



Full wwPDB X-ray Structure Validation Report ⓘ

Jun 15, 2020 – 12:31 pm BST

PDB ID : 2WPE
Title : Trypanosoma brucei trypanothione reductase in complex with 3,4- dihydro-quinazoline inhibitor (DDD00073359)
Authors : Alphey, M.S.; Patterson, S.; Fairlamb, A.H.
Deposited on : 2009-08-06
Resolution : 2.10 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 following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.11
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) : 2.11

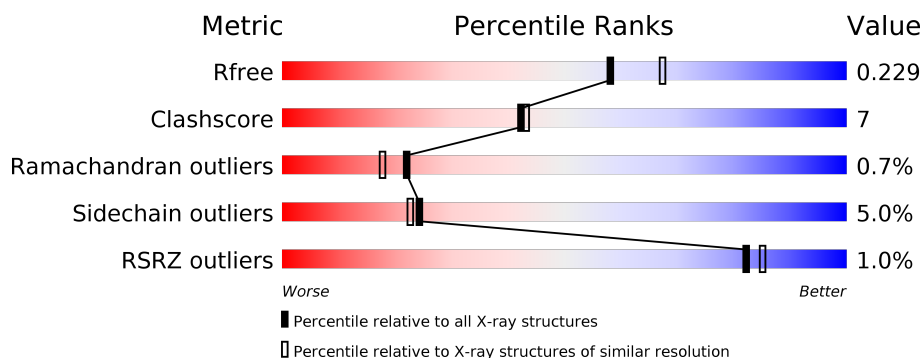
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.10 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	5197 (2.10-2.10)
Clashscore	141614	5710 (2.10-2.10)
Ramachandran outliers	138981	5647 (2.10-2.10)
Sidechain outliers	138945	5648 (2.10-2.10)
RSRZ outliers	127900	5083 (2.10-2.10)

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 on 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	495	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 2%, orange 84%, yellow 13%, green 3%, grey 0%);"></div> <div style="display: flex; justify-content: space-between; width: 100%;"> 2% 84% 13% 3% </div> </div>
1	B	495	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 2%, orange 80%, yellow 16%, green 2%, grey 0%);"></div> <div style="display: flex; justify-content: space-between; width: 100%;"> 2% 80% 16% 2% </div> </div>
1	C	495	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 2%, orange 79%, yellow 17%, green 2%, grey 0%);"></div> <div style="display: flex; justify-content: space-between; width: 100%;"> 2% 79% 17% 2% </div> </div>
1	D	495	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, orange 83%, yellow 13%, green 3%, grey 0%);"></div> <div style="display: flex; justify-content: space-between; width: 100%;"> 83% 13% 3% </div> </div>

2 Entry composition

There are 8 unique types of molecules in this entry. The entry contains 16447 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 TRYPANOTHIONE REDUCTASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	490	Total	C	N	O	S	0	2	0
			3735	2375	637	703	20			
1	B	486	Total	C	N	O	S	0	2	0
			3704	2358	631	696	19			
1	C	484	Total	C	N	O	S	0	4	0
			3698	2352	628	699	19			
1	D	489	Total	C	N	O	S	0	4	0
			3732	2371	635	706	20			

There are 12 discrepancies between the modelled and reference sequences:

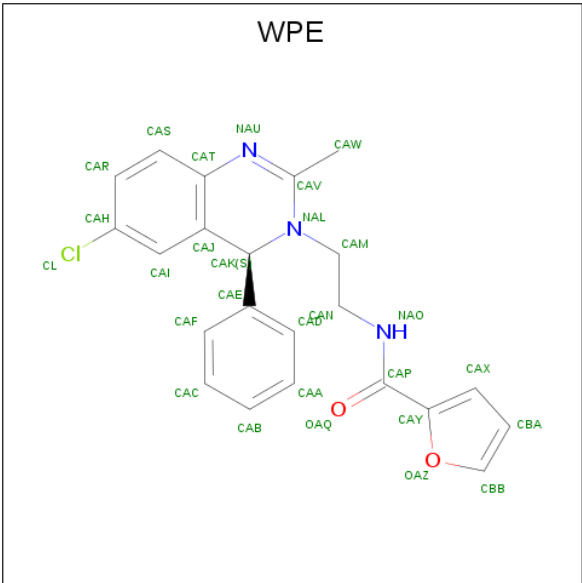
Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	GLY	-	expression tag	UNP Q389T8
A	-1	SER	-	expression tag	UNP Q389T8
A	0	HIS	-	expression tag	UNP Q389T8
B	-2	GLY	-	expression tag	UNP Q389T8
B	-1	SER	-	expression tag	UNP Q389T8
B	0	HIS	-	expression tag	UNP Q389T8
C	-2	GLY	-	expression tag	UNP Q389T8
C	-1	SER	-	expression tag	UNP Q389T8
C	0	HIS	-	expression tag	UNP Q389T8
D	-2	GLY	-	expression tag	UNP Q389T8
D	-1	SER	-	expression tag	UNP Q389T8
D	0	HIS	-	expression tag	UNP Q389T8

- Molecule 2 is FLAVIN-ADENINE DINUCLEOTIDE (three-letter code: FAD) (formula: $C_{27}H_{33}N_9O_{15}P_2$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
2	B	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
2	C	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
2	D	1	Total	C	N	O	P	0	0
			53	27	9	15	2		

- Molecule 3 is N-{2-[(4S)-6-CHLORO-2-METHYL-4-PHENYLQUINAZOLIN-3(4H)-YL]ETHYL}FURAN-2-CARBOXAMIDE (three-letter code: WPE) (formula: C₂₂H₂₀ClN₃O₂).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	Cl	N	O	0	0
			28	22	1	3	2		
3	B	1	Total	C	Cl	N	O	0	0
			28	22	1	3	2		
3	C	1	Total	C	Cl	N	O	0	0
			28	22	1	3	2		
3	D	1	Total	C	Cl	N	O	0	0
			28	22	1	3	2		

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

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	B	1	Total	Na	0	0
			1	1		
4	A	1	Total	Na	0	0
			1	1		
4	D	1	Total	Na	0	0
			1	1		
4	C	1	Total	Na	0	0
			1	1		

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

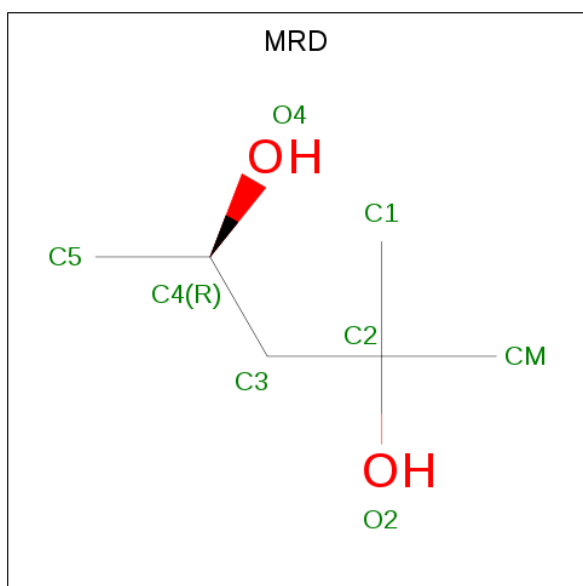
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	B	5	Total	Cl	0	0
			5	5		
5	A	4	Total	Cl	0	0
			4	4		
5	D	4	Total	Cl	0	0
			4	4		
5	C	5	Total	Cl	0	0
			5	5		

- Molecule 6 is (4S)-2-METHYL-2,4-PENTANEDIOL (three-letter code: MPD) (formula: C₆H₁₄O₂).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	1	Total	C	O	0	0
			8	6	2		

- Molecule 7 is (4R)-2-METHYLPENTANE-2,4-DIOL (three-letter code: MRD) (formula: $C_6H_{14}O_2$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	D	1	Total	C	O	0	0
			8	6	2		

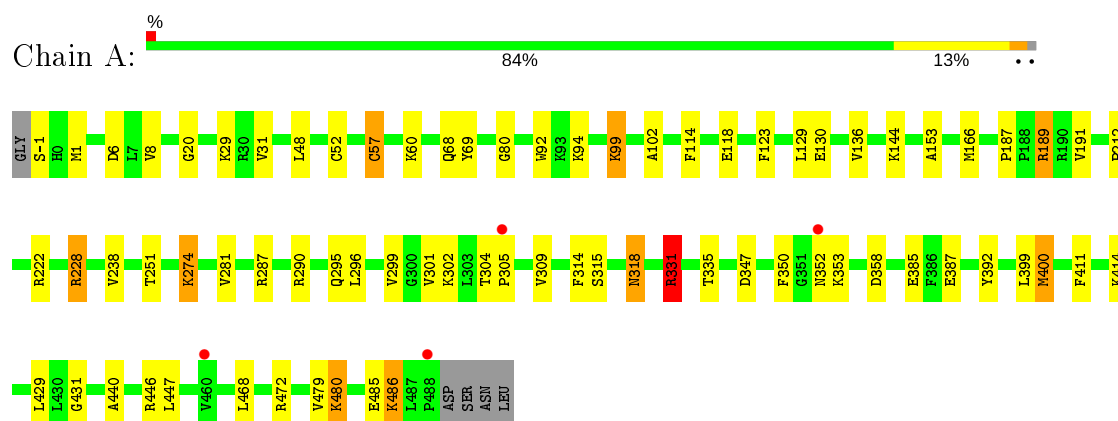
- Molecule 8 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	365	Total 365	O 365	0	0
8	B	265	Total 265	O 265	0	0
8	C	265	Total 265	O 265	0	0
8	D	321	Total 321	O 321	0	0

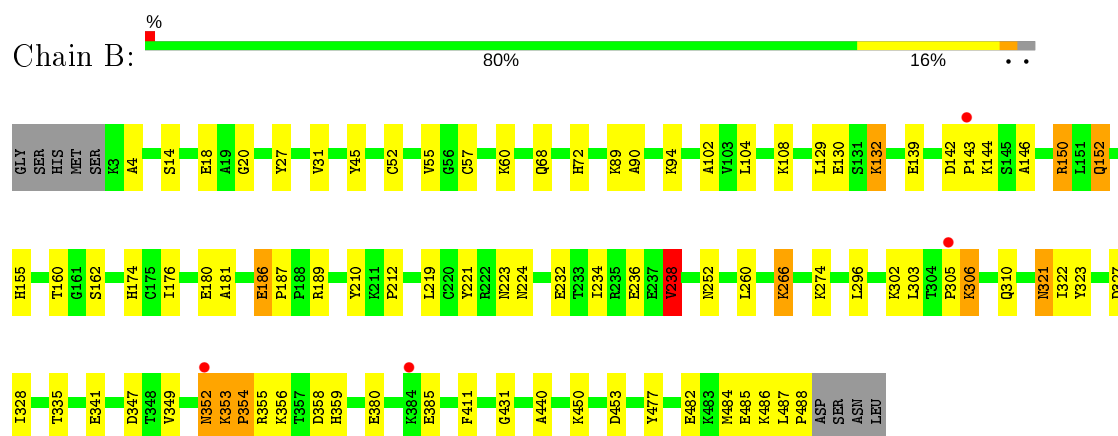
3 Residue-property plots

These plots are drawn for all protein, RNA and DNA 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.

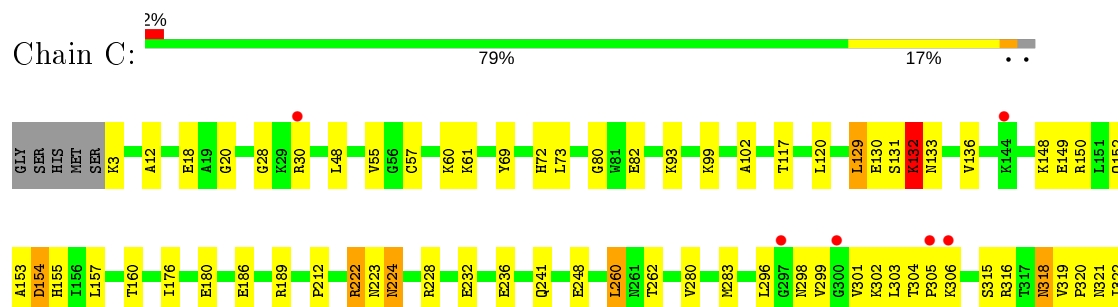
• Molecule 1: TRYPANOTHIONE REDUCTASE

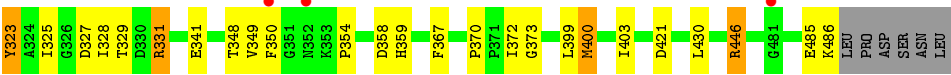


• Molecule 1: TRYPANOTHIONE REDUCTASE

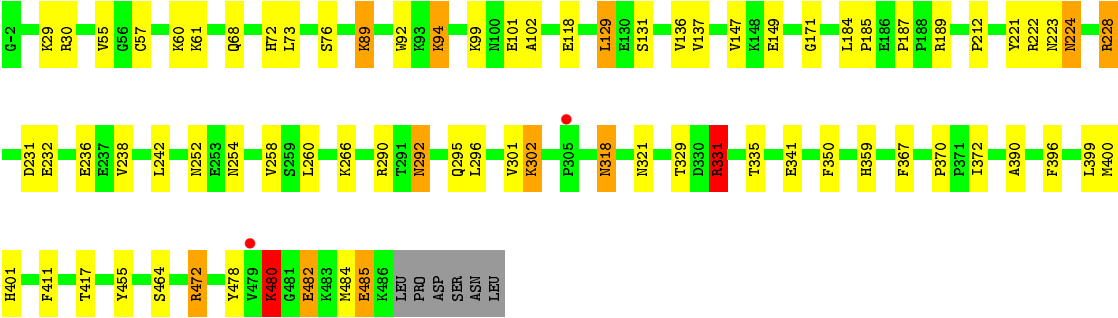
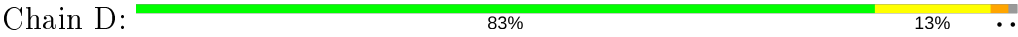


• Molecule 1: TRYPANOTHIONE REDUCTASE





● Molecule 1: TRYPANOTHIONE REDUCTASE



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	100.64Å 63.29Å 169.16Å 90.00° 98.20° 90.00°	Depositor
Resolution (Å)	45.98 – 2.10 45.98 – 2.10	Depositor EDS
% Data completeness (in resolution range)	100.0 (45.98-2.10) 99.9 (45.98-2.10)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.82 (at 2.10Å)	Xtriage
Refinement program	REFMAC 5.5.0088	Depositor
R, R_{free}	0.168 , 0.230 0.168 , 0.229	Depositor DCC
R_{free} test set	6169 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	24.1	Xtriage
Anisotropy	0.416	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 57.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	16447	wwPDB-VP
Average B, all atoms (Å ²)	27.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 8.34% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: MPD, CL, NA, MRD, WPE, FAD

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	1.22	8/3820 (0.2%)	1.04	11/5181 (0.2%)
1	B	1.09	4/3787 (0.1%)	0.92	4/5135 (0.1%)
1	C	1.08	1/3787 (0.0%)	0.91	6/5138 (0.1%)
1	D	1.14	1/3822 (0.0%)	0.94	4/5183 (0.1%)
All	All	1.13	14/15216 (0.1%)	0.95	25/20637 (0.1%)

All (14) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	281	VAL	CB-CG2	7.42	1.68	1.52
1	A	118	GLU	CG-CD	6.82	1.62	1.51
1	A	52	CYS	CB-SG	-6.65	1.71	1.82
1	B	186	GLU	CB-CG	-5.89	1.41	1.52
1	A	123	PHE	CD2-CE2	5.87	1.50	1.39
1	B	380	GLU	CG-CD	5.86	1.60	1.51
1	A	102	ALA	CA-CB	5.83	1.64	1.52
1	A	191	VAL	CB-CG2	5.78	1.65	1.52
1	A	69	TYR	CD1-CE1	5.58	1.47	1.39
1	C	280	VAL	CB-CG2	5.54	1.64	1.52
1	B	238	VAL	CB-CG1	-5.27	1.41	1.52
1	B	181	ALA	CA-CB	5.14	1.63	1.52
1	A	309	VAL	CB-CG1	5.07	1.63	1.52
1	D	118	GLU	CD-OE1	5.03	1.31	1.25

All (25) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	331[A]	ARG	NE-CZ-NH2	-14.28	113.16	120.30
1	A	331[B]	ARG	NE-CZ-NH2	-14.28	113.16	120.30
1	A	331[A]	ARG	NE-CZ-NH1	10.56	125.58	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	331[B]	ARG	NE-CZ-NH1	10.56	125.58	120.30
1	A	189	ARG	NE-CZ-NH2	-9.39	115.60	120.30
1	A	189	ARG	NE-CZ-NH1	8.25	124.42	120.30
1	B	358	ASP	CB-CG-OD1	7.62	125.16	118.30
1	D	260	LEU	CA-CB-CG	7.13	131.70	115.30
1	C	222	ARG	NE-CZ-NH1	6.57	123.58	120.30
1	A	94	LYS	CD-CE-NZ	-6.45	96.86	111.70
1	C	327	ASP	CB-CG-OD2	-6.39	112.55	118.30
1	B	488	PRO	N-CA-CB	6.24	110.79	103.30
1	B	266	LYS	CD-CE-NZ	-6.12	97.63	111.70
1	A	6	ASP	CB-CG-OD1	-6.08	112.83	118.30
1	A	347	ASP	CB-CG-OD1	5.91	123.62	118.30
1	A	287	ARG	NE-CZ-NH1	5.80	123.20	120.30
1	D	30	ARG	CA-CB-CG	-5.73	100.78	113.40
1	D	302	LYS	CD-CE-NZ	-5.64	98.72	111.70
1	C	228	ARG	NE-CZ-NH2	5.55	123.07	120.30
1	B	347	ASP	CB-CG-OD1	5.51	123.26	118.30
1	C	327	ASP	CB-CG-OD1	5.47	123.22	118.30
1	D	290	ARG	NE-CZ-NH2	-5.45	117.58	120.30
1	A	358	ASP	CB-CG-OD2	-5.21	113.61	118.30
1	C	283	MET	CG-SD-CE	-5.12	92.01	100.20
1	C	260	LEU	CA-CB-CG	5.03	126.87	115.30

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts ⓘ

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	3735	0	3751	44	0
1	B	3704	0	3723	52	0
1	C	3698	0	3709	64	0
1	D	3732	0	3737	54	0
2	A	53	0	31	2	0
2	B	53	0	31	0	0
2	C	53	0	31	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	D	53	0	31	0	0
3	A	28	0	20	1	0
3	B	28	0	20	3	0
3	C	28	0	20	1	0
3	D	28	0	20	1	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
4	C	1	0	0	0	0
4	D	1	0	0	0	0
5	A	4	0	0	2	0
5	B	5	0	0	0	0
5	C	5	0	0	1	0
5	D	4	0	0	0	0
6	A	8	0	14	2	0
7	D	8	0	14	0	0
8	A	365	0	0	11	0
8	B	265	0	0	7	0
8	C	265	0	0	4	0
8	D	321	0	0	12	0
All	All	16447	0	15152	209	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 7.

All (209) 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)
1:D:321:ASN:HB2	8:D:2232:HOH:O	1.41	1.17
1:A:485:GLU:HG2	1:A:486:LYS:HD2	1.20	1.08
1:D:292:ASN:HB2	8:D:2213:HOH:O	1.71	0.91
1:C:130:GLU:HB2	1:C:136:VAL:CG2	2.00	0.90
1:B:352:ASN:C	1:B:352:ASN:HD22	1.74	0.90
1:C:241:GLN:OE1	1:C:370:PRO:HG3	1.72	0.88
1:C:155:HIS:HD1	1:C:323:TYR:HH	1.19	0.87
1:D:318:ASN:H	1:D:318:ASN:HD22	1.18	0.86
1:D:341:GLU:OE2	1:D:359:HIS:HE1	1.64	0.81
1:B:305:PRO:O	1:B:306:LYS:HB2	1.80	0.81
1:B:224:ASN:HD22	1:B:252:ASN:HD21	1.30	0.80
1:C:304:THR:HB	1:C:305:PRO:HD2	1.65	0.78
1:A:485:GLU:HG2	1:A:486:LYS:CD	2.08	0.76
1:C:20:GLY:O	1:C:120:LEU:HD13	1.85	0.76

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:370:PRO:HD2	8:D:2261:HOH:O	1.86	0.76
1:C:93:LYS:NZ	1:C:186[B]:GLU:OE2	2.20	0.75
1:A:318:ASN:H	1:A:318:ASN:HD22	1.36	0.74
1:C:155:HIS:HB3	1:C:323:TYR:HE2	1.53	0.73
1:C:301:VAL:HA	1:C:318:ASN:HD21	1.54	0.72
1:D:101[B]:GLU:HG2	8:D:2065:HOH:O	1.90	0.72
1:C:132:LYS:HD2	1:C:321[B]:ASN:OD1	1.91	0.70
1:C:117:THR:O	8:C:2059:HOH:O	2.11	0.69
1:B:274[A]:LYS:HG3	8:B:2156:HOH:O	1.92	0.68
1:D:455:TYR:CE2	1:D:472:ARG:HB2	2.29	0.67
1:A:166:MET:HG3	6:A:1494:MPD:H53	1.79	0.65
1:C:80:GLY:HA2	1:D:94:LYS:HG2	1.79	0.65
1:A:400:MET:HB3	8:A:2051:HOH:O	1.96	0.65
1:B:155:HIS:HB3	1:B:323:TYR:HE2	1.61	0.65
1:B:132:LYS:HZ2	1:B:132:LYS:HB3	1.61	0.65
1:B:234:ILE:O	1:B:238:VAL:HG12	1.97	0.64
8:A:2061:HOH:O	1:B:72:HIS:HD2	1.81	0.63
1:D:189:ARG:HA	1:D:212:PRO:HD2	1.80	0.62
1:A:129:LEU:HD22	1:A:296:LEU:HD23	1.82	0.62
1:B:352:ASN:C	1:B:352:ASN:ND2	2.49	0.62
1:B:482:GLU:HG3	1:B:484:MET:CE	2.29	0.62
1:D:318:ASN:ND2	1:D:318:ASN:H	1.94	0.62
1:B:186:GLU:HB2	1:B:187:PRO:CD	2.29	0.62
1:B:224:ASN:ND2	1:B:252:ASN:HD21	1.98	0.62
1:D:318:ASN:N	1:D:318:ASN:HD22	1.94	0.62
1:D:482:GLU:HG2	1:D:484:MET:CE	2.30	0.61
1:C:133:ASN:ND2	1:C:153:ALA:O	2.22	0.61
1:B:186:GLU:HB2	1:B:187:PRO:HD2	1.83	0.60
1:C:318:ASN:H	1:C:318:ASN:HD22	1.47	0.60
1:D:329:THR:OG1	1:D:331[A]:ARG:NH1	2.35	0.60
1:C:222:ARG:HD2	5:C:1490:CL:CL	2.39	0.60
1:D:390:ALA:HB3	1:D:417:THR:OG1	2.00	0.60
1:D:232:GLU:O	1:D:236:GLU:HG3	2.02	0.60
1:B:341:GLU:OE2	1:B:359:HIS:HE1	1.84	0.59
1:C:485:GLU:HB3	8:C:2259:HOH:O	2.02	0.58
1:D:331[A]:ARG:HH11	1:D:331[A]:ARG:HB2	1.67	0.58
1:A:429:LEU:HD21	1:A:468:LEU:HD21	1.86	0.58
1:C:315:SER:O	1:C:323:TYR:HB3	2.04	0.58
1:B:4:ALA:HA	1:B:152:GLN:HG2	1.85	0.58
1:A:304:THR:HB	1:A:305:PRO:HD2	1.86	0.58
1:C:348:THR:O	1:C:348:THR:HG22	2.04	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:130:GLU:HB2	1:C:136:VAL:HG22	1.85	0.57
1:C:148:LYS:O	1:C:149:GLU:HG2	2.05	0.57
1:C:148:LYS:C	1:C:149:GLU:HG2	2.25	0.57
1:D:331[A]:ARG:NH2	8:D:2236:HOH:O	2.34	0.57
1:C:370:PRO:HG2	1:C:430:LEU:HD11	1.85	0.56
1:A:295:GLN:NE2	8:A:2233:HOH:O	2.38	0.56
1:B:353:LYS:O	1:B:354:PRO:C	2.45	0.55
1:A:411:PHE:CD1	1:A:431:GLY:HA3	2.40	0.55
1:C:319:VAL:HG11	1:C:322:ILE:HD12	1.87	0.55
1:B:104:LEU:HG	1:B:108:LYS:HE3	1.87	0.55
1:C:61:LYS:HE3	1:C:367:PHE:CE1	2.41	0.55
1:A:446:ARG:NE	8:A:2330:HOH:O	2.38	0.55
1:A:446:ARG:HB2	8:A:2285:HOH:O	2.07	0.55
1:B:162:SER:HB3	1:B:327:ASP:HB3	1.89	0.55
1:C:296:LEU:HD12	1:C:303:LEU:HD21	1.88	0.55
1:A:29:LYS:HD2	1:A:350:PHE:CD1	2.42	0.54
1:C:93:LYS:HZ1	1:C:186[B]:GLU:CD	2.11	0.54
1:A:228:ARG:NH2	5:A:1493:CL:CL	2.67	0.54
1:C:132:LYS:HG3	1:C:133:ASN:OD1	2.07	0.54
1:D:480:LYS:HA	1:D:480:LYS:HE3	1.89	0.54
1:C:223:ASN:HB3	1:C:224[A]:ASN:OD1	2.07	0.54
1:A:68:GLN:NE2	8:A:2058:HOH:O	2.39	0.53
1:C:403:ILE:HD11	1:D:102:ALA:HB2	1.90	0.53
1:D:29:LYS:HE3	1:D:350:PHE:CD1	2.44	0.53
1:D:72:HIS:HD2	8:D:2053:HOH:O	1.91	0.53
1:C:73:LEU:CD2	1:D:73:LEU:HD23	2.39	0.53
1:B:18:GLU:OE1	3:B:1000:WPE:NAU	2.42	0.52
1:C:154:ASP:HB3	1:C:155:HIS:CD2	2.44	0.52
1:D:171:GLY:HA3	1:D:258:VAL:O	2.08	0.52
1:C:329:THR:OG1	1:C:331:ARG:HD2	2.09	0.51
1:B:219:LEU:HD23	1:B:219:LEU:C	2.31	0.51
1:C:131:SER:O	1:C:133:ASN:N	2.44	0.51
1:C:176:ILE:HB	1:C:180:GLU:HB2	1.91	0.51
1:D:221:TYR:CE2	1:D:223:ASN:HB2	2.46	0.51
1:C:160:THR:OG1	1:C:328:ILE:HD12	2.11	0.51
1:C:299:VAL:HG23	1:C:301:VAL:HG23	1.92	0.51
1:A:301:VAL:HA	1:A:318:ASN:HD21	1.75	0.50
1:C:130:GLU:HB2	1:C:136:VAL:HG21	1.90	0.50
1:C:82:GLU:OE1	1:D:89:LYS:HE3	2.10	0.50
1:D:359:HIS:HD2	8:D:2254:HOH:O	1.95	0.50
1:B:132:LYS:NZ	1:B:321:ASN:OD1	2.44	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:232:GLU:O	1:B:236:GLU:HG3	2.11	0.50
1:B:189:ARG:HA	1:B:212:PRO:HD2	1.93	0.50
1:C:93:LYS:NZ	1:C:186[B]:GLU:CD	2.65	0.50
1:D:136:VAL:HG13	1:D:147:VAL:HG13	1.94	0.50
1:C:189:ARG:HA	1:C:212:PRO:HD2	1.92	0.50
1:B:14:SER:HA	3:B:1000:WPE:HAR	1.94	0.50
1:A:440:ALA:HB3	1:B:440:ALA:HB3	1.93	0.50
1:C:304:THR:HB	1:C:305:PRO:CD	2.38	0.50
1:A:302:LYS:H	1:A:318:ASN:ND2	2.09	0.49
1:C:232:GLU:O	1:C:236:GLU:HG3	2.12	0.49
1:A:20:GLY:HA2	1:A:31:VAL:HG11	1.94	0.49
1:B:296:LEU:HD12	1:B:303:LEU:HD21	1.94	0.49
1:B:305:PRO:O	1:B:306:LYS:CB	2.53	0.49
1:D:61:LYS:HE3	1:D:367:PHE:CE1	2.47	0.49
1:B:130:GLU:OE1	1:B:150:ARG:NH2	2.45	0.49
1:D:321:ASN:CB	8:D:2232:HOH:O	2.23	0.49
1:D:222:ARG:HH12	1:D:254:ASN:ND2	2.10	0.49
6:A:1494:MPD:H51	8:A:2134:HOH:O	2.13	0.49
1:D:370:PRO:HG2	8:D:2176:HOH:O	2.13	0.49
1:B:274[A]:LYS:HG2	8:B:2155:HOH:O	2.14	0.48
1:D:295:GLN:NE2	8:D:2216:HOH:O	2.45	0.48
1:A:222:ARG:NH2	5:A:1490:CL:CL	2.84	0.48
1:C:302:LYS:H	1:C:318:ASN:ND2	2.11	0.48
1:D:222:ARG:NH1	1:D:254:ASN:ND2	2.62	0.48
1:A:302:LYS:H	1:A:318:ASN:HD21	1.62	0.48
1:B:176:ILE:HB	1:B:180:GLU:HB2	1.96	0.47
1:B:352:ASN:ND2	1:B:352:ASN:O	2.47	0.47
1:C:155:HIS:ND1	1:C:323:TYR:OH	2.27	0.47
1:A:130:GLU:HB2	1:A:136:VAL:HG23	1.95	0.47
1:D:301:VAL:HA	1:D:318:ASN:HD21	1.79	0.47
1:C:69:TYR:CD1	1:D:76:SER:HB3	2.50	0.47
1:B:310:GLN:HB3	8:B:2172:HOH:O	2.14	0.47
1:C:155:HIS:HB3	1:C:323:TYR:CE2	2.43	0.47
3:A:1000:WPE:HAM2	3:A:1000:WPE:HAW1	1.69	0.46
1:A:314:PHE:O	1:A:315:SER:HB2	2.16	0.46
1:B:139:GLU:HG3	1:B:146:ALA:HB3	1.97	0.46
1:C:12:ALA:HB1	1:C:48:LEU:HD12	1.96	0.46
1:C:349:VAL:HG12	1:C:350:PHE:CE1	2.51	0.46
1:D:136:VAL:HG12	1:D:137:VAL:N	2.31	0.46
1:D:68:GLN:NE2	8:D:2045:HOH:O	2.48	0.46
1:A:331[A]:ARG:NH2	8:A:2260:HOH:O	2.49	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:478:TYR:HA	1:D:482:GLU:O	2.15	0.45
1:B:52:CYS:HB2	1:B:335:THR:OG1	2.16	0.45
1:C:72:HIS:HD2	8:C:2033:HOH:O	1.99	0.45
1:C:18:GLU:OE1	3:C:1000:WPE:NAU	2.49	0.45
1:D:302:LYS:H	1:D:318:ASN:ND2	2.14	0.45
1:A:385:GLU:HB3	8:A:2300:HOH:O	2.17	0.45
1:A:99:LYS:C	1:A:99:LYS:HD2	2.37	0.45
1:B:477:TYR:CD1	1:B:487:LEU:HD13	2.52	0.45
1:C:320:PRO:O	1:C:321[B]:ASN:OD1	2.34	0.45
1:C:372:ILE:HG22	1:C:373:GLY:N	2.32	0.45
1:A:392:TYR:O	1:A:414:LYS:HA	2.17	0.44
1:B:221:TYR:CE2	1:B:223:ASN:HB2	2.51	0.44
3:D:1000:WPE:HAW1	3:D:1000:WPE:HAM2	1.84	0.44
1:B:132:LYS:NZ	1:B:132:LYS:HB3	2.31	0.44
1:A:57:CYS:HB3	2:A:998:FAD:C4	2.47	0.44
1:B:90:ALA:HB1	1:B:210:TYR:CD1	2.53	0.44
1:A:8:VAL:CG2	1:A:153:ALA:HB2	2.48	0.44
1:D:129:LEU:HD22	1:D:296:LEU:HD23	1.99	0.44
1:C:316:ARG:HG2	1:C:323:TYR:CD1	2.53	0.43
1:D:411:PHE:CZ	1:D:464:SER:HB3	2.53	0.43
1:A:304:THR:HB	1:A:305:PRO:CD	2.48	0.43
1:C:102:ALA:HB1	1:D:399:LEU:HD11	2.00	0.43
1:A:318:ASN:H	1:A:318:ASN:ND2	2.11	0.43
1:A:479:VAL:O	1:A:480:LYS:C	2.57	0.43
1:B:411:PHE:CD1	1:B:431:GLY:HA3	2.53	0.43
1:D:184:LEU:HA	1:D:185:PRO:HD3	1.94	0.43
1:B:160:THR:OG1	1:B:328:ILE:HD12	2.18	0.43
1:B:266:LYS:HD2	1:B:266:LYS:N	2.33	0.43
1:C:130:GLU:CB	1:C:136:VAL:CG2	2.86	0.42
1:C:358:ASP:OD2	1:C:446:ARG:NH2	2.51	0.42
1:D:92:TRP:HB3	1:D:187:PRO:HD3	2.01	0.42
1:D:482:GLU:HG2	1:D:484:MET:HE3	2.00	0.42
1:A:399:LEU:HD11	1:B:102:ALA:HB1	1.99	0.42
1:B:450:LYS:NZ	8:B:2239:HOH:O	2.51	0.42
1:C:341:GLU:OE2	1:C:359:HIS:HE1	2.02	0.42
1:D:485:GLU:OE1	1:D:485:GLU:N	2.53	0.42
1:A:446:ARG:NH1	1:B:453:ASP:OD1	2.52	0.42
1:A:80:GLY:HA2	1:B:94:LYS:HG2	2.01	0.42
1:C:157:LEU:HD11	1:C:325:ILE:HG12	2.01	0.42
1:B:20:GLY:HA2	1:B:31:VAL:HG11	2.02	0.42
1:D:238:VAL:HG21	1:D:372:ILE:HD11	2.01	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:52:CYS:HB3	8:B:2015:HOH:O	2.20	0.41
1:C:331:ARG:N	8:C:2191:HOH:O	2.53	0.41
1:D:136:VAL:CG1	1:D:137:VAL:N	2.82	0.41
1:A:68:GLN:HB3	8:A:2059:HOH:O	2.19	0.41
1:B:68:GLN:NE2	8:B:2022:HOH:O	2.46	0.41
1:A:274:LYS:HE3	1:A:274:LYS:HB2	1.41	0.41
1:A:447:LEU:HD23	1:A:447:LEU:HA	1.95	0.41
1:B:27:TYR:OH	1:B:353:LYS:HE3	2.20	0.41
1:C:318:ASN:HD22	1:C:318:ASN:N	2.16	0.41
1:A:144:LYS:HB2	1:A:144:LYS:HE2	1.92	0.41
1:C:129:LEU:HD22	1:C:296:LEU:HD23	2.02	0.41
1:A:129:LEU:HD23	1:A:299:VAL:HG21	2.03	0.41
1:D:222:ARG:NH2	8:D:2163:HOH:O	2.53	0.41
1:A:189:ARG:HA	1:A:212:PRO:HD2	2.02	0.41
1:B:174:HIS:HE1	8:B:2081:HOH:O	2.03	0.41
1:C:421:ASP:C	1:C:421:ASP:OD1	2.59	0.41
1:D:224[A]:ASN:ND2	1:D:252:ASN:OD1	2.54	0.41
1:B:142:ASP:HA	1:B:143:PRO:HD3	1.94	0.41
1:B:482:GLU:HG3	1:B:484:MET:HE3	2.03	0.41
1:C:485:GLU:HG3	1:C:486:LYS:HG2	2.03	0.41
1:D:302:LYS:H	1:D:318:ASN:HD21	1.69	0.41
3:B:1000:WPE:HAW1	3:B:1000:WPE:HAM2	1.67	0.40
1:A:331[B]:ARG:HB3	8:A:2264:HOH:O	2.21	0.40
1:D:400:MET:HG3	1:D:401:HIS:N	2.36	0.40
1:A:48:LEU:HD11	1:A:114:PHE:HE2	1.86	0.40
1:A:92:TRP:HB3	1:A:187:PRO:HD3	2.03	0.40
2:A:998:FAD:H1'1	2:A:998:FAD:H9	1.89	0.40
1:D:228:ARG:HB3	1:D:228:ARG:HE	1.21	0.40
1:D:238:VAL:O	1:D:242:LEU:HG	2.21	0.40
1:C:399:LEU:O	1:C:400:MET:C	2.60	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	490/495 (99%)	477 (97%)	12 (2%)	1 (0%)	47	49
1	B	486/495 (98%)	469 (96%)	12 (2%)	5 (1%)	15	11
1	C	486/495 (98%)	458 (94%)	24 (5%)	4 (1%)	19	15
1	D	491/495 (99%)	473 (96%)	13 (3%)	5 (1%)	15	11
All	All	1953/1980 (99%)	1877 (96%)	61 (3%)	15 (1%)	22	15

All (15) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	132	LYS
1	A	352	ASN
1	C	28	GLY
1	B	306	LYS
1	B	354	PRO
1	D	331[A]	ARG
1	D	331[B]	ARG
1	D	396	PHE
1	D	480	LYS
1	B	45	TYR
1	C	55	VAL
1	C	298	ASN
1	D	55	VAL
1	B	55	VAL
1	B	349	VAL

5.3.2 Protein sidechains ⓘ

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	405/407 (100%)	385 (95%)	20 (5%)	25	23
1	B	400/407 (98%)	380 (95%)	20 (5%)	24	23
1	C	401/407 (98%)	379 (94%)	22 (6%)	21	19

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	D	404/407 (99%)	382 (95%)	22 (5%)	22	20
All	All	1610/1628 (99%)	1526 (95%)	84 (5%)	24	21

All (84) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	-1	SER
1	A	1	MET
1	A	57	CYS
1	A	60	LYS
1	A	99	LYS
1	A	228	ARG
1	A	238	VAL
1	A	251	THR
1	A	274	LYS
1	A	290	ARG
1	A	318	ASN
1	A	331[A]	ARG
1	A	331[B]	ARG
1	A	335	THR
1	A	353	LYS
1	A	387	GLU
1	A	400	MET
1	A	472	ARG
1	A	480	LYS
1	A	486	LYS
1	B	57	CYS
1	B	60	LYS
1	B	89	LYS
1	B	129	LEU
1	B	132	LYS
1	B	144	LYS
1	B	150	ARG
1	B	152	GLN
1	B	238	VAL
1	B	260	LEU
1	B	302	LYS
1	B	321	ASN
1	B	322	ILE
1	B	352	ASN
1	B	353	LYS
1	B	355	ARG

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Mol	Chain	Res	Type
1	B	356	LYS
1	B	385	GLU
1	B	485	GLU
1	B	486	LYS
1	C	3	LYS
1	C	30	ARG
1	C	57	CYS
1	C	60	LYS
1	C	99	LYS
1	C	129	LEU
1	C	132	LYS
1	C	150	ARG
1	C	152	GLN
1	C	154	ASP
1	C	224[A]	ASN
1	C	224[B]	ASN
1	C	248	GLU
1	C	260	LEU
1	C	262	THR
1	C	306	LYS
1	C	318	ASN
1	C	323	TYR
1	C	331	ARG
1	C	354	PRO
1	C	400	MET
1	C	446	ARG
1	D	57	CYS
1	D	60	LYS
1	D	89	LYS
1	D	94	LYS
1	D	99	LYS
1	D	129	LEU
1	D	131	SER
1	D	149	GLU
1	D	224[A]	ASN
1	D	224[B]	ASN
1	D	228	ARG
1	D	231	ASP
1	D	266	LYS
1	D	292	ASN
1	D	318	ASN
1	D	331[A]	ARG

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Mol	Chain	Res	Type
1	D	331[B]	ARG
1	D	335	THR
1	D	472	ARG
1	D	480	LYS
1	D	482	GLU
1	D	485	GLU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (23) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	152	GLN
1	A	318	ASN
1	B	72	HIS
1	B	107	ASN
1	B	174	HIS
1	B	224	ASN
1	B	310	GLN
1	B	352	ASN
1	B	359	HIS
1	C	72	HIS
1	C	107	ASN
1	C	310	GLN
1	C	318	ASN
1	C	359	HIS
1	D	68	GLN
1	D	72	HIS
1	D	107	ASN
1	D	152	GLN
1	D	252	ASN
1	D	254	ASN
1	D	318	ASN
1	D	321	ASN
1	D	359	HIS

5.3.3 RNA ⓘ

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 carbohydrates in this entry.

5.6 Ligand geometry [i](#)

Of 32 ligands modelled in this entry, 22 are monoatomic - leaving 10 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	$\# Z > 2$
6	MPD	A	1494	-	7,7,7	0.81	0	9,10,10	0.76	0
3	WPE	D	1000	-	27,31,31	2.25	7 (25%)	33,43,43	2.11	7 (21%)
2	FAD	B	998	-	51,58,58	1.59	9 (17%)	60,89,89	2.38	11 (18%)
3	WPE	B	1000	-	27,31,31	2.29	7 (25%)	33,43,43	1.73	6 (18%)
2	FAD	C	998	-	51,58,58	1.57	10 (19%)	60,89,89	2.37	9 (15%)
2	FAD	A	998	-	51,58,58	1.55	8 (15%)	60,89,89	2.01	13 (21%)
2	FAD	D	998	-	51,58,58	1.54	9 (17%)	60,89,89	2.37	12 (20%)
3	WPE	C	1000	-	27,31,31	2.51	9 (33%)	33,43,43	1.73	8 (24%)
3	WPE	A	1000	-	27,31,31	2.33	9 (33%)	33,43,43	1.76	6 (18%)
7	MRD	D	1492	-	7,7,7	0.65	0	9,10,10	0.81	0

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
6	MPD	A	1494	-	-	1/5/5/5	-
3	WPE	D	1000	-	-	0/11/30/30	0/4/4/4
2	FAD	B	998	-	-	3/30/50/50	0/6/6/6

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	WPE	B	1000	-	-	0/11/30/30	0/4/4/4
2	FAD	C	998	-	-	4/30/50/50	0/6/6/6
2	FAD	A	998	-	-	4/30/50/50	0/6/6/6
2	FAD	D	998	-	-	4/30/50/50	0/6/6/6
3	WPE	C	1000	-	-	2/11/30/30	0/4/4/4
3	WPE	A	1000	-	-	0/11/30/30	0/4/4/4
7	MRD	D	1492	-	-	2/5/5/5	-

All (68) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	1000	WPE	CAV-NAU	8.41	1.40	1.29
3	B	1000	WPE	CAV-NAU	8.40	1.40	1.29
3	D	1000	WPE	CAV-NAU	5.85	1.37	1.29
3	A	1000	WPE	CAV-NAU	5.45	1.37	1.29
3	A	1000	WPE	CAE-CAK	5.24	1.59	1.52
3	D	1000	WPE	CAJ-CAK	4.91	1.57	1.51
2	A	998	FAD	C5X-N5	4.80	1.43	1.35
2	C	998	FAD	C10-N1	4.77	1.39	1.33
2	C	998	FAD	C2A-N3A	4.54	1.39	1.32
3	A	1000	WPE	CAY-CAP	4.49	1.56	1.49
3	D	1000	WPE	CAY-CAP	4.40	1.56	1.49
3	D	1000	WPE	CAW-CAV	4.18	1.55	1.49
2	B	998	FAD	C2A-N3A	4.17	1.38	1.32
3	B	1000	WPE	CAE-CAK	4.11	1.58	1.52
2	B	998	FAD	C4X-N5	4.07	1.39	1.33
2	D	998	FAD	C2A-N3A	3.95	1.38	1.32
3	C	1000	WPE	CAY-CAP	3.91	1.55	1.49
2	A	998	FAD	C4X-C10	3.83	1.42	1.38
3	C	1000	WPE	CAW-CAV	3.82	1.55	1.49
2	B	998	FAD	C2B-C1B	-3.82	1.48	1.53
2	B	998	FAD	C10-N1	3.82	1.38	1.33
2	A	998	FAD	C10-N1	3.72	1.38	1.33
2	D	998	FAD	C10-N1	3.69	1.38	1.33
3	C	1000	WPE	CAJ-CAK	3.67	1.55	1.51
3	C	1000	WPE	CAK-NAL	3.54	1.50	1.48
2	A	998	FAD	C2A-N1A	3.54	1.40	1.33
2	A	998	FAD	C4-N3	3.51	1.39	1.33
3	A	1000	WPE	CAW-CAV	3.50	1.54	1.49
2	C	998	FAD	C4-N3	3.49	1.39	1.33
3	D	1000	WPE	CAE-CAK	3.44	1.57	1.52

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	1000	WPE	CAY-CAP	3.42	1.55	1.49
2	D	998	FAD	C4-N3	3.23	1.38	1.33
2	C	998	FAD	C2A-N1A	3.22	1.39	1.33
2	D	998	FAD	C4X-C10	3.18	1.42	1.38
3	A	1000	WPE	CAC-CAF	3.11	1.45	1.38
3	A	1000	WPE	CAA-CAD	3.10	1.45	1.38
2	D	998	FAD	C1'-N10	3.09	1.51	1.48
3	B	1000	WPE	CAW-CAV	3.04	1.54	1.49
2	B	998	FAD	C2A-N1A	3.02	1.39	1.33
3	D	1000	WPE	CAV-NAL	2.96	1.43	1.35
2	A	998	FAD	C2A-N3A	2.90	1.36	1.32
2	D	998	FAD	C5'-C4'	2.79	1.55	1.51
2	D	998	FAD	C5X-N5	2.75	1.39	1.35
2	B	998	FAD	C6-C5X	-2.70	1.37	1.41
3	C	1000	WPE	CAV-NAL	2.69	1.42	1.35
2	D	998	FAD	C4X-N5	2.68	1.37	1.33
3	C	1000	WPE	CAM-NAL	2.67	1.51	1.46
3	A	1000	WPE	CAM-NAL	2.60	1.51	1.46
2	C	998	FAD	C4X-C10	2.49	1.41	1.38
3	C	1000	WPE	CAI-CAH	2.43	1.42	1.38
2	D	998	FAD	C2A-N1A	2.42	1.38	1.33
2	B	998	FAD	C5X-N5	2.42	1.39	1.35
3	B	1000	WPE	CAV-NAL	2.37	1.41	1.35
2	A	998	FAD	C4X-N5	2.35	1.36	1.33
3	A	1000	WPE	CAJ-CAK	-2.32	1.49	1.51
2	B	998	FAD	C1'-N10	2.28	1.50	1.48
2	C	998	FAD	C9A-N10	2.27	1.41	1.38
3	D	1000	WPE	CAI-CAH	2.20	1.41	1.38
2	C	998	FAD	C4X-N5	2.17	1.36	1.33
3	A	1000	WPE	CAC-CAB	2.17	1.43	1.38
3	B	1000	WPE	CAJ-CAK	2.15	1.54	1.51
3	B	1000	WPE	CAD-CAE	2.13	1.42	1.39
2	C	998	FAD	C5X-N5	2.09	1.38	1.35
2	B	998	FAD	C4-N3	2.07	1.36	1.33
3	C	1000	WPE	CAN-NAO	2.06	1.50	1.46
2	C	998	FAD	O4-C4	2.04	1.29	1.24
2	C	998	FAD	O3'-C3'	-2.03	1.38	1.43
2	A	998	FAD	C7M-C7	2.01	1.55	1.51

All (72) bond angle outliers are listed below:

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	998	FAD	C4-N3-C2	11.16	124.56	115.14
2	B	998	FAD	C4-N3-C2	10.17	123.73	115.14
2	D	998	FAD	C10-C4X-N5	-8.91	115.10	121.26
2	B	998	FAD	C1'-N10-C9A	8.42	124.92	118.29
2	D	998	FAD	C4X-N5-C5X	8.33	125.10	116.77
2	C	998	FAD	C4X-N5-C5X	6.71	123.48	116.77
2	D	998	FAD	N3A-C2A-N1A	-6.65	118.28	128.68
2	C	998	FAD	C4X-C4-N3	-6.26	114.86	123.43
2	A	998	FAD	N3A-C2A-N1A	-6.20	118.98	128.68
2	B	998	FAD	N3A-C2A-N1A	-6.17	119.04	128.68
3	D	1000	WPE	CAN-CAM-NAL	-5.99	106.35	113.73
2	A	998	FAD	C4-N3-C2	5.57	119.85	115.14
2	D	998	FAD	C4-N3-C2	5.51	119.80	115.14
2	C	998	FAD	N3A-C2A-N1A	-5.45	120.17	128.68
3	D	1000	WPE	CAS-CAT-CAJ	5.04	123.84	119.49
2	A	998	FAD	C4X-N5-C5X	4.92	121.69	116.77
3	B	1000	WPE	CAN-CAM-NAL	-4.83	107.79	113.73
3	D	1000	WPE	CAT-NAU-CAV	4.78	122.68	118.19
3	A	1000	WPE	CAN-CAM-NAL	-4.70	107.94	113.73
2	A	998	FAD	C10-C4X-N5	-4.62	118.06	121.26
2	A	998	FAD	C1'-N10-C9A	4.51	121.84	118.29
2	D	998	FAD	C4X-C4-N3	-4.48	117.31	123.43
3	C	1000	WPE	CAE-CAK-NAL	-4.44	105.25	111.55
2	C	998	FAD	C10-C4X-N5	-4.25	118.32	121.26
2	B	998	FAD	C4X-C4-N3	-4.15	117.76	123.43
3	C	1000	WPE	CAT-NAU-CAV	4.12	122.06	118.19
3	B	1000	WPE	CAM-CAN-NAO	-4.07	103.81	111.60
3	A	1000	WPE	CAE-CAK-NAL	-4.06	105.80	111.55
2	A	998	FAD	C4X-C4-N3	-3.83	118.19	123.43
2	D	998	FAD	C4-C4X-C10	3.80	122.47	119.95
2	B	998	FAD	C1'-N10-C10	-3.75	115.06	118.41
2	A	998	FAD	C2A-N1A-C6A	3.57	124.87	118.75
2	B	998	FAD	C4X-N5-C5X	3.55	120.32	116.77
3	A	1000	WPE	CAM-CAN-NAO	-3.50	104.91	111.60
3	C	1000	WPE	CAY-CAP-NAO	3.38	120.31	115.59
3	B	1000	WPE	CAE-CAK-NAL	-3.35	106.80	111.55
2	D	998	FAD	C4-C4X-N5	3.35	122.43	118.60
3	D	1000	WPE	CAE-CAK-NAL	-3.29	106.88	111.55
3	A	1000	WPE	CAS-CAT-CAJ	3.20	122.25	119.49
2	C	998	FAD	C1'-N10-C9A	3.16	120.78	118.29
2	D	998	FAD	C2A-N1A-C6A	3.14	124.12	118.75

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	1000	WPE	CAH-CAI-CAJ	-3.12	115.85	119.77
2	B	998	FAD	O4B-C1B-C2B	-3.05	102.46	106.93
3	C	1000	WPE	CAE-CAK-CAJ	-2.93	107.73	112.78
2	D	998	FAD	C1'-N10-C10	2.89	121.00	118.41
2	C	998	FAD	C4-C4X-C10	2.86	121.84	119.95
3	D	1000	WPE	CAM-CAN-NAO	-2.81	106.22	111.60
3	B	1000	WPE	CAY-CAP-NAO	-2.79	111.69	115.59
2	A	998	FAD	C4-C4X-C10	2.71	121.75	119.95
2	A	998	FAD	O2'-C2'-C3'	2.66	115.57	109.10
2	A	998	FAD	O4B-C1B-C2B	-2.56	103.18	106.93
2	B	998	FAD	C5X-C9A-N10	2.51	119.53	117.72
2	B	998	FAD	C3B-C2B-C1B	2.48	104.72	100.98
3	C	1000	WPE	CAJ-CAK-NAL	2.40	113.89	110.39
3	D	1000	WPE	CAJ-CAT-NAU	-2.40	120.08	122.17
3	C	1000	WPE	OAQ-CAP-CAY	-2.40	115.86	121.08
3	A	1000	WPE	CAS-CAT-NAU	-2.37	115.44	118.59
3	C	1000	WPE	CAR-CAH-CAI	-2.36	118.39	121.53
2	B	998	FAD	C4A-C5A-N7A	-2.29	107.02	109.40
3	B	1000	WPE	CAE-CAK-CAJ	-2.28	108.85	112.78
2	D	998	FAD	O2B-C2B-C1B	-2.27	102.46	110.85
2	A	998	FAD	C5X-C9A-N10	2.25	119.35	117.72
2	C	998	FAD	C4A-C5A-N7A	-2.24	107.06	109.40
3	D	1000	WPE	CAR-CAH-CAI	2.18	124.43	121.53
3	B	1000	WPE	CAT-NAU-CAV	2.11	120.17	118.19
2	A	998	FAD	C9A-N10-C10	-2.09	119.17	121.91
2	D	998	FAD	C1B-N9A-C4A	-2.09	122.97	126.64
2	C	998	FAD	C9A-C5X-N5	-2.06	119.13	122.36
2	D	998	FAD	C4A-C5A-N7A	-2.06	107.25	109.40
2	A	998	FAD	C5A-C6A-N6A	2.04	123.45	120.35
2	B	998	FAD	C4-C4X-N5	2.04	120.92	118.60
3	C	1000	WPE	CAI-CAH-CL	2.02	121.68	119.15

There are no chirality outliers.

All (20) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	C	1000	WPE	OAQ-CAP-CAY-CAX
7	D	1492	MRD	C2-C3-C4-C5
2	A	998	FAD	PA-O3P-P-O5'
3	C	1000	WPE	NAL-CAM-CAN-NAO
2	A	998	FAD	P-O3P-PA-O1A
2	A	998	FAD	O4B-C4B-C5B-O5B

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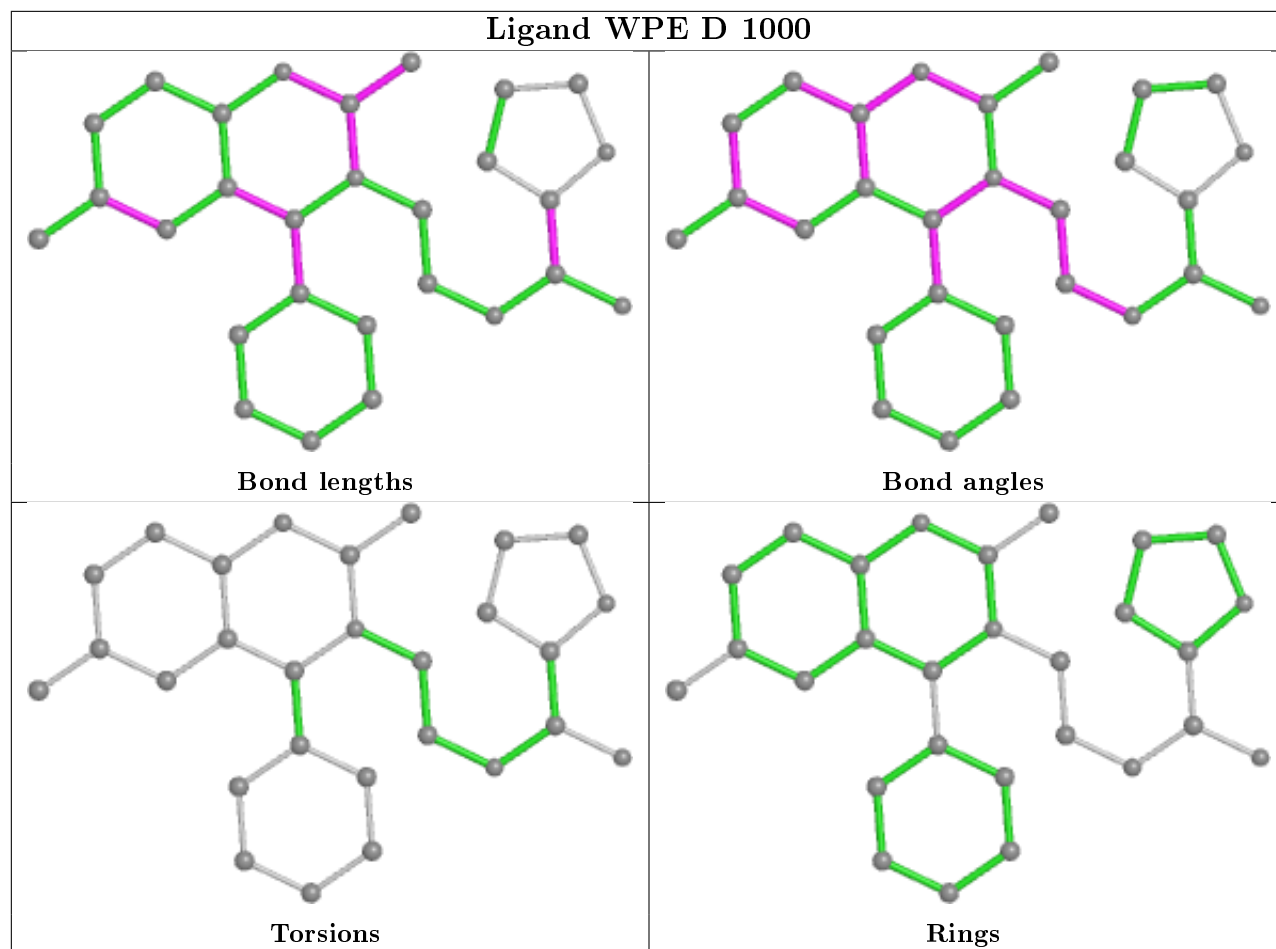
Mol	Chain	Res	Type	Atoms
2	D	998	FAD	PA-O3P-P-O5'
2	C	998	FAD	PA-O3P-P-O5'
2	C	998	FAD	O4B-C4B-C5B-O5B
2	D	998	FAD	P-O3P-PA-O2A
2	C	998	FAD	P-O3P-PA-O2A
6	A	1494	MPD	C2-C3-C4-C5
2	D	998	FAD	O4B-C4B-C5B-O5B
2	B	998	FAD	P-O3P-PA-O2A
2	B	998	FAD	O4B-C4B-C5B-O5B
2	B	998	FAD	PA-O3P-P-O5'
2	D	998	FAD	P-O3P-PA-O1A
2	C	998	FAD	P-O3P-PA-O1A
2	A	998	FAD	P-O3P-PA-O2A
7	D	1492	MRD	C2-C3-C4-O4

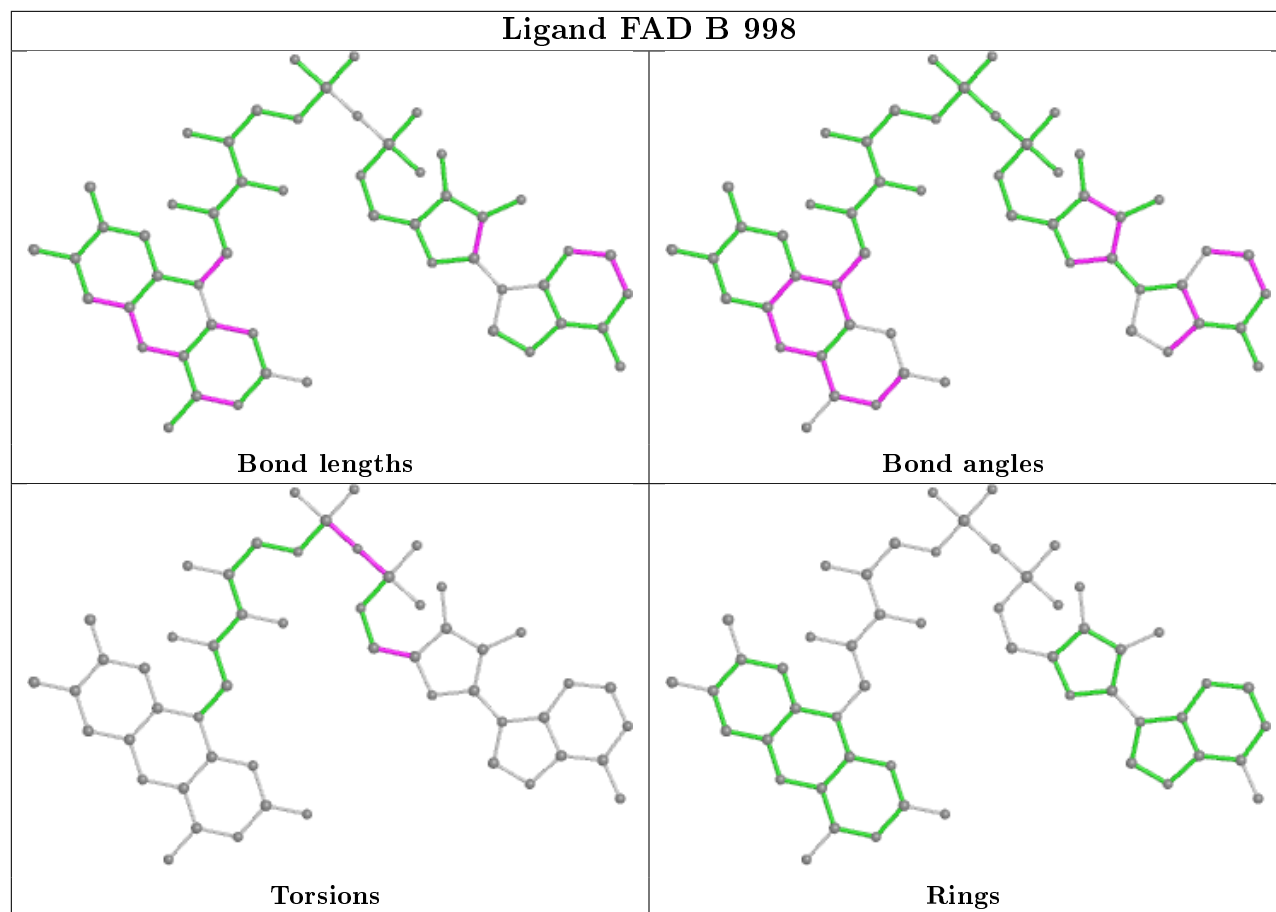
There are no ring outliers.

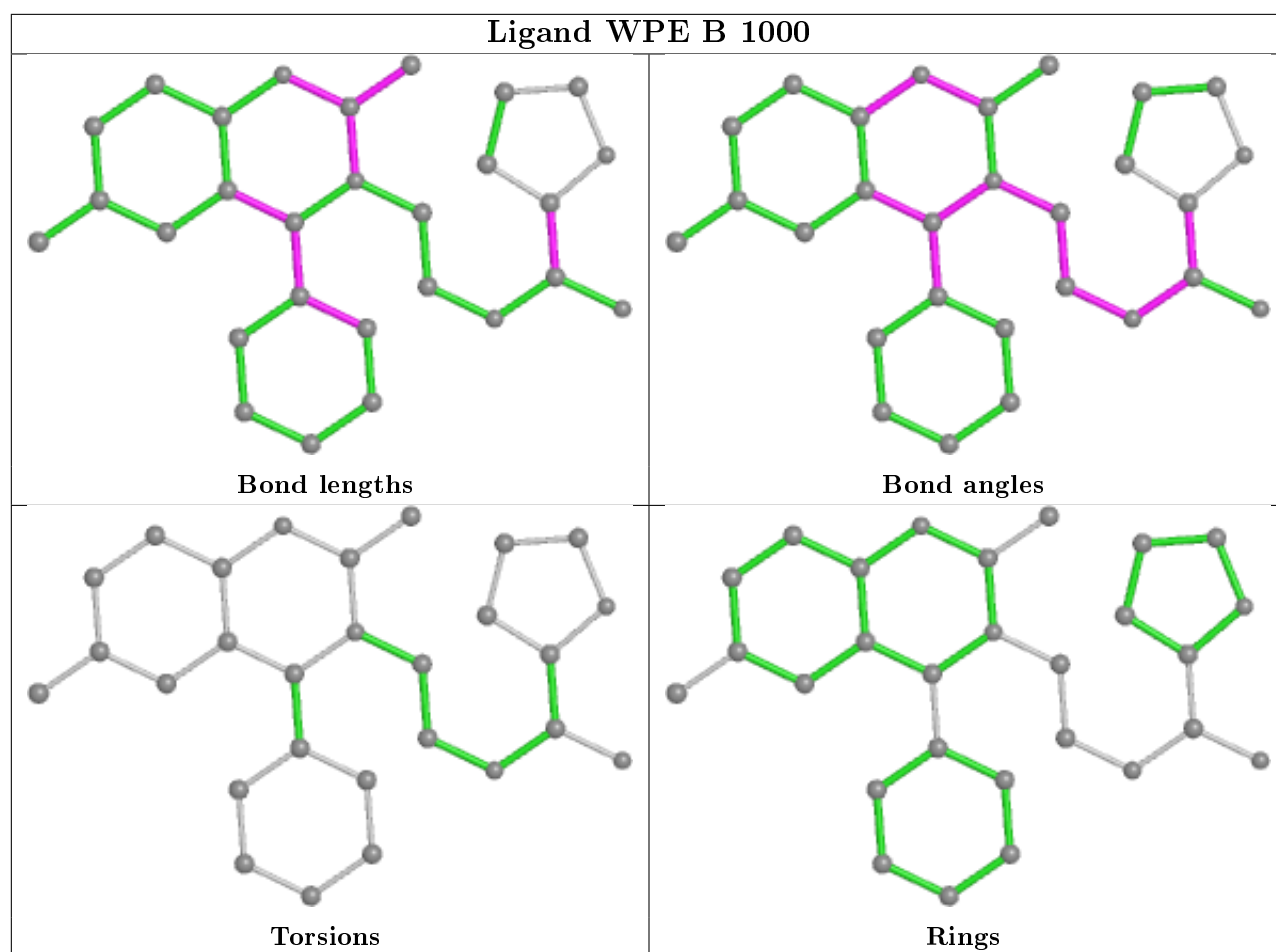
6 monomers are involved in 10 short contacts:

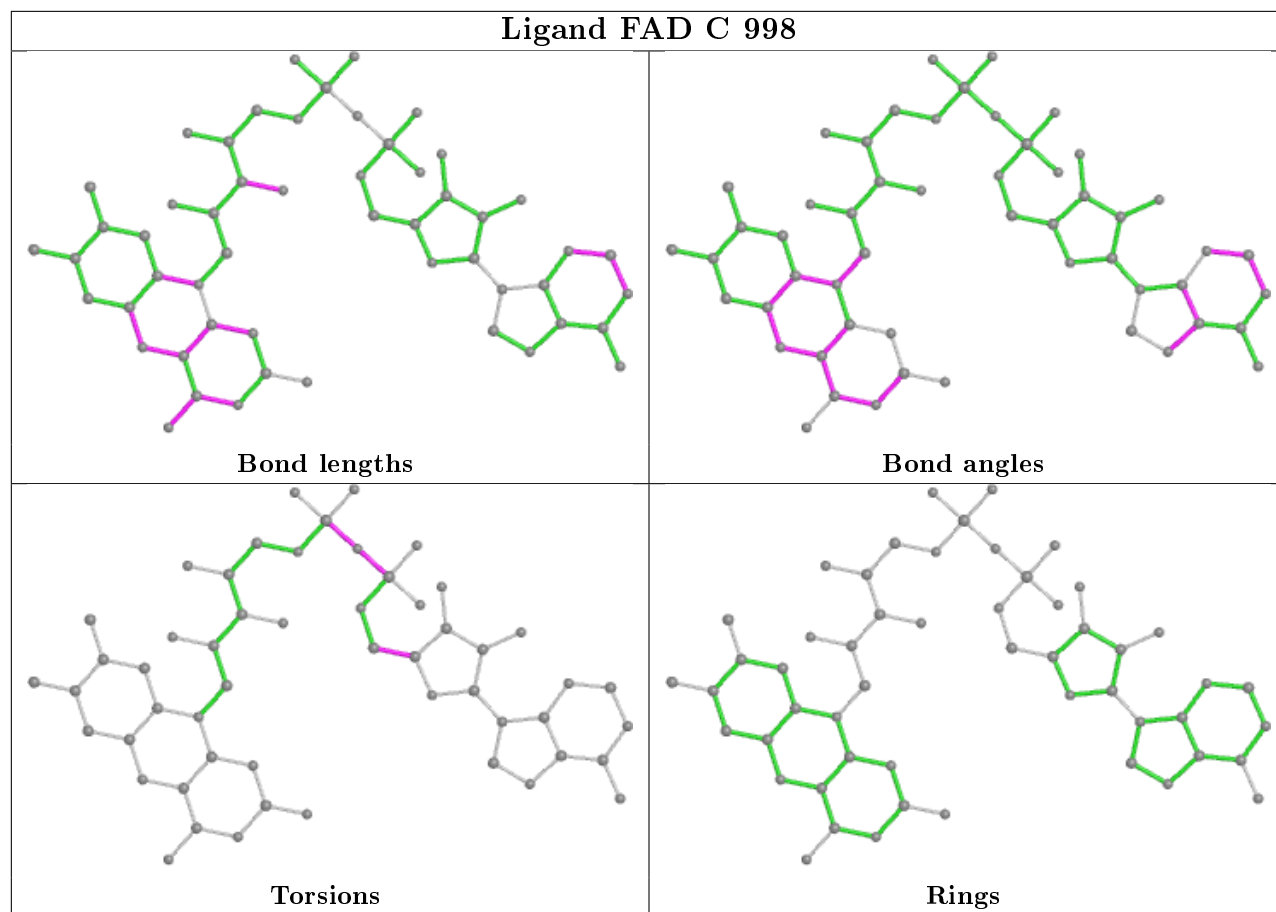
Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	A	1494	MPD	2	0
3	D	1000	WPE	1	0
3	B	1000	WPE	3	0
2	A	998	FAD	2	0
3	C	1000	WPE	1	0
3	A	1000	WPE	1	0

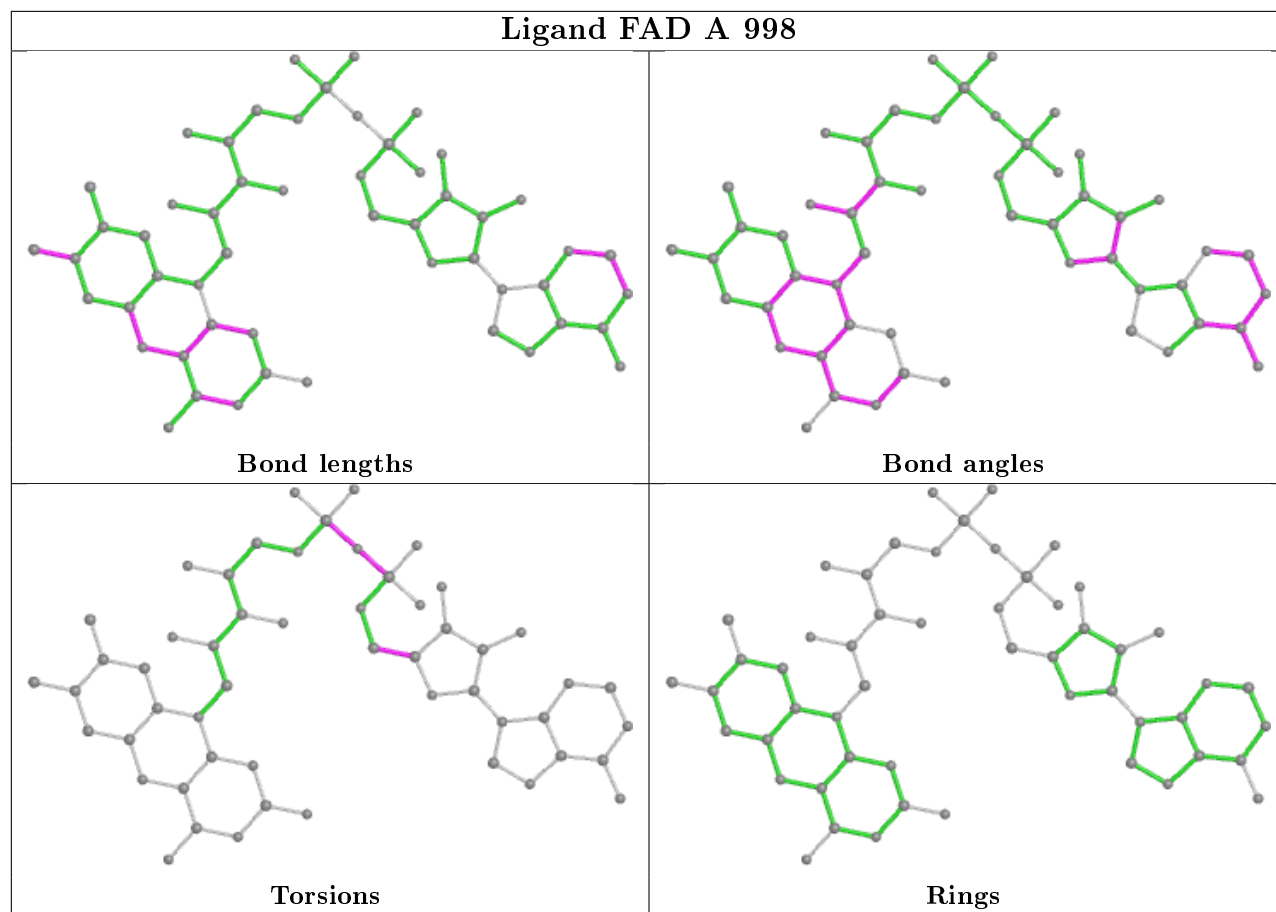
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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.

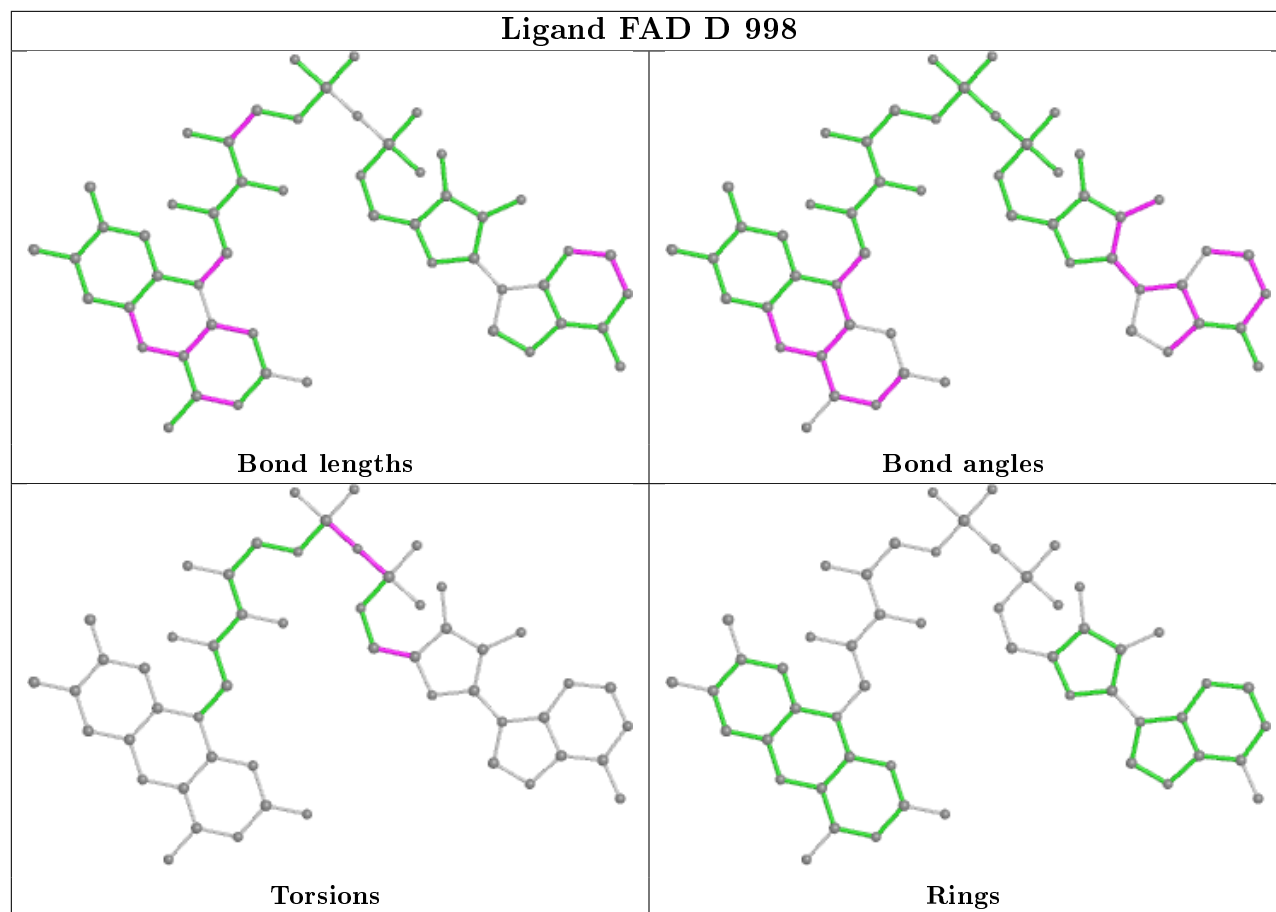


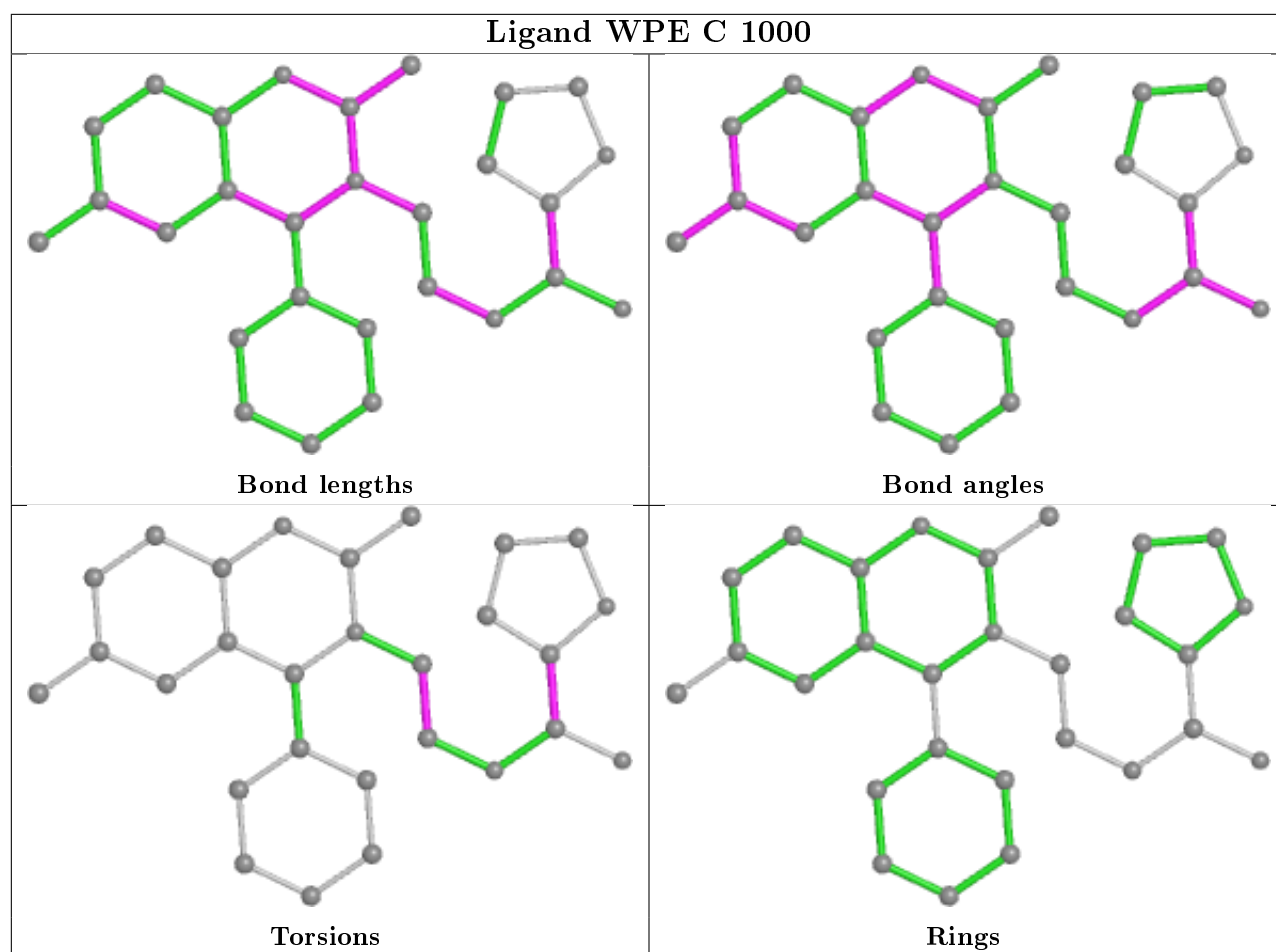


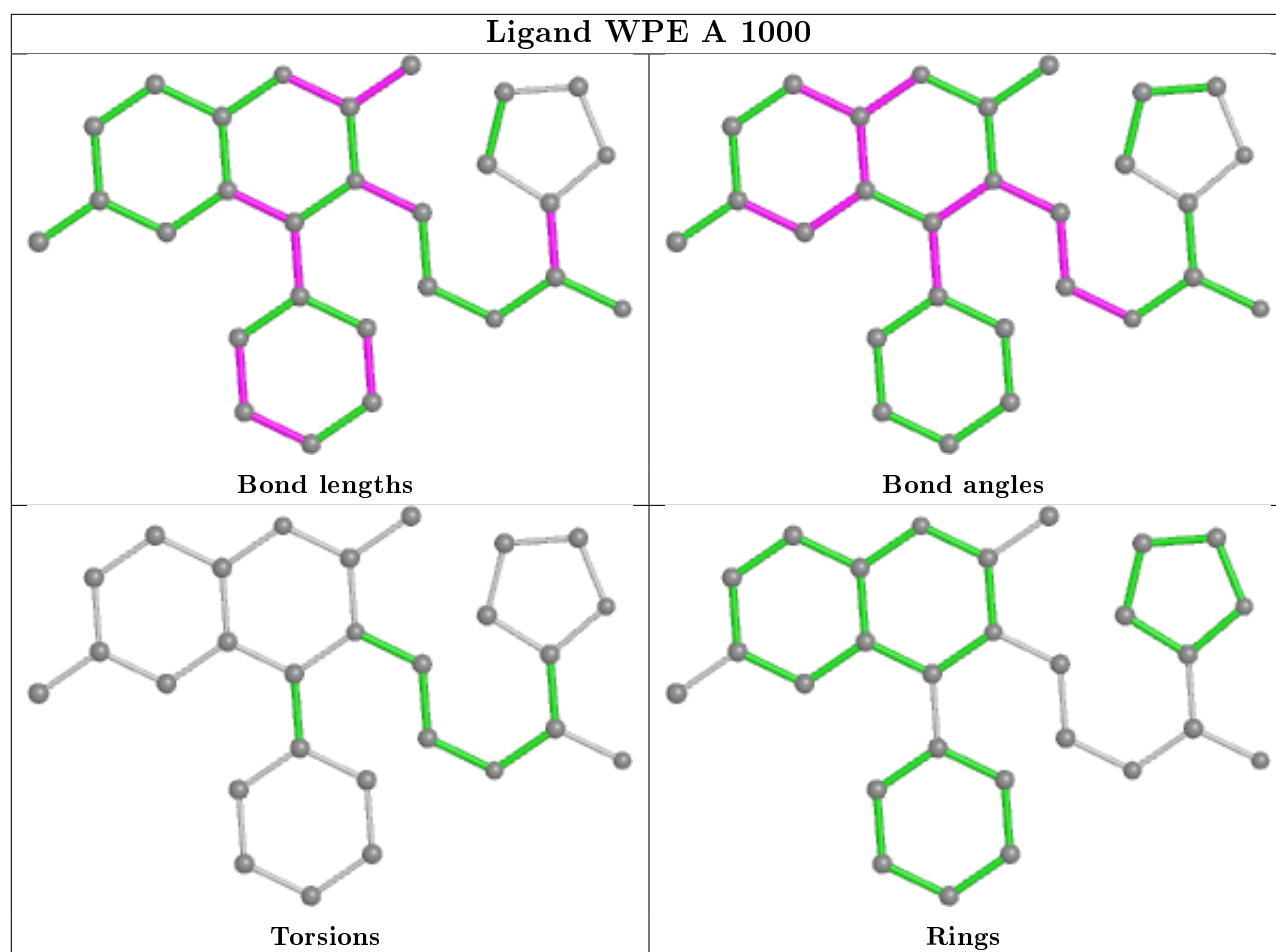












5.7 Other polymers [i](#)

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	490/495 (98%)	-0.43	4 (0%) 86 88	12, 20, 36, 51	0
1	B	486/495 (98%)	-0.10	4 (0%) 86 88	15, 27, 48, 60	0
1	C	484/495 (97%)	-0.09	9 (1%) 66 71	14, 27, 56, 68	0
1	D	489/495 (98%)	-0.40	2 (0%) 92 93	14, 23, 36, 56	0
All	All	1949/1980 (98%)	-0.26	19 (0%) 82 85	12, 24, 49, 68	0

All (19) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	352	ASN	3.4
1	B	352	ASN	3.2
1	C	30	ARG	3.1
1	A	488	PRO	3.0
1	B	305	PRO	2.9
1	D	479	VAL	2.8
1	C	305	PRO	2.6
1	C	350	PHE	2.5
1	C	481	GLY	2.5
1	C	306	LYS	2.5
1	C	300	GLY	2.5
1	A	305	PRO	2.4
1	C	297	GLY	2.4
1	A	352	ASN	2.3
1	B	384	LYS	2.3
1	B	143	PRO	2.1
1	D	305	PRO	2.1
1	C	144	LYS	2.1
1	A	460	VAL	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 carbohydrates 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(\AA^2)	Q<0.9
3	WPE	C	1000	28/28	0.87	0.17	40,49,82,83	0
4	NA	A	1489	1/1	0.89	0.14	26,26,26,26	0
5	CL	B	1494	1/1	0.90	0.11	33,33,33,33	0
3	WPE	B	1000	28/28	0.91	0.14	29,33,62,63	0
6	MPD	A	1494	8/8	0.91	0.21	34,39,41,43	0
7	MRD	D	1492	8/8	0.92	0.18	39,42,44,44	0
5	CL	C	1491	1/1	0.95	0.08	42,42,42,42	0
3	WPE	D	1000	28/28	0.95	0.12	17,25,60,61	0
5	CL	D	1490	1/1	0.95	0.10	39,39,39,39	0
5	CL	C	1488	1/1	0.95	0.09	39,39,39,39	0
3	WPE	A	1000	28/28	0.96	0.11	15,24,53,54	0
5	CL	D	1488	1/1	0.96	0.09	32,32,32,32	0
4	NA	B	1489	1/1	0.96	0.13	37,37,37,37	0
5	CL	A	1493	1/1	0.96	0.12	35,35,35,35	0
2	FAD	B	998	53/53	0.97	0.12	15,24,37,39	0
4	NA	C	1487	1/1	0.97	0.06	26,26,26,26	0
2	FAD	C	998	53/53	0.97	0.09	16,26,36,38	0
5	CL	C	1492	1/1	0.97	0.07	34,34,34,34	0
5	CL	B	1490	1/1	0.97	0.05	27,27,27,27	0
5	CL	B	1492	1/1	0.97	0.07	40,40,40,40	0
4	NA	D	1487	1/1	0.98	0.06	33,33,33,33	0
5	CL	D	1491	1/1	0.98	0.07	36,36,36,36	0
2	FAD	A	998	53/53	0.98	0.09	8,15,18,20	0
5	CL	C	1489	1/1	0.99	0.15	38,38,38,38	0
5	CL	A	1490	1/1	0.99	0.07	24,24,24,24	0
5	CL	D	1489	1/1	0.99	0.11	21,21,21,21	0
5	CL	A	1492	1/1	0.99	0.10	26,26,26,26	0

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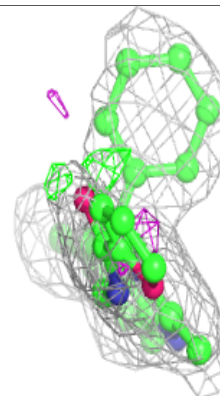
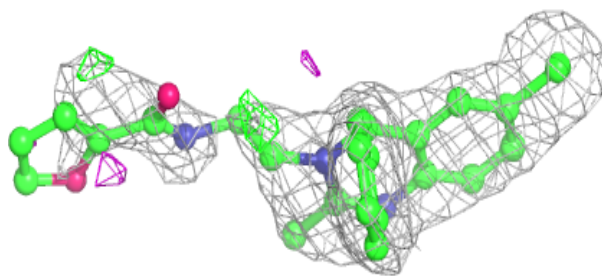
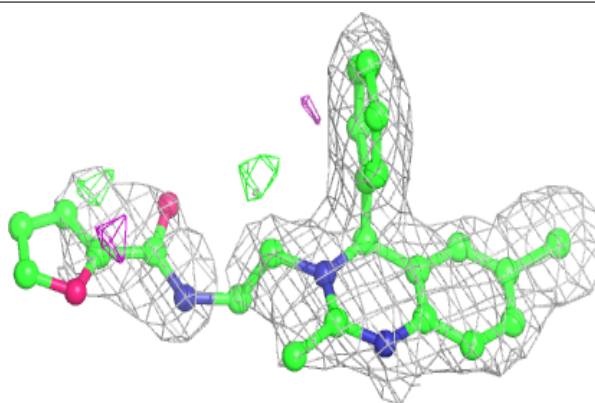
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
2	FAD	D	998	53/53	0.99	0.09	11,16,19,20	0
5	CL	B	1493	1/1	0.99	0.10	33,33,33,33	0
5	CL	A	1491	1/1	0.99	0.07	22,22,22,22	0
5	CL	B	1491	1/1	0.99	0.09	24,24,24,24	0
5	CL	C	1490	1/1	0.99	0.07	24,24,24,24	0

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.

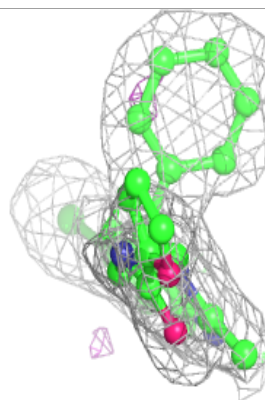
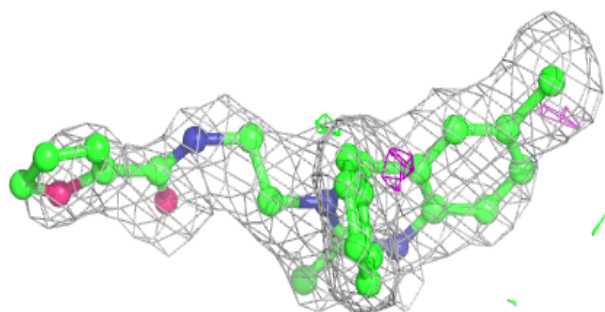
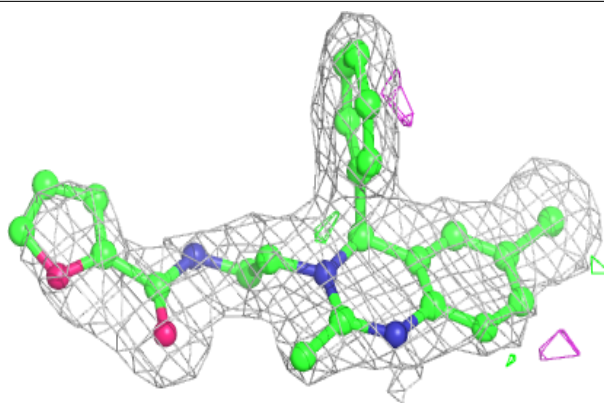
Electron density around WPE C 1000:

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

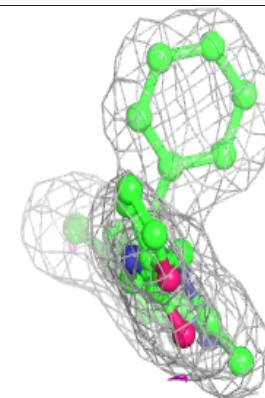
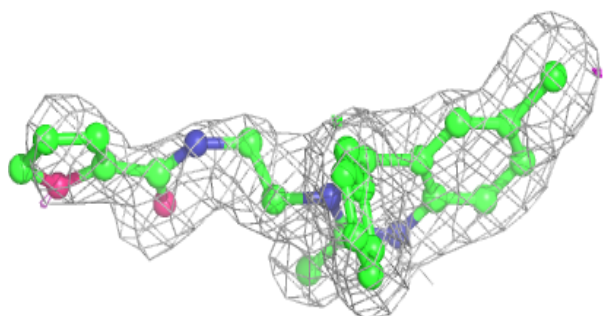
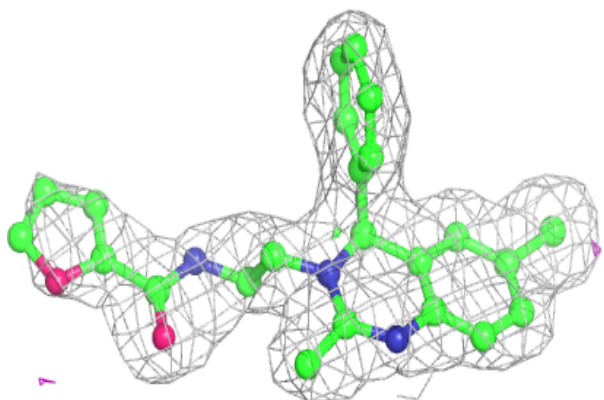


Electron density around WPE B 1000:

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

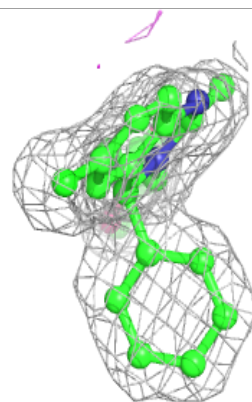
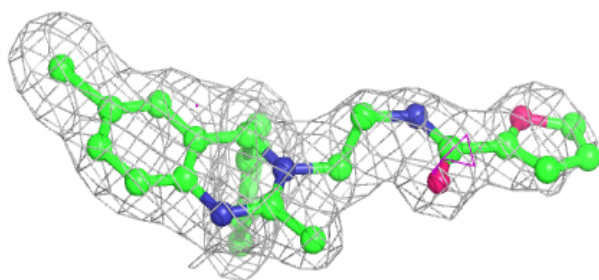
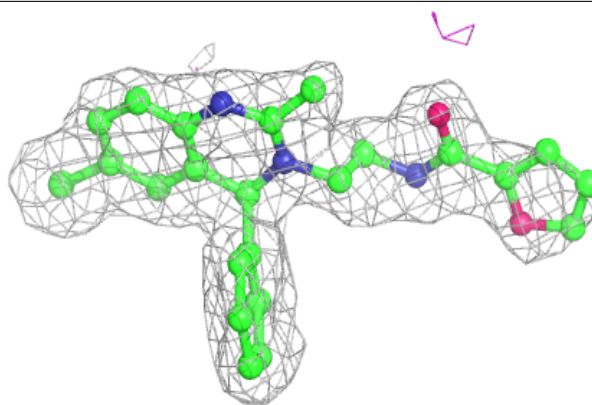
**Electron density around WPE D 1000:**

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

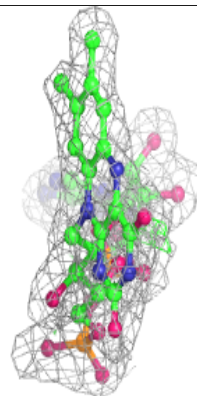
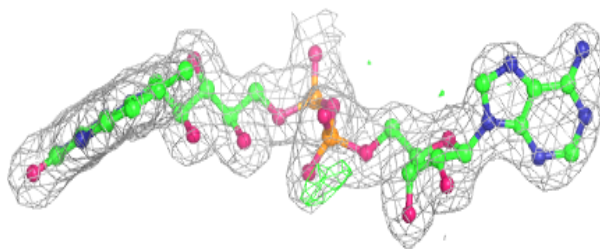
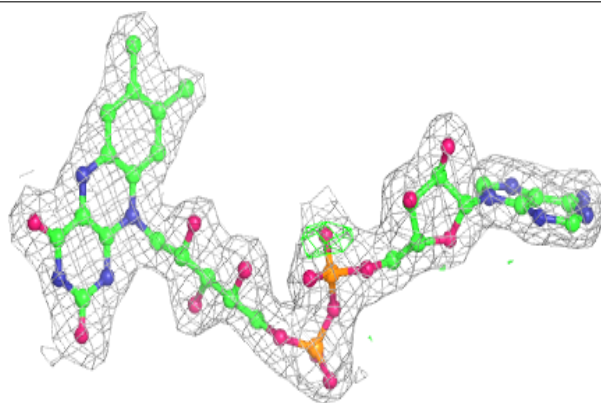


Electron density around WPE A 1000:

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

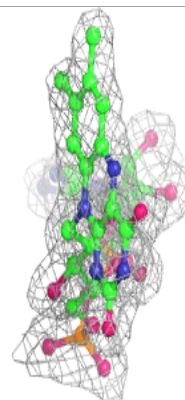
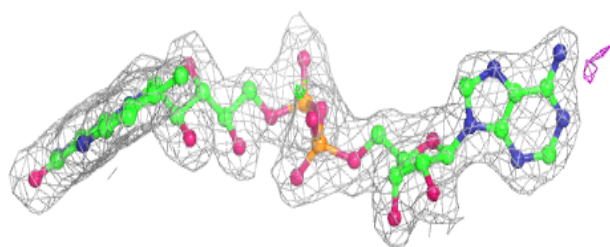
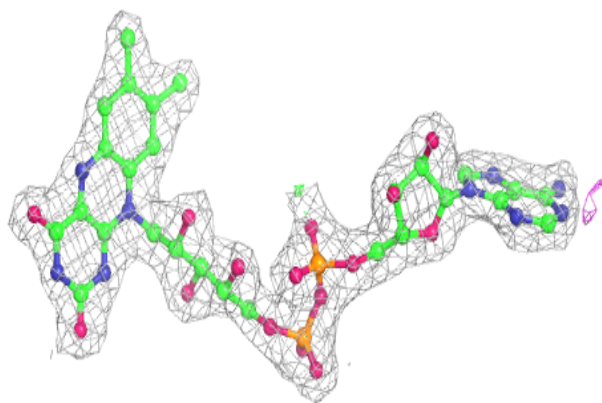
**Electron density around FAD B 998:**

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

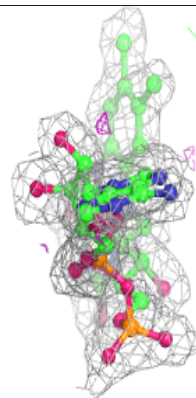
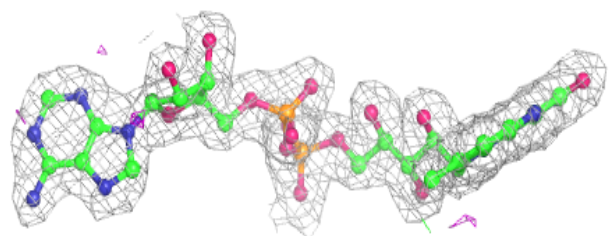
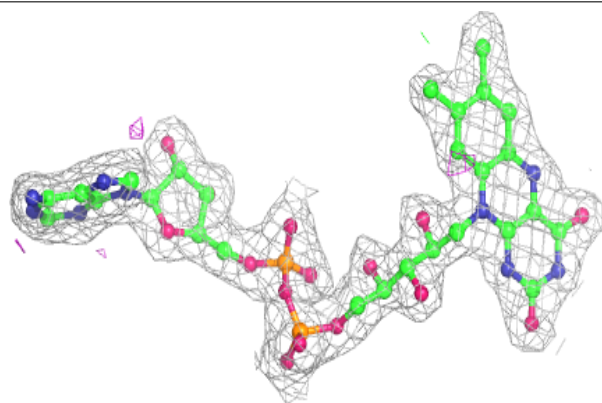


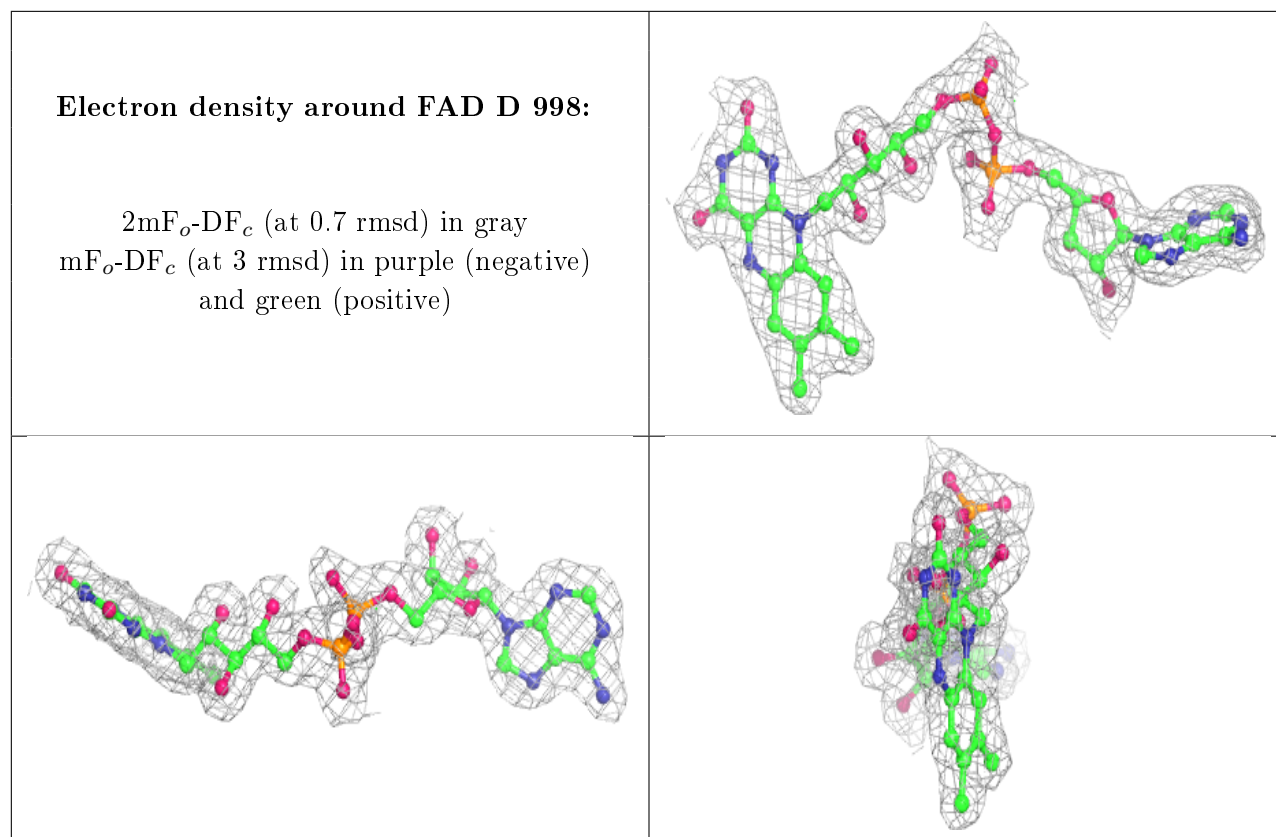
Electron density around FAD C 998:

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

**Electron density around FAD A 998:**

$2mF_o-DF_c$ (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.