



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 11:38 AM UTC

PDB ID : 8TC7 / pdb_00008tc7
Title : Human asparaginyl-tRNA synthetase, apo form
Authors : Dogovski, C.; Metcalfe, R.D.; Xie, S.C.; Morton, C.J.; Tilley, L.; Griffin, M.D.W.
Deposited on : 2023-06-30
Resolution : 1.90 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
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

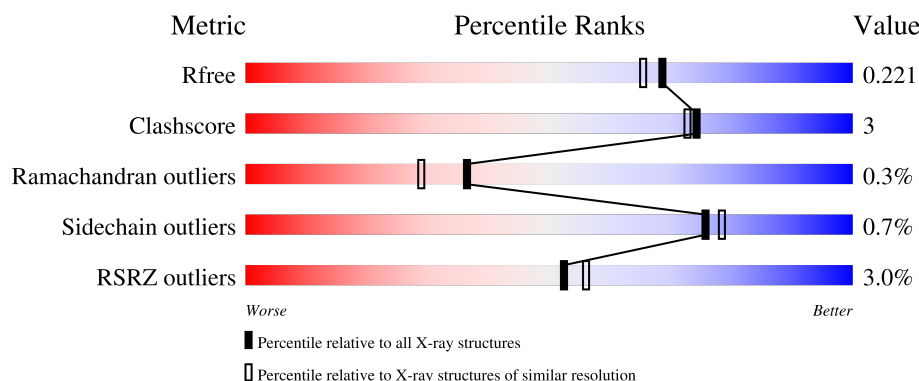
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.90 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	7789 (1.90-1.90)
Clashscore	190562	8410 (1.90-1.90)
Ramachandran outliers	187476	8333 (1.90-1.90)
Sidechain outliers	187428	8333 (1.90-1.90)
RSRZ outliers	180081	7790 (1.90-1.90)

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	453	<div> <div>2%</div> <div>87% 7% 6%</div> </div>
1	B	453	<div> <div>3%</div> <div>86% 9% 5%</div> </div>
1	C	453	<div> <div>3%</div> <div>88% 7% 6%</div> </div>
1	D	453	<div> <div>3%</div> <div>87% 8% 6%</div> </div>

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
2	GOL	B	609	-	X	-	-

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 15123 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 Asparagine-tRNA ligase, cytoplasmic.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	426	Total	C	N	O	S	0	2	0
			3471	2215	593	637	26			
1	B	429	Total	C	N	O	S	0	2	0
			3488	2224	597	641	26			
1	C	428	Total	C	N	O	S	0	0	0
			3464	2210	590	638	26			
1	D	428	Total	C	N	O	S	0	0	0
			3461	2207	591	637	26			

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	96	GLY	-	expression tag	UNP O43776
A	97	MET	-	expression tag	UNP O43776
B	96	GLY	-	expression tag	UNP O43776
B	97	MET	-	expression tag	UNP O43776
C	96	GLY	-	expression tag	UNP O43776
C	97	MET	-	expression tag	UNP O43776
D	96	GLY	-	expression tag	UNP O43776
D	97	MET	-	expression tag	UNP O43776

- 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 6 3 3	0	0
2	B	1	Total C O 6 3 3	0	0
2	C	1	Total C O 6 3 3	0	0
2	C	1	Total C O 6 3 3	0	0
2	C	1	Total C O 6 3 3	0	0
2	D	1	Total C O 6 3 3	0	0
2	D	1	Total C O 6 3 3	0	0
2	D	1	Total C O 6 3 3	0	0

- Molecule 3 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	B	1	Total Cl 1 1	0	0
3	C	1	Total Cl 1 1	0	0

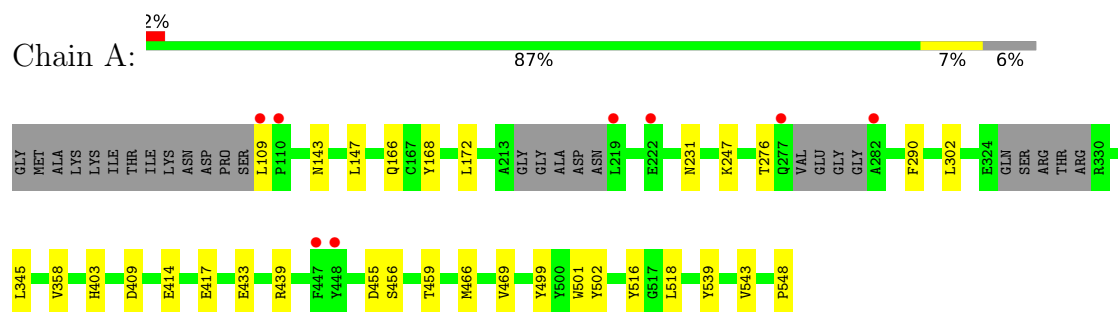
- Molecule 4 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	288	Total O 288 288	0	0
4	B	329	Total O 329 329	0	0
4	C	229	Total O 229 229	0	0
4	D	259	Total O 259 259	0	0

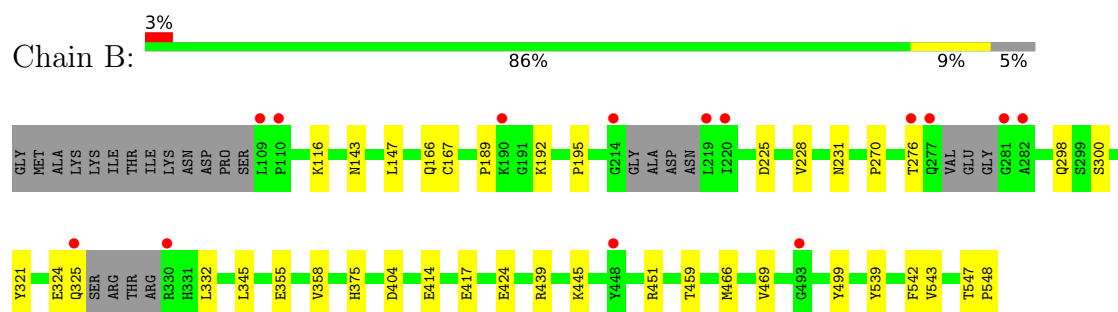
3 Residue-property plots [i](#)

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.

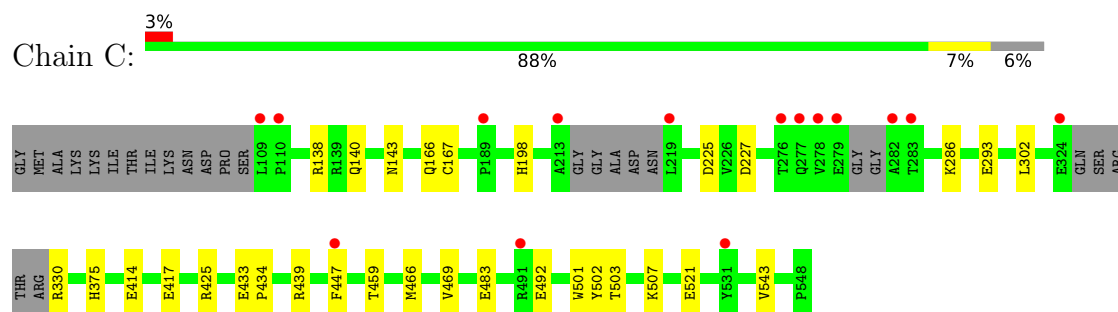
- Molecule 1: Asparagine-tRNA ligase, cytoplasmic



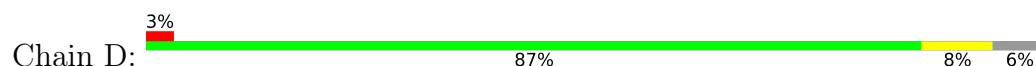
- Molecule 1: Asparagine-tRNA ligase, cytoplasmic

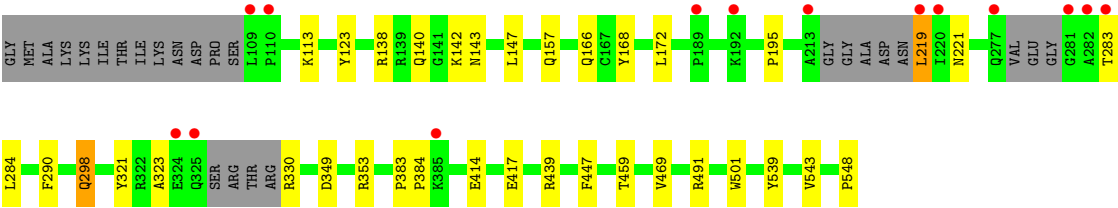


- Molecule 1: Asparagine-tRNA ligase, cytoplasmic



- Molecule 1: Asparagine-tRNA ligase, cytoplasmic





4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	113.49Å 127.19Å 163.16Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	46.58 – 1.90 46.58 – 1.90	Depositor EDS
% Data completeness (in resolution range)	99.7 (46.58-1.90) 99.8 (46.58-1.90)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.34 (at 1.90Å)	Xtrriage
Refinement program	PHENIX 1.20.1_4487	Depositor
R, R_{free}	0.180 , 0.217 0.186 , 0.221	Depositor DCC
R_{free} test set	9081 reflections (4.89%)	wwPDB-VP
Wilson B-factor (Å ²)	28.9	Xtrriage
Anisotropy	0.660	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 46.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	15123	wwPDB-VP
Average B, all atoms (Å ²)	44.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 40.40 % 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 2.7501e-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: CL, 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	0.55	0/3555	0.67	0/4810
1	B	0.56	0/3572	0.68	0/4832
1	C	0.49	0/3547	0.63	0/4800
1	D	0.53	0/3544	0.64	1/4795 (0.0%)
All	All	0.54	0/14218	0.65	1/19237 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	298	GLN	CA-CB-CG	-5.55	103.00	114.10

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	3471	0	3399	23	0
1	B	3488	0	3413	26	0
1	C	3464	0	3394	19	0
1	D	3461	0	3390	19	1
2	A	42	0	54	5	1
2	B	54	0	70	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	C	18	0	23	1	0
2	D	18	0	24	1	0
3	B	1	0	0	1	0
3	C	1	0	0	0	0
4	A	288	0	0	7	0
4	B	329	0	0	12	0
4	C	229	0	0	7	0
4	D	259	0	0	1	0
All	All	15123	0	13767	85	1

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

All (85) 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:B:610:CL:CL	4:B:968:HOH:O	2.32	0.84
1:B:167:CYS:SG	4:B:1012:HOH:O	2.39	0.81
1:C:483:GLU:OE2	4:C:701:HOH:O	2.00	0.77
1:B:375:HIS:ND1	4:B:705:HOH:O	2.18	0.75
1:B:231:ASN:HB3	2:B:603:GOL:H32	1.70	0.72
1:D:219:LEU:HD13	1:D:221:ASN:HD22	1.58	0.67
1:B:192:LYS:O	4:B:701:HOH:O	2.14	0.66
1:D:143:ASN:ND2	1:D:166:GLN:OE1	2.29	0.65
1:C:143:ASN:OD1	1:C:166:GLN:NE2	2.30	0.65
1:B:358:VAL:HG11	1:B:466:MET:HE3	1.80	0.63
1:B:298:GLN:OE1	4:B:702:HOH:O	2.16	0.62
1:D:138:ARG:NH2	1:D:140:GLN:OE1	2.34	0.61
2:D:603:GOL:O1	4:D:702:HOH:O	2.16	0.60
1:C:167:CYS:SG	4:C:910:HOH:O	2.57	0.58
1:B:451[A]:ARG:NH2	4:B:714:HOH:O	2.37	0.57
1:A:501:TRP:CD1	1:D:548:PRO:HB3	2.40	0.57
1:A:358:VAL:HG11	1:A:466:MET:HE3	1.87	0.56
1:B:539:TYR:CD1	1:B:548:PRO:HG2	2.41	0.55
1:A:109:LEU:N	4:A:714:HOH:O	2.40	0.55
1:C:433:GLU:HG2	4:C:770:HOH:O	2.05	0.55
1:B:298:GLN:HG2	1:B:321:TYR:O	2.08	0.54
1:A:455:ASP:HA	2:A:601:GOL:H2	1.90	0.53
1:A:456:SER:OG	4:A:703:HOH:O	2.19	0.53
1:B:116:LYS:NZ	4:B:720:HOH:O	2.41	0.53
2:A:602:GOL:H11	4:A:942:HOH:O	2.09	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:231:ASN:HB3	2:A:607:GOL:H12	1.91	0.52
1:A:143:ASN:OD1	1:A:166:GLN:NE2	2.43	0.52
1:C:439:ARG:HA	1:C:459:THR:O	2.10	0.52
1:C:330:ARG:NH1	4:C:710:HOH:O	2.43	0.51
1:C:375:HIS:HB2	4:C:884:HOH:O	2.10	0.51
1:C:447:PHE:HB3	1:C:492:GLU:HG3	1.91	0.51
1:B:143:ASN:OD1	1:B:166:GLN:NE2	2.44	0.50
1:C:521:GLU:OE2	2:C:603:GOL:H31	2.10	0.50
1:B:414:GLU:O	1:B:417:GLU:HG2	2.11	0.50
1:A:539:TYR:CD1	1:A:548:PRO:HG2	2.47	0.50
1:A:247:LYS:NZ	4:A:719:HOH:O	2.44	0.49
1:C:286:LYS:HE3	1:C:293:GLU:HG3	1.94	0.49
1:C:425:ARG:NH1	4:C:707:HOH:O	2.37	0.49
1:A:414:GLU:O	1:A:417:GLU:HG2	2.13	0.49
1:A:290:PHE:CE1	1:D:543:VAL:HG22	2.47	0.49
1:D:414:GLU:O	1:D:417:GLU:HG2	2.13	0.49
1:D:439:ARG:HA	1:D:459:THR:O	2.12	0.49
1:B:439:ARG:HA	1:B:459:THR:O	2.13	0.49
1:D:113:LYS:HD3	1:D:123:TYR:HE2	1.78	0.48
1:D:298:GLN:HG2	1:D:321:TYR:O	2.14	0.48
1:A:439:ARG:HA	1:A:459:THR:O	2.13	0.48
1:B:445:LYS:NZ	4:B:725:HOH:O	2.46	0.48
1:A:516:TYR:OH	4:A:701:HOH:O	2.13	0.47
1:C:138:ARG:NH2	1:C:140:GLN:OE1	2.47	0.47
1:A:433:GLU:HG2	4:A:795:HOH:O	2.15	0.46
1:D:447:PHE:HA	1:D:491:ARG:HH21	1.80	0.45
1:C:225:ASP:OD2	1:C:227:ASP:HB2	2.16	0.45
1:D:349:ASP:O	1:D:353:ARG:HG3	2.17	0.45
1:C:414:GLU:O	1:C:417:GLU:HG2	2.16	0.45
1:B:543:VAL:HG23	4:B:767:HOH:O	2.16	0.45
1:A:403:HIS:HB3	2:A:605:GOL:H12	1.99	0.44
1:B:547:THR:HA	1:B:548:PRO:C	2.42	0.44
1:A:276:THR:HB	1:A:499:TYR:CZ	2.53	0.43
1:A:168:TYR:CE2	2:A:602:GOL:H12	2.53	0.43
1:B:270:PRO:HG3	1:B:300:SER:HB3	2.01	0.43
1:C:434:PRO:HB3	1:C:466:MET:CE	2.48	0.43
1:B:225:ASP:HB3	1:B:228:VAL:HG23	2.01	0.43
1:A:548:PRO:HB3	1:D:501:TRP:CD1	2.53	0.42
1:B:276:THR:HB	1:B:499:TYR:CZ	2.55	0.42
1:B:548:PRO:HB3	1:C:501:TRP:CD1	2.54	0.42
1:C:302:LEU:HD22	1:C:502:TYR:CE1	2.55	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:539:TYR:CD1	1:D:548:PRO:HG2	2.55	0.41
1:A:302:LEU:HD22	1:A:502:TYR:CE1	2.55	0.41
1:B:332:LEU:HD23	1:B:542:PHE:CE1	2.55	0.41
1:B:345:LEU:H	1:B:345:LEU:HD23	1.85	0.41
1:B:192:LYS:HB3	4:B:701:HOH:O	2.20	0.41
1:B:195:PRO:HG3	2:B:605:GOL:H32	2.02	0.41
1:A:168:TYR:CZ	1:A:172:LEU:HD11	2.54	0.41
1:C:543:VAL:HG23	4:C:779:HOH:O	2.21	0.41
1:D:168:TYR:CZ	1:D:172:LEU:HD11	2.56	0.41
1:B:355:GLU:OE1	4:B:708:HOH:O	2.22	0.41
1:A:543:VAL:HG22	1:D:290:PHE:CZ	2.56	0.40
1:D:157:GLN:HG3	1:D:195:PRO:HD2	2.03	0.40
1:B:189:PRO:HD3	4:B:972:HOH:O	2.20	0.40
1:C:503:THR:HG22	1:C:507:LYS:HE3	2.03	0.40
1:D:284:LEU:HD23	1:D:298:GLN:CD	2.46	0.40
1:A:409:ASP:O	4:A:704:HOH:O	2.22	0.40
1:A:276:THR:HB	1:A:499:TYR:OH	2.21	0.40
1:D:283:THR:O	1:D:323:ALA:HB3	2.22	0.40
1:D:383:PRO:HA	1:D:384:PRO:HD3	1.94	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:142:LYS:NZ	2:A:607:GOL:O1[2_455]	2.13	0.07

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	420/453 (93%)	410 (98%)	9 (2%)	1 (0%)	43 36

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	423/453 (93%)	414 (98%)	7 (2%)	2 (0%)	24	16
1	C	420/453 (93%)	414 (99%)	5 (1%)	1 (0%)	43	36
1	D	420/453 (93%)	410 (98%)	9 (2%)	1 (0%)	43	36
All	All	1683/1812 (93%)	1648 (98%)	30 (2%)	5 (0%)	36	29

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	324	GLU
1	A	469	VAL
1	C	469	VAL
1	D	469	VAL
1	B	469	VAL

5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	380/398 (96%)	377 (99%)	3 (1%)	73	75
1	B	381/398 (96%)	377 (99%)	4 (1%)	68	70
1	C	380/398 (96%)	379 (100%)	1 (0%)	86	88
1	D	379/398 (95%)	376 (99%)	3 (1%)	73	75
All	All	1520/1592 (96%)	1509 (99%)	11 (1%)	76	78

All (11) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	147	LEU
1	A	345	LEU
1	A	518	LEU
1	B	147	LEU
1	B	325	GLN
1	B	404	ASP

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Mol	Chain	Res	Type
1	B	424	GLU
1	C	198	HIS
1	D	147	LEU
1	D	219	LEU
1	D	330	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	229	GLN
1	A	375	HIS
1	B	325	GLN
1	D	143	ASN
1	D	166	GLN
1	D	532	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 24 ligands modelled in this entry, 2 are monoatomic - leaving 22 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
2	GOL	A	603	-	5,5,5	1.44	1 (20%)	5,5,5	0.89	0
2	GOL	B	606	-	5,5,5	1.69	1 (20%)	5,5,5	1.00	0
2	GOL	B	601	-	5,5,5	1.07	0	5,5,5	1.68	2 (40%)
2	GOL	D	601	-	5,5,5	0.86	0	5,5,5	1.68	2 (40%)
2	GOL	A	606	-	5,5,5	2.61	2 (40%)	5,5,5	1.21	0
2	GOL	B	603	-	5,5,5	1.19	0	5,5,5	1.21	0
2	GOL	A	605	-	5,5,5	1.04	0	5,5,5	1.07	0
2	GOL	B	602	-	5,5,5	1.19	1 (20%)	5,5,5	1.56	1 (20%)
2	GOL	B	605	-	5,5,5	1.02	0	5,5,5	1.05	1 (20%)
2	GOL	A	602	-	5,5,5	1.45	1 (20%)	5,5,5	0.90	0
2	GOL	A	607	-	5,5,5	1.11	1 (20%)	5,5,5	1.32	1 (20%)
2	GOL	B	609	-	5,5,5	1.33	1 (20%)	5,5,5	1.13	1 (20%)
2	GOL	C	601	-	5,5,5	1.02	0	5,5,5	0.84	0
2	GOL	B	604	-	5,5,5	1.34	1 (20%)	5,5,5	1.09	0
2	GOL	A	601	-	5,5,5	0.67	0	5,5,5	1.48	1 (20%)
2	GOL	D	603	-	5,5,5	1.24	0	5,5,5	0.83	0
2	GOL	C	603	-	5,5,5	1.85	2 (40%)	5,5,5	2.15	2 (40%)
2	GOL	B	608	-	5,5,5	1.21	0	5,5,5	0.81	0
2	GOL	D	602	-	5,5,5	1.34	1 (20%)	5,5,5	1.40	1 (20%)
2	GOL	C	602	-	5,5,5	0.83	0	5,5,5	1.10	0
2	GOL	A	604	-	5,5,5	0.75	0	5,5,5	1.20	0
2	GOL	B	607	-	5,5,5	0.65	0	5,5,5	1.17	1 (20%)

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	A	603	-	-	2/4/4/4	-
2	GOL	B	606	-	-	3/4/4/4	-
2	GOL	B	601	-	-	2/4/4/4	-
2	GOL	D	601	-	-	0/4/4/4	-
2	GOL	A	606	-	-	2/4/4/4	-
2	GOL	B	603	-	-	2/4/4/4	-
2	GOL	A	605	-	-	0/4/4/4	-
2	GOL	B	602	-	-	0/4/4/4	-
2	GOL	B	605	-	-	2/4/4/4	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	GOL	A	602	-	-	2/4/4/4	-
2	GOL	A	607	-	-	0/4/4/4	-
2	GOL	B	609	-	-	4/4/4/4	-
2	GOL	C	601	-	-	0/4/4/4	-
2	GOL	B	604	-	-	1/4/4/4	-
2	GOL	A	601	-	-	3/4/4/4	-
2	GOL	D	603	-	-	0/4/4/4	-
2	GOL	C	603	-	-	0/4/4/4	-
2	GOL	B	608	-	-	2/4/4/4	-
2	GOL	D	602	-	-	2/4/4/4	-
2	GOL	C	602	-	-	0/4/4/4	-
2	GOL	A	604	-	-	0/4/4/4	-
2	GOL	B	607	-	-	1/4/4/4	-

All (12) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	606	GOL	O3-C3	4.45	1.61	1.42
2	A	606	GOL	C3-C2	3.42	1.64	1.51
2	B	606	GOL	C1-C2	3.38	1.64	1.51
2	C	603	GOL	O3-C3	-2.81	1.30	1.42
2	A	602	GOL	O2-C2	-2.77	1.35	1.43
2	C	603	GOL	C3-C2	2.72	1.62	1.51
2	A	603	GOL	O2-C2	-2.71	1.35	1.43
2	B	609	GOL	C1-C2	2.42	1.61	1.51
2	B	602	GOL	O3-C3	-2.16	1.33	1.42
2	D	602	GOL	O2-C2	-2.14	1.37	1.43
2	A	607	GOL	C3-C2	2.13	1.59	1.51
2	B	604	GOL	C3-C2	2.04	1.59	1.51

All (13) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	603	GOL	C3-C2-C1	-3.99	97.15	111.80
2	B	602	GOL	C3-C2-C1	-2.69	101.93	111.80
2	D	602	GOL	C3-C2-C1	-2.58	102.33	111.80
2	B	601	GOL	O1-C1-C2	-2.42	99.47	110.38
2	A	601	GOL	O2-C2-C3	2.40	119.14	109.18
2	D	601	GOL	O3-C3-C2	-2.38	99.67	110.38
2	B	607	GOL	C3-C2-C1	-2.27	103.48	111.80
2	B	609	GOL	C3-C2-C1	-2.10	104.09	111.80

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	603	GOL	O1-C1-C2	2.09	119.80	110.38
2	A	607	GOL	C3-C2-C1	-2.04	104.31	111.80
2	B	605	GOL	C3-C2-C1	-2.03	104.36	111.80
2	D	601	GOL	C3-C2-C1	-2.02	104.39	111.80
2	B	601	GOL	C3-C2-C1	-2.01	104.44	111.80

There are no chirality outliers.

All (28) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	601	GOL	O1-C1-C2-O2
2	A	603	GOL	C1-C2-C3-O3
2	B	601	GOL	O1-C1-C2-O2
2	B	601	GOL	O1-C1-C2-C3
2	B	605	GOL	C1-C2-C3-O3
2	B	608	GOL	C1-C2-C3-O3
2	B	609	GOL	O1-C1-C2-C3
2	B	609	GOL	C1-C2-C3-O3
2	D	602	GOL	C1-C2-C3-O3
2	B	606	GOL	O2-C2-C3-O3
2	B	609	GOL	O2-C2-C3-O3
2	D	602	GOL	O2-C2-C3-O3
2	A	601	GOL	O1-C1-C2-C3
2	A	602	GOL	O1-C1-C2-C3
2	A	606	GOL	O1-C1-C2-C3
2	B	603	GOL	C1-C2-C3-O3
2	B	606	GOL	C1-C2-C3-O3
2	A	601	GOL	O2-C2-C3-O3
2	A	603	GOL	O2-C2-C3-O3
2	B	608	GOL	O2-C2-C3-O3
2	A	602	GOL	O1-C1-C2-O2
2	B	605	GOL	O2-C2-C3-O3
2	B	603	GOL	O2-C2-C3-O3
2	B	609	GOL	O1-C1-C2-O2
2	A	606	GOL	O2-C2-C3-O3
2	B	604	GOL	C1-C2-C3-O3
2	B	607	GOL	O2-C2-C3-O3
2	B	606	GOL	O1-C1-C2-C3

There are no ring outliers.

8 monomers are involved in 10 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	603	GOL	1	0
2	A	605	GOL	1	0
2	B	605	GOL	1	0
2	A	602	GOL	2	0
2	A	607	GOL	1	1
2	A	601	GOL	1	0
2	D	603	GOL	1	0
2	C	603	GOL	1	0

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	426/453 (94%)	-0.11	8 (1%) 66 70	18, 38, 72, 105	2 (0%)
1	B	429/453 (94%)	-0.16	14 (3%) 49 52	20, 37, 77, 118	2 (0%)
1	C	428/453 (94%)	-0.04	15 (3%) 47 50	24, 43, 89, 117	0
1	D	428/453 (94%)	-0.05	14 (3%) 49 52	25, 41, 89, 128	0
All	All	1711/1812 (94%)	-0.09	51 (2%) 52 56	18, 39, 81, 128	4 (0%)

All (51) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	219	LEU	6.0
1	B	219	LEU	5.8
1	C	278	VAL	4.9
1	D	189	PRO	4.3
1	D	282	ALA	4.2
1	C	219	LEU	4.2
1	D	219	LEU	3.7
1	A	110	PRO	3.4
1	B	448[A]	TYR	3.3
1	D	110	PRO	3.3
1	A	282	ALA	3.3
1	B	110	PRO	3.1
1	D	281	GLY	3.1
1	C	110	PRO	3.1
1	C	282	ALA	3.0
1	A	448[A]	TYR	3.0
1	D	109	LEU	2.9
1	C	213	ALA	2.9
1	D	324	GLU	2.8
1	D	192	LYS	2.8
1	B	109	LEU	2.8

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Mol	Chain	Res	Type	RSRZ
1	D	325	GLN	2.7
1	C	324	GLU	2.7
1	B	190	LYS	2.7
1	C	109	LEU	2.6
1	A	447	PHE	2.6
1	A	109	LEU	2.5
1	B	277	GLN	2.5
1	B	493	GLY	2.5
1	A	277	GLN	2.4
1	B	214	GLY	2.4
1	B	325	GLN	2.3
1	D	277	GLN	2.3
1	C	276	THR	2.3
1	C	283	THR	2.3
1	D	283	THR	2.3
1	B	281	GLY	2.3
1	A	222	GLU	2.2
1	B	282	ALA	2.2
1	C	189	PRO	2.2
1	D	213	ALA	2.2
1	B	220	ILE	2.2
1	B	276	THR	2.2
1	C	491	ARG	2.2
1	D	385	LYS	2.2
1	C	447	PHE	2.1
1	C	277	GLN	2.1
1	C	531	TYR	2.1
1	D	220	ILE	2.1
1	C	279	GLU	2.1
1	B	330	ARG	2.1

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
2	GOL	B	606	6/6	0.66	0.17	60,67,73,74	0
2	GOL	B	603	6/6	0.80	0.15	63,68,74,78	0
2	GOL	A	607	6/6	0.83	0.13	65,67,71,73	0
2	GOL	C	603	6/6	0.83	0.15	38,41,45,54	0
2	GOL	A	606	6/6	0.85	0.15	36,37,46,52	0
2	GOL	D	601	6/6	0.85	0.13	43,54,57,62	0
2	GOL	B	604	6/6	0.86	0.12	50,58,62,73	0
2	GOL	A	605	6/6	0.86	0.17	47,65,67,81	0
2	GOL	B	609	6/6	0.87	0.13	35,44,50,60	0
2	GOL	C	601	6/6	0.87	0.11	48,53,54,74	0
2	GOL	B	601	6/6	0.89	0.11	44,52,58,60	0
3	CL	C	604	1/1	0.89	0.10	83,83,83,83	0
2	GOL	B	607	6/6	0.90	0.11	47,54,58,73	0
2	GOL	A	604	6/6	0.90	0.10	47,49,61,64	0
2	GOL	B	605	6/6	0.91	0.12	59,65,66,74	0
2	GOL	B	608	6/6	0.91	0.11	40,61,65,72	0
2	GOL	D	602	6/6	0.91	0.10	41,51,61,67	0
2	GOL	C	602	6/6	0.91	0.10	47,51,55,57	0
2	GOL	A	601	6/6	0.92	0.09	35,42,44,48	0
2	GOL	D	603	6/6	0.93	0.09	35,44,51,52	0
3	CL	B	610	1/1	0.93	0.10	70,70,70,70	0
2	GOL	B	602	6/6	0.93	0.08	36,40,45,45	0
2	GOL	A	603	6/6	0.94	0.08	43,49,52,53	0
2	GOL	A	602	6/6	0.94	0.10	45,48,61,62	0

6.5 Other polymers

There are no such residues in this entry.