	1.281091
19	RDBE MV	153.3502	285.3212	0.537465	0.462535	1.238346	1.25735
23	RDBE MV PC	146.8004	285.3212	0.514509	0.485491	1.211612	1.236596
28	RDBE MV PC MR	138.476	285.3212	0.485334	0.514666	1.176758	1.207328
31	RDBE MV PC MR ST	131.644	285.3212	0.461389	0.538611	1.147362	1.183414
34	RDBE MV PC MR ST POL	130.6877	285.3212	0.458037	0.541963	1.143187	1.18543

Table 7: Physico-Chemical - Regression of Training Set

Model No	Parameter Used	AI	B	SE	R	R2	R2A	F Ratio	Q=r/se
8	RDBE	-0.3895(±0.0370)	0.0872	0.8889	0.7702	0.5932	0.5879	110.8254	0.8665
19	RDBE MV	-0.3255(±0.0451) -0.0042 (±0.0018)	0.3885	0.8636	0.7881	0.6211	0.6110	61.4800	0.9126
23	RDBE MV PC	-0.3869(±0.0523) -0.0224 (±0.0086) 0.0078 (±0.0036)	0.3063	0.8430	0.8023	0.6438	0.6293	44.5736	0.9517
28	RDBE MV PC MR	-0.2897(±0.0636) -0.0236 (±0.0083) 0.0179 (±0.0053) 0.0179 (±0.0325)	0.0422	0.8141	0.8199	0.6722	0.6543	37.4323	1.0071
31	RDBE MV PC MR ST	-0.3250(±0.0594) -0.0622 (±0.0129) 0.0320 (±0.0062) 0.0320 (±0.0299) -0.0622 (±0.0060)	1.6089	0.7511	0.8514	0.7248	0.7057	37.9307	1.1335
34	RDBE MV PC MR ST POL	-0.3140(±0.0595) -0.0598 (±0.0129) 0.0317 (±0.0062) 0.0317 (±7.6376) -0.0598 (±0.0059) 27.2304 (±19.2519)	1.8128	0.7460	0.8558	0.7324	0.7098	32.3817	1.1472

QSAR MODEL DEVELOPMENT AND VALIDATION

The data set was split in two subsets the training set and test. The training set of 78 compounds is used in building the QSAR model and 22 compounds is for the test set that was used to evaluate the predictive ability of the model

Predictive ability was evaluated by the LOO (Leave one out method) cross validation procedure. This method systematically removes one data point at a point and then a model is constructed on the basis of the reduced data set which is then used to predict the activity of the removed sample. This procedure was repeated for all points until a complete set of predicted values were obtained. It was noted that the predicted activities were very close to the respective experimental values. Various cross- validation parameters calculated for the proposed models are presented in Table -8

The MLR methods are applied to generate and you Qsar model for the prediction of Log (Sol) activities of the training and test compounds for the training set these models are reported in table 8 and they show much improvement in R square values these models are as below.

Table 8: Physico-Chemical- Observed and Estimated of Training Set

SN	Observed Log S (mol/L)	*Predicted Log S (mol/L)*	*Residuals*
1	-1.4	-1.81795	0.417953
2	-1.73	-2.82133	1.091328
3	-2.26	-2.03288	-0.22712
4	-1.37	-1.38886	0.01886
5	-1.96	-1.66661	-0.29339
6	-2.95	-3.50021	0.550213
7	-2.44	-2.10143	-0.33857
8	-1.58	-1.42766	-0.15234
9	-1.22	-1.77445	0.554452
10	-2.81	-3.84446	1.034462
11	-0.95	-1.42119	0.471194
12	-2.15	-2.35652	0.206515
13	-1.3	-2.33763	1.037629
14	1.7	0.311977	1.388023
15	-3.6	-2.52255	-1.07745
16	-2.11	-1.89033	-0.21967
17	-2.25	-2.7754	0.5254
18	-3.24	-2.36233	-0.87767
19	-4.83	-3.85106	-0.97894

20	-1.16	-1.21722	0.057224
21	-3.09	-3.40269	0.312691
22	-3.27	-2.49057	-0.77943
23	-3.75	-4.78534	1.035341
24	-5	-4.51072	-0.48928
25	-2.64	-2.71128	0.071279
26	-3.95	-3.24227	-0.70773
27	-2.97	-3.19587	0.225874
28	-3.13	-2.32972	-0.80028
29	-4.15	-3.52923	-0.62077
30	-2.65	-2.28963	-0.36037
31	-1.03	-0.92956	-0.10044
32	-3.25	-3.2764	0.026401
33	-2.69	-2.81009	0.120092
34	-3.46	-2.4702	-0.9898
35	-1.02	-1.75728	0.737276
36	-3.49	-3.26065	-0.22935
37	-2.19	-1.92455	-0.26545
38	-3.47	-2.47224	-0.99776
39	-3.56	-2.36848	-1.19152
40	-3.02	-3.54694	0.526944
41	-3.24	-2.51522	-0.72478
42	-4.82	-3.83382	-0.98618
43	-3.57	-2.48549	-1.08451
44	-1.22	-1.19765	-0.02235
45	-3.87	-5.01377	1.143771
46	-1.98	-2.64203	0.66203
47	-3.24	-4.67895	1.438951
48	-0.85	-1.34324	0.493242
49	-2.95	-2.99158	0.041583
50	-4.16	-4.29221	0.132205
51	-2.29	-3.02526	0.735263
52	-1.49	-1.54468	0.054675
53	-3.86	-4.08429	0.224293
54	-3.79	-2.60241	-1.18759
55	-4.42	-3.53059	-0.88941
56	-2.37	-2.33421	-0.03579
57	-6.18	-5.25114	-0.92886
58	-0.91	-1.73827	0.82827
59	-1.94	-1.24947	-0.69053
60	-1.84	-1.37197	-0.46803
61	-5.46	-5.13589	-0.32411
62	-2.7	-2.7305	0.030502
63	-2.73	-3.04875	0.318745
64	-1.51	-2.24493	0.734927
65	-1.36	-1.60669	0.246694
66	-2.73	-2.77526	0.04526
67	-4.07	-3.58103	-0.48897
68	-1	-2.35582	1.355822

69	-3.7	-3.606	-0.094
70	-1.5	-1.14298	-0.35702
71	-2.66	-4.25202	1.592023
72	-6.73	-5.71671	-1.01329
73	-1.49	-1.10873	-0.38127
74	-3.4	-3.68325	0.283253
75	-2	-2.741	0.740998
76	-5.75	-5.05388	-0.69612
77	-3.47	-2.7974	-0.6726
78	-3.33	-4.56109	1.23109

Observed and estimated activities for the compounds using the best model is recorded in table 9 and cross validated parameters of training set have been calculated for various model and they are reported in table 10. On the basis of value for different cross validated parameter it is observed that model containing RDBE, MV,PC, MR, ST AND POL, is the best model with predicted power of 0.7098 the predictive power of the model is also shown in the figure 2.

Table 9: Physico-Chemical- Crossed validation of Training Set

Model No	Parameter Used	press	ssy	Press/SSY	R^2CV	PSE	Spress
8	RDBE	60.0528	147.6236	0.406797	0.593203	0.877444	0.888914
19	RDBE MV	55.9293	147.6236	0.378864	0.621136	0.846784	0.863553
23	RDBE MV PC	52.5905	147.6236	0.356247	0.643753	0.821119	0.84302
28	RDBE MV PC MR	48.384	147.6236	0.327752	0.672248	0.787596	0.814122
31	RDBE MV PC MR ST	40.622	147.6236	0.275173	0.724827	0.721661	0.751129
34	RDBE MV PC MR ST POL	39.5088	147.6236	0.267632	0.732368	0.711704	0.745964

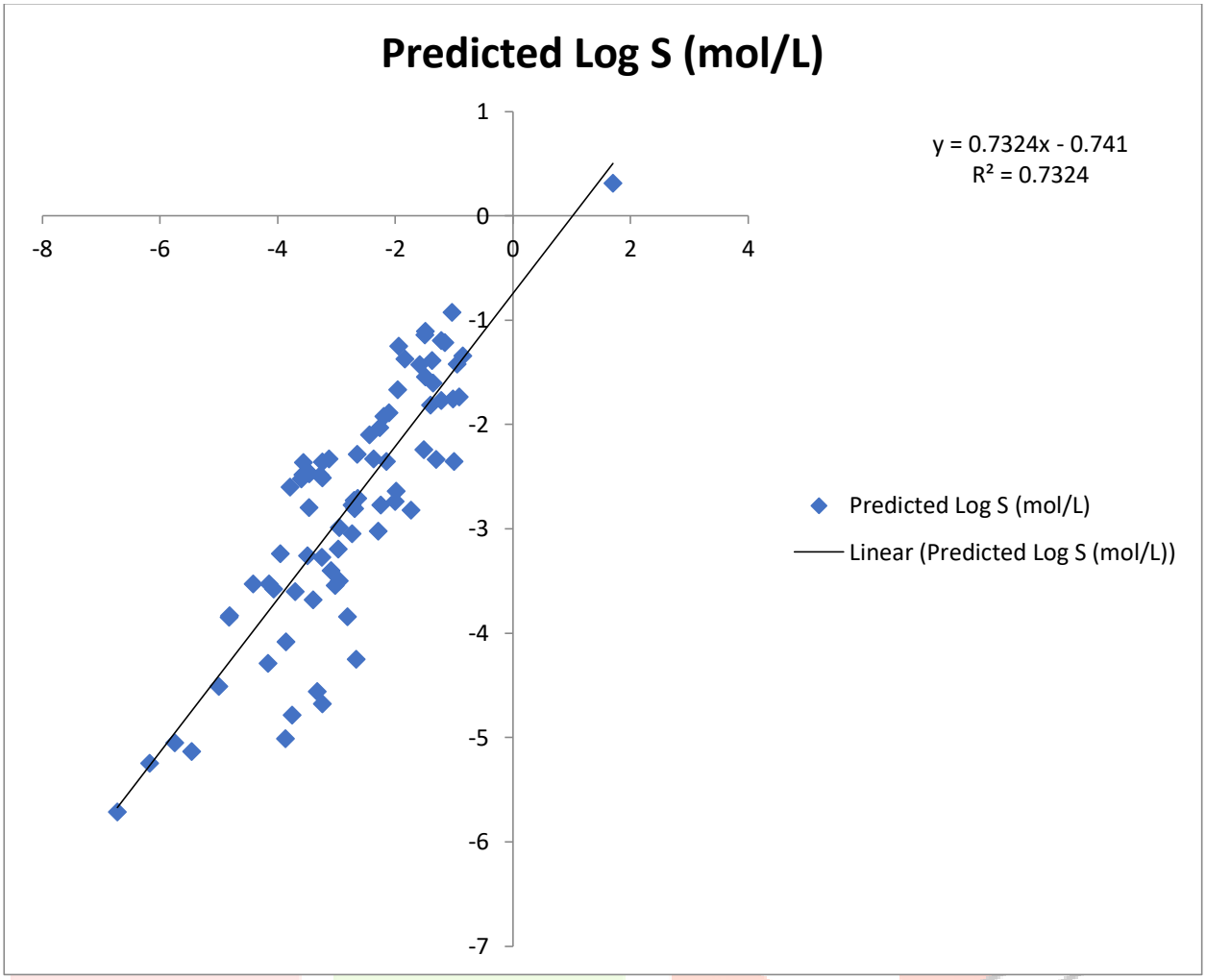


Table 10: Physico-Chemical- Regression of Test Set

Model No	Parameter Used	AI	B	SE	R	R2	R2A	F Ratio	Q=r/se
34	RDBE MV PC MR ST POL	-0.2363(±0.2685) 0.0958 (±0.2602) -0.0228 (±0.1155) -0.0228 (±72.2314) 0.0958 (±0.1733) -146.8624 (±182.0240)	-6.1340	2.1558	0.6292	**0.3959**	0.1543	1.6385	0.2919

LogS(mol/L)=-0.2363(±0.2685)RDBE0.0958(±0.2602)MV-0.0228(±0.1155)PC-0.0228(±72.2314)MR0.0958(±0.1733)ST-146.8624(±182.0240)POL+-6.1340, N=22, SE=(2.1558),R=(0.6292),R^2=(0.3959),R^2A=(0.1543),FRATIO=(1.6385),Q=(0.2919)

PRESS (predicted residual sum of squares) appears to be the most important cross validation parameters accounting for good estimate of the real predictive error of the models. In case its value is less than SSY(sum of the square of all response value), it will mean that the predictive power of the model is good and is not based upon chance therefore, can be considered statistically significant.

To be a reasonable QSAR model , PRESS/SSY should be smaller than 0.400. In our case , the ratio PRESS/SSY ranges between 0.4067 to 0.2676 indicating that all proposed models (equations 8, 19, 23, 28, 31, and 34) are reliable. The PSE and SPRESS are good parameters to discuss the uncertainty in prediction. The lower the value of these parameters, the better will be the predictive ability of the model. The indication of the performance of the model is obtained from R2 CV (the overall predictive ability) higher R2 CV shows that the model is good. In order to examine the relative potential of models , predictive correlation coefficient (R2 pred) were estimated by plotting graphs between observed and calculated Log (Sol) values obtained with the help of eqn 34. The comparison between observed and predicted activities is listed in Table- 9. Such correlations are shown in figure 2. From the fig 2, R2 pred values obtained for equation 34 is 0.7324 is fairly high indicating the good quality of models.

Amongst all these statistically significant five models discussed above model 34 is the best model since the values R = 0.8558, R2 = 0.7324 , R2A = 0.7095 , R2cv = 0.7323 are the best as compared to all the models. The calculated F value is greater than F theoretical value , the value of standard error of estimate is the lowest , SE = 1.8128, PRESS/SSY = 0.2676 confirms that it is statistically significant and excellent model and it has been found to be having outstanding predictive power also.

The generated QSAR model was employed to predicted Log (Sol) activities of the test (Prediction) molecules and the outcome is displayed in table 11 - 13 the predictive power is also shown in the figure 3.

Table 11: Physico-Chemical- Observed and Estimated of Test Set

Sn	Log S (mol/L)	*Predicted Log S (mol/L)*	*Residuals*
7	0.48	-3.523	4.003005
18	-3.76	-2.78438	-0.97562
19	-6.75	-6.61976	-0.13024
22	-4.5	-4.52639	0.026387
26	-5.19	-3.34022	-1.84978
36	-5.35	-4.66644	-0.68356
38	-5.28	-4.93877	-0.34123
43	-3.6	-3.07649	-0.52351
46	-1.8	-5.24706	3.447056
47	-0.56	-3.62541	3.065409
52	-1.12	-0.46315	-0.65685
57	-3.61	-3.6082	-0.0018
60	-4.63	-3.90065	-0.72935
62	-4.59	-4.17249	-0.41751
64	-8.8	-7.17499	-1.62501
71	0.02	-1.77763	1.797628
78	-5.49	-4.00542	-1.48458
86	-4.44	-2.65344	-1.78656
88	-5.2	-3.9682	-1.2318
95	-3.52	-2.53051	-0.98949
96	-6.74	-4.86817	-1.87183
99	-1.56	-4.51924	2.959236

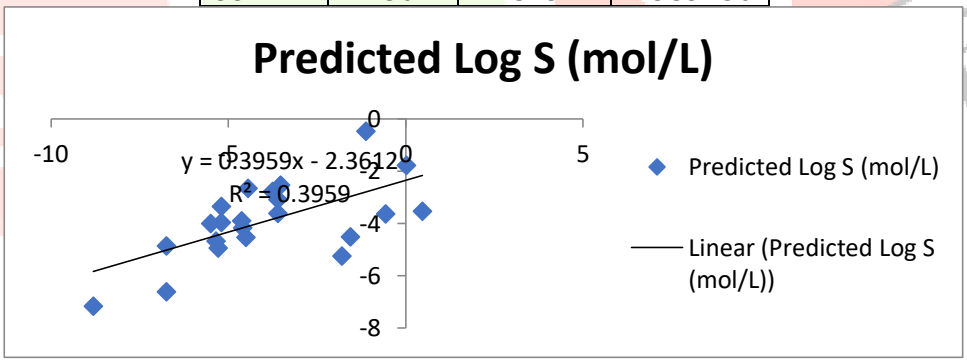


Table 12: Physico-Chemical- Crossed validation of Test Set.

Model No	Parameter Used	press	Ssy	Press/SSY	R²CV	PSE	Spress
34	RDBE MV PC MR ST POL	69.7148	115.4047	0.60409	0.39591	1.780128	1.867014

The predicted Log (Sol) values of test set is within the range of -6.6197 to -0.4631 hence model is validated.

Conclusion

The qspr model for describing the variation of aqueous solubility for 100 drug type organic compounds by considering the descriptors was successfully established. They Accept lipnski's rule of drug absorption. The relationship of aqueous solubility of the compound was established with molecular, size, shape, and strength of hydrogen bond. The parameters used in the study to establish the best model are RDBE, MV, PC, MR, ST, POL IN future similar analysis on drug permeability by the lipinski's rule to predict bioavailability will inspire the new set of descriptors.

The calculated topological indices and indicator parameters recorded in Table- 2.1

Following topological indices have been calculated using dragon software and they are reported in Table-2.1 (MW, Sv, Se, Sp, Mv, Pol, VDA, W, J, JhetZ, Jhetm, Jhetv, Jhete, Jhetp, BAC, Dr06, X0, X1, X2, X0A, X1A, X2A, X1v, X2v, X3v, X0sol, X1sol, X2sol, AMR, TPSA(Tot), MLOGP, ALOGP

Table 2.1 Topological Indices Calculations

SN	Log S (mol/L)	Sv	Se	Sp	Mv	VDA	W	J	JhetZ	Jhetm	Jhetv	Jhete	Jhetp	BAC	X0	X1	X2	X0A	X1A	X2A	X0sol	X1sol	X2sol	AMR	TPSATot	MLOGP	ALOGP
1	-1.4	11.9	18.96	12.51	0.63	25.2	126	2.131	2.887	2.887	2.175	2.88	2.042	7	7.397	4.788	4.134	0.74	0.479	0.344	7.397	4.788	4.134	39.14	29.1	1.628	0.95
2	-1.73	19.41	33.35	19.89	0.61	69.158	657	1.728	2.323	2.323	1.451	2.315	1.333	18	13.569	9.13	8.263	0.714	0.435	0.267	13.569	9.13	8.263	63.228	139.54	-0.346	-2.02
3	-2.26	10.08	16.62	10.24	0.63	21	105	2.029	2.515	2.515	1.763	2.507	1.639	2	6.975	4.877	4.263	0.697	0.443	0.284	6.975	4.877	4.263	32.922	65.85	-0.002	-1.208
4	-1.37	10.81	17.41	11.2	0.64	24	120	2.26	3.125	3.125	2.639	3.122	2.553	11	7.56	4.698	4.264	0.756	0.47	0.328	7.56	4.698	4.264	37.517	63.32	0.025	0.688
5	-1.96	11.32	18.73	11.65	0.63	27.273	150	2.437	3.371	3.371	2.692	3.368	2.582	18	8.431	5.109	4.803	0.766	0.464	0.32	8.431	5.109	4.803	39.211	83.55	-0.004	0.42
6	-2.95	23.7	39.57	24.72	0.61	90.095	946	1.939	2.487	2.486	1.887	2.483	1.792	35	15.405	10.083	8.637	0.734	0.458	0.288	15.405	10.083	8.637	78.526	106.97	1.261	1.372
7	0.48	16.49	25.95	17.27	0.63	40.571	284	2.005	2.632	2.632	1.711	2.621	1.547	10	10.129	6.698	6.025	0.724	0.447	0.287	10.129	6.698	6.025	56.889	26.93	2.306	1.62
8	-2.44	9.82	15.31	10.19	0.65	19.556	88	2.228	3.089	3.089	2.639	3.088	2.565	6	6.69	4.305	3.642	0.743	0.478	0.331	6.69	4.305	3.642	32.816	37.3	1.7	1.434
9	-1.58	11.9	18.96	12.51	0.63	25.2	126	2.131	2.887	2.887	2.175	2.88	2.042	7	7.397	4.788	4.134	0.74	0.479	0.344	7.397	4.788	4.134	39.14	29.1	1.628	0.95
10	-1.22	19.91	35.04	21.22	0.57	62.125	497	2.231	2.899	2.898	1.774	2.891	1.634	33	12.182	7.421	7.278	0.761	0.464	0.331	12.182	7.421	7.278	62.369	61.72	1.535	1.458
11	-2.81	29.59	47.58	31.3	0.62	107.167	1286	1.46	1.77	1.77	1.532	1.768	1.491	14	16.681	11.707	10.366	0.695	0.434	0.266	16.681	11.707	10.366	94.693	45.59	2.192	2.734
12	-0.95	10.3	16.08	10.74	0.64	19.556	88	2.228	3.073	3.073	2.697	3.071	2.628	6	6.69	4.305	3.642	0.743	0.478	0.331	6.69	4.305	3.642	34.746	44.08	1.7	1.534
13	-2.15	10.3	16.08	10.74	0.64	19.556	88	2.228	3.073	3.073	2.697	3.071	2.628	6	6.69	4.305	3.642	0.743	0.478	0.331	6.69	4.305	3.642	34.746	44.08	1.7	1.534
14	-1.3	21.9	38.14	23.23	0.58	83.333	750	2.099	2.618	2.618	1.746	2.613	1.628	35	13.544	8.486	7.679	0.752	0.471	0.334	13.544	8.486	7.679	69.062	85.57	1.335	1.336
15	1.7	6.92	11.28	7.77	0.69	12	42	3.541	5.274	5.321	2.857	4.154	2.905	29	6.077	2.943	3.521	0.868	0.491	0.391	7.577	3.693	5.829	29.246	40.46	0.735	0.9
16	-3.6	20.04	33.11	21.49	0.61	78.118	664	1.961	2.736	2.736	1.816	2.314	1.83	21	12.51	8.274	6.369	0.736	0.487	0.318	12.864	8.774	6.867	69.646	114.19	0.821	0.61
17	-2.11	20.54	33.79	21.57	0.64	88	880	2.487	3.217	3.218	2.484	3.155	2.37	63	15.284	9.362	8.403	0.764	0.468	0.311	16.284	9.94	9.458	73.29	118.87	1.634	1.722
18	-3.76	25.46	38.13	27.51	0.65	78.9	789	1.663	2.256	2.256	1.964	2.081	2.015	9	13.949	9.754	8.641	0.697	0.443	0.288	14.303	10.162	9.283	90.677	31.48	4.301	4.46
19	-6.75	25.46	38.13	27.51	0.65	78.9	789	1.663	2.256	2.256	1.964	2.081	2.015	9	13.949	9.754	8.641	0.697	0.443	0.288	14.303	10.162	9.283	90.677	31.48	4.301	4.46
20	-2.25	25.42	42.47	26.68	0.61	92.818	1021	1.671	1.977	1.977	1.33	1.974	1.243	19	15.69	10.613	9.43	0.713	0.442	0.277	15.69	10.613	9.43	80.249	81.86	2.21	1.421
21	-3.24	29.42	50.68	31.48	0.58	95.478	1098	1.537	1.577	1.577	1.497	1.576	1.482	19	16.137	11.097	10.328	0.702	0.427	0.265	16.137	11.097	10.328	86.373	74.6	2.052	1.369
22	-4.5	18.12	28.28	18.93	0.65	57.375	459	1.827	2.52	2.519	2.146	2.518	2.084	15	11.544	7.686	6.916	0.721	0.452	0.301	11.544	7.686	6.916	60.279	46.53	2.494	2.361
23	-4.83	24.78	36.7	26.57	0.67	74.6	746	1.751	2.185	2.186	2.04	2.139	2.037	11	14.113	9.72	8.453	0.706	0.442	0.273	15.113	10.297	9.157	85.741	12.03	5.149	4.996
24	-1.16	8.09	13.52	8.23	0.62	15.25	61	2.231	3.142	3.142	1.993	3.128	1.828	5	5.983	3.788	3.377	0.748	0.473	0.338	5.983	3.788	3.377	28.209	72.76	0.1	-0.061
25	-3.09	19.09	29.35	20.38	0.66	60.706	516	1.928	3.462	3.463	2.445	2.617	2.799	17	12.466	7.998	7.735	0.733	0.444	0.297	12.716	8.787	9.054	68.991	94.56	2.061	1.439
26	-5.19	18.44	26.84	18.86	0.71	56.889	512	1.895	2.457	2.457	2.205	2.456	2.161	17	12.861	8.609	8.017	0.715	0.43	0.267	12.861	8.609	8.017	64.539	74.6	2.296	2.274
27	-3.27	29.33	50.12	31.17	0.59	100.667	1208	1.574	1.629	1.628	1.536	1.628	1.518	28	17.06	11.453	10.998	0.711	0.424	0.262	17.06	11.453	10.998	86.925	91.67	1.168	0.383
28	-3.75	22.79	33.16	23.89	0.69	72.6	726	1.793	2.353	2.353	2.007	2.324	1.947	10	14.113	9.665	8.722	0.706	0.439	0.281	14.613	9.953	9.13	79.962	32.67	3.355	3.385
29	-5	28.11	42.52	29.8	0.67	121.36	1517	1.638	2.22	2.221	2.017	2.136	2.031	42	18.137	11.863	11.323	0.725	0.439	0.29	17.556	12.213	11.547	99.475	73.58	4.277	3.614
30	-2.64	18.6	30.16	19.49	0.62	48.125	385	2.194	2.681	2.681	2.32	2.679	2.253	11	11.596	7.714	6.534	0.725	0.454	0.272	11.596	7.714	6.534	59.252	65.18	2.461	2.335
31	-3.95	25.6	41.37	27.28	0.61	72.4	724	1.565	1.742	1.742	1.681	1.741	1.669	10	13.905	9.593	9.377	0.695	0.417	0.26	13.905	9.593	9.377	78.796	37.3	3.544	3.773
32	-2.97	17.93	30.84	18.99	0.64	70.3	703	2.296	3.929	3.943	2.418	3.113	2.555	69	15.345	8.927	10.664	0.767	0.425	0.305	13.345	9.432	11.342	65.463	135.12	-0.077	0.316
33	-3.13	16.82	26.61	17.79	0.65	54.667	410	2.273	3.059	3.06	2.21	3.002	2.112	26	11.259	7.13	6.188	0.751	0.475	0.326	11.759	7.419	6.559	57.796	46.53	2.573	2.734

34	-4.15	20.32	31.35	21.18	0.66	69.556	626	1.873	2.448	2.45	2.236	2.446	2.182	19	13.121	8.592	7.715	0.729	0.452	0.297	12.251	8.182	7.176	67.293	37.3	3.895	3.656
35	-2.65	21.64	36.13	23.94	0.62	104.6	1046	2.049	3.072	3.073	1.958	2.457	2.072	50	15.173	9.26	9.329	0.759	0.463	0.346	16.13	11.141	11.787	83.561	232.75	0.083	-0.355
36	-5.35	19.94	31.6	20.3	0.66	82.8	828	1.909	2.525	2.531	1.86	2.517	1.722	30	14.751	9.376	9.284	0.738	0.446	0.309	12.251	8.165	7.326	67.276	49.33	3.864	3.927
37	-1.03	7.72	13.25	7.62	0.64	18.667	84	2.346	3.742	3.756	2.105	3.719	1.879	10	6.853	4.198	3.873	0.761	0.466	0.323	5.983	3.788	3.377	26.586	66.24	0.578	0.782
38	-5.28	25	39.49	26.52	0.63	72.4	724	1.565	1.788	1.788	1.724	1.788	1.712	10	13.905	9.593	9.377	0.695	0.417	0.26	13.905	9.593	9.377	79.646	37.3	3.458	3.523
39	-3.25	26.15	42.24	27.44	0.64	94.75	1137	1.971	2.503	2.503	1.719	2.477	1.626	59	17.646	11.399	10.361	0.735	0.438	0.259	18.146	11.688	10.694	87.921	71.06	0.977	2.169
40	-2.69	16.7	26.74	18.27	0.67	54.118	460	2.177	4.2	4.205	2.53	3.028	2.929	38	12.845	7.716	8.669	0.756	0.429	0.299	13.845	9.72	11.712	64.294	135.12	-0.547	0.038
41	-3.46	16.42	28.37	16.85	0.61	57.125	457	2.449	3.377	3.389	2.275	3.362	2.065	43	12.345	7.304	7.553	0.772	0.456	0.328	9.845	6.092	5.595	54.089	35.83	2.926	3.321
42	-1.02	12.41	20.29	12.96	0.62	30.182	166	2.171	3.149	3.149	2.315	3.142	2.175	12	8.268	5.182	4.755	0.752	0.471	0.34	8.268	5.182	4.755	40.942	52.82	1.466	1.385
43	-3.6	19.4	32.61	20.76	0.59	53.867	404	2.291	2.792	2.792	2.643	2.791	2.615	34	11.422	7.003	6.513	0.761	0.467	0.326	11.422	7.003	6.513	60.732	37.3	3.23	3.582
44	-3.49	24	39.59	25.53	0.6	83.368	792	1.715	2.184	2.183	1.473	2.18	1.376	16	13.665	9.165	8.053	0.719	0.458	0.31	13.665	9.165	8.053	76.825	41.49	2.534	2.54
45	-2.19	14.7	24.51	15.78	0.59	27.273	150	2.437	3.147	3.147	2.911	3.146	2.869	18	8.431	5.109	4.803	0.766	0.464	0.32	8.431	5.109	4.803	46.984	20.23	2.813	3.243
46	-1.8	22.09	35.5	22.41	0.65	90.909	1000	1.708	2.175	2.178	1.583	2.168	1.461	10	15.579	10.566	9.865	0.708	0.44	0.29	13.839	9.762	8.698	76.625	81.65	3.487	0.75
47	-0.56	22.7	38.57	23.72	0.6	83.4	834	1.934	2.286	2.286	1.7	2.28	1.591	42	14.861	9.43	8.715	0.743	0.449	0.291	14.861	9.43	8.715	73.024	78.89	1.356	0.368
48	-3.47	19.37	33.16	20.86	0.57	49.571	347	2.156	2.732	2.731	2.129	2.725	2.008	23	10.552	6.592	5.996	0.754	0.471	0.333	10.552	6.592	5.996	63.271	15.27	2.911	2.954
49	-3.56	11.57	18.39	11.79	0.64	25.091	138	2.04	2.844	2.844	2.029	2.834	1.884	5	7.845	5.271	4.909	0.713	0.439	0.289	7.845	5.271	4.909	41.051	81.21	0.147	0.324
50	-3.02	20.15	31.94	20.84	0.65	62.526	594	1.922	2.727	2.727	1.87	2.723	1.766	21	13.569	9.168	8.198	0.714	0.437	0.264	13.569	9.168	8.198	68.949	61.81	0.886	2.173
51	-3.24	15.13	24.93	15.06	0.66	68.235	580	1.692	2.438	2.438	1.356	2.427	1.204	18	12.414	8.059	7.574	0.73	0.448	0.303	12.414	8.059	7.574	53.379	124.22	0.502	1.02
52	-1.12	23.71	36.27	24.7	0.66	91.81	964	1.548	1.97	1.97	1.598	1.967	1.523	19	14.983	10.075	9.245	0.713	0.438	0.28	14.983	10.075	9.245	78.646	57.61	2.823	2.676
53	-4.82	23.71	36.27	24.7	0.66	91.81	964	1.548	1.97	1.97	1.598	1.967	1.523	19	14.983	10.075	9.245	0.713	0.438	0.28	14.983	10.075	9.245	78.646	57.61	2.823	2.676
54	-3.57	24.68	42.12	26.4	0.59	90.2	902	2.418	2.967	2.967	2.16	2.932	2.03	51	15.121	9.528	7.849	0.756	0.476	0.302	15.621	9.816	8.22	83.019	67.59	1.985	1.776
55	-1.22	12.31	21.94	12.66	0.59	32.167	193	2.51	3.576	3.576	2.164	3.56	1.95	22	9.138	5.664	4.915	0.761	0.472	0.307	9.138	5.664	4.915	41.221	83.87	0.443	-0.337
56	-3.87	30.62	49.13	32.2	0.62	137.615	1789	1.527	1.981	1.981	1.637	1.979	1.582	33	18.518	12.694	10.516	0.712	0.453	0.277	18.518	12.694	10.516	100.119	49.81	2.666	3.96
57	-3.61	18.51	29.6	19.18	0.64	55.294	470	2.145	2.822	2.821	2.198	2.814	2.098	30	12.577	8.041	7.417	0.74	0.447	0.285	12.577	8.041	7.417	62.824	72.19	1.315	1.151
58	-1.98	12.9	18.86	13.5	0.68	25.455	140	1.993	2.97	2.97	2.723	2.969	2.679	2	7.682	5.377	4.617	0.698	0.448	0.289	7.682	5.377	4.617	44.202	20.23	2.637	2.471
59	-3.24	25.86	38.92	27.21	0.66	86	946	1.55	2.045	2.045	1.527	2.021	1.436	2	14.941	10.81	9.68	0.679	0.432	0.277	15.441	11.098	10.088	89.55	43.95	2.732	3.412
60	-4.63	28.8	47.14	30.81	0.6	85.545	941	1.579	1.663	1.662	1.614	1.662	1.605	18	15.535	10.483	10.263	0.706	0.419	0.257	15.535	10.483	10.263	87.499	37.3	3.827	4.176
61	-0.85	9.21	14.52	9.44	0.66	19.556	88	2.228	3.187	3.187	2.536	3.182	2.433	6	6.69	4.305	3.642	0.743	0.478	0.331	6.69	4.305	3.642	30.66	50.19	0.119	0.284
62	-4.59	19.33	30.81	19.54	0.67	82.8	828	1.909	2.555	2.561	1.832	2.546	1.689	30	14.751	9.376	9.284	0.738	0.446	0.309	12.251	8.165	7.326	65.433	62.22	3.223	3.315
63	-2.95	33.96	57.31	34.97	0.62	151.152	2494	1.875	2.176	2.176	1.873	2.175	1.813	174	24.782	15.2	15.706	0.751	0.422	0.262	24.782	15.2	15.706	113.819	254.88	-1.439	-2.804
64	-8.8	24.18	33.19	25.33	0.71	65.4	654	1.545	2.04	2.04	2.04	2.04	2.04	0	13.104	9.933	9.054	0.655	0.414	0.251	13.104	9.933	9.054	84.829	0	5.625	4.779
65	-4.16	33.46	52.64	36.11	0.63	148.148	2000	1.298	1.585	1.585	1.164	1.525	1.111	7	18.64	13.242	11.556	0.69	0.441	0.282	19.493	13.938	12.607	116.099	59.88	2.634	4.158
66	-2.29	18	28.28	18.73	0.64	50.125	401	2.101	2.636	2.635	2.267	2.633	2.195	11	11.596	7.688	6.702	0.725	0.452	0.279	11.596	7.688	6.702	59.163	62.02	1.973	2.727
67	-1.49	11.84	18.96	12.1	0.66	31.333	188	2.541	3.416	3.416	2.809	3.414	2.712	21	9.138	5.626	5.1	0.761	0.469	0.319	9.138	5.626	5.1	39.575	74.6	1.384	1.039
68	-3.86	21	31.28	21.73	0.68	64.947	617	1.849	2.359	2.359	2.045	2.357	1.983	5	13.295	9.232	8.228	0.7	0.44	0.274	13.295	9.232	8.228	70.196	65.18	2.607	3.509
69	-3.79	22.39	37.81	23.77	0.59	76.333	687	1.686	2.131	2.131	1.398	2.127	1.3	16	12.958	8.665	7.7	0.72	0.456	0.308	12.958	8.665	7.7	71.461	57.28	1.306	1.926
70	-4.42	30.99	51.91	33.33	0.58	91.478	1052	1.603	1.676	1.676	1.646	1.676	1.64	27	16.405	10.86	11.009	0.713	0.418	0.262	16.405	10.86	11.009	92.78	34.14	4.05	3.58

71	0.02	9.98	14.41	10.02	0.71	21.8	109	1.925	3.238	3.238	2.168	3.225	1.987	0	6.812	4.966	4.089	0.681	0.451	0.292	6.812	4.966	4.089	30.157	51.56	-0.231	-0.616
72	-2.37	15.6	26.06	16.48	0.6	43.077	280	2.147	3.046	3.045	2.054	3.039	1.914	18	9.682	6.22	5.305	0.745	0.478	0.332	9.682	6.22	5.305	50.459	41.82	2.086	1.985
73	-6.18	18.99	25.42	19.81	0.73	45.25	362	1.671	2.506	2.506	2.506	2.506	2.506	0	10.535	7.933	7.212	0.658	0.418	0.258	10.535	7.933	7.212	66.723	0	4.76	3.945
74	-0.91	10.18	16.07	10.54	0.64	19.556	88	2.228	3.18	3.18	2.505	3.173	2.367	6	6.69	4.305	3.642	0.743	0.478	0.331	6.69	4.305	3.642	33.832	49.63	-0.693	-0.248
75	-1.94	10.33	16.63	10.65	0.65	22.8	114	2.396	3.321	3.321	2.654	3.319	2.552	11	7.56	4.715	4.17	0.756	0.472	0.321	7.56	4.715	4.17	34.511	57.53	1.643	1.167
76	-1.84	10.81	17.41	11.2	0.64	22.8	114	2.396	3.306	3.306	2.702	3.303	2.603	11	7.56	4.715	4.17	0.756	0.472	0.321	7.56	4.715	4.17	36.44	64.31	1.132	1.267
77	-5.46	36.89	60.18	39.38	0.61	221.29	3430	1.304	1.848	1.848	1.356	1.668	1.372	26	22.269	14.831	13.683	0.718	0.449	0.304	22.519	15.652	14.984	120.469	119.73	3.333	5.577
78	-5.49	21.01	30.71	22.2	0.7	74.316	706	1.936	2.583	2.585	1.997	2.519	1.911	19	13.828	9.075	8.219	0.728	0.454	0.304	14.828	9.653	8.961	75.461	49.33	3.988	4.348
79	-2.7	18	28.9	19.07	0.64	62.941	535	1.848	3.242	3.242	1.885	2.524	2.024	17	12.466	7.971	7.934	0.733	0.443	0.305	12.716	8.792	9.234	65.968	106.6	0.971	1.182
80	-2.73	21.08	33.56	22.39	0.64	76	722	1.887	3.271	3.272	1.904	2.605	2.006	26	14.044	8.865	8.933	0.739	0.443	0.308	14.294	9.686	10.233	75.165	106.35	1.06	1.351
81	-1.51	15	24.8	16.07	0.63	43.857	307	2.461	4.733	4.734	2.749	3.498	3.094	29	10.768	6.416	6.543	0.769	0.458	0.327	11.018	7.237	7.844	52.59	101.13	0.92	0.481
82	-1.36	11.89	19.59	12.85	0.63	27.636	152	2.394	4.425	4.426	2.953	3.415	3.348	18	8.483	4.999	5.323	0.771	0.454	0.333	8.733	5.893	6.71	44.1	94.56	-0.115	-0.088
83	-2.73	17.88	27.79	18.86	0.66	63.059	536	1.837	3.299	3.299	1.878	2.556	2.008	10	12.303	8.077	7.654	0.724	0.449	0.306	12.553	8.898	8.954	65.982	106.35	0.487	0.786
84	-4.07	25.99	43.32	27.88	0.6	104.909	1154	1.45	2.221	2.221	1.261	1.882	1.242	17	15.742	10.437	10.279	0.716	0.435	0.294	15.992	11.259	11.579	84.381	90.38	2.284	3.203
85	-1	27.81	48.9	29.72	0.57	106.182	1168	1.789	2.144	2.144	1.472	2.14	1.378	43	16.328	10.26	10.323	0.742	0.446	0.313	16.328	10.26	10.323	85.524	81.95	1.358	1.146
86	-4.44	9.9	12.62	10.86	0.82	18.667	84	2.341	3.925	3.947	3.166	3.374	3.356	10	6.853	4.182	4.023	0.761	0.465	0.335	8.353	5.048	5.247	40.472	0	4.063	3.823
87	-3.7	19.43	30.05	19.88	0.67	67.684	643	1.761	2.166	2.166	1.592	2.16	1.499	17	13.569	9.092	8.467	0.714	0.433	0.273	13.569	9.092	8.467	63.511	88.73	1.547	0.906
88	-5.2	30.47	51.68	32.88	0.57	94.455	1039	1.633	1.782	1.782	1.576	1.78	1.531	2	15.253	10.789	9.218	0.693	0.45	0.288	15.253	10.789	9.218	93.204	23.47	3.827	4.418
89	-1.5	8.31	13.07	8.54	0.69	18.667	84	2.346	3.887	3.893	2.323	3.676	2.175	10	6.853	4.198	3.873	0.761	0.466	0.323	7.353	4.487	4.244	31.175	66.24	0.778	1.241
90	-2.66	30.3	50.57	32.27	0.59	90.917	1091	2.061	2.458	2.457	1.906	2.455	1.822	54	17.483	11.489	10.261	0.728	0.442	0.263	17.483	11.489	10.261	98.051	30.93	2.543	3.188
91	-6.73	21.59	29.3	22.57	0.72	57	513	1.642	2.463	2.463	2.463	2.463	2.463	0	11.949	8.949	7.837	0.664	0.426	0.261	11.949	8.949	7.837	75.409	0	5.165	4.555
92	-1.49	7.61	12.74	7.68	0.63	15.25	61	2.231	3.595	3.594	2.142	3.58	1.959	5	5.983	3.788	3.377	0.748	0.473	0.338	5.983	3.788	3.377	26.37	66.24	0.1	0.577
93	-3.4	10.51	17.39	10.39	0.66	29.667	178	2.049	3.335	3.335	2.012	3.321	1.835	10	8.715	5.665	5.554	0.726	0.436	0.292	8.715	5.665	5.554	36.401	115.15	0.399	0.426
94	-2	26.11	43.8	27.74	0.59	91.333	959	1.534	1.777	1.776	1.258	1.774	1.186	11	14.82	10.186	8.977	0.706	0.443	0.281	14.82	10.186	8.977	80.816	49.77	2.207	1.721
95	-3.52	16.4	25.92	17.44	0.66	52.533	394	2.33	3.458	3.462	2.118	3.329	1.948	30	11.422	7.041	6.232	0.761	0.469	0.312	12.422	7.618	6.974	59.344	45.06	3.056	3.553
96	-6.74	21.2	32.94	22.24	0.64	66.889	602	1.934	2.561	2.56	2.009	2.555	1.902	18	13.121	8.592	7.715	0.729	0.452	0.297	13.121	8.592	7.715	71.385	49.33	3.47	3.957
97	-5.75	40.58	65	43.1	0.61	161.875	2590	1.459	1.676	1.676	1.598	1.675	1.58	42	22.673	15.271	14.821	0.709	0.424	0.265	22.673	15.271	14.821	129.338	64.33	3.792	4.353
98	-3.47	21.39	36.33	23.11	0.59	76.111	685	2.331	3.77	3.771	2.285	3.05	2.411	33	13.596	8.454	7.75	0.755	0.47	0.323	13.846	9.275	9.051	70.377	87.14	1.845	3.232
99	-1.56	28.7	47.69	30.51	0.6	83.478	960	1.782	2.074	2.074	1.681	2.072	1.617	31	16.353	11.04	10.24	0.711	0.425	0.25	16.353	11.04	10.24	89.934	41.93	2.401	2.52
100	-3.33	29.99	46.69	31.53	0.64	87.68	1096	1.449	1.637	1.637	1.365	1.635	1.314	2	16.336	12.288	12.052	0.653	0.396	0.236	16.336	12.288	12.052	94.507	32.78	2.904	1.146

Table 2.2 : Correlation of Topological Indices

	Log S (mol/L)	*Sv*	*Se*	*Sp*	*Mv*	*VDA*	*W*	*J*	*JhetZ*	*Jhetm*	*Jhetv*	*Jhete*	*Jhetp*
Log S (mol/L)	1.0000												
Sv	-0.5126	1.0000											
Se	-0.4292	0.9882	1.0000										
Sp	-0.5092	0.9989	0.9881	1.0000									
Mv	-0.2243	-0.3442	-0.4624	-0.3530	1.0000								
VDA	-0.4406	0.9273	0.9259	0.9232	-0.3040	1.0000							
W	-0.3995	0.8911	0.8886	0.8855	-0.2676	0.9764	1.0000						
J	0.5530	-0.7406	-0.6896	-0.7301	0.0796	-0.6758	-0.6373	1.0000					
JhetZ	0.4791	-0.7677	-0.7406	-0.7544	0.2650	-0.6543	-0.6186	0.8743	1.0000				
Jhetm	0.4789	-0.7669	-0.7398	-0.7535	0.2667	-0.6533	-0.6175	0.8748	1.0000	1.0000			
Jhetv	0.2282	-0.6913	-0.7089	-0.6799	0.4065	-0.6880	-0.6278	0.7675	0.7670	0.7664	1.0000		
Jhete	0.5184	-0.8692	-0.8394	-0.8642	0.2495	-0.7693	-0.7171	0.9198	0.9258	0.9253	0.7941	1.0000	
Jhetp	0.1705	-0.5980	-0.6205	-0.5820	0.4121	-0.5988	-0.5485	0.6943	0.7665	0.7660	0.9726	0.7088	1.0000
BAC	0.0291	0.3560	0.4126	0.3490	-0.2588	0.4484	0.4742	0.1184	0.0260	0.0266	-0.0620	-0.0321	-0.0359
X0	-0.4582	0.9496	0.9469	0.9418	-0.2869	0.9578	0.9229	-0.6514	-0.6526	-0.6516	-0.6641	-0.7713	-0.5703
X1	-0.5155	0.9721	0.9536	0.9634	-0.2419	0.9497	0.9150	-0.7479	-0.7398	-0.7389	-0.7098	-0.8446	-0.6187
X2	-0.4873	0.9416	0.9301	0.9335	-0.2309	0.9277	0.9012	-0.6965	-0.6615	-0.6603	-0.6667	-0.7983	-0.5604
X0A	0.5402	-0.5030	-0.4211	-0.4903	-0.1303	-0.3486	-0.3240	0.8563	0.7585	0.7597	0.5296	0.7320	0.4982
X1A	0.5000	-0.6260	-0.5737	-0.6123	-0.0934	-0.4844	-0.4737	0.7174	0.5959	0.5951	0.5054	0.6969	0.4088
X2A	0.4938	-0.6627	-0.6087	-0.6446	-0.0252	-0.4888	-0.4731	0.7341	0.7223	0.7225	0.5321	0.7284	0.4845
X0sol	-0.4461	0.9506	0.9438	0.9469	-0.2628	0.9521	0.9198	-0.6361	-0.6317	-0.6308	-0.6461	-0.7656	-0.5430
X1sol	-0.5020	0.9610	0.9408	0.9578	-0.2173	0.9495	0.9131	-0.7200	-0.6714	-0.6706	-0.6730	-0.8193	-0.5579
X2sol	-0.4440	0.9035	0.8900	0.9040	-0.1882	0.9060	0.8797	-0.6269	-0.5341	-0.5329	-0.5940	-0.7377	-0.4525
AMR	-0.5493	0.9858	0.9607	0.9855	-0.2506	0.9363	0.8965	-0.7228	-0.7110	-0.7100	-0.6524	-0.8391	-0.5462
TPSATot	0.1948	0.0851	0.1484	0.0789	-0.2000	0.3023	0.3099	0.0433	0.1558	0.1547	-0.1505	0.0184	-0.0842
MLOGP	-0.6844	0.4683	0.3794	0.4713	0.1982	0.3192	0.2668	-0.4388	-0.4899	-0.4883	-0.1474	-0.4710	-0.1281
ALOGP	-0.6847	0.4705	0.3911	0.4786	0.1428	0.3701	0.3240	-0.3894	-0.4063	-0.4049	-0.1327	-0.4048	-0.1090

	BAC	*X0*	*X1*	*X2*	*X0A*	*X1A*	*X2A*	*X0sol*	*X1sol*	*X2sol*	*AMR*	*TPSATot*	*MLOGP*	*ALOGP*
BAC	1.0000													
X0	0.5489	1.0000												
X1	0.4202	0.9846	1.0000											
X2	0.4973	0.9824	0.9782	1.0000										
X0A	0.3568	-0.3614	-0.5057	-0.4278	1.0000									

X1A	-0.0905	-0.6076	-0.6707	-0.7210	0.7036	1.0000								
X2A	-0.0477	-0.6110	-0.6974	-0.6608	0.7974	0.8769	1.0000							
X0sol	0.5364	0.9865	0.9741	0.9636	-0.3517	-0.5830	-0.6012	1.0000						
X1sol	0.4287	0.9765	0.9858	0.9704	-0.4676	-0.6511	-0.6586	0.9864	1.0000					
X2sol	0.4986	0.9466	0.9333	0.9647	-0.3485	-0.6727	-0.5819	0.9612	0.9692	1.0000				
AMR	0.3798	0.9586	0.9765	0.9497	-0.4844	-0.6217	-0.6405	0.9659	0.9802	0.9333	1.0000			
TPSATot	0.6135	0.3129	0.2117	0.2905	0.2810	-0.0396	0.0663	0.3172	0.2707	0.3686	0.1305	1.0000		
MLOGP	-0.2493	0.3188	0.3956	0.3362	-0.4755	-0.3334	-0.3717	0.3067	0.3545	0.2641	0.4742	-0.6403	1.0000	
ALOGP	-0.2304	0.3315	0.3914	0.3267	-0.3666	-0.2350	-0.2821	0.3323	0.3706	0.2873	0.4833	-0.6023	0.9029	1.0000

1. SV, SE, Sp has good correlation with VDA, W, X0, X1, X2, X0sol, X1sol, X2sol, AMR,
2. MV has poor Correlation with All the descriptors
3. VDA has good correlation with W, X0, X1, X2, X0sol, X1sol, X2sol, AMR,
4. W has good correlation with X0, X1, X2, X0sol, X1sol, X2sol, AMR,
5. All the Balaban indices has good correlation with X0A, X1A, X2A,
6. BAC has poor correlation.
7. X0, X1, X2 has good correlation with X0sol, X1sol, X2sol.

Result and discussion:

Modeling with Topological parameters:

The Topological parameters have been subjected regression analysis for modeling LogS(mol/l) activity for the compounds listed in Table-2.3.
The resulting models obtained are summarized in 2.4. The quality of models has been reported in terms of statistical parameters viz. Se, R^2 ,R^2A, F-ratio and Q.

Table2.3: Regression Topological Indices

Mono Parametric

Model No	Parameter Used	AI	B	SE	R	R2	R2A	F Ratio
1	Sv	-0.1189 (±0.0201)	-0.6728	1.4650	0.5126	0.2628	0.2553	34.9333
2	Se	-0.0602 (±0.0128)	-1.1114	1.5411	0.4292	0.1842	0.1759	22.1302
3	Sp	-0.1097 (±0.0187)	-0.7387	1.4685	0.5092	0.2593	0.2517	34.3015
4	Mv	-9.5161 (±4.1761)	3.0412	1.6628	0.2243	0.0503	0.0406	5.1924
5	VDA	-0.0206 (±0.0042)	-1.6757	1.5318	0.4406	0.1941	0.1859	23.6012
6	W	-0.0012 (±0.0003)	-2.2249	1.5642	0.3995	0.1596	0.1510	18.6098
7	J	2.6605 (±0.4049)	-8.2617	1.4216	0.5530	0.3058	0.2987	43.1722
8	JhetZ	1.1209 (±0.2074)	-6.0707	1.4977	0.4791	0.2296	0.2217	29.2032
9	Jhetm	1.1158 (±0.2066)	-6.0583	1.4979	0.4789	0.2293	0.2214	29.1575
10	Jhetv	0.8660 (±0.3732)	-4.7802	1.6613	0.2282	0.0521	0.0424	5.3850
11	Jhete	1.4953 (±0.2492)	-6.9003	1.4592	0.5184	0.2687	0.2612	36.0067
12	Jhetp	0.5900 (±0.3444)	-4.1898	1.6813	0.1705	0.0291	0.0192	2.9341
13	BAC	0.0023 (±0.0080)	-3.0686	1.7056	0.0291	0.0008	0.0093	0.0831
14	X0	-0.1980 (±0.0388)	-0.5459	1.5167	0.4582	0.2099	0.2019	26.0379
15	X1	-0.3207 (±0.0538)	-0.3858	1.4621	0.5155	0.2658	0.2583	35.4763
16	X2	-0.3126 (±0.0566)	-0.6450	1.4900	0.4873	0.2375	0.2297	30.5242
17	X0A	29.9279 (±4.7098)	24.8565	1.4359	0.5402	0.2918	0.2846	40.3785
18	X1A	44.1357 (±7.7224)	22.8952	1.4777	0.5000	0.2500	0.2423	32.6644
19	X2A	29.6467 (±5.2745)	11.8840	1.4838	0.4938	0.2438	0.2361	31.5935
20	X0sol	-0.1927 (±0.0391)	-0.6066	1.5271	0.4461	0.1990	0.1908	24.3505
21	X1sol	-0.3064 (±0.0533)	-0.4582	1.4757	0.5020	0.2520	0.2443	33.0124
22	X2sol	-0.2728 (±0.0556)	-0.8873	1.5288	0.4440	0.1972	0.1890	24.0697
23	AMR	-0.0404 (±0.0062)	-0.3557	1.4258	0.5493	0.3017	0.2946	42.3417
24	TPSATot	0.0082 (±0.0042)	-3.5530	1.6736	0.1948	0.0380	0.0281	3.8663
25	MLOGP	-0.7916 (±0.0852)	-1.4324	1.2441	0.6844	0.4683	0.4629	86.3296
26	ALOGP	-0.7134 (±0.0767)	-1.5908	1.2436	0.6847	0.4688	0.4634	86.4833

Bi Parametric

Model No	Parameter Used	AI	B	SE	R	R2	R2A	F Ratio	Q=r/se
27	ALOGP Sv	-0.5935(±0.0835) -0.0568 (±0.0186)	-0.7111	1.1939	0.7179	0.5154	0.5054	51.5782	0.6013
28	ALOGP Sp	-0.5960(±0.0842) -0.0507 (±0.0174)	-0.7714	1.1987	0.7152	0.5115	0.5014	50.7850	0.5966
29	ALOGP J	-0.5765(±0.0757) 1.6240 (±0.3496)	-5.0649	1.1306	0.7520	0.5654	0.5565	63.1088	0.6651
30	ALOGP Jhete	-0.5918(±0.0786) 0.8321 (±0.2176)	-3.9940	1.1653	0.7337	0.5384	0.5288	56.5589	0.6296
31	ALOGP X0	-0.6237(±0.0770) -0.1122 (±0.0319)	-0.3683	1.1773	0.7272	0.5288	0.5191	54.4338	0.6177
32	ALOGP X1	-0.5942(±0.0779) -0.1818 (±0.0465)	-0.3360	1.1617	0.7356	0.5412	0.5317	57.2020	0.6332
33	ALOGP X2	-0.6130(±0.0754) -0.1893 (±0.0464)	-0.3538	1.1548	0.7393	0.5466	0.5373	58.4727	0.6402
34	ALOGP X0A	-0.5858(±0.0750) 18.5104 (±3.9858)	-15.3525	1.1306	0.7519	0.5654	0.5565	63.1003	0.6650
35	ALOGP X1A	-0.6256(±0.0697) 31.6832 (±5.9007)	-16.0347	1.0975	0.7684	**0.5905**	0.5821	69.9363	0.7001
36	ALOGP X2A	-0.6174(±0.0726) 19.6085 (±4.1818)	-7.6460	1.1286	0.7530	0.5669	0.5580	63.4950	0.6672
37	ALOGP X1sol	-0.6023(±0.0772) -0.1756 (±0.0453)	-0.3452	1.1630	0.7350	0.5402	0.5307	56.9808	0.6320
38	ALOGP AMR	-0.5700(±0.0828) -0.0210 (±0.0058)	-0.4963	1.1745	0.7287	0.5310	0.5213	54.9142	0.6204
39	ALOGP MLOGP	-0.3766(±0.1754) -0.4142 (±0.1947)	-1.4351	1.2218	0.7018	0.4925	0.4820	47.0600	0.5744

Tri Parametric

Model No	Parameter Used	AI	B	SE	R	R2	R2A	F Ratio	Q=r/se
40	ALOGP X1A J	-0.5909(±0.0733) 23.3624 (±8.2063) 0.6845 (±0.4720)	-13.7058	1.0913	0.7741	0.5993	0.5868	47.8557	0.7093
41	ALOGP X1A JHETE	-0.6108(±0.0745) 28.5569 (±8.0466) 0.1604 (±0.2795)	-15.0727	1.1013	0.7693	0.5919	0.5791	46.4116	0.6985
42	ALOGP X1A X1	-0.6047(±0.0737) 27.3063 (±7.7483) -0.0504 (±0.0577)	-13.6919	1.0989	0.7705	0.5937	0.5810	46.7640	0.7012
43	ALOGP X1A X2	-0.6132(±0.0718) 27.3835 (±8.2972) -0.0458 (±0.0620)	-13.7752	1.1001	0.7699	0.5928	0.5801	46.5880	0.6998
44	ALOGP X1A X0A	-0.5931(±0.0723) 23.2443 (±8.0193) 8.1045 (±5.2582)	-18.2129	1.0898	0.7748	0.6004	0.5879	48.0773	0.7110
45	ALOGP X1A X2A	-0.6220(±0.0709) 28.4439 (±11.9947) 2.5680 (±8.2662)	-15.3509	1.1027	0.7687	0.5909	0.5781	46.2221	0.6971
46	ALOGP X1A X1SOL	-0.6047(±0.0729) 27.0982 (±7.5597) -0.0531 (±0.0547)	-13.5678	1.0978	0.7710	0.5945	0.5818	46.9106	0.7023
47	ALOGP X1A AMR	-0.5984(±0.0778) 28.2170 (±7.3707) -0.0054 (±0.0068)	-14.1740	1.0997	0.7701	0.5931	0.5804	46.6484	0.7003

Tera Parametric

Model No	Parameter Used	AI	B	SE	R	R2	R2A	F Ratio	Q=r/se
48	ALOGP X1A X0A J	-0.5859(±0.0737) 21.7372 (±8.5039) 5.4157 (±7.2000) 5.4157 (±0.6454)	-16.2848	1.0938	0.7757	0.6016	0.5849	35.8709	0.7092
49	ALOGP X1A X0A JHETE	-0.5943(±0.0750) 23.4751 (±8.7654) 8.2666 (±5.8125) 8.2666 (±0.3058)	-18.3794	1.0955	0.7749	0.6004	0.5836	35.6852	0.7073
50	ALOGP X1A X0A X1	-0.5703(±0.0764) 18.4349 (±9.5415) 8.2686 (±5.2648) 8.2686 (±0.0573)	-15.7742	1.0906	0.7772	0.6040	0.5873	36.2255	0.7126
51	ALOGP X1A X0A X2	-0.5669(±0.0756) 14.7101 (±10.8533) 9.6609 (±5.4161) 9.6609 (±0.0633)	-14.9980	1.0878	0.7785	**0.6060**	0.5894	36.5305	0.7157
52	ALOGP X1A X0A X1SOL	-0.5679(±0.0758) 17.6384 (±9.5006) 8.5374 (±5.2674) 8.5374 (±0.0544)	-15.5556	1.0887	0.7781	0.6054	0.5888	36.4359	0.7147

53	ALOGP X1A X0A AMR	-0.5622(±0.0806) 19.1695 (±9.2825) 8.3439 (±5.2718) 8.3439 (±0.0068)	-16.2237	1.0911	0.7769	0.6036	0.5869	36.1611	0.7120

Penta Parametric

Model No	Parameter Used	AI	B	SE	R	R2	R2A	F Ratio	Q=r/se
54	ALOGP X1A X0A X2X1	-0.5852(±0.0765) -2.4321 (±16.7851) 19.0636 (±8.8718) 19.0636 (±0.3898) -2.4321 (±0.3519)	-14.0603	1.0833	0.7832	0.6133	0.5928	29.8213	0.7230
55	ALOGP X1A X0A X2X1SOL	-0.5674(±0.0761) 13.9861 (±13.2697) 9.9902 (±6.4378) 9.9902 (±0.2427) 13.9861 (±0.2085)	-14.9079	1.0935	0.7785	0.6060	0.5851	28.9215	0.7119
56	ALOGP X1A X0A X2JHETE	-0.5700(±0.0752) 9.9947 (±11.2633) 17.2261 (±7.4759) 17.2261 (±0.0962) 9.9947 (±0.4615)	-15.8353	1.0814	0.7840	0.6147	0.5942	29.9969	0.7250
57	ALOGP X1A X0A X2BAC	-0.6590(±0.0817) 17.0138 (±10.5841) 19.2008 (±6.4385) 19.2008 (±0.0913) 17.0138 (±0.0093)	-23.6247	1.0570	0.7949	0.6319	0.6123	32.2747	0.7520
58	ALOGP X1A X0A X2SV	-0.6701(±0.0801) -6.9983 (±12.6276) 20.2248 (±6.2518) 20.2248 (±0.1845) -6.9983 (±0.0618)	-12.4066	1.0435	0.8008	0.6412	0.6222	33.6024	0.7674
59	ALOGP X1A X0A X2 SE	-0.6008(±0.0730) -5.5929 (±12.1618) 16.3429 (±5.5799) 16.3429 (±0.1543) -5.5929 (±0.0285)	-10.1020	1.0388	0.8028	**0.6445**	0.6256	34.0841	0.7728
60	ALOGP X1A X0A X2SP	-0.6676(±0.0807) -4.4976 (±12.3807) 18.3339 (±6.0154) 18.3339 (±0.1694) -4.4976 (±0.0522)	-12.1419	1.0478	0.7989	0.6383	0.6190	33.1745	0.7625

Table 2.4 Regression Model

Model No	Parameter Used	AI	B	SE	R	R2	R2A	F Ratio	Q=r/se
26	ALOGP	-0.7134 (±0.0767)	-1.5908	1.2436	0.6847	0.4688	0.4634	86.4833	0.5506
35	ALOGP X1A	-0.6256(±0.0697) 31.6832 (±5.9007)	-16.0347	1.0975	0.7684	0.5905	0.5821	69.9363	0.7001
44	ALOGP X1A X0A	-0.5931(±0.0723) 23.2443 (±8.0193) 8.1045 (±5.2582)	-18.2129	1.0898	0.7748	0.6004	0.5879	48.0773	0.7110
51	ALOGP X1A X0A X2	-0.5669(±0.0756) 14.7101 (±10.8533) 9.6609 (±5.4161) 9.6609 (±0.0633)	-14.9980	1.0878	0.7785	0.6060	0.5894	36.5305	0.7157
59	ALOGP X1A X0A X2 SE	-0.6008(±0.0730) -5.5929 (±12.1618) 16.3429 (±5.5799) 16.3429 (±0.1543) -5.5929 (±0.0285)	-10.1020	1.0388	0.8028	0.6445	0.6256	34.0841	0.7728

Table 2.5: Observed and Estimated Model Topological Indices of model No 59.

Observation	Observed Log S (mol/L)	*Predicted Log S (mol/L)*	*Residuals*
1	-1.4	-1.71276	0.312762
2	-1.73	-0.97433	-0.75567
3	-2.26	-1.19808	-1.06192
4	-1.37	-1.45278	0.082776
5	-1.96	-1.2587	-0.7013
6	-2.95	-2.44602	-0.50398
7	0.48	-2.55866	3.038658
8	-2.44	-2.0214	-0.4186
9	-1.58	-1.71276	0.132762
10	-1.22	-1.78584	0.565845
11	-2.81	-3.95035	1.140353
12	-0.95	-2.01154	1.06154
13	-2.15	-2.01154	-0.13846
14	-1.3	-1.82836	0.528355
15	1.7	-0.03276	1.732764
16	-3.6	-1.51021	-2.08979
17	-2.11	-2.62375	0.513754
18	-3.76	-4.95504	1.195037
19	-6.75	-4.95504	-1.79496
20	-2.25	-2.88334	0.633337
21	-3.24	-2.67509	-0.56491
22	-4.5	-3.3384	-1.1616
23	-4.83	-5.15529	0.32529
24	-1.16	-1.03655	-0.12345
25	-3.09	-2.87767	-0.21233
26	-5.19	-3.97171	-1.21829
27	-3.27	-2.32251	-0.94749
28	-3.75	-4.63381	0.883805
29	-5	-4.98031	-0.01969
30	-2.64	-2.89667	0.256666
31	-3.95	-4.52281	0.572809
32	-2.97	-2.94806	-0.02194
33	-3.13	-2.96919	-0.16081
34	-4.15	-4.12759	-0.02241
35	-2.65	-1.70468	-0.94532
36	-5.35	-4.91327	-0.43673
37	-1.03	-1.57714	0.547144
38	-5.28	-4.54337	-0.73663
39	-3.25	-3.46197	0.211974
40	-2.69	-2.30506	-0.38494
41	-3.46	-3.43132	-0.02868
42	-1.02	-1.93946	0.919458
43	-3.6	-2.89664	-0.70336
44	-3.49	-3.08357	-0.40643
45	-2.19	-2.42977	0.239774
46	-1.8	-3.4129	1.612901
47	-0.56	-1.77729	1.217291
48	-3.47	-2.3339	-1.1361
49	-3.56	-2.01407	-1.54593

50	-3.02	-3.59858	0.578577
51	-3.24	-3.01404	-0.22596
52	-1.12	-4.08074	2.960744
53	-4.82	-4.08074	-0.73926
54	-3.57	-1.7833	-1.7867
55	-1.22	-0.69774	-0.52226
56	-3.87	-4.45358	0.583583
57	-3.61	-2.41685	-1.19315
58	-1.98	-3.40304	1.423043
59	-3.24	-5.0334	1.793395
60	-4.63	-4.53879	-0.09121
61	-0.85	-1.40222	0.552224
62	-4.59	-4.61733	0.02733
63	-2.95	-1.56887	-1.38113
64	-8.8	-6.3371	-2.4629
65	-4.16	-5.09379	0.933791
66	-2.29	-3.38023	1.090234
67	-1.49	-1.87579	0.385786
68	-3.86	-4.72259	0.862592
69	-3.79	-2.66295	-1.12705
70	-4.42	-4.02026	-0.39974
71	0.02	-1.96911	1.989114
72	-2.37	-2.219	-0.151
73	-6.18	-5.54518	-0.63482
74	-0.91	-0.9418	0.031797
75	-1.94	-1.7731	-0.1669
76	-1.84	-1.76233	-0.07767
77	-5.46	-5.96864	0.508644
78	-5.49	-4.89441	-0.59559
79	-2.7	-2.86333	0.163332
80	-2.73	-2.96958	0.239582
81	-1.51	-1.57765	0.067655
82	-1.36	-1.01155	-0.34845
83	-2.73	-2.75944	0.029436
84	-4.07	-4.23567	0.16567
85	-1	-2.15272	1.152716
86	-4.44	-3.53484	-0.90516
87	-3.7	-3.1283	-0.5717
88	-5.2	-4.10736	-1.09264
89	-1.5	-1.86927	0.369268
90	-2.66	-3.40167	0.741665
91	-6.73	-5.83504	-0.89496
92	-1.49	-1.49072	0.000724
93	-3.4	-2.2766	-1.1234
94	-2	-2.82422	0.824221
95	-3.52	-3.35012	-0.16988
96	-6.74	-4.16401	-2.57599
97	-5.75	-5.40194	-0.34806
98	-3.47	-3.11468	-0.35532
99	-1.56	-3.43362	1.873615
100	-3.33	-4.43879	1.108793

Figure -1

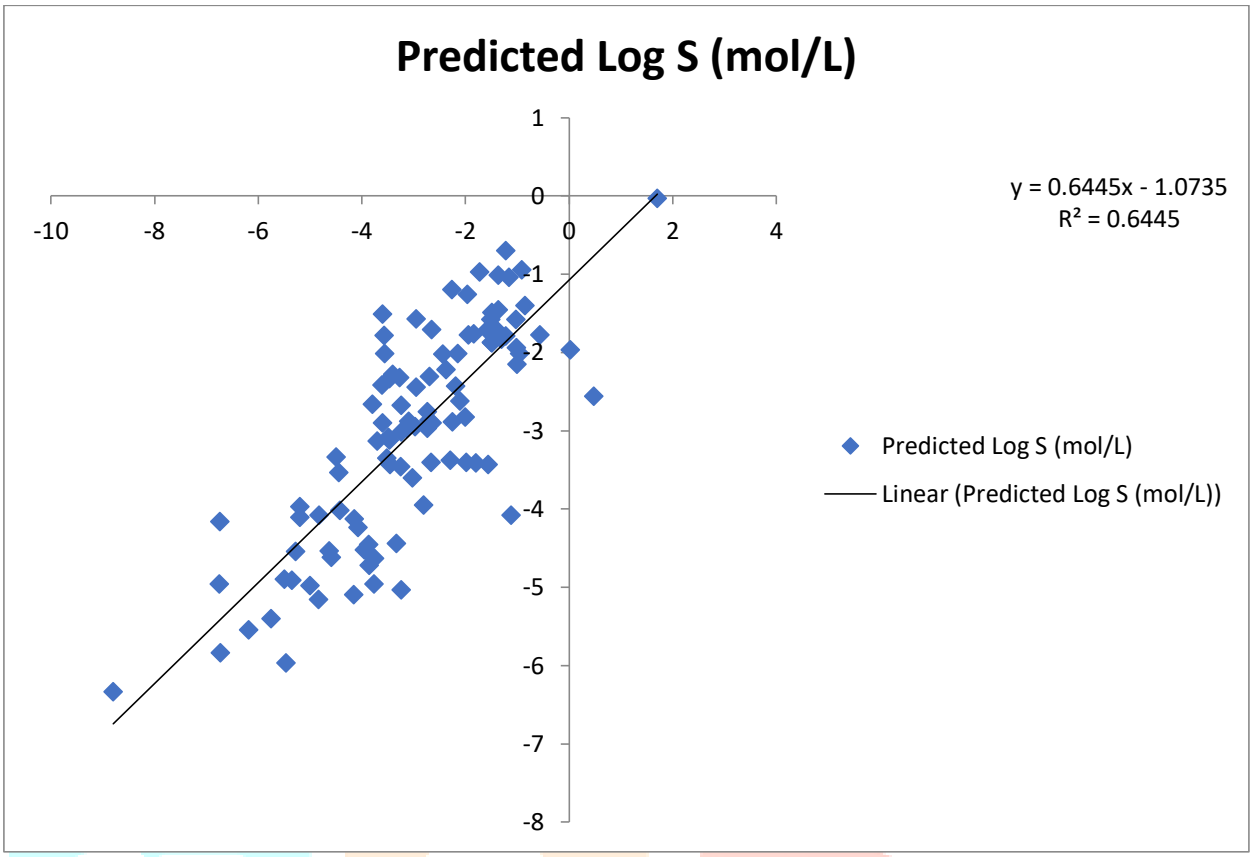


Table 2.6: Cross validation of Topological Indices

Model No	Parameter Used	Press	ssy	Press/SSY	R²CV	PSE	Spress
26	ALOGP	151.5664	285.3212	0.531213	0.468787	1.231123	1.243622
35	ALOGP X1A	116.8398	285.3212	0.409503	0.590497	1.080925	1.097513
44	ALOGP X1A X0A	114.0183	285.3212	0.399614	0.600386	1.067794	1.089812
51	ALOGP X1A X0A X2	112.4141	285.3212	0.393991	0.606009	1.060255	1.087799
59	ALOGP X1A X0A X2 SE	101.4301	285.3212	0.355494	0.644506	1.007125	1.03877

Among all the Penta parametric models listed in table 2.4 models 2826, 35, 44, 51, and 59 gave quite improved results. The significance and quality of these models was checked on the basis of the values of " R ", " R2", "R2A ", quality factor "Q", standard error of estimate "SE", " R2 C2V", "PSE", and PRESS/SSY ratio of these equations. The squared correlation coefficient (R2) is a measure of the fit of the regression model correspondingly, it represents the part of variation in the observed data explained by the model .Study of these models shows that while carrying out the tetra parametric regression analysis, R2A goes on increasing while SE goes on decreasing and it means that statistically the quality of models goes on increasing. All the equations have higher Q value . Q is the quality factor estimated to determine the predictive value of the model.

The data set was split in two subsets the training set and test. The training set of 73 compounds is used in building the QSAR model and 27 compounds is for the test set that was used to evaluate the predictive ability of the model

Predictive ability was evaluated by the LOO (Leave one out method) cross validation procedure. This method systematically removes one data point at a point and then a model is constructed on the basis of the reduced data set which is then used to predict the activity of the removed sample. This procedure was repeated for all points until a complete set of predicted values were obtained. It was noted that the predicted activities were very close to the respective experimental values. Various cross- validation parameters calculated for the proposed models are presented in Table -2.7

The MLR methods are applied to generate and you Qsar model for the prediction of log(Sol) activities of the training and test compounds for the training set these models are reported in table 8 and they show much improvement in R square values these models are as below.

Table 2.7: Topological Indices - Regression of Training Set

Model No	Parameter Used	AI	B	SE	R	R2	R2A	F Ratio	Q=r/se
26	ALOGP	-0.7894 (±0.0664)	-1.2013	0.8111	0.8157	0.6654	0.6607	141.1896	1.0057
35	ALOGP X1A	-0.6541(±0.0582) 27.0353 (±4.3868)	-13.7025	0.6577	0.8849	0.7831	0.7769	126.3547	1.3454
44	ALOGP X1A X0A	-0.6641(±0.0621) 28.9143 (±5.8796) -2.2080 (±4.5680)	-12.9127	0.6613	0.8853	0.7838	0.7744	83.3921	1.3387
51	ALOGP X1A X0A X2	-0.6533(±0.0710) 26.9874 (±8.4425) -1.8755 (±4.7139) -1.8755 (±0.0540)	-12.1781	0.6656	0.8855	0.7841	0.7714	61.7561	1.3304
59	ALOGP X1A X0A X2 SE	-0.6706(±0.0588) 4.9210 (±7.9811) 6.8310 (±4.1856) 6.8310 (±0.1023) 4.9210 (±0.0184)	-7.9036	0.5503	0.9245	0.8546	0.8438	78.7869	1.6800

Table 2.8 Topological Indices- Observed and Estimated of Training Set

Observation	LogSexp(mol/L)	*Predicted LogSexp(mol/L)*	*Residuals*
1	-1.4	-1.37602	-0.02398
2	-1.37	-1.36866	-0.00134
3	-1.96	-1.30349	-0.65651
4	-2.95	-2.0773	-0.8727
5	-2.44	-1.80203	-0.63797
6	-1.58	-1.37602	-0.20398
7	-1.22	-1.66071	0.440707
8	-2.81	-3.47023	0.660235
9	-0.95	-1.78816	0.838161
10	-2.15	-1.78816	-0.36184
11	-1.3	-1.49741	0.197411
12	-2.11	-2.53854	0.428543
13	-3.76	-4.6282	0.8682
14	-2.25	-2.45727	0.207267
15	-3.24	-2.1951	-1.0449
16	-4.83	-4.9795	0.149505
17	-1.16	-0.83445	-0.32555
18	-3.09	-2.78329	-0.30671
19	-3.75	-4.43173	0.681733
20	-5	-4.88119	-0.11881
21	-2.64	-2.65368	0.013681
22	-3.95	-4.3674	0.4174
23	-2.97	-3.32199	0.351986
24	-3.13	-2.82592	-0.30408
25	-4.15	-4.03695	-0.11305
26	-5.35	-5.01064	-0.33936
27	-1.03	-1.64256	0.612559
28	-5.28	-4.39733	-0.88267
29	-3.25	-3.35693	0.106933
30	-2.69	-2.54089	-0.14911
31	-3.46	-3.72429	0.264287
32	-1.02	-1.82185	0.801846
33	-3.6	-2.91117	-0.68883
34	-3.49	-2.64448	-0.84552
35	-2.19	-2.58914	0.399138
36	-0.56	-1.53419	0.97419
37	-3.02	-3.41844	0.398435
38	-3.24	-2.88041	-0.35959
39	-4.82	-3.86992	-0.95008
40	-1.22	-0.51395	-0.70605
41	-3.87	-4.00115	0.131148

42	-1.98	-3.10769	1.127692
43	-4.63	-4.42635	-0.20365
44	-0.85	-1.11386	0.263859
45	-4.59	-4.68326	0.093262
46	-4.16	-4.53791	0.377911
47	-2.29	-3.21502	0.925018
48	-1.49	-1.8649	0.374905
49	-3.86	-4.48085	0.620854
50	-4.42	-3.88669	-0.53331
51	-2.37	-1.92919	-0.44081
52	-6.18	-5.23374	-0.94626
53	-0.91	-0.5942	-0.3158
54	-1.94	-1.71107	-0.22893
55	-1.84	-1.69616	-0.14384

56	-5.46	-5.61898	0.158977
57	-5.49	-4.83836	-0.65164
58	-2.7	-2.771	0.070996
59	-2.73	-2.89491	0.164912
60	-1.51	-1.65833	0.148334
61	-1.36	-1.16926	-0.19074
62	-2.73	-2.50232	-0.22768
63	-4.07	-4.03695	-0.03305
64	-1	-1.86318	0.863176
65	-3.7	-2.93286	-0.76714
66	-1.5	-1.96928	0.469284
67	-2.66	-3.13876	0.478759
68	-1.49	-1.34427	-0.14573
69	-2	-2.3161	0.316098
70	-3.52	-3.43272	-0.08728
71	-5.75	-5.09274	-0.65726
72	-3.47	-2.982	-0.488
73	-3.33	-3.88634	0.556341

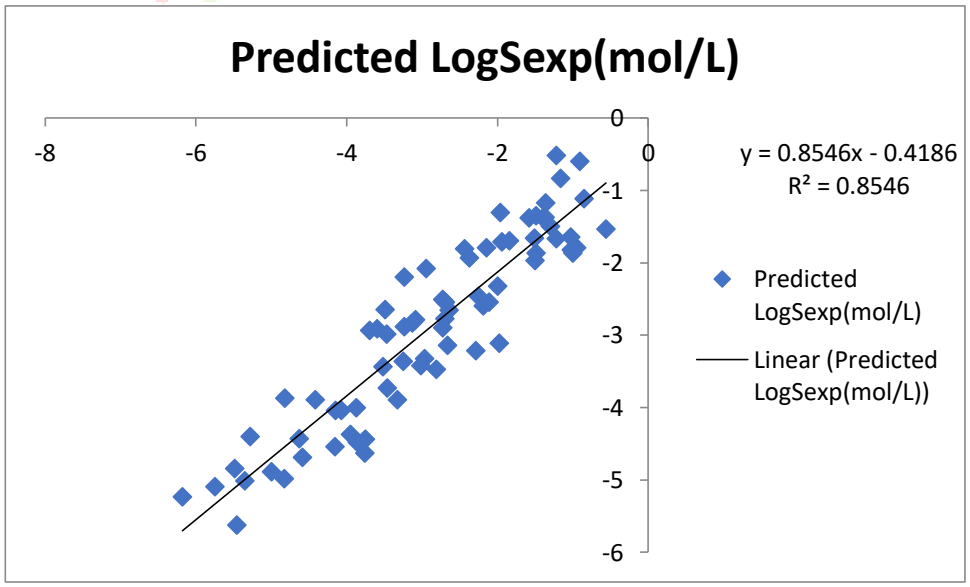


Table 2.9: Topological Indices- Crossed validation of Training Set

Model No	Parameter Used	press	Ssy	Press/SSY	R²CV	PSE	Spress
26	ALOGP	46.7053	139.5829	0.334606	0.665394	0.799874	0.811062
35	ALOGP X1A	30.2774	139.5829	0.216913	0.783087	0.644018	0.657673
44	ALOGP X1A X0A	30.1752	139.5829	0.216181	0.783819	0.64293	0.661303
51	ALOGP X1A X0A X2	30.1298	139.5829	0.215856	0.784144	0.642446	0.665647
59	ALOGP X1A X0A X2 SE	20.2893	139.5829	0.145357	0.854643	0.527196	0.550296

PRESS (predicted residual sum of squares) appears to be the most important cross validation parameters accounting for good estimate of the real predictive error of the models. In case its value is less than SSY(sum of the square of all response value), it will mean that the predictive power of the model is good and is not based upon chance therefore, can be considered statistically significant

To be a reasonable QSAR model , PRESS/SSY should be smaller than 0.400. In our case , the ratio PRESS/SSY ranges between 0.3346- 0.1453 indicating that all proposed models (equations 2826, 35, 44, 51 and 59) are reliable. The PSE and SPRESS are good parameters to discuss the uncertainty in prediction. The lower the value of these parameters, the better will be the predictive ability of the model. The indication of the performance of the model is obtained from R2CV (the overall predictive ability) higher R2CV shows that the model is good. In order to examine the relative potential of models , predictive correlation coefficient (R2 pred) were estimated by plotting graphs between observed and calculated Log (Sol) values obtained with the help of eqn 59. The comparison between observed and predicted activities is listed in Table- 2.8. Such correlations are shown in figure 2. From the fig 2, R2 pred values obtained for equation 59 is 0. 8546 is fairly high indicating the good quality of models.

Amongst all these statistically significant five models discussed above model 59 is the best model since the values R = 0.9245, R2 = 0.8546 , R2A = 0.8438 , R2cv = 0.0.8546 are the best as compared to all the models. The calculated F value is greater than F theoretical value , the value of standard error of estimate is the lowest , SE = 0.5503, PRESS/SSY = 0.1453 confirms that it is statistically significant and excellent model and it has been found to be having outstanding predictive power also.

The generated QSAR model was employed to predicted Log (Sol) activities of the test (Prediction) molecules and the outcome is displayed in table 2.10 - 2.12 the predictive power is also shown in the figure 3.

Table 2.10: Topological Indices- Regression of Test Set

Model No	Parameter Used	AI	B	SE	R	R2	R2A	F Ratio	Q=r/se
59	ALOGP X1A X0A X2 SE	-0.6350(±0.1893) -23.1911 (±39.7409) 23.1347 (±15.1262) 23.1347 (±0.4798) -23.1911 (±0.0901)	-6.8613	1.8002	0.7180	**0.5155**	0.4001	4.4688	0.3988

Log S (mol/L) = -0.6350(±0.1893) ALOGP -23.1911 (±39.7409) X1A 23.1347 (±15.1262) X0A 23.1347 (±0.4798) X2 -23.1911 (±0.0901) SE +-6.8613,

N=27 , SE = (1.8002), R = (0.7180) , R2 = (0.5155) , R2A = (0.4001), F RATIO = (4.4688), Q = (0.3988)

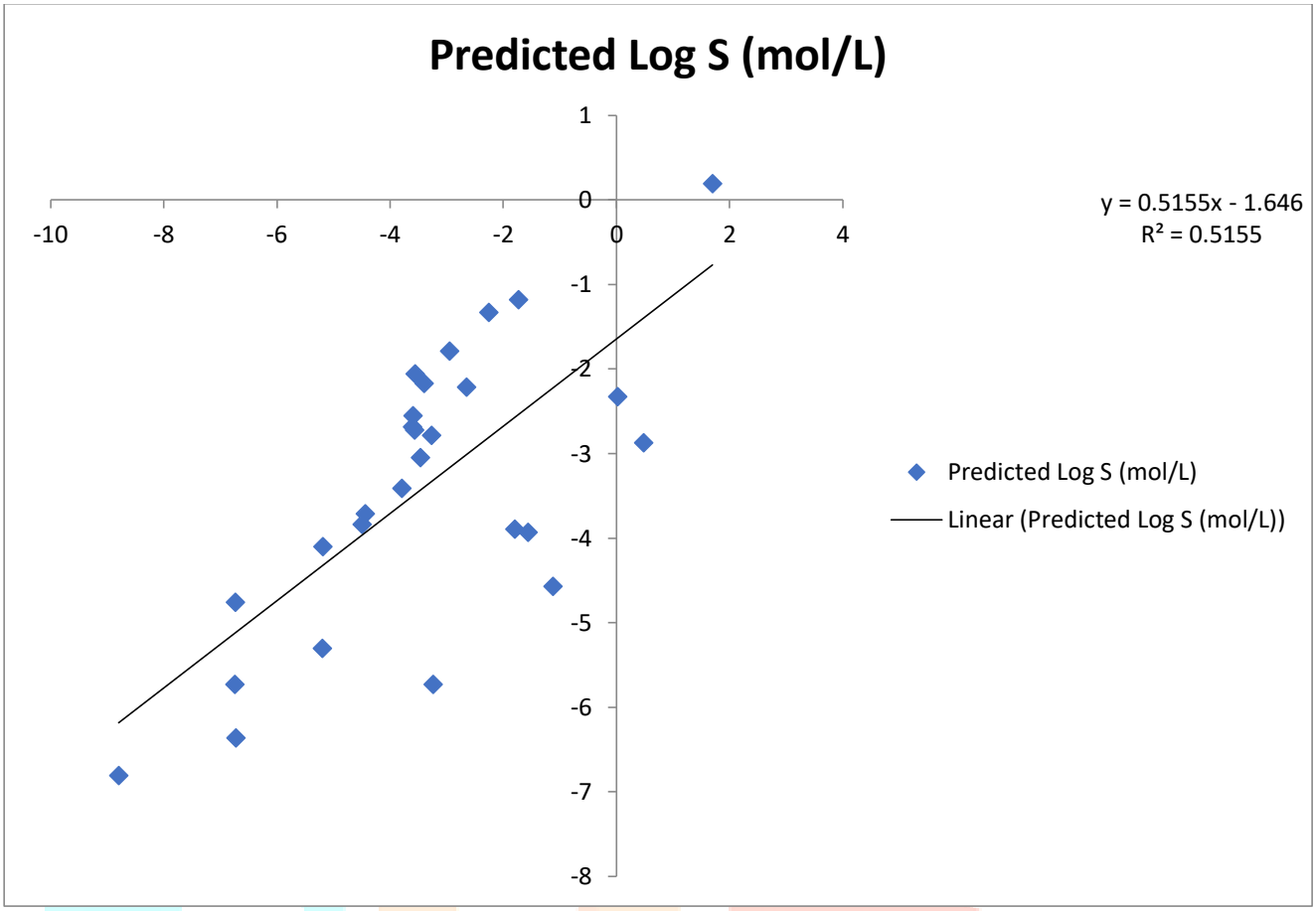
Table 2.11: Topological Indices- Observed and Estimated of Test Set

Sn	Observed Log S (mol/L)	*Predicted Log S (mol/L)*	*Residuals*
1	-1.73	-1.18024	-0.54976
2	-2.26	-1.33295	-0.92705
3	0.48	-2.87175	3.35175
4	1.7	0.186639	1.513361
5	-3.6	-2.55353	-1.04647
6	-6.75	-5.73443	-1.01557
7	-4.5	-3.83695	-0.66305
8	-5.19	-4.10053	-1.08947
9	-3.27	-2.7841	-0.4859
10	-2.65	-2.21637	-0.43363
11	-1.8	-3.89541	2.095413
12	-3.47	-3.05176	-0.41824
13	-3.56	-2.06131	-1.49869
14	-1.12	-4.57051	3.450511
15	-3.57	-2.72344	-0.84656
16	-3.61	-2.68638	-0.92362
17	-3.24	-5.72845	2.488451
18	-2.95	-1.78847	-1.16153
19	-8.8	-6.80872	-1.99128
20	-3.79	-3.41551	-0.37449
21	0.02	-2.32925	2.349252
22	-4.44	-3.71411	-0.72589
23	-5.2	-5.30441	0.104405
24	-6.73	-6.3645	-0.3655
25	-3.4	-2.17125	-1.22875
26	-6.74	-4.75937	-1.98063
27	-1.56	-3.93295	2.372946

Table 2.12: Topological Indices- Crossed validation of Test Set

Model No	Parameter Used	Press	ssy	Press/SSY	R^2CV	PSE	Spress
59	ALOGP X1A X0A X2 SE	68.0518	140.4589	0.484496	0.515504	1.587588	1.64987

The predicted Log (Sol) values of test set is within the range of -6.8087 to 0.1866 to hence model is validated.



Conclusion

The qspr model for describing the variation of aqueous solubility for 100 drug type organic compounds by considering the descriptors was successfully established. They Accept lipnski's rule of drug absorption. The relationship of aqueous solubility of the compound was established with molecular, size, shape, and strength of hydrogen bond. The parameters used in the study to establish the best model are Alogp, VDA, Mlogp, MV. IN future similar analysis on drug permeability by the lipinski's rule to predict bioavailability will inspire the new set of descriptors.

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