



Full wwPDB X-ray Structure Validation Report ⓘ

Sep 7, 2023 – 06:09 AM EDT

PDB ID : 4FEW
Title : Crystal structure of the aminoglycoside phosphotransferase APH(3')-Ia, with substrate kanamycin and small molecule inhibitor pyrazolopyrimidine PP2
Authors : Stogios, P.J.; Evdokimova, E.; Wawrzak, Z.; Minasov, G.; Egorova, O.; Di Leo, R.; Shakya, T.; Spanogiannopoulos, P.; Wright, G.D.; Savchenko, A.; Anderson, W.F.; Center for Structural Genomics of Infectious Diseases (CSGID)
Deposited on : 2012-05-30
Resolution : 1.98 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

The following versions of software and data (see [references](#) ①) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtrriage (Phenix) : 1.13
EDS : 2.35
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.35

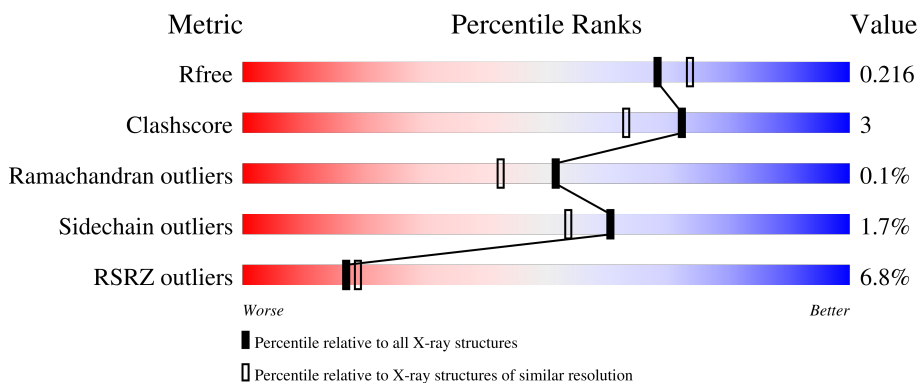
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.98 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



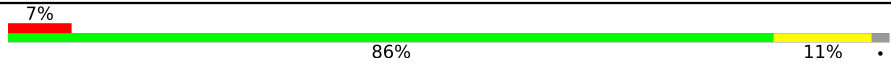
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	11647 (2.00-1.96)
Clashscore	141614	1014 (1.98-1.98)
Ramachandran outliers	138981	1006 (1.98-1.98)
Sidechain outliers	138945	1006 (1.98-1.98)
RSRZ outliers	127900	11410 (2.00-1.96)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	272	
1	B	272	
1	C	272	
1	D	272	
1	E	272	

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Mol	Chain	Length	Quality of chain
1	F	272	 <p>A horizontal bar chart representing the quality of chain. The bar is divided into three segments: a red segment on the left labeled '7%', a large green segment in the middle labeled '86%', and a yellow segment on the right labeled '11%'. A small grey dot is visible at the far right end of the bar.</p>

2 Entry composition

There are 8 unique types of molecules in this entry. The entry contains 14307 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

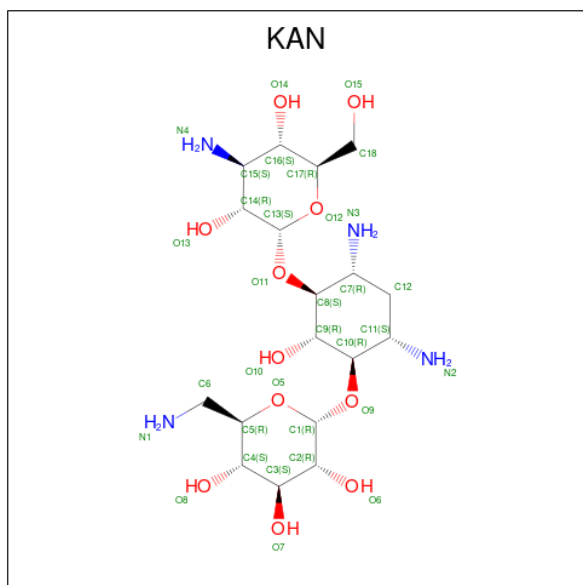
- Molecule 1 is a protein called Aminoglycoside 3'-phosphotransferase AphA1-IAB.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	N	O	S	Se			
1	A	266	Total 2143	C 1365	N 371	O 396	S 5	Se 6	0	1	0
1	B	256	Total 2071	C 1323	N 359	O 378	S 5	Se 6	0	0	0
1	C	254	Total 2081	C 1331	N 358	O 382	S 4	Se 6	0	5	0
1	D	266	Total 2176	C 1385	N 378	O 401	S 5	Se 7	0	5	0
1	E	254	Total 2077	C 1326	N 358	O 383	S 4	Se 6	0	4	0
1	F	266	Total 2178	C 1387	N 384	O 395	S 5	Se 7	0	4	0

There are 6 discrepancies between the modelled and reference sequences:

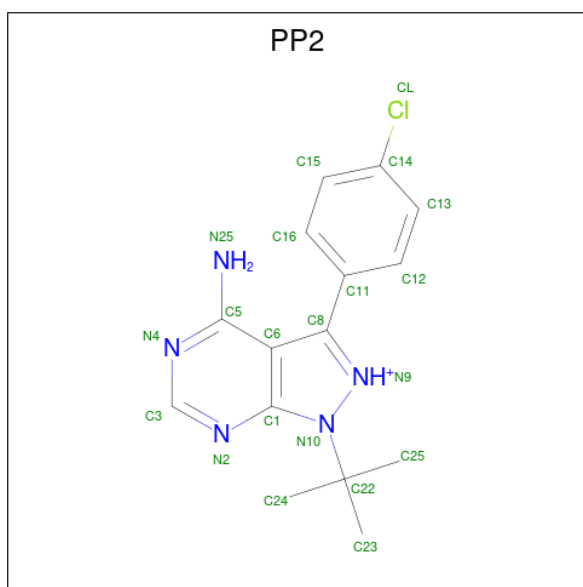
Chain	Residue	Modelled	Actual	Comment	Reference
A	0	GLY	-	expression tag	UNP B0VD92
B	0	GLY	-	expression tag	UNP B0VD92
C	0	GLY	-	expression tag	UNP B0VD92
D	0	GLY	-	expression tag	UNP B0VD92
E	0	GLY	-	expression tag	UNP B0VD92
F	0	GLY	-	expression tag	UNP B0VD92

- Molecule 2 is KANAMYCIN A (three-letter code: KAN) (formula: C₁₈H₃₆N₄O₁₁).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
2	A	1	33	18	4	11	0	0
2	B	1	33	18	4	11	0	0
2	C	1	33	18	4	11	0	0
2	D	1	33	18	4	11	0	0
2	E	1	33	18	4	11	0	0
2	F	1	33	18	4	11	0	0

- Molecule 3 is 1-TERT-BUTYL-3-(4-CHLORO-PHENYL)-1H-PYRAZOLO[3,4-D]PYRIMIDIN-4-YLAMINE (three-letter code: PP2) (formula: C₁₅H₁₇ClN₅).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	
3	A	1	Total	C	Cl	N	0	0
			21	15	1	5		
3	B	1	Total	C	Cl	N	0	0
			21	15	1	5		
3	C	1	Total	C	Cl	N	0	1
			42	30	2	10		
3	D	1	Total	C	Cl	N	0	0
			21	15	1	5		
3	E	1	Total	C	Cl	N	0	0
			21	15	1	5		
3	F	1	Total	C	Cl	N	0	0
			21	15	1	5		

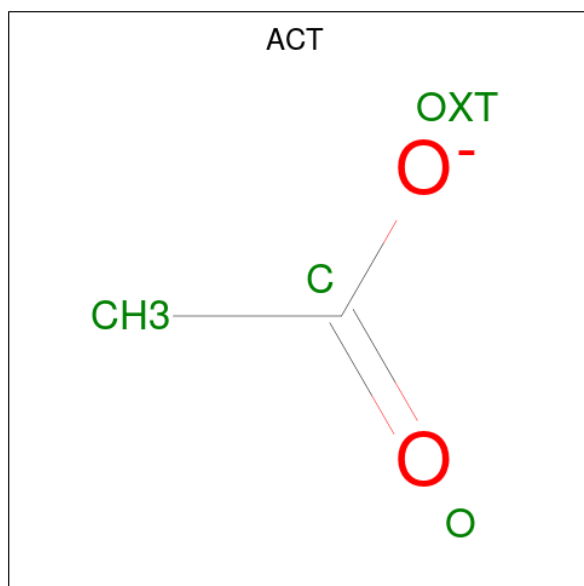
- Molecule 4 is SODIUM ION (three-letter code: NA) (formula: Na).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	Na	0	0
			1	1		
4	B	1	Total	Na	0	0
			1	1		
4	D	2	Total	Na	0	0
			2	2		
4	E	1	Total	Na	0	0
			1	1		
4	F	2	Total	Na	0	0
			2	2		

- Molecule 5 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total Cl 1 1	0	0

- Molecule 6 is ACETATE ION (three-letter code: ACT) (formula: $C_2H_3O_2$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	1	Total C O 4 2 2	0	0
6	B	1	Total C O 4 2 2	0	0
6	D	1	Total C O 4 2 2	0	0
6	D	1	Total C O 4 2 2	0	0
6	E	1	Total C O 4 2 2	0	0
6	F	1	Total C O 4 2 2	0	0

- Molecule 7 is DI(HYDROXYETHYL)ETHER (three-letter code: PEG) (formula: $C_4H_{10}O_3$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	C	1	Total C O 7 4 3	0	0
7	F	1	Total C O 7 4 3	0	0

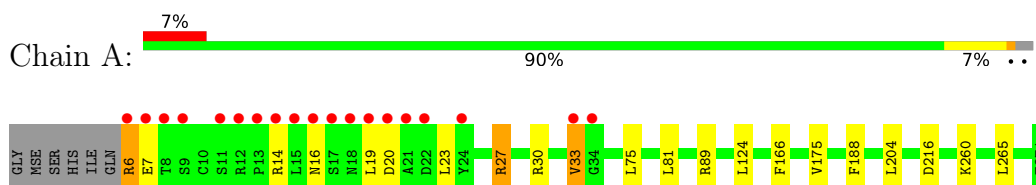
- Molecule 8 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	A	231	Total O 237 237	0	6
8	B	139	Total O 142 142	0	3
8	C	193	Total O 194 194	0	1
8	D	214	Total O 217 217	0	3
8	E	189	Total O 191 191	0	2
8	F	204	Total O 209 209	0	5

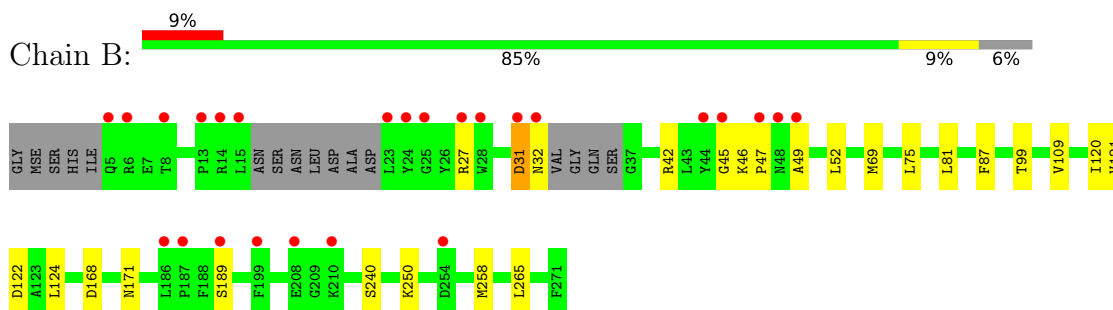
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

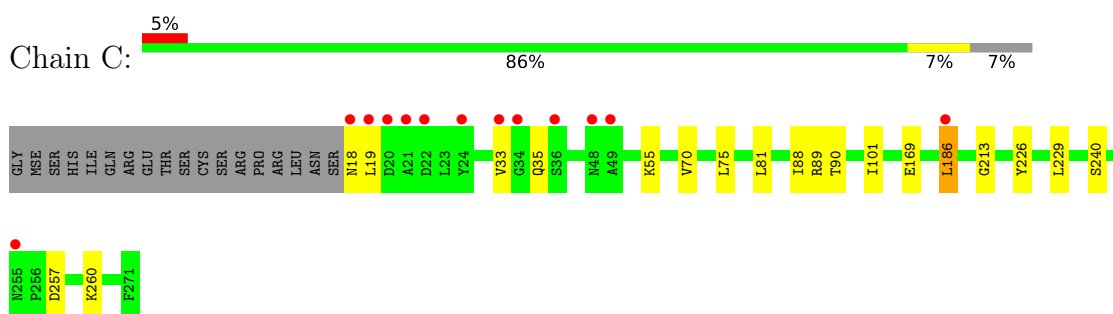
- Molecule 1: Aminoglycoside 3'-phosphotransferase AphA1-IAB



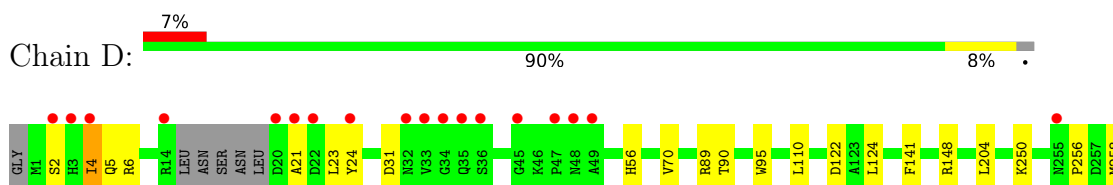
- Molecule 1: Aminoglycoside 3'-phosphotransferase AphA1-IAB



- Molecule 1: Aminoglycoside 3'-phosphotransferase AphA1-IAB

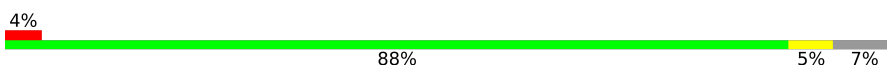


- Molecule 1: Aminoglycoside 3'-phosphotransferase AphA1-IAB



F271


- Molecule 1: Aminoglycoside 3'-phosphotransferase AphA1-IAB

Chain E:  4% 88% 5% 7%



F271

- Molecule 1: Aminoglycoside 3'-phosphotransferase AphA1-IAB

Chain F:  7% 86% 11%



4 Data and refinement statistics i

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	57.28Å 93.58Å 96.40Å 61.22° 73.18° 87.35°	Depositor
Resolution (Å)	23.90 – 1.98 23.90 – 1.97	Depositor EDS
% Data completeness (in resolution range)	92.2 (23.90-1.98) 91.9 (23.90-1.97)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.07	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.33 (at 1.96Å)	Xtrriage
Refinement program	PHENIX (phenix.refine: 1.7.3_928)	Depositor
R, R_{free}	0.157 , 0.216 0.159 , 0.216	Depositor DCC
R_{free} test set	5691 reflections (4.94%)	wwPDB-VP
Wilson B-factor (Å ²)	24.6	Xtrriage
Anisotropy	0.267	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 60.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	0.006 for -h,-k,-h-k+l	Xtrriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	14307	wwPDB-VP
Average B, all atoms (Å ²)	35.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.71% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: CL, PP2, NA, KAN, ACT, PEG

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
1	A	0.37	0/2195	0.52	0/2969
1	B	0.33	0/2118	0.49	0/2860
1	C	0.38	0/2135	0.53	0/2888
1	D	0.38	0/2234	0.53	1/3017 (0.0%)
1	E	0.37	0/2128	0.53	1/2878 (0.0%)
1	F	0.39	0/2232	0.53	0/3010
All	All	0.37	0/13042	0.52	2/17622 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	E	204	LEU	CA-CB-CG	-5.95	101.62	115.30
1	D	110	LEU	CA-CB-CG	5.60	128.17	115.30

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2143	0	2082	13	0
1	B	2071	0	2013	16	0
1	C	2081	0	2023	10	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	D	2176	0	2117	14	0
1	E	2077	0	2011	8	0
1	F	2178	0	2133	18	0
2	A	33	0	36	0	0
2	B	33	0	36	0	0
2	C	33	0	36	0	0
2	D	33	0	36	0	0
2	E	33	0	36	0	0
2	F	33	0	36	0	0
3	A	21	0	17	2	0
3	B	21	0	17	2	0
3	C	42	0	34	6	0
3	D	21	0	17	2	0
3	E	21	0	17	3	0
3	F	21	0	17	2	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
4	D	2	0	0	0	0
4	E	1	0	0	0	0
4	F	2	0	0	0	0
5	A	1	0	0	0	0
6	A	4	0	3	0	0
6	B	4	0	3	0	0
6	D	8	0	6	0	0
6	E	4	0	3	0	0
6	F	4	0	3	0	0
7	C	7	0	8	0	0
7	F	7	0	8	0	0
8	A	237	0	0	2	0
8	B	142	0	0	1	0
8	C	194	0	0	0	0
8	D	217	0	0	1	0
8	E	191	0	0	0	0
8	F	209	0	0	0	0
All	All	14307	0	12748	89	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 3.

All (89) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:C:302[A]:PP2:H3	3:C:302[A]:PP2:H12	1.10	1.16
3:D:302:PP2:H3	3:D:302:PP2:H12	1.05	1.15
3:A:302:PP2:H3	3:A:302:PP2:H12	1.05	1.12
3:F:302:PP2:H3	3:F:302:PP2:H12	1.01	1.11
3:C:302[B]:PP2:H3	3:C:302[B]:PP2:H12	1.11	1.11
3:B:302:PP2:H3	3:B:302:PP2:H12	1.09	1.08
3:E:302:PP2:H3	3:E:302:PP2:H12	1.15	1.06
3:F:302:PP2:H12	3:F:302:PP2:N25	1.82	0.94
3:D:302:PP2:H12	3:D:302:PP2:N25	1.85	0.91
3:A:302:PP2:H12	3:A:302:PP2:N25	1.88	0.88
3:C:302[B]:PP2:H12	3:C:302[B]:PP2:N25	1.91	0.86
3:B:302:PP2:H12	3:B:302:PP2:N25	1.92	0.85
3:C:302[A]:PP2:H12	3:C:302[A]:PP2:N25	1.91	0.84
3:E:302:PP2:H12	3:E:302:PP2:N25	1.92	0.84
1:F:89[A]:ARG:NH1	1:F:90:THR:O	2.21	0.74
1:D:256:PRO:HB2	1:D:258:MSE:HE3	1.72	0.72
3:E:302:PP2:H3	3:E:302:PP2:C12	2.00	0.69
1:E:89[B]:ARG:NH1	1:E:90:THR:O	2.27	0.67
1:C:89[A]:ARG:NH1	1:C:90:THR:O	2.28	0.66
1:C:19:LEU:HD22	1:C:88:ILE:HD12	1.82	0.61
1:C:186:LEU:HD23	1:C:186:LEU:H	1.67	0.60
1:F:79:MSE:SE	1:F:130:ARG:HG2	2.52	0.60
1:B:46:LYS:HD2	1:B:47:PRO:HD2	1.82	0.60
1:F:32:ASN:HB2	1:F:35:GLN:HB2	1.84	0.60
1:F:155[A]:ARG:NH1	1:F:270:PHE:O	2.35	0.59
1:B:27:ARG:HG3	1:B:45:GLY:HA3	1.85	0.57
1:A:30:ARG:NH1	8:A:599:HOH:O	2.30	0.57
1:F:151:GLN:O	1:F:155[A]:ARG:HG3	2.06	0.55
1:A:124:LEU:HD22	1:A:204:LEU:HD13	1.88	0.55
1:E:70:VAL:HG11	1:F:70:VAL:HG11	1.88	0.55
1:D:4:ILE:HG23	1:D:6:ARG:HG3	1.89	0.54
1:E:20:ASP:OD1	1:E:20:ASP:N	2.40	0.54
1:F:124:LEU:HD23	1:F:211:LEU:HD11	1.90	0.53
1:A:166:PHE:HZ	1:A:175[B]:VAL:HG12	1.75	0.52
1:A:6:ARG:HH11	1:A:6:ARG:HB3	1.75	0.52
1:C:75:LEU:HB3	1:C:81:LEU:HD11	1.90	0.52
1:A:7:GLU:OE2	1:B:42:ARG:NH1	2.41	0.51
1:F:109:VAL:HG21	1:F:206:PHE:HB2	1.93	0.51
1:A:6:ARG:HB3	1:A:6:ARG:NH1	2.25	0.51
1:C:70[A]:VAL:HG11	1:D:70[A]:VAL:HG11	1.92	0.51
1:F:122:ASP:OD1	1:F:250:LYS:HG3	2.11	0.49
1:D:256:PRO:HB2	1:D:258:MSE:CE	2.40	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:C:302[A]:PP2:H15	1:D:5:GLN:OE1	2.12	0.48
1:D:124:LEU:HD22	1:D:204:LEU:HD13	1.95	0.48
1:A:188:PHE:CD1	1:A:260:LYS:HE2	2.49	0.48
1:C:169:GLU:HA	1:F:1:MSE:HE3	1.96	0.48
1:D:122:ASP:OD1	1:D:250:LYS:HG3	2.13	0.47
1:F:12:ARG:HH21	1:F:15:LEU:HD11	1.79	0.47
1:E:75:LEU:HB3	1:E:81:LEU:HD11	1.96	0.47
1:D:89:ARG:NH1	1:D:90:THR:O	2.46	0.46
1:D:258:MSE:HA	1:D:258:MSE:HE2	1.96	0.46
1:E:188:PHE:CD1	1:E:260:LYS:HE2	2.50	0.46
1:A:175[A]:VAL:HG23	8:A:411:HOH:O	2.15	0.46
1:B:52:LEU:HD23	1:B:99:THR:HA	1.98	0.46
1:A:27:ARG:HE	1:A:27:ARG:HB3	1.30	0.46
1:D:56:HIS:HB2	1:D:95:TRP:CZ3	2.51	0.46
1:F:12:ARG:NH2	1:F:15:LEU:HD11	2.31	0.45
1:D:21:ALA:HA	1:D:24:TYR:CZ	2.51	0.45
1:D:148:ARG:HD2	8:D:600:HOH:O	2.16	0.45
1:B:69:MSE:HG3	1:B:87:PHE:CG	2.51	0.44
1:A:19:LEU:O	1:A:23:LEU:HG	2.17	0.44
1:F:26:TYR:CE2	1:F:46:LYS:HD3	2.53	0.44
1:D:70[B]:VAL:HG12	1:D:141:PHE:HZ	1.83	0.43
1:B:121:VAL:HA	1:B:124:LEU:HD12	2.00	0.43
1:C:101:ILE:HD13	1:C:213:GLY:HA3	2.01	0.43
1:B:31:ASP:HA	1:B:32:ASN:HA	1.72	0.42
1:F:245:LYS:HE2	1:F:249:GLN:NE2	2.34	0.42
1:A:75:LEU:HB3	1:A:81:LEU:HD11	2.01	0.42
1:C:257:ASP:CG	1:C:260:LYS:HG3	2.40	0.42
1:F:32:ASN:ND2	1:F:38:ALA:O	2.33	0.42
1:B:122:ASP:OD1	1:B:250:LYS:HG3	2.19	0.42
1:E:155:ARG:HH21	1:E:271:PHE:HA	1.85	0.42
1:B:265:LEU:HD23	1:B:265:LEU:HA	1.79	0.41
1:C:55:LYS:HE3	3:C:302[B]:PP2:H15	2.01	0.41
1:E:46:LYS:HA	1:E:47:PRO:HD2	1.95	0.41
1:B:46:LYS:HG2	1:B:49:ALA:HB3	2.02	0.41
1:D:23:LEU:HD12	1:D:23:LEU:HA	1.82	0.41
1:A:265:LEU:HD23	1:A:265:LEU:HA	1.92	0.41
1:B:69:MSE:HE3	1:B:69:MSE:HB3	1.96	0.41
1:F:4:ILE:HG23	1:F:6[B]:ARG:HG3	2.02	0.41
1:B:75:LEU:HB3	1:B:81:LEU:HD11	2.03	0.41
1:B:168:ASP:O	1:B:171:ASN:HB2	2.21	0.41
1:B:258:MSE:HE3	8:B:520:HOH:O	2.20	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:153:GLN:HB2	1:E:179:TRP:CH2	2.55	0.41
1:F:2:SER:HB2	1:F:3:HIS:CD2	2.56	0.41
1:B:109:VAL:HG12	1:B:120:ILE:HD11	2.03	0.41
1:A:89:ARG:HB3	1:B:87:PHE:HB3	2.03	0.40
1:F:48:ASN:OD1	1:F:48:ASN:N	2.54	0.40
1:C:226:TYR:HA	1:C:229:LEU:HB2	2.04	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	265/272 (97%)	257 (97%)	7 (3%)	1 (0%)	34	22
1	B	250/272 (92%)	247 (99%)	3 (1%)	0	100	100
1	C	257/272 (94%)	251 (98%)	6 (2%)	0	100	100
1	D	267/272 (98%)	263 (98%)	4 (2%)	0	100	100
1	E	256/272 (94%)	246 (96%)	10 (4%)	0	100	100
1	F	266/272 (98%)	260 (98%)	6 (2%)	0	100	100
All	All	1561/1632 (96%)	1524 (98%)	36 (2%)	1 (0%)	51	42

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	33	VAL

5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar

resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	234/231 (101%)	227 (97%)	7 (3%)	41	29
1	B	225/231 (97%)	222 (99%)	3 (1%)	69	64
1	C	226/231 (98%)	221 (98%)	5 (2%)	52	46
1	D	238/231 (103%)	235 (99%)	3 (1%)	69	64
1	E	225/231 (97%)	224 (100%)	1 (0%)	91	90
1	F	237/231 (103%)	233 (98%)	4 (2%)	60	53
All	All	1385/1386 (100%)	1362 (98%)	23 (2%)	60	53

All (23) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	6	ARG
1	A	14	ARG
1	A	16	ASN
1	A	20	ASP
1	A	27	ARG
1	A	33	VAL
1	A	216	ASP
1	B	31	ASP
1	B	189	SER
1	B	240	SER
1	C	18	ASN
1	C	33	VAL
1	C	35	GLN
1	C	186	LEU
1	C	240	SER
1	D	2	SER
1	D	4	ILE
1	D	31	ASP
1	E	20	ASP
1	F	5	GLN
1	F	23	LEU
1	F	48	ASN
1	F	104	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 29 ligands modelled in this entry, 8 are monoatomic - leaving 21 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	PP2	C	302[A]	-	17,23,23	0.87	0	19,35,35	1.44	1 (5%)
3	PP2	C	302[B]	-	17,23,23	0.87	0	19,35,35	1.39	1 (5%)
2	KAN	E	301	-	35,35,35	0.93	1 (2%)	46,52,52	1.50	4 (8%)
6	ACT	F	305	4	3,3,3	0.80	0	3,3,3	1.36	0
3	PP2	D	302	-	17,23,23	0.84	0	19,35,35	1.65	2 (10%)
7	PEG	F	306	-	6,6,6	1.05	0	5,5,5	1.69	2 (40%)
3	PP2	A	302	-	17,23,23	0.83	0	19,35,35	1.35	1 (5%)
7	PEG	C	303	-	6,6,6	1.12	0	5,5,5	1.52	0
6	ACT	D	305	-	3,3,3	0.82	0	3,3,3	1.50	0
2	KAN	A	301	-	35,35,35	0.86	2 (5%)	46,52,52	1.25	5 (10%)
3	PP2	F	302	-	17,23,23	0.84	0	19,35,35	1.57	2 (10%)
3	PP2	B	302	-	17,23,23	0.88	0	19,35,35	1.35	1 (5%)
6	ACT	B	304	4	3,3,3	0.78	0	3,3,3	1.33	0
2	KAN	F	301	-	35,35,35	0.88	1 (2%)	46,52,52	1.39	5 (10%)
6	ACT	D	306	4	3,3,3	0.79	0	3,3,3	1.40	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	KAN	C	301	-	35,35,35	0.84	1 (2%)	46,52,52	1.36	6 (13%)
2	KAN	D	301	-	35,35,35	0.85	1 (2%)	46,52,52	1.38	6 (13%)
3	PP2	E	302	-	17,23,23	0.84	0	19,35,35	1.55	3 (15%)
6	ACT	A	305	4	3,3,3	0.82	0	3,3,3	1.31	0
6	ACT	E	304	4	3,3,3	0.72	0	3,3,3	1.25	0
2	KAN	B	301	-	35,35,35	0.63	0	46,52,52	1.35	6 (13%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
7	PEG	C	303	-	-	1/4/4/4	-
2	KAN	F	301	-	-	2/12/72/72	0/3/3/3
3	PP2	C	302[A]	-	-	0/6/10/10	0/3/3/3
3	PP2	C	302[B]	-	-	0/6/10/10	0/3/3/3
2	KAN	E	301	-	-	2/12/72/72	0/3/3/3
7	PEG	F	306	-	-	1/4/4/4	-
2	KAN	A	301	-	-	2/12/72/72	0/3/3/3
2	KAN	C	301	-	-	2/12/72/72	0/3/3/3
2	KAN	D	301	-	-	1/12/72/72	0/3/3/3
3	PP2	F	302	-	-	0/6/10/10	0/3/3/3
3	PP2	B	302	-	-	0/6/10/10	0/3/3/3
3	PP2	E	302	-	-	0/6/10/10	0/3/3/3
3	PP2	D	302	-	-	0/6/10/10	0/3/3/3
3	PP2	A	302	-	-	0/6/10/10	0/3/3/3
2	KAN	B	301	-	-	1/12/72/72	0/3/3/3

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	F	301	KAN	C14-C15	-2.65	1.50	1.53
2	E	301	KAN	O5-C1	2.41	1.48	1.41
2	A	301	KAN	O5-C5	2.28	1.49	1.44
2	D	301	KAN	C16-C15	-2.22	1.50	1.53
2	C	301	KAN	O5-C1	2.15	1.47	1.41
2	A	301	KAN	O11-C13	2.13	1.47	1.41

All (45) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	E	301	KAN	O5-C5-C6	5.31	115.89	106.01
3	F	302	PP2	N2-C3-N4	-5.07	120.75	128.68
3	C	302[B]	PP2	N2-C3-N4	-4.95	120.94	128.68
3	C	302[A]	PP2	N2-C3-N4	-4.89	121.03	128.68
3	A	302	PP2	N2-C3-N4	-4.79	121.20	128.68
3	B	302	PP2	N2-C3-N4	-4.74	121.26	128.68
3	D	302	PP2	N2-C3-N4	-4.68	121.36	128.68
3	E	302	PP2	N2-C3-N4	-4.61	121.47	128.68
2	D	301	KAN	C6-C5-C4	-4.20	104.85	113.10
2	F	301	KAN	C6-C5-C4	-3.85	105.53	113.10
2	C	301	KAN	O5-C5-C6	3.51	112.55	106.01
2	D	301	KAN	O11-C8-C9	3.39	116.29	107.28
2	A	301	KAN	O11-C8-C9	3.26	115.96	107.28
2	E	301	KAN	O11-C8-C9	3.25	115.93	107.28
2	F	301	KAN	O5-C5-C6	3.18	111.93	106.01
2	B	301	KAN	C6-C5-C4	-3.18	106.85	113.10
2	C	301	KAN	O11-C8-C9	3.14	115.63	107.28
2	F	301	KAN	O11-C8-C9	3.13	115.60	107.28
2	E	301	KAN	C6-C5-C4	-3.12	106.96	113.10
2	D	301	KAN	C18-C17-C16	-3.12	105.70	113.00
2	C	301	KAN	C6-C5-C4	-3.07	107.06	113.10
2	B	301	KAN	O11-C8-C9	3.05	115.39	107.28
2	E	301	KAN	C13-C14-C15	2.95	114.36	110.40
2	A	301	KAN	C6-C5-C4	-2.76	107.66	113.10
2	B	301	KAN	C13-C14-C15	2.75	114.10	110.40
2	A	301	KAN	O5-C5-C6	2.64	110.92	106.01
2	A	301	KAN	O12-C17-C18	2.52	112.69	106.44
2	B	301	KAN	C1-O9-C10	-2.51	111.75	117.96
2	C	301	KAN	C13-C14-C15	2.51	113.77	110.40
2	B	301	KAN	C16-C15-C14	-2.36	105.93	111.06
2	F	301	KAN	C10-C9-C8	2.36	113.86	108.96
2	A	301	KAN	C16-C15-C14	-2.33	106.01	111.06
2	B	301	KAN	O5-C5-C6	2.31	110.31	106.01
2	D	301	KAN	C13-C14-C15	2.26	113.44	110.40
2	D	301	KAN	O14-C16-C15	-2.25	106.17	110.22
3	D	302	PP2	C15-C14-CL	2.25	122.87	119.35
3	F	302	PP2	C15-C14-CL	2.24	122.86	119.35
7	F	306	PEG	O2-C2-C1	2.17	119.61	110.07
2	F	301	KAN	C14-C15-N4	-2.16	106.63	111.05
7	F	306	PEG	O2-C3-C4	2.15	119.52	110.07
3	E	302	PP2	C15-C14-C13	-2.10	118.52	121.24
3	E	302	PP2	C15-C14-CL	2.06	122.57	119.35
2	D	301	KAN	C10-C9-C8	2.04	113.20	108.96

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	301	KAN	O11-C13-C14	-2.04	102.81	108.10
2	C	301	KAN	O13-C14-C15	2.03	113.87	110.22

There are no chirality outliers.

All (12) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
7	F	306	PEG	C1-C2-O2-C3
7	C	303	PEG	O1-C1-C2-O2
2	D	301	KAN	C9-C8-O11-C13
2	E	301	KAN	C9-C8-O11-C13
2	C	301	KAN	C9-C8-O11-C13
2	A	301	KAN	C9-C8-O11-C13
2	F	301	KAN	C9-C8-O11-C13
2	B	301	KAN	C9-C8-O11-C13
2	C	301	KAN	C9-C10-O9-C1
2	E	301	KAN	C9-C10-O9-C1
2	F	301	KAN	C9-C10-O9-C1
2	A	301	KAN	C9-C10-O9-C1

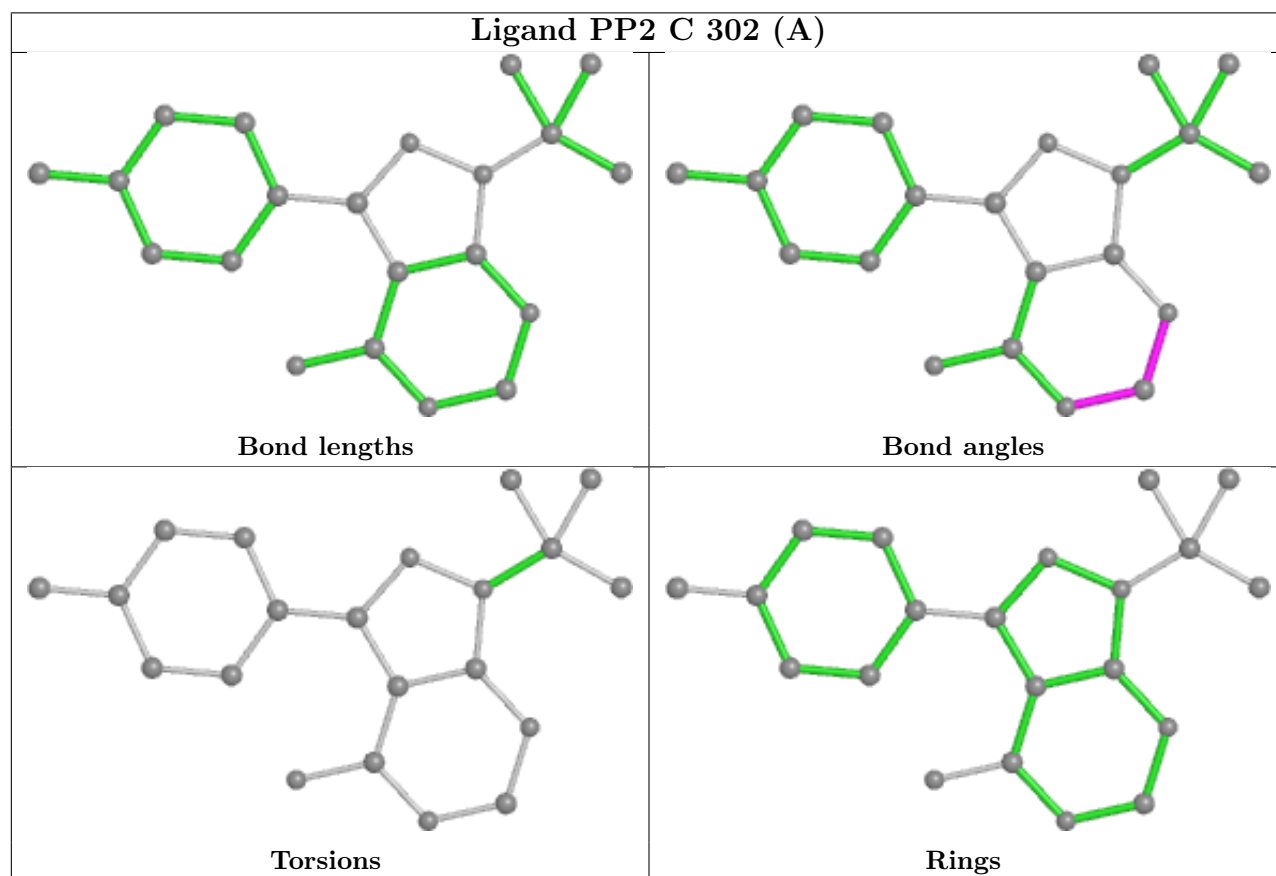
There are no ring outliers.

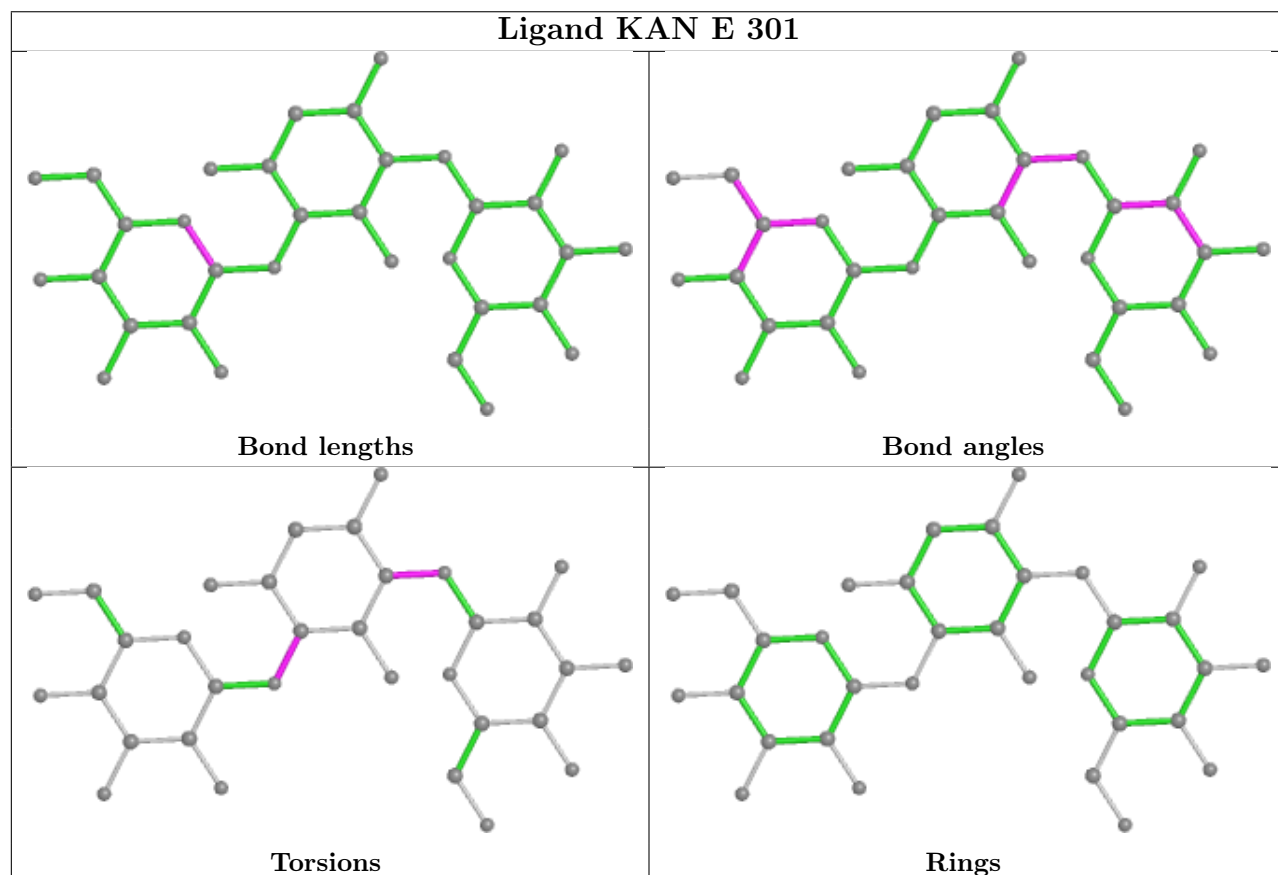
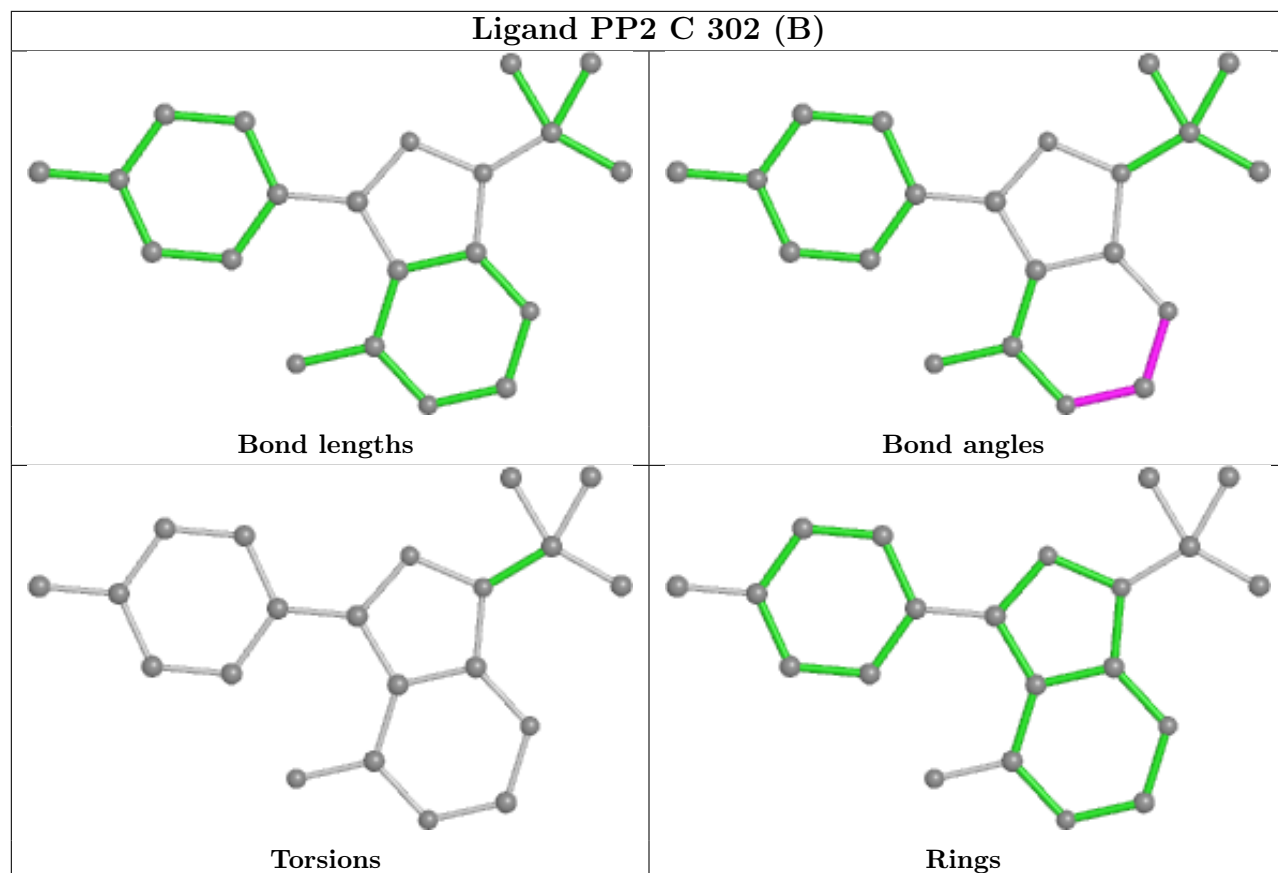
7 monomers are involved in 17 short contacts:

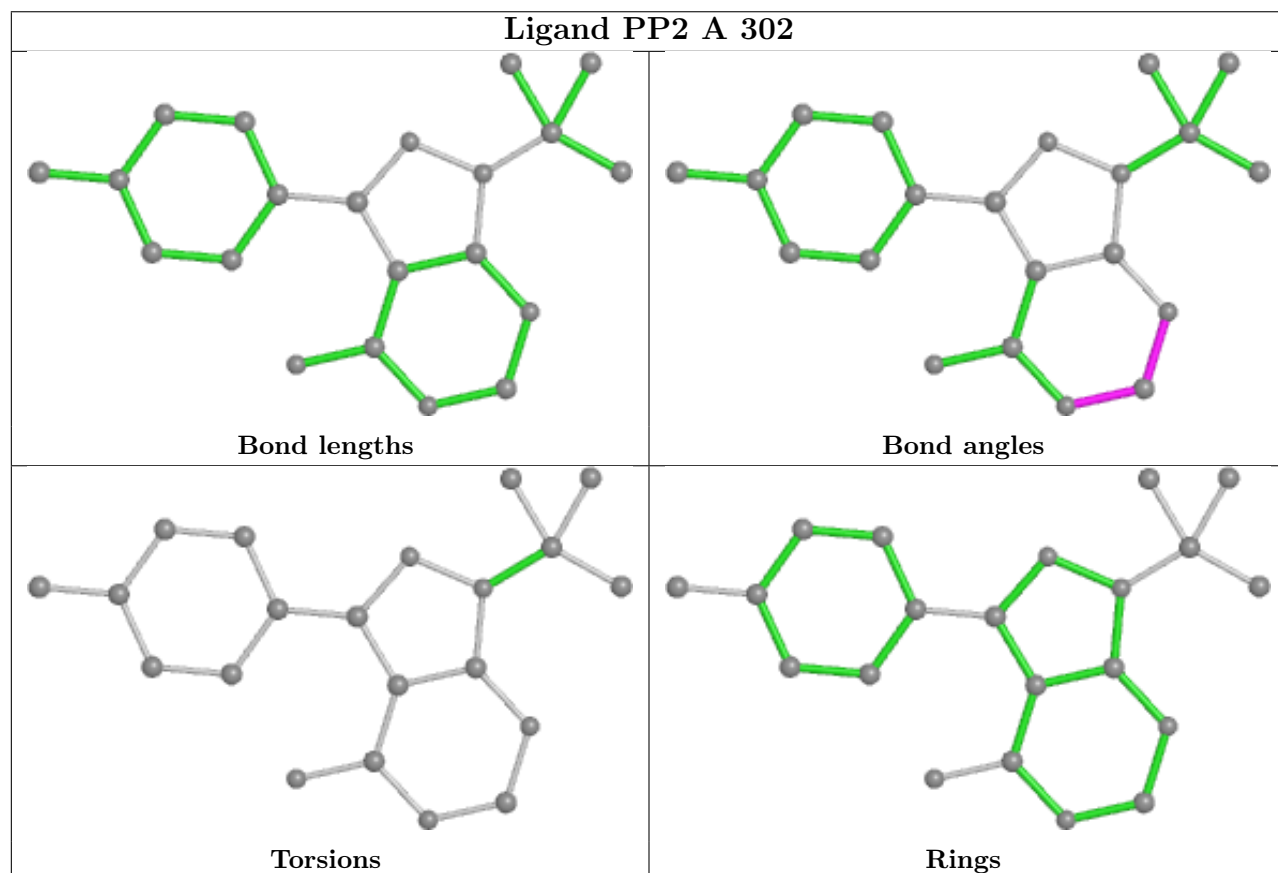
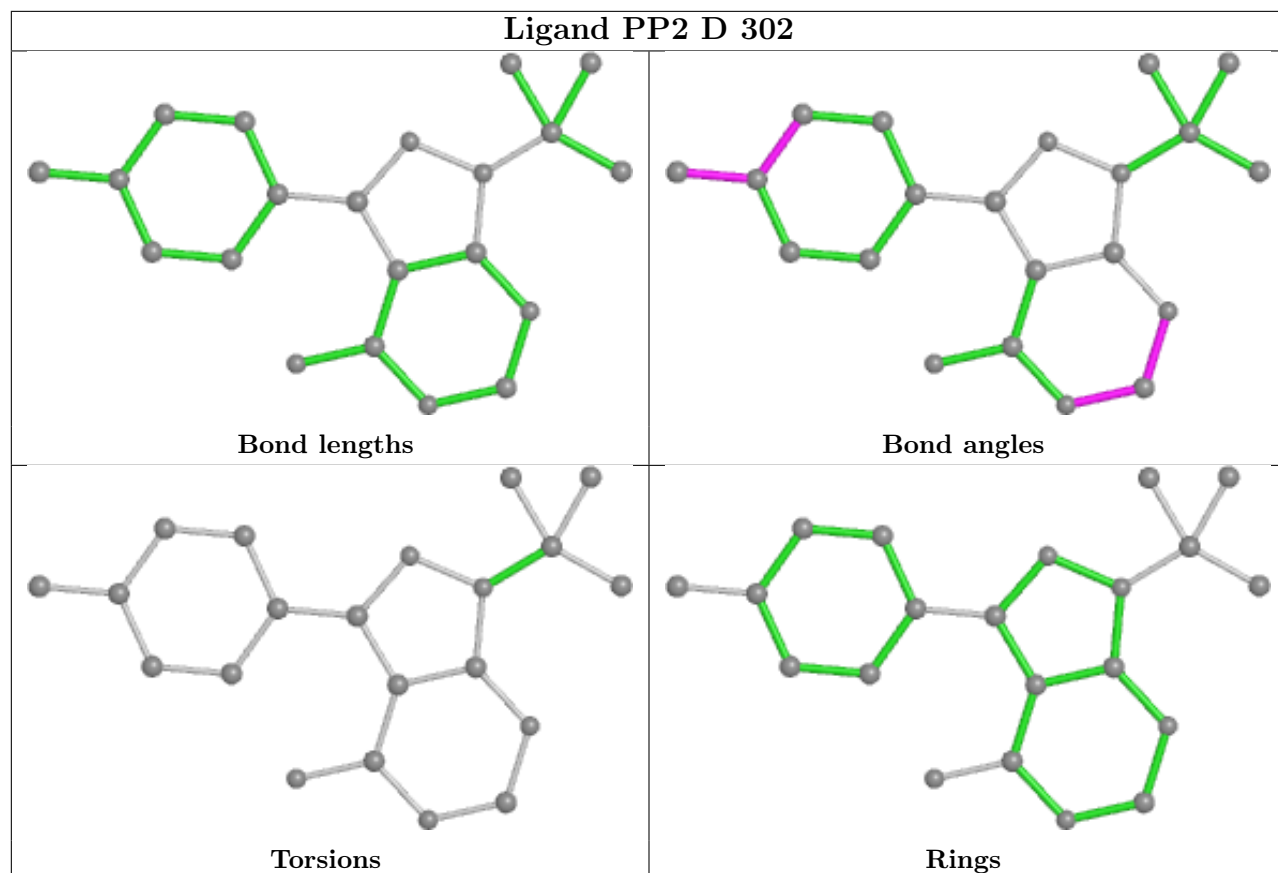
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	C	302[A]	PP2	3	0
3	C	302[B]	PP2	3	0
3	D	302	PP2	2	0
3	A	302	PP2	2	0
3	F	302	PP2	2	0
3	B	302	PP2	2	0
3	E	302	PP2	3	0

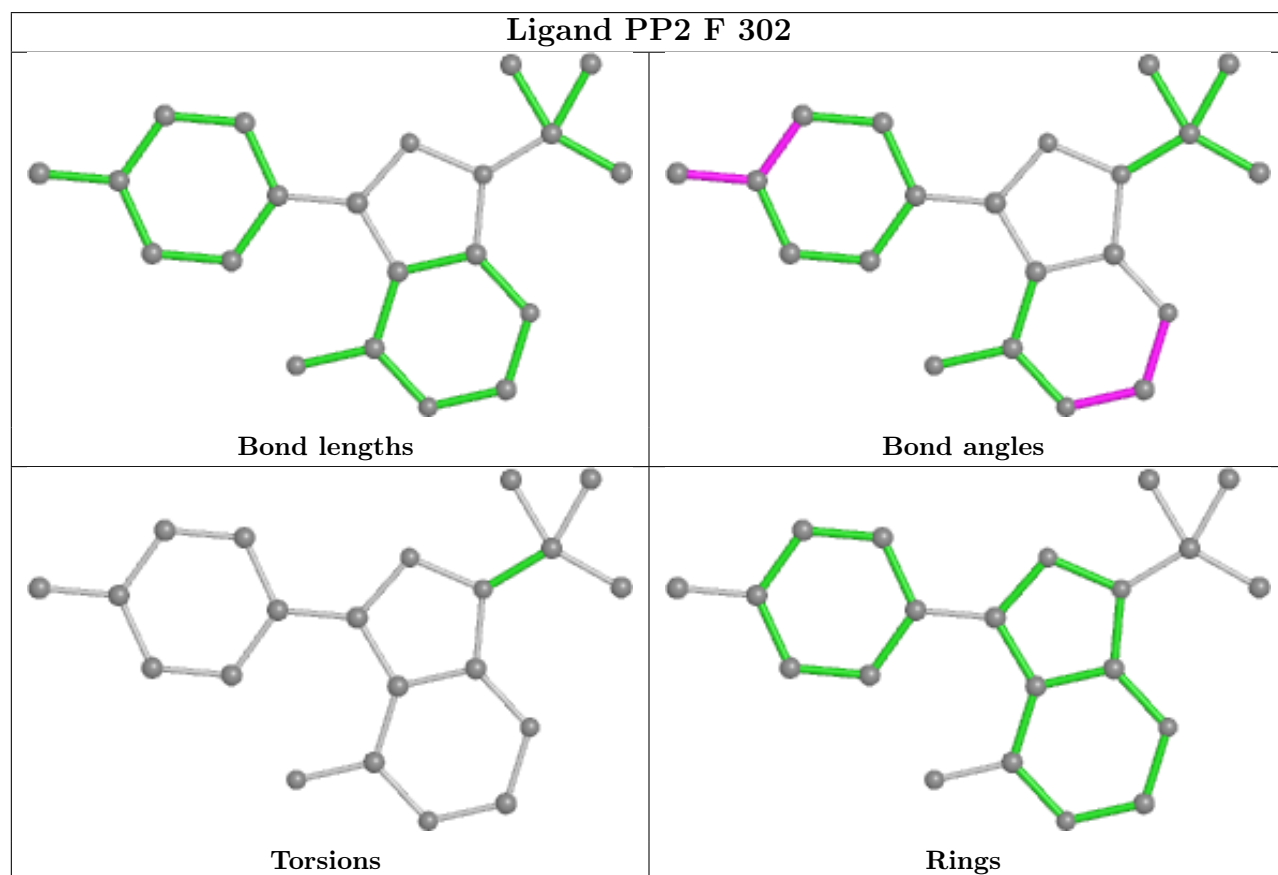
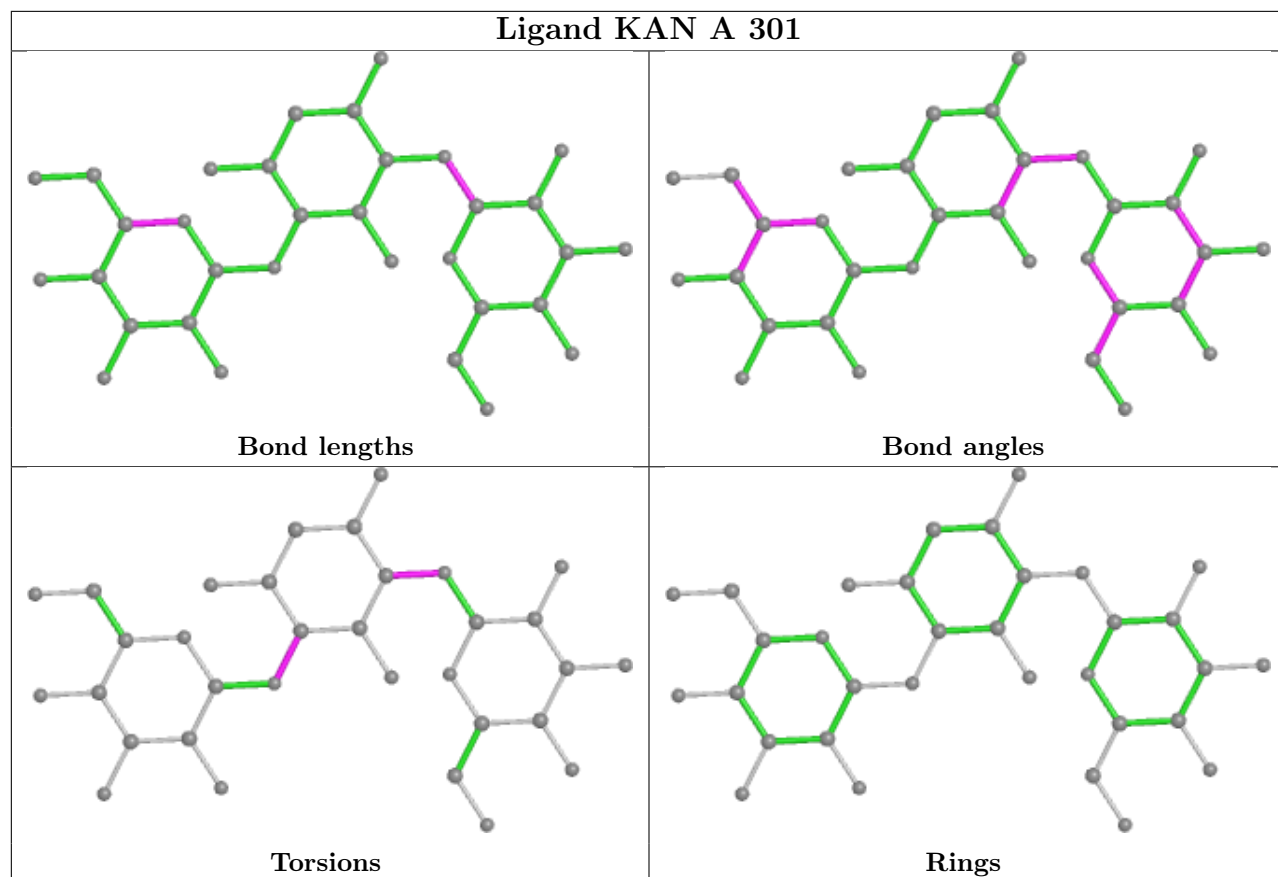
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier.

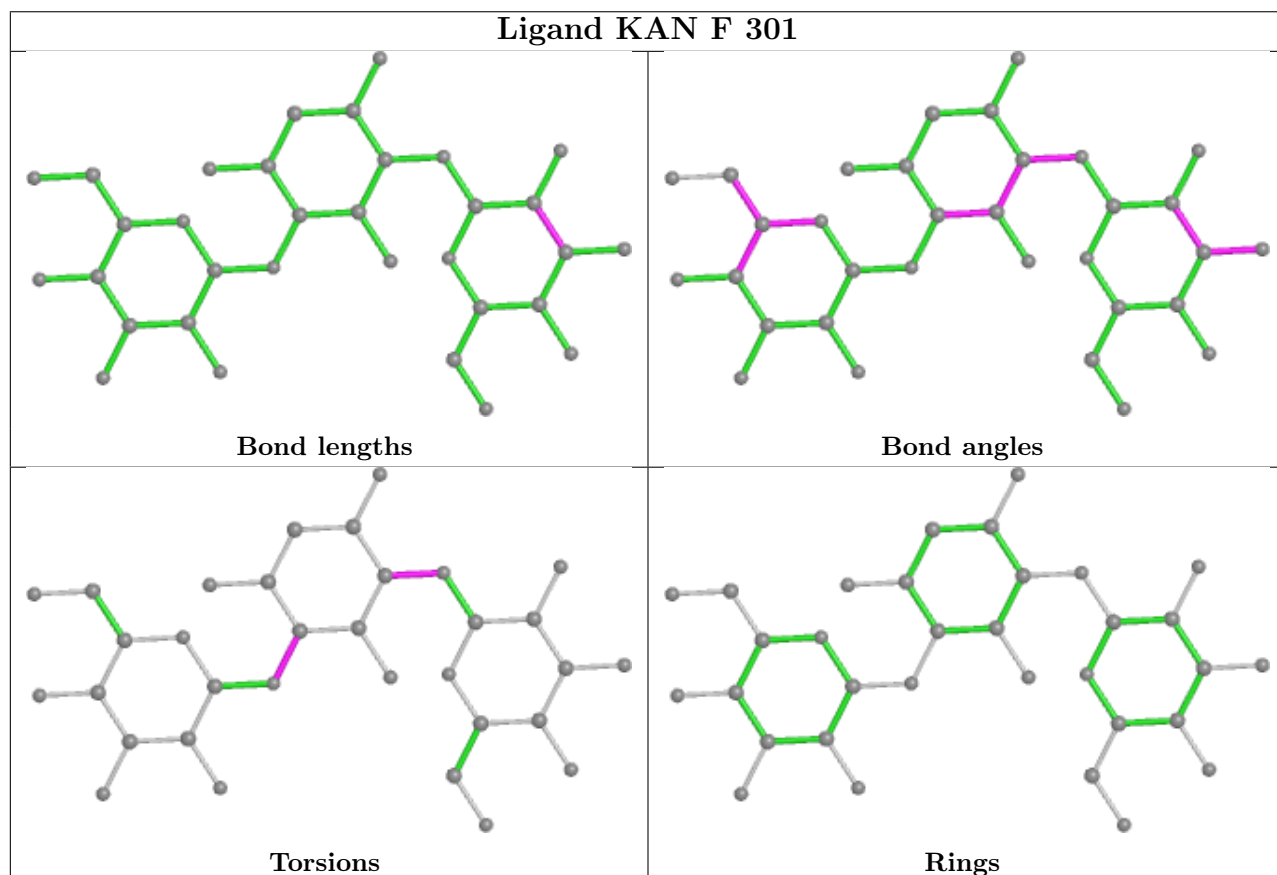
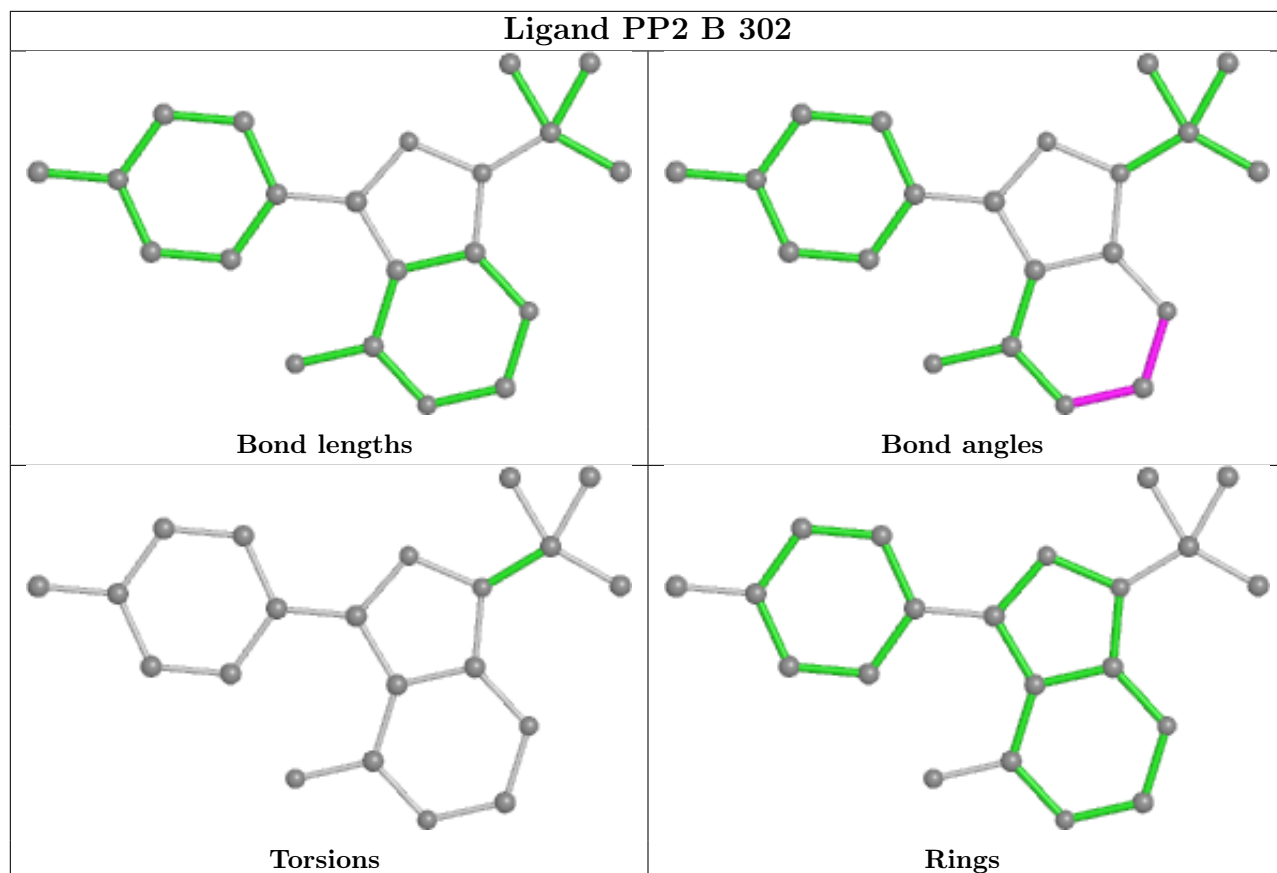
The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

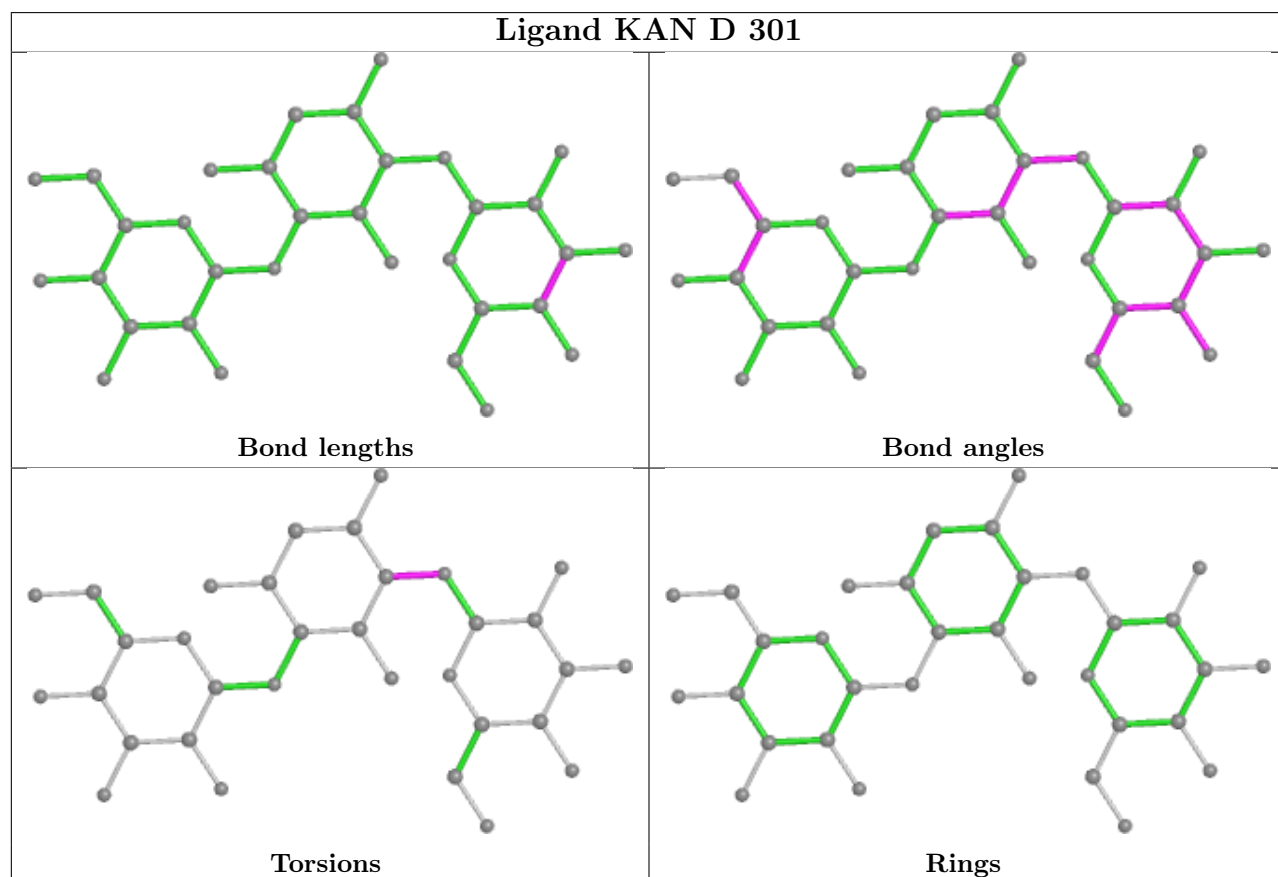
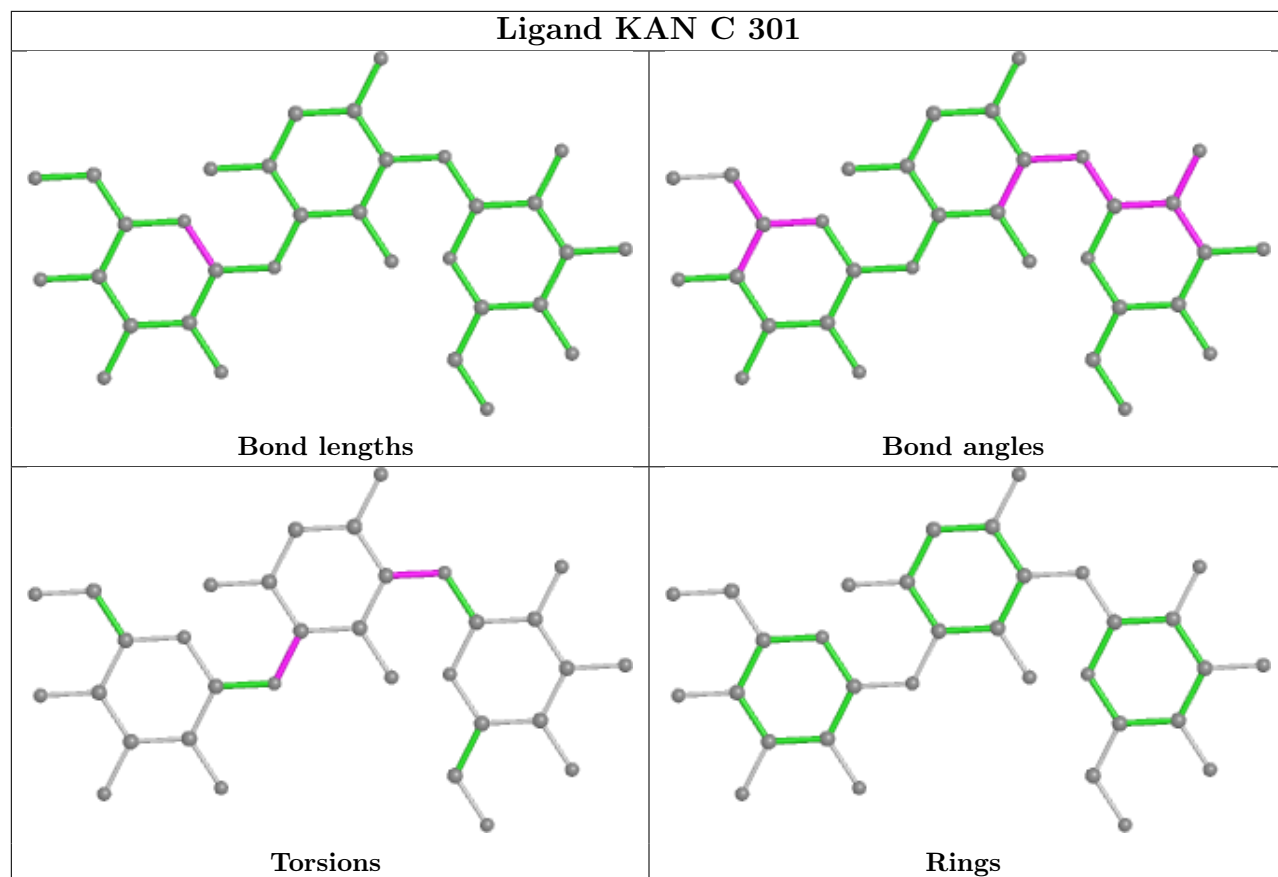


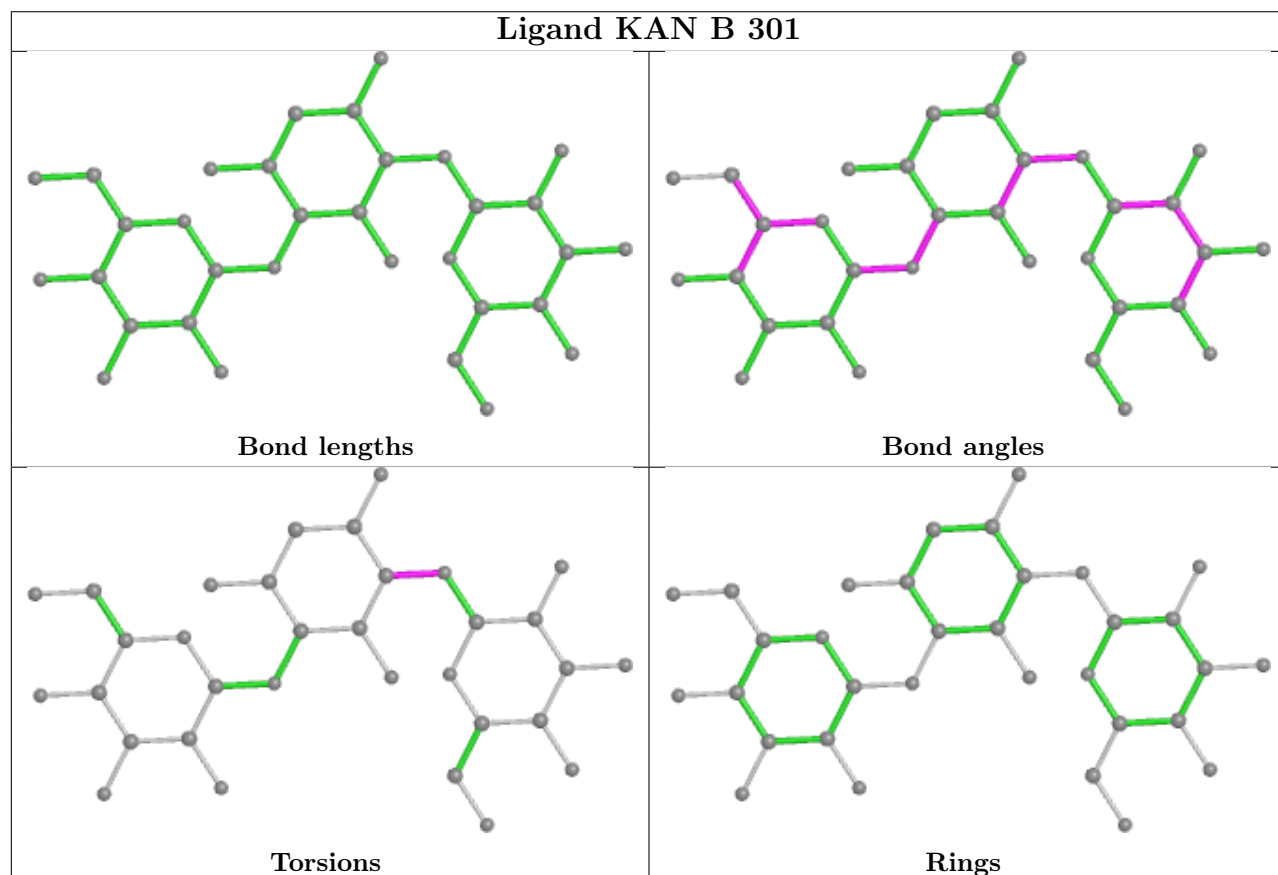
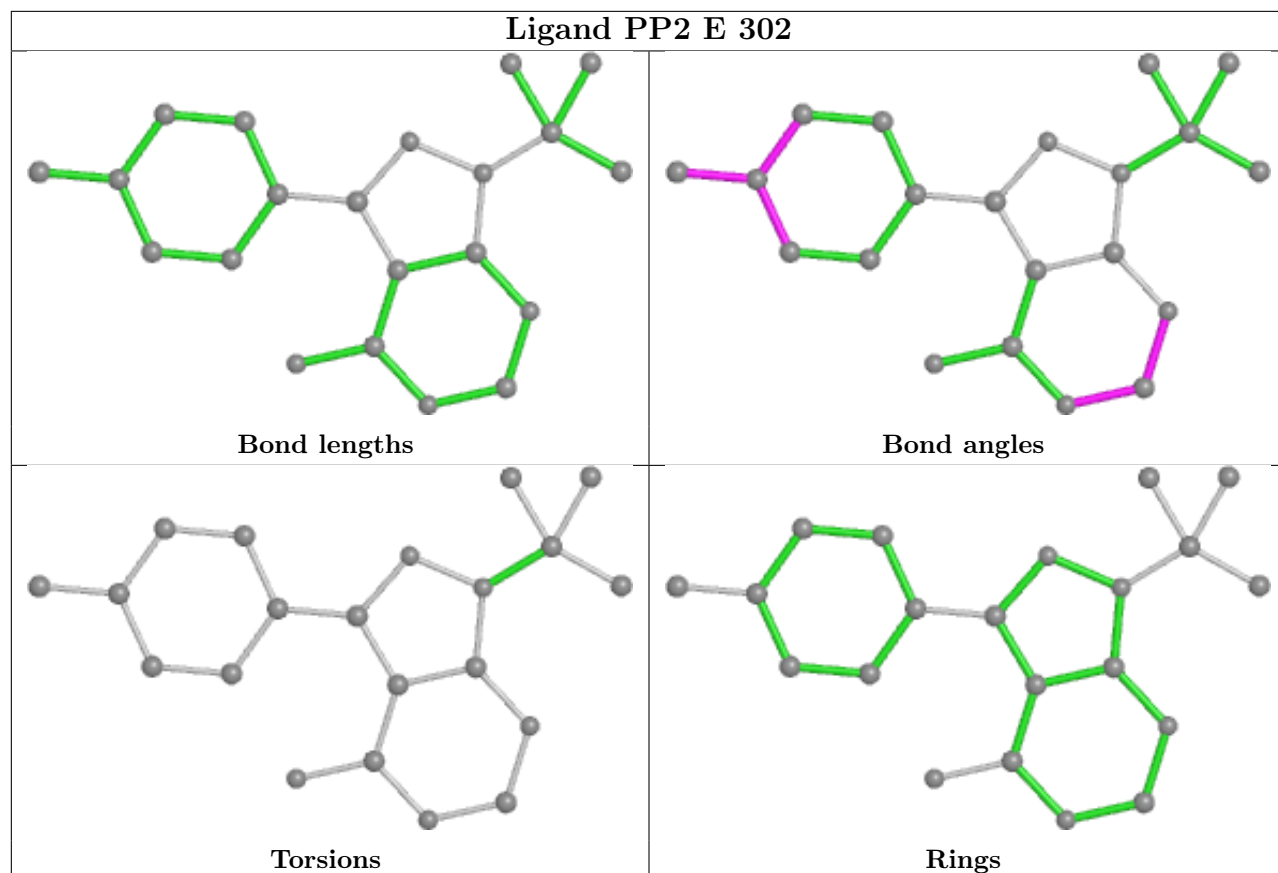












5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	260/272 (95%)	-0.00	19 (7%) 15 16	15, 29, 87, 112	0
1	B	250/272 (91%)	0.37	25 (10%) 7 8	20, 39, 87, 121	0
1	C	248/272 (91%)	-0.11	13 (5%) 27 29	17, 27, 60, 104	0
1	D	259/272 (95%)	0.05	18 (6%) 16 18	17, 30, 80, 121	0
1	E	248/272 (91%)	-0.08	10 (4%) 38 40	16, 30, 57, 109	0
1	F	259/272 (95%)	0.06	19 (7%) 15 16	17, 29, 79, 116	0
All	All	1524/1632 (93%)	0.05	104 (6%) 17 19	15, 30, 75, 121	0

All (104) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	14	ARG	8.1
1	B	24	TYR	7.8
1	C	36	SER	7.8
1	D	24	TYR	7.1
1	F	24	TYR	6.9
1	A	16	ASN	6.3
1	B	6	ARG	5.9
1	D	4	ILE	5.8
1	A	17	SER	5.8
1	C	34	GLY	5.7
1	B	48	ASN	5.5
1	D	32	ASN	5.3
1	F	22	ASP	5.2
1	D	36	SER	5.2
1	B	45	GLY	5.0
1	A	6	ARG	4.9
1	A	18	ASN	4.9
1	D	47	PRO	4.7
1	F	23	LEU	4.7

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Mol	Chain	Res	Type	RSRZ
1	B	5	GLN	4.7
1	B	8	THR	4.6
1	F	48	ASN	4.5
1	A	14	ARG	4.3
1	D	14	ARG	4.3
1	B	32	ASN	4.3
1	E	18	ASN	4.2
1	F	28	TRP	4.2
1	B	49	ALA	4.1
1	C	48	ASN	4.0
1	F	33	VAL	4.0
1	D	2	SER	3.9
1	B	15	LEU	3.9
1	A	8	THR	3.9
1	E	36	SER	3.9
1	D	45	GLY	3.9
1	F	44	TYR	3.8
1	C	18	ASN	3.7
1	D	22	ASP	3.7
1	F	47	PRO	3.7
1	F	36	SER	3.6
1	F	14	ARG	3.6
1	B	44	TYR	3.6
1	C	20	ASP	3.5
1	A	12	ARG	3.4
1	F	35	GLN	3.4
1	A	34	GLY	3.4
1	B	25	GLY	3.3
1	D	48	ASN	3.3
1	F	32	ASN	3.3
1	C	33	VAL	3.3
1	B	27	ARG	3.3
1	D	33	VAL	3.3
1	B	47	PRO	3.3
1	A	13	PRO	3.2
1	D	20	ASP	3.2
1	A	21	ALA	3.2
1	F	2	SER	3.2
1	A	11	SER	3.0
1	C	19	LEU	3.0
1	D	3	HIS	3.0
1	D	49	ALA	3.0

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Mol	Chain	Res	Type	RSRZ
1	D	34	GLY	3.0
1	A	33	VAL	2.9
1	F	27	ARG	2.9
1	C	22	ASP	2.8
1	C	24	TYR	2.8
1	A	19	LEU	2.8
1	D	35	GLN	2.8
1	F	21	ALA	2.7
1	F	15	LEU	2.7
1	B	189	SER	2.6
1	B	186	LEU	2.6
1	C	49	ALA	2.6
1	A	15	LEU	2.6
1	D	255	ASN	2.6
1	A	9	SER	2.5
1	E	19	LEU	2.5
1	E	168	ASP	2.5
1	F	29	ALA	2.5
1	E	160	LEU	2.5
1	D	21	ALA	2.5
1	B	13	PRO	2.4
1	B	199	PHE	2.4
1	F	49	ALA	2.4
1	E	189	SER	2.3
1	B	187	PRO	2.3
1	E	208	GLU	2.3
1	B	31	ASP	2.3
1	E	158	ASN	2.3
1	F	187	PRO	2.2
1	A	22	ASP	2.2
1	E	186	LEU	2.2
1	C	255	ASN	2.2
1	C	21	ALA	2.2
1	E	157	ASN	2.2
1	B	254	ASP	2.2
1	A	7	GLU	2.2
1	B	23	LEU	2.2
1	A	24	TYR	2.1
1	B	28	TRP	2.1
1	A	20	ASP	2.0
1	B	208	GLU	2.0
1	C	186	LEU	2.0

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Mol	Chain	Res	Type	RSRZ
1	B	210	LYS	2.0

6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

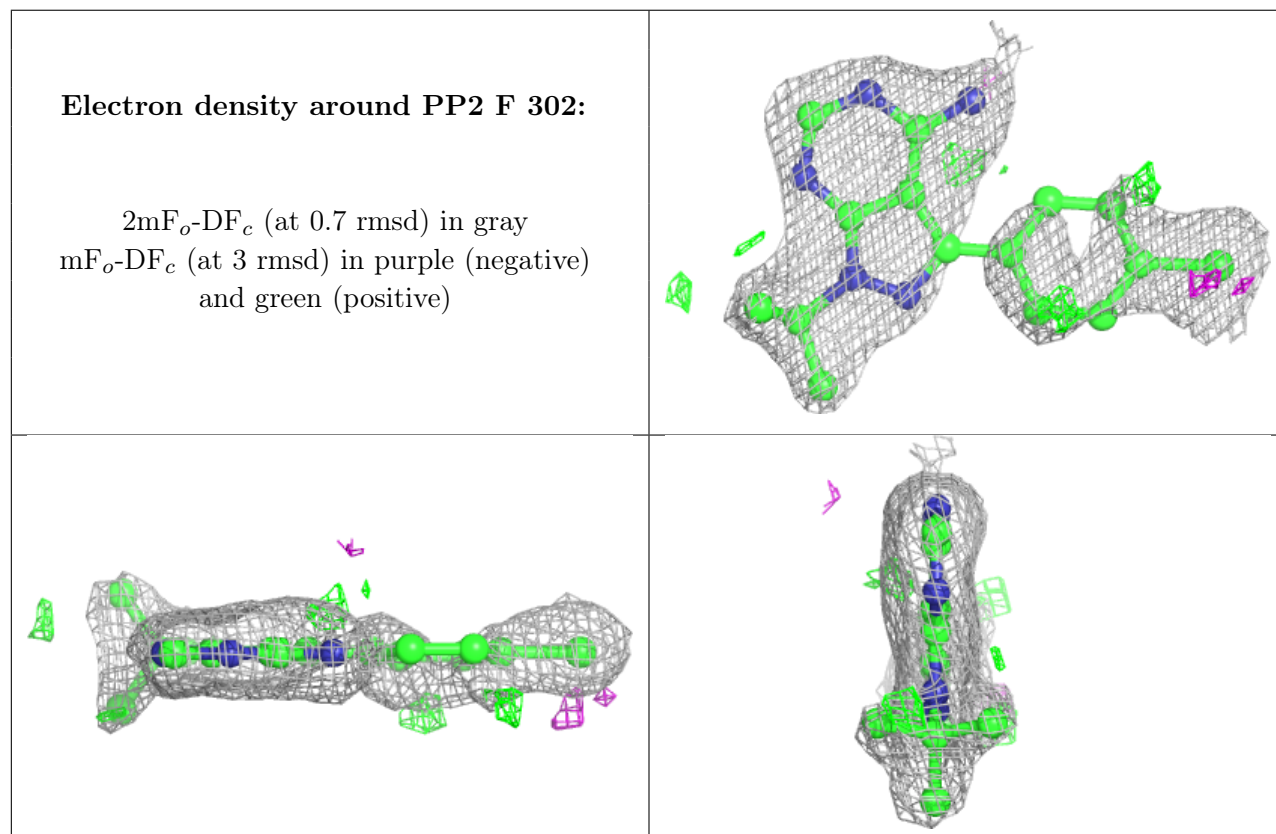
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
6	ACT	F	305	4/4	0.75	0.25	61,75,101,107	0
6	ACT	D	306	4/4	0.83	0.20	44,60,61,66	0
3	PP2	F	302	21/21	0.87	0.16	16,38,75,133	21
6	ACT	B	304	4/4	0.88	0.21	31,59,67,91	0
6	ACT	D	305	4/4	0.88	0.13	32,38,46,75	0
7	PEG	C	303	7/7	0.89	0.18	38,60,89,127	0
6	ACT	A	305	4/4	0.90	0.16	27,40,47,49	0
6	ACT	E	304	4/4	0.91	0.18	37,47,51,99	0
3	PP2	B	302	21/21	0.91	0.13	19,37,63,143	21
4	NA	B	303	1/1	0.91	0.19	44,44,44,44	0
7	PEG	F	306	7/7	0.92	0.14	35,42,68,114	0
3	PP2	D	302	21/21	0.93	0.13	10,24,51,82	21
3	PP2	E	302	21/21	0.93	0.13	11,20,39,60	21
3	PP2	A	302	21/21	0.94	0.13	15,30,81,115	21
2	KAN	E	301	33/33	0.94	0.10	30,33,37,38	0
4	NA	D	304	1/1	0.94	0.10	40,40,40,40	0
5	CL	A	304	1/1	0.94	0.09	45,45,45,45	0
4	NA	F	304	1/1	0.95	0.14	37,37,37,37	0
4	NA	A	303	1/1	0.95	0.12	32,32,32,32	0
3	PP2	C	302[B]	21/21	0.95	0.12	0,21,75,103	21
4	NA	D	303	1/1	0.95	0.08	22,22,22,22	1
3	PP2	C	302[A]	21/21	0.95	0.12	3,22,47,104	21

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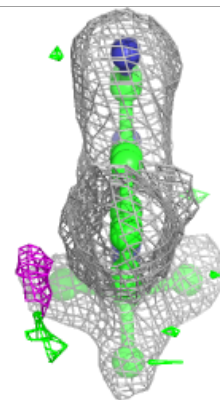
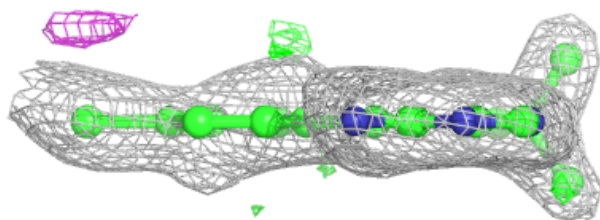
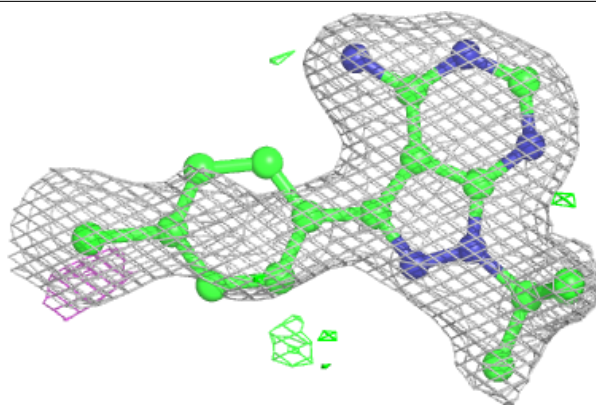
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
2	KAN	A	301	33/33	0.96	0.07	17,23,33,36	0
2	KAN	B	301	33/33	0.96	0.09	25,28,36,38	0
2	KAN	D	301	33/33	0.97	0.07	17,21,25,25	0
2	KAN	C	301	33/33	0.97	0.07	22,25,35,38	0
2	KAN	F	301	33/33	0.97	0.07	13,19,26,27	0
4	NA	E	303	1/1	0.98	0.10	35,35,35,35	0
4	NA	F	303	1/1	0.99	0.04	23,23,23,23	1

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

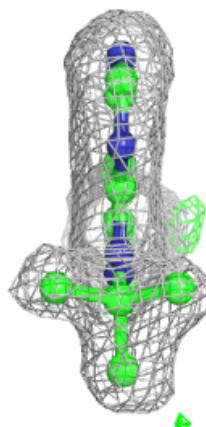
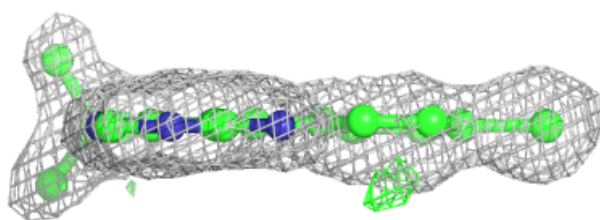
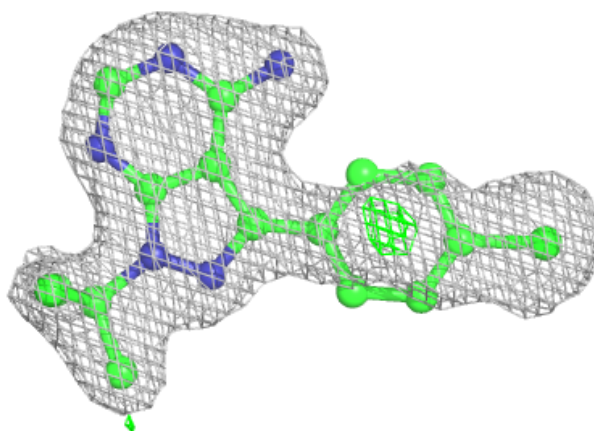


Electron density around PP2 B 302:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

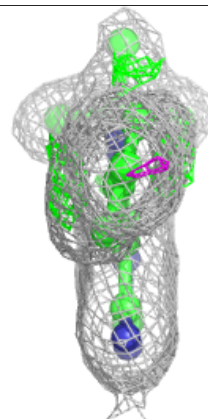
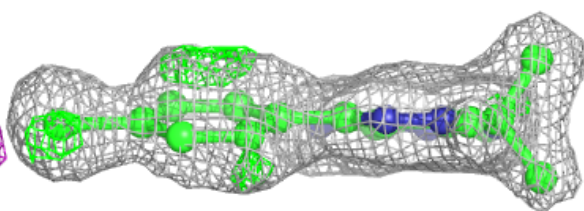
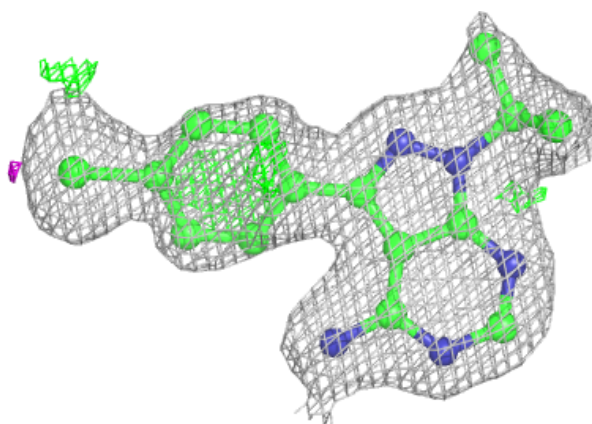
**Electron density around PP2 D 302:**

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

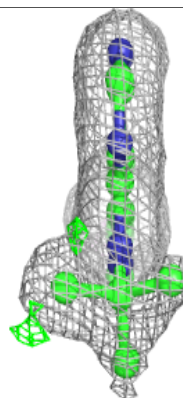
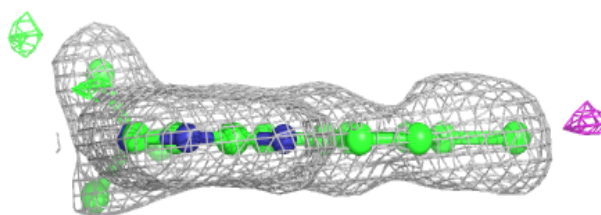
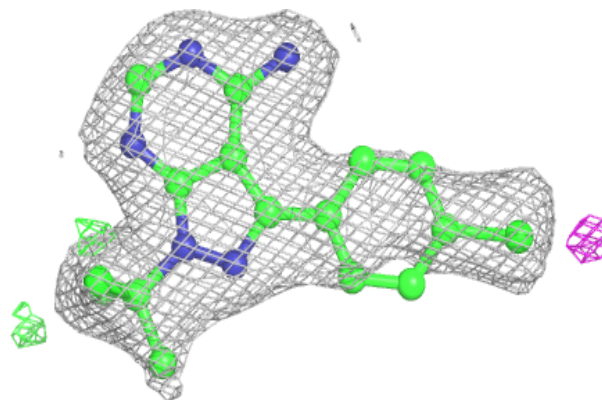


Electron density around PP2 E 302:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

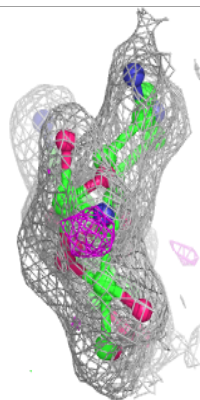
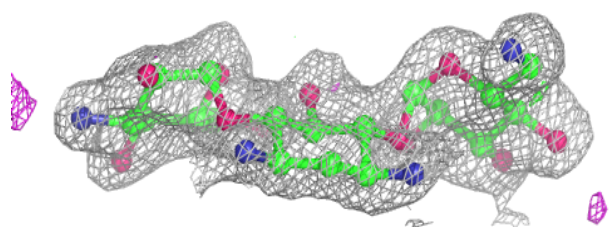
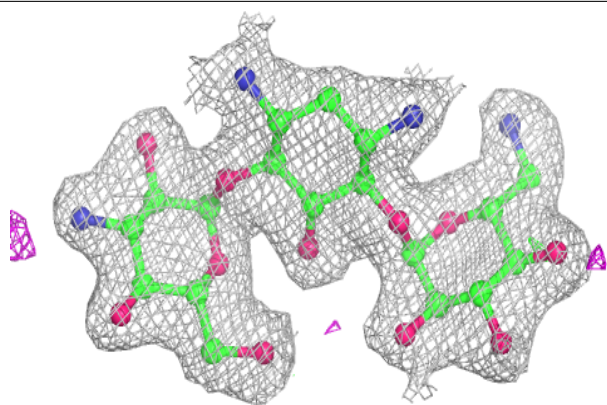
**Electron density around PP2 A 302:**

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

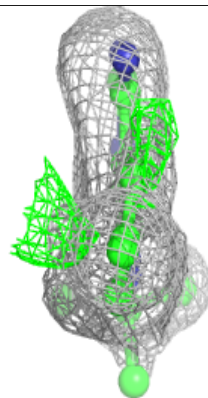
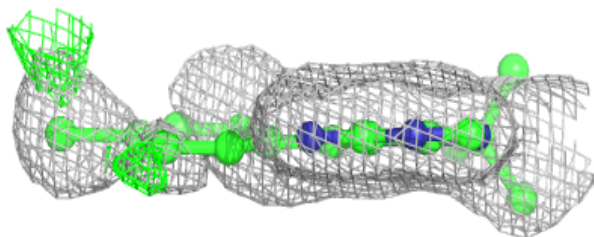
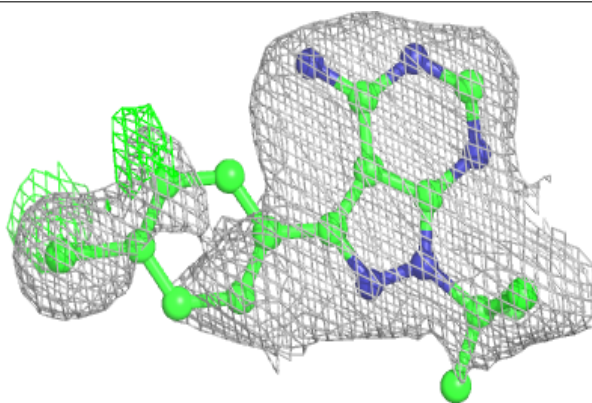


Electron density around KAN E 301:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

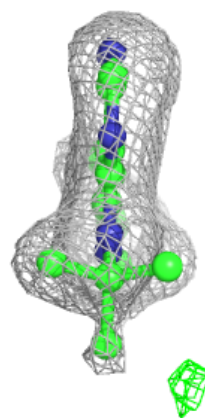
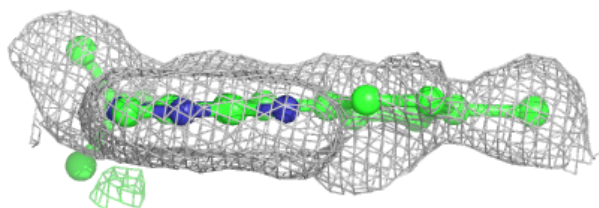
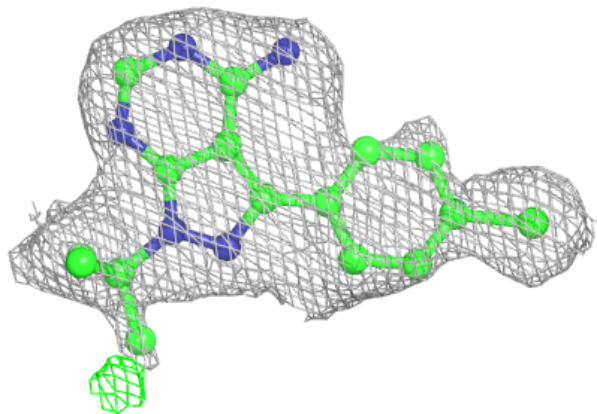
**Electron density around PP2 C 302 (B):**

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



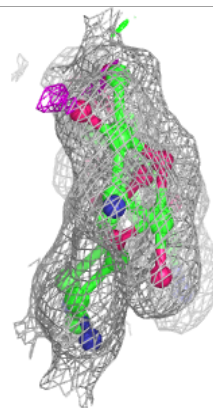
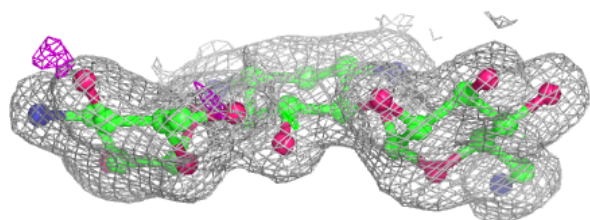
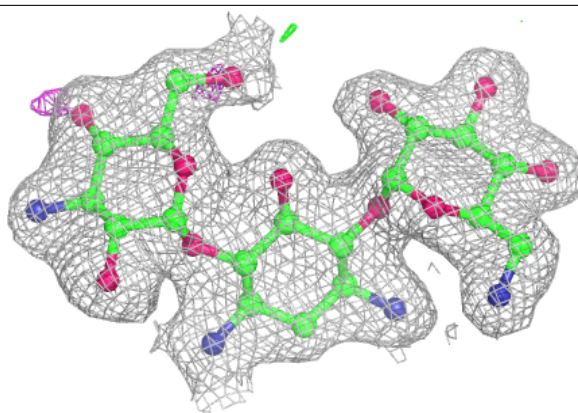
Electron density around PP2 C 302 (A):

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

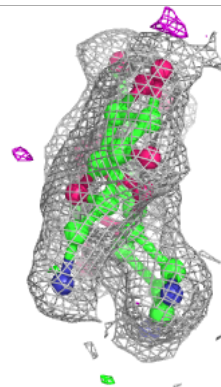
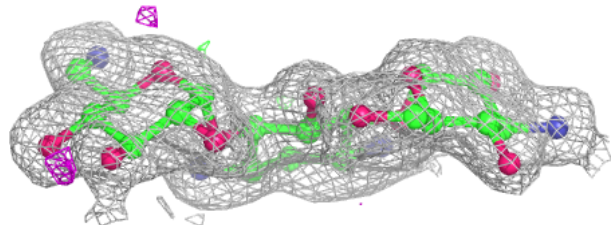
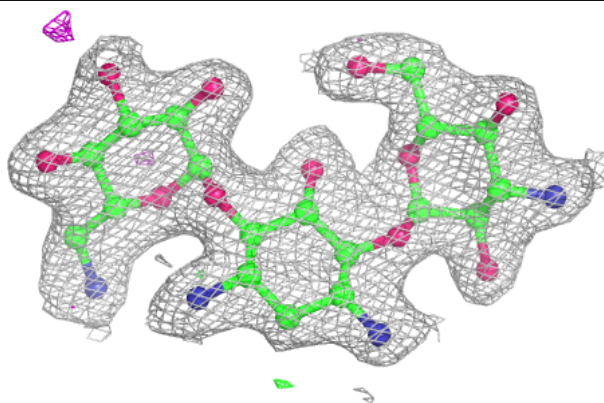


Electron density around KAN A 301:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

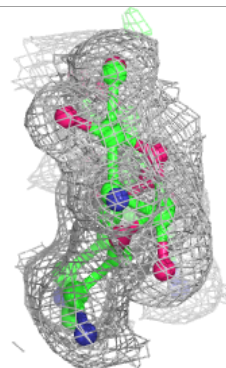
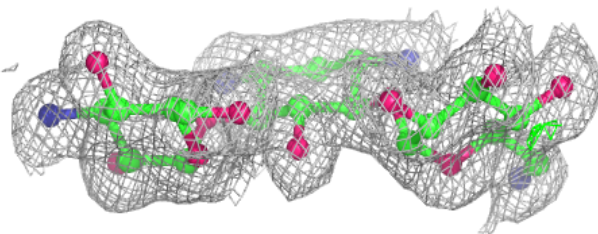
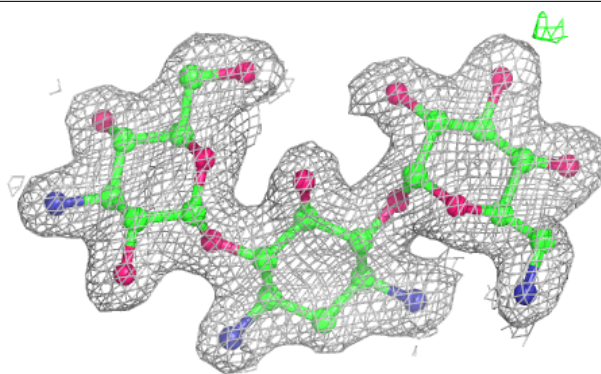
**Electron density around KAN B 301:**

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

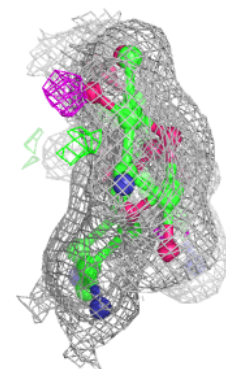
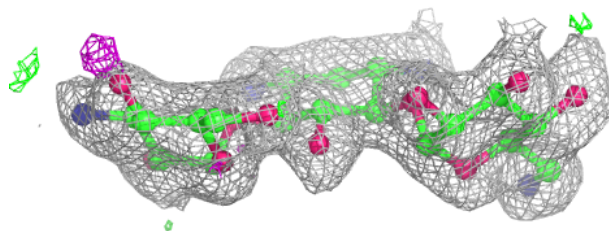
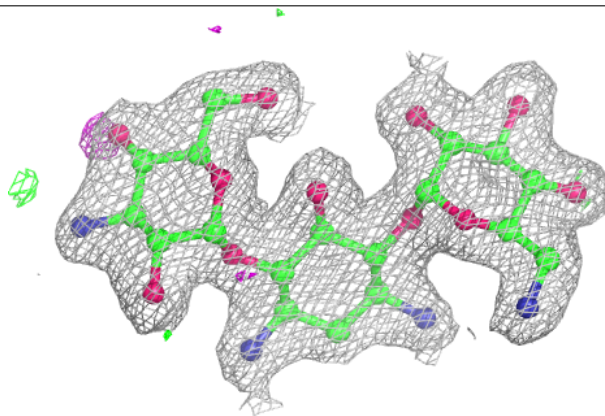


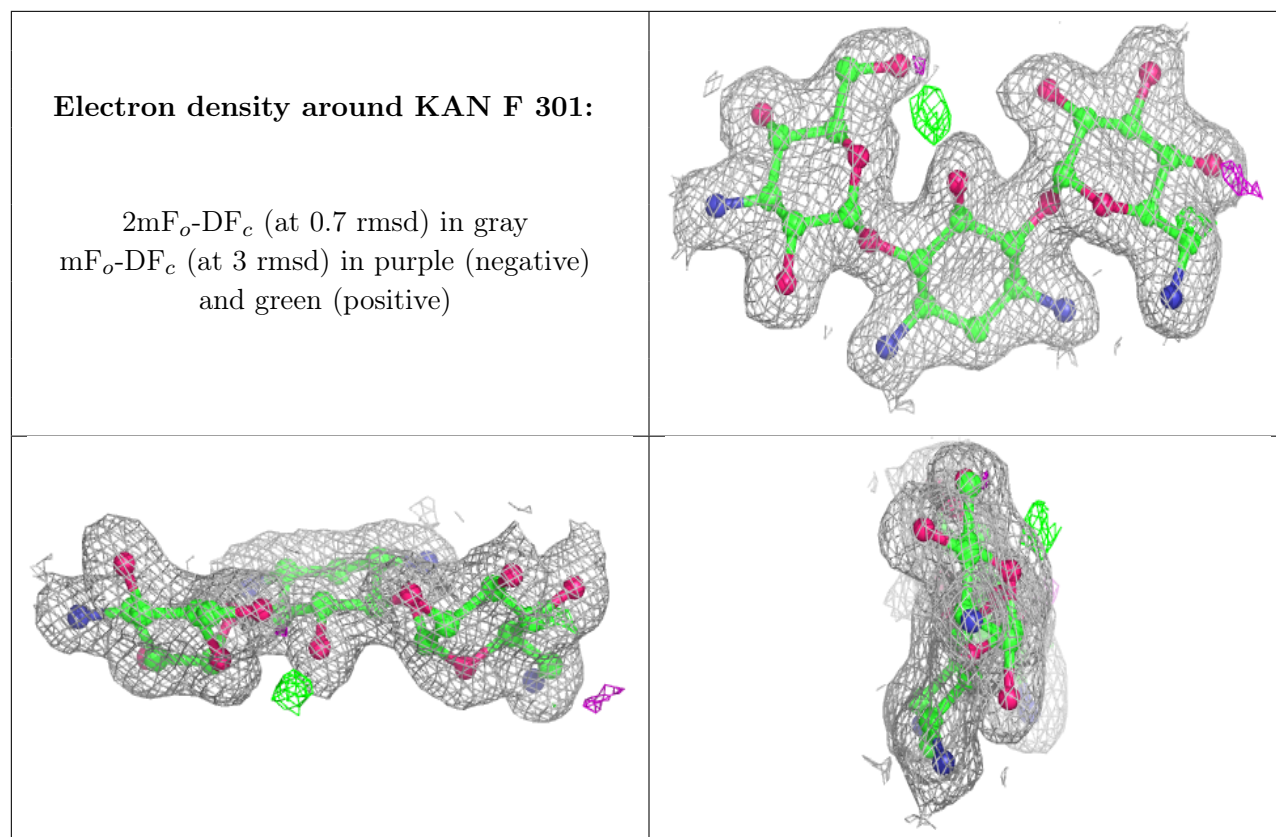
Electron density around KAN D 301:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

**Electron density around KAN C 301:**

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)





6.5 Other polymers [i](#)

There are no such residues in this entry.