

## 机器学习方法用于建立乙酰胆碱酯酶抑制剂的分类模型

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### Classification Models for Acetylcholinesterase Inhibitors Based on Machine Learning Methods

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**表S1** 1559个分子描述符  
**Table S1** Full list of 1559 molecular descriptors

- [1] Number of Atoms
- [2] Number of Heavy atoms
- [3] Number of H atoms
- [4] Number of B atoms
- [5] Number of C atoms
- [6] Number of N atoms
- [7] Number of O atoms
- [8] Number of F atoms
- [9] Number of P atoms
- [10] Number of S atoms
- [11] Number of Cl atoms
- [12] Number of Br atoms
- [13] Number of I atoms
- [14] Number of Bonds
- [15] Number of non-H Bonds
- [16] Number of rings
- [17] Molecular weight
- [18] Average molecular weight
- [19] Number of H-bond donnor
- [20] Number of H-bond acceptor
- [21] Sanderson electronegativity sum
- [22] Number of rotatable bonds
- [23] Dipole moment (in Debye)
- [24] Total absolute atomic charge
- [25] Total squared atomic charge
- [26] Charge Polarization
- [27] Topological electronic index TE
- [28] Topological electronic index CTE
- [29] Maximum negative charges
- [30] Maximum positive charges
- [31] Local dipol index
- [32] Total negative charges
- [33] Total positive charges
- [34] Submolecular Polarity Parameter
- [35] Second-order submolecular polarity parameter
- [36] Relative positive charge
- [37] Relative negative charge
- [38] 0th Electronic-topological
- [39] 1st Electronic-topological
- [40] 2nd Electronic-topological
- [41] Electron charge density connectivity index
- [42] Hydrophobic alogp
- [43] Molecular polarizability
- [44] Schultz molecular topological index

[45] Gutman molecular topological index  
[46] Topological charge index G1  
[47] Topological charge index G2  
[48] Topological charge index G3  
[49] Topological charge index G4  
[50] Topological charge index G5  
[51] Mean topological charge index J1  
[52] Mean topological charge index J2  
[53] Mean topological charge index J3  
[54] Mean topological charge index J4  
[55] Mean topological charge index J5  
[56] Global topological charge index J  
[57] Wiener index  
[58] Mean Wiener index  
[59] Harary index  
[60] Gravitational topological index  
[61] Molecular path count of length 1  
[62] Molecular path count of length 2  
[63] Molecular path count of length 3  
[64] Molecular path count of length 4  
[65] Molecular path count of length 5  
[66] Molecular path count of length 6  
[67] Total path count  
[68] Sum of Estate of atom type sLi  
[69] Sum of Estate of atom type ssBe  
[70] Sum of Estate of atom type ssssBe  
[71] Sum of Estate of atom type ssBH  
[72] Sum of Estate of atom type sssB  
[73] Sum of Estate of atom type ssssB  
[74] Sum of Estate of atom type sCH3  
[75] Sum of Estate of atom type dCH2  
[76] Sum of Estate of atom type ssCH2  
[77] Sum of Estate of atom type tCH  
[78] Sum of Estate of atom type dsCH  
[79] Sum of Estate of atom type aaCH  
[80] Sum of Estate of atom type sssCH  
[81] Sum of Estate of atom type ddC  
[82] Sum of Estate of atom type tsC  
[83] Sum of Estate of atom type dssC  
[84] Sum of Estate of atom type aasC  
[85] Sum of Estate of atom type aaaC  
[86] Sum of Estate of atom type sssC  
[87] Sum of Estate of atom type sNH3  
[88] Sum of Estate of atom type sNH2  
[89] Sum of Estate of atom type ssNH2  
[90] Sum of Estate of atom type dNH

[91] Sum of Estate of atom type ssNH  
[92] Sum of Estate of atom type aaNH  
[93] Sum of Estate of atom type tN  
[94] Sum of Estate of atom type sssNH  
[95] Sum of Estate of atom type dsN  
[96] Sum of Estate of atom type aaN  
[97] Sum of Estate of atom type sssN  
[98] Sum of Estate of atom type ddsN  
[99] Sum of Estate of atom type aasN  
[100] Sum of Estate of atom type aOH  
[101] Sum of Estate of atom type sOH  
[102] Sum of Estate of atom type dO  
[103] Sum of Estate of atom type ssO  
[104] Sum of Estate of atom type aaO  
[105] Sum of Estate of atom type F  
[106] Sum of Estate of atom type ssSiH2  
[107] Sum of Estate of atom type ssSiH2  
[108] Sum of Estate of atom type sssSiH  
[109] Sum of Estate of atom type ssssSi  
[110] Sum of Estate of atom type sPH2  
[111] Sum of Estate of atom type ssPH  
[112] Sum of Estate of atom type sssP  
[113] Sum of Estate of atom type dsssP  
[114] Sum of Estate of atom type ssssP  
[115] Sum of Estate of atom type sSH  
[116] Sum of Estate of atom type dS  
[117] Sum of Estate of atom type ssS  
[118] Sum of Estate of atom type aaS  
[119] Sum of Estate of atom type dssS  
[120] Sum of Estate of atom type ddssS  
[121] Sum of Estate of atom type sCl  
[122] Sum of Estate of atom type sGeH3  
[123] Sum of Estate of atom type ssGeH2  
[124] Sum of Estate of atom type sssGeH  
[125] Sum of Estate of atom type ssssGe  
[126] Sum of Estate of atom type sAsH2  
[127] Sum of Estate of atom type ssAsH  
[128] Sum of Estate of atom type sssAs  
[129] Sum of Estate of atom type sssdAs  
[130] Sum of Estate of atom type ssssAs  
[131] Sum of Estate of atom type sSeH  
[132] Sum of Estate of atom type dSe  
[133] Sum of Estate of atom type ssSe  
[134] Sum of Estate of atom type aaSe  
[135] Sum of Estate of atom type dssSe  
[136] Sum of Estate of atom type ddssSe

[137] Sum of Estate of atom type sBr  
[138] Sum of Estate of atom type sSnH3  
[139] Sum of Estate of atom type ssSnH2  
[140] Sum of Estate of atom type sssSnH  
[141] Sum of Estate of atom type ssssSn  
[142] Sum of Estate of atom type sI  
[143] Sum of Estate of atom type sPbH3  
[144] Sum of Estate of atom type ssPbH2  
[145] Sum of Estate of atom type sssPbH  
[146] Sum of Estate of atom type ssssPb  
[147] Sum of Estate of atom type unknown  
[148] Sum of Estate of all heavy atoms  
[149] Sum of Estate of all C atoms  
[150] Sum of Estate of all halogen atoms  
[151] Sum of Estate of all hetero atoms  
[152] Sum of Estate of H-bond acceptors  
[153] Average of Estate values  
[154] Maximum of Estate values  
[155] Minimum of Estate values  
[156] Sum of H Estate of atom type HsOH  
[157] Sum of H Estate of atom type HdNH  
[158] Sum of H Estate of atom type HsSH  
[159] Sum of H Estate of atom type HsNH2  
[160] Sum of H Estate of atom type HssNH  
[161] Sum of H Estate of atom type HaaNH  
[162] Sum of H Estate of atom type HsNH3p  
[163] Sum of H Estate of atom type HssNH2p  
[164] Sum of H Estate of atom type HsssNHp  
[165] Sum of H Estate of atom type HtCH  
[166] Sum of H Estate of atom type HdCH2  
[167] Sum of H Estate of atom type HdsCH  
[168] Sum of H Estate of atom type HaaCH  
[169] Sum of H Estate of atom type HCHnX  
[170] Sum of H Estate of atom type HCsats  
[171] Sum of H Estate of atom type HCsat  
[172] Sum of H Estate of atom type Havin  
[173] Sum of H Estate of atom type Hother  
[174] Sum of H Estate of atom type Hmisc  
[175] Sum of H Estate of H-bond donors  
[176] Xu index  
[177] Modified Xu Index  
[178] Balaban Index J  
[179] Platt Number  
[180] Log of Superpendentic index  
[181] First Zagreb Index(M1)  
[182] Second Zagreb Index(M2)

[183] First Modified Zagreb Index  
[184] Second Modified Zagreb Index  
[185] Quadratic index(Q)  
[186] 0th edge connectivity index  
[187] Edge connectivity index  
[188] Extended edge connectivity index  
[189] 2nd spectral moment  
[190] 3rd spectral moment  
[191] 4th spectral moment  
[192] 5th spectral moment  
[193] 6th spectral moment  
[194] 7th spectral moment  
[195] 8th spectral moment  
[196] 9th spectral moment  
[197] 10th spectral moment  
[198] Moreau-Broto autocorrelation of lag 0 weighted by atomic mass  
[199] Moreau-Broto autocorrelation of lag 1 weighted by atomic mass  
[200] Moreau-Broto autocorrelation of lag 2 weighted by atomic mass  
[201] Moreau-Broto autocorrelation of lag 3 weighted by atomic mass  
[202] Moreau-Broto autocorrelation of lag 4 weighted by atomic mass  
[203] Moreau-Broto autocorrelation of lag 5 weighted by atomic mass  
[204] Moreau-Broto autocorrelation of lag 6 weighted by atomic mass  
[205] Moreau-Broto autocorrelation of lag 7 weighted by atomic mass  
[206] Moreau-Broto autocorrelation of lag 8 weighted by atomic mass  
[207] Moreau-Broto autocorrelation of lag 9 weighted by atomic mass  
[208] Moreau-Broto autocorrelation of lag 10 weighted by atomic mass  
[209] Moreau-Broto autocorrelation of lag 0 weighted by electronegativity  
[210] Moreau-Broto autocorrelation of lag 1 weighted by electronegativity  
[211] Moreau-Broto autocorrelation of lag 2 weighted by electronegativity  
[212] Moreau-Broto autocorrelation of lag 3 weighted by electronegativity  
[213] Moreau-Broto autocorrelation of lag 4 weighted by electronegativity  
[214] Moreau-Broto autocorrelation of lag 5 weighted by electronegativity  
[215] Moreau-Broto autocorrelation of lag 6 weighted by electronegativity  
[216] Moreau-Broto autocorrelation of lag 7 weighted by electronegativity  
[217] Moreau-Broto autocorrelation of lag 8 weighted by electronegativity  
[218] Moreau-Broto autocorrelation of lag 9 weighted by electronegativity  
[219] Moreau-Broto autocorrelation of lag 10 weighted by electronegativity  
[220] Moreau-Broto autocorrelation of lag 0 weighted by vdW radius  
[221] Moreau-Broto autocorrelation of lag 1 weighted by vdW radius  
[222] Moreau-Broto autocorrelation of lag 2 weighted by vdW radius  
[223] Moreau-Broto autocorrelation of lag 3 weighted by vdW radius  
[224] Moreau-Broto autocorrelation of lag 4 weighted by vdW radius  
[225] Moreau-Broto autocorrelation of lag 5 weighted by vdW radius  
[226] Moreau-Broto autocorrelation of lag 6 weighted by vdW radius  
[227] Moreau-Broto autocorrelation of lag 7 weighted by vdW radius  
[228] Moreau-Broto autocorrelation of lag 8 weighted by vdW radius

[229] Moreau-Broto autocorrelation of lag 9 weighted by vdW radius  
[230] Moreau-Broto autocorrelation of lag 10 weighted by vdW radius  
[231] Moreau-Broto autocorrelation of lag 0 weighted by atom AlogP  
[232] Moreau-Broto autocorrelation of lag 1 weighted by atom AlogP  
[233] Moreau-Broto autocorrelation of lag 2 weighted by atom AlogP  
[234] Moreau-Broto autocorrelation of lag 3 weighted by atom AlogP  
[235] Moreau-Broto autocorrelation of lag 4 weighted by atom AlogP  
[236] Moreau-Broto autocorrelation of lag 5 weighted by atom AlogP  
[237] Moreau-Broto autocorrelation of lag 6 weighted by atom AlogP  
[238] Moreau-Broto autocorrelation of lag 7 weighted by atom AlogP  
[239] Moreau-Broto autocorrelation of lag 8 weighted by atom AlogP  
[240] Moreau-Broto autocorrelation of lag 9 weighted by atom AlogP  
[241] Moreau-Broto autocorrelation of lag 10 weighted by atom AlogP  
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[243] Moreau-Broto autocorrelation of lag 1 weighted by atomic charge  
[244] Moreau-Broto autocorrelation of lag 2 weighted by atomic charge  
[245] Moreau-Broto autocorrelation of lag 3 weighted by atomic charge  
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[248] Moreau-Broto autocorrelation of lag 6 weighted by atomic charge  
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[251] Moreau-Broto autocorrelation of lag 9 weighted by atomic charge  
[252] Moreau-Broto autocorrelation of lag 10 weighted by atomic charge  
[253] Moreau-Broto autocorrelation of lag 0 weighted by E-State indices  
[254] Moreau-Broto autocorrelation of lag 1 weighted by E-State indices  
[255] Moreau-Broto autocorrelation of lag 2 weighted by E-State indices  
[256] Moreau-Broto autocorrelation of lag 3 weighted by E-State indices  
[257] Moreau-Broto autocorrelation of lag 4 weighted by E-State indices  
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[262] Moreau-Broto autocorrelation of lag 9 weighted by E-State indices  
[263] Moreau-Broto autocorrelation of lag 10 weighted by E-State indices  
[264] Moreau-Broto autocorrelation of lag 0 weighted by polarizability  
[265] Moreau-Broto autocorrelation of lag 1 weighted by polarizability  
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[273] Moreau-Broto autocorrelation of lag 9 weighted by polarizability  
[274] Moreau-Broto autocorrelation of lag 10 weighted by polarizability

[275] Moran autocorrelation of lag 1 weighted by atomic mass  
[276] Moran autocorrelation of lag 2 weighted by atomic mass  
[277] Moran autocorrelation of lag 3 weighted by atomic mass  
[278] Moran autocorrelation of lag 4 weighted by atomic mass  
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[284] Moran autocorrelation of lag 10 weighted by atomic mass  
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[297] Moran autocorrelation of lag 3 weighted by vdW radius  
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[319] Moran autocorrelation of lag 5 weighted by atomic mass  
[320] Moran autocorrelation of lag 6 weighted by atomic mass



[321] Moran autocorrelation of lag 7 weighted by atomic mass  
[322] Moran autocorrelation of lag 8 weighted by atomic mass  
[323] Moran autocorrelation of lag 9 weighted by atomic mass  
[324] Moran autocorrelation of lag 10 weighted by atomic mass  
[325] Moran autocorrelation of lag 1 weighted by E-State indices  
[326] Moran autocorrelation of lag 2 weighted by E-State indices  
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[365] Geary autocorrelation of lag 1 weighted by vdW radius  
[366] Geary autocorrelation of lag 2 weighted by vdW radius

[367] Geary autocorrelation of lag 3 weighted by vdW radius  
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[394] Geary autocorrelation of lag 10 weighted by atomic charge  
[395] Geary autocorrelation of lag 1 weighted by E-State indices  
[396] Geary autocorrelation of lag 2 weighted by E-State indices  
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[403] Geary autocorrelation of lag 9 weighted by E-State indices  
[404] Geary autocorrelation of lag 10 weighted by E-State indices  
[405] Geary autocorrelation of lag 1 weighted by atomic polarizability  
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[407] Geary autocorrelation of lag 3 weighted by atomic polarizability  
[408] Geary autocorrelation of lag 4 weighted by atomic polarizability  
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[410] Geary autocorrelation of lag 6 weighted by atomic polarizability  
[411] Geary autocorrelation of lag 7 weighted by atomic polarizability  
[412] Geary autocorrelation of lag 8 weighted by atomic polarizability

[413] Geary autocorrelation of lag 9 weighted by atomic polarizability  
[414] Geary autocorrelation of lag 10 weighted by atomic polarizability  
[415] 0th Kier-Hall connectivity index  
[416] 1st Kier-Hall connectivity index  
[417] 2nd Kier-Hall connectivity index  
[418] Mean Randic Connectivity index  
[419] Simple topological index by Narumi  
[420] Harmonic topological index by Narumi  
[421] Geometric topological index by Narumi  
[422] Arithmetic topological index by Narumi  
[423] 0th valence connectivity index  
[424] 1st valence connectivity index  
[425] 2nd valence connectivity index  
[426] 0th order delta chi index  
[427] 1st order delta chi index  
[428] 2nd order delta chi index  
[429] Poligini index  
[430] 0th Solvation connectivity index  
[431] 1st Solvation connectivity index  
[432] 2nd Solvation connectivity index  
[433] Electron charge density index  
[434] 1st order Kier shape index  
[435] 2nd order Kier shape index  
[436] 3rd order Kier shape index  
[437] 1st order Kappa alpha shape index  
[438] 2nd order Kappa alpha shape index  
[439] 3rd order Kappa alpha shape index  
[440] Kier Molecular Flexibility Index  
[441] Topological radius  
[442] Topological diameter  
[443] Graph-theoretical shape coefficient  
[444] Eccentricity  
[445] Average atom eccentricity  
[446] Mean eccentricity deviation  
[447] Average distance degree  
[448] Mean distance degree deviation  
[449] Unipolarity  
[450] Rouvary index Irouv  
[451] Centralization  
[452] Variation  
[453] Dispersion  
[454] Log of PRS INDEX  
[455] RDSQ index  
[456] RDCHI index  
[457] First highest eigenvalue of BCUT descriptors weighted by atomic mass  
[458] Second highest eigenvalue of BCUT descriptors weighted by atomic mass

[459] Third highest eigenvalue of BCUT descriptors weighted by atomic mass  
[460] Forth highest eigenvalue of BCUT descriptors weighted by atomic mass  
[461] Fifth highest eigenvalue of BCUT descriptors weighted by atomic mass  
[462] First lowest eigenvalue of BCUT descriptors weighted by atomic mass  
[463] Second lowest eigenvalue of BCUT descriptors weighted by atomic mass  
[464] Third lowest eigenvalue of BCUT descriptors weighted by atomic mass  
[465] Forth lowest eigenvalue of BCUT descriptors weighted by atomic mass  
[466] Fifth lowest eigenvalue of BCUT descriptors weighted by atomic mass  
[467] First highest eigenvalue of BCUT descriptors weighted by electronegativity  
[468] Second highest eigenvalue of BCUT descriptors weighted by electronegativity  
[469] Third highest eigenvalue of BCUT descriptors weighted by electronegativity  
[470] Forth highest eigenvalue of BCUT descriptors weighted by electronegativity  
[471] Fifth highest eigenvalue of BCUT descriptors weighted by electronegativity  
[472] First lowest eigenvalue of BCUT descriptors weighted by electronegativity  
[473] Second lowest eigenvalue of BCUT descriptors weighted by electronegativity  
[474] Third lowest eigenvalue of BCUT descriptors weighted by electronegativity  
[475] Forth lowest eigenvalue of BCUT descriptors weighted by electronegativity  
[476] Fifth lowest eigenvalue of BCUT descriptors weighted by electronegativity  
[477] First highest eigenvalue of BCUT descriptors weighted by vdW radius  
[478] Second highest eigenvalue of BCUT descriptors weighted by vdW radius  
[479] Third highest eigenvalue of BCUT descriptors weighted by vdW radius  
[480] Forth highest eigenvalue of BCUT descriptors weighted by vdW radius  
[481] Fifth highest eigenvalue of BCUT descriptors weighted by vdW radius  
[482] First lowest eigenvalue of BCUT descriptors weighted by vdW radius  
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[485] Forth lowest eigenvalue of BCUT descriptors weighted by vdW radius  
[486] Fifth lowest eigenvalue of BCUT descriptors weighted by vdW radius  
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[488] Second highest eigenvalue of BCUT descriptors weighted by atomic charge  
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[490] Forth highest eigenvalue of BCUT descriptors weighted by atomic charge  
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[505] Forth lowest eigenvalue of BCUT descriptors weighted by atom AlogP  
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[515] Forth lowest eigenvalue of BCUT descriptors weighted by E-State indices  
[516] Fifth lowest eigenvalue of BCUT descriptors weighted by E-State indices  
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[526] Fifth lowest eigenvalue of BCUT descriptors weighted by polarizability  
[527] 3D Wiener Index  
[528] Gravitational 3D index  
[529] Radius of gyration  
[530] Principal moments of Inertia, IA  
[531] Principal moments of Inertia, IB  
[532] Principal moments of Inertia, IC  
[533] Ovality from vdW  
[534] 0th moment over vdW volume  
[535] 2nd invariant moment over vdW volume(\*0.01)  
[536] 2nd moment shape index over vdW volume  
[537] 4th invariant moment over vdW volume(\*0.001)  
[538] 4th moment shape index over vdW volume  
[539] 6th invariant moment over vdW volume(\*0.0001)  
[540] 6th moment shape index over vdW volume  
[541] 0th order moment over vdW surface  
[542] 2nd order invariant moment over vdW surface  
[543] 2nd order moment shape index over vdW surface  
[544] 4th order invariant moment over vdW surface  
[545] 4th order moment shape index over vdW surface  
[546] 6th order invariant moment over vdW surface  
[547] 6th order moment shape index over vdW surface  
[548] Minimum MEP at vdW surface  
[549] Maximum MEP at vdW surface  
[550] Local polarity of molecule by vdW surface

[551] Total variance of the surface potential\*1000 at vdW surface  
[552] Un-weighted 1st MS-WHIM Variance over vdW surface  
[553] Un-weighted 2nd MS-WHIM Variance over vdW surface  
[554] Un-weighted 3rd MS-WHIM Variance over vdW surface  
[555] Un-weighted 1st MS-WHIM eigenvalue proportion over vdW surface  
[556] Un-weighted 2nd MS-WHIM eigenvalue proportion over vdW surface  
[557] Un-weighted The MS-WHIM accentric factor over vdW surface  
[558] Un-weighted 1st MS-WHIM skewness over vdW surface  
[559] Un-weighted 2nd MS-WHIM skewness over vdW surface  
[560] Un-weighted 3rd MS-WHIM skewness over vdW surface  
[561] Un-weighted 1st MS-WHIM kurtosis over vdW surface  
[562] Un-weighted 2nd MS-WHIM kurtosis over vdW surface  
[563] Un-weighted 3rd MS-WHIM kurtosis over vdW surface  
[564] Positive MEP weighted 1st MS-WHIM Variance over vdW surface  
[565] Positive MEP weighted 2nd MS-WHIM Variance over vdW surface  
[566] Positive MEP weighted 3rd MS-WHIM Variance over vdW surface  
[567] Positive MEP weighted 1st MS-WHIM eigenvalue proportion over vdW surface  
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[569] Positive MEP weighted the MS-WHIM accentric factor over vdW surface  
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[588] Ovality from SAS  
[589] 0th moment over SAS volume  
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[591] 2nd moment shape index over SAS volume  
[592] 4th invariant moment over SAS volume  
[593] 4th moment shape index over SAS volume  
[594] 6th invariant moment over SAS volume  
[595] 6th moment shape index over SAS volume  
[596] 0th order moment over SAS surface

[597] 2nd order invariant moment over SAS surface  
[598] 2nd order moment shape index over SAS surface  
[599] 4th order invariant moment over SAS surface  
[600] 4th order moment shape index over SAS surface  
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[602] 6th order moment shape index over SAS surface  
[603] Minimum MEP at SAS surface  
[604] Maximum MEP at SAS surface  
[605] Local polarity of molecule by SAS surface  
[606] Total variance of the surface potential\*1000 at SAS surface  
[607] Un-weighted 1st MS-WHIM Variance over SAS surface  
[608] Un-weighted 2nd MS-WHIM Variance over SAS surface  
[609] Un-weighted 3rd MS-WHIM Variance over SAS surface  
[610] Un-weighted MS-WHIM eigenvalue proportion over SAS surface  
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[615] Un-weighted 3rd MS-WHIM skewness over SAS surface  
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[669] RNCS  
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[671] PSA for O atoms  
[672] PSA for H on N,O atoms  
[673] Polar Surface Area(PSA)  
[674] RSHM index  
[675] RSAM index  
[676] Sum of absolute charge for N,O  
[677] HDCA index  
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[1557] R-GETAWAY R+7 by E-State indices  
[1558] R-GETAWAY R+8 by E-State indices  
[1559] GETAWAY RT+ by E-State indices

表 S2 筛选出的 37 个分子描述符  
**Table S2 Selected Molecular descriptors**

SN	Descriptions	Type
1	0th Electronic-topological	Charge descriptors
2	Hydrophobic alogp	Physical chemistry properties descriptors
3	Sum of H Estate of atom type HCsats	Topological descriptors
4	ALOGP weighted Moreau-Broto lagged 2	
5	ALOGP weighted Moreau-Broto lagged 8	
6	Atomic mass weighted moran lagged 4	
7	ALOGP weighted moran lagged 4	
8	E-State weighted moran lagged 1	
9	Polarizability mass weighted moran lagged 3	
10	ALOGP weighted Geary 4	
11	Atomic charge weighted Geary10	
12	E-State weighted Geary 1	
13	Polarizability mass weighted Geary 3	
14	1st MS-WHIM skewness over VDW surface	Geometrical molecular descriptors
15	PPSA3	
16	DPSA1	
17	FNSA1	
18	Un-weighted RDF g( 6.0000)	
19	Un-weighted RDF g( 8.5000)	
20	Un-weighted RDF g( 11.0000)	
21	ALOGP weighted RDF g( 5.5000)	
22	ALOGP weighted RDF g( 6.5000)	
23	Polarizability weighted RDF g( 3.5000)	
24	Polarizability weighted RDF g( 5.5000)	
25	Global WHIM D by Atomic mass	
26	3rd directional WHIM density by VDW radius	
27	3D-MoRSE-Signal I( 6.0) by Un-	
28	3D-MoRSE-Signal I(14.0) by Un-	
29	3D-MoRSE-Signal I(29.0) by Un-	
30	3D-MoRSE-Signal I(18.0) by Atomic mass	
31	3D-MoRSE-Signal I(30.0) by Atomic mass	
32	H-GETAWAY H1 by Atomic mass	
33	H-GETAWAY H5 by Atomic mass	
34	R-GETAWAY R7 by Un-weighted	
35	R-GETAWAY R+2 by E-State	
36	R-GETAWAY R+6 by E-State	
37	R-GETAWAY R+8 by E-State	

表S3 SVM模型y-scrambling验证结果<sup>a</sup>

Table S3 the results of y-scrambling test on SVM model

No. permutation	Step <sup>b</sup> (Number of Descriptors)	Prediction for positive	Prediction for negati	Average of Q (%)
		Average of SE(%)	Average of SP (%)	
1	564	70.5	26.0	53.2
	295	77.1	23.5	56.3
	53	78.7	46.0	66.0
2	564	70.5	32.0	55.5
	295	72.4	33.5	57.3
	42	75.9	48.0	65.1
3	564	75.6	24.0	55.5
	295	75.6	23.0	55.2
	50	77.5	46.0	65.3
4	564	74.9	30.0	57.5
	295	72.4	28.5	55.3
	55	74.9	47.0	64.1
5	564	71.4	24.0	53.0
	295	73.3	28.5	55.9
	54	74.0	43.5	62.1
6	564	74.6	27.5	56.3
	295	75.9	27.5	57.1
	54	76.2	50.0	66.0
7	564	68.9	34.0	55.3
	295	69.2	35.5	56.1
	39	76.8	53.0	67.6
8	564	73.0	26.0	54.8
	295	76.5	22.0	55.3
	53	78.1	47.0	66.0
9	564	74.3	27.5	56.1
	295	73.7	30.5	56.9
	55	79.4	47.0	66.8
10	564	74.3	25.5	55.3
	295	77.8	22.0	56.1
	57	79.4	41.0	64.5
11	564	73.7	30.0	56.7
	295	73.3	30.5	56.7
	38	77.5	47.5	65.8
12	564	71.1	22.0	52.0
	295	73.0	20.0	52.4
	34	73.7	51.0	64.9
13	564	72.1	23.0	53.0
	295	74.9	24.0	55.2
	56	74.0	46.5	63.3
14	564	72.1	25.5	54.0
	295	73.3	24.0	54.2

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	49	72.7	48.0	63.1
15	564	75.9	22.5	55.2
	295	79.7	23.0	57.7
	58	75.9	49.5	65.6
16	564	68.6	22.5	50.7
	295	70.5	21.0	51.3
	43	76.5	46.0	64.7
17	564	74.9	30.5	57.7
	295	74.9	31.5	58.1
	47	75.9	52.0	66.6
18	564	77.1	30.0	58.8
	295	75.6	32.5	58.8
	58	82.5	48.0	69.1
19	564	75.2	30.0	57.7
	295	76.2	28.0	57.5
	39	77.8	50.0	67.0
20	564	72.7	16.0	50.7
	295	74.9	16.0	52.0
	51	75.2	43.0	62.7
21	564	72.1	31.5	56.3
	295	71.4	36.0	57.7
	56	75.6	47.0	64.5
22	564	74.0	32.5	57.9
	295	75.9	29.0	57.7
	58	79.0	46.5	66.4
23	564	74.0	32.0	57.7
	295	75.2	29.5	57.5
	57	79.4	43.0	65.3
24	564	71.4	31.0	55.8
	295	70.2	32.0	55.4
	49	76.8	48.0	65.6
25	564	70.8	25.5	53.2
	295	74.3	25.5	55.3
	58	75.6	48.0	64.9
26	564	72.4	25.5	54.2
	295	73.7	28.0	55.9
	51	75.6	42.0	62.5
27	564	72.7	37.0	58.8
	295	72.7	34.5	57.9
	59	77.8	48.5	66.4
28	564	75.2	32.0	58.5
	295	75.6	33.5	59.2
	44	77.5	51.5	67.4
29	564	72.1	26.0	54.2
	295	78.1	21.5	56.1
	49	75.9	45.0	63.9

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30	564	73.3	31.5	57.1
	295	73.3	32.0	57.3
	58	80.3	43.5	66.0

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a) average prediction accuracies obtained from 5-fold cross validation, b) steps(preprocessing; ranking and backward selection; Monte Carlo simulated annealing)