



Full wwPDB X-ray Structure Validation Report ⓘ

Aug 25, 2026 – 12:37 PM JST

PDB ID : 9WEG / pdb_00009weg
Title : Plasmodium vivax aspartyl-tRNA synthetase in complex with AMS, Mg ion,
Iodides and Pentaethylene glycol
Authors : Manickam, Y.; Sharma, V.K.; Sharma, A.
Deposited on : 2025-08-19
Resolution : 2.23 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	:	1.8.5 (274361), CSD as541be (2020)
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	:	9.0.015 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.50

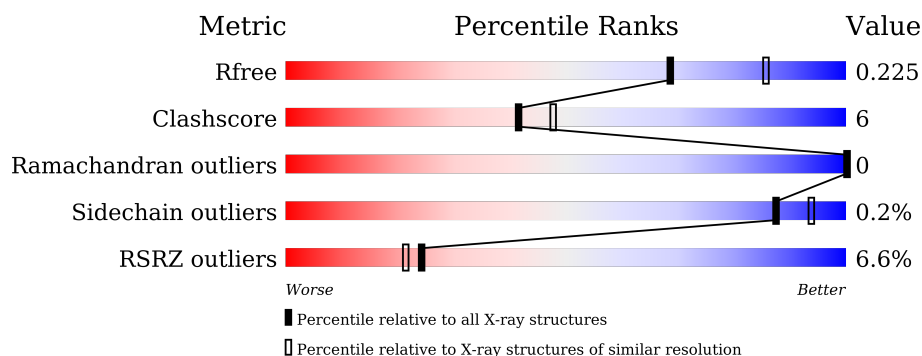
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.23 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	7682 (2.24-2.20)
Clashscore	190562	8402 (2.24-2.20)
Ramachandran outliers	187476	8303 (2.24-2.20)
Sidechain outliers	187428	8304 (2.24-2.20)
RSRZ outliers	180081	7683 (2.24-2.20)

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	536	7% 82% 12% 6%
1	B	536	6% 79% 14% 6%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	IOD	A	703	-	-	X	-

2 Entry composition [i](#)

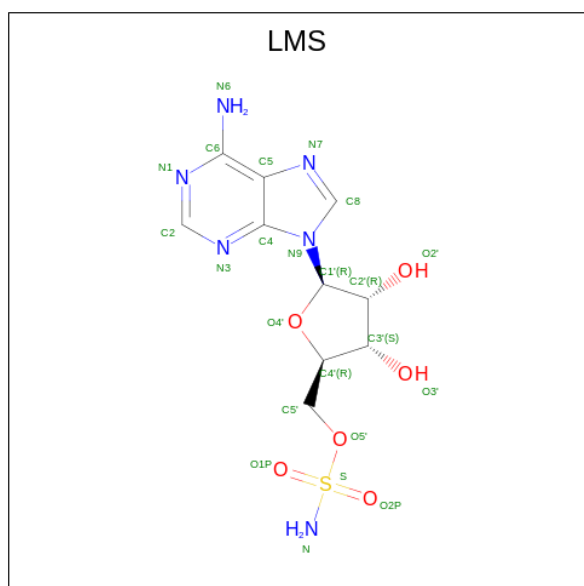
There are 7 unique types of molecules in this entry. The entry contains 8692 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 aspartate-tRNA ligase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	503	Total	C	N	O	S	0	8	0
			4124	2643	686	766	29			
1	B	502	Total	C	N	O	S	0	8	0
			4089	2624	681	756	28			

- Molecule 2 is [(2R,3S,4R,5R)-5-(6-AMINO-9H-PURIN-9-YL)-3,4-DIHYDROXYTETRAHYDRO-2-FURANYL]METHYL SULFAMATE (CCD ID: LMS) (formula: C₁₀H₁₄N₆O₆S) (labeled as "Ligand of Interest" by depositor).

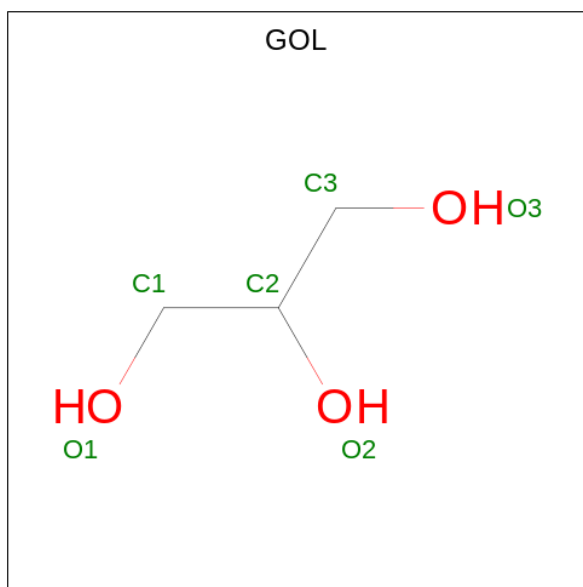


Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	S	0	0
			23	10	6	6	1		
2	B	1	Total	C	N	O	S	0	0
			23	10	6	6	1		

- Molecule 3 is IODIDE ION (CCD ID: IOD) (formula: I).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	3	Total I 3 3	0	0
3	B	2	Total I 2 2	0	0

- Molecule 4 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).

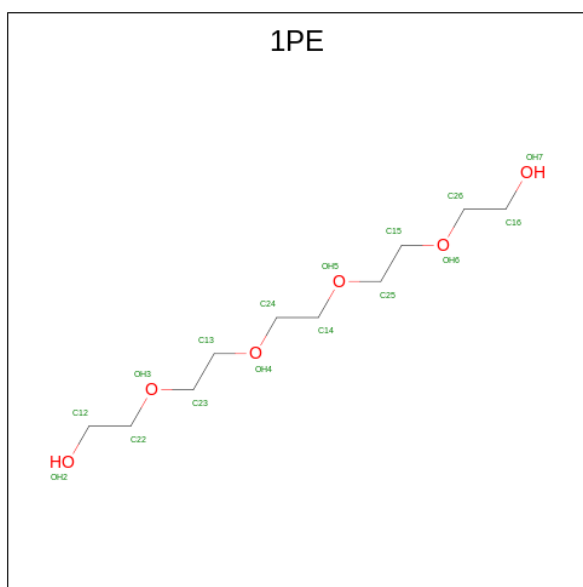


Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C O 6 3 3	0	0

- Molecule 5 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	B	1	Total Mg 1 1	0	0

- Molecule 6 is PENTAETHYLENE GLYCOL (CCD ID: 1PE) (formula: $C_{10}H_{22}O_6$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	B	1	Total	C	O	0	0
			16	10	6		

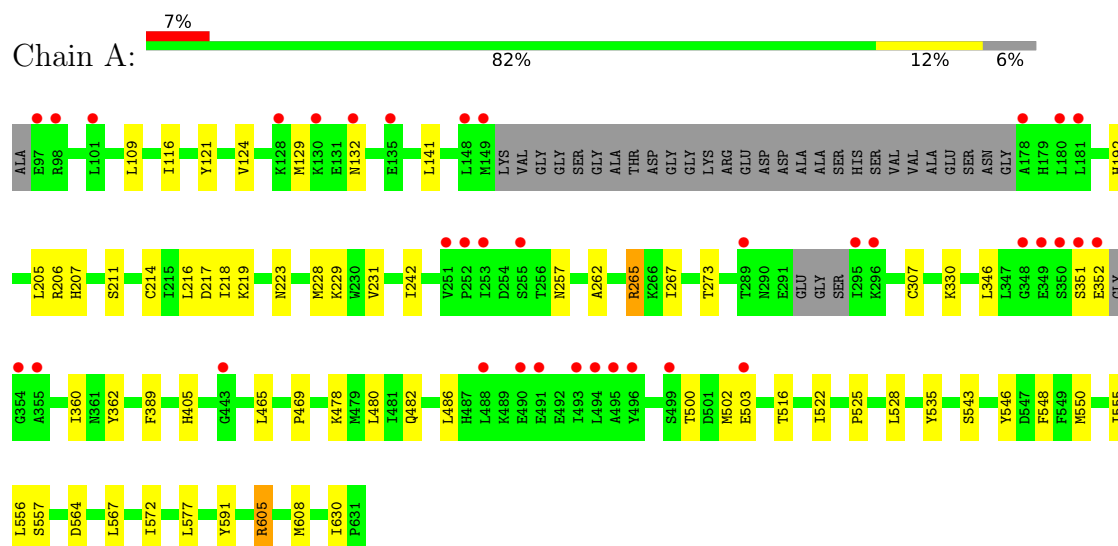
- Molecule 7 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	183	Total O 197 197	0	14
7	B	192	Total O 208 208	0	16

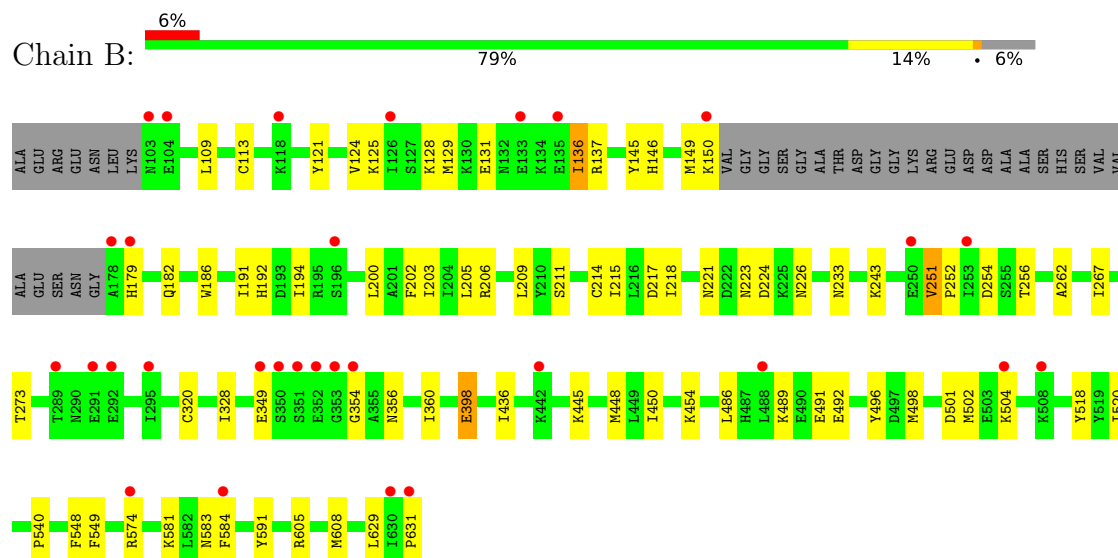
3 Residue-property plots [i](#)

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: aspartate-tRNA ligase



- Molecule 1: aspartate-tRNA ligase



4 Data and refinement statistics

Property	Value	Source
Space group	P 61 2 2	Depositor
Cell constants a, b, c, α , β , γ	138.69Å 138.69Å 274.99Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	45.83 – 2.23 45.83 – 2.23	Depositor EDS
% Data completeness (in resolution range)	99.5 (45.83-2.23) 99.4 (45.83-2.23)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.38 (at 2.22Å)	Xtriage
Refinement program	PHENIX (1.15rc1_3423: ???)	Depositor
R, R_{free}	0.190 , 0.221 0.196 , 0.225	Depositor DCC
R_{free} test set	3854 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å ²)	54.4	Xtriage
Anisotropy	0.010	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 51.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	8692	wwPDB-VP
Average B, all atoms (Å ²)	66.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.50% 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: IOD, 1PE, MG, LMS, GOL

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	0.38	2/4236 (0.0%)	0.58	4/5709 (0.1%)
1	B	0.48	2/4198 (0.0%)	0.61	6/5665 (0.1%)
All	All	0.43	4/8434 (0.0%)	0.59	10/11374 (0.1%)

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	398[A]	GLU	C-N	7.39	1.43	1.33
1	B	398[B]	GLU	C-N	7.39	1.43	1.33
1	A	265[A]	ARG	CA-C	6.62	1.61	1.52
1	A	265[B]	ARG	CA-C	6.62	1.61	1.52

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	136	ILE	N-CA-C	11.91	125.07	107.80
1	A	265[A]	ARG	CA-C-O	10.19	132.11	119.78
1	A	265[B]	ARG	CA-C-O	10.19	132.11	119.78
1	A	351	SER	N-CA-C	-8.31	94.78	108.49
1	B	251	VAL	CA-C-N	8.02	128.32	119.90
1	B	251	VAL	C-N-CA	8.02	128.32	119.90
1	B	354	GLY	N-CA-C	7.49	123.23	113.27
1	B	136	ILE	N-CA-CB	-6.00	103.91	111.46
1	A	605	ARG	CA-CB-CG	-5.77	102.55	114.10
1	B	254	ASP	N-CA-C	5.04	116.77	111.28

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	4124	0	4027	45	0
1	B	4089	0	3973	65	0
2	A	23	0	14	1	0
2	B	23	0	14	0	0
3	A	3	0	0	3	0
3	B	2	0	0	0	0
4	A	6	0	8	1	0
5	B	1	0	0	0	0
6	B	16	0	22	4	0
7	A	197	0	0	2	0
7	B	208	0	0	6	0
All	All	8692	0	8058	104	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 6.

All (104) 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:A:307[B]:CYS:HB3	3:A:703:IOD:I	2.33	0.98
1:B:320[B]:CYS:SG	7:B:808[B]:HOH:O	2.28	0.90
1:A:307[A]:CYS:HB2	3:A:703:IOD:I	2.41	0.89
1:B:186:TRP:CZ2	1:B:243:LYS:HD2	2.12	0.84
1:B:356:ASN:CG	1:B:398[A]:GLU:HG2	2.04	0.83
1:B:356:ASN:ND2	1:B:398[A]:GLU:HG2	1.98	0.79
1:A:525:PRO:HG2	1:A:528:LEU:HD12	1.69	0.74
1:B:445:LYS:NZ	7:B:808[B]:HOH:O	2.25	0.69
1:B:540:PRO:HB2	6:B:705:1PE:H262	1.77	0.66
1:A:218:ILE:HG12	1:A:223:ASN:HA	1.81	0.63
1:B:191:ILE:HG23	1:B:203:ILE:HG23	1.82	0.61
1:B:540:PRO:CB	6:B:705:1PE:H262	2.29	0.61
1:B:179:HIS:HA	1:B:182:GLN:OE1	2.03	0.59
1:B:501:ASP:HA	1:B:504:LYS:HE2	1.85	0.58
1:A:572:ILE:HG23	1:A:577:LEU:HB2	1.84	0.58
1:B:398[B]:GLU:O	7:B:801:HOH:O	2.12	0.58

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:465:LEU:HG	1:A:516:THR:HB	1.86	0.57
1:B:125:LYS:H	1:B:128:LYS:HZ3	1.52	0.57
1:B:186:TRP:CE2	1:B:243:LYS:HD2	2.39	0.57
1:B:491:GLU:H	1:B:491:GLU:CD	2.13	0.57
1:B:486:LEU:HG	1:B:502:MET:HE2	1.88	0.56
1:B:491:GLU:OE2	1:B:491:GLU:N	2.38	0.55
1:B:128:LYS:O	1:B:131:GLU:HB2	2.06	0.55
1:B:186:TRP:CE2	1:B:243:LYS:HB2	2.41	0.55
1:A:500:THR:O	1:A:503:GLU:HB2	2.07	0.54
1:A:591:TYR:HA	1:B:273:THR:HG23	1.89	0.54
1:A:192:HIS:HB2	1:A:206:ARG:HB2	1.89	0.53
1:A:218:ILE:HD12	1:A:228[B]:MET:HG3	1.90	0.53
1:A:360:ILE:HG22	1:B:360:ILE:HD11	1.89	0.53
1:B:631:PRO:HD2	7:B:897:HOH:O	2.08	0.53
1:B:211:SER:OG	1:B:256:THR:HA	2.09	0.53
1:A:360:ILE:HG22	1:B:360:ILE:CD1	2.39	0.52
1:B:356:ASN:ND2	1:B:398[A]:GLU:CG	2.71	0.52
1:B:489:LYS:HB2	1:B:492:GLU:HG3	1.91	0.52
1:B:605:ARG:HG3	1:B:608:MET:HE2	1.92	0.51
1:B:186:TRP:CZ2	1:B:243:LYS:HB2	2.46	0.51
1:B:218:ILE:HG13	1:B:223:ASN:HA	1.93	0.51
1:A:265[B]:ARG:NH2	7:A:803:HOH:O	2.43	0.51
1:B:224:ASP:OD2	1:B:226:ASN:HB2	2.12	0.50
1:B:398[A]:GLU:O	7:B:801:HOH:O	2.20	0.50
1:B:209:LEU:HD11	1:B:448:MET:HE3	1.94	0.50
1:B:192:HIS:HB2	1:B:206:ARG:HB2	1.94	0.49
1:A:522:ILE:HG22	1:A:546:TYR:HB3	1.93	0.49
1:A:116:ILE:HD11	1:A:132:ASN:HB2	1.95	0.49
1:A:630:ILE:HD13	1:B:584:PHE:CZ	2.48	0.48
1:A:217:ASP:OD1	1:A:219:LYS:HG2	2.13	0.48
1:A:124:VAL:HG21	1:A:129:MET:SD	2.52	0.48
1:A:307[B]:CYS:CB	3:A:703:IOD:I	3.21	0.48
1:A:535:TYR:HA	1:A:543:SER:HA	1.96	0.48
1:B:574:ARG:HD2	6:B:705:1PE:H142	1.94	0.48
1:A:218:ILE:HB	1:A:228[B]:MET:SD	2.53	0.48
1:A:548:PHE:HB2	1:A:556:LEU:HB3	1.96	0.48
1:B:194:ILE:HD12	1:B:203:ILE:HG12	1.96	0.48
1:A:214:CYS:HA	1:A:262:ALA:O	2.14	0.47
1:B:124:VAL:HA	1:B:128:LYS:NZ	2.29	0.47
1:A:405:HIS:HE1	7:A:814:HOH:O	1.97	0.47
1:A:480:LEU:HD13	1:A:502:MET:HG3	1.97	0.47

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:550:MET:SD	1:A:555:ILE:HD13	2.55	0.47
1:B:445:LYS:NZ	7:B:808[A]:HOH:O	2.45	0.47
1:A:362:TYR:CD2	1:B:629:LEU:HD13	2.50	0.47
1:A:205:LEU:O	1:A:211:SER:HA	2.15	0.46
1:A:478:LYS:O	1:A:482:GLN:HG2	2.15	0.46
1:B:349:GLU:CD	1:B:581:LYS:HD2	2.39	0.46
1:A:465:LEU:HD12	1:A:469:PRO:HD3	1.98	0.46
1:B:186:TRP:HZ2	1:B:243:LYS:HD2	1.75	0.46
1:B:214:CYS:HA	1:B:262:ALA:O	2.16	0.45
1:A:557:SER:HB3	2:A:701:LMS:HN2	1.81	0.45
1:A:273:THR:HG23	1:B:591:TYR:HA	1.99	0.45
1:A:486:LEU:HD13	1:A:502:MET:HE3	1.99	0.45
1:A:257:ASN:ND2	4:A:705:GOL:H32	2.32	0.44
1:B:200:LEU:HD23	1:B:217:ASP:HA	1.99	0.44
1:B:583:ASN:OD1	1:B:583:ASN:N	2.51	0.44
1:A:564:ASP:HB3	1:A:567:LEU:HD12	2.00	0.44
1:A:205:LEU:HD11	1:A:242:ILE:HD12	2.00	0.44
1:A:346:LEU:HD22	1:A:360:ILE:HD13	1.99	0.44
1:B:146:HIS:HD2	1:B:150:LYS:HD3	1.82	0.44
1:A:605:ARG:HG3	1:A:608:MET:HE2	2.00	0.43
1:B:129:MET:HE3	1:B:129:MET:HB3	1.82	0.43
1:B:137:ARG:HA	1:B:137:ARG:HD2	1.80	0.43
1:B:218:ILE:HD12	1:B:221:ASN:HB2	2.00	0.43
1:B:251:VAL:HA	1:B:252:PRO:HD2	1.77	0.43
1:B:113:CYS:O	1:B:128:LYS:HE3	2.18	0.43
1:B:194:ILE:CD1	1:B:203:ILE:HG12	2.49	0.42
1:B:496:TYR:CE2	1:B:498:MET:HA	2.54	0.42
1:B:520:ILE:HG12	1:B:548:PHE:CD1	2.54	0.42
1:B:218:ILE:HD11	1:B:224:ASP:H	1.84	0.42
1:B:328:ILE:HG21	1:B:436:ILE:HA	2.02	0.42
1:B:202:PHE:CD1	1:B:215:ILE:HD12	2.54	0.42
1:B:121:TYR:HA	1:B:267:ILE:O	2.19	0.42
1:A:121:TYR:HA	1:A:267:ILE:O	2.20	0.42
1:B:518:TYR:HA	1:B:549:PHE:O	2.20	0.42
1:B:540:PRO:HB3	6:B:705:1PE:H262	2.00	0.42
1:A:141:LEU:HB2	1:A:207:HIS:HB3	2.02	0.41
1:A:216:LEU:HD22	1:A:231:VAL:HG21	2.03	0.41
1:B:356:ASN:CB	1:B:398[A]:GLU:HG2	2.51	0.41
1:A:265[A]:ARG:HH11	1:A:265[A]:ARG:HG2	1.85	0.41
1:A:265[A]:ARG:HG2	1:A:265[A]:ARG:NH1	2.36	0.41
1:B:205:LEU:O	1:B:211:SER:HA	2.20	0.41

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:450:ILE:O	1:B:454:LYS:HG2	2.21	0.41
1:B:109:LEU:HD13	1:B:233:ASN:ND2	2.35	0.40
1:B:145:TYR:O	1:B:149:MET:HB2	2.21	0.40
1:B:251:VAL:O	1:B:251:VAL:HG12	2.21	0.40
1:A:109:LEU:HD21	1:A:229:LYS:HG2	2.02	0.40
1:A:330:LYS:HG2	1:A:389:PHE:CE1	2.56	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	503/536 (94%)	488 (97%)	15 (3%)	0	100	100
1	B	506/536 (94%)	493 (97%)	13 (3%)	0	100	100
All	All	1009/1072 (94%)	981 (97%)	28 (3%)	0	100	100

There are no Ramachandran outliers to report.

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	454/485 (94%)	453 (100%)	1 (0%)	87	94
1	B	444/485 (92%)	443 (100%)	1 (0%)	87	94

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
All	All	898/970 (93%)	896 (100%)	2 (0%)	87	94

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	352	GLU
1	B	136	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (10) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	221	ASN
1	A	299	GLN
1	A	405	HIS
1	A	482	GLN
1	B	146	HIS
1	B	233	ASN
1	B	374	GLN
1	B	378	GLN
1	B	425	ASN
1	B	483	HIS

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 10 ligands modelled in this entry, 6 are monoatomic - leaving 4 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	$\# Z > 2$
4	GOL	A	705	-	5,5,5	0.26	0	5,5,5	0.28	0
6	1PE	B	705	-	15,15,15	0.11	0	14,14,14	0.10	0
2	LMS	B	701	-	25,25,25	0.11	0	38,38,38	0.18	0
2	LMS	A	701	-	25,25,25	0.80	0	38,38,38	0.48	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	GOL	A	705	-	-	0/4/4/4	-
6	1PE	B	705	-	-	4/13/13/13	-
2	LMS	B	701	-	-	4/10/26/26	0/3/3/3
2	LMS	A	701	-	-	0/10/26/26	0/3/3/3

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (8) torsion outliers are listed below:

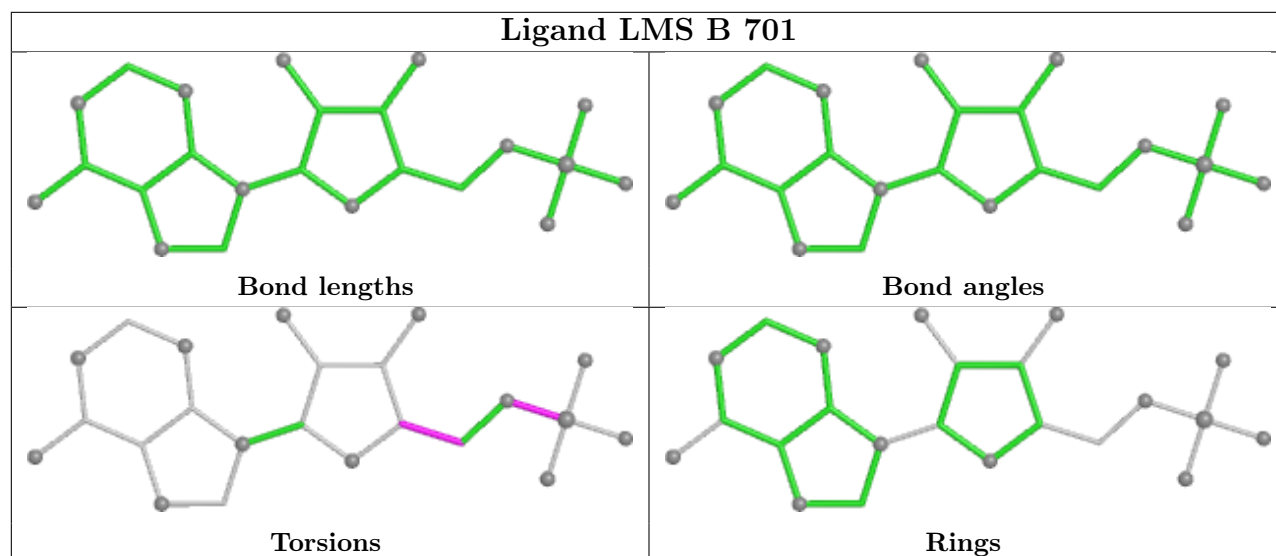
Mol	Chain	Res	Type	Atoms
2	B	701	LMS	C5'-O5'-S-N
2	B	701	LMS	C5'-O5'-S-O1P
2	B	701	LMS	C3'-C4'-C5'-O5'
2	B	701	LMS	O4'-C4'-C5'-O5'
6	B	705	1PE	C12-C22-OH3-C23
6	B	705	1PE	C16-C26-OH6-C15
6	B	705	1PE	C23-C13-OH4-C24
6	B	705	1PE	OH6-C15-C25-OH5

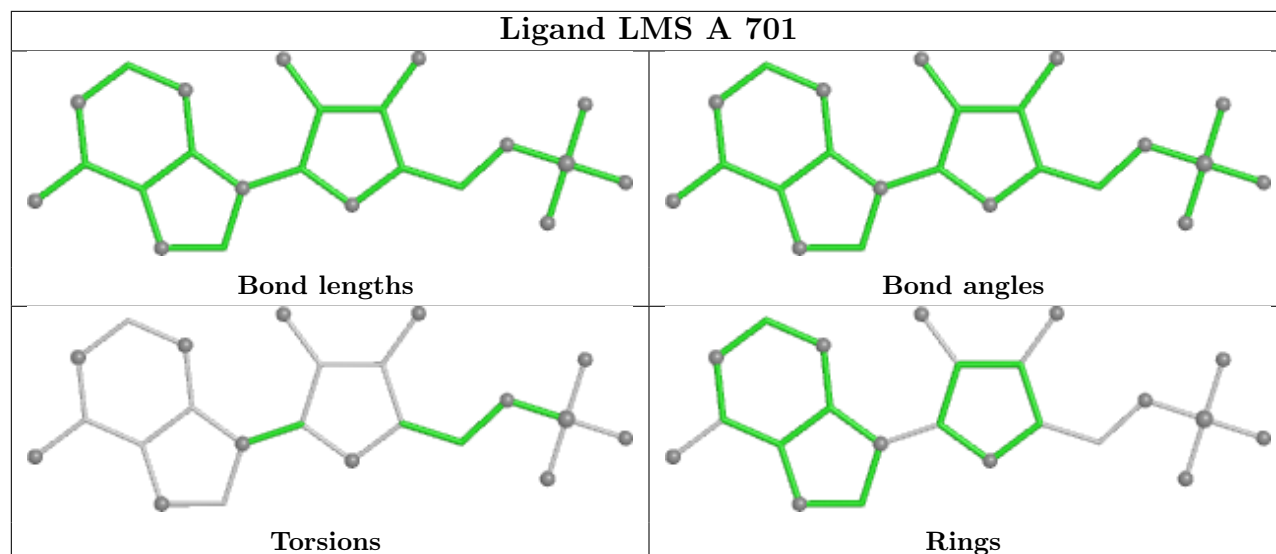
There are no ring outliers.

3 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	705	GOL	1	0
6	B	705	1PE	4	0
2	A	701	LMS	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	503/536 (93%)	0.23	36 (7%)	21 19	31, 58, 109, 160	9 (1%)
1	B	502/536 (93%)	0.28	30 (5%)	27 25	30, 62, 126, 151	10 (1%)
All	All	1005/1072 (93%)	0.25	66 (6%)	24 21	30, 59, 119, 160	19 (1%)

All (66) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	350	SER	10.5
1	B	353	GLY	5.3
1	B	351	SER	5.1
1	B	103	ASN	5.0
1	A	253	ILE	4.8
1	A	98	ARG	4.8
1	A	295	ILE	4.7
1	B	354	GLY	4.4
1	A	354	GLY	4.3
1	A	352	GLU	4.2
1	B	253	ILE	4.1
1	B	295	ILE	4.1
1	A	351	SER	4.0
1	A	350	SER	3.6
1	B	352	GLU	3.5
1	B	104	GLU	3.4
1	B	135	GLU	3.4
1	A	494	LEU	3.3
1	A	348	GLY	3.3
1	A	490	GLU	3.2
1	A	135	GLU	3.1
1	A	252	PRO	3.0
1	A	178	ALA	3.0
1	A	491	GLU	3.0

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	A	181	LEU	2.9
1	B	178	ALA	2.9
1	A	296	LYS	2.7
1	B	289	THR	2.7
1	A	499	SER	2.7
1	A	355	ALA	2.6
1	B	150	LYS	2.6
1	B	133	GLU	2.6
1	B	630	ILE	2.6
1	A	130	LYS	2.6
1	A	180	LEU	2.6
1	A	101	LEU	2.5
1	A	132	ASN	2.5
1	B	179	HIS	2.5
1	A	289	THR	2.4
1	A	349	GLU	2.4
1	B	504	LYS	2.4
1	B	508	LYS	2.4
1	A	255	SER	2.4
1	A	251	VAL	2.4
1	A	503	GLU	2.4
1	B	118	LYS	2.3
1	B	292	GLU	2.3
1	B	349	GLU	2.3
1	A	97	GLU	2.3
1	A	493	ILE	2.3
1	A	488	LEU	2.2
1	B	250	GLU	2.2
1	A	148	LEU	2.2
1	B	574	ARG	2.2
1	B	442[A]	LYS	2.2
1	A	149	MET	2.1
1	A	496	TYR	2.1
1	A	128	LYS	2.1
1	A	443	GLY	2.1
1	B	631	PRO	2.1
1	B	291	GLU	2.1
1	B	584	PHE	2.1
1	A	495	ALA	2.0
1	B	488	LEU	2.0
1	B	126	ILE	2.0
1	B	196	SER	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 oligosaccharides in this entry.

6.4 Ligands [i](#)

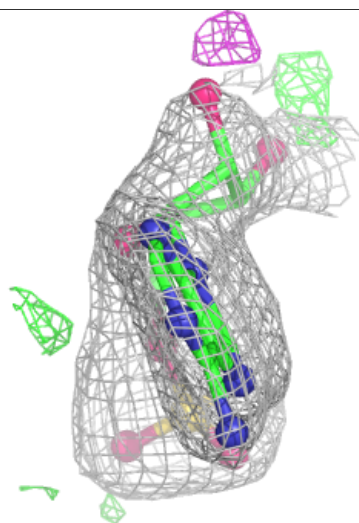
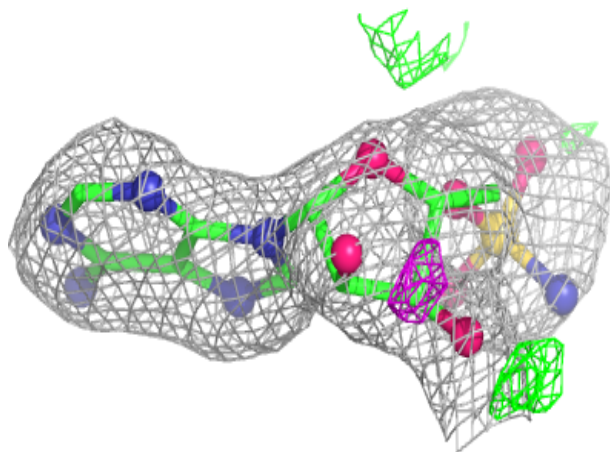
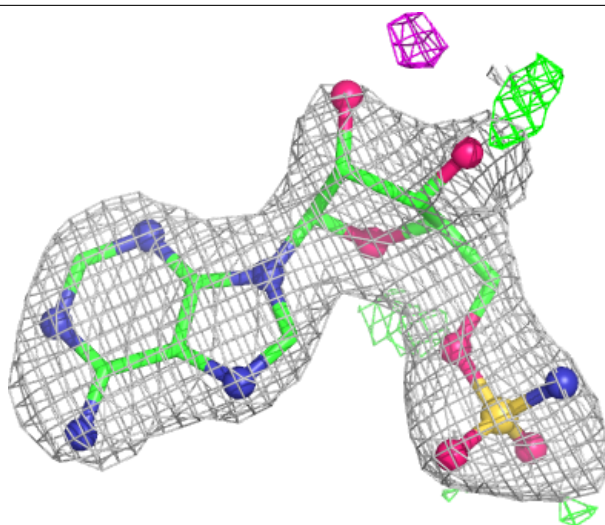
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

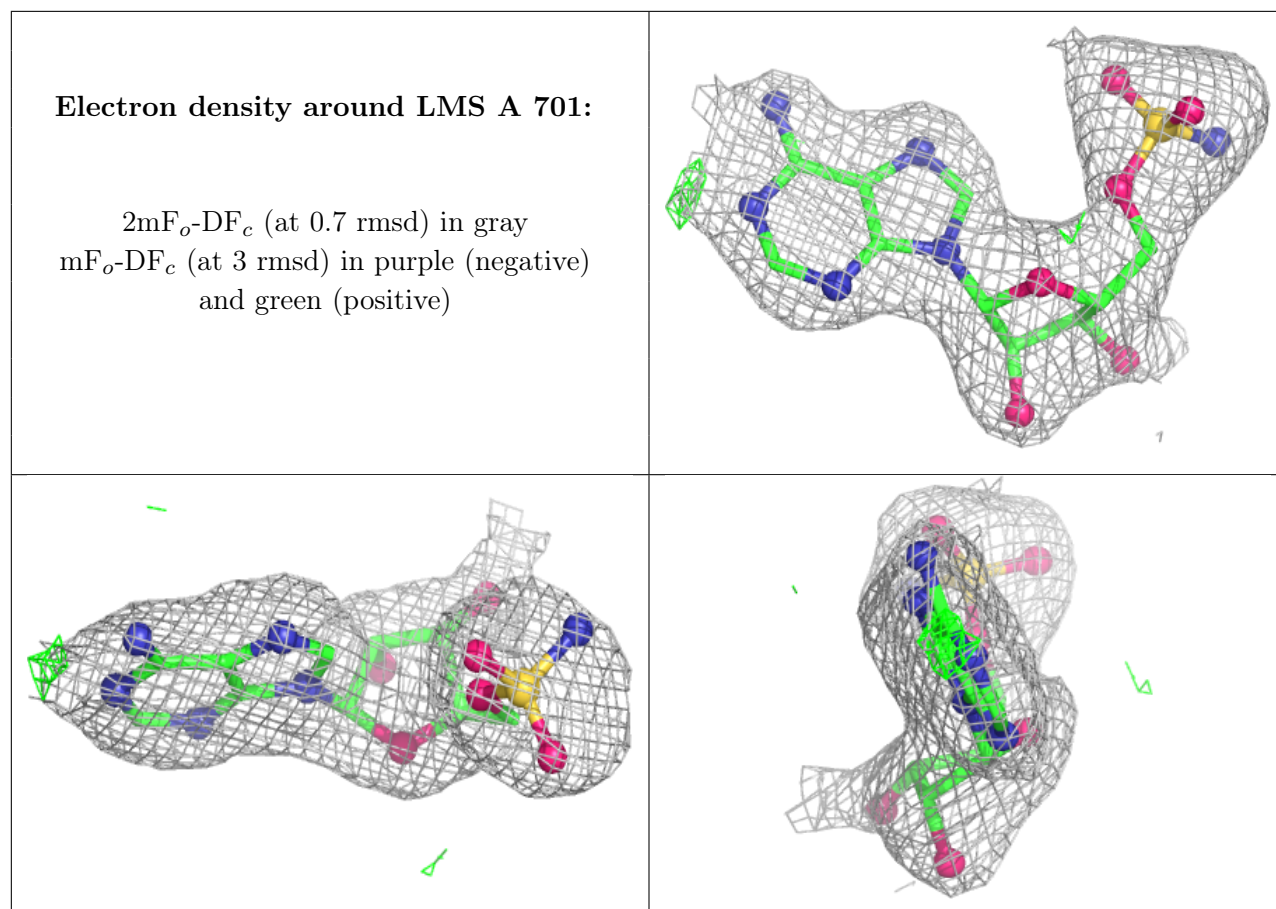
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
6	1PE	B	705	16/16	0.77	0.30	69,81,88,88	16
4	GOL	A	705	6/6	0.78	0.17	77,81,83,83	0
3	IOD	A	704	1/1	0.85	0.14	145,145,145,145	1
2	LMS	B	701	23/23	0.90	0.13	58,67,86,88	23
3	IOD	B	704	1/1	0.90	0.34	110,110,110,110	1
3	IOD	A	703	1/1	0.91	0.16	119,119,119,119	1
5	MG	B	702	1/1	0.94	0.07	80,80,80,80	0
3	IOD	A	702	1/1	0.96	0.08	90,90,90,90	1
3	IOD	B	703	1/1	0.96	0.25	123,123,123,123	1
2	LMS	A	701	23/23	0.96	0.08	41,46,70,76	23

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 LMS B 701:

$2mF_o-DF_c$ (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.