

Molecular modeling and analysis of cannabinoid and cannabinoid-like molecules combining K-means clustering with Pearson correlation and PCA

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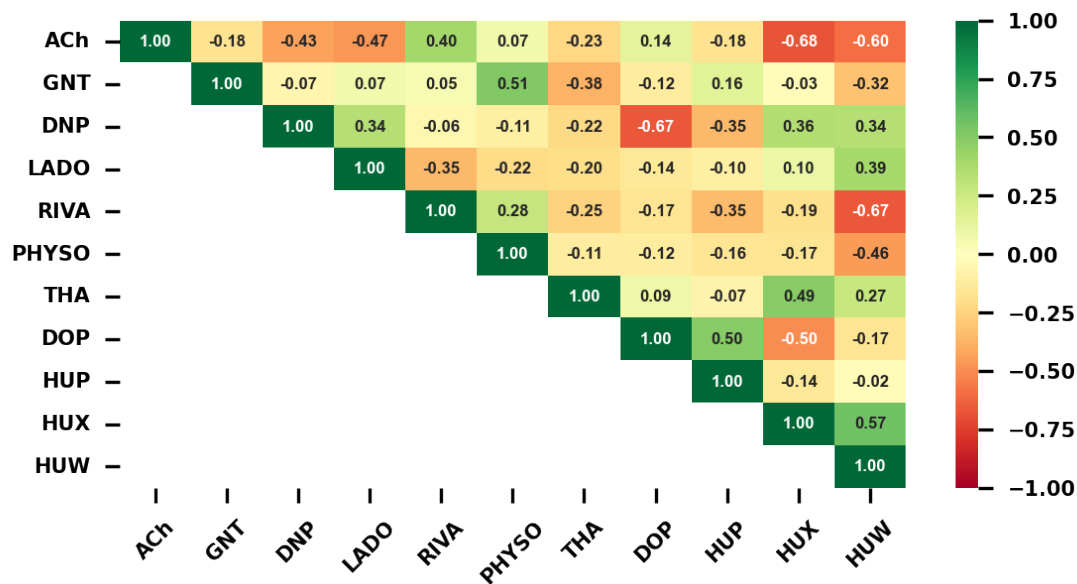


Figure S1: Validation of Similarity Matrix using classical AChE inhibitors (AChEIs) with ADMET + EE data.

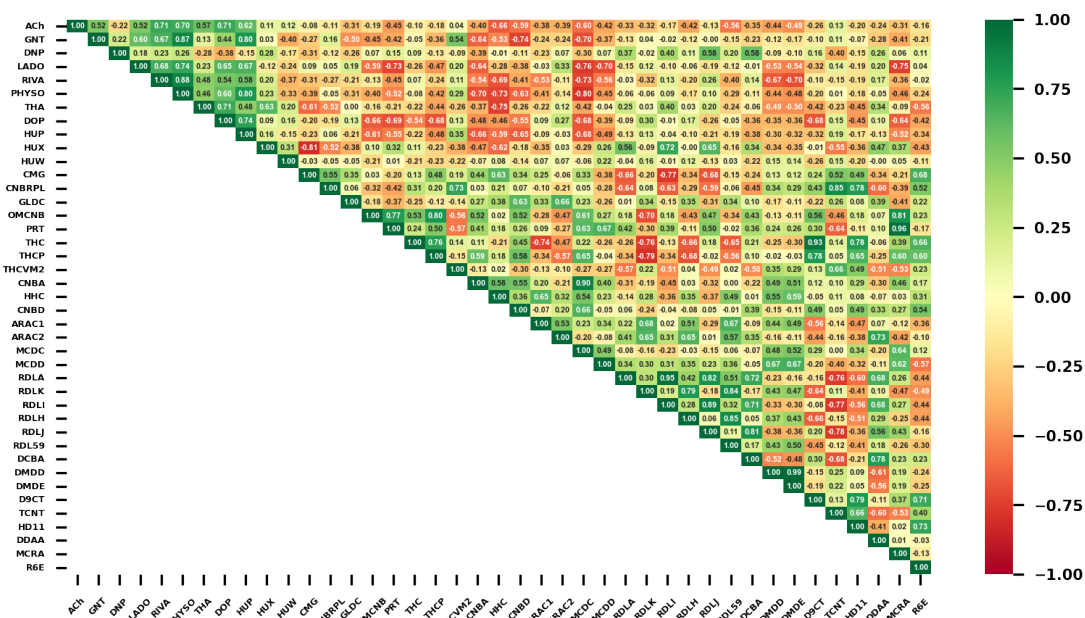


Figure S2: Analysis of Similarity between molecules studied with classical AChE inhibitors (AChEIs) using the ADMET data of cannabinoids. The known AChEIs were also included.

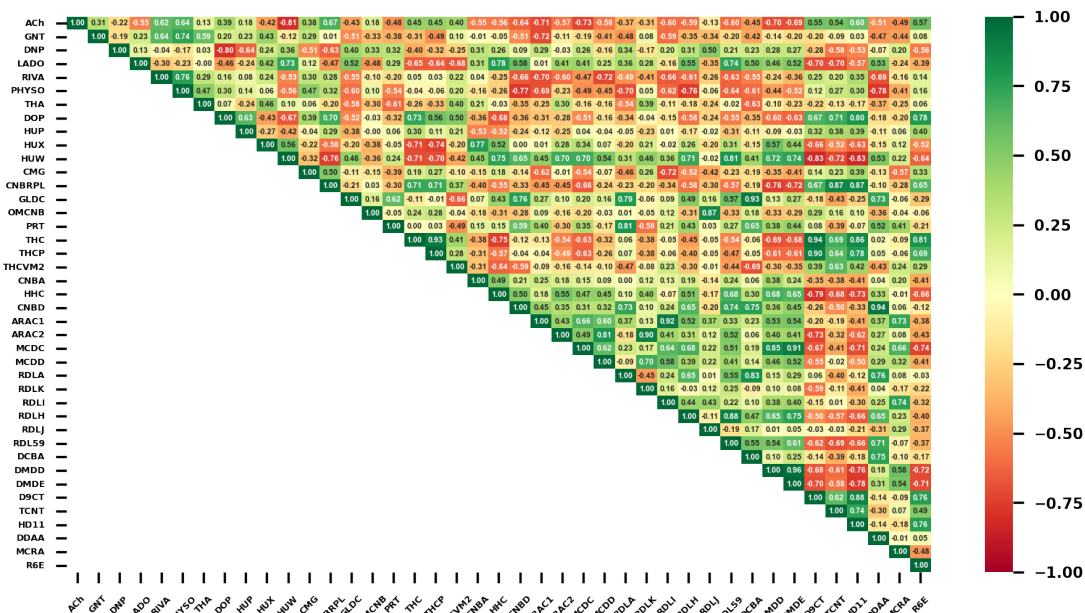


Figure S3: Analysis of Similarity between molecules studied with classicals AChE inhibitors (AChEIs) using the electronic structure data of cannabinoids. The known AChEIs were also included.

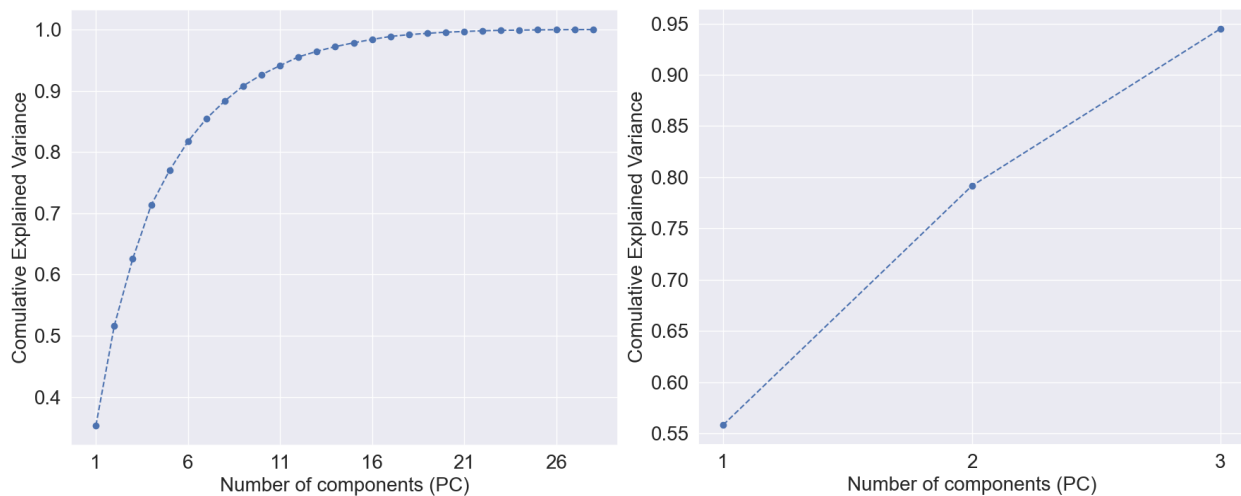


Figure S4: Explained variance based on ADMET and ES data for principal components before (left) and after (right) dimensionality reduction. In the PCA approach, the value of k was assumed to be equal to the number of principal components (PCs) that collectively contributed to almost all of the data variance.

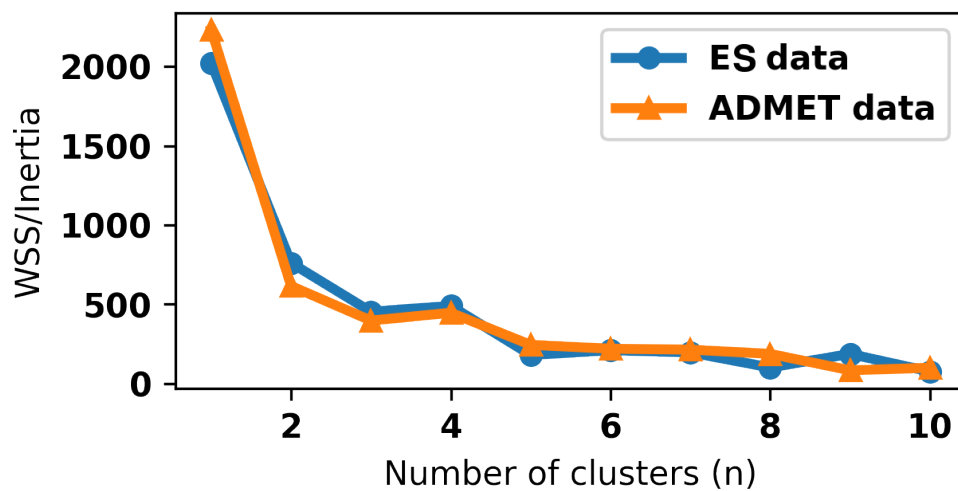


Figure S5: WSS values depending on the number of clusters for the ADMET and ES data. The value of k obtained by the elbow method was $k = 5$ for ADMET and ES data, with the maximum value of the WSS being greater (> 2000) for the ADMET data than for the ES data.

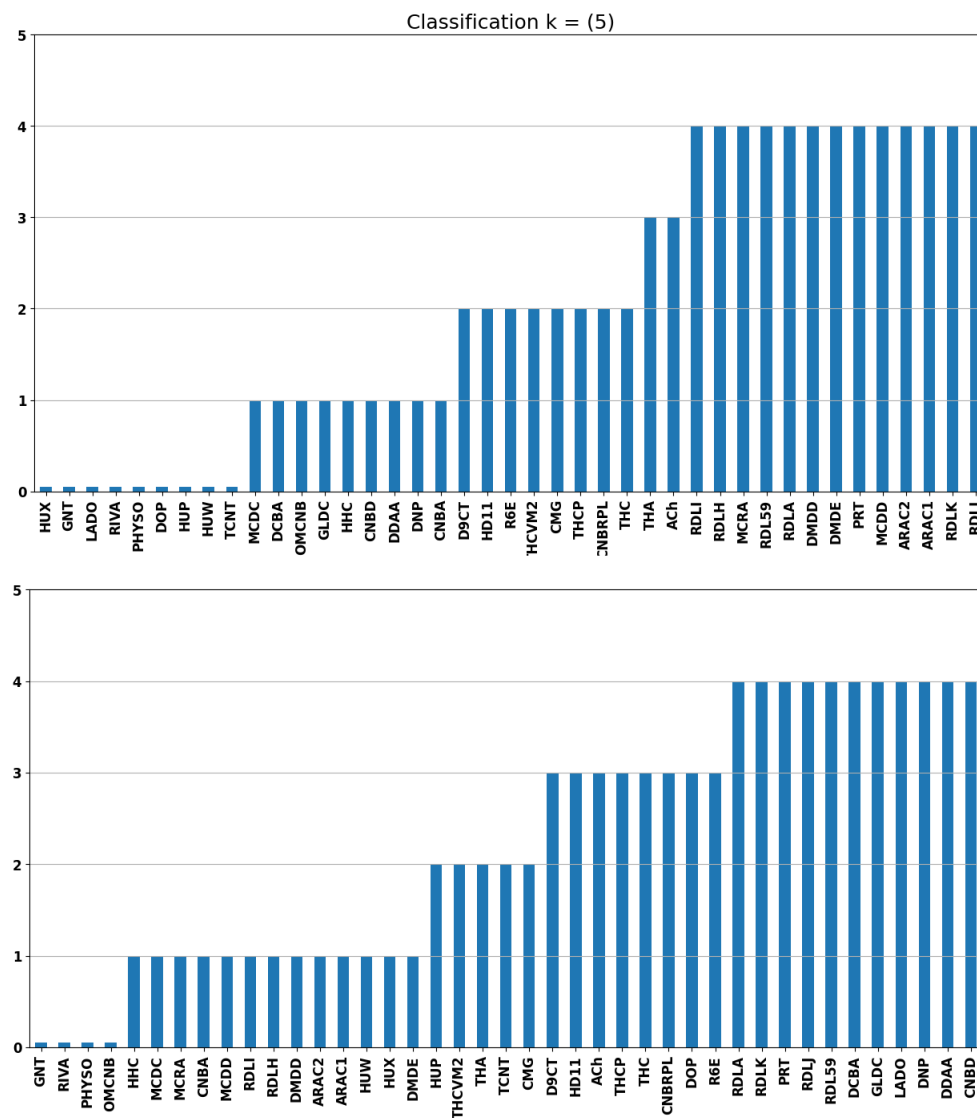


Figure S6: K-means with ADMET data (top) and ES data (bottom). The results of applying the K-means algorithm, which uses a correlation matrix, $\mathbf{M}_{\text{corr}}$, as the data space, to the ADMET and ES data separately, with k equal to 5.

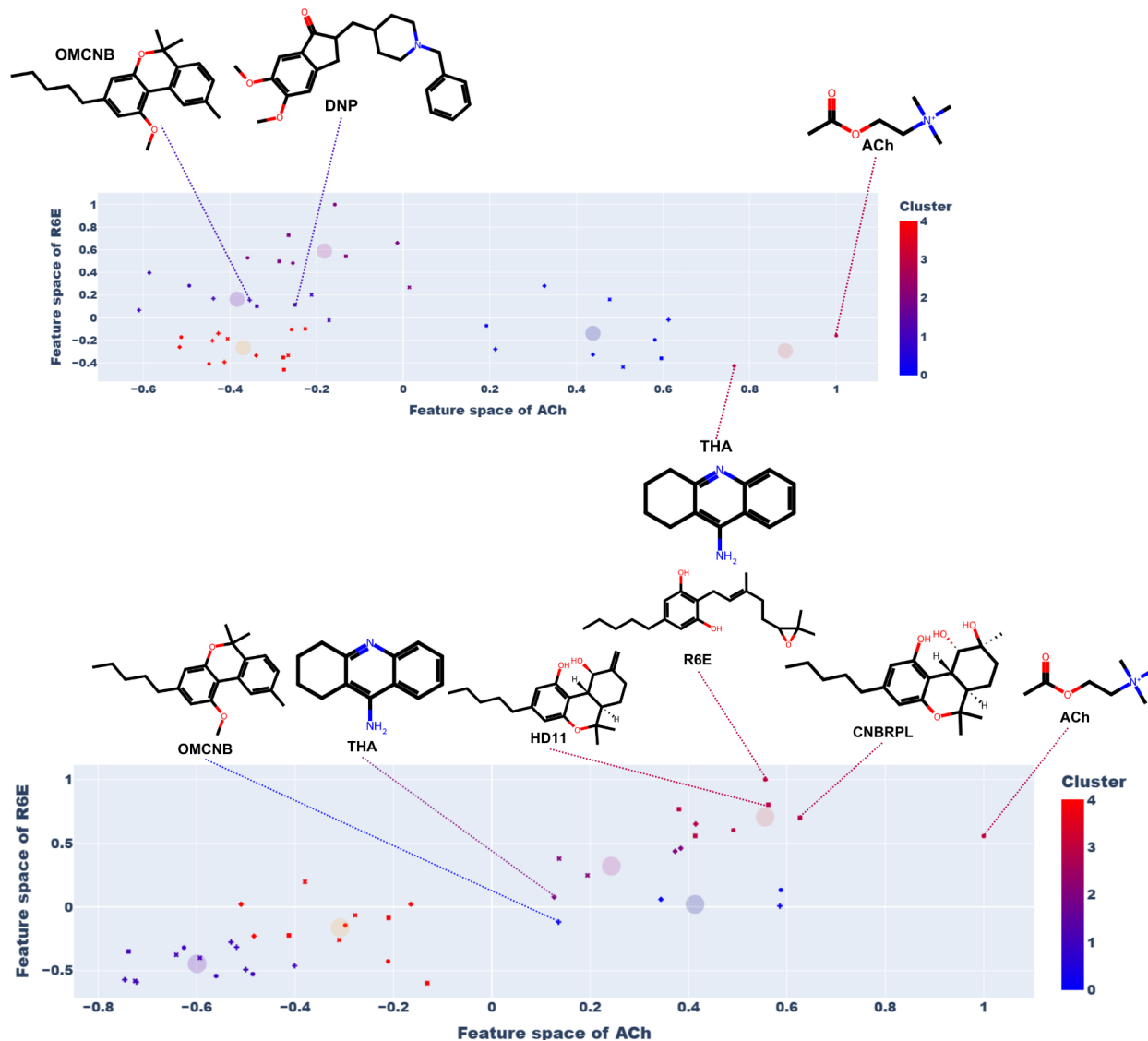


Figure S7: Comparative analysis between the ADMET and ES data. K-means with ADMET data (top) and ES data (bottom) with $k=5$, considering ACh and classical AChEIs. ACh is a separated group.

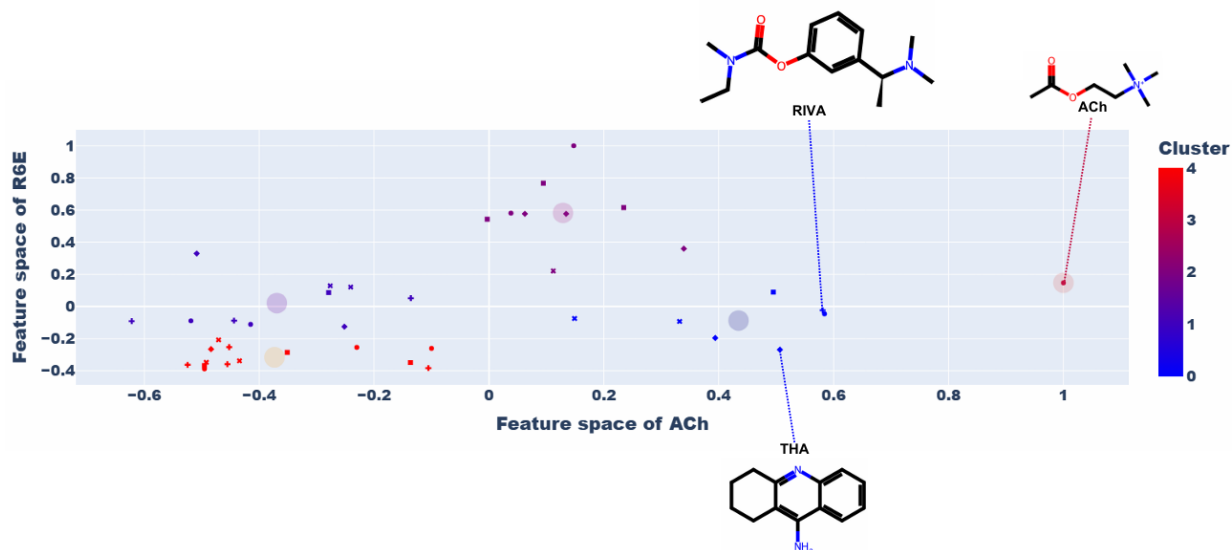


Figure S8: Rearrangement of clusters using both ADMET and EE data with k=5. ACh is in a separated group.

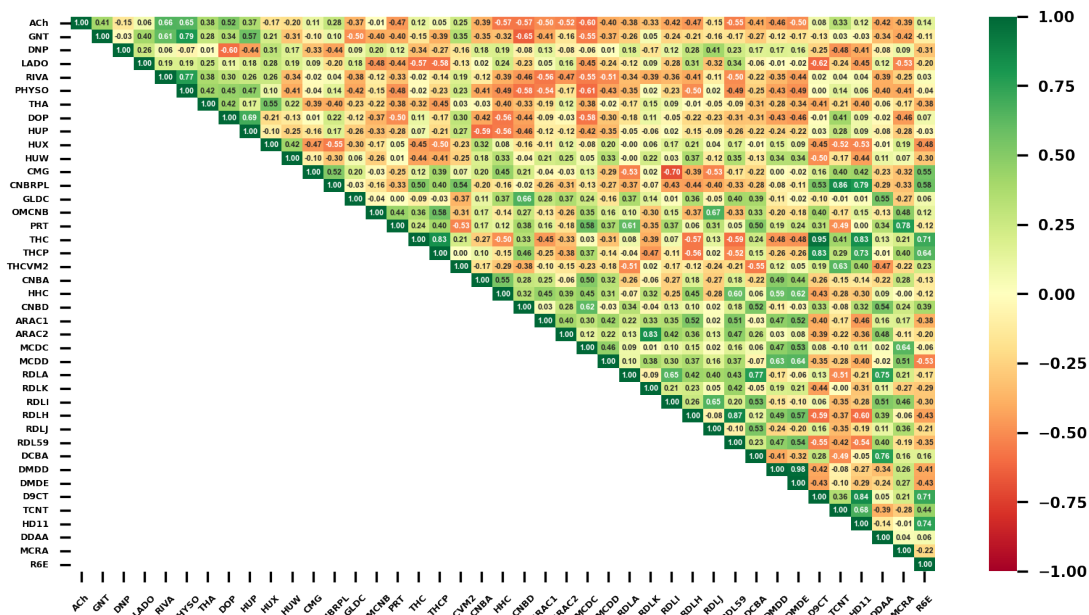


Figure S9: Analysis of Similarity between molecules studied with classical AChE inhibitors (AChEIs) using at the same time ADMET+EE data.

	PC1	PC2	PC3	PC4	PC5
HOMO-4 (eV)	0.28	-0.02	0.00	-0.07	0.10
HOMO-3 (eV)	0.28	-0.02	0.03	-0.08	0.10
HOMO-2 (eV)	0.26	0.10	-0.01	-0.23	0.14
HOMO-1 (eV)	0.23	0.18	0.01	-0.26	0.07
HOMO (eV)	0.20	0.12	-0.00	-0.24	0.18
LUMO (eV)	-0.09	0.34	-0.05	-0.04	0.15
LUMO+1 (eV)	-0.14	0.35	0.05	-0.02	-0.07
LUMO+2 (eV)	-0.14	0.35	0.04	-0.09	0.02
LUMO+3 (eV)	-0.17	0.36	-0.01	-0.02	-0.01
LUMO+4 (eV)	-0.19	0.32	0.03	-0.07	0.04
H1 (a.u.)	0.16	0.10	0.26	-0.23	-0.03
CHARGE HETEROA	0.08	-0.08	-0.31	0.36	0.10
H1-H2 (A)	0.10	-0.02	0.29	0.04	0.09
Molecular size (A)	0.25	0.18	-0.06	0.16	-0.05
VOLUME (cm^3)	0.00	-0.01	0.11	0.36	0.35
MW	0.26	0.09	0.03	0.28	-0.06
Num Aromatic Rings	0.22	-0.17	-0.12	-0.03	-0.16
Fraction Csp3	-0.15	0.25	-0.02	0.29	-0.10
Rotatable bonds	0.04	0.18	-0.01	0.23	0.09
H-bond acceptors	0.11	0.08	0.39	0.25	0.05
H-bond donors	0.14	0.04	0.43	-0.06	-0.16
MR	0.27	0.10	-0.06	0.25	-0.02
TPSA	0.12	0.00	0.47	0.10	-0.15
Consensus Log P	0.24	0.16	-0.24	-0.02	0.02
ESOL Log S	-0.27	-0.12	0.19	-0.05	0.01
BBB permeant	0.07	0.12	0.03	0.28	-0.36
Drugscore	-0.05	0.05	0.08	0.09	0.67
Druglikeness	-0.06	-0.28	0.16	0.06	0.26
Score(kcal/mol)	-0.26	-0.11	0.13	0.04	-0.09

Figure S10: PCA loadings calculated for all descriptors (ADMET and EE).

Table S1: Virtual Screening using Autodock Vina (Part 1)

Molecule	SMILES	CID/C_id	Score/Vina (kcal/mol)
gama-Eudesmyl-D9-trans-Tetrahydrocannabinolate	<chem>CCCCCc1cc2OC(C)(C)[C@H]3[C@H](c2c(c1C(=O)OC([C@@H]1CC[C@@H]2(C(=C(C)C)CCC2)C1C)(C)C)O)C=C(CC3)C</chem>	24862526	-9.9
alfa-Terpinyol-D9-trans-Tetrahydrocannabinolate	<chem>CCCCCc1cc2OC(C)(C)[C@H]3[C@H](c2c(c1C(=O)OC([C@@H]1CCC(=CC1)C)(C)C)O)C=C(CC3)C</chem>	-	-7.9
alfa-Cadinyl-D9-trans-Tetrahydrocannabinolate	<chem>CCCCCc1cc2OC(C)(C)[C@H]3[C@H](c2c(c1C(=O)OC([C@@H]1CCC(=CC1)C)(C)C)O)C=C(CC3)C</chem>	-	-9.1
VCE-004-8	<chem>CCCCC1=C(NCc2ccccc2)C(=O)C(=C(C1=O)O)[C@H]1C=C(C)CC[C@H]1C(=C)C</chem>	-	-8.3
VCE-003	<chem>CCCCC1=C(C/C=C/C(C)C)C(=O)C(=C(C1=O)O)</chem>	44139743	-8.9
Trans-Cannabitriol	<chem>CCCCCc1cc(O)c2c(c1)OC(C1=C2[C@H](O)[C@@H](O)CC1)(C)C</chem>	155804790	-10
Trans-arachidin-2	<chem>CC(=CCc1c(O)cc(cc1O)CCc1cccc(cc1O)C</chem>	92012758	-11.2
Trans-arachidin-1	<chem>CC/C=C/C1c(O)cc(cc1O)/C=C/C1ccc(c(c1)O)O)C</chem>	11220670	-13
THC-O-Acetate	<chem>CCCCCc1cc(OC(=O)C)c2c(c1)OC([C@H]1[C@H]2C=C(C)CC1)(C)C</chem>	198013	-9.9
Tetrahydrocannabiphorol	<chem>CCCCCc1cc(O)c2c(c1)OC([C@H]1[C@H]2C=C(C)CC1)(C)C</chem>	6453074	-11.6
Tetrahydrocannabinol-epoxide	<chem>CCCCCc1cc(O)c2c(c1)OC([C@H]1[C@H]2[C@@H]2O[C@H]2(C)C1)(C)C</chem>	-	-10.6
TetrahydrocannabivarinaM3	<chem>C[C@H](C1c1cc(O)c2c(c1)OC([C@H]1[C@H]2C=C(C)CC1)C(=O)O)(C)C</chem>	-	-10.5
Tetrahydrocannabivarine-M2	<chem>CCCCCc1cc(O)c2c(c1)OC([C@H]1[C@H]2C=C(C)CC1)C(=O)O)(C)C</chem>	101123021	-11.2
TetrahydrocannabivarinaM1	<chem>CCCCCc1cc(O)c2c(c1)OC([C@H]1[C@H]2C=C(C)CC1)(C)C</chem>	137518224	-11.2
Tetrahydrocannabivarina	<chem>CCCCCc1cc(O)c2c(c1)OC([C@H]1[C@H]2C=C(C)CC1)(C)C</chem>	93147	-10.6
Sesquicannabigerol	<chem>CCCCCc1cc(O)c(c(c1O)C)/C=C/C/C=C/C(C)C(C)C</chem>	54669855	-8.3
Rhododaurichroman-ic-acid-A	<chem>CC(=CCCCc1cc2O[C@@H]3(C)CC[C@H]4[C@H]3[C@H](c2c(c1C(=O)O)O)C4(C)C</chem>	-	-9.7
Radulanin L	<chem>CC1=CCc2c(OC1)cc(c(c2O)/C=C/C1cccc1O</chem>	-	-12.1
Radulanin K	<chem>OC(=O)c1c/C=C/c2ccccc2cc2c1C([C@H]1C[C@H]1(CO2)C</chem>	C00015861	-12.1
Radulanin J	<chem>COc1cc/C=C/c2ccccc2cc2c1C([C@H]1C[C@H]1(CO2)C</chem>	14804135	-12.3
Radulanin I	<chem>Oc1cc/C=C/c2ccccc2cc2c1C([C@H]1C[C@H]1(CO2)C</chem>	14804134	-12.3
Radulanin H	<chem>CC1=CCc2c(OC1)cc(c(c2O)C(=O)O)/C=C/C1cccc1</chem>	C00015858	-11.1
Radulanin A	<chem>CC1=CCC2=C(C=C(C2OC1)CCC3=CC=CC=C3)O</chem>	9970905	-12.9
Radulanin 59	<chem>CC1=CCc2c(OC1)c(C(=O)O)c(c2O)/C=C/C1cccc1</chem>	-	-13.3
rac-6-epoxycannabigerol-acid	<chem>CCCCCc1cc(O)c(c(c1C(=O)O)O)C([C@H]1O[C@H]1(C)CCC=C(C)C</chem>	-	-9
rac-6-epoxycannabigerol	<chem>CCCCCc1cc(O)c(c(c1O)O)C([C@H]1O[C@H]1(C)CCC=C(C)C</chem>	168310608	-11.3
Perrottetinen-acid	<chem>CC1=C[C@H]2[C@@H](CC1)C(C)OC1c2c(O)c(c(c1)/C=C/C1cccc1)C(=O)O</chem>	-	-12.8
Perrottetinen	<chem>CC1=C[C@H]2[C@@H](CC1)C(C)OC1c2c(O)cc(c1)/C=C/C1cccc1</chem>	24766094	-12.4
Oxo-Cannabitriol	<chem>CCCCCc1cc(O)c2c(c1)OC(C1=C2C(=O)[C@H](CC1)C)O)(C)C</chem>	-	-9.9
O-Propyl-D9-trans-tetrahydrocannabinol	<chem>CCCOc1cc(CCCC)cc2c1C([C@H]1C=C(C)CC[C@H]1C(O2)(C)C</chem>	-	-8.6
O-propylcannabidiol	<chem>CCCOc1cc(CCCC)cc(c1[C@H]1C=C(C)CC[C@H]1C(=C)C)O</chem>	-	-9.7
O-propylcannabiniol	<chem>CCCOc1cc(CCCC)cc2c1c1cc(C)cc1C(O2)(C)C</chem>	-	-10.4
O-Pentyl-D9-trans-tetrahydrocannabinol	<chem>CCCCCOc1cc(CCCC)cc2c1C([C@H]1C=C(C)CC[C@H]1C(O2)(C)C</chem>	164990027	-8.2
O-pentylcannabidiol	<chem>CCCCCOc1cc(CCCC)cc(c1[C@H]1C=C(C)CC[C@H]1C(=C)C)O</chem>	-	-9.2
O-Pentylcannabiniol	<chem>CCCCCOc1cc(CCCC)cc2c1c1cc(C)cc1C(O2)(C)C</chem>	-	-9.6
O-methylcannabiniol	<chem>CCCCCc1cc(OC)c2c(c1)OC(c1c2cc(C)cc1)(C)C</chem>	628150	-10.1
nor-Cannabivarina	<chem>CCc1cc(O)c2c(c1)OC(c1c2cc(C)cc1)(C)C</chem>	59444399	-10.1
nor-Cannabitriol	<chem>CCc1cc(O)c2c(c1)OC(C1=C2[C@H](O)[C@@H](O)CC1)(C)C</chem>	59444417	-10.9
nor-Cannabiniol	<chem>CCCCCc1cc(O)c2c(c1)OC(c1c2cc(C)cc1)(C)C</chem>	59444392	-11.5
N-arauquidonoilglicierol	<chem>CCCCC/C=C/C/C=C/C/C=C/C/C=C/C(CCC(=O)NCC(=O)O</chem>	5283389	-7.5
methylen-bis-D9-trans-tetrahydrocannabinol	<chem>CCCCCc1cc2OC(C)(C)[C@H]3[C@H](c2c(c1C1c(CCCC)cc2c(c1O)[C@@H]1C=C(C)CC[C@H]1C(O2)(C)C)O)C=C(CC3)C</chem>	102487751	-7.6
Machaeridiol D	<chem>O[C@H]1C[C@H]2[C@H](C[C@H]1C)c1c(O)cc(cc1OC2(C)C)c1cc2c(o1)cccc2</chem>	10861764	-11.2
Machaeridiol C	<chem>CC1CCC(C(C1)C2=C(C=C(C2O)C3=CC4=CC=CC=C4O3)O)C(=C)C</chem>	10882982	-12.6
Machaeriol B	<chem>C[C@H]1CC[C@H]2[C@H](C1)c1c(O)cc(cc1OC2(C)C)c1cc2c(o1)cccc2</chem>	10384052	-11.8
Machaeriol A	<chem>C[C@H]1CC[C@H]2[C@H](C1)c1c(O)cc(cc1OC2(C)C)/C=C/C1cccc1</chem>	162870568	-11.3
Machaeriol C	<chem>C[C@H]1CC[C@H](C[C@H]1(C1)c1c(O)cc(cc1O)c1cc2c(o1)cccc2)C(=C)C</chem>	-	-10.9
Machaeriol B	<chem>C[C@H]1CC[C@H](C[C@H]1(C1)c1c(O)cc(cc1O)/C=C/C1cccc1O)C(=C)C</chem>	-	-11.8
Machaeridiol A	<chem>C[C@H]1CC[C@H](C[C@H]1(C1)c1c(O)cc(cc1O)/C=C/C1cccc1)C(=C)C</chem>	-	-9.6
Linderatin	<chem>CC1=C[C@H]([C@@H](CC1)C(=C)C)c1c(O)cc(c(c1O)C(=O)Cc1cccc1)O</chem>	-	-8.6
Isotetrahydrocannabivarina	<chem>CCCCCc1cc(O)c2c(c1)O[C]1(=CC2=C(C=C1)C(=C)C)C</chem>	-	-10.8
Isotetrahydrocannabinol	<chem>CCCCCc1cc(O)c2c(c1)O[C]1(=CC2=C(C=C1)C(=C)C)C</chem>	-	-12.1
Iso-Cannabitriol	<chem>CCCCCc1cc(O)c2c(c1)OC(C1=C2[C@H](O)[C@@H](O)CC1)(C)C</chem>	-	-10.8
hydroxy-D9-11-hexahydrocannabinol	<chem>CCCCCc1cc(O)c2c(c1)OC([C@H]1[C@H]2[C@@H](O)C(=C)CC1)(C)C</chem>	122180086	-10.9
Hydroxy-helicannabigerol	<chem>C/C(=C\Cc1c(O)cc(c(c1O)C(=O)O)CCc1cccc(c1O)/CCC=C(C)C</chem>	-	-11.8
HU-313	<chem>CCCCC1=CC(=O)C(=C(C1=O)O)[C@H]1C=C(C)CC[C@H]1C(=C)C</chem>	98454947	-10
Hexahydrocannabinol	<chem>CCCCCc1cc(O)c2c(c1)OC([C@H]1[C@H]2[C@H](O)CC1)(C)C</chem>	11067065	-11.8
Heli-cannabigerol	<chem>C/C(=C\Cc1c(O)cc(cc1O)CCc1cccc1)/CCC=C(C)C</chem>	14060723	-12
Glepidotin-C-51	<chem>OC(=O)c1c/C=C/c2ccccc2cc(c(c1O)CCC(O)(C)C)O</chem>	-	-12.7
Glepidotin-C	<chem>O[C@H](C(=C)C)Cc1c(O)cc(cc1O)CCc1cccc1</chem>	442703	-11.5
gama-Eudesmyl-cannabigerolate	<chem>CCCCCc1cc(O)c(c(c1C(=O)O)C([C@@H]1CC[C@H]2(C(=C(C)C)CCC2)C1)(C)C)O)C/C=C/C/C=C(C)C)C</chem>	-	-9.9

Table S1: Virtual Screening using Autodock Vina (Part 2)

Molecule	SMILES	CID/C_id	Score/Vina (kcal/mol)
gamma-Cadinyl-cannabigerolate	<chem>CCCCCc1cc(O)c(c1C(=O)O[C@@H]1(C)CC[C@@H]([C@@H]2[C@@H]1CCC(=C2)C)C(C)C)O)/C=C/C/CCC=C(C)C)\C</chem>	-	-8.2
Ferruginene-C	<chem>CC(=C)[C@H](CCC(=C)[C@H]1CCC(=C[C@H]1c1c(O)cc(cc1O)C)C)O</chem>	101796996	-9.7
Ferruginen-B	<chem>Cc1cc(O)c2c(c1)O[C@H]1[C@H]2[C@H](CC[C@@H]1(C)O)C(=C)C/C=C/C(O)(C)C</chem>	-	-8.6
Ferruginen-A	<chem>Cc1cc(O)c2c(c1)O[C@H]1[C@H]2[C@H](CC[C@@H]1(C)O)C(=C)CC[C@H](C(=C)C)O</chem>	-	-9.6
Ethyl-Cannabitriol	<chem>CCCCCc1cc(O)c2c(c1)OC(C1=C2[C@H](OCC)[C@H](CC1)(C)O)(C)C</chem>	59444384	-8.9
Dronabinol	<chem>CCCCCc1cc(O)c2c(c1)OC([C@H]1[C@H]2C=C(C)CC1)(C)C</chem>	16078	-11.6
Desmodianone-A	<chem>CC1=C[C@H]2[C@H]([C@H]1C(C)C)OC1c2c(O)cc(c1)[C@H]1COc2c(C1=O)c(O)c(c2)O)C</chem>	-	-9.5
Desmodianone-E	<chem>CC1=CC2C(CC1)C(C)OC1c2cc(c(c1)O)C1COc2c(C1=O)c(O)c(c2)O)C</chem>	10993817	-11.9
Desmodianone-D	<chem>Oc1cc(cc2c1[C@H]1[C@H]3[C@H]([C@H]2)C)CC[C@H]3C1(C)C[C@H]1COc2c(C1=O)c(O)c(c2)O)C</chem>	11102162	-11.7
Desmodianone-C	<chem>C/C(=C)Cc1c(O)cc(cc1O)[C@H]1COc2c(C1=O)c(O)c(c2)O)C/CCC=C(C)C</chem>	-	-9.4
Deprenyl-O-methyl-cannabigerolic-acid	<chem>CCCCCc1cc(OC)c(c1C(=O)O)O)CC=C(C)C</chem>	23874497	-9.8
Demethyl-decarbo-Amorfrutin-A	<chem>CC(=CCc1c(O)cc(cc1O)CCc1cccc1)C</chem>	442715	-11.1
DemethylAmorfrutin-A	<chem>CC(=CCc1c(O)cc(cc1O)C(=O)O)CCc1cccc1)C</chem>	9945203	-11.6
Delta-9-tetrahydrocannabivarinic-acid	<chem>CCc1cc2OC(C)(C)[C@H]3[C@H](C2c1C(=O)O)C=C(C)C3)C</chem>	59444416	-9.5
Delta-9-tetrahydrocannabiorcol	<chem>CC1=C[C@H]2[C@H]([C@H]1C(C)C)OC1c2c(O)cc(c1)C</chem>	22805649	-9.7
delta-9-tetrahydrocannabinol-C4	<chem>CCCCc1cc(O)c2c(c1)OC([C@H]1[C@H]2C=C(C)CC1)(C)C</chem>	6453891	-11.2
Delta-9-cis-tetrahydrocannabinol	<chem>CCCCCc1cc(O)c2c(c1)OC([C@H]1[C@H]2C=C(C)CC1)(C)C</chem>	12831993	-11.9
delta-8-Tetrahydrocannabinol-acid	<chem>CCCCCc1cc2OC(C)(C)[C@H]3[C@H]([C@H]2c1C(=O)O)O)CC(=CC3)C</chem>	-	-9.6
delta-8-Tetrahydrocannabinol	<chem>CCCCCc1cc(O)c2c(c1)OC([C@H]1[C@H]2CC(=CC1)C)(C)C</chem>	86308458	-10.9
delta1-Tetrahydrocannabiorcol	<chem>CC1=C[C@H]2[C@H]([C@H]1C(C)C)OC1c2c(O)cc(c1)C</chem>	22805649	-9.5
dehydrocannabifuran	<chem>CCCCCCC1=CC2OC3C(C2=C(C1)O)C(CCC3)C(=C)C</chem>	-	-11.8
Decarboxyamorfrutin-B	<chem>COc1cc(CCC2CCCC2)c(c1C/C=C/C/CCC=C(C)C)\C)O)C(=O)O</chem>	24739090	-9.5
DecarboxyAmorfrutin-A	<chem>COc1cc(CCC2CCCC2)cc(c1CC=C(C)C)O</chem>	14805915	-12.6
Daurichromenic-acid	<chem>C/C(=C)C[C@H]1(C)C=Cc2c(O1)cc(c(c2O)C(=O)O)C/CCC=C(C)C</chem>	11696381	-11.5
D9-trans-Tetrahydrocannabiorcolic acid	<chem>CC1=C[C@H]2[C@H]([C@H]1C(C)C)OC1c2c(O)c(c(c1)C)C(=O)O</chem>	59444386	-10.3
D9-trans-Tetrahydrocannabinolic-acid-B	<chem>CCCCCc1cc(O)c2c(c1C(=O)O)OC([C@H]1[C@H]2C=C(C)CC1)(C)C</chem>	46889976	-11.1
D9-trans-Tetrahydrocannabinolic-acid-A	<chem>CCCCCc1cc2OC(C)(C)[C@H]3[C@H]([C@H]2c1C(=O)O)O)C=C(C)C3)C</chem>	98523	-10.2
D9-trans-nor-Tetrahydrocannabinolic acid	<chem>CCCCc1cc2OC(C)(C)[C@H]3[C@H]([C@H]2c1C(=O)O)O)C=C(C)C3)C</chem>	59444388	-10
D9-Tetrahydrocannabinolic-acid	<chem>CCCCCc1cc2OC(C)(C)[C@H]3[C@H]([C@H]2c1C(=O)O)O)C=C(C)C3)C</chem>	98523	-10.4
Confluentin	<chem>CC(=CCC[C@H]1(C)C=Cc2c(O1)C(C)c(c2)O)C(=O)O)C</chem>	-	-10.7
Citrylidenecannabis	<chem>CCCCCc1cc2O[C@H]3(C)CC[C@H]4[C@H]([C@H]2c1C)OC4(C)C)C3</chem>	101820920	-9.5
Chricanine-B	<chem>Oc1cc(/C=C/C/c2cccc2)cc2c1C[C@H]([C@H]1O)C(O2)(C)C</chem>	163193809	-12
Chlorcannabiorcichromenic-acid	<chem>CC(=CCC[C@H]1(C)C=Cc2c(O1)c(C)c(c2O)C(=O)O)C)C</chem>	-	-10.8
Chiricanin-A	<chem>CC(=CCc1c(O)cc(cc1O)CCc1cccc1)C</chem>	442715	-11.6
THC	<chem>CCCCCCC1=CC(=C2C3C=C(CCC3C(OC2=C1)(C)C)C)O</chem>	2978	-11.4
CBDA-THC-ester	<chem>CCCCCc1cc(O)c2c(c1)OC(C1=C2[C@H](O)[C@@H](CC1)(C)OOC(=O)c1c(CCCC)cc(c1O)[C@H]1C=C(C)CC[C@H]1C(=C)C)O</chem>	-	-9.6
Carmagerol	<chem>CCCCCc1cc(O)c(c1O)C/C=C/C[CC[C@H](C(O)(C)C)O)/C</chem>	44586785	-12
Cannflavin-A	<chem>COc1cc(ccc1O)c1cc(=O)c2c(c1)cc(c(c2O)CC/C=C/C/CCC=C(C)C)\C)O</chem>	-	-10.8
Cannabivarin	<chem>CCc1cc(O)c2c(c1)OC(c1c2cc(C)cc1)(C)C</chem>	622545	-9.9
Cannabitriol	<chem>CCCCCc1cc(O)c2c(c1)OC(C1=C2[C@H](O)[C@@H](CC1)(C)O)(C)C</chem>	156460	-9.6
Cannabistilbene-I	<chem>COc1cc(CCC2ccc(c2)CC=C(C)C)O)cc(c1)O</chem>	146349	-7.9
Cannabispiran	<chem>COc1cc(O)c2c(c1)CCCC12CCC(=O)CC1</chem>	162936	-9.5
Cannabispiradienone	<chem>COc1cc(O)c2c(c1)CC[C@H]12C=CC(=O)C=C1</chem>	90475437	-10
Cannabisin-G	<chem>COc1cc(ccc1O)/C=C\C(=C/c1ccc(c1O)C)O)\C(=O)NCCc1ccc(cc1O)/C(=O)NCCc1ccc(cc1)O</chem>	10438919	-11.4
Cannabisin-A	<chem>Oc1ccc(cc1)CCNC(=O)c1cc2cc(O)c(cc2c1C(=O)NCCc1ccc(cc1)O)c1ccc(c(c1)O)O)O</chem>	15086398	-12.6
Cannabiscitrin	<chem>OC[C@H]1O[C@H]([C@H]1O)C2C(Cc(c2O)O)C2OC3C=C(C)CC(=C3C(=O)C2)O)[C@H]([C@H]1O)O)O</chem>	-	-11.3
Cannabisativine	<chem>CCCC[C@H]([C@H]([C@H]1C=CC[C@H]2N1CCCNCCCCNC(=O)C2)O)O</chem>	442846	-10.1
Cannabiripsol	<chem>CCCCCc1cc(O)c2c(c1)OC([C@H]1[C@H]2[C@H](O)[C@@H](CC1)(C)O)(C)C</chem>	192007	-12.5
Cannabioxepane	<chem>CCCCCCC1=CC2OC3C4C2=C(C1)OCC(=C)C4CCC3C</chem>	-	-11.1
Cannabiorcol	<chem>Cc1ccc2c(c1)c1c(O)cc(cc1OC2(C)C)C</chem>	59444404	-10.7
Cannabiorcicitran	<chem>Cc1cc2O[C]3(=CC4=C(C)OC(c1c24)(C)C)C=C3)C</chem>	-	-10
Cannabiorcichromenic-acid	<chem>CC(=CCC[C@H]1(C)C=Cc2c(O1)cc(c(c2O)C(=O)O)C)C</chem>	101737129	-10.4
Cannabiorcichromene	<chem>CC(=CCC[C@H]1(C)C=Cc2c(O1)cc(cc2O)C)C</chem>	162881404	-9.9
Cannabinolic-acid	<chem>CCCCCc1cc2OC(C)(C)[C@H]3[C@H]([C@H]2c1C(=O)O)O)CC(cc3)C</chem>	3081990	-10.6
cannabinol-C4	<chem>CCCCc1cc(O)c2c(c1)OC(c1c2cc(C)cc1)(C)C</chem>	59444392	-10.3
cannabinol-C2	<chem>CCc1cc(O)c2c(c1)OC(c1c2cc(C)cc1)(C)C</chem>	59444399	-10.2
O-methyl-Cannabinol	<chem>CCCCCc1cc(OC)c2c(c1)OC(c1c2cc(C)cc1)(C)C</chem>	628150	-12.5
Cannabinodivarin	<chem>CCCc1cc(O)c(c1O)c1cc(C)ccc1C(=C)C</chem>	59444390	-10.3

Table S1: Virtual Screening using Autodock Vina (Part 3)

Molecule	SMILES	CID/C_id	Score/Vina (kcal/mol)
Cannabinodiol	<chem>CCCCCc1cc(O)c(c1O)c1cc(C)ccc1C(=C)C</chem>	11551346	-11.2
Cannabinerolic-acid	<chem>CCCCCc1cc(O)c(c1C(=O)O)O/C=C/C(\CCC=C(C)C)/C</chem>	9998639	-9.7
Cannabimovone	<chem>CCCCCc1cc(O)c(c1O)[C@H]1[C@@H](C[C@H]1[C@@H]1O)C(=O)C(=C)C</chem>	46217279	-11
Cannabiglendol	<chem>CCc1cc(O)c2c(c1O)[C@@]1[C]C@H]2[C@H](CC1)C(O)(C)C</chem>	-	-9.5
Cannabigerovarinic-acid	<chem>CCc1cc(O)c(c1C(=O)O)O/C=C/C(\CCC=C(C)C)\C</chem>	59444383	-9.7
Cannabigerovarin	<chem>CCc1cc(O)c(c1O)O/C=C/C(\CCC=C(C)C)\C</chem>	59444407	-10.2
Cannabigerquinone	<chem>CCCCCc1=CC(=O)C(=CC1=O)C/C=C/C(\CCC=C(C)C)\C</chem>	-	-10.3
Cannabigerolic-acid-monomethyl-ether	<chem>CCCCCc1cc(O)c(c1C(=O)O)O/C=C/C(\CCC=C(C)C)\C</chem>	24739091	-9.3
Cannabigerolic-acid	<chem>CCCCCc1cc(O)c(c1C(=O)O)O/C=C/C(\CCC=C(C)C)\C</chem>	6449999	-9.5
Cannabigerol-monomethyl-ether	<chem>CCCCCc1cc(O)c(c1O)C/C=C/C(\CCC=C(C)C)\C</chem>	13864080	-7.9
Cannabigerol	<chem>CCCCCc1cc(O)c(c1O)O/C=C/C(\CCC=C(C)C)\C</chem>	5315659	-9.9
Cannabifuran	<chem>CCCCCc1CC(O)C2C(C1)OC1C2=C(C=C[C@H]1C)C(C)C</chem>	-	-9.9
Cannabielsoin	<chem>CCCCCc1cc(O)c2c(c1O)[C@H]1[C@@H]2[C@@H](CC[C@]1(C)O)C(=C)C</chem>	162113	-8.7
Cannabielsoic-acid-B	<chem>CCCCCc1cc(O)c2c(c1C(=O)O)O[C@H]1[C@@H]2[C@H](CC[C@]1(C)O)C(=C)C</chem>	-	-9.1
cannabielsoic-acid-A	<chem>CCCCCc1cc2O[C@H]3[C@@H](c2c(c1C(=O)O)O)[C@@H](CC[C@]3(C)O)C(=C)C</chem>	59444405	-9.6
Cannabidivarinic-Acid	<chem>CCc1cc(O)c(c1C(=O)O)O[C@H]1C=C(C)CC[C@H]1C(=C)C</chem>	59444387	-10.3
Cannabidivarina	<chem>CCc1cc(O)c(c1O)O[C@H]1C=C(C)CC[C@H]1C(=C)C</chem>	11601669	-9.8
Cannabidiol	<chem>CC1=C[C@H](C)[C@H](CC1)C(=C)C1c1c(O)cc(c1O)C</chem>	124350795	-9.4
cannabidiolate	<chem>CCCCCc1cc(O)c(c1C(=O)O)O[C@H]1C=C(C)CC[C@H]1C(=C)C</chem>	160570	-11.7
Cannabidiol-3-monomethyl-ether	<chem>CCCCCc1cc(O)c(c1O)C[C@H]1C=C(C)CC[C@H]1C(=C)C</chem>	164905	-9.3
Cannabidiol	<chem>CCCCCc1cc(O)c(c1O)O[C@H]1C=C(C)CC[C@H]1C(=C)C</chem>	644019	-11.2
Cannabidibutol	<chem>CCCCc1cc(O)c(c1O)O[C@H]1C=C(C)CC[C@H]1C(=C)C</chem>	59444413	-10.5
Cannabicyclovarin	<chem>CCc1cc2O[C@]3(C)CC[C@H]4[C@@H]3[C@@H](c2c(c1O)C4(C)C</chem>	59444397	-9.3
Cannabicycloic-Acid	<chem>CCCCCc1cc2O[C@]3(C)CC[C@H]4[C@@H]3[C@@H](c2c(c1C(=O)O)O)C4(C)C</chem>	59444422	-10.8
Cannabicyclol	<chem>CCCCCc1cc(O)c2c(c1O)[C@H]1[C@@H]2[C@@H]3[C@@H](C2C1)(C)C(C</chem>	59444380	-11.2
Cannabicyclohexanol	<chem>CCCCCCCC(c1ccc(c1O)[C@H]1CC[C@H](C1)O)(C)C</chem>	12788231	-10.1
Cannabicooumaronic-acid	<chem>CCCCCc1cc2oc3c2c(c1C(=O)O)OC(C@H]3CCC(=O)C)(C)C</chem>	-	-12
Cannabicooumaronone-1	<chem>CCCCCc1cc2OC(C)(C)[C@H](c3c2c(c1)oc3)CCC(=O)C</chem>	-	-9.5
Cannabicooumaronone	<chem>CCCCCc1=CC2=C3C(C1)OCC3[C@@H](C2)(C)CCC(=O)C</chem>	-	-10.2
Cannabicitran	<chem>CCCCCc1cc2O[C@]3(C)CC[C@H]4[C@@H]3[C@@H](c2c(c1)OC4(C)C3</chem>	21668222	-10.6
Cannabicyclolic-acid	<chem>OC(=O)c1c(C)cc2c(c1O)[C@H]1[C@@H]3[C@@H](O2)(C)CC[C@H]3C1(C)C</chem>	101542703	-10.8
Cannabicyclol	<chem>Cc1cc2O[C@]3(C)CC[C@H]4[C@@H]3[C@@H](c2c(c1O)C4(C)C</chem>	21668227	-9.9
Cannabichromevarinic-Acid	<chem>CCc1cc2O[C@]3(C)CCC=C(C)OCC=Cc2c(c1C(=O)O)O</chem>	156367564	-9.9
Cannabichromevarina	<chem>CCc1cc2O[C@]3(C)CCC=C(C)OCC=Cc2c(c1O)O</chem>	139496813	-8.6
Cannabichromenate	<chem>CCCCCc1cc2O[C@]3(C)CCC=C(C)OCC=Cc2c(c1C(=O)O)O</chem>	92448135	-9
Cannabichromanone-D	<chem>CCCCCc1cc2OC(=CCC[C@H]3C(=O)c2c(c1)OC3(C)O)C</chem>	163078176	-10
Cannabichromanone	<chem>CCCCCc1cc(O)c2c(c1O)OC([C@H](C2=O)CCC(=O)C)(C)C</chem>	162929173	-10.1
cannabichromanon	<chem>CCCCCc1cc(O)c2c(c1O)OC([C@H](C2=O)CCC(=O)C)(C)C</chem>	25105340	-9.4
Canabinol-M3	<chem>C[C@H](CCc1cc(O)c2c(c1O)OC(c1c2cc(c1)C(=O)O)(C)O</chem>	-	-12.8
CanabinolM2	<chem>CCCCCc1cc(O)c2c(c1O)OC(c1c2cc(c1)C(=O)O)(C)C</chem>	629782	-13.6
CanabinolM1	<chem>CCCCCc1cc(O)c2c(c1O)OC(c1c2cc(CO)cc1)(C)C</chem>	3082311	-12.3
Canabinol	<chem>CCCCCc1cc(O)c2c(c1O)OC(c1c2cc(C)cc1)(C)C</chem>	2543	-11.8
CanabichromenoM1	<chem>C[C@H](CCc1cc2O[C@]3(C)CCC=C(C)OCC=Cc2c(c1O)O</chem>	-	-10.2
Canabichromeno	<chem>CCCCCc1cc2O[C@]3(C)CCC=C(C)OCC=Cc2c(c1O)O</chem>	21668219	-9.9
Bornyl-D9-trans-Tetrahydrocannabinolate	<chem>CCCCCc1cc2OC(C)(C)[C@H]3[C@H](c2c(c1C(=O)O)C@H]1C[C@@H]2(C)[C@@]1(C)CC2)(C)O)C=C(CC3)C</chem>	24862528	-9.3
Bisnor-Cannabichromanone	<chem>CCc1cc(O)c2c(c1O)OC([C@H](C2=O)CCC(=O)C)(C)C</chem>	-	-10.1
Bisnor-cannabielsoin	<chem>CCc1cc(O)c2c(c1O)[C@H]1[C@@H]2[C@@H](CC[C@]1(C)O)C(=C)C</chem>	-	-11.1
Cannabielsoin	<chem>CCc1cc(O)c2c(c1C(=O)O)O[C@H]1[C@@H]2[C@H](CC[C@]1(C)O)C(=C)C</chem>	-	-8.7
B-Fenchyl-D9-trans-Tetrahydrocannabinolate	<chem>CCCCCc1cc2OC(C)(C)[C@H]3[C@H](c2c(c1C(=O)O)C@H]1[C@@H]2(C)CC[C@H](C1(C)C)C2)O)C=C(CC3)C</chem>	-	-8.4
Armofrutin-C	<chem>C/C(=C/Cc1c(O)cc(c1O)C(=O)O)CCc1ccccc1)/CCC=C(C)C</chem>	25135579	-12.1
Armofrutin-B	<chem>COc1cc(CCc2ccccc2)c(c1C/C=C/C(\CCC=C(C)C)\C)O)C(=O)O</chem>	24739090	-12.1
Armofrutin-4	<chem>C/C(=C/Cc1c(O)cc(c1O)C(=O)O)CCc1ccccc1)/CCC=C(C)C</chem>	25135579	-10.9
Armofrutin-3	<chem>COc1cc(CCc2ccccc2)c(c1C[C@]3(C)CC[C@H](C3)O)C(=O)O</chem>	38354854	-10.8
Araphyn-4	<chem>O[C@H](C)(O)C(C)Cc1c(O)cc(c1O)/C=C/c1ccccc1</chem>	-	-11.6
Araphyn-3	<chem>Oc1ccc(cc1)/C=C/Cc1cc(O)c(c1O)O[C@H](C(O)(C)O</chem>	-	-11.3
Araphyn-1	<chem>CC/C=C/Cc1c(O)cc(c1O)/C=C/c1ccccc1C</chem>	25187674	-11.9
Arachidin-MeBu	<chem>CC[C@H](C(=O)O)c1cc(C/C=C/c2ccccc2)c(c1C/C=C/C(C)O)C(=O)O)C</chem>	-	-12.9
Arachidin-ival	<chem>CC/C=C/Cc1c(OC(=O)CC(C)C)cc(c1O)C(=O)O)/C=C/c1ccccc1C</chem>	-	-10.4
Arachidin-Bu	<chem>CC/C=C/Cc1c(OC(=O)CC(C)C)cc(c1O)C(=O)O)/C=C/c1ccccc1C</chem>	-	-10.3
Arachidin-ang	<chem>C/C=C(C(=O)O)c1cc(C/C=C/c2ccccc2)c(c1C/C=C/C(C)O)C(=O)O)/C</chem>	-	-10.5
Arachidin-57b	<chem>Oc1ccc(cc1)/C=C/Cc1cc(O)c2c(c1O)[C@]3(C)OCC=C2</chem>	-	-12.1
Arachidin-57ab	<chem>Oc1ccc(cc1)/C=C/Cc1cc2O[C@]3(C)OCC=Cc2c(c1C(=O)O)O</chem>	-	-11.5
Arachidin-57a	<chem>OC(=O)c1c/C=C/Cc2ccccc2cc2c(c1O)C=CC[C@](O2)(C)O</chem>	-	-11.5
Arachidin-56b	<chem>CC(=CCC[C@]1(C)CCc2c(O)1cc(cc2O))/C=C/c1ccccc1C</chem>	-	-13.2

Table S1: Virtual Screening using Autodock Vina (Part 4)

Molecule	SMILES	CID/C_id	Score/Vina (kcal/mol)
Arachidin-56	<chem>Oc1cc/C=C/c2ccccc2cc2c1CCC(O2)(C)C</chem>	101193354	-11.6
Arachidin-3	<chem>CC/C=C/c1c(O)cc(cc1O)/C=C/c1ccc(cc1)O)C</chem>	11380920	-12.3
Anthopogocyclic-acid	<chem>OC(=O)c1c(O)cc2c(c1C)[C@H]1[C@H]3[C@H](O2)(C)CC[C@H]3C1(C)C</chem>	54753488	-10.1
anhydroCannabimovone	<chem>CCCCc1cc2O[C@H]3[C@H](c2c(c1)O)[C@H](C[C@H]3C(=O)C)C(=C)C</chem>	-	-10.5
Anadamide	<chem>CCCCC/C=C/C=C/C=C/C=C/C=C/C(CCC(=O)N)CCO</chem>	5281969	-8.4
Amorfrutin-A	<chem>COc1cc(CCc2ccccc2)c(c1CC=C(C)C)O)C(=O)O</chem>	17950432	-11.1
Cannabidiolic_acid-M3	<chem>C[C@H](CCCC1cc(O)c(c1C(=O)O)O)[C@H]1C=C(CCC[C@H]1C(=C)C)C(=O)O)O</chem>	-	-9.8
Cannabidiolic-acid-M2	<chem>CCCCCc1cc(O)c(c1C(=O)O)O)[C@H]1C=C(CCC[C@H]1C(=C)C)C(=O)O</chem>	137518579	-9.8
Canabidiolic-acid-M1	<chem>CCCCCc1cc(O)c(c1C(=O)O)O)[C@H]1C=C(CO)CC[C@H]1C(=C)C</chem>	137518582	-9.1
Canabidiolic-acid	<chem>CCCCCc1cc(O)c(c1C(=O)O)O)[C@H]1C=C(C)CC[C@H]1C(=C)C</chem>	160570	-11.7
Canabichromenic-acid-M1	<chem>C[C@H](CCCC1cc2O[C@H](C)(CCC=C(C)C)C=Cc2c(c1C(=O)O)O)O</chem>	-	-9.7
Canabichromenic-acid	<chem>CCCCCc1cc2O[C@H](C)(CCC=C(C)C)C=Cc2c(c1C(=O)O)O</chem>	92448135	-8.9
Acetylcannabigerquinol	<chem>CCCCC1=CC(=O)C(=C(C1=O)OC(=O)C)/C=C/C(=C(C)C)C</chem>	25172436	-7.8
Acetyl-Abnormal-hydrocannabigerquinol	<chem>CCCCC1=C(C)/C=C/C(=C(C)C)C(=O)C[C@H](C=C(C)[C@H]1O[C@H](O)C)O)O</chem>	-	-8.3
Abnormal-cannabigerquinol	<chem>CCCCC1=C(C)/C=C/C(=C(C)C)C(=O)C=C(C1=O)O</chem>	44139743	-9.1
Abnormal-cannabigerol	<chem>CCCCC1=C(C)/C=C/C(=C(C)C)C(=O)C[C@H](C=C(C1)O)O</chem>	-	-8.3
	84 <chem>CCCCNc1cc(C)c2c(c1)OC=C1[C@H]2CC(=CC1)C</chem>	-	-10.6
	83 <chem>CC(=CCc1c(CCc2ccccc2)c(c1O)O)O)C</chem>	86056178	-12
	82 <chem>COc1cc(CCc2ccc(cc2)O)ccc1CC=C(C)C</chem>	86056215	-13.2
	79 <chem>C/C(=C)CCc1c(O)cc(c1O)C(=O)C1ccccc1)O)/CCC=C(C)C</chem>	-	-10.9
72d	<chem>CC(=C)C(=O)CCC[C@H]1(C)CCc2c(O1)cc(c(c2/C=C/c1ccccc1)C(=O)O)O</chem>	-	-10.5
72c	<chem>CC(=C)[C@H](CCC[C@H]1(C)CCc2c(O1)cc(c(c2/C=C/c1ccccc1)C(=O)O)O)O</chem>	-	-12.6
72b	<chem>OC(=O)c1c(O)cc2c(c1/C=C/c1ccccc1)CC[C@H](O2)(C)CC/C=C(C(O)(C)C</chem>	-	-9.4
72a	<chem>CC(=CCC[C@H]1(C)CCc2c(O1)cc(c(c2/C=C/c1ccccc1)C(=O)O)O)C</chem>	-	-9.2
71b	<chem>OC(=O)c1c(O)cc2c(c1/C=C/c1ccccc1)[C@H]1[C@H]3[C@H](O2)(C)CC[C@H]3C1(C)C</chem>	-	-10.9
71a	<chem>Oc1cc/C=C/c2ccccc2c2c(c1O)[C@H]1([C@H]3[C@H]2C([C@H]3CC1)(C)C)C</chem>	-	-11.2
70c	<chem>CC(=CCC[C@H]1(C)C=Cc2c(O1)cc(c(c2/C=C/c1ccccc1)C(=O)O)O)C</chem>	-	-9.5
70b	<chem>CC(=CCC[C@H]1(C)C=Cc2c(O1)cc(cc2/C=C/c1ccccc1)O)C</chem>	-	-8.8
70a	<chem>Oc1cc/C=C/c2ccccc2c2c(c1O)C(C=C2)(C)C</chem>	-	-10.9
69c	<chem>CC(=CCC[C@H]1(C)C=Cc2c(O1)cc(cc2O)/C=C/c1ccccc1)C</chem>	-	-13.1
69b	<chem>OC(=O)c1c/C=C/c2ccccc2cc2c(c1O)C=CC(O2)(C)C</chem>	-	-12.5
69a	<chem>Oc1cc/C=C/c2ccccc2cc2c1C=CC(O2)(C)C</chem>	101472763	-12.2
	68 <chem>CC(=C)[C@H]1Oc2c(C1)c/C=C/c1ccccc1cc(c2)O</chem>	-	-11.5
	67 <chem>Oc1cc/C=C/c2ccccc2c2c(c1)O)cc2</chem>	71453429	-10.9
	66 <chem>Oc1cc/C=C/c2ccccc2c2c(c1O)C([C@H]2O)(C)C</chem>	-	-11.3
65d	<chem>COc1cc(O)cc(c1CC=C(C)C)/C=C/c1ccc(c1)O)C)O</chem>	66575864	-13.8
65c	<chem>COc1cc(O)cc(c1CC=C(C)C)/C=C/c1ccc(c1)O)O</chem>	71468710	-13.3
65b	<chem>COc1cc/C=C/c2cc(O)cc(c2CC=C(C)C)O)ccc1O</chem>	57387613	-13.5
65a	<chem>CC(=CCc1c/C=C/c2ccc(c2)O)O)cc(cc1O)O)C</chem>	57387612	-13
	64 <chem>Oc1cc/C=C/c2ccccc2c(c1O)C[C@H](C(=C)C)O</chem>	-	-11
63h	<chem>CC(=CCc1c/C=C/c2ccc(cc2)O)cc(cc1O)O)C</chem>	129844396	-11
63g	<chem>COC(=O)c1c(O)cc(c1/C=C/c1ccccc1)C/C=C(C(=C(C)C)/C)O</chem>	-	-10.5
63f	<chem>COc1cc(O)cc(c1C/C=C/C(=C(C)C)/C)/C=C/c1ccccc1</chem>	-	-9.8
63e	<chem>C/C(=C/Cc1c(O)cc(cc1/C=C/c1ccccc1)O)/CCC=C(C)C</chem>	-	-10.8
63d	<chem>COC(=O)c1c(O)cc(c1C/C=C/c1ccccc1)CC=C(C)C)O</chem>	-	-11.4
63c	<chem>COc1cc/C=C/c2ccccc2c(c1O)CC=C(C)C</chem>	18546453	-10.2
63b	<chem>COc1cc(O)cc(c1CC=C(C)C)/C=C/c1ccccc1</chem>	6446720	-11.6
63a	<chem>CC(=CCc1c/C=C/c2ccccc2cc(cc1O)O)C</chem>	101193350	-12.1
12-acetoxy-delta-8-Tetrahydrocannabinolic-acid	<chem>CCCCCc1cc2OC(C)(C)[C@H]3[C@H](c2c(c1C(=O)O)O)[C@H](OC(=O)C)C(=CC3)C</chem>	-	-11.9
11-hydroxy-9-oxo-delta-8-Tetrahydrocannabinol	<chem>CCCCCc1cc(O)c2c(c1)OC([C@H]1[C@H]2(O)C(=O)C(=CC1)C)C</chem>	-	-11.2
11-acetoxy-delta-8-Tetrahydrocannabinolic-acid	<chem>CCCCCc1cc2OC(C)(C)[C@H]3[C@H](c2c(c1C(=O)O)O)CC(=C(C3)OC(=O)C)C</chem>	-	-9.2
10-Oxo-delta-6a-tetrahydrocannabinol	<chem>CCCCCc1cc(O)c2c(c1)OC(C1=C2C(=O)[C@H](C)CC1)(C)C</chem>	162394589	-10.7
10-hydroxy-delta-8-Tetrahydrocannabinolic-acid	<chem>CCCCCc1cc(O)c2c(c1)OC([C@H]1[C@H]2CC(=C(C1)O)C)C</chem>	-	-9.6
8-Oxo-D9-trans-tetrahydrocannabinol	<chem>CCCCCc1cc(O)c2c(c1)OC([C@H]1[C@H]2C(=C(C)C(=O)C1)C)C</chem>	101152951	-10.6
8-hydroxyisocannabichromene	<chem>CCCCCc1cc2O[C@H](C)CC[C@H]1(C)C(=C)O)C=Cc2c(c1)O</chem>	-	-10.3
8-Hydroxy-delta(9)-tetrahydrocannabinol	<chem>CCCCCc1cc(O)c2c(c1)OC([C@H]1[C@H]2C(=C(C)C)[C@H](C1)O)(C)C</chem>	169652	-11.5
8-hydroxycannabinolic-acid-A	<chem>CCCCCc1cc2OC(C)(C)c3c(c2c(c1C(=O)O)O)CC(c3)O)C</chem>	44139742	-10.8
8-Hydroxycannabinol	<chem>CCCCCc1cc(O)c2c(c1)OC(c1c2cc(C)c(c1)O)(C)C</chem>	44241652	-9.9
8a-Hydroxy-D9-trans-tetrahydrocannabinol	<chem>CCCCCc1cc(O)c2c(c1)OC([C@H]1[C@H]2C(=C(C)C)[C@H](C1)O)(C)C</chem>	23620581	-10.5
7-hydroxycannabinol	<chem>CCCCCc1cc(O)c2c(c1)OC(c1c2cc(C)cc1O)(C)C</chem>	-	-12.4
6-Metiletrapterol-A	<chem>Cc1ccc2c(c1)c1c(O)cc(cc1OC2(C)C)[C@H]1COc2c(C1=O)c(O)c(c2)O)C</chem>	-	-13.9
6ar-Cannabichromanone-C	<chem>CCCCCc1cc(O)c2c(c1)OC([C@H]1(C2=O)CC(=O)C)C(=O)C)C</chem>	-	-12.8
6ar-Cannabichromanone-B	<chem>CCCCCc1cc(O)c2c(c1)OC([C@H]1(C2=O)[C@H](CC(=O)C)O)(C)C</chem>	-	-11.6

Table S1: Virtual Screening using Autodock Vina (Part 5)

Molecule	SMILES	CID/C_id	Score/Vina (kcal/mol)
6a-7-10a-trihydroxy-D9-tetrahydrocannabinol	<chem>CCCCC1cc(O)c2c(c1)OC([C@@]1([C@H]2O)C=C(C)C[C@H]1O)O)(C)C</chem>	-	-10.4
5-acetyl-4-hydroxycannabigerol	<chem>CCCCC1cc(O)c(c1O)OC(=O)C/C=C/C(=C(C)C)\C</chem>	44139615	-8.8
4-Terpinyl-D9-trans-Tetrahydrocannabinolate	<chem>CCCCC1cc2OC(C)(C)[C@H]3[C@H](c2c1c1(=O)O[C@@]1(CCC(=CC1)C)C(C)O)C=C(CC3)C</chem>	162889905	-9.8
Cannabiorcol	<chem>CCCCC1cc2OC(C)(C)c3c(c2c1c1(=O)O[C@@]1(CCC(=CC1)C)C(C)O)cc(cc3)C</chem>	162847257	-10.7
4-Acetoxyacannabichromene	<chem>CCCCC1cc(O)c2c(c1OC(=O)C)O[C@H](C=C2)(C)CCC=C(C)C</chem>	162952316	-9
2-hydroxy-1-2-dihydrocannabichromene	<chem>CCCCC1cc2O[C@H](C)(CCC=C(C)C)[C@H](Cc2c1)O)O</chem>	-	-10.7
2-Formyl-D9-trans-tetrahydrocannabinol	<chem>CCCCC1cc2OC(C)(C)[C@H]3[C@H](c2c1c1CO)C=C(CC3)C</chem>	172516719	-10.6
2-arauinoilglycerol	<chem>CCCCC/C=C\C/C=C\C/C=C\C/C=C\C/C=C\C/C(=O)OC(CO)CO</chem>	52822280	-8

Table S2: Classes and Subclasses of cannabinoids and cannabinoids-like molecules studied.

Molecules	Plant	Class	Subclass
CMG; R6E	<i>Cannabis sativa</i> [100,101]	Cannabinoid	CBG derivate
GLDC	<i>Glycyrrhiza lepidota</i> [102]	Stilbenoid	-
OMCNB; CNBA	<i>Cannabis sativa</i> [101]	Cannabinoid	CBN derivate
PRT	<i>Radula perrotteti</i> [103]; <i>Radula marginata</i> [59]	bibenzyl cannabinoid	Cannabinoid-like
THC; D9CT; THCP	<i>Cannabis sativa</i> [101]	Cannabinoid	THC derivate
THCVM2	<i>Cannabis sativa</i> [104]	Cannabinoid	THCV metabolite
HHC	<i>Helichrysum umbraculigerum</i> [105]	CBG derivate	Cannabinoid-like
CNBD	<i>Cannabis sativa</i> [105]	Cannabinoid	CNBD derivate
ARAC1; ARAC2	<i>Arachis hypogea</i> [106]	Monomeric stilbene	-
MCRA; MCDC; MCDD	<i>Machaerium Pers</i> [107]	CBD, THC analogues	Cannabinoid-like
RDLA; RDLK; RDLI; RDLH; RDLJ; RDL59	<i>Radula buccinifera</i> ; <i>Radula javanica</i> ; <i>Radula complanata</i> [108]	Prenyl bibenzyls	-
DCBA; DDAA	<i>Glycyrrhiza foetida</i> [109-111]	Stilbenoid	Cannabinoid-like
DMDD; DMDE	<i>Desmodium canum</i> [112]	Isoflavonones	Cannabinoid-like
CNBRPL; HD11	<i>Cannabis sativa</i> [101]	Cannabinoid	Miscellaneous
TCNT	<i>Cannabis sativa</i> [101]	Cannabinoid	CBT derivate

Table S3: Frontier molecular orbital energies. Values are in eV.

Molecule	HOMO-4	HOMO-3	HOMO-2	HOMO-1	HOMO	LUMO	LUMO+1	LUMO+2	LUMO+3	LUMO+4
ACh	-10.73	-10.10	-10.08	-8.85	-8.22	-0.47	0.91	0.36	0.67	0.77
GNT	-8.02	-7.83	-7.33	-6.85	-6.28	-0.95	-0.44	-0.13	0.00	0.27
DNP	-7.54	-7.33	-7.15	-6.98	-6.15	-1.74	-0.88	-0.59	-0.45	-0.39
LADO	-7.62	-7.51	-7.31	-6.99	-6.62	-1.24	-0.82	-0.57	-0.41	-0.31
RIVA	-9.48	-9.02	-8.29	-7.28	-7.09	-0.85	-0.70	0.02	0.32	0.40
PHYSO	-8.38	-8.16	-7.44	-7.16	-5.87	-0.72	-0.26	0.08	0.25	0.47
THA	-8.97	-8.93	-7.58	-7.30	-6.44	-2.06	-0.99	-0.32	-0.25	0.05
DOP	-9.21	-8.81	-6.68	-6.06	-5.84	-0.40	0.07	0.13	0.32	0.64
HUP	-7.62	-6.89	-6.57	-6.49	-6.10	-1.31	-0.06	0.11	0.20	0.36
HUX	-8.25	-7.73	-7.30	-6.79	-6.55	-2.30	-1.34	-0.62	-0.12	0.01
HUW	-7.69	-7.50	-7.31	-6.63	-6.54	-2.22	-1.19	-0.51	-0.42	-0.40
CMG	-7.74	-7.63	-6.64	-6.23	-6.11	-0.22	-0.01	0.06	0.20	0.35
CNBRPL	-7.94	-7.63	-7.45	-6.27	-6.00	-0.24	0.02	0.04	0.35	0.46
GLDC	-7.02	-7.00	-6.80	-6.28	-6.13	-0.54	-0.42	-0.19	-0.02	0.05
OMCNB	-7.69	-7.54	-6.73	-6.44	-5.91	-1.23	-0.40	-0.16	0.15	0.38
PRT	-7.01	-6.80	-6.35	-6.23	-6.00	-0.50	-0.42	-0.10	0.02	0.06
THC	-7.94	-7.91	-6.46	-5.95	-5.95	-0.19	0.06	0.10	0.37	0.41
THCP	-7.96	-7.87	-6.45	-6.18	-5.97	-0.21	0.04	0.10	0.36	0.42
THCVM2	-8.08	-8.03	-7.29	-6.32	-6.03	-1.54	-0.24	0.00	0.03	0.35
CNBA	-8.13	-7.75	-6.84	-6.38	-6.06	-1.34	-1.02	-0.54	0.02	0.12
HHC	-6.73	-6.44	-6.37	-6.28	-6.19	-1.12	-0.52	-0.31	-0.12	0.00
CNBD	-7.26	-7.09	-6.54	-6.35	-6.16	-0.82	-0.53	-0.15	0.02	0.04
ARAC1	-7.56	-6.76	-6.31	-6.23	-5.43	-1.75	-0.51	-0.17	-0.03	0.04
ARAC2	-7.22	-6.79	-6.47	-6.20	-5.52	-1.60	-0.56	-0.03	0.00	0.15
MCDC	-7.03	-6.77	-6.70	-6.22	-5.78	-1.55	-0.31	-0.10	-0.03	0.11
MCDD	-7.40	-6.98	-6.75	-6.15	-5.78	-1.54	-0.30	-0.13	0.08	0.16
RDLA	-7.02	-6.84	-6.61	-6.49	-6.24	-0.55	-0.42	-0.25	-0.07	0.03
RDLK	-7.79	-7.21	-6.75	-6.14	-5.54	-1.59	-0.56	-0.07	0.08	0.16
RDLI	-7.69	-7.11	-6.79	-6.24	-5.63	-1.72	-0.48	-0.15	-0.03	0.14
RDLH	-7.03	-6.92	-6.78	-6.63	-6.43	-1.72	-0.45	-0.39	-0.21	-0.02
RDLJ	-7.62	-7.11	-6.78	-6.23	-5.65	-1.75	-0.48	-0.09	0.03	0.19
RDL59	-7.01	-6.97	-6.75	-6.69	-6.59	-1.49	-0.70	-0.42	-0.34	-0.01
DCBA	-7.01	-6.81	-6.65	-6.21	-6.09	-0.52	-0.42	-0.17	0.06	0.14
DMDD	-7.16	-6.68	-6.37	-6.24	-6.09	-1.87	-0.48	-0.15	-0.08	0.04
DMDE	-6.68	-6.46	-6.42	-6.25	-6.07	-1.86	-0.39	-0.14	-0.06	-0.01
D9CT	-7.98	-7.85	-6.44	-6.21	-5.97	-0.17	0.03	0.09	0.31	0.47
TCNT	-7.92	-7.76	-7.43	-6.16	-5.78	-0.95	-0.04	0.04	0.35	0.43
HD11	-8.02	-7.61	-6.92	-6.22	-5.99	-0.31	-0.13	0.06	0.20	0.40
DDAA	-7.02	-6.81	-6.57	-6.22	-6.13	-0.52	-0.42	-0.14	0.01	0.05
MCRA	-7.64	-7.11	-6.88	-6.08	-5.69	-1.70	-0.48	-0.03	0.03	0.12
R6E	-8.08	-7.56	-6.39	-6.36	-6.13	-0.26	0.02	0.04	0.32	0.37
Maximum	-6.68	-6.44	-6.31	-5.95	-5.43	-0.17	0.06	0.1	0.37	0.47
Minimum	-8.13	-8.03	-7.45	-6.69	-6.59	-1.87	-1.02	-0.54	-0.34	-0.02
Difference	1.45	1.59	1.14	0.74	1.16	1.7	1.08	0.64	0.71	0.49

*Maximum and Minimum in relation to the cannabinoids and cannabinoids-like molecules;

The difference is between maximum and minimum values.

Table S4: Electronic descriptors: Charge on H1, charge on the heteroatom, H1-H2 distance between two most acidic hydrogens, molecular size and volume.

Molecule	H1 (a.u.)	Charge Heteroatom (a.u.)	H1-H2 (Å)	Molecular size (Å)	Volume (cm ³ /mol)
ACh	0.19	-0.73	1.80	9.00	198.28
GNT	0.46	-0.84	8.26	9.49	390.58
DNP	0.21	0.34	2.29	16.28	310.53
LADO	0.44	-1.07	6.49	11.97	260.65
RIVA	0.37	-0.73	2.00	11.24	543.29
PHYSO	0.38	-0.79	9.03	12.71	406.67
THA	0.44	-0.81	5.72	9.56	230.46
DOP	0.50	-1.39	3.11	9.25	203.03
HUP	0.43	-1.25	1.62	9.29	282.86
HUX	0.48	-0.80	5.75	11.21	364.39
HUW	0.45	-0.88	5.72	12.30	211.65
CMG	0.50	-0.89	10.36	17.24	337.47
CNBRPL	0.50	-0.90	5.18	15.69	259.95
GLDC	0.44	-0.70	5.65	16.27	248.74
OMCNB	0.20	-0.64	4.30	15.27	213.79
PRT	0.48	-0.70	2.23	15.86	317.08
THC	0.49	-0.73	3.03	15.37	223.41
THCP	0.49	-0.73	3.09	17.88	221.94
THCVM2	0.49	-0.71	4.13	13.17	257.97
CNBA	0.49	-0.73	5.10	15.26	319.58
HHC	0.55	-0.75	12.42	20.17	383.10
CNBD	0.51	-0.77	5.63	15.58	246.28
ARAC1	0.50	-0.69	3.14	16.78	225.19
ARAC2	0.54	-0.76	12.28	16.10	251.56
MCDC	0.50	-0.73	5.70	15.14	313.87
MCDD	0.49	-0.85	7.73	15.97	254.45
RDLA	0.47	-0.68	2.23	14.60	226.64
RDLK	0.49	-0.85	15.11	15.11	234.33
RDLI	0.48	-0.71	3.49	14.62	224.01
RDLH	0.52	-0.74	3.79	14.21	225.95
RDLJ	0.22	-0.57	4.62	14.55	230.98
RDL59	0.52	-0.80	6.57	14.14	203.76
DCBA	0.45	-0.73	5.67	15.38	258.91
DMDD	0.52	-0.75	5.61	16.14	357.30
DMDE	0.52	-0.76	5.62	16.12	343.48
D9CT	0.47	-0.68	2.20	15.35	262.35
TCNT	0.48	-0.87	4.35	15.03	255.40
HD11	0.48	-0.80	4.26	14.76	278.61
DDAA	0.56	-0.78	5.65	15.63	219.66
MCRA	0.49	-0.72	2.20	15.92	308.93
R6E	0.53	-0.75	5.66	13.62	246.50

^a H1 is the most acidic hydrogen. H1-H2 is the smallest distance between the most acidic hydrogens.

Table S5: General descriptors: Molecular weight (Mw), number of aromatic rings, the fraction of sp³ carbon atoms, rotatable bonds, hydrogen bond acceptors, and hydrogen bond donors.

Molecule	MW (g/mol)	Num Aromatic Rings	Fraction Csp ³	Rotatable bonds	H-bond acceptors	H-bond donors
ACh	146.21	0	0.86	4	2	0
GNT	287.35	0	0.53	1	4	1
DNP	380.50	2	0.46	6	3	1
LADO	285.45	1	0.44	7	3	3
RIVA	250.34	1	0.50	6	3	0
PHYSO	275.35	1	0.53	3	3	1
THA	198.26	2	0.31	0	1	1
DOP	153.18	1	0.25	2	3	3
HUP	242.32	0	0.40	0	2	2
HUX	298.81	2	0.39	1	1	1
HUW	315.82	2	0.39	2	1	3
CMG	350.49	1	0.62	10	4	4
CNBRPL	348.48	1	0.71	4	4	3
GLDC	298.38	2	0.26	6	3	3
OMCNB	324.46	2	0.45	5	2	0
PRT	346.46	2	0.33	2	2	1
THC	314.46	1	0.62	4	2	1
THCP	342.51	1	0.65	6	2	1
THCVM2	316.39	1	0.53	3	4	2
CNBA	354.44	2	0.41	5	4	2
HHC	410.50	2	0.32	9	5	4
CNBD	310.43	2	0.33	6	2	2
ARAC1	312.36	2	0.16	4	4	4
ARAC2	298.38	2	0.26	5	3	3
MCDC	364.48	2	0.33	3	3	2
MCDD	378.46	3	0.42	1	4	2
RDLA	278.35	2	0.16	2	2	1
RDLK	312.36	2	0.26	2	4	3
RDLI	278.35	2	0.26	2	2	1
RDLH	322.35	2	0.15	3	4	2
RDLJ	292.37	2	0.30	3	2	0
RDL59	322.35	2	0.15	3	4	2
DCBA	296.40	2	0.30	6	2	1
DMDD	436.50	2	0.50	1	6	3
DMDE	436.50	2	0.42	1	6	3
D9CT	314.46	1	0.62	4	2	1
TCNT	332.43	1	0.60	4	4	3
HD11	330.46	1	0.62	4	3	2
DDAA	282.38	2	0.26	5	2	2
MCRA	348.48	2	0.42	2	2	1
R6E	332.48	1	0.62	9	3	2

Table S6: ADMET descriptors of studied molecules using the web platform SwissADME and OSIRIS software [85,86].

Molecule	MR	TPSA Å ²	Consensus Log P	ESOL Log S	BBB	Drugscore	Druglikeness	Score(kcal/mol)
ACH	39.42	26.30	-2.32	2.23	2.00	0.0	0.0	-5.4
GNT	84.05	41.93	1.92	-2.93	1.00	0.91	6.20	-10.5
DNP	116.27	47.56	3.11	-4.82	1.00	0.63	7.29	-11.60
LADO	83.71	53.52	1.44	-2.72	1.00	0.89	2.64	-9.9
RIVA	73.12	32.78	2.34	-2.69	1.00	0.87	1.81	-8.3
PHYSO	84.93	44.81	1.65	-2.57	1.00	0.86	2.19	-9.5
THA	63.58	38.91	2.59	-3.27	1.00	0.16	-7.18	-9.1
DOP	42.97	66.48	0.46	-0.44	1.00	0.28	0.47	-7.4
HUP	72.87	58.88	1.89	-1.60	1.00	0.73	0.27	-9.9
HUX	90.04	38.01	4.09	-4.56	1.00	0.17	0.84	-10.5
HUW	92.16	62.04	2.40	-3.92	1.00	-1.48	0.23	-10.4
CMG	104.80	80.92	4.13	-4.76	2.00	0.30	-10.26	-12.00
CNBRPL	100.74	69.92	3.65	-4.50	1.00	0.32	-8.78	-12.50
GLDC	89.63	60.69	3.62	-4.41	1.00	0.37	-13.73	-11.50
OMCNB	101.56	18.46	5.58	-5.95	2.00	0.18	-12.83	-12.20
PRT	109.09	29.46	5.43	-6.49	2.00	0.12	-3.59	-12.40
THC	97.91	29.46	5.33	-6.11	1.00	0.23	-11.18	-11.40
THCP	107.52	29.46	5.92	-6.82	2.00	0.18	-19.19	-12.30
THCVM2	90.07	66.76	3.72	-5.09	1.00	0.37	-4.49	-11.20
CNBA	104.05	66.76	4.84	-5.95	2.00	0.20	-14.28	-10.90
HHC	121.01	97.99	5.11	-6.45	2.00	0.24	-1.99	-12.60
CNBD	99.98	40.46	5.52	-6.18	1.00	0.22	-20.65	-12.5
ARAC1	94.42	80.92	3.61	-4.76	2.00	0.37	1.12	-13.00
ARAC2	90.49	60.69	4.00	-4.91	1.00	0.41	-1.34	-11.20
MCDC	111.34	53.60	5.38	-6.74	2.00	0.10	-20.43	-12.60
MCDD	110.56	62.83	4.37	-5.65	2.00	0.20	0.95	-11.20
RDLA	87.13	29.46	4.01	-4.62	1.00	0.23	-1.64	-12.9
RDLK	90.82	69.92	3.00	-4.23	1.00	0.31	-0.65	-12.10
RDLI	85.23	29.46	4.04	-4.64	1.00	0.25	-0.48	-12.30
RDLH	94.09	66.76	3.66	-4.82	1.00	0.23	-1.73	-11.10
RDLJ	89.70	18.46	4.43	-4.84	1.00	0.25	0.19	-12.30
RDL59	94.09	66.76	3.52	-4.47	1.00	0.23	-1.73	-13.30
DCBA	92.94	29.46	4.79	-5.26	1.00	0.39	-0.65	-12.60
DMDD	119.89	96.22	04.05	-5.87	2.00	0.16	-1.22	-11.70
DMDE	121.79	96.22	4.17	-5.74	2.00	0.14	-2.16	-11.90
D9CT	97.91	29.46	5.28	-6.11	1.00	0.23	-11.18	-13.00
TCNT	96.22	69.92	3.26	-3.67	1.00	0.14	-12.22	-11.00
HD11	99.07	49.69	4.55	-5.50	1.00	0.27	-14.19	-11.80
DDAA	88.47	40.46	4.42	-5.05	1.00	0.36	-1.90	-11.10
MCRA	109.56	29.46	5.38	-6.32	2.00	0.11	-5.90	-11.30
R6E	101.45	52.99	5.02	-5.37	1.00	0.21	-9.69	-12.00

Table S7: Classification generated by the K-means algorithm for ADMET+ES data.

Molecules	k=4	k=5	k=6
DOP, GNT, HUP, LADO, PHYSO, RIVA, THA	0	0	0
CNBA, CNBD, HHC, MCDC, PRT	1	1	1
CMG, CNBRPL, D9CT, HD11, R6E, TCNT, THC, THCP, THCV2,	2	2	2
ACh	3	3	3
ARAC1, ARAC2, DMDD, DMDE, MCDD, MCRA, RDL59, RDLH, RDLI, RDLK	1	4	4
DNP, HUW, HUX, RDLJ	1	4	5
DCBA, DDAA, GLDC, OMCNB, RDLA	1	1	5