



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 03:59 PM UTC

PDB ID : 4EG6 / pdb_00004eg6
Title : Trypanosoma brucei methionyl-tRNA synthetase in complex with inhibitor Chem 1325
Authors : Koh, C.Y.; Kim, J.E.; Shibata, S.; Fan, E.; Verlinde, C.L.M.J.; Hol, W.G.J.
Deposited on : 2012-03-30
Resolution : 2.90 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

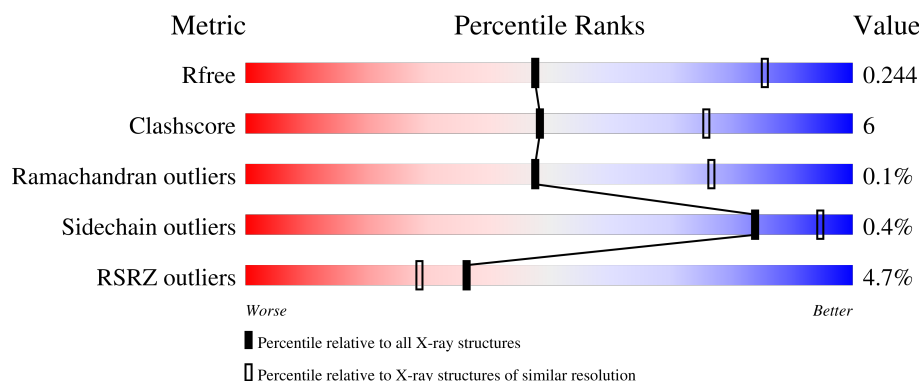
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.90 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	2481 (2.90-2.90)
Clashscore	190562	2690 (2.90-2.90)
Ramachandran outliers	187476	2623 (2.90-2.90)
Sidechain outliers	187428	2625 (2.90-2.90)
RSRZ outliers	180081	2481 (2.90-2.90)

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	542	
1	B	542	

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	DMS	A	809	-	-	X	-

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 8743 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 Methionyl-tRNA synthetase, putative.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	526	Total	As	C	N	O	S	0	1	0
			4231	1	2722	715	782	11			
1	B	515	Total	As	C	N	O	S	0	0	0
			4137	1	2669	698	758	11			

There are 20 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-4	GLY	-	expression tag	UNP Q38C91
A	-3	PRO	-	expression tag	UNP Q38C91
A	-2	GLY	-	expression tag	UNP Q38C91
A	0	MET	ALA	conflict	UNP Q38C91
A	309	THR	ALA	conflict	UNP Q38C91
A	452	ALA	LYS	engineered mutation	UNP Q38C91
A	453	ARG	LYS	engineered mutation	UNP Q38C91
A	454	ALA	GLU	engineered mutation	UNP Q38C91
A	499	VAL	ALA	conflict	UNP Q38C91
A	503	ASN	SER	conflict	UNP Q38C91
B	-4	GLY	-	expression tag	UNP Q38C91
B	-3	PRO	-	expression tag	UNP Q38C91
B	-2	GLY	-	expression tag	UNP Q38C91
B	0	MET	ALA	conflict	UNP Q38C91
B	309	THR	ALA	conflict	UNP Q38C91
B	452	ALA	LYS	engineered mutation	UNP Q38C91
B	453	ARG	LYS	engineered mutation	UNP Q38C91
B	454	ALA	GLU	engineered mutation	UNP Q38C91
B	499	VAL	ALA	conflict	UNP Q38C91
B	503	ASN	SER	conflict	UNP Q38C91

- Molecule 2 is GLYCEROL (CCD ID: GOL) (formula: C₃H₈O₃).



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

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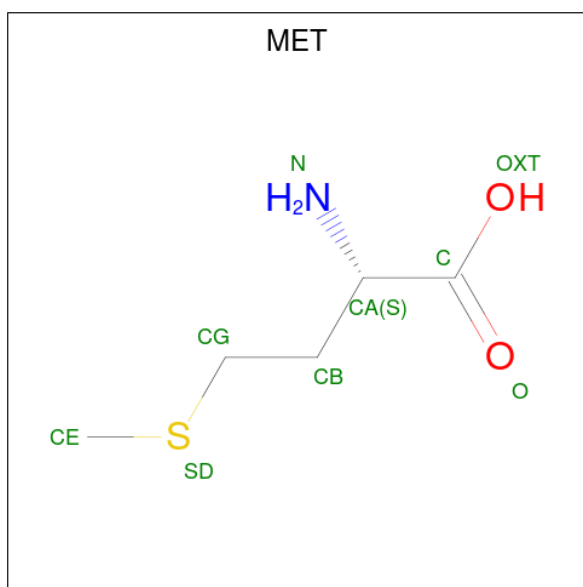
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	B	1	Total	C	O	0	0
			6	3	3		

- Molecule 3 is DIMETHYL SULFOXIDE (CCD ID: DMS) (formula: C_2H_6OS).



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

- Molecule 4 is METHIONINE (CCD ID: MET) (formula: $C_5H_{11}NO_2S$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total	C	N	O	S	0	0
			9	5	1	2	1		

- Molecule 5 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



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

- Molecule 6 is 4-{4-[(1H-benzimidazol-2-ylmethyl)amino]-6-(2-chloro-4-methoxyphenoxy)pyrimidin-2-yl}piperazin-2-one (CCD ID: 0P5) (formula: C₂₃H₂₂ClN₇O₃).



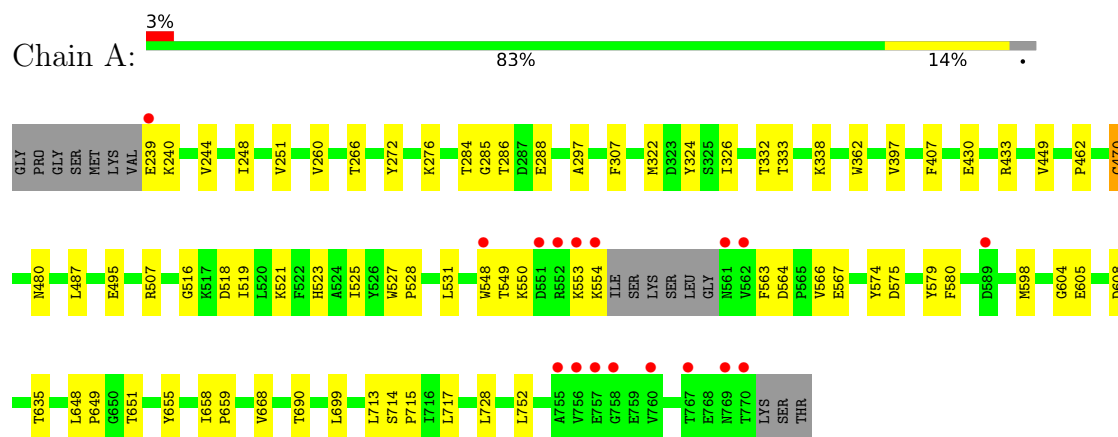
- Molecule 7 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	105	Total O 105 105	0	0
7	B	112	Total O 112 112	0	0

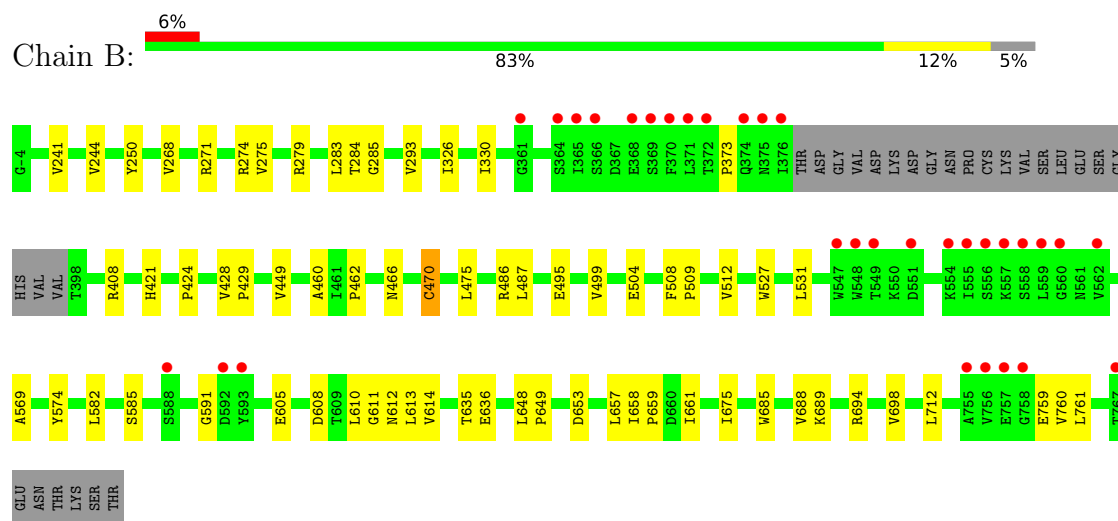
3 Residue-property plots

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: Methionyl-tRNA synthetase, putative



- Molecule 1: Methionyl-tRNA synthetase, putative



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	86.64Å 105.63Å 207.44Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	30.00 – 2.90 30.00 – 2.90	Depositor EDS
% Data completeness (in resolution range)	99.4 (30.00-2.90) 99.4 (30.00-2.90)	Depositor EDS
R_{merge}	0.17	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.37 (at 2.90Å)	Xtriage
Refinement program	REFMAC refmac_5.6.0117	Depositor
R, R_{free}	0.190 , 0.243 0.192 , 0.244	Depositor DCC
R_{free} test set	2162 reflections (5.04%)	wwPDB-VP
Wilson B-factor (Å ²)	44.7	Xtriage
Anisotropy	0.760	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 38.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	8743	wwPDB-VP
Average B, all atoms (Å ²)	42.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.28% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

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

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: SO4, DMS, CAS, OP5, 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	0.69	0/4334	0.77	0/5889
1	B	0.70	0/4235	0.80	3/5751 (0.1%)
All	All	0.69	0/8569	0.78	3/11640 (0.0%)

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	285	GLY	N-CA-C	5.32	117.76	110.69
1	B	466	ASN	CA-C-N	5.22	125.02	119.28
1	B	466	ASN	C-N-CA	5.22	125.02	119.28

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	4231	0	4172	49	0
1	B	4137	0	4104	42	0
2	A	48	0	64	1	0
2	B	42	0	56	1	0
3	A	20	0	30	7	0
4	A	9	0	8	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	B	5	0	0	1	0
6	B	34	0	22	3	0
7	A	105	0	0	2	0
7	B	112	0	0	2	0
All	All	8743	0	8456	94	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 (94) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:A:808:DMS:H23	3:A:809:DMS:H12	1.55	0.88
1:A:322:MET:HE3	1:A:566:VAL:HG22	1.57	0.86
1:A:239:GLU:HG2	1:A:240:LYS:H	1.56	0.70
1:B:408:ARG:NH2	5:B:904:SO4:O2	2.27	0.68
1:B:250:TYR:CE1	6:B:906:OP5:H16	2.30	0.65
1:A:668:VAL:HG11	1:A:713:LEU:HG	1.80	0.64
1:A:516:GLY:HA3	1:A:549:THR:HG23	1.80	0.63
1:A:240:LYS:NZ	1:A:507:ARG:O	2.32	0.63
1:B:284:THR:HG22	1:B:326:ILE:HG21	1.81	0.62
1:B:486:ARG:O	1:B:499:VAL:HG22	2.00	0.62
1:A:244:VAL:HG22	1:A:266:THR:HG23	1.84	0.60
1:B:688:VAL:HG23	1:B:689:LYS:HG3	1.84	0.60
1:B:268:VAL:HG11	1:B:661:ILE:HD13	1.84	0.59
1:B:268:VAL:HG21	1:B:582:LEU:HD11	1.83	0.59
1:A:564:ASP:HB3	1:A:567:GLU:HB2	1.83	0.59
1:A:239:GLU:HG2	1:A:240:LYS:N	2.18	0.58
1:A:284:THR:HG22	1:A:326:ILE:HG21	1.84	0.58
1:B:271:ARG:O	1:B:275:VAL:HG23	2.04	0.58
1:B:487:LEU:HD22	1:B:495:GLU:HG3	1.88	0.55
1:B:250:TYR:CD1	6:B:906:OP5:H16	2.42	0.55
1:B:608:ASP:O	1:B:612:ASN:HB3	2.06	0.54
1:A:521:LYS:NZ	3:A:810:DMS:H21	2.23	0.54
1:A:518:ASP:HB3	1:A:548:TRP:CE3	2.44	0.53
1:A:248:ILE:HD12	1:A:332:THR:CG2	2.40	0.52
1:B:460:ALA:O	1:B:470:CAS:CE2	2.57	0.52
1:A:487:LEU:HD22	1:A:495:GLU:HG3	1.93	0.51
1:A:521:LYS:H	3:A:809:DMS:H11	1.76	0.50
1:A:521:LYS:HB3	3:A:809:DMS:H11	1.94	0.50
1:B:569:ALA:HB1	1:B:574:TYR:CD1	2.46	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:338:LYS:NZ	7:A:910:HOH:O	2.42	0.50
1:A:651:THR:HG22	1:A:655:TYR:CE2	2.46	0.50
1:A:519:ILE:HD12	1:A:523:HIS:CE1	2.47	0.49
1:A:690:THR:HG21	7:B:1005:HOH:O	2.13	0.48
1:B:613:LEU:HD21	1:B:675:ILE:CG2	2.42	0.48
1:B:759:GLU:O	1:B:760:VAL:HG13	2.14	0.48
1:B:685:TRP:O	1:B:688:VAL:HG22	2.14	0.47
1:B:244:VAL:HG23	1:B:512:VAL:HB	1.96	0.47
1:A:322:MET:CE	1:A:566:VAL:HG22	2.38	0.47
1:B:610:LEU:O	1:B:614:VAL:HG23	2.14	0.47
1:A:658:ILE:N	1:A:659:PRO:HA	2.28	0.47
1:B:274:ARG:NH2	7:B:1086:HOH:O	2.47	0.47
1:B:250:TYR:CZ	1:B:293:VAL:HG23	2.49	0.47
1:B:635:THR:HG22	1:B:636:GLU:N	2.31	0.46
1:B:694:ARG:O	1:B:698:VAL:HG23	2.16	0.46
1:A:550:LYS:HB3	2:A:807:GOL:H31	1.98	0.46
1:B:611:GLY:HA2	1:B:761:LEU:HD12	1.98	0.45
1:B:653:ASP:O	1:B:657:LEU:HD13	2.15	0.45
1:B:283:LEU:HD11	1:B:330:ILE:HB	1.98	0.45
1:B:585:SER:HB2	1:B:591:GLY:HA2	1.98	0.45
1:B:241:VAL:HG22	1:B:279:ARG:CB	2.47	0.45
1:B:271:ARG:HG2	2:B:901:GOL:H32	1.98	0.45
1:A:272:TYR:CE2	1:A:276:LYS:HD2	2.52	0.45
1:A:248:ILE:HA	1:A:285:GLY:O	2.17	0.44
1:A:297:ALA:HB2	1:A:307:PHE:CD2	2.52	0.44
1:B:527:TRP:CE2	1:B:531:LEU:HD11	2.52	0.44
1:A:322:MET:HE3	1:A:566:VAL:CG2	2.39	0.44
1:B:449:VAL:HB	1:B:475:LEU:HD12	2.00	0.44
1:B:527:TRP:CH2	1:B:531:LEU:HD21	2.53	0.43
1:A:251:VAL:HG13	1:A:286:THR:HB	2.00	0.43
1:A:580:PHE:CE1	1:A:598:MET:HA	2.54	0.43
3:A:808:DMS:C2	3:A:809:DMS:H12	2.39	0.43
7:A:917:HOH:O	1:B:421:HIS:HB3	2.19	0.43
1:B:241:VAL:HG22	1:B:279:ARG:HB3	2.00	0.43
1:B:428:VAL:HG13	1:B:429:PRO:HA	2.00	0.43
1:A:362:TRP:CE3	1:A:397:VAL:HG23	2.53	0.43
1:A:521:LYS:N	3:A:809:DMS:H11	2.34	0.42
6:B:906:OP5:H3	6:B:906:OP5:H1	1.78	0.42
1:A:635:THR:HG22	1:B:424:PRO:HG2	2.00	0.42
1:B:658:ILE:N	1:B:659:PRO:HA	2.34	0.42
1:B:268:VAL:CG1	1:B:661:ILE:HD13	2.50	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:A:810:DMS:C2	3:A:811:DMS:H13	2.49	0.42
1:B:648:LEU:HB3	1:B:649:PRO:HD3	2.01	0.42
1:A:575:ASP:HB3	1:A:717:LEU:HD23	2.00	0.42
1:A:579:TYR:OH	1:A:605:GLU:OE1	2.34	0.42
1:B:649:PRO:HA	1:B:712:LEU:HD11	2.00	0.42
1:A:519:ILE:HD12	1:A:523:HIS:HE1	1.85	0.41
1:A:407:PHE:HB2	1:A:449:VAL:HG11	2.02	0.41
1:A:288:GLU:HB2	1:A:333:THR:HG23	2.03	0.41
1:A:525:ILE:C	1:A:528:PRO:HD2	2.46	0.41
1:A:728:LEU:HA	1:A:752:LEU:HD22	2.03	0.41
1:B:460:ALA:C	1:B:470:CAS:CE2	2.94	0.41
1:A:553:LYS:O	1:A:554:LYS:HB2	2.21	0.41
1:A:714:SER:N	1:A:715:PRO:CD	2.83	0.41
1:A:462:PRO:HA	1:A:470:CAS:CE2	2.51	0.41
1:A:239:GLU:CG	1:A:240:LYS:H	2.24	0.40
1:A:648:LEU:N	1:A:649:PRO:CD	2.84	0.40
1:B:508:PHE:CG	1:B:509:PRO:HA	2.55	0.40
1:A:527:TRP:CE2	1:A:531:LEU:HD11	2.56	0.40
1:A:248:ILE:HD13	1:A:480:ASN:HB3	2.04	0.40
1:A:604:GLY:O	1:A:608:ASP:HB2	2.21	0.40
1:B:462:PRO:HA	1:B:470:CAS:CE1	2.51	0.40
1:A:260:VAL:HG13	1:A:324:TYR:OH	2.22	0.40
1:A:322:MET:HE2	1:A:574:TYR:HE2	1.85	0.40
1:A:430:GLU:OE2	1:A:433:ARG:NH1	2.54	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	522/542 (96%)	508 (97%)	14 (3%)	0	100 100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	510/542 (94%)	485 (95%)	24 (5%)	1 (0%)	43	72
All	All	1032/1084 (95%)	993 (96%)	38 (4%)	1 (0%)	48	77

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	373	PRO

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	456/468 (97%)	454 (100%)	2 (0%)	84	94
1	B	444/468 (95%)	442 (100%)	2 (0%)	81	93
All	All	900/936 (96%)	896 (100%)	4 (0%)	84	94

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	563	PHE
1	A	699	LEU
1	B	504	GLU
1	B	605	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	252	ASN
1	A	321	GLN
1	A	612	ASN
1	B	321	GLN
1	B	466	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

2 non-standard protein/DNA/RNA residues are modelled in this entry.

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
1	CAS	A	470	1	5,8,9	0.84	0	1,9,11	2.68	1 (100%)
1	CAS	B	470	1	5,8,9	0.97	0	1,9,11	2.50	1 (100%)

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
1	CAS	A	470	1	-	0/0/7/9	-
1	CAS	B	470	1	-	0/0/7/9	-

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	470	CAS	CB-CA-C	-2.68	103.53	110.80
1	B	470	CAS	CB-CA-C	-2.50	104.03	110.80

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

2 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	A	470	CAS	1	0
1	B	470	CAS	3	0

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

23 ligands are modelled in this entry.

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	SO4	B	904	-	4,4,4	0.43	0	6,6,6	0.31	0
3	DMS	A	811	-	3,3,3	0.50	0	3,3,3	0.77	0
3	DMS	A	809	-	3,3,3	0.56	0	3,3,3	0.47	0
2	GOL	A	805	-	5,5,5	0.23	0	5,5,5	0.34	0
2	GOL	B	905	-	5,5,5	0.38	0	5,5,5	0.26	0
3	DMS	A	812	-	3,3,3	0.48	0	3,3,3	0.58	0
2	GOL	A	801	-	5,5,5	0.35	0	5,5,5	0.28	0
2	GOL	B	908	-	5,5,5	0.31	0	5,5,5	0.31	0
2	GOL	A	806	-	5,5,5	0.31	0	5,5,5	0.34	0
4	MET	A	814	-	7,8,8	0.93	1 (14%)	5,9,9	1.19	1 (20%)
2	GOL	B	902	-	5,5,5	0.46	0	5,5,5	0.54	0
3	DMS	A	810	-	3,3,3	0.55	0	3,3,3	0.58	0
3	DMS	A	808	-	3,3,3	0.50	0	3,3,3	0.74	0
2	GOL	A	813	-	5,5,5	0.41	0	5,5,5	0.42	0
2	GOL	A	802	-	5,5,5	0.30	0	5,5,5	0.18	0
2	GOL	B	909	-	5,5,5	0.22	0	5,5,5	0.35	0
6	0P5	B	906	-	38,38,38	1.50	5 (13%)	47,53,53	1.72	8 (17%)
2	GOL	B	907	-	5,5,5	0.24	0	5,5,5	0.35	0
2	GOL	A	804	-	5,5,5	0.37	0	5,5,5	0.70	0
2	GOL	B	901	-	5,5,5	0.50	0	5,5,5	0.69	0
2	GOL	A	803	-	5,5,5	0.34	0	5,5,5	0.36	0
2	GOL	B	903	-	5,5,5	0.41	0	5,5,5	0.68	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	GOL	A	807	-	5,5,5	0.42	0	5,5,5	0.31	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
2	GOL	B	909	-	-	2/4/4/4	-
2	GOL	A	801	-	-	2/4/4/4	-
2	GOL	B	908	-	-	2/4/4/4	-
2	GOL	A	806	-	-	2/4/4/4	-
2	GOL	A	813	-	-	2/4/4/4	-
2	GOL	B	901	-	-	4/4/4/4	-
4	MET	A	814	-	-	0/8/8/8	-
2	GOL	B	902	-	-	0/4/4/4	-
2	GOL	A	803	-	-	2/4/4/4	-
2	GOL	B	903	-	-	1/4/4/4	-
6	0P5	B	906	-	-	4/15/25/25	0/4/5/5
2	GOL	B	907	-	-	0/4/4/4	-
2	GOL	A	804	-	-	0/4/4/4	-
2	GOL	A	805	-	-	0/4/4/4	-
2	GOL	B	905	-	-	4/4/4/4	-
2	GOL	A	807	-	-	4/4/4/4	-
2	GOL	A	802	-	-	2/4/4/4	-

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	B	906	0P5	CAN-CBC	4.98	1.52	1.49
6	B	906	0P5	C-NAS	3.45	1.40	1.33
6	B	906	0P5	CBF-NAR	-3.36	1.33	1.39
6	B	906	0P5	CBG-NAU	-3.02	1.33	1.38
6	B	906	0P5	C6-NAT	-2.65	1.32	1.36
4	A	814	MET	OXT-C	-2.39	1.23	1.30

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	B	906	0P5	C2-N3-C4	4.55	120.51	114.48
6	B	906	0P5	C5-C4-N3	-4.16	119.30	124.16
6	B	906	0P5	CAL-NAS-C	-4.12	119.68	126.04
6	B	906	0P5	CAA-OAV-CAZ	-3.48	110.03	117.50
6	B	906	0P5	NAU-CBC-NAR	-3.11	108.93	112.72
6	B	906	0P5	N1-C2-N3	-2.67	121.52	126.27
6	B	906	0P5	CBF-NAR-CBC	2.53	108.54	105.25
4	A	814	MET	OXT-C-O	-2.26	118.95	124.08
6	B	906	0P5	C6-C5-C4	2.19	118.46	115.34

There are no chirality outliers.

All (31) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	807	GOL	C1-C2-C3-O3
2	A	813	GOL	O1-C1-C2-O2
2	A	813	GOL	O1-C1-C2-C3
2	B	901	GOL	O1-C1-C2-C3
2	B	905	GOL	C1-C2-C3-O3
2	B	908	GOL	C1-C2-C3-O3
2	B	909	GOL	O1-C1-C2-O2
2	B	909	GOL	O1-C1-C2-C3
2	B	901	GOL	O2-C2-C3-O3
2	B	908	GOL	O2-C2-C3-O3
2	A	801	GOL	O1-C1-C2-C3
2	A	802	GOL	C1-C2-C3-O3
2	A	803	GOL	C1-C2-C3-O3
2	A	807	GOL	O1-C1-C2-C3
2	B	901	GOL	C1-C2-C3-O3
2	B	905	GOL	O1-C1-C2-C3
2	A	803	GOL	O2-C2-C3-O3
2	A	807	GOL	O2-C2-C3-O3
2	B	901	GOL	O1-C1-C2-O2
2	B	905	GOL	O2-C2-C3-O3
2	A	801	GOL	O1-C1-C2-O2
2	A	802	GOL	O2-C2-C3-O3
2	A	806	GOL	O1-C1-C2-O2
2	B	903	GOL	O2-C2-C3-O3
2	A	806	GOL	O1-C1-C2-C3
2	A	807	GOL	O1-C1-C2-O2
2	B	905	GOL	O1-C1-C2-O2
6	B	906	0P5	NAT-CAN-CBC-NAR
6	B	906	0P5	CAJ-CAZ-OAV-CAA

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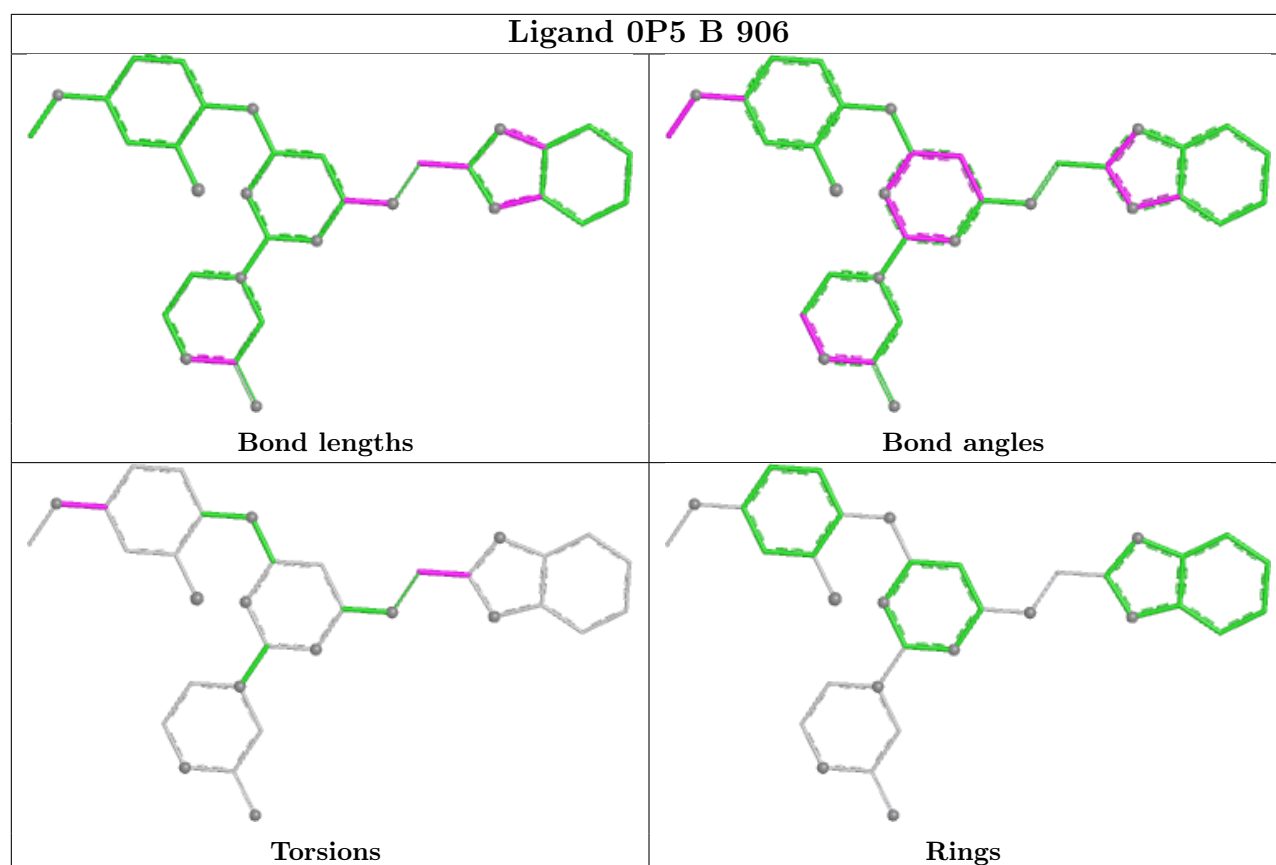
Mol	Chain	Res	Type	Atoms
6	B	906	0P5	NAT-CAN-CBC-NAU
6	B	906	0P5	CAF-CAZ-OAV-CAA

There are no ring outliers.

8 monomers are involved in 13 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	B	904	SO4	1	0
3	A	811	DMS	1	0
3	A	809	DMS	5	0
3	A	810	DMS	2	0
3	A	808	DMS	2	0
6	B	906	0P5	3	0
2	B	901	GOL	1	0
2	A	807	GOL	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	525/542 (96%)	-0.26	17 (3%)	50 41	21, 35, 76, 129	1 (0%)
1	B	514/542 (94%)	-0.11	32 (6%)	26 21	24, 39, 101, 149	0
All	All	1039/1084 (95%)	-0.18	49 (4%)	36 28	21, 37, 90, 149	1 (0%)

All (49) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	376	ILE	6.1
1	B	365	ILE	5.9
1	B	756	VAL	5.7
1	A	770	THR	5.0
1	A	554	LYS	4.8
1	B	559	LEU	4.1
1	B	557	LYS	3.9
1	B	368	GLU	3.7
1	A	562	VAL	3.6
1	B	755	ALA	3.6
1	A	548	TRP	3.6
1	B	560	GLY	3.5
1	B	767	THR	3.2
1	A	561	ASN	3.2
1	A	769	ASN	3.1
1	A	758	GLY	3.1
1	A	756	VAL	3.0
1	B	366	SER	3.0
1	B	370	PHE	3.0
1	B	371	LEU	2.9
1	A	767	THR	2.9
1	A	589	ASP	2.9
1	A	760	VAL	2.8
1	B	375	ASN	2.7

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Mol	Chain	Res	Type	RSRZ
1	B	555	ILE	2.6
1	B	558	SER	2.6
1	B	548	TRP	2.6
1	B	593	TYR	2.6
1	B	549	THR	2.5
1	B	369	SER	2.4
1	A	757	GLU	2.4
1	B	758	GLY	2.4
1	A	239	GLU	2.4
1	B	364	SER	2.3
1	A	553	LYS	2.3
1	A	755	ALA	2.3
1	B	547	TRP	2.3
1	B	592	ASP	2.3
1	B	562	VAL	2.2
1	B	757	GLU	2.2
1	B	374	GLN	2.2
1	A	552	ARG	2.2
1	B	551	ASP	2.1
1	B	556	SER	2.1
1	B	588	SER	2.1
1	B	361	GLY	2.1
1	B	554	LYS	2.0
1	B	372	THR	2.0
1	A	551	ASP	2.0

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

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
1	CAS	B	470	9/10	0.97	0.09	38,40,49,50	3
1	CAS	A	470	9/10	0.99	0.07	32,34,42,44	3

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands ⓘ

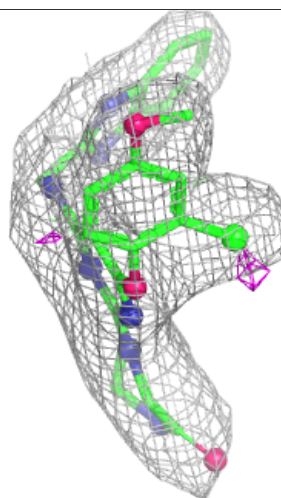
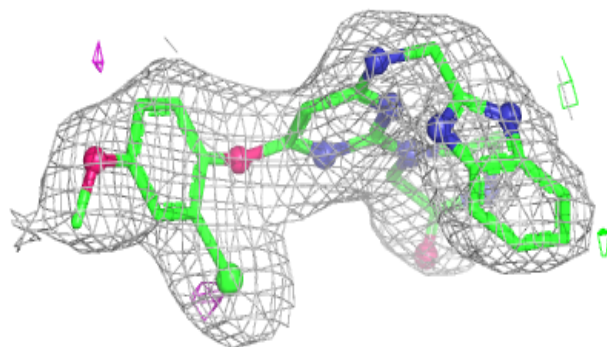
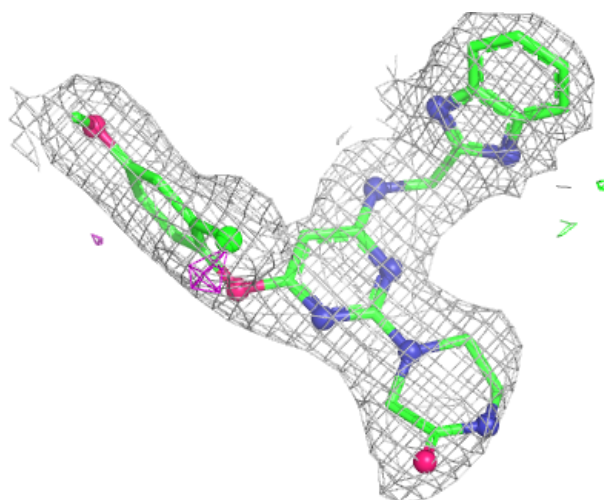
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q<0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	GOL	A	807	6/6	0.71	0.24	61,68,71,72	0
3	DMS	A	812	4/4	0.77	0.33	84,88,93,95	0
3	DMS	A	811	4/4	0.78	0.25	78,79,80,87	0
2	GOL	B	907	6/6	0.79	0.16	49,50,52,54	0
2	GOL	A	805	6/6	0.81	0.16	44,46,47,48	0
5	SO4	B	904	5/5	0.81	0.24	74,77,81,82	0
2	GOL	B	902	6/6	0.82	0.26	58,63,64,66	0
2	GOL	A	813	6/6	0.84	0.18	51,57,61,63	0
2	GOL	A	804	6/6	0.85	0.14	39,41,43,45	0
2	GOL	B	905	6/6	0.85	0.18	59,64,65,68	0
2	GOL	B	901	6/6	0.87	0.17	46,48,48,49	0
2	GOL	A	801	6/6	0.88	0.17	42,44,47,48	0
2	GOL	B	909	6/6	0.88	0.18	58,59,63,66	0
3	DMS	A	810	4/4	0.88	0.17	59,63,64,67	0
2	GOL	A	806	6/6	0.89	0.22	70,72,72,72	0
2	GOL	B	908	6/6	0.90	0.13	56,59,61,66	0
2	GOL	A	802	6/6	0.90	0.14	50,51,52,53	0
3	DMS	A	809	4/4	0.91	0.19	65,69,75,76	0
3	DMS	A	808	4/4	0.92	0.18	72,74,76,80	0
2	GOL	B	903	6/6	0.92	0.15	56,56,60,63	0
2	GOL	A	803	6/6	0.95	0.09	41,42,42,43	0
6	OP5	B	906	34/34	0.95	0.09	31,43,52,54	0
4	MET	A	814	9/9	0.97	0.08	28,28,28,29	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 0P5 B 906:

$2mF_o-DF_c$ (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.