



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 14, 2026 – 09:04 PM UTC

PDB ID : 9BLV / pdb_00009blv
Title : Proteus vulgaris tryptophan indole-lyase complexed with L-Trp and benzimidazole
Authors : Phillips, R.S.
Deposited on : 2024-05-01
Resolution : 1.78 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 ⓘ](#)) were used in the production of this report:

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

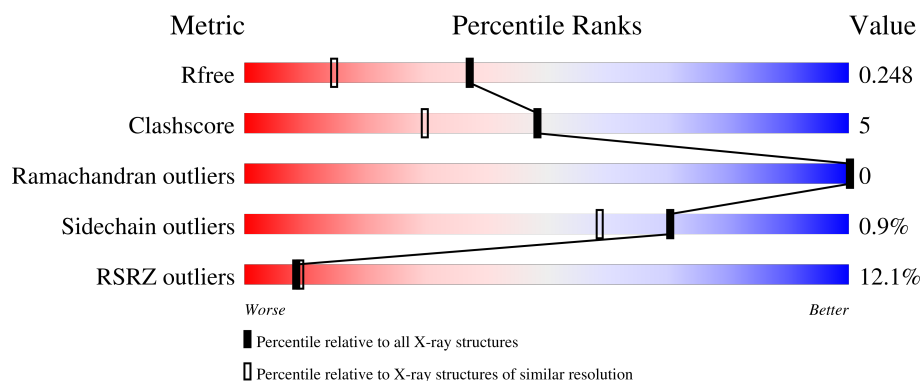
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.78 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}	180053	1365 (1.78-1.78)
Clashscore	190562	1395 (1.78-1.78)
Ramachandran outliers	187476	1382 (1.78-1.78)
Sidechain outliers	187428	1382 (1.78-1.78)
RSRZ outliers	180081	1365 (1.78-1.78)

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	467	<div> <div>7%</div> <div>87%</div> <div>11%</div> <div>.</div> </div>
1	B	467	<div> <div>11%</div> <div>85%</div> <div>15%</div> <div>.</div> </div>
1	C	467	<div> <div>13%</div> <div>83%</div> <div>15%</div> <div>.</div> </div>
1	D	467	<div> <div>16%</div> <div>80%</div> <div>18%</div> <div>.</div> </div>

2 Entry composition

There are 8 unique types of molecules in this entry. The entry contains 15824 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.

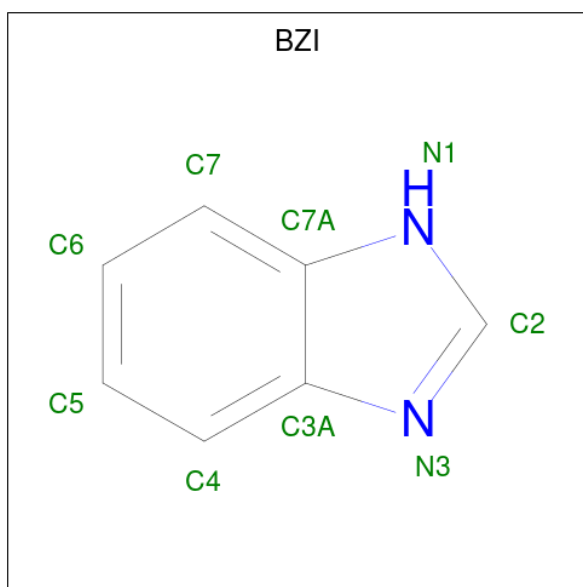
- Molecule 1 is a protein called Tryptophanase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	458	Total	C	N	O	S	0	5	0
			3666	2347	625	676	18			
1	B	465	Total	C	N	O	S	0	6	0
			3728	2385	632	693	18			
1	C	458	Total	C	N	O	S	0	7	0
			3683	2360	626	679	18			
1	D	458	Total	C	N	O	S	0	7	0
			3681	2358	626	677	20			

- Molecule 2 is POTASSIUM ION (CCD ID: K) (formula: K).

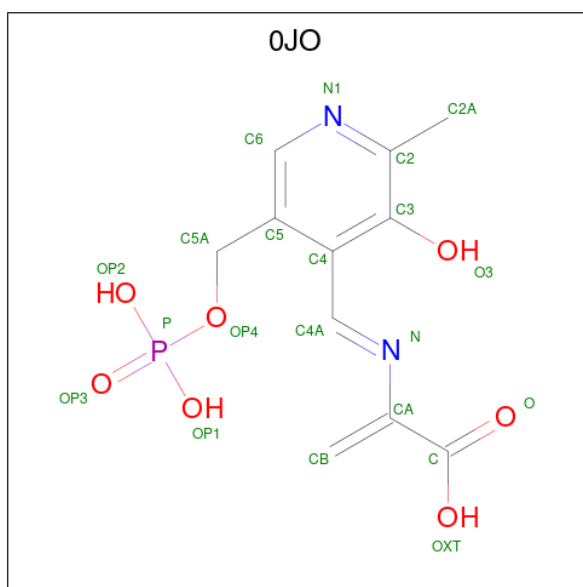
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	2	Total	K	0	0
			2	2		
2	C	2	Total	K	0	0
			2	2		

- Molecule 3 is BENZIMIDAZOLE (CCD ID: BZI) (formula: C₇H₆N₂).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	N	0	0
			9	7	2		
3	D	1	Total	C	N	0	0
			9	7	2		

- Molecule 4 is 2-[(E)-{3-hydroxy-2-methyl-5-[(phosphonooxy)methyl]pyridin-4-yl}methylidene]amino}prop-2-enoic acid (CCD ID: 0JO) (formula: C₁₁H₁₃N₂O₇P) (labeled as "Ligand of Interest" by depositor).



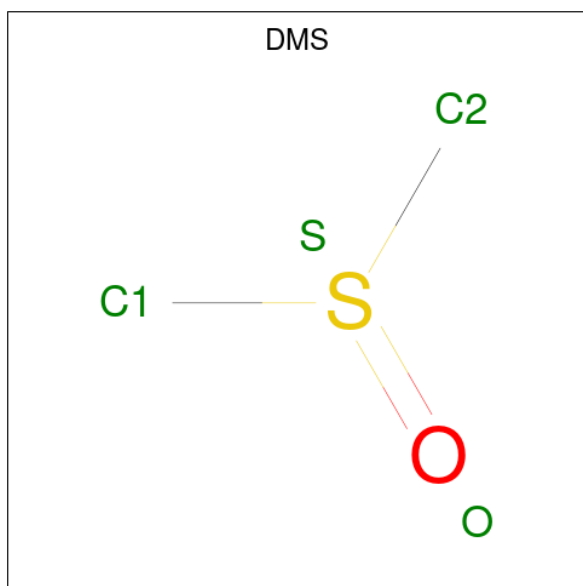
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total	C	N	O	P	0	0
			21	11	2	7	1		

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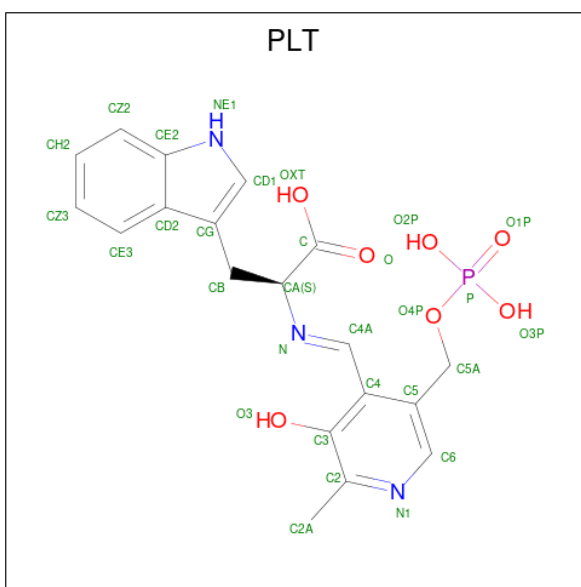
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	D	1	Total	C	N	O	P	0	0
			21	11	2	7	1		

- Molecule 5 is DIMETHYL SULFOXIDE (CCD ID: DMS) (formula: C_2H_6OS).



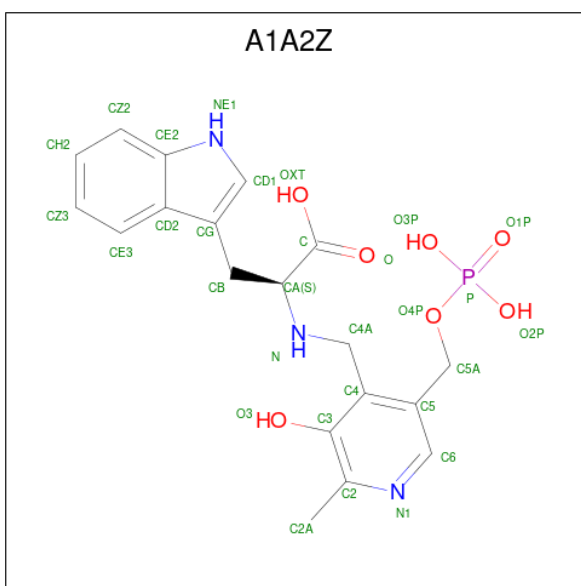
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	A	1	Total	C	O	S	0	0
			4	2	1	1		
5	B	1	Total	C	O	S	0	0
			4	2	1	1		

- Molecule 6 is [3-HYDROXY-2-METHYL-5-PHOSPHONOOXYMETHYL-PYRIDIN-4-YL METHYL]-L-TRYPTOPHANE (CCD ID: PLT) (formula: $C_{19}H_{20}N_3O_7P$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
6	B	1	Total	C	N	O	P	0	0
			30	19	3	7	1		

- Molecule 7 is N-({3-hydroxy-2-methyl-5-[(phosphonooxy)methyl]pyridin-4-yl}methyl)-L-tryptophan (CCD ID: A1A2Z) (formula: $C_{19}H_{22}N_3O_7P$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
7	C	1	Total	C	N	O	P	0	0
			30	19	3	7	1		

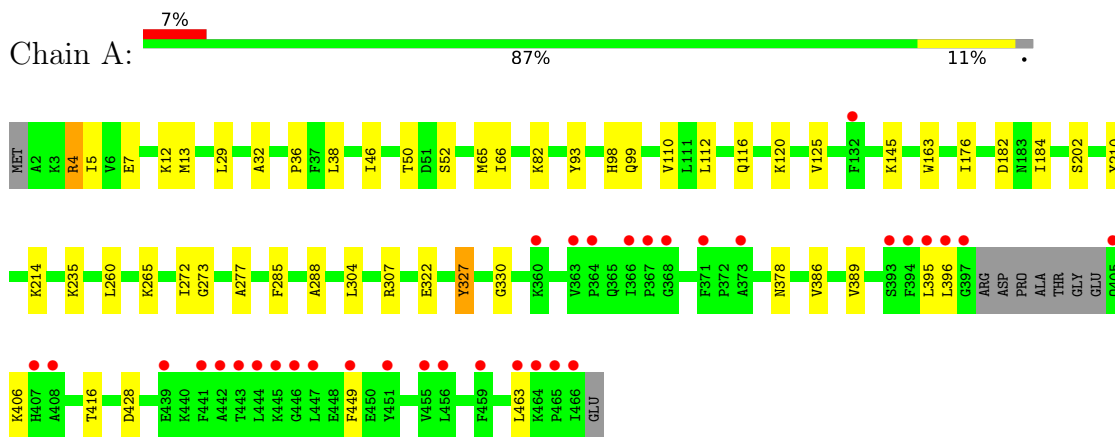
- Molecule 8 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	212	Total 212	O 212	0	1
8	B	227	Total 227	O 227	0	3
8	C	261	Total 261	O 261	0	7
8	D	234	Total 234	O 234	0	4

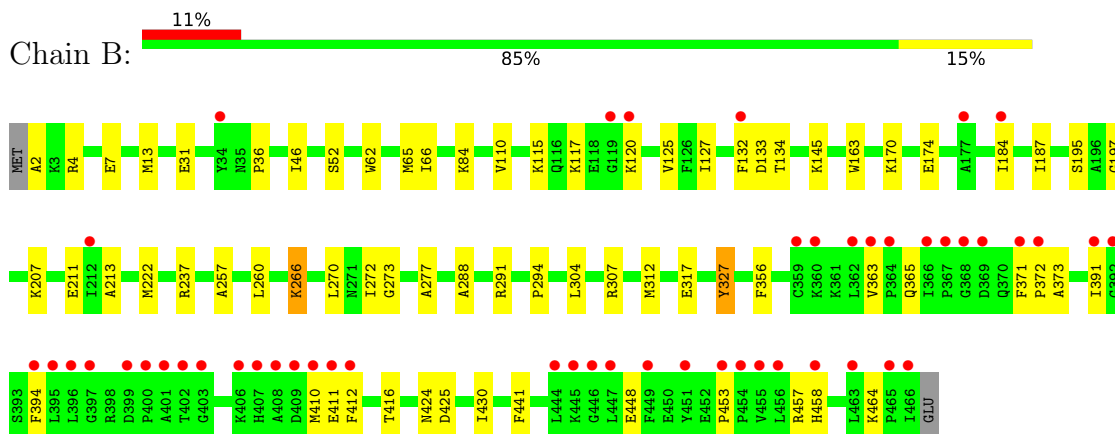
3 Residue-property plots [i](#)

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.

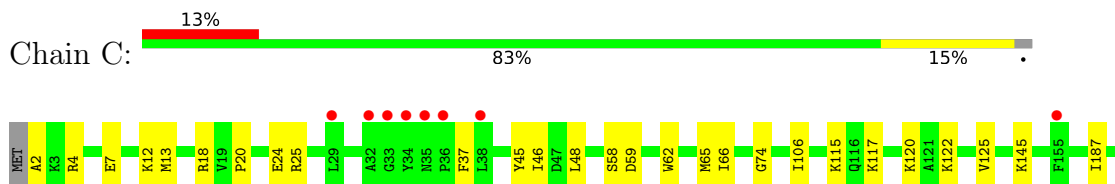
- Molecule 1: Tryptophanase

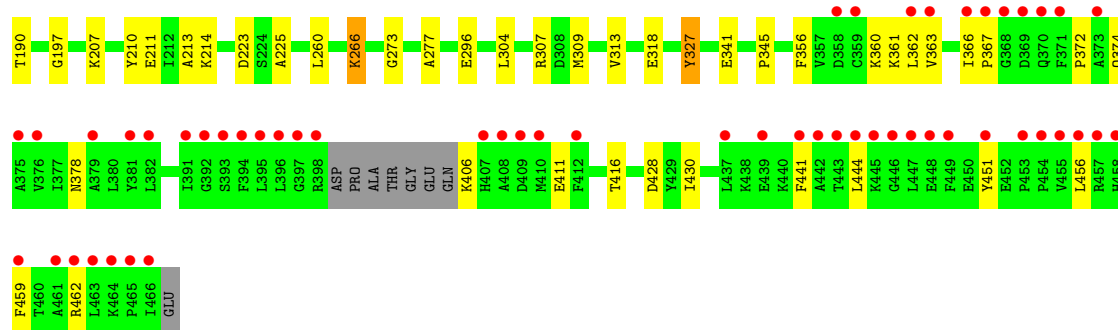


- Molecule 1: Tryptophanase

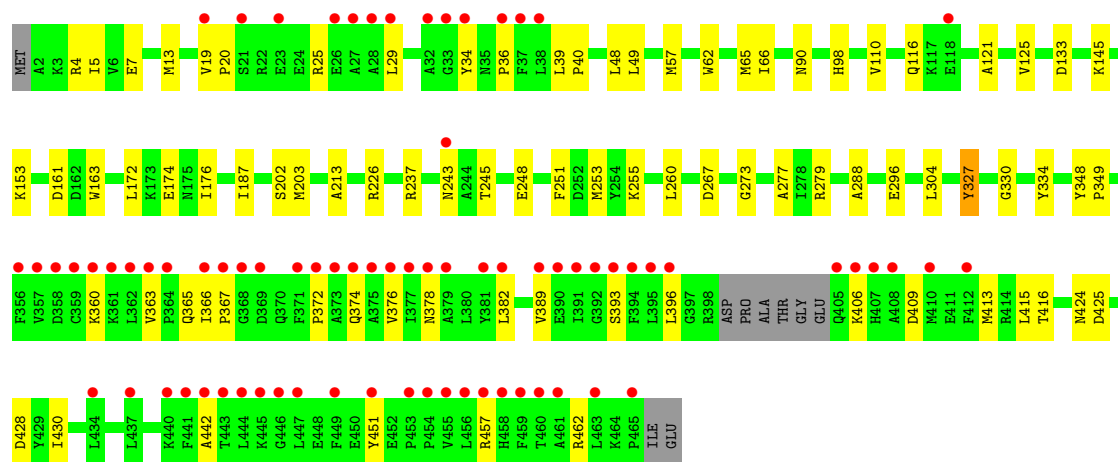
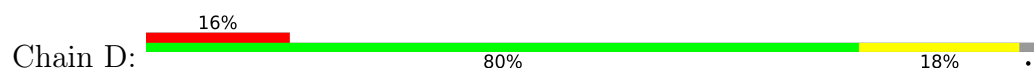


- Molecule 1: Tryptophanase





● Molecule 1: Tryptophanase



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	113.52Å 109.96Å 144.98Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	56.76 – 1.78 56.76 – 1.78	Depositor EDS
% Data completeness (in resolution range)	54.3 (56.76-1.78) 54.7 (56.76-1.78)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.28 (at 1.77Å)	Xtriage
Refinement program	PHENIX 1.21.1_5286	Depositor
R, R_{free}	0.198 , 0.247 0.198 , 0.248	Depositor DCC
R_{free} test set	4846 reflections (2.77%)	wwPDB-VP
Wilson B-factor (Å ²)	19.9	Xtriage
Anisotropy	0.076	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 44.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtriage
Estimated twinning fraction	0.000 for k,h,-l	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	15824	wwPDB-VP
Average B, all atoms (Å ²)	33.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 44.05 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 1.6130e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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: 0JO, K, PLT, DMS, BZI, A1A2Z

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	0.28	2/3759 (0.1%)	0.44	2/5072 (0.0%)
1	B	0.21	0/3818	0.39	0/5156
1	C	0.21	0/3777	0.39	0/5097
1	D	0.25	0/3778	0.45	2/5096 (0.0%)
All	All	0.24	2/15132 (0.0%)	0.42	4/20421 (0.0%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	4[A]	ARG	C-O	6.57	1.31	1.24
1	A	4[B]	ARG	C-O	6.57	1.31	1.24

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	4[A]	ARG	CA-C-O	6.37	127.88	120.49
1	A	4[B]	ARG	CA-C-O	6.37	127.88	120.49
1	D	243	ASN	CB-CA-C	-5.25	101.68	110.56
1	D	237	ARG	N-CA-CB	-5.18	103.73	110.88

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	3666	0	3661	30	0
1	B	3728	0	3706	49	0
1	C	3683	0	3672	43	0
1	D	3681	0	3677	50	0
2	A	2	0	0	0	0
2	C	2	0	0	0	0
3	A	9	0	6	3	0
3	D	9	0	6	1	0
4	A	21	0	10	2	0
4	D	21	0	10	0	0
5	A	4	0	6	0	0
5	B	4	0	6	0	0
6	B	30	0	17	3	0
7	C	30	0	0	0	0
8	A	212	0	0	2	0
8	B	227	0	0	4	0
8	C	261	0	0	4	0
8	D	234	0	0	2	0
All	All	15824	0	14777	163	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 5.

All (163) 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:C:273:GLY:HA2	1:C:304:LEU:HD21	1.70	0.72
1:C:360:LYS:HB2	8:C:602[B]:HOH:O	1.90	0.69
1:B:273:GLY:HA2	1:B:304:LEU:HD21	1.75	0.69
1:B:13:MET:HE2	1:D:62:TRP:CD1	2.29	0.68
1:B:62:TRP:CD1	1:D:13:MET:HE2	2.27	0.68
1:D:360:LYS:HD2	1:D:376:VAL:HG21	1.76	0.68
1:A:65:MET:HE2	1:A:307:ARG:HD2	1.75	0.67
1:C:20:PRO:O	1:C:25:ARG:NH1	2.27	0.67
1:D:273:GLY:HA2	1:D:304:LEU:HD21	1.76	0.67
1:A:395:LEU:HD11	3:A:503:BZI:H7	1.76	0.67
1:D:374:GLN:NE2	1:D:378:ASN:OD1	2.26	0.64
1:D:187:ILE:HD12	1:D:213:ALA:HB2	1.81	0.63
1:C:117:LYS:O	1:C:120:LYS:NZ	2.32	0.62
1:A:125:VAL:HG12	1:A:145:LYS:HB3	1.82	0.61
1:D:20:PRO:O	1:D:25:ARG:NH1	2.32	0.61
1:C:207:LYS:NZ	1:C:211:GLU:OE2	2.32	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:360:LYS:HD2	8:C:602[B]:HOH:O	2.01	0.61
1:D:365:GLN:NE2	1:D:442:ALA:O	2.34	0.60
1:D:279:ARG:NH1	8:D:604:HOH:O	2.36	0.59
1:A:13:MET:HE2	1:C:62:TRP:CD1	2.37	0.59
1:C:345:PRO:HG3	1:C:361:LYS:HD3	1.85	0.58
1:D:396:LEU:HG	1:D:406:LYS:HB3	1.86	0.58
1:C:260:LEU:HG	1:C:277:ALA:HB3	1.85	0.58
1:C:65:MET:HE2	1:C:307:ARG:HD2	1.85	0.58
1:C:360:LYS:HE3	1:C:411:GLU:HG2	1.85	0.58
1:D:57:MET:HE1	1:D:65[B]:MET:SD	2.44	0.57
1:C:106:ILE:HD11	1:C:296:GLU:HG3	1.86	0.57
1:C:48:LEU:HD11	1:C:430:ILE:HD13	1.86	0.56
1:C:125:VAL:HG12	1:C:145:LYS:HB3	1.88	0.56
1:D:245:THR:N	1:D:248:GLU:OE1	2.29	0.56
1:B:424:ASN:ND2	1:D:425:ASP:OD2	2.39	0.54
1:B:222:MET:HE2	1:B:257:ALA:HB2	1.89	0.54
1:B:170:LYS:NZ	1:B:174:GLU:OE2	2.39	0.54
1:C:4[B]:ARG:NH2	1:C:428:ASP:OD2	2.39	0.54
1:B:115:LYS:NZ	1:B:184[A]:ILE:O	2.40	0.54
1:B:448:GLU:O	1:B:464:LYS:N	2.38	0.54
1:C:225:ALA:HB1	1:C:266:LYS:HD3	1.90	0.54
1:D:110:VAL:HG21	1:D:288:ALA:HA	1.90	0.53
1:C:115:LYS:NZ	8:C:609:HOH:O	2.34	0.53
1:B:373:ALA:HB2	1:B:411:GLU:HG3	1.91	0.53
1:B:4[A]:ARG:NH2	1:B:425:ASP:OD1	2.42	0.53
1:D:49:LEU:HD12	1:D:389:VAL:HB	1.92	0.52
1:C:363:VAL:HG11	1:C:444:LEU:HD11	1.91	0.52
1:B:125:VAL:HG12	1:B:145:LYS:HB3	1.92	0.52
1:A:82:LYS:NZ	8:A:606:HOH:O	2.40	0.52
1:B:65:MET:HE2	1:B:307:ARG:HD2	1.91	0.52
1:C:7:GLU:HG3	1:C:327[B]:TYR:CZ	2.45	0.52
1:A:210:TYR:CE1	1:A:214:LYS:HE3	2.45	0.51
1:B:365:GLN:NE2	1:B:441:PHE:O	2.43	0.51
1:D:116:GLN:HG2	1:D:121:ALA:HB3	1.93	0.51
1:D:7:GLU:HG3	1:D:327[B]:TYR:CZ	2.46	0.51
1:A:396:LEU:HG	1:A:406:LYS:HD2	1.93	0.50
1:A:120:LYS:HD2	1:A:182:ASP:HB3	1.93	0.50
1:D:4[B]:ARG:NH2	1:D:425:ASP:OD1	2.38	0.50
1:C:406:LYS:N	8:C:623:HOH:O	2.44	0.50
1:C:187:ILE:HD12	1:C:213:ALA:HB2	1.93	0.50
1:B:291:ARG:O	1:B:294:PRO:HD2	2.12	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:133[B]:ASP:CG	3:D:501:BZI:HN1	2.20	0.49
1:B:453:PRO:HG2	1:B:457:ARG:HA	1.94	0.49
1:D:153:LYS:HD2	1:D:161:ASP:CG	2.38	0.49
1:D:413:MET:HE3	1:D:415:LEU:HD21	1.94	0.49
1:B:457:ARG:HG2	8:B:765:HOH:O	2.12	0.49
1:A:176:ILE:HA	1:A:184:ILE:HD11	1.94	0.49
1:B:7:GLU:HG3	1:B:327[B]:TYR:CZ	2.47	0.49
1:D:174:GLU:OE2	8:D:601:HOH:O	2.20	0.48
1:B:207:LYS:NZ	1:B:211:GLU:OE2	2.31	0.48
1:A:112:LEU:O	1:A:116:GLN:HG2	2.14	0.48
1:B:187:ILE:HD12	1:B:213:ALA:HB2	1.94	0.48
1:B:197:GLY:HA2	1:B:356:PHE:CE1	2.49	0.48
1:B:448:GLU:N	1:B:464:LYS:O	2.41	0.48
1:D:363:VAL:HG11	1:D:366:ILE:HD12	1.95	0.48
1:C:122:LYS:HD3	1:C:122:LYS:HA	1.58	0.48
1:B:115:LYS:NZ	1:B:184[B]:ILE:O	2.47	0.47
1:A:110:VAL:HG21	1:A:288:ALA:HA	1.95	0.47
1:A:449:PHE:HA	1:A:463:LEU:HD23	1.96	0.47
1:A:36:PRO:HG2	8:A:630:HOH:O	2.12	0.47
1:A:273:GLY:HA2	1:A:304:LEU:HD21	1.96	0.47
1:D:409:ASP:N	1:D:409:ASP:OD1	2.46	0.47
1:D:360:LYS:HD3	1:D:360:LYS:HA	1.63	0.47
1:A:389:VAL:HG21	3:A:503:BZI:H5	1.97	0.47
1:C:18:ARG:NH2	1:C:24:GLU:OE1	2.48	0.47
1:B:117:LYS:O	1:B:120:LYS:NZ	2.41	0.47
1:C:374:GLN:NE2	1:C:378:ASN:OD1	2.46	0.47
1:B:62:TRP:O	1:B:66:ILE:HG12	2.15	0.47
1:B:425:ASP:OD2	1:D:424:ASN:ND2	2.39	0.47
1:D:260:LEU:HG	1:D:277:ALA:HB3	1.97	0.47
1:D:25:ARG:NH2	1:D:382:LEU:O	2.41	0.46
1:A:7:GLU:HG3	1:A:327[B]:TYR:CZ	2.51	0.46
1:A:265:LYS:HD2	1:A:272:ILE:HA	1.98	0.46
1:D:393:SER:O	1:D:457:ARG:NH2	2.45	0.46
1:C:362:LEU:O	1:C:441:PHE:HB3	2.16	0.46
1:C:367:PRO:O	1:C:372:PRO:HD3	2.16	0.46
1:C:451:TYR:HB3	1:C:462:ARG:HB2	1.98	0.46
1:C:197:GLY:HA2	1:C:356:PHE:CE1	2.51	0.46
1:B:84:LYS:NZ	1:B:317:GLU:OE1	2.46	0.45
1:D:90:ASN:HB2	1:D:251:PHE:CE1	2.51	0.45
1:B:66:ILE:O	1:C:12:LYS:HE2	2.16	0.45
1:B:391:ILE:HB	1:B:412:PHE:HB2	1.99	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:203:MET:HE1	1:D:253:MET:HG3	1.97	0.45
1:B:66:ILE:HG13	1:C:66:ILE:CD1	2.46	0.44
1:D:29:LEU:HD11	1:D:34:TYR:HA	1.98	0.44
1:C:2:ALA:N	1:C:341:GLU:OE2	2.50	0.44
1:C:309:MET:O	1:C:313:VAL:HG23	2.18	0.44
1:D:4[B]:ARG:NH2	1:D:428:ASP:OD2	2.38	0.44
1:D:367:PRO:O	1:D:372:PRO:HD3	2.18	0.44
1:B:13:MET:HE3	1:D:13:MET:HE3	1.99	0.44
3:A:503:BZI:N3	4:A:504:OJO:H2	2.32	0.44
1:B:260:LEU:HG	1:B:277:ALA:HB3	1.99	0.44
1:D:36:PRO:HA	1:D:39:LEU:HD12	1.99	0.44
1:D:4[B]:ARG:HG3	1:D:334:TYR:CE1	2.53	0.43
1:C:74:GLY:HA3	1:D:40:PRO:HA	2.00	0.43
1:C:190:THR:HA	1:C:223:ASP:HB3	1.99	0.43
1:A:5:ILE:HD12	1:A:330:GLY:HA3	2.00	0.43
1:A:98:HIS:CD2	1:A:99:GLN:HG2	2.53	0.43
1:B:66:ILE:HG13	1:C:66:ILE:HD12	2.00	0.43
1:C:45:TYR:CD2	1:C:46:ILE:HG13	2.53	0.43
1:D:163:TRP:CD2	1:D:202:SER:HB3	2.52	0.43
1:A:4[A]:ARG:NH2	1:A:428:ASP:OD2	2.46	0.43
1:A:66:ILE:CD1	1:D:66:ILE:HG13	2.49	0.43
1:D:125:VAL:HG12	1:D:145:LYS:HB2	2.00	0.43
1:B:110:VAL:HG21	1:B:288:ALA:HA	2.00	0.43
1:B:372:PRO:HD2	1:B:411:GLU:CD	2.44	0.43
1:B:127:ILE:O	1:B:187:ILE:HA	2.18	0.43
1:C:456:LEU:HD23	1:C:459:PHE:HE2	1.84	0.43
1:A:46:ILE:HB	1:A:386:VAL:HG22	2.01	0.43
1:D:5:ILE:HD12	1:D:330:GLY:HA3	2.00	0.43
1:A:12:LYS:HD3	1:C:13:MET:HE3	2.00	0.42
1:A:29:LEU:HD21	1:A:378:ASN:HB3	2.01	0.42
4:A:504:OJO:H3	4:A:504:OJO:H4	1.70	0.42
1:B:36:PRO:HG2	8:B:655:HOH:O	2.18	0.42
1:B:31:GLU:HG3	8:B:758:HOH:O	2.19	0.42
1:A:93:TYR:HB3	1:A:285:PHE:CD1	2.54	0.42
1:B:133[A]:ASP:OD1	1:B:134:THR:N	2.53	0.42
1:B:410:MET:HG3	1:B:411:GLU:H	1.85	0.42
1:C:210:TYR:CZ	1:C:214:LYS:HE2	2.55	0.42
1:B:52:SER:HB2	6:B:502:PLT:HA	2.02	0.42
1:B:270:LEU:HD11	1:B:312:MET:HA	2.02	0.42
1:D:226:ARG:HA	1:D:267:ASP:CG	2.45	0.42
1:A:163:TRP:CD2	1:A:202:SER:HB3	2.55	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:266:LYS:HE2	6:B:502:PLT:HA	2.02	0.41
1:C:59:ASP:N	1:C:59:ASP:OD1	2.53	0.41
1:A:50:THR:HG23	1:A:52:SER:H	1.85	0.41
1:B:163:TRP:CH2	1:B:237:ARG:HB2	2.54	0.41
1:C:366:ILE:HB	1:C:372:PRO:HB3	2.02	0.41
1:A:235:LYS:HE2	1:A:322:GLU:OE1	2.21	0.41
6:B:502:PLT:O	6:B:502:PLT:HE3	2.21	0.41
1:A:260:LEU:HG	1:A:277:ALA:HB3	2.03	0.41
1:D:98:HIS:HD1	1:D:296:GLU:CD	2.28	0.41
1:D:172:LEU:O	1:D:176:ILE:HG13	2.21	0.41
1:D:255:LYS:O	1:D:279:ARG:NH2	2.50	0.41
1:B:371:PHE:HE1	1:B:457:ARG:NH2	2.19	0.41
1:B:2:ALA:N	8:B:636:HOH:O	2.54	0.41
1:B:46:ILE:HG21	1:B:430:ILE:HD11	2.02	0.41
1:C:58:SER:OG	1:C:318:GLU:OE2	2.32	0.41
1:B:394:PHE:CE2	1:B:458:HIS:HA	2.56	0.41
1:B:272:ILE:HD12	1:B:272:ILE:HA	1.89	0.40
1:D:48:LEU:HD11	1:D:430:ILE:HD13	2.02	0.40
1:B:132[B]:PHE:CG	1:B:133[B]:ASP:N	2.89	0.40
1:D:348:TYR:CD1	1:D:349:PRO:HA	2.56	0.40
1:A:32:ALA:HB1	1:A:38:LEU:HB2	2.04	0.40
1:C:210:TYR:CE1	1:C:214:LYS:HE2	2.57	0.40
1:D:451:TYR:HB3	1:D:462:ARG:HB2	2.03	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	459/467 (98%)	443 (96%)	16 (4%)	0	100	100
1	B	469/467 (100%)	453 (97%)	16 (3%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	C	461/467 (99%)	445 (96%)	16 (4%)	0	100	100
1	D	461/467 (99%)	441 (96%)	20 (4%)	0	100	100
All	All	1850/1868 (99%)	1782 (96%)	68 (4%)	0	100	100

There are no Ramachandran outliers to report.

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	384/386 (100%)	381 (99%)	3 (1%)	73	63
1	B	390/386 (101%)	384 (98%)	6 (2%)	57	41
1	C	386/386 (100%)	381 (99%)	5 (1%)	61	46
1	D	386/386 (100%)	382 (99%)	4 (1%)	68	55
All	All	1546/1544 (100%)	1528 (99%)	18 (1%)	70	49

All (18) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	327[A]	TYR
1	A	327[B]	TYR
1	A	416	THR
1	B	195	SER
1	B	266	LYS
1	B	327[A]	TYR
1	B	327[B]	TYR
1	B	363	VAL
1	B	416	THR
1	C	37	PHE
1	C	266	LYS
1	C	327[A]	TYR
1	C	327[B]	TYR
1	C	416	THR

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Mol	Chain	Res	Type
1	D	19	VAL
1	D	327[A]	TYR
1	D	327[B]	TYR
1	D	416	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	116	GLN
1	A	123	ASN
1	A	142	ASN
1	B	175	ASN
1	B	199	GLN
1	C	60	HIS
1	D	60	HIS
1	D	175	ASN

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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 12 ligands modelled in this entry, 4 are monoatomic - leaving 8 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
5	DMS	A	505	-	3,3,3	0.60	0	3,3,3	0.25	0
4	OJO	A	504	-	20,21,21	1.39	2 (10%)	23,30,30	0.60	0
3	BZI	D	501	-	10,10,10	0.62	0	13,13,13	0.79	0
7	A1A2Z	C	503	1	32,32,32	0.55	0	43,46,46	0.82	3 (6%)
6	PLT	B	502	-	31,32,32	0.62	0	43,46,46	1.35	2 (4%)
4	OJO	D	502	-	20,21,21	1.40	2 (10%)	23,30,30	0.62	0
3	BZI	A	503	-	10,10,10	0.61	0	13,13,13	0.71	0
5	DMS	B	501	-	3,3,3	0.58	0	3,3,3	0.14	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
4	OJO	A	504	-	-	0/11/15/15	0/1/1/1
3	BZI	D	501	-	-	-	0/2/2/2
7	A1A2Z	C	503	1	-	4/19/19/19	0/3/3/3
6	PLT	B	502	-	-	2/19/19/19	0/3/3/3
4	OJO	D	502	-	-	0/11/15/15	0/1/1/1
3	BZI	A	503	-	-	-	0/2/2/2

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	D	502	OJO	CA-C	-5.17	1.40	1.50
4	A	504	OJO	CA-C	-5.04	1.41	1.50
4	A	504	OJO	OXT-C	-3.08	1.22	1.30
4	D	502	OJO	OXT-C	-3.06	1.22	1.30

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	B	502	PLT	CA-N-C4A	7.26	127.55	116.77
6	B	502	PLT	CB-CA-N	3.41	114.72	109.56
7	C	503	A1A2Z	O2P-P-O3P	2.15	115.88	107.80
7	C	503	A1A2Z	C4A-C4-C5	2.12	122.06	119.75
7	C	503	A1A2Z	C4A-N-CA	2.02	117.64	113.84

There are no chirality outliers.

All (6) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	B	502	PLT	C-CA-N-C4A
6	B	502	PLT	CB-CA-N-C4A
7	C	503	A1A2Z	C-CA-N-C4A
7	C	503	A1A2Z	C5-C4-C4A-N
7	C	503	A1A2Z	C3-C4-C4A-N
7	C	503	A1A2Z	CB-CA-N-C4A

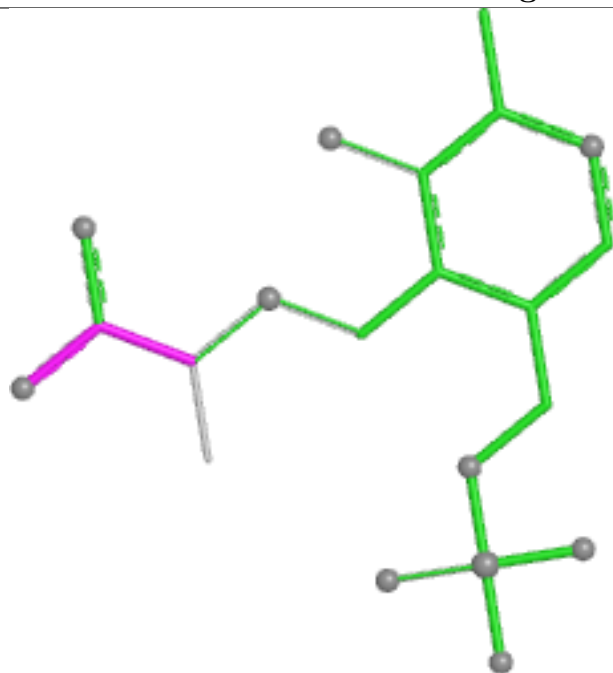
There are no ring outliers.

4 monomers are involved in 8 short contacts:

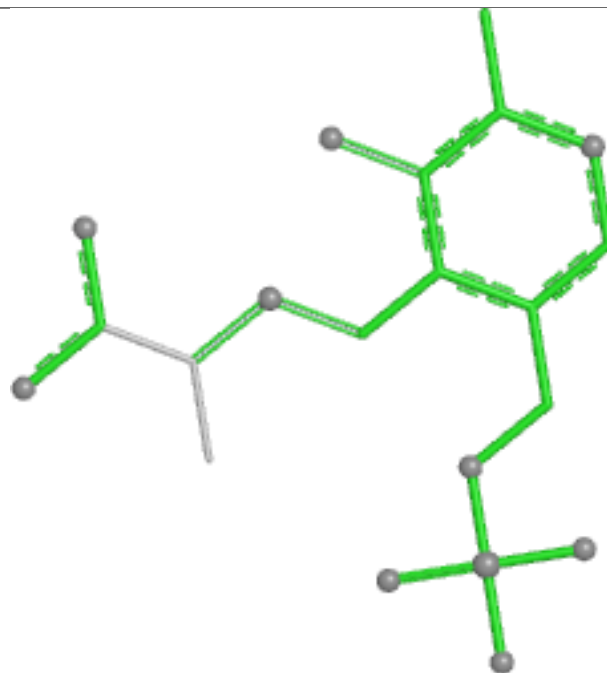
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	504	OJO	2	0
3	D	501	BZI	1	0
6	B	502	PLT	3	0
3	A	503	BZI	3	0

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.

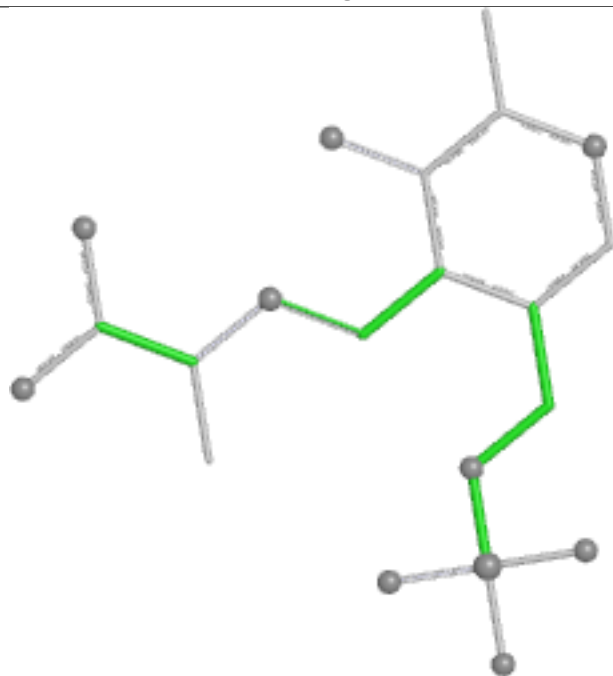
Ligand 0JO A 504



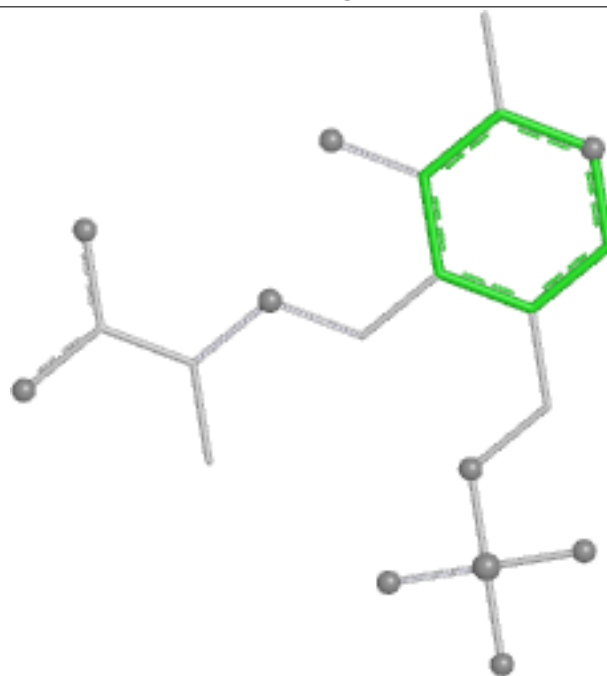
Bond lengths



Bond angles

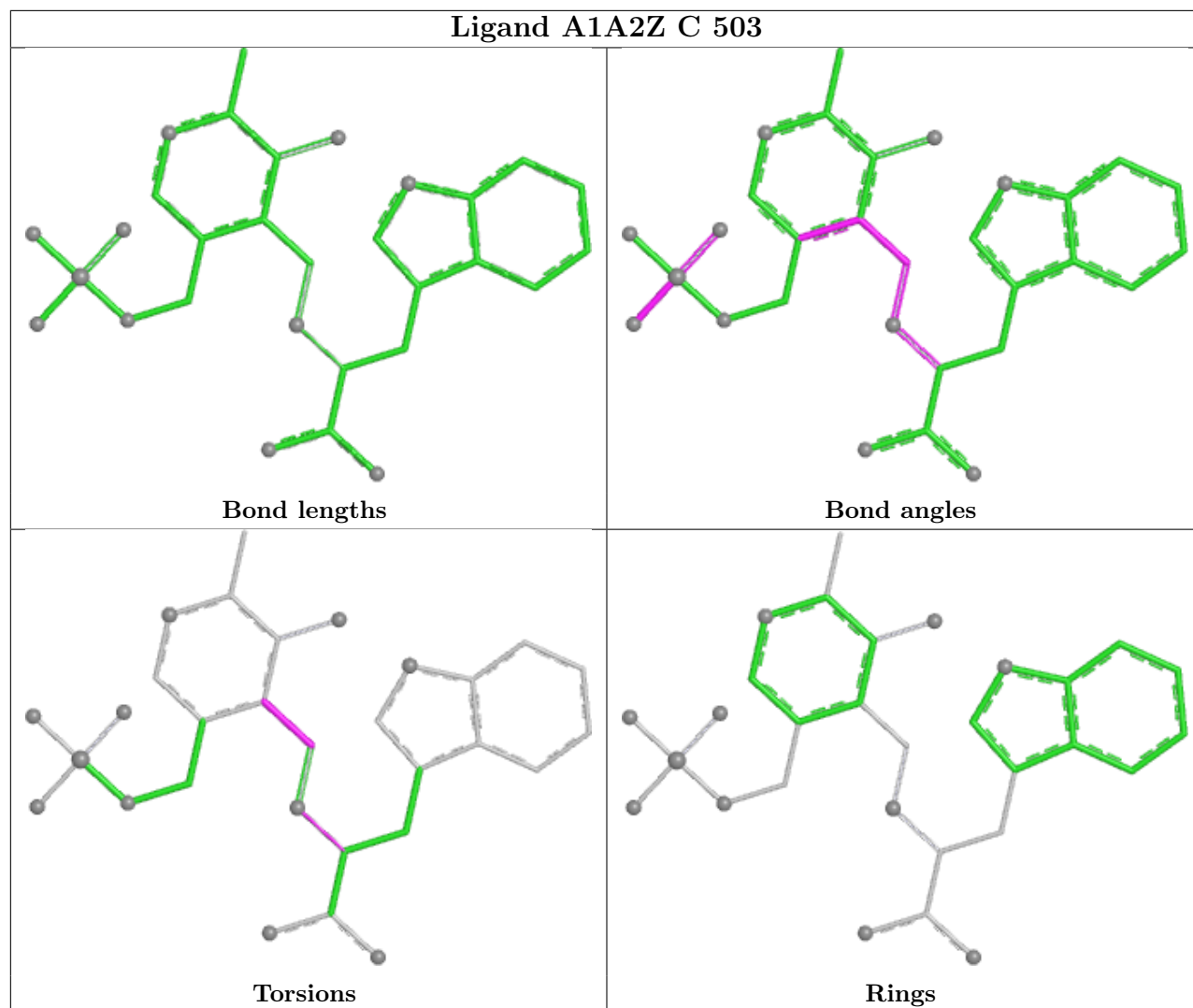


Torsions

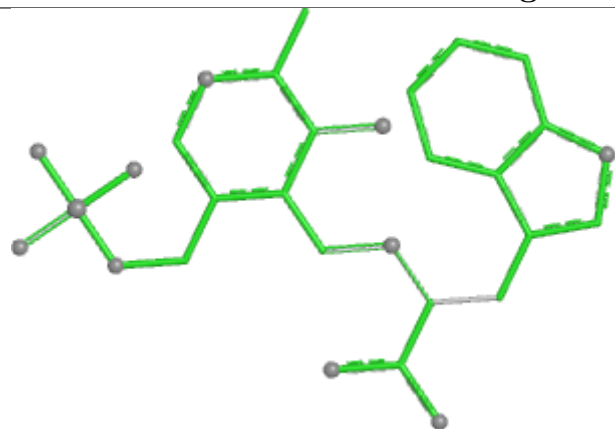


Rings

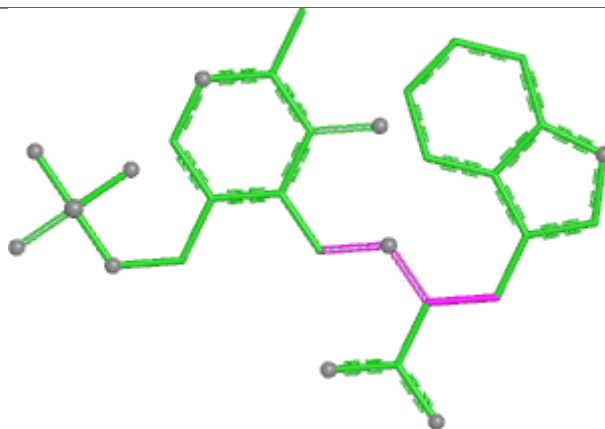
Ligand A1A2Z C 503



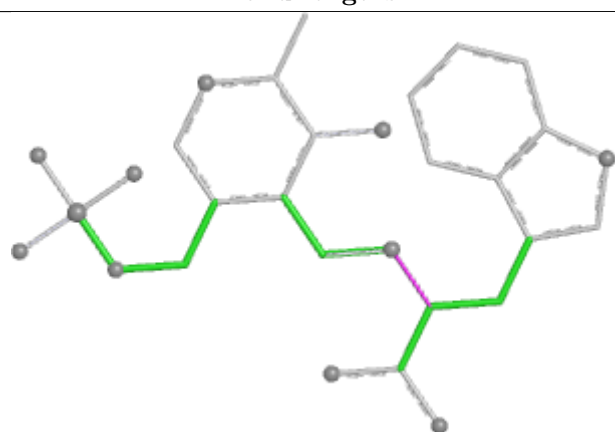
Ligand PLT B 502



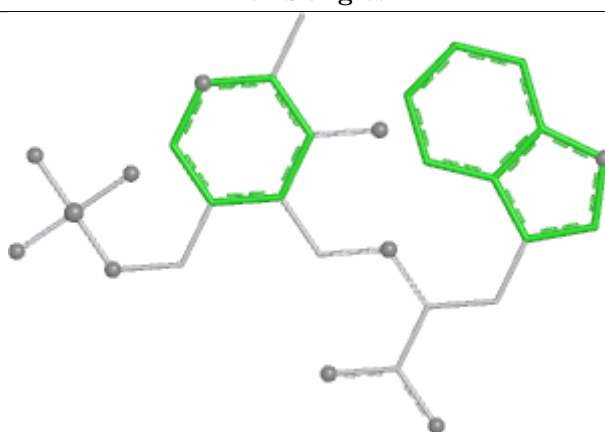
Bond lengths



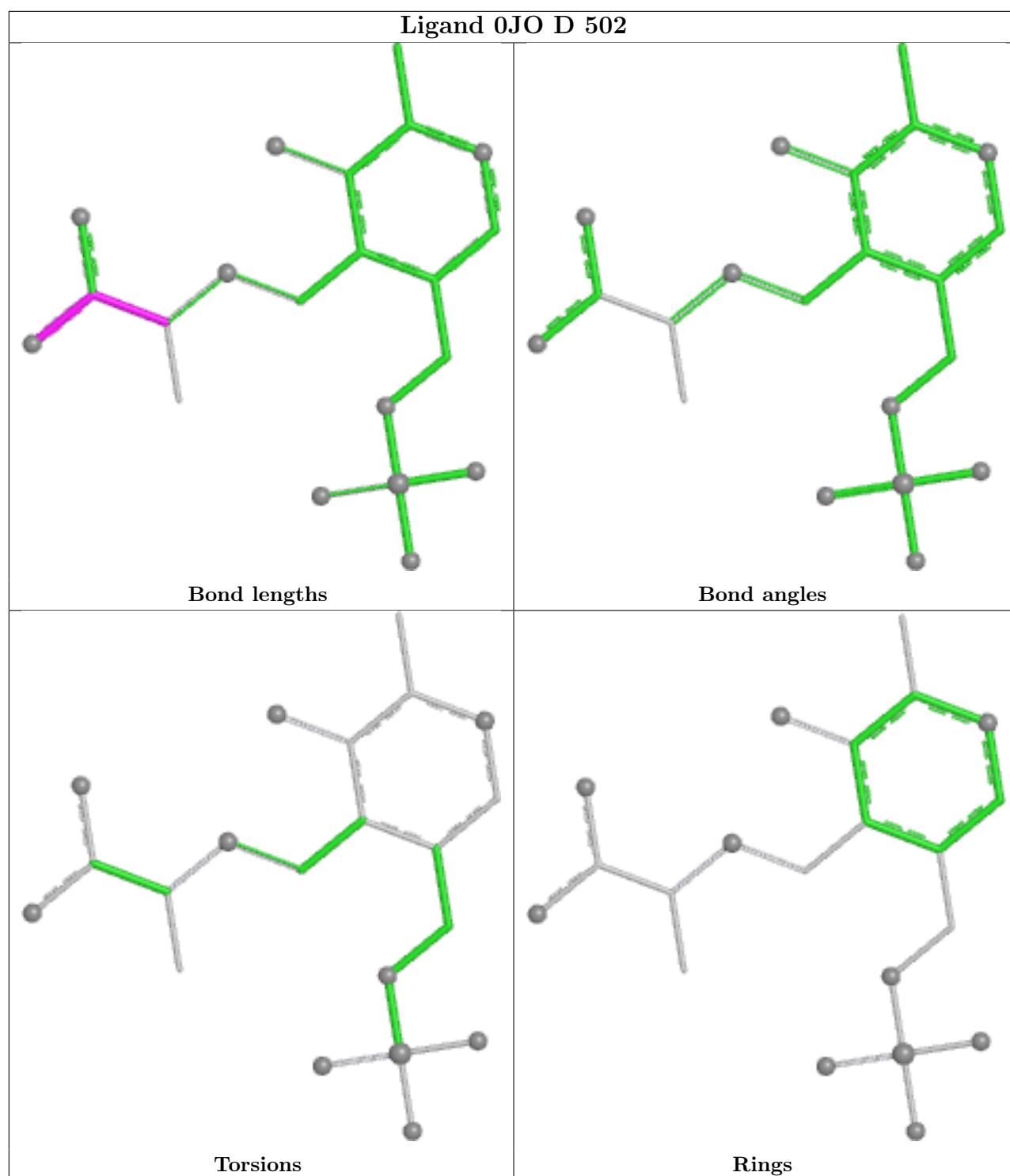
Bond angles



Torsions



Rings



5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

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	458/467 (98%)	0.24	34 (7%)	20 24	11, 26, 62, 92	5 (1%)
1	B	465/467 (99%)	0.48	50 (10%)	11 12	11, 28, 69, 99	6 (1%)
1	C	458/467 (98%)	0.51	62 (13%)	7 7	13, 28, 70, 108	7 (1%)
1	D	458/467 (98%)	0.52	76 (16%)	4 4	9, 25, 82, 109	7 (1%)
All	All	1839/1868 (98%)	0.44	222 (12%)	8 9	9, 27, 72, 109	25 (1%)

All (222) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	412	PHE	7.3
1	C	396	LEU	5.9
1	A	455	VAL	5.9
1	D	391	ILE	5.7
1	B	396	LEU	5.6
1	D	441	PHE	5.5
1	B	447	LEU	5.3
1	B	466	ILE	5.3
1	D	463	LEU	5.3
1	D	371	PHE	5.1
1	C	394	PHE	5.0
1	D	412	PHE	5.0
1	D	359	CYS	5.0
1	D	362	LEU	4.9
1	D	363	VAL	4.9
1	A	397	GLY	4.9
1	B	394	PHE	4.7
1	B	451	TYR	4.7
1	C	391	ILE	4.7
1	D	456	LEU	4.6
1	C	466	ILE	4.6

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Mol	Chain	Res	Type	RSRZ
1	C	456	LEU	4.6
1	D	382	LEU	4.5
1	C	366	ILE	4.5
1	C	375	ALA	4.5
1	C	454	PRO	4.4
1	B	371	PHE	4.4
1	C	451	TYR	4.4
1	B	395	LEU	4.4
1	B	446	GLY	4.3
1	B	455	VAL	4.3
1	C	442	ALA	4.3
1	D	389	VAL	4.2
1	D	358	ASP	4.2
1	D	366	ILE	4.0
1	B	410	MET	4.0
1	D	394	PHE	4.0
1	C	363	VAL	4.0
1	A	405	GLN	3.9
1	D	376	VAL	3.9
1	D	372	PRO	3.9
1	D	405	GLN	3.8
1	B	456	LEU	3.8
1	C	447	LEU	3.8
1	D	29	LEU	3.8
1	C	371	PHE	3.8
1	B	363	VAL	3.8
1	D	396	LEU	3.8
1	C	395	LEU	3.8
1	C	463	LEU	3.8
1	A	394	PHE	3.7
1	D	395	LEU	3.7
1	D	408	ALA	3.7
1	B	408	ALA	3.7
1	D	437	LEU	3.7
1	D	460	THR	3.6
1	D	461	ALA	3.6
1	B	444	LEU	3.6
1	D	444	LEU	3.6
1	D	449	PHE	3.6
1	C	444	LEU	3.6
1	D	445	LYS	3.5
1	C	392	GLY	3.5

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Mol	Chain	Res	Type	RSRZ
1	D	32	ALA	3.5
1	A	443	THR	3.5
1	C	33	GLY	3.5
1	C	455	VAL	3.4
1	C	446	GLY	3.4
1	D	33	GLY	3.4
1	D	367	PRO	3.4
1	C	34	TYR	3.4
1	D	447	LEU	3.4
1	B	400	PRO	3.4
1	B	407	HIS	3.4
1	A	395	LEU	3.4
1	B	401	ALA	3.3
1	D	373	ALA	3.3
1	D	369	ASP	3.3
1	B	449	PHE	3.3
1	C	453	PRO	3.3
1	C	459	PHE	3.3
1	B	465	PRO	3.3
1	C	367	PRO	3.3
1	C	449	PHE	3.3
1	C	373	ALA	3.3
1	D	455	VAL	3.2
1	B	368	GLY	3.2
1	D	357	VAL	3.2
1	C	458	HIS	3.2
1	D	443	THR	3.2
1	A	442	ALA	3.1
1	B	402	THR	3.1
1	D	34	TYR	3.1
1	D	392	GLY	3.1
1	C	409	ASP	3.1
1	D	451	TYR	3.1
1	C	410	MET	3.1
1	C	408	ALA	3.1
1	D	442	ALA	3.1
1	D	459	PHE	3.1
1	B	454	PRO	3.0
1	C	461	ALA	3.0
1	A	371	PHE	3.0
1	C	368	GLY	3.0
1	C	36	PRO	3.0

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Mol	Chain	Res	Type	RSRZ
1	B	397	GLY	3.0
1	D	393	SER	3.0
1	D	375	ALA	3.0
1	D	379	ALA	3.0
1	B	463	LEU	3.0
1	D	360	LYS	3.0
1	C	29	LEU	2.9
1	C	38	LEU	2.9
1	A	366	ILE	2.9
1	A	466	ILE	2.9
1	D	368	GLY	2.9
1	D	465	PRO	2.9
1	B	360	LYS	2.9
1	C	32	ALA	2.9
1	C	362	LEU	2.9
1	D	377	ILE	2.9
1	A	363	VAL	2.8
1	A	456	LEU	2.8
1	D	407	HIS	2.8
1	D	434	LEU	2.8
1	D	454	PRO	2.8
1	C	437	LEU	2.8
1	A	368	GLY	2.8
1	B	403	GLY	2.8
1	A	449	PHE	2.7
1	C	441	PHE	2.7
1	D	390	GLU	2.7
1	B	406	LYS	2.7
1	C	464	LYS	2.7
1	A	396	LEU	2.7
1	C	397	GLY	2.7
1	B	445	LYS	2.7
1	C	462	ARG	2.6
1	A	364	PRO	2.6
1	B	399	ASP	2.6
1	A	465	PRO	2.6
1	B	453	PRO	2.6
1	B	119	GLY	2.6
1	A	447	LEU	2.6
1	C	155	PHE	2.5
1	A	393	SER	2.5
1	C	381	TYR	2.5

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Mol	Chain	Res	Type	RSRZ
1	C	376	VAL	2.5
1	D	446	GLY	2.5
1	B	364	PRO	2.5
1	D	453	PRO	2.5
1	A	444	LEU	2.5
1	B	362	LEU	2.5
1	B	412	PHE	2.5
1	D	23	GLU	2.5
1	C	369	ASP	2.4
1	A	408	ALA	2.4
1	D	381	TYR	2.4
1	A	439	GLU	2.4
1	B	411	GLU	2.4
1	D	410[A]	MET	2.4
1	B	367	PRO	2.4
1	D	19	VAL	2.4
1	D	36	PRO	2.4
1	D	364	PRO	2.4
1	C	382	LEU	2.4
1	C	443	THR	2.4
1	D	356	PHE	2.4
1	C	358[A]	ASP	2.4
1	A	464	LYS	2.4
1	C	407	HIS	2.4
1	C	393	SER	2.3
1	B	372	PRO	2.3
1	A	463	LEU	2.3
1	A	446	GLY	2.3
1	B	120	LYS	2.3
1	B	177	ALA	2.3
1	D	38	LEU	2.3
1	C	445	LYS	2.3
1	C	359	CYS	2.2
1	D	27	ALA	2.2
1	A	459	PHE	2.2
1	B	132[A]	PHE	2.2
1	C	465	PRO	2.2
1	D	457	ARG	2.2
1	B	409	ASP	2.2
1	D	37	PHE	2.2
1	A	451	TYR	2.2
1	A	373	ALA	2.2

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Mol	Chain	Res	Type	RSRZ
1	C	379	ALA	2.2
1	D	28	ALA	2.2
1	A	441	PHE	2.2
1	D	406	LYS	2.2
1	A	407	HIS	2.1
1	A	360	LYS	2.1
1	D	21	SER	2.1
1	C	370	GLN	2.1
1	D	26	GLU	2.1
1	B	184[A]	ILE	2.1
1	B	391	ILE	2.1
1	D	361	LYS	2.1
1	A	367	PRO	2.1
1	B	392	GLY	2.1
1	C	35	ASN	2.1
1	D	243	ASN	2.1
1	D	378	ASN	2.1
1	C	439	GLU	2.1
1	C	448	GLU	2.1
1	D	118	GLU	2.1
1	D	374	GLN	2.1
1	C	398	ARG	2.1
1	C	457	ARG	2.1
1	B	458	HIS	2.1
1	D	458	HIS	2.1
1	B	212	ILE	2.1
1	B	366	ILE	2.1
1	B	369	ASP	2.0
1	B	359	CYS	2.0
1	A	132	PHE	2.0
1	B	34	TYR	2.0
1	A	445	LYS	2.0
1	D	440	LYS	2.0

6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

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

6.3 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

6.4 Ligands

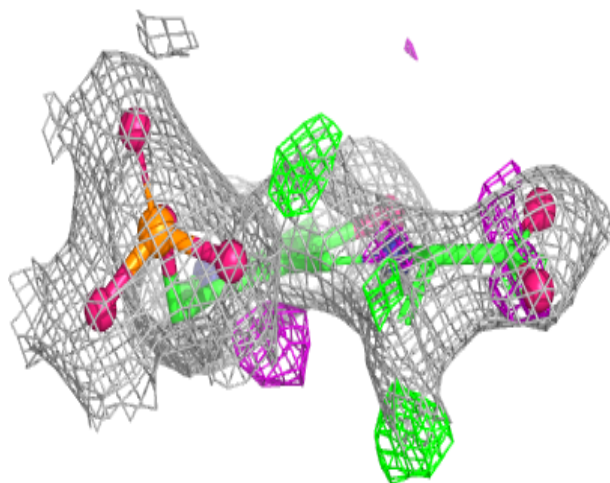
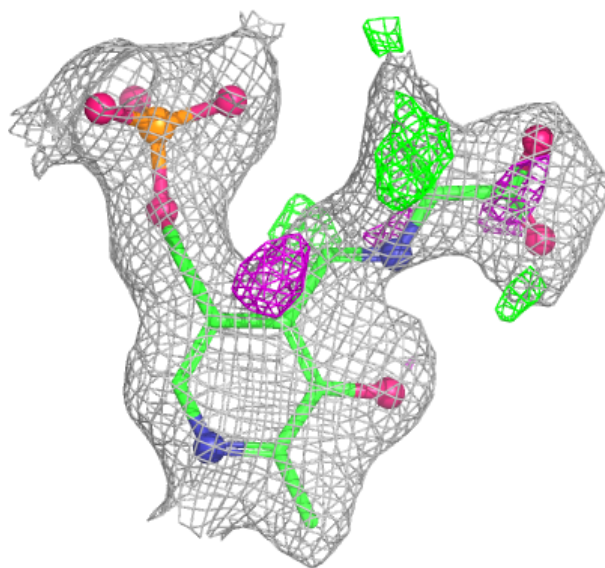
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	BZI	A	503	9/9	0.76	0.16	32,35,38,40	9
3	BZI	D	501	9/9	0.81	0.14	30,32,34,35	9
5	DMS	A	505	4/4	0.91	0.12	34,38,48,53	0
5	DMS	B	501	4/4	0.94	0.11	31,37,41,41	0
4	OJO	D	502	21/21	0.95	0.09	13,20,36,37	0
6	PLT	B	502	30/30	0.95	0.10	17,32,42,46	0
7	A1A2Z	C	503	30/30	0.95	0.10	15,30,40,42	0
4	OJO	A	504	21/21	0.96	0.07	17,25,32,33	0
2	K	C	502	1/1	0.99	0.03	17,17,17,17	0
2	K	A	501	1/1	0.99	0.05	20,20,20,20	0
2	K	C	501	1/1	0.99	0.05	19,19,19,19	0
2	K	A	502	1/1	1.00	0.05	17,17,17,17	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.

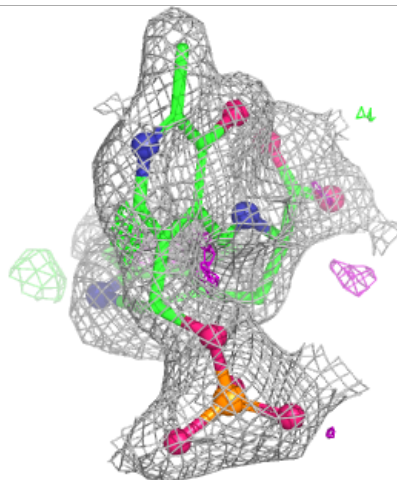
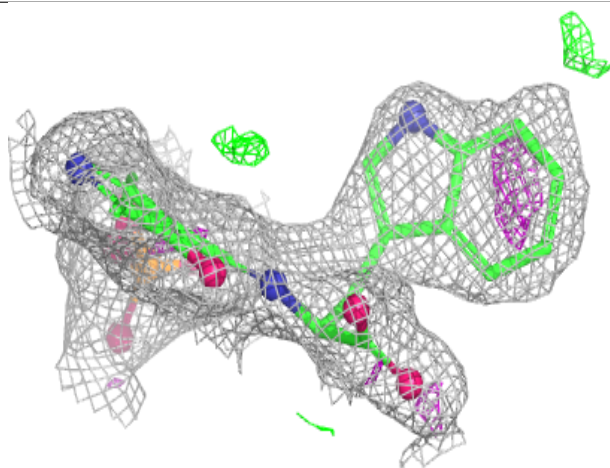
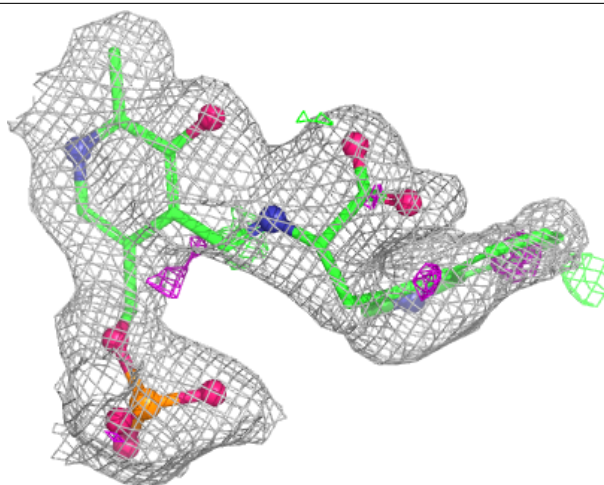
Electron density around 0JO D 502:

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



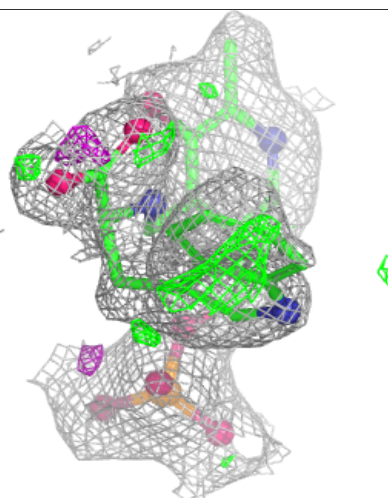
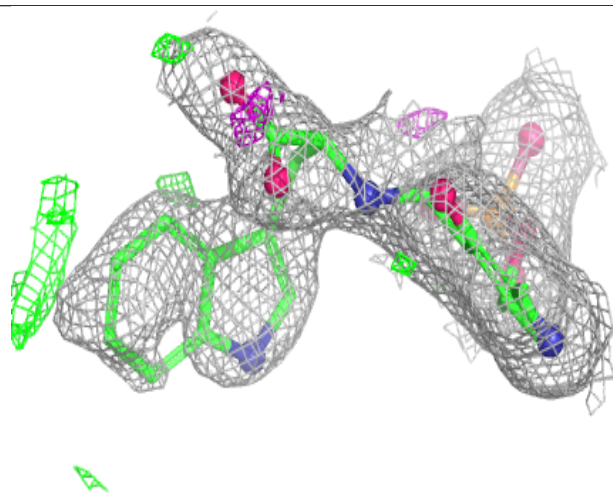
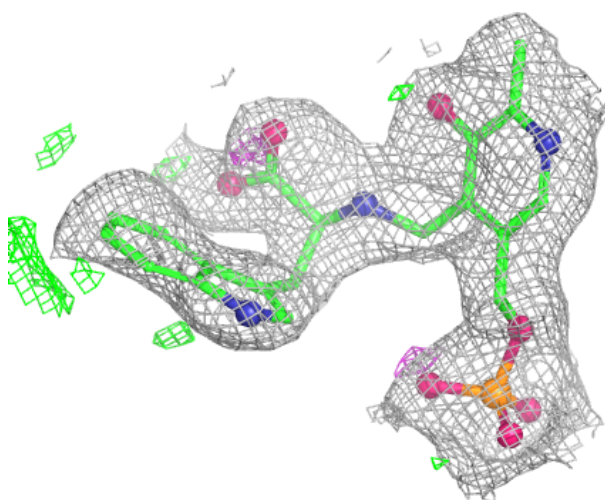
Electron density around PLT B 502:

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



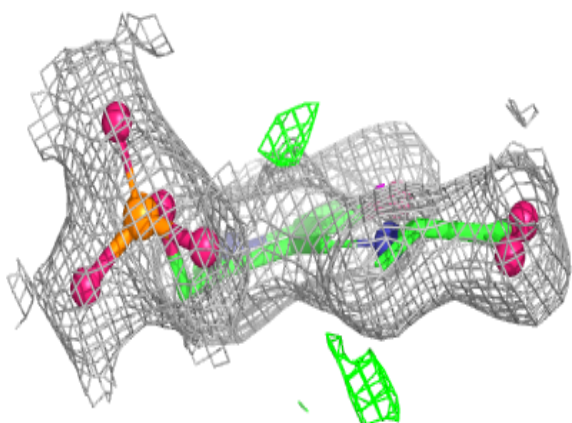
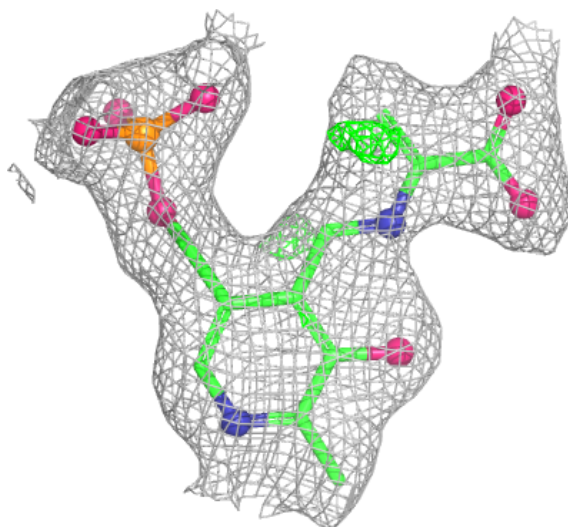
Electron density around A1A2Z C 503:

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



Electron density around 0JO A 504:

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



6.5 Other polymers ⓘ

There are no such residues in this entry.