



Full wwPDB X-ray Structure Validation Report ⓘ

Jun 3, 2026 – 10:31 am BST

PDB ID : 9R32 / pdb_00009r32
Title : CRYSTAL STRUCTURE OF LYSYL-TRNA SYNTHETASE FROM *Cryptosporidium parvum* COMPLEXED WITH L-LYSINE AND INHIBITOR DDD01887015
Authors : Dawson, A.; Baragana, B.; Forte, B.
Deposited on : 2025-05-02
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	:	1.8.4, 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	:	9.0.010 (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

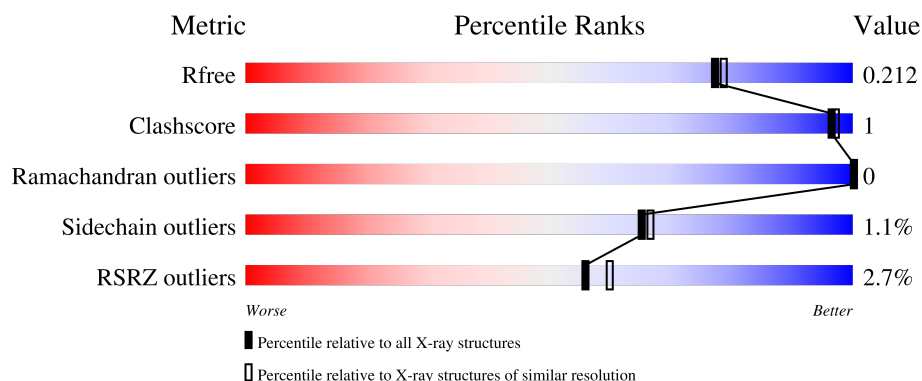
1 Overall quality at a glance

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	535	<div> <div>0%</div> <div>88%</div> <div>5%</div> <div>6%</div> </div>
1	B	535	<div> <div>2%</div> <div>90%</div> <div>•</div> <div>6%</div> </div>
1	C	535	<div> <div>2%</div> <div>90%</div> <div>•</div> <div>6%</div> </div>
1	D	535	<div> <div>4%</div> <div>90%</div> <div>•</div> <div>6%</div> </div>

2 Entry composition

There are 8 unique types of molecules in this entry. The entry contains 17853 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 Lysine-tRNA ligase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	501	Total	C	N	O	S	0	1	0
			4051	2595	675	753	28			
1	B	501	Total	C	N	O	S	0	2	0
			4057	2599	676	754	28			
1	C	501	Total	C	N	O	S	0	2	0
			4057	2599	676	754	28			
1	D	501	Total	C	N	O	S	0	2	0
			4057	2599	676	754	28			

There are 84 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	25	MET	-	initiating methionine	UNP Q5CR27
A	26	ALA	-	expression tag	UNP Q5CR27
A	27	HIS	-	expression tag	UNP Q5CR27
A	28	HIS	-	expression tag	UNP Q5CR27
A	29	HIS	-	expression tag	UNP Q5CR27
A	30	HIS	-	expression tag	UNP Q5CR27
A	31	HIS	-	expression tag	UNP Q5CR27
A	32	HIS	-	expression tag	UNP Q5CR27
A	33	MET	-	expression tag	UNP Q5CR27
A	34	GLY	-	expression tag	UNP Q5CR27
A	35	THR	-	expression tag	UNP Q5CR27
A	36	LEU	-	expression tag	UNP Q5CR27
A	37	GLU	-	expression tag	UNP Q5CR27
A	38	ALA	-	expression tag	UNP Q5CR27
A	39	GLN	-	expression tag	UNP Q5CR27
A	40	THR	-	expression tag	UNP Q5CR27
A	41	GLN	-	expression tag	UNP Q5CR27
A	42	GLY	-	expression tag	UNP Q5CR27
A	43	PRO	-	expression tag	UNP Q5CR27
A	44	GLY	-	expression tag	UNP Q5CR27
A	45	SER	-	expression tag	UNP Q5CR27

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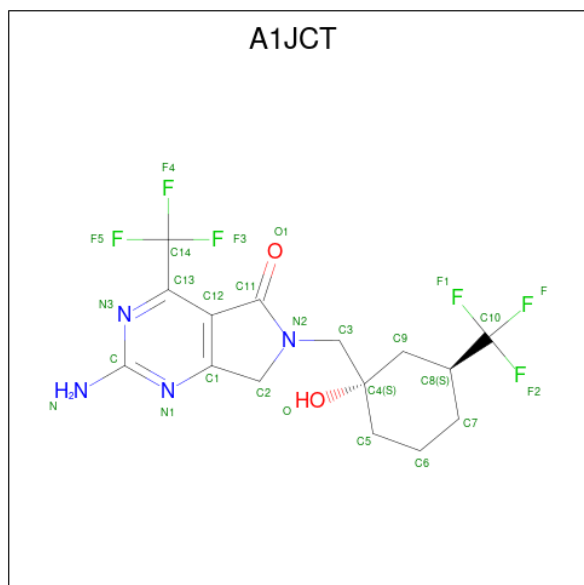
Chain	Residue	Modelled	Actual	Comment	Reference
B	25	MET	-	initiating methionine	UNP Q5CR27
B	26	ALA	-	expression tag	UNP Q5CR27
B	27	HIS	-	expression tag	UNP Q5CR27
B	28	HIS	-	expression tag	UNP Q5CR27
B	29	HIS	-	expression tag	UNP Q5CR27
B	30	HIS	-	expression tag	UNP Q5CR27
B	31	HIS	-	expression tag	UNP Q5CR27
B	32	HIS	-	expression tag	UNP Q5CR27
B	33	MET	-	expression tag	UNP Q5CR27
B	34	GLY	-	expression tag	UNP Q5CR27
B	35	THR	-	expression tag	UNP Q5CR27
B	36	LEU	-	expression tag	UNP Q5CR27
B	37	GLU	-	expression tag	UNP Q5CR27
B	38	ALA	-	expression tag	UNP Q5CR27
B	39	GLN	-	expression tag	UNP Q5CR27
B	40	THR	-	expression tag	UNP Q5CR27
B	41	GLN	-	expression tag	UNP Q5CR27
B	42	GLY	-	expression tag	UNP Q5CR27
B	43	PRO	-	expression tag	UNP Q5CR27
B	44	GLY	-	expression tag	UNP Q5CR27
B	45	SER	-	expression tag	UNP Q5CR27
C	25	MET	-	initiating methionine	UNP Q5CR27
C	26	ALA	-	expression tag	UNP Q5CR27
C	27	HIS	-	expression tag	UNP Q5CR27
C	28	HIS	-	expression tag	UNP Q5CR27
C	29	HIS	-	expression tag	UNP Q5CR27
C	30	HIS	-	expression tag	UNP Q5CR27
C	31	HIS	-	expression tag	UNP Q5CR27
C	32	HIS	-	expression tag	UNP Q5CR27
C	33	MET	-	expression tag	UNP Q5CR27
C	34	GLY	-	expression tag	UNP Q5CR27
C	35	THR	-	expression tag	UNP Q5CR27
C	36	LEU	-	expression tag	UNP Q5CR27
C	37	GLU	-	expression tag	UNP Q5CR27
C	38	ALA	-	expression tag	UNP Q5CR27
C	39	GLN	-	expression tag	UNP Q5CR27
C	40	THR	-	expression tag	UNP Q5CR27
C	41	GLN	-	expression tag	UNP Q5CR27
C	42	GLY	-	expression tag	UNP Q5CR27
C	43	PRO	-	expression tag	UNP Q5CR27
C	44	GLY	-	expression tag	UNP Q5CR27
C	45	SER	-	expression tag	UNP Q5CR27

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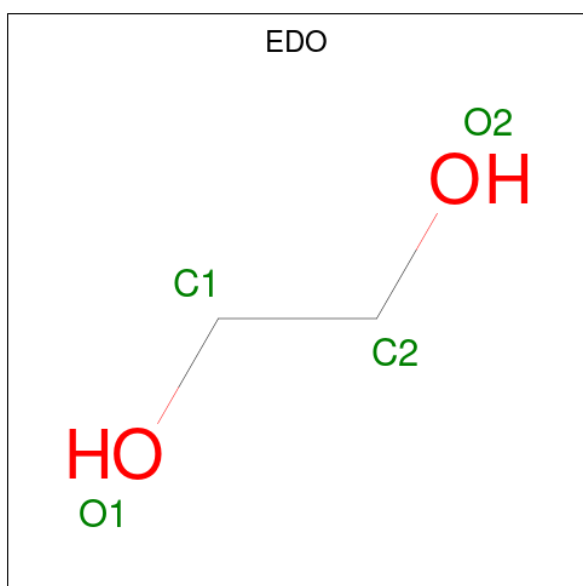
Chain	Residue	Modelled	Actual	Comment	Reference
D	25	MET	-	initiating methionine	UNP Q5CR27
D	26	ALA	-	expression tag	UNP Q5CR27
D	27	HIS	-	expression tag	UNP Q5CR27
D	28	HIS	-	expression tag	UNP Q5CR27
D	29	HIS	-	expression tag	UNP Q5CR27
D	30	HIS	-	expression tag	UNP Q5CR27
D	31	HIS	-	expression tag	UNP Q5CR27
D	32	HIS	-	expression tag	UNP Q5CR27
D	33	MET	-	expression tag	UNP Q5CR27
D	34	GLY	-	expression tag	UNP Q5CR27
D	35	THR	-	expression tag	UNP Q5CR27
D	36	LEU	-	expression tag	UNP Q5CR27
D	37	GLU	-	expression tag	UNP Q5CR27
D	38	ALA	-	expression tag	UNP Q5CR27
D	39	GLN	-	expression tag	UNP Q5CR27
D	40	THR	-	expression tag	UNP Q5CR27
D	41	GLN	-	expression tag	UNP Q5CR27
D	42	GLY	-	expression tag	UNP Q5CR27
D	43	PRO	-	expression tag	UNP Q5CR27
D	44	GLY	-	expression tag	UNP Q5CR27
D	45	SER	-	expression tag	UNP Q5CR27

- Molecule 2 is 2-azanyl-6-[[[(1 {S},3 {S})-1-oxidanyl-3-(trifluoromethyl)cyclohexyl]methyl]-4-(trifluoromethyl)-7 {H}-pyrrolo[3,4-d]pyrimidin-5-one (CCD ID: A1JCT) (formula: C₁₅H₁₆F₆N₄O₂) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	F	N	O	0	0
			27	15	6	4	2		
2	B	1	Total	C	F	N	O	0	0
			27	15	6	4	2		
2	C	1	Total	C	F	N	O	0	0
			27	15	6	4	2		
2	D	1	Total	C	F	N	O	0	0
			27	15	6	4	2		

- Molecule 3 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: C₂H₆O₂).



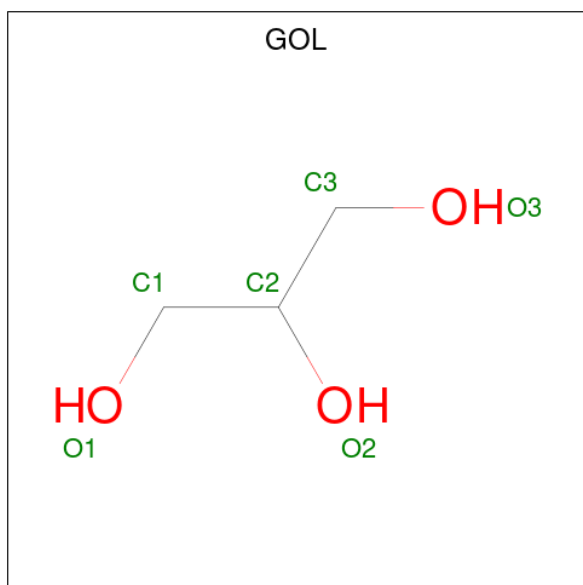
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			4	2	2		
3	A	1	Total	C	O	0	0
			4	2	2		
3	C	1	Total	C	O	0	0
			4	2	2		
3	C	1	Total	C	O	0	0
			4	2	2		

- Molecule 4 is 2-AMINO-2-HYDROXYMETHYL-PROPANE-1,3-DIOL (CCD ID: TRS) (formula: C₄H₁₂NO₃).



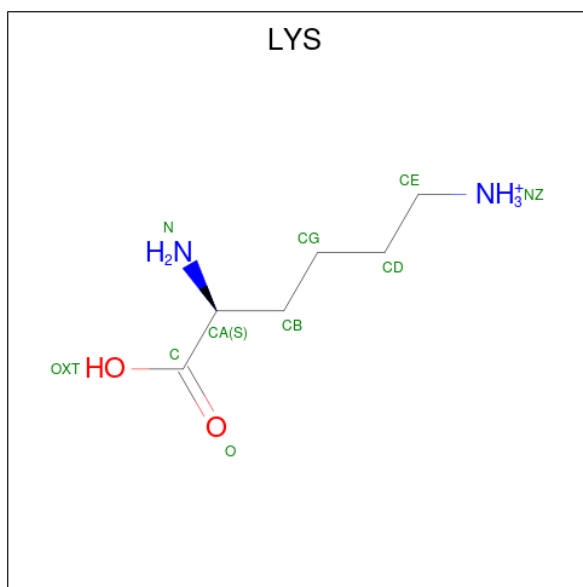
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	N	O	0	0
			8	4	1	3		
4	B	1	Total	C	N	O	0	0
			8	4	1	3		
4	C	1	Total	C	N	O	0	0
			8	4	1	3		
4	D	1	Total	C	N	O	0	0
			8	4	1	3		

- Molecule 5 is GLYCEROL (CCD ID: GOL) (formula: C₃H₈O₃).



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

- Molecule 6 is LYSINE (CCD ID: LYS) (formula: $C_6H_{15}N_2O_2$).



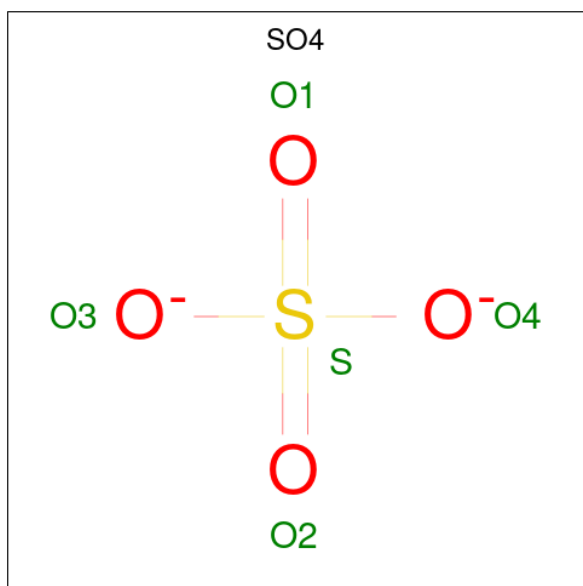
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	1	Total C N O 10 6 2 2	0	0
6	B	1	Total C N O 10 6 2 2	0	0
6	C	1	Total C N O 10 6 2 2	0	0

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
6	D	1	Total	C	N	O	0	0
			10	6	2	2		

- Molecule 7 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



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

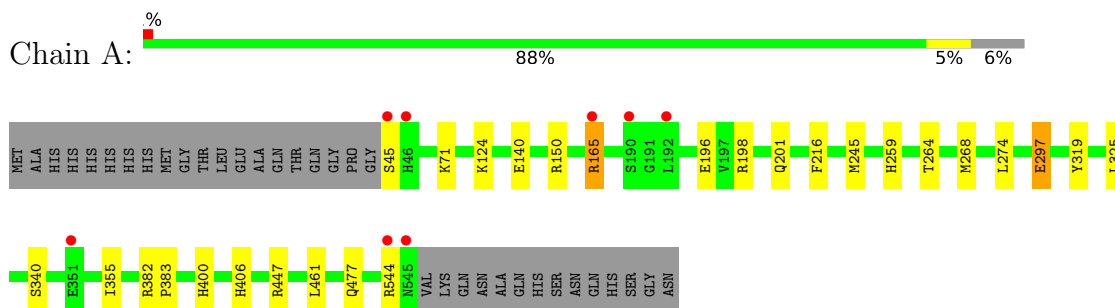
- Molecule 8 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	387	Total	O	0	0
			387	387		
8	B	347	Total	O	0	0
			347	347		
8	C	342	Total	O	0	0
			342	342		
8	D	300	Total	O	0	0
			300	300		

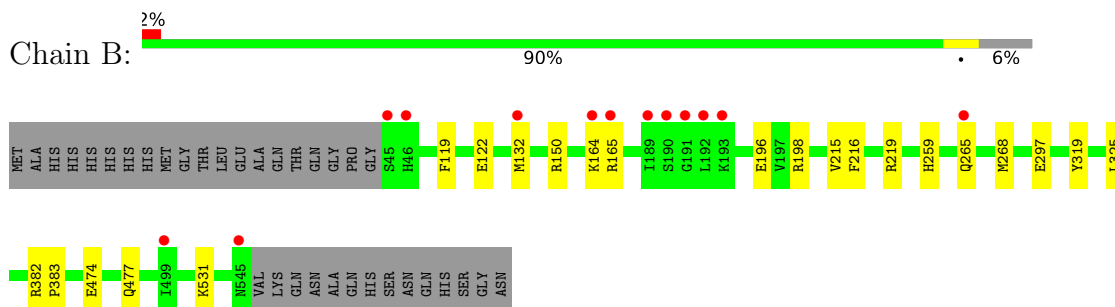
3 Residue-property plots [i](#)

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.

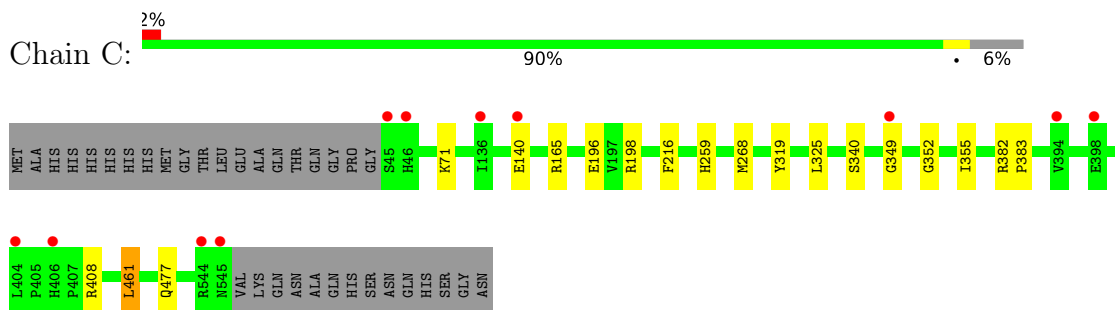
• Molecule 1: Lysine-tRNA ligase



• Molecule 1: Lysine-tRNA ligase

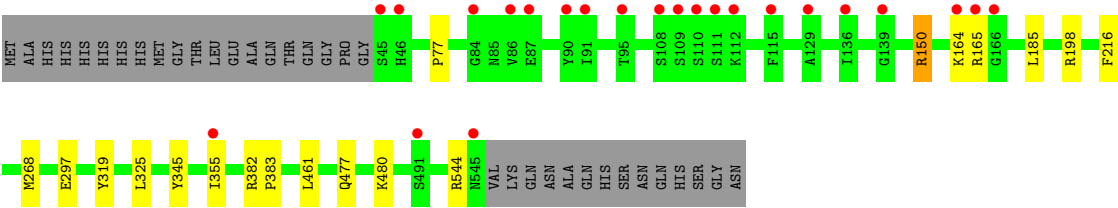


• Molecule 1: Lysine-tRNA ligase



• Molecule 1: Lysine-tRNA ligase





4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	73.15Å 119.42Å 142.76Å 90.00° 90.31° 90.00°	Depositor
Resolution (Å)	91.77 – 1.90 91.77 – 1.90	Depositor EDS
% Data completeness (in resolution range)	97.2 (91.77-1.90) 97.2 (91.77-1.90)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.89 (at 1.90Å)	Xtriage
Refinement program	REFMAC 5.8.0425	Depositor
R, R_{free}	0.180 , 0.206 0.189 , 0.212	Depositor DCC
R_{free} test set	9337 reflections (4.84%)	wwPDB-VP
Wilson B-factor (Å ²)	18.2	Xtriage
Anisotropy	0.408	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 33.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	0.069 for h,-k,-l	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	17853	wwPDB-VP
Average B, all atoms (Å ²)	23.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.96% 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: TRS, A1JCT, SO4, EDO, 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	0.61	0/4152	0.97	6/5602 (0.1%)
1	B	0.59	0/4161	0.95	3/5614 (0.1%)
1	C	0.59	0/4161	0.96	4/5614 (0.1%)
1	D	0.58	0/4161	0.94	2/5614 (0.0%)
All	All	0.59	0/16635	0.96	15/22444 (0.1%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	4
1	B	0	3
1	C	0	2
1	D	0	2
All	All	0	11

There are no bond length outliers.

All (15) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	196	GLU	CB-CG-CD	7.05	124.58	112.60
1	B	216	PHE	CA-CB-CG	-6.80	107.00	113.80
1	C	477	GLN	CB-CA-C	-6.56	99.90	110.79
1	A	216	PHE	CA-CB-CG	-6.38	107.42	113.80
1	C	196	GLU	CB-CG-CD	6.32	123.34	112.60
1	C	216	PHE	CA-CB-CG	-6.28	107.52	113.80
1	D	216	PHE	CA-CB-CG	-6.14	107.66	113.80
1	D	477	GLN	CB-CA-C	-6.02	100.80	110.79

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	477	GLN	CB-CA-C	-5.97	100.87	110.79
1	A	140	GLU	CB-CG-CD	5.96	122.73	112.60
1	B	477	GLN	CB-CA-C	-5.78	101.20	110.79
1	C	140	GLU	CB-CG-CD	5.77	122.41	112.60
1	B	474	GLU	CB-CA-C	5.12	115.24	110.17
1	A	297	GLU	CA-C-N	5.06	124.90	120.10
1	A	297	GLU	C-N-CA	5.06	124.90	120.10

There are no chirality outliers.

All (11) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	150	ARG	Sidechain
1	A	165	ARG	Sidechain
1	A	198	ARG	Sidechain
1	A	544	ARG	Peptide
1	B	150	ARG	Sidechain
1	B	198	ARG	Sidechain
1	B	219	ARG	Sidechain
1	C	198	ARG	Sidechain
1	C	349	GLY	Peptide
1	D	150	ARG	Sidechain
1	D	198	ARG	Sidechain

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	4051	0	4000	16	0
1	B	4057	0	4008	8	0
1	C	4057	0	4008	7	0
1	D	4057	0	4008	8	0
2	A	27	0	0	0	0
2	B	27	0	0	0	0
2	C	27	0	0	0	0
2	D	27	0	0	0	0
3	A	8	0	12	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	C	8	0	12	0	0
4	A	8	0	12	0	0
4	B	8	0	12	0	0
4	C	8	0	12	0	0
4	D	8	0	12	0	0
5	A	18	0	24	2	0
5	B	12	0	16	0	0
5	C	12	0	16	0	0
5	D	12	0	16	0	0
6	A	10	0	12	0	0
6	B	10	0	12	0	0
6	C	10	0	12	0	0
6	D	10	0	12	0	0
7	C	5	0	0	0	0
8	A	387	0	0	5	0
8	B	347	0	0	0	0
8	C	342	0	0	1	0
8	D	300	0	0	3	0
All	All	17853	0	16216	33	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 1.

All (33) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:150:ARG:NH2	1:D:185:LEU:O	2.22	0.72
1:D:77:PRO:O	8:D:801:HOH:O	2.08	0.72
1:A:406:HIS:HD2	8:A:1146:HOH:O	1.81	0.62
1:C:268:MET:HE2	1:D:268:MET:HE2	1.83	0.59
1:D:544:ARG:NH1	8:D:802:HOH:O	2.34	0.59
1:A:259:HIS:HE1	1:B:297:GLU:O	1.86	0.59
1:C:355:ILE:HD11	1:C:461:LEU:HD21	1.86	0.56
1:A:447:ARG:O	5:A:705:GOL:H32	2.07	0.54
1:C:259:HIS:HE1	1:D:297:GLU:O	1.91	0.52
1:A:400:HIS:HE1	8:A:882:HOH:O	1.91	0.52
1:A:268:MET:HE2	1:B:268:MET:HE2	1.92	0.52
1:C:352:GLY:N	8:C:807:HOH:O	2.44	0.51
1:A:406:HIS:HE1	8:D:1032:HOH:O	1.93	0.51
1:C:325:LEU:C	1:C:325:LEU:HD23	2.39	0.48
1:D:325:LEU:C	1:D:325:LEU:HD23	2.39	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:201:GLN:HE22	5:A:706:GOL:H2	1.80	0.47
1:A:325:LEU:C	1:A:325:LEU:HD23	2.41	0.45
1:A:165:ARG:NH1	8:A:813:HOH:O	2.50	0.45
1:A:297:GLU:O	1:B:259:HIS:HE1	1.99	0.44
1:A:245:MET:SD	1:A:264:THR:HG21	2.57	0.43
1:A:382:ARG:HA	1:A:383:PRO:C	2.43	0.43
1:B:265:GLN:HG3	1:C:408:ARG:HH21	1.82	0.43
1:D:345:TYR:CD2	1:D:461:LEU:HD13	2.54	0.43
1:D:382:ARG:HA	1:D:383:PRO:C	2.43	0.42
1:B:325:LEU:C	1:B:325:LEU:HD23	2.45	0.42
1:C:382:ARG:HA	1:C:383:PRO:C	2.44	0.42
1:B:215:VAL:CG2	1:B:531:LYS:HE3	2.49	0.42
1:A:355:ILE:CD1	1:A:461:LEU:HD21	2.50	0.42
1:B:382:ARG:HA	1:B:383:PRO:C	2.44	0.42
1:A:259:HIS:HD2	8:A:1155:HOH:O	2.02	0.41
1:A:274:LEU:HD12	8:A:833:HOH:O	2.21	0.41
1:A:355:ILE:HD11	1:A:461:LEU:HD21	2.02	0.41
1:B:119:PHE:CZ	1:B:122:GLU:HA	2.55	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	500/535 (94%)	490 (98%)	10 (2%)	0	100	100
1	B	501/535 (94%)	493 (98%)	8 (2%)	0	100	100
1	C	501/535 (94%)	493 (98%)	8 (2%)	0	100	100
1	D	501/535 (94%)	493 (98%)	8 (2%)	0	100	100
All	All	2003/2140 (94%)	1969 (98%)	34 (2%)	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	444/471 (94%)	439 (99%)	5 (1%)	65	67
1	B	445/471 (94%)	440 (99%)	5 (1%)	65	67
1	C	445/471 (94%)	440 (99%)	5 (1%)	65	67
1	D	445/471 (94%)	440 (99%)	5 (1%)	65	67
All	All	1779/1884 (94%)	1759 (99%)	20 (1%)	65	67

All (20) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	45	SER
1	A	71	LYS
1	A	124	LYS
1	A	319	TYR
1	A	340	SER
1	B	132	MET
1	B	164	LYS
1	B	165	ARG
1	B	196	GLU
1	B	319	TYR
1	C	71	LYS
1	C	165	ARG
1	C	319	TYR
1	C	340	SER
1	C	461	LEU
1	D	164	LYS
1	D	165	ARG
1	D	319	TYR
1	D	355	ILE
1	D	480	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (12) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	123	GLN
1	A	201	GLN
1	A	259	HIS
1	A	400	HIS
1	A	406	HIS
1	B	259	HIS
1	B	278	GLN
1	B	387	GLN
1	C	123	GLN
1	C	259	HIS
1	D	259	HIS
1	D	265	GLN

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](#)

26 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	GOL	B	704	-	5,5,5	0.18	0	5,5,5	0.57	0
2	A1JCT	D	701	-	27,29,29	0.54	0	37,47,47	0.99	1 (2%)
4	TRS	A	703	-	7,7,7	0.19	0	9,9,9	0.29	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	EDO	C	704	-	3,3,3	0.39	0	2,2,2	0.16	0
5	GOL	D	703	-	5,5,5	0.16	0	5,5,5	0.42	0
6	LYS	D	705	-	8,9,9	0.55	0	9,10,10	0.97	0
2	A1JCT	B	701	-	27,29,29	0.73	1 (3%)	37,47,47	1.26	2 (5%)
5	GOL	C	702	-	5,5,5	0.17	0	5,5,5	0.42	0
5	GOL	D	704	-	5,5,5	0.07	0	5,5,5	0.30	0
3	EDO	A	707	-	3,3,3	0.25	0	2,2,2	0.28	0
6	LYS	C	708	-	8,9,9	0.63	0	9,10,10	0.85	0
3	EDO	A	702	-	3,3,3	0.23	0	2,2,2	0.22	0
2	A1JCT	C	701	-	27,29,29	0.72	1 (3%)	37,47,47	1.08	2 (5%)
5	GOL	C	706	-	5,5,5	0.09	0	5,5,5	0.24	0
5	GOL	A	706	-	5,5,5	0.20	0	5,5,5	0.36	0
4	TRS	B	702	-	7,7,7	0.25	0	9,9,9	0.55	0
5	GOL	A	705	-	5,5,5	0.28	0	5,5,5	0.74	0
5	GOL	B	703	-	5,5,5	0.23	0	5,5,5	0.48	0
4	TRS	C	703	-	7,7,7	0.15	0	9,9,9	0.29	0
5	GOL	A	704	-	5,5,5	0.19	0	5,5,5	0.29	0
4	TRS	D	702	-	7,7,7	0.28	0	9,9,9	0.34	0
7	SO4	C	707	-	4,4,4	0.40	0	6,6,6	0.47	0
3	EDO	C	705	-	3,3,3	0.26	0	2,2,2	0.47	0
6	LYS	A	708	-	8,9,9	0.80	1 (12%)	9,10,10	0.90	0
6	LYS	B	705	-	8,9,9	0.32	0	9,10,10	1.02	1 (11%)
2	A1JCT	A	701	-	27,29,29	0.70	0	37,47,47	1.12	1 (2%)

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
5	GOL	B	704	-	-	0/4/4/4	-
2	A1JCT	D	701	-	-	1/17/41/41	0/3/3/3
4	TRS	A	703	-	-	2/9/9/9	-
3	EDO	C	704	-	-	0/1/1/1	-
5	GOL	D	703	-	-	2/4/4/4	-
6	LYS	D	705	-	-	0/9/9/9	-
2	A1JCT	B	701	-	-	1/17/41/41	0/3/3/3
5	GOL	C	702	-	-	2/4/4/4	-
5	GOL	D	704	-	-	4/4/4/4	-
3	EDO	A	707	-	-	0/1/1/1	-
6	LYS	C	708	-	-	0/9/9/9	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	EDO	A	702	-	-	0/1/1/1	-
2	A1JCT	C	701	-	-	1/17/41/41	0/3/3/3
5	GOL	C	706	-	-	0/4/4/4	-
5	GOL	A	706	-	-	4/4/4/4	-
4	TRS	B	702	-	-	0/9/9/9	-
5	GOL	A	705	-	-	1/4/4/4	-
5	GOL	B	703	-	-	0/4/4/4	-
4	TRS	C	703	-	-	3/9/9/9	-
5	GOL	A	704	-	-	2/4/4/4	-
4	TRS	D	702	-	-	0/9/9/9	-
3	EDO	C	705	-	-	0/1/1/1	-
6	LYS	A	708	-	-	0/9/9/9	-
6	LYS	B	705	-	-	0/9/9/9	-
2	A1JCT	A	701	-	-	1/17/41/41	0/3/3/3

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	701	A1JCT	F3-C14	-2.65	1.23	1.32
2	B	701	A1JCT	F3-C14	-2.31	1.24	1.32
6	A	708	LYS	OXT-C	-2.06	1.23	1.30

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	701	A1JCT	F4-C14-F3	-5.31	86.24	105.72
2	A	701	A1JCT	F4-C14-F3	-4.39	89.61	105.72
2	D	701	A1JCT	F4-C14-F3	-3.83	91.65	105.72
2	C	701	A1JCT	F4-C14-F3	-3.61	92.48	105.72
2	B	701	A1JCT	F4-C14-F5	2.68	115.56	105.72
6	B	705	LYS	O-C-CA	-2.21	114.33	122.14
2	C	701	A1JCT	F4-C14-F5	2.16	113.64	105.72

There are no chirality outliers.

All (24) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	704	GOL	C1-C2-C3-O3
5	A	706	GOL	O1-C1-C2-C3
5	A	706	GOL	C1-C2-C3-O3

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Mol	Chain	Res	Type	Atoms
5	D	703	GOL	C1-C2-C3-O3
5	D	704	GOL	C1-C2-C3-O3
5	D	703	GOL	O2-C2-C3-O3
5	C	702	GOL	O1-C1-C2-C3
5	D	704	GOL	O1-C1-C2-C3
5	D	704	GOL	O1-C1-C2-O2
5	A	706	GOL	O1-C1-C2-O2
5	D	704	GOL	O2-C2-C3-O3
2	A	701	A1JCT	C4-C3-N2-C11
2	B	701	A1JCT	C4-C3-N2-C11
2	C	701	A1JCT	C4-C3-N2-C11
2	D	701	A1JCT	C4-C3-N2-C11
4	C	703	TRS	C3-C-C1-O1
4	C	703	TRS	N-C-C1-O1
5	A	706	GOL	O2-C2-C3-O3
4	A	703	TRS	C3-C-C2-O2
4	C	703	TRS	C2-C-C1-O1
5	C	702	GOL	O1-C1-C2-O2
5	A	704	GOL	O2-C2-C3-O3
4	A	703	TRS	N-C-C2-O2
5	A	705	GOL	C1-C2-C3-O3

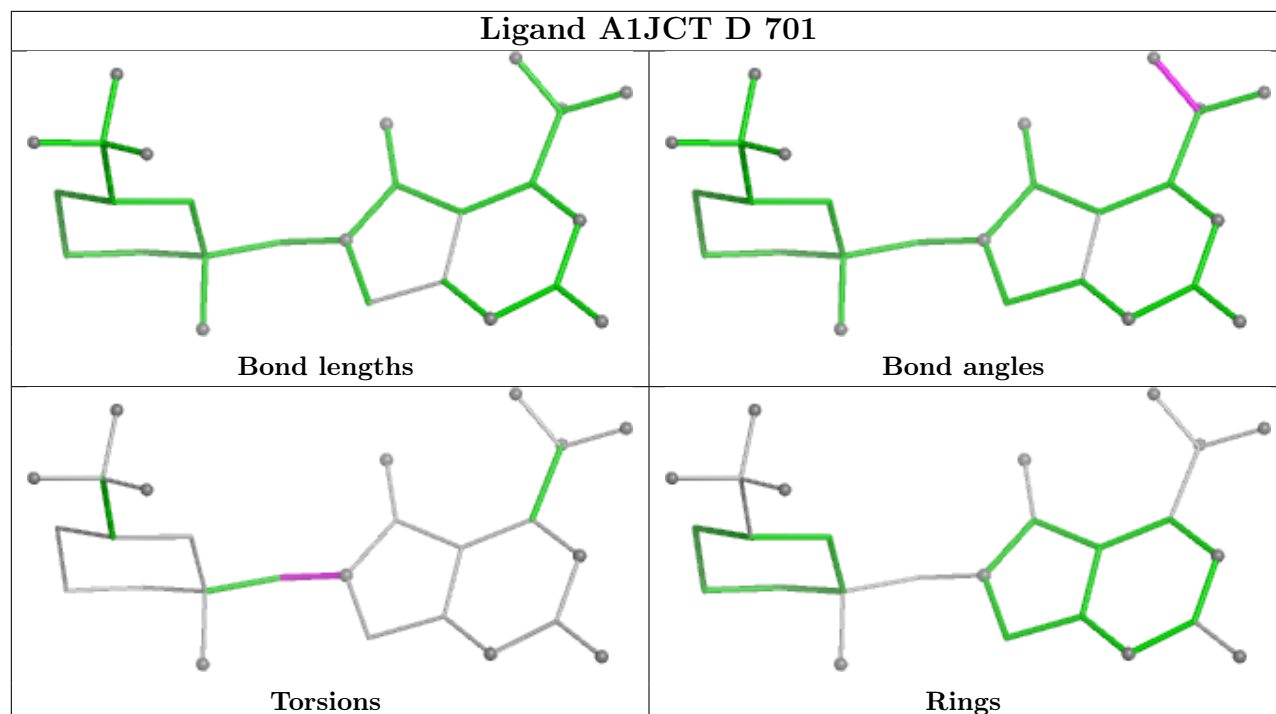
There are no ring outliers.

2 monomers are involved in 2 short contacts:

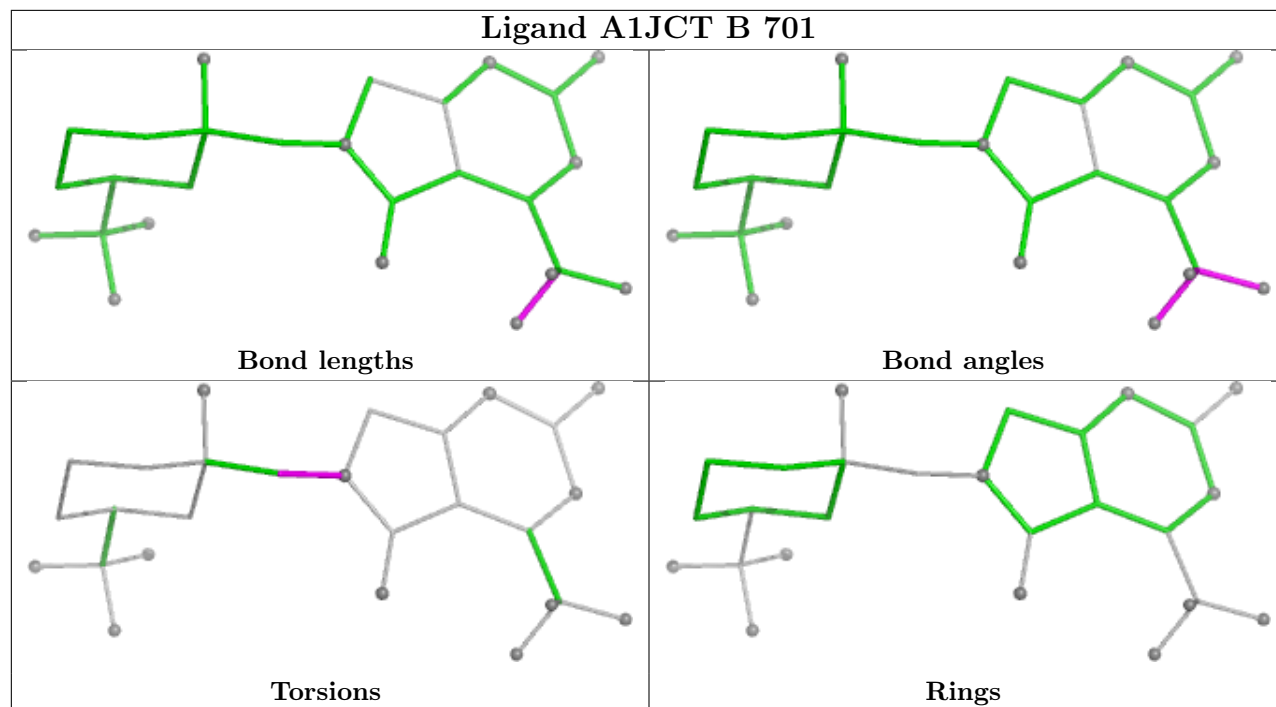
Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	706	GOL	1	0
5	A	705	GOL	1	0

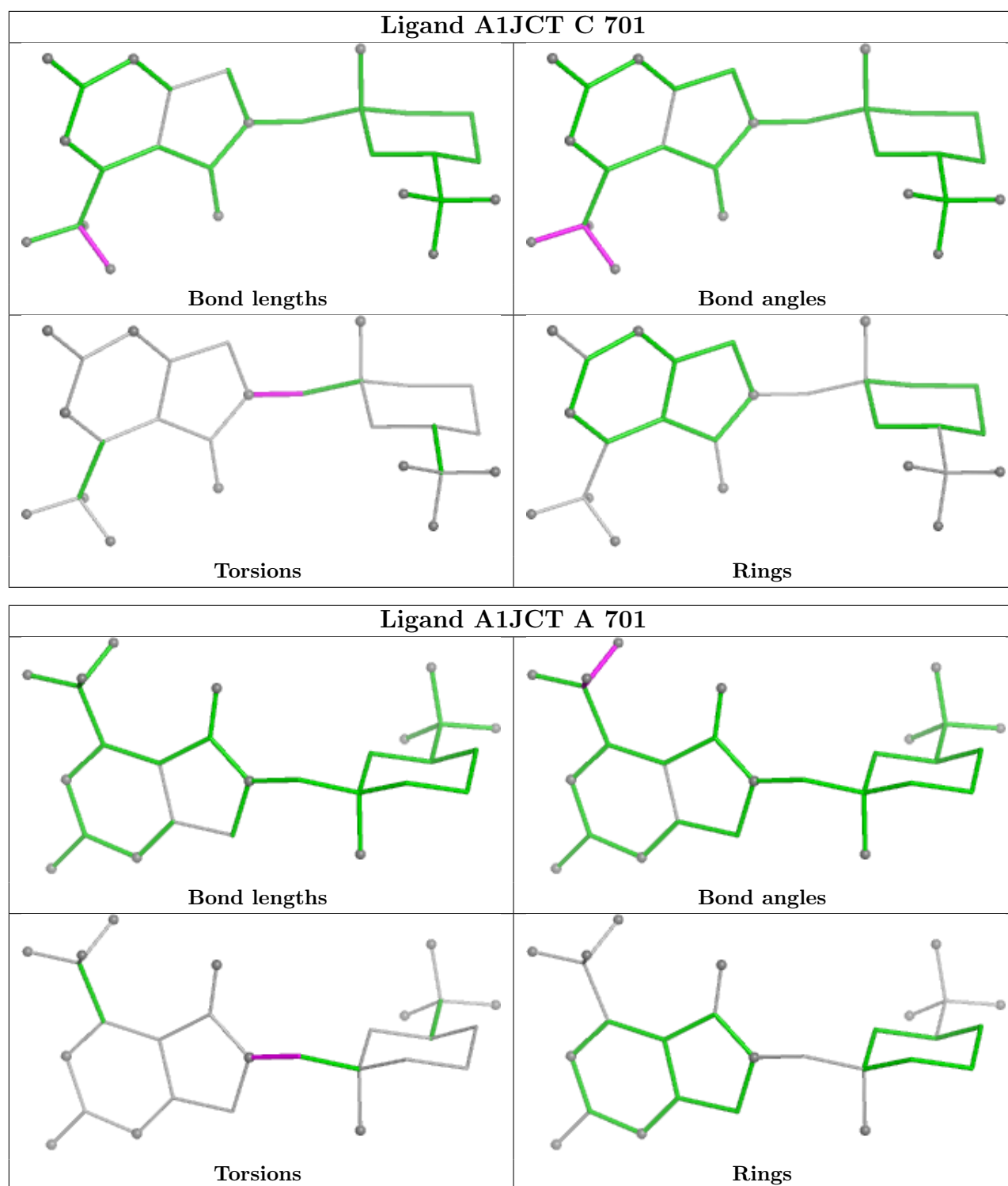
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

Ligand A1JCT D 701



Ligand A1JCT B 701





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	501/535 (93%)	-0.29	8 (1%) 70 74	10, 18, 37, 60	1 (0%)
1	B	501/535 (93%)	-0.15	13 (2%) 57 61	12, 19, 43, 60	2 (0%)
1	C	501/535 (93%)	-0.04	11 (2%) 62 66	12, 21, 40, 63	2 (0%)
1	D	501/535 (93%)	0.15	23 (4%) 37 40	12, 23, 46, 70	2 (0%)
All	All	2004/2140 (93%)	-0.08	55 (2%) 56 60	10, 20, 42, 70	7 (0%)

All (55) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	45	SER	4.0
1	D	115	PHE	3.9
1	D	109	SER	3.6
1	B	191	GLY	3.6
1	B	46	HIS	3.5
1	D	45	SER	3.5
1	C	46	HIS	3.5
1	A	545	ASN	3.5
1	D	112	LYS	3.5
1	C	545	ASN	3.4
1	D	355	ILE	3.3
1	A	190	SER	3.3
1	D	91	ILE	3.2
1	B	190	SER	3.2
1	A	351	GLU	3.1
1	B	265	GLN	3.0
1	A	46	HIS	3.0
1	D	46	HIS	3.0
1	D	90	TYR	3.0
1	D	165	ARG	3.0
1	D	545	ASN	2.9

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Mol	Chain	Res	Type	RSRZ
1	B	45	SER	2.9
1	A	45	SER	2.9
1	D	164	LYS	2.8
1	B	545	ASN	2.8
1	C	406	HIS	2.8
1	C	394	VAL	2.8
1	A	192	LEU	2.7
1	D	110	SER	2.7
1	D	87	GLU	2.7
1	B	193	LYS	2.6
1	D	166	GLY	2.6
1	A	544	ARG	2.6
1	D	111	SER	2.6
1	D	84	GLY	2.6
1	B	192	LEU	2.4
1	D	108	SER	2.4
1	B	499	ILE	2.4
1	D	136	ILE	2.4
1	B	164	LYS	2.4
1	C	140	GLU	2.4
1	B	189	ILE	2.2
1	C	136	ILE	2.2
1	B	165	ARG	2.2
1	A	165	ARG	2.2
1	D	86	VAL	2.2
1	D	491	SER	2.2
1	C	404	LEU	2.2
1	C	349	GLY	2.1
1	B	132	MET	2.1
1	D	129	ALA	2.1
1	C	544	ARG	2.1
1	C	398	GLU	2.1
1	D	95	THR	2.0
1	D	139	GLY	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 [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

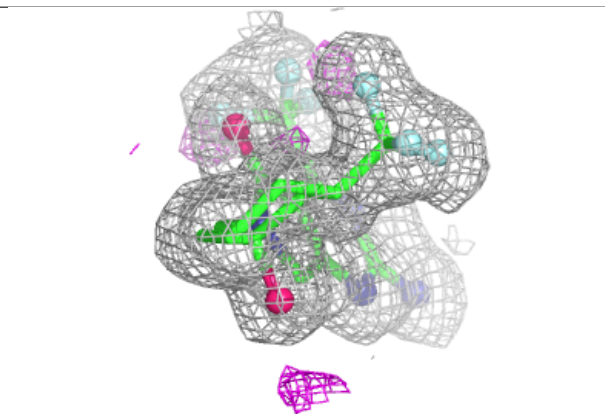
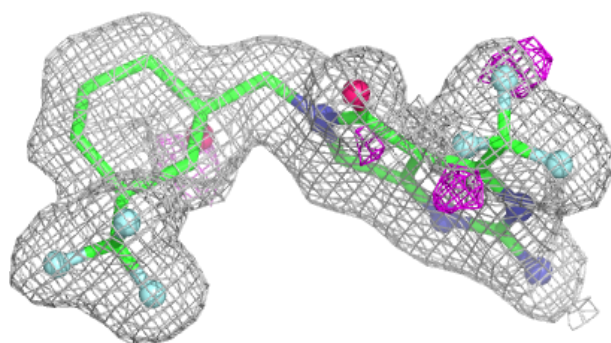
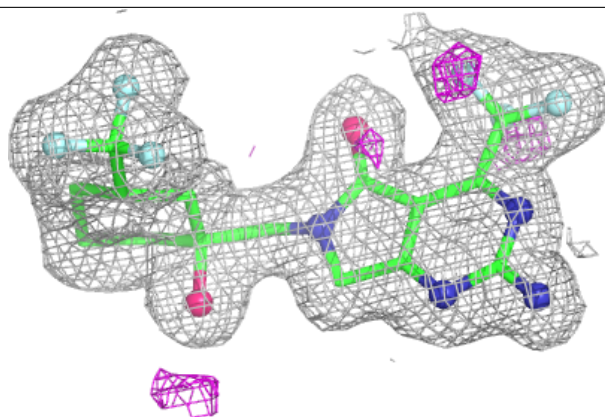
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
7	SO4	C	707	5/5	0.75	0.17	51,53,61,63	0
5	GOL	A	705	6/6	0.82	0.14	31,34,38,39	0
5	GOL	A	704	6/6	0.82	0.14	29,34,36,36	0
5	GOL	B	704	6/6	0.84	0.13	31,35,39,40	0
3	EDO	C	705	4/4	0.86	0.12	29,31,32,33	0
4	TRS	C	703	8/8	0.88	0.12	25,30,33,34	0
4	TRS	D	702	8/8	0.88	0.12	32,36,38,39	0
5	GOL	A	706	6/6	0.89	0.12	32,33,37,40	0
4	TRS	A	703	8/8	0.90	0.11	28,35,37,41	0
5	GOL	C	706	6/6	0.91	0.13	35,39,46,46	0
5	GOL	D	704	6/6	0.92	0.12	31,40,44,44	0
4	TRS	B	702	8/8	0.93	0.09	23,27,30,31	0
5	GOL	D	703	6/6	0.93	0.09	26,30,30,32	0
3	EDO	C	704	4/4	0.94	0.08	25,28,28,30	0
5	GOL	C	702	6/6	0.94	0.07	22,27,28,30	0
3	EDO	A	702	4/4	0.95	0.07	19,20,22,24	0
6	LYS	C	708	10/10	0.95	0.07	14,15,16,17	0
6	LYS	D	705	10/10	0.95	0.07	14,15,16,16	0
2	A1JCT	D	701	27/27	0.95	0.07	14,17,21,32	0
5	GOL	B	703	6/6	0.96	0.08	22,27,30,32	0
3	EDO	A	707	4/4	0.96	0.07	17,22,22,22	0
2	A1JCT	B	701	27/27	0.96	0.05	12,14,20,29	0
6	LYS	B	705	10/10	0.97	0.05	12,15,16,17	0
2	A1JCT	A	701	27/27	0.97	0.05	12,13,18,29	0
2	A1JCT	C	701	27/27	0.97	0.05	13,15,21,25	0
6	LYS	A	708	10/10	0.97	0.05	11,11,12,12	0

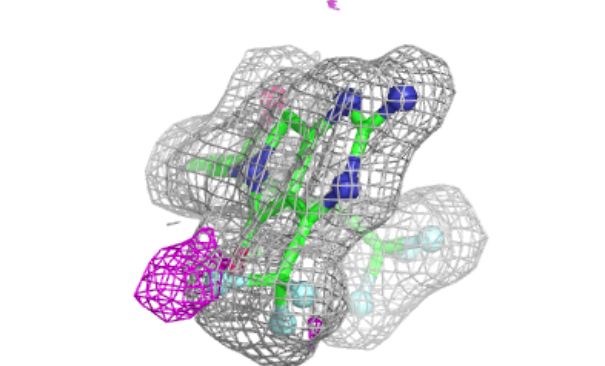
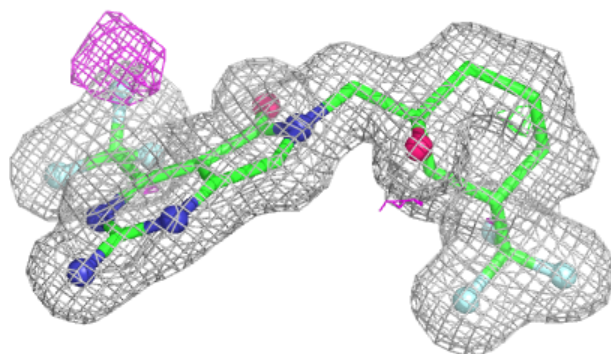
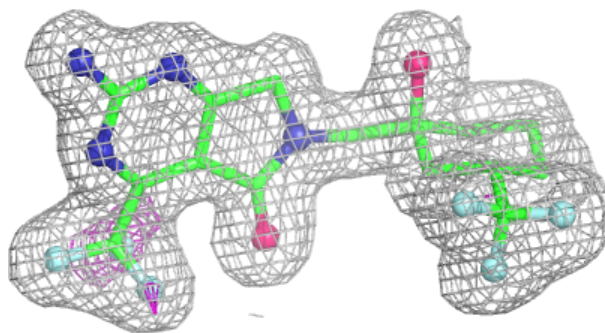
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around A1JCT D 701:

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

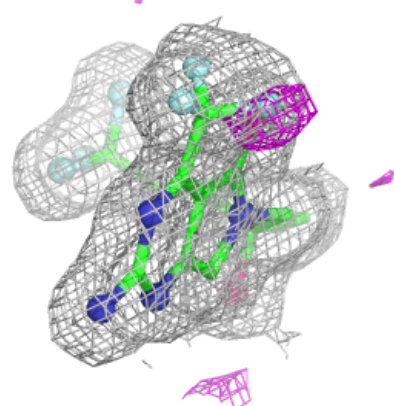
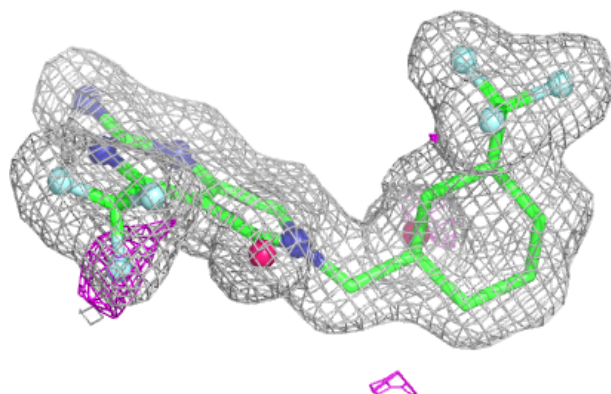
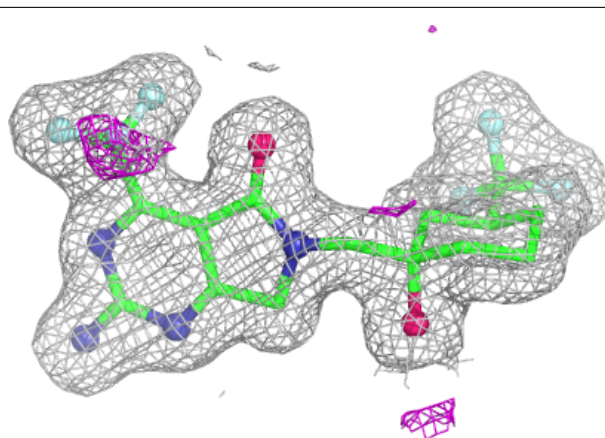
**Electron density around A1JCT B 701:**

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

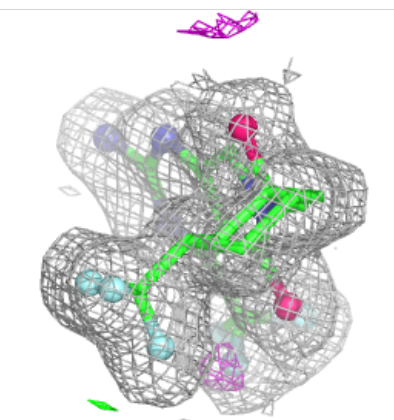
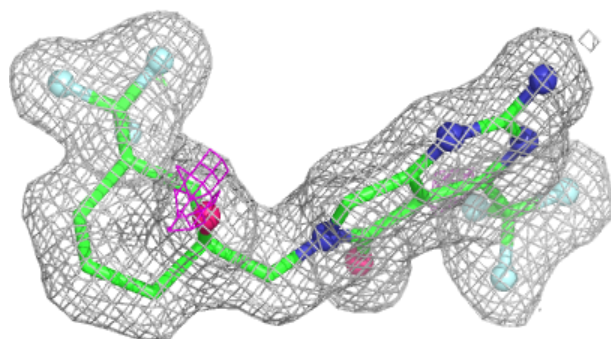
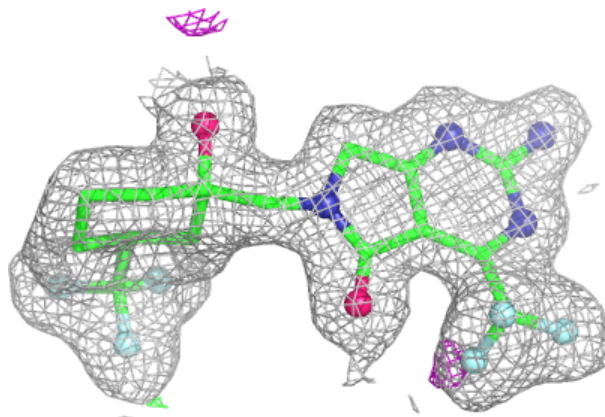


Electron density around A1JCT A 701:

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

**Electron density around A1JCT C 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 [i](#)

There are no such residues in this entry.