



Full wwPDB X-ray Structure Validation Report ⓘ

Feb 22, 2021 – 02:47 PM GMT

PDB ID : 6QU3
Title : Crystal Structure of Phosphofructokinase from *Trypanosoma brucei* in complex with an allosteric inhibitor ctc360
Authors : McNae, I.W.; Dornan, J.; Walkinshaw, M.D.
Deposited on : 2019-02-26
Resolution : 2.35 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 following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.17.1.dev1
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.17.1.dev1

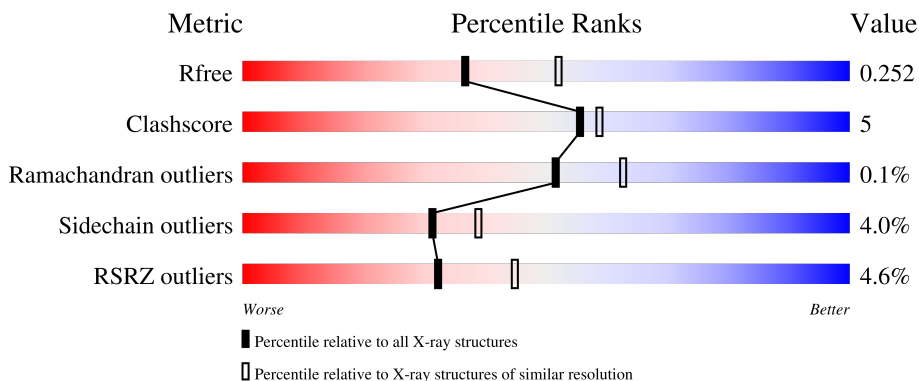
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.35 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}	130704	1164 (2.36-2.36)
Clashscore	141614	1232 (2.36-2.36)
Ramachandran outliers	138981	1211 (2.36-2.36)
Sidechain outliers	138945	1212 (2.36-2.36)
RSRZ outliers	127900	1150 (2.36-2.36)

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	507	
1	B	507	
1	C	507	
1	D	507	

2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 14588 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 ATP-dependent 6-phosphofructokinase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	464	Total 3590	C 2248	N 658	O 667	S 17	0	0	0
1	B	446	Total 3448	C 2161	N 633	O 638	S 16	0	0	0
1	C	446	Total 3452	C 2166	N 632	O 638	S 16	0	0	0
1	D	461	Total 3533	C 2211	N 648	O 657	S 17	0	0	0

There are 80 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-19	MET	-	initiating methionine	UNP O15648
A	-18	GLY	-	expression tag	UNP O15648
A	-17	SER	-	expression tag	UNP O15648
A	-16	SER	-	expression tag	UNP O15648
A	-15	HIS	-	expression tag	UNP O15648
A	-14	HIS	-	expression tag	UNP O15648
A	-13	HIS	-	expression tag	UNP O15648
A	-12	HIS	-	expression tag	UNP O15648
A	-11	HIS	-	expression tag	UNP O15648
A	-10	HIS	-	expression tag	UNP O15648
A	-9	SER	-	expression tag	UNP O15648
A	-8	SER	-	expression tag	UNP O15648
A	-7	GLY	-	expression tag	UNP O15648
A	-6	LEU	-	expression tag	UNP O15648
A	-5	VAL	-	expression tag	UNP O15648
A	-4	PRO	-	expression tag	UNP O15648
A	-3	ARG	-	expression tag	UNP O15648
A	-2	GLY	-	expression tag	UNP O15648
A	-1	SER	-	expression tag	UNP O15648
A	0	HIS	-	expression tag	UNP O15648
B	-19	MET	-	initiating methionine	UNP O15648

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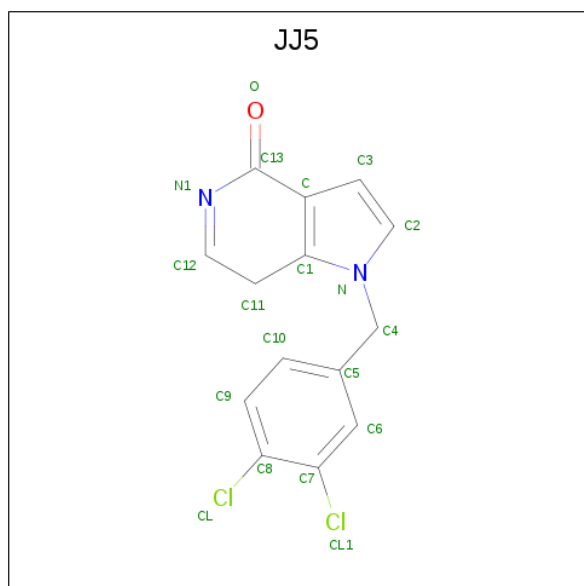
Chain	Residue	Modelled	Actual	Comment	Reference
B	-18	GLY	-	expression tag	UNP O15648
B	-17	SER	-	expression tag	UNP O15648
B	-16	SER	-	expression tag	UNP O15648
B	-15	HIS	-	expression tag	UNP O15648
B	-14	HIS	-	expression tag	UNP O15648
B	-13	HIS	-	expression tag	UNP O15648
B	-12	HIS	-	expression tag	UNP O15648
B	-11	HIS	-	expression tag	UNP O15648
B	-10	HIS	-	expression tag	UNP O15648
B	-9	SER	-	expression tag	UNP O15648
B	-8	SER	-	expression tag	UNP O15648
B	-7	GLY	-	expression tag	UNP O15648
B	-6	LEU	-	expression tag	UNP O15648
B	-5	VAL	-	expression tag	UNP O15648
B	-4	PRO	-	expression tag	UNP O15648
B	-3	ARG	-	expression tag	UNP O15648
B	-2	GLY	-	expression tag	UNP O15648
B	-1	SER	-	expression tag	UNP O15648
B	0	HIS	-	expression tag	UNP O15648
C	-19	MET	-	initiating methionine	UNP O15648
C	-18	GLY	-	expression tag	UNP O15648
C	-17	SER	-	expression tag	UNP O15648
C	-16	SER	-	expression tag	UNP O15648
C	-15	HIS	-	expression tag	UNP O15648
C	-14	HIS	-	expression tag	UNP O15648
C	-13	HIS	-	expression tag	UNP O15648
C	-12	HIS	-	expression tag	UNP O15648
C	-11	HIS	-	expression tag	UNP O15648
C	-10	HIS	-	expression tag	UNP O15648
C	-9	SER	-	expression tag	UNP O15648
C	-8	SER	-	expression tag	UNP O15648
C	-7	GLY	-	expression tag	UNP O15648
C	-6	LEU	-	expression tag	UNP O15648
C	-5	VAL	-	expression tag	UNP O15648
C	-4	PRO	-	expression tag	UNP O15648
C	-3	ARG	-	expression tag	UNP O15648
C	-2	GLY	-	expression tag	UNP O15648
C	-1	SER	-	expression tag	UNP O15648
C	0	HIS	-	expression tag	UNP O15648
D	-19	MET	-	initiating methionine	UNP O15648
D	-18	GLY	-	expression tag	UNP O15648
D	-17	SER	-	expression tag	UNP O15648

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Chain	Residue	Modelled	Actual	Comment	Reference
D	-16	SER	-	expression tag	UNP O15648
D	-15	HIS	-	expression tag	UNP O15648
D	-14	HIS	-	expression tag	UNP O15648
D	-13	HIS	-	expression tag	UNP O15648
D	-12	HIS	-	expression tag	UNP O15648
D	-11	HIS	-	expression tag	UNP O15648
D	-10	HIS	-	expression tag	UNP O15648
D	-9	SER	-	expression tag	UNP O15648
D	-8	SER	-	expression tag	UNP O15648
D	-7	GLY	-	expression tag	UNP O15648
D	-6	LEU	-	expression tag	UNP O15648
D	-5	VAL	-	expression tag	UNP O15648
D	-4	PRO	-	expression tag	UNP O15648
D	-3	ARG	-	expression tag	UNP O15648
D	-2	GLY	-	expression tag	UNP O15648
D	-1	SER	-	expression tag	UNP O15648
D	0	HIS	-	expression tag	UNP O15648

- Molecule 2 is 1-[(3,4-dichlorophenyl)methyl]-7 {H}-pyrrolo[3,2-c]pyridin-4-one (three-letter code: JJ5) (formula: C₁₄H₁₀Cl₂N₂O).



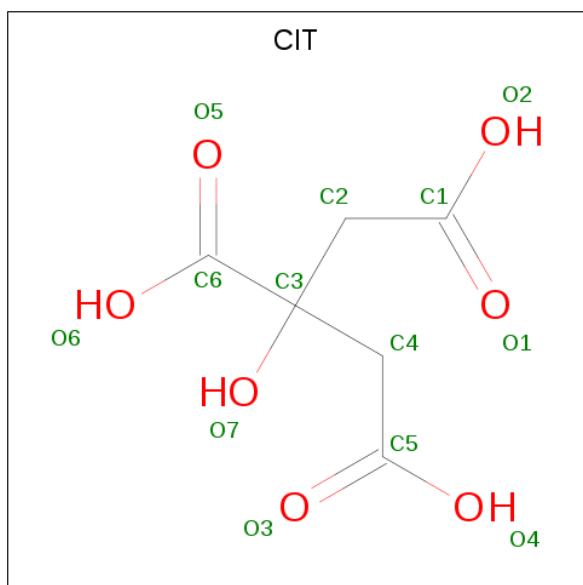
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
			Total	C	Cl	N			O
2	A	1	Total	C	Cl	N	O	0	0
			19	14	2	2	1		
2	B	1	Total	C	Cl	N	O	0	0
			19	14	2	2	1		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
2	C	1	Total	C	Cl	N	O	0	0
			19	14	2	2	1		
2	D	1	Total	C	Cl	N	O	0	0
			19	14	2	2	1		

- Molecule 3 is CITRIC ACID (three-letter code: CIT) (formula: C₆H₈O₇).



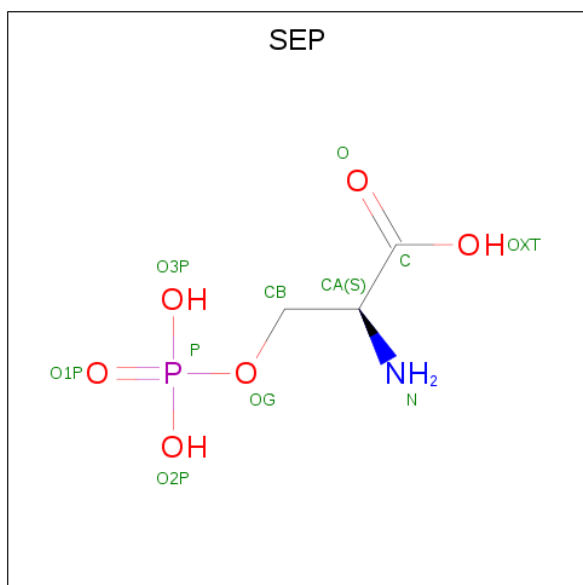
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf	
3	A	1	Total	C	O	0	0
			13	6	7		
3	B	1	Total	C	O	0	0
			13	6	7		
3	C	1	Total	C	O	0	0
			13	6	7		
3	D	1	Total	C	O	0	0
			13	6	7		

- Molecule 4 is GLYCEROL (three-letter code: GOL) (formula: C₃H₈O₃).



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

- Molecule 5 is PHOSPHOSERINE (three-letter code: SEP) (formula: $C_3H_8NO_6P$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
5	A	1	11	3	1	6	1	0	0

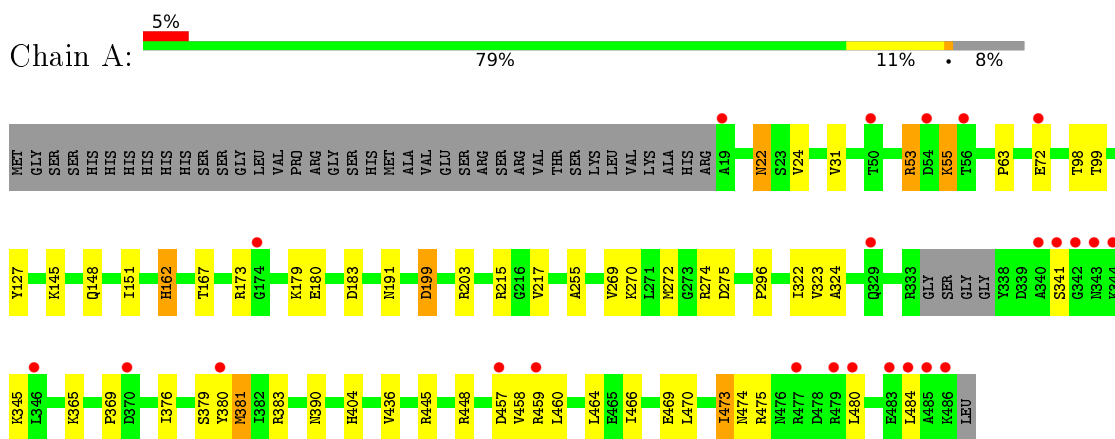
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	118	Total 118	O 118	0	0
6	B	78	Total 78	O 78	0	0
6	C	99	Total 99	O 99	0	0
6	D	107	Total 107	O 107	0	0

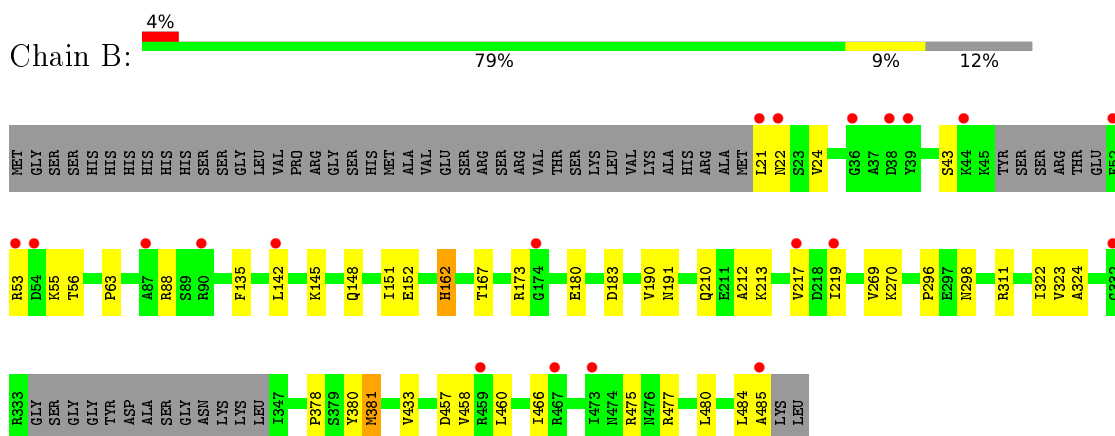
3 Residue-property plots [i](#)

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.

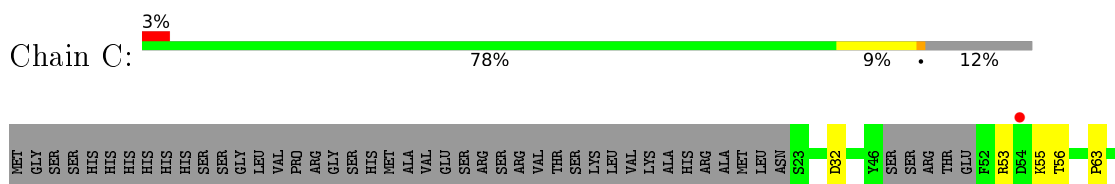
- Molecule 1: ATP-dependent 6-phosphofructokinase

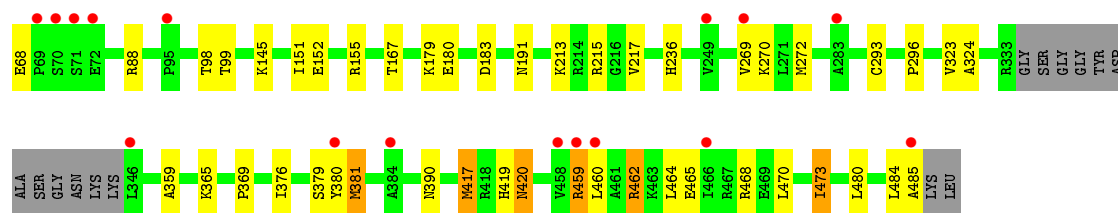


- Molecule 1: ATP-dependent 6-phosphofructokinase

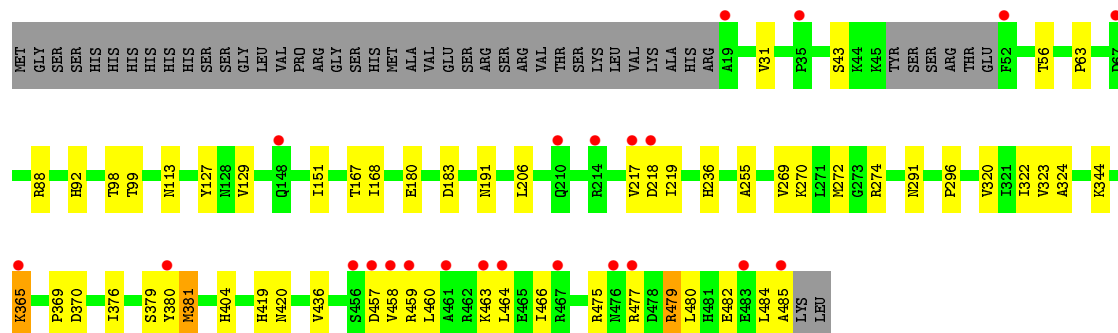
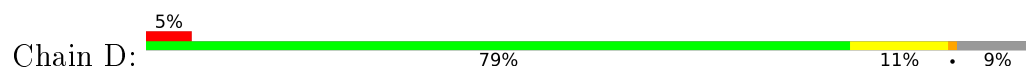


- Molecule 1: ATP-dependent 6-phosphofructokinase





• Molecule 1: ATP-dependent 6-phosphofruktokinase



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, α , β , γ	166.15Å 150.56Å 83.99Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	68.66 – 2.35 68.57 – 2.35	Depositor EDS
% Data completeness (in resolution range)	99.9 (68.66-2.35) 99.9 (68.57-2.35)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.63 (at 2.34Å)	Xtrriage
Refinement program	REFMAC 5.8.0238	Depositor
R, R_{free}	0.206 , 0.246 0.213 , 0.252	Depositor DCC
R_{free} test set	4390 reflections (4.97%)	wwPDB-VP
Wilson B-factor (Å ²)	48.0	Xtrriage
Anisotropy	0.024	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 49.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	14588	wwPDB-VP
Average B, all atoms (Å ²)	73.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.78% 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: CIT, GOL, SEP, JJ5

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	0.66	0/3651	0.77	0/4938
1	B	0.66	0/3506	0.76	0/4744
1	C	0.66	0/3511	0.76	0/4751
1	D	0.67	0/3592	0.76	0/4860
All	All	0.66	0/14260	0.76	0/19293

There are no bond length outliers.

There are no bond angle outliers.

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	3590	0	3638	44	0
1	B	3448	0	3496	33	0
1	C	3452	0	3499	37	0
1	D	3533	0	3574	46	0
2	A	19	0	0	0	0
2	B	19	0	0	0	0
2	C	19	0	0	0	0
2	D	19	0	0	0	0
3	A	13	0	5	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	13	0	5	0	0
3	C	13	0	5	0	0
3	D	13	0	5	0	0
4	A	6	0	8	0	0
4	B	6	0	8	2	0
4	C	6	0	8	1	0
4	D	6	0	8	0	0
5	A	11	0	5	0	0
6	A	118	0	0	2	0
6	B	78	0	0	2	0
6	C	99	0	0	2	0
6	D	107	0	0	4	0
All	All	14588	0	14264	146	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 5.

All (146) 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:199:ASP:OD1	1:A:203:ARG:NH2	1.95	0.98
1:A:390:ASN:HB3	6:A:1148:HOH:O	1.73	0.88
1:A:22:ASN:HD21	1:A:24:VAL:HG23	1.51	0.74
1:C:98:THR:HA	1:C:191:ASN:HD22	1.53	0.73
1:D:291:ASN:HD22	1:D:320:VAL:H	1.33	0.72
1:A:55:LYS:C	1:A:55:LYS:HD3	2.07	0.72
1:D:98:THR:HA	1:D:191:ASN:HD22	1.54	0.72
1:A:98:THR:HA	1:A:191:ASN:HD22	1.54	0.71
1:C:236:HIS:HD2	1:C:419:HIS:H	1.36	0.71
1:D:236:HIS:HD2	1:D:419:HIS:H	1.37	0.70
1:B:190:VAL:O	1:B:219:ILE:HD13	1.91	0.69
1:D:272:MET:HE3	6:D:1118:HOH:O	1.92	0.69
1:A:466:ILE:HG21	1:D:484:LEU:HD11	1.73	0.69
1:B:191:ASN:C	1:B:219:ILE:HD12	2.14	0.68
1:A:22:ASN:ND2	1:A:24:VAL:HG23	2.09	0.67
1:D:113:ASN:HD21	1:D:168:ILE:H	1.41	0.67
1:C:152:GLU:HG3	1:D:475:ARG:HD3	1.80	0.64
1:C:417:MET:CE	1:C:420:ASN:HA	2.28	0.62
1:C:470:LEU:HD23	1:C:473:ILE:HD11	1.82	0.61
1:D:217:VAL:CG2	1:D:219:ILE:HG13	2.29	0.61
1:A:470:LEU:O	1:A:473:ILE:HD13	2.01	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:341:SER:HB3	1:C:359:ALA:HB2	1.82	0.61
1:A:470:LEU:HA	1:A:473:ILE:HD12	1.84	0.59
1:D:291:ASN:ND2	1:D:320:VAL:H	1.99	0.59
1:A:272:MET:HE1	1:A:379:SER:CB	2.34	0.58
1:A:98:THR:HA	1:A:191:ASN:ND2	2.19	0.58
1:C:98:THR:HA	1:C:191:ASN:ND2	2.17	0.58
1:A:22:ASN:OD1	1:A:24:VAL:HG23	2.04	0.58
1:D:98:THR:HA	1:D:191:ASN:ND2	2.19	0.58
1:A:484:LEU:HD11	1:D:466:ILE:HG21	1.84	0.58
1:B:311:ARG:CD	1:B:458:VAL:HG22	2.32	0.58
1:B:212:ALA:HB1	1:B:219:ILE:HG22	1.84	0.57
1:B:380:TYR:CE1	1:B:381:MET:HB3	2.40	0.57
1:D:236:HIS:CD2	1:D:419:HIS:H	2.20	0.57
1:A:475:ARG:HD3	1:B:152:GLU:HG3	1.86	0.57
1:B:212:ALA:HB1	1:B:219:ILE:CG2	2.35	0.56
1:C:272:MET:HE3	6:C:1107:HOH:O	2.06	0.55
1:C:460:LEU:HD13	1:C:460:LEU:C	2.27	0.55
1:C:236:HIS:CD2	1:C:419:HIS:H	2.22	0.54
1:D:274:ARG:NH2	1:D:344:LYS:O	2.40	0.54
1:A:474:ASN:OD1	1:D:477:ARG:NH1	2.41	0.54
1:C:63:PRO:HB3	1:D:63:PRO:HB3	1.90	0.54
1:A:63:PRO:HB3	1:B:63:PRO:HB3	1.88	0.54
1:B:145:LYS:O	1:B:148:GLN:HG2	2.07	0.53
1:C:272:MET:HE1	1:C:379:SER:CB	2.38	0.53
1:D:370:ASP:HB2	6:D:1203:HOH:O	2.08	0.53
1:A:127:TYR:OH	1:A:404:HIS:HD2	1.91	0.53
1:C:480:LEU:O	1:C:484:LEU:HD12	2.09	0.52
1:D:272:MET:HE1	1:D:379:SER:CB	2.40	0.52
1:A:162:HIS:H	1:A:162:HIS:CD2	2.27	0.52
1:C:68:GLU:OE1	1:C:68:GLU:N	2.39	0.52
1:B:480:LEU:O	1:B:484:LEU:HD12	2.10	0.52
1:D:99:THR:H	1:D:191:ASN:ND2	2.08	0.52
1:A:99:THR:H	1:A:191:ASN:ND2	2.08	0.51
1:A:480:LEU:O	1:A:484:LEU:HD12	2.09	0.51
1:B:162:HIS:CD2	1:B:162:HIS:H	2.28	0.51
1:C:417:MET:HE1	1:C:420:ASN:HA	1.91	0.51
1:D:480:LEU:O	1:D:484:LEU:HD12	2.09	0.51
1:B:212:ALA:CB	1:B:219:ILE:CG2	2.89	0.51
1:D:479:ARG:HA	1:D:482:GLU:OE1	2.09	0.51
1:A:99:THR:H	1:A:191:ASN:HD22	1.59	0.51
1:C:99:THR:H	1:C:191:ASN:ND2	2.08	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:217:VAL:HG23	1:D:219:ILE:HG13	1.90	0.51
1:D:127:TYR:OH	1:D:404:HIS:HD2	1.94	0.50
1:B:311:ARG:HD2	1:B:458:VAL:HG22	1.92	0.50
1:D:99:THR:H	1:D:191:ASN:HD22	1.59	0.50
1:C:459:ARG:HD3	1:C:459:ARG:H	1.75	0.50
1:A:22:ASN:CG	1:A:24:VAL:HG23	2.32	0.50
1:C:215:ARG:HB2	1:C:217:VAL:HG23	1.94	0.50
1:C:99:THR:H	1:C:191:ASN:HD22	1.60	0.49
1:C:464:LEU:N	1:C:464:LEU:HD22	2.27	0.49
1:B:475:ARG:NH1	6:B:1104:HOH:O	2.39	0.49
1:B:56:THR:HG22	1:B:88:ARG:HH12	1.77	0.49
1:B:191:ASN:O	1:B:219:ILE:HD12	2.13	0.49
1:A:274:ARG:NH1	1:A:275:ASP:OD2	2.45	0.48
1:D:460:LEU:O	1:D:464:LEU:HD12	2.13	0.48
1:A:145:LYS:O	1:A:148:GLN:HG3	2.13	0.48
1:B:378:PRO:O	1:B:381:MET:HG3	2.14	0.48
1:D:457:ASP:HB3	1:D:460:LEU:HB3	1.95	0.48
1:D:92:HIS:HE1	1:D:218:ASP:OD1	1.96	0.48
1:C:380:TYR:CG	1:C:381:MET:N	2.83	0.47
1:B:212:ALA:HB1	1:B:217:VAL:HG22	1.95	0.47
1:B:380:TYR:CG	1:B:381:MET:N	2.83	0.47
1:C:272:MET:HE1	1:C:379:SER:HB3	1.96	0.47
1:B:145:LYS:HG2	6:B:1103:HOH:O	2.15	0.47
1:C:468:ARG:NH1	1:D:129:VAL:O	2.43	0.47
1:A:380:TYR:CG	1:A:381:MET:N	2.83	0.46
1:B:298:ASN:HD22	4:B:1003:GOL:H12	1.80	0.46
1:C:155:ARG:NH1	6:C:1106:HOH:O	2.48	0.46
1:A:215:ARG:HB2	1:A:217:VAL:HG23	1.97	0.46
1:D:255:ALA:HB2	1:D:376:ILE:HD12	1.97	0.46
1:A:470:LEU:HA	1:A:473:ILE:CD1	2.44	0.46
1:D:365:LYS:O	1:D:369:PRO:HA	2.15	0.46
1:D:380:TYR:CG	1:D:381:MET:N	2.83	0.46
1:A:365:LYS:O	1:A:369:PRO:HA	2.15	0.46
1:B:180:GLU:O	1:B:183:ASP:HB2	2.16	0.46
1:C:365:LYS:O	1:C:369:PRO:HA	2.15	0.46
1:A:460:LEU:O	1:A:464:LEU:HD12	2.17	0.45
1:C:180:GLU:O	1:C:183:ASP:HB2	2.16	0.45
1:B:210:GLN:HA	1:B:213:LYS:HG2	1.98	0.45
1:B:457:ASP:HB3	1:B:460:LEU:HB3	1.98	0.45
1:B:53:ARG:HG2	1:B:55:LYS:O	2.17	0.45
1:D:56:THR:HG22	1:D:88:ARG:HH12	1.81	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:272:MET:HE1	1:D:379:SER:HB3	1.97	0.45
1:A:272:MET:HE1	1:A:379:SER:HB3	1.99	0.45
1:C:56:THR:HG22	1:C:88:ARG:HH12	1.82	0.45
1:D:180:GLU:O	1:D:183:ASP:HB2	2.15	0.45
1:A:469:GLU:O	1:A:473:ILE:HG23	2.16	0.44
1:A:53:ARG:HG2	1:A:55:LYS:HG3	1.99	0.44
1:A:180:GLU:O	1:A:183:ASP:HB2	2.16	0.44
1:C:293:CYS:O	4:C:1003:GOL:H31	2.18	0.44
1:B:270:LYS:HA	1:B:323:VAL:O	2.18	0.44
1:A:296:PRO:HD3	1:A:324:ALA:HB3	1.98	0.44
1:D:217:VAL:HG21	1:D:219:ILE:HD11	2.00	0.44
1:D:270:LYS:HA	1:D:323:VAL:O	2.18	0.44
1:A:380:TYR:CD2	1:C:376:ILE:HG23	2.52	0.43
1:B:296:PRO:HD3	1:B:324:ALA:HB3	2.00	0.43
1:D:381:MET:HE3	6:D:1105:HOH:O	2.17	0.43
1:A:460:LEU:HD22	1:A:464:LEU:HD11	2.01	0.43
1:A:460:LEU:CD2	1:A:464:LEU:HD11	2.47	0.43
1:D:296:PRO:HD3	1:D:324:ALA:HB3	1.99	0.43
1:B:212:ALA:HB1	1:B:217:VAL:CG2	2.49	0.43
1:B:135:PHE:CE2	1:B:142:LEU:HD21	2.54	0.43
1:C:296:PRO:HD3	1:C:324:ALA:HB3	2.01	0.43
1:D:113:ASN:HD21	1:D:168:ILE:N	2.14	0.42
1:B:298:ASN:ND2	4:B:1003:GOL:H12	2.34	0.42
1:A:270:LYS:HA	1:A:323:VAL:O	2.19	0.42
1:B:162:HIS:H	1:B:162:HIS:HD2	1.67	0.42
1:B:484:LEU:O	1:B:485:ALA:HB3	2.19	0.42
1:D:460:LEU:HD13	1:D:464:LEU:CD1	2.49	0.42
1:C:470:LEU:HA	1:C:473:ILE:CD1	2.49	0.42
1:D:217:VAL:HG22	1:D:219:ILE:HG13	2.00	0.42
1:C:270:LYS:HA	1:C:323:VAL:O	2.19	0.42
1:A:484:LEU:HD11	1:D:466:ILE:CG2	2.47	0.42
1:A:255:ALA:HB2	1:A:376:ILE:HD12	2.01	0.42
1:B:466:ILE:HG21	1:C:484:LEU:HD11	2.02	0.41
1:A:272:MET:HE3	6:A:1101:HOH:O	2.19	0.41
1:C:390:ASN:HB2	6:D:1146:HOH:O	2.20	0.41
1:C:484:LEU:O	1:C:485:ALA:HB3	2.20	0.41
1:A:466:ILE:CG2	1:D:484:LEU:HD11	2.46	0.41
1:A:484:LEU:CD1	1:D:466:ILE:HG21	2.51	0.41
1:C:53:ARG:HG2	1:C:55:LYS:O	2.21	0.41
1:D:217:VAL:CG2	1:D:219:ILE:CD1	2.99	0.40
1:C:462:ARG:O	1:C:465:GLU:HB2	2.21	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:458:VAL:HG13	1:D:459:ARG:N	2.37	0.40
1:D:484:LEU:O	1:D:485:ALA:HB3	2.21	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	460/507 (91%)	449 (98%)	10 (2%)	1 (0%)	47	56
1	B	440/507 (87%)	431 (98%)	8 (2%)	1 (0%)	47	56
1	C	440/507 (87%)	432 (98%)	8 (2%)	0	100	100
1	D	457/507 (90%)	449 (98%)	8 (2%)	0	100	100
All	All	1797/2028 (89%)	1761 (98%)	34 (2%)	2 (0%)	51	63

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	24	VAL
1	A	53	ARG

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	387/422 (92%)	365 (94%)	22 (6%)	20	22
1	B	372/422 (88%)	360 (97%)	12 (3%)	39	47
1	C	372/422 (88%)	359 (96%)	13 (4%)	36	44
1	D	378/422 (90%)	365 (97%)	13 (3%)	37	46
All	All	1509/1688 (89%)	1449 (96%)	60 (4%)	31	39

All (60) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	22	ASN
1	A	31	VAL
1	A	55	LYS
1	A	72	GLU
1	A	151	ILE
1	A	162	HIS
1	A	167	THR
1	A	173	ARG
1	A	179	LYS
1	A	199	ASP
1	A	269	VAL
1	A	322	ILE
1	A	345	LYS
1	A	381	MET
1	A	383	ARG
1	A	436	VAL
1	A	445	ARG
1	A	448	ARG
1	A	457	ASP
1	A	458	VAL
1	A	459	ARG
1	A	473	ILE
1	B	21	LEU
1	B	22	ASN
1	B	43	SER
1	B	151	ILE
1	B	162	HIS
1	B	167	THR
1	B	173	ARG
1	B	269	VAL
1	B	322	ILE
1	B	381	MET
1	B	433	VAL

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Mol	Chain	Res	Type
1	B	477	ARG
1	C	32	ASP
1	C	145	LYS
1	C	151	ILE
1	C	167	THR
1	C	179	LYS
1	C	213	LYS
1	C	269	VAL
1	C	381	MET
1	C	417	MET
1	C	420	ASN
1	C	459	ARG
1	C	462	ARG
1	C	473	ILE
1	D	31	VAL
1	D	43	SER
1	D	151	ILE
1	D	167	THR
1	D	206	LEU
1	D	269	VAL
1	D	322	ILE
1	D	365	LYS
1	D	381	MET
1	D	420	ASN
1	D	436	VAL
1	D	463	LYS
1	D	479	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (22) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	162	HIS
1	A	191	ASN
1	A	289	GLN
1	A	315	HIS
1	A	404	HIS
1	A	446	GLN
1	B	162	HIS
1	B	298	ASN
1	B	446	GLN
1	B	474	ASN
1	C	191	ASN

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Mol	Chain	Res	Type
1	C	236	HIS
1	C	329	GLN
1	C	446	GLN
1	D	92	HIS
1	D	113	ASN
1	D	191	ASN
1	D	236	HIS
1	D	291	ASN
1	D	329	GLN
1	D	404	HIS
1	D	446	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 monosaccharides in this entry.

5.6 Ligand geometry [i](#)

13 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
2	JJ5	C	1001	-	17,21,21	1.46	3 (17%)	20,30,30	1.02	1 (5%)
2	JJ5	A	1001	-	17,21,21	1.41	3 (17%)	20,30,30	1.30	3 (15%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	CIT	D	1002	-	3,12,12	0.45	0	3,17,17	0.70	0
2	JJ5	D	1001	-	17,21,21	1.57	5 (29%)	20,30,30	1.34	3 (15%)
4	GOL	B	1003	-	5,5,5	0.11	0	5,5,5	0.25	0
5	SEP	A	1004	-	7,10,10	0.86	0	8,14,14	0.64	0
3	CIT	C	1002	-	3,12,12	0.43	0	3,17,17	0.81	0
4	GOL	C	1003	-	5,5,5	0.10	0	5,5,5	0.46	0
4	GOL	A	1003	-	5,5,5	0.10	0	5,5,5	0.28	0
3	CIT	A	1002	-	3,12,12	0.38	0	3,17,17	1.61	1 (33%)
4	GOL	D	1003	-	5,5,5	0.08	0	5,5,5	0.31	0
3	CIT	B	1002	-	3,12,12	0.58	0	3,17,17	0.59	0
2	JJ5	B	1001	-	17,21,21	1.54	4 (23%)	20,30,30	1.37	3 (15%)

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	JJ5	C	1001	-	-	0/4/14/14	0/2/3/3
2	JJ5	A	1001	-	-	0/4/14/14	0/2/3/3
3	CIT	D	1002	-	-	3/6/16/16	-
2	JJ5	D	1001	-	-	0/4/14/14	0/2/3/3
4	GOL	B	1003	-	-	4/4/4/4	-
5	SEP	A	1004	-	-	4/6/10/10	-
3	CIT	C	1002	-	-	1/6/16/16	-
4	GOL	C	1003	-	-	4/4/4/4	-
4	GOL	A	1003	-	-	0/4/4/4	-
3	CIT	A	1002	-	-	0/6/16/16	-
4	GOL	D	1003	-	-	0/4/4/4	-
3	CIT	B	1002	-	-	0/6/16/16	-
2	JJ5	B	1001	-	-	0/4/14/14	0/2/3/3

All (15) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	1001	JJ5	C7-CL1	3.42	1.81	1.73
2	A	1001	JJ5	C12-N1	3.29	1.36	1.28
2	B	1001	JJ5	C7-CL1	3.27	1.81	1.73
2	C	1001	JJ5	C12-N1	3.22	1.36	1.28
2	C	1001	JJ5	C7-CL1	3.17	1.81	1.73
2	D	1001	JJ5	C12-N1	3.00	1.35	1.28

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	1001	JJ5	C8-CL	2.91	1.80	1.73
2	B	1001	JJ5	C12-N1	2.89	1.35	1.28
2	C	1001	JJ5	C8-CL	2.60	1.79	1.73
2	A	1001	JJ5	C7-CL1	2.15	1.78	1.73
2	A	1001	JJ5	C8-CL	2.11	1.78	1.73
2	D	1001	JJ5	C2-N	-2.10	1.35	1.38
2	D	1001	JJ5	C13-N1	-2.06	1.34	1.38
2	B	1001	JJ5	C13-N1	-2.05	1.34	1.38
2	D	1001	JJ5	C8-CL	2.04	1.78	1.73

All (11) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	1001	JJ5	C5-C4-N	-3.20	107.59	112.40
2	B	1001	JJ5	C5-C4-N	-2.95	107.97	112.40
2	C	1001	JJ5	C5-C4-N	-2.95	107.97	112.40
3	A	1002	CIT	C3-C2-C1	2.69	119.29	114.98
2	A	1001	JJ5	C7-C6-C5	-2.51	118.74	120.46
2	A	1001	JJ5	C2-N-C1	2.50	112.78	107.59
2	B	1001	JJ5	C9-C8-CL	2.40	123.23	118.41
2	D	1001	JJ5	C6-C7-CL1	2.30	122.20	118.49
2	B	1001	JJ5	C6-C7-CL1	2.21	122.06	118.49
2	A	1001	JJ5	C6-C7-CL1	2.14	121.94	118.49
2	D	1001	JJ5	C2-N-C1	2.10	111.96	107.59

There are no chirality outliers.

All (16) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	D	1002	CIT	C2-C3-C4-C5
3	D	1002	CIT	C6-C3-C4-C5
4	C	1003	GOL	O1-C1-C2-O2
4	C	1003	GOL	O1-C1-C2-C3
4	C	1003	GOL	C1-C2-C3-O3
5	A	1004	SEP	N-CA-CB-OG
5	A	1004	SEP	CB-OG-P-O2P
5	A	1004	SEP	CB-OG-P-O3P
3	D	1002	CIT	O7-C3-C4-C5
4	B	1003	GOL	O1-C1-C2-C3
4	B	1003	GOL	C1-C2-C3-O3
5	A	1004	SEP	CB-OG-P-O1P
4	C	1003	GOL	O2-C2-C3-O3

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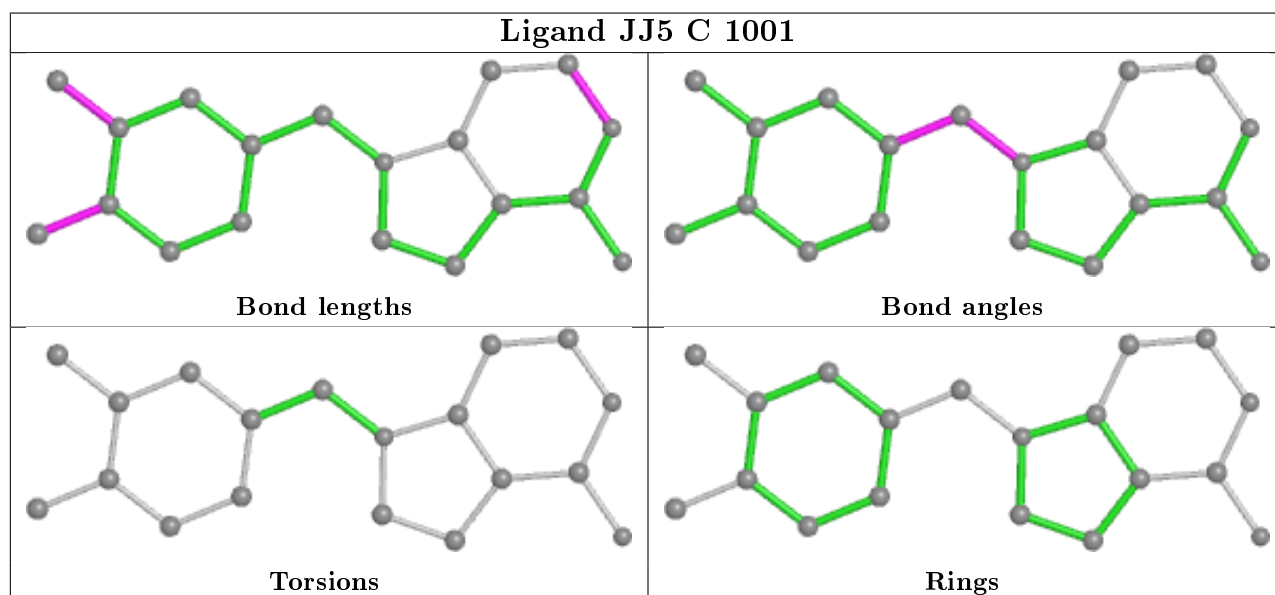
Mol	Chain	Res	Type	Atoms
4	B	1003	GOL	O2-C2-C3-O3
3	C	1002	CIT	C1-C2-C3-C6
4	B	1003	GOL	O1-C1-C2-O2

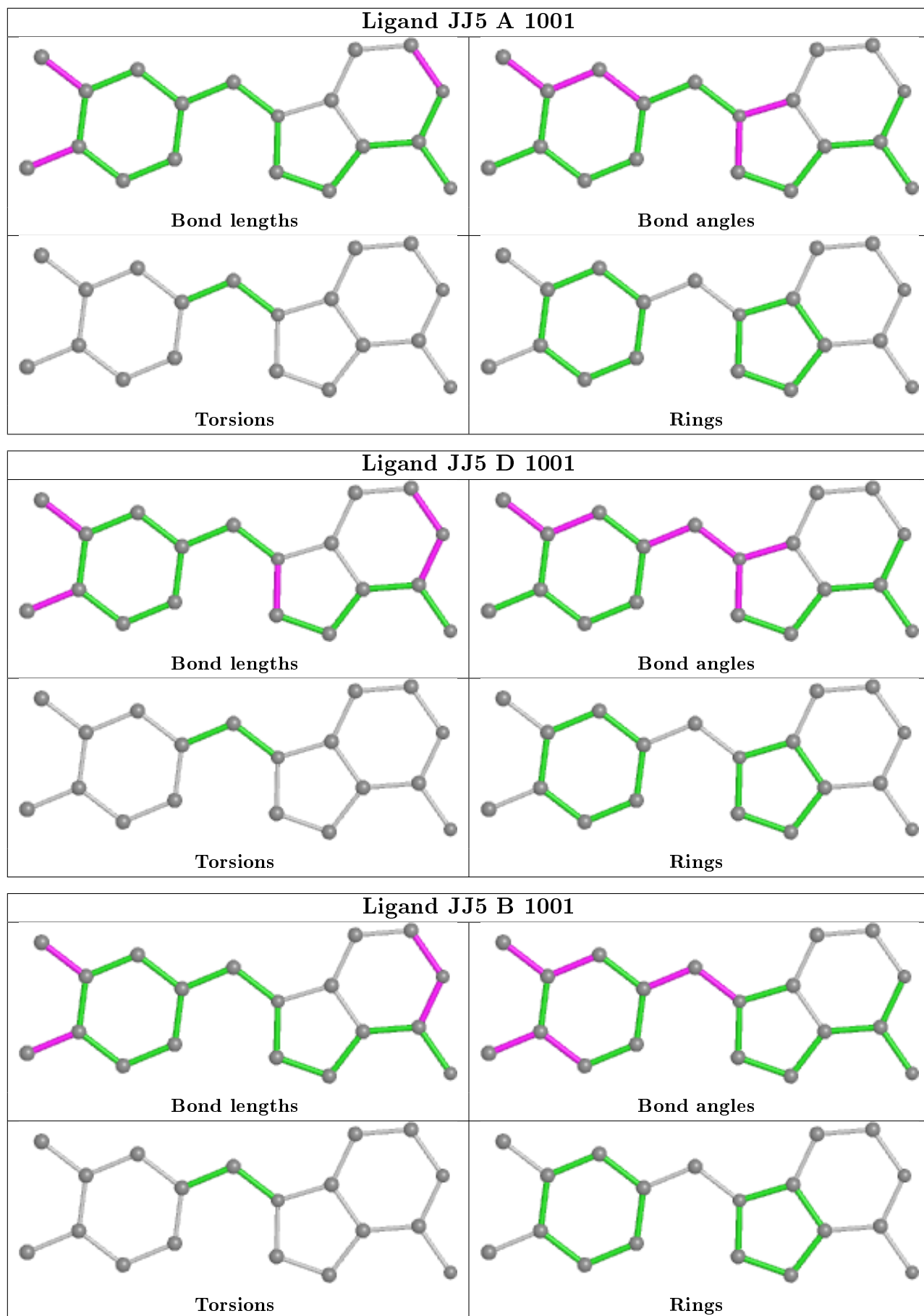
There are no ring outliers.

2 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	1003	GOL	2	0
4	C	1003	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	464/507 (91%)	0.36	24 (5%) 27 39	45, 65, 114, 166	0
1	B	446/507 (87%)	0.42	20 (4%) 33 46	46, 70, 105, 148	0
1	C	446/507 (87%)	0.45	17 (3%) 40 53	48, 70, 110, 140	0
1	D	461/507 (90%)	0.39	23 (4%) 28 41	44, 66, 109, 132	0
All	All	1817/2028 (89%)	0.40	84 (4%) 32 45	44, 68, 111, 166	0

All (84) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	19	ALA	5.4
1	C	71	SER	4.5
1	D	458	VAL	4.4
1	B	21	LEU	4.3
1	A	485	ALA	4.1
1	B	52	PHE	4.0
1	A	341	SER	3.9
1	C	485	ALA	3.7
1	A	457	ASP	3.7
1	D	463	LYS	3.6
1	C	346	LEU	3.6
1	A	344	LYS	3.6
1	A	19	ALA	3.6
1	B	217	VAL	3.5
1	A	346	LEU	3.5
1	A	54	ASP	3.5
1	C	459	ARG	3.4
1	B	87	ALA	3.3
1	C	458	VAL	3.3
1	B	54	ASP	3.3
1	A	483	GLU	3.3

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Mol	Chain	Res	Type	RSRZ
1	A	480	LEU	3.2
1	A	343	ASN	3.2
1	D	467	ARG	3.1
1	B	142	LEU	3.0
1	A	50	THR	3.0
1	B	459	ARG	3.0
1	D	464	LEU	3.0
1	A	342	GLY	3.0
1	C	70	SER	2.9
1	A	329	GLN	2.9
1	A	340	ALA	2.9
1	B	219	ILE	2.9
1	B	174	GLY	2.9
1	C	54	ASP	2.8
1	A	174	GLY	2.8
1	D	457	ASP	2.8
1	D	210	GLN	2.8
1	B	22	ASN	2.8
1	A	459	ARG	2.7
1	B	485	ALA	2.7
1	C	380	TYR	2.7
1	D	217	VAL	2.7
1	C	69	PRO	2.6
1	B	44	LYS	2.6
1	D	52	PHE	2.6
1	A	56	THR	2.5
1	B	53	ARG	2.4
1	C	72	GLU	2.4
1	D	67	ASP	2.4
1	B	36	GLY	2.3
1	C	95	PRO	2.3
1	D	148	GLN	2.3
1	B	467	ARG	2.3
1	C	283	ALA	2.2
1	B	332	GLY	2.2
1	D	456	SER	2.2
1	B	38	ASP	2.2
1	D	218	ASP	2.2
1	D	477	ARG	2.2
1	B	39	TYR	2.2
1	A	72	GLU	2.2
1	D	485	ALA	2.2

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Mol	Chain	Res	Type	RSRZ
1	B	473	ILE	2.2
1	C	460	LEU	2.2
1	C	249	VAL	2.2
1	D	380	TYR	2.1
1	D	459	ARG	2.1
1	C	384	ALA	2.1
1	D	483	GLU	2.1
1	A	484	LEU	2.1
1	D	365	LYS	2.1
1	D	214	ARG	2.1
1	C	269	VAL	2.1
1	D	35	PRO	2.1
1	A	486	LYS	2.1
1	A	370	ASP	2.1
1	C	466	ILE	2.0
1	D	476	ASN	2.0
1	D	461	ALA	2.0
1	A	479	ARG	2.0
1	B	90	ARG	2.0
1	A	380	TYR	2.0
1	A	477	ARG	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 monosaccharides 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.

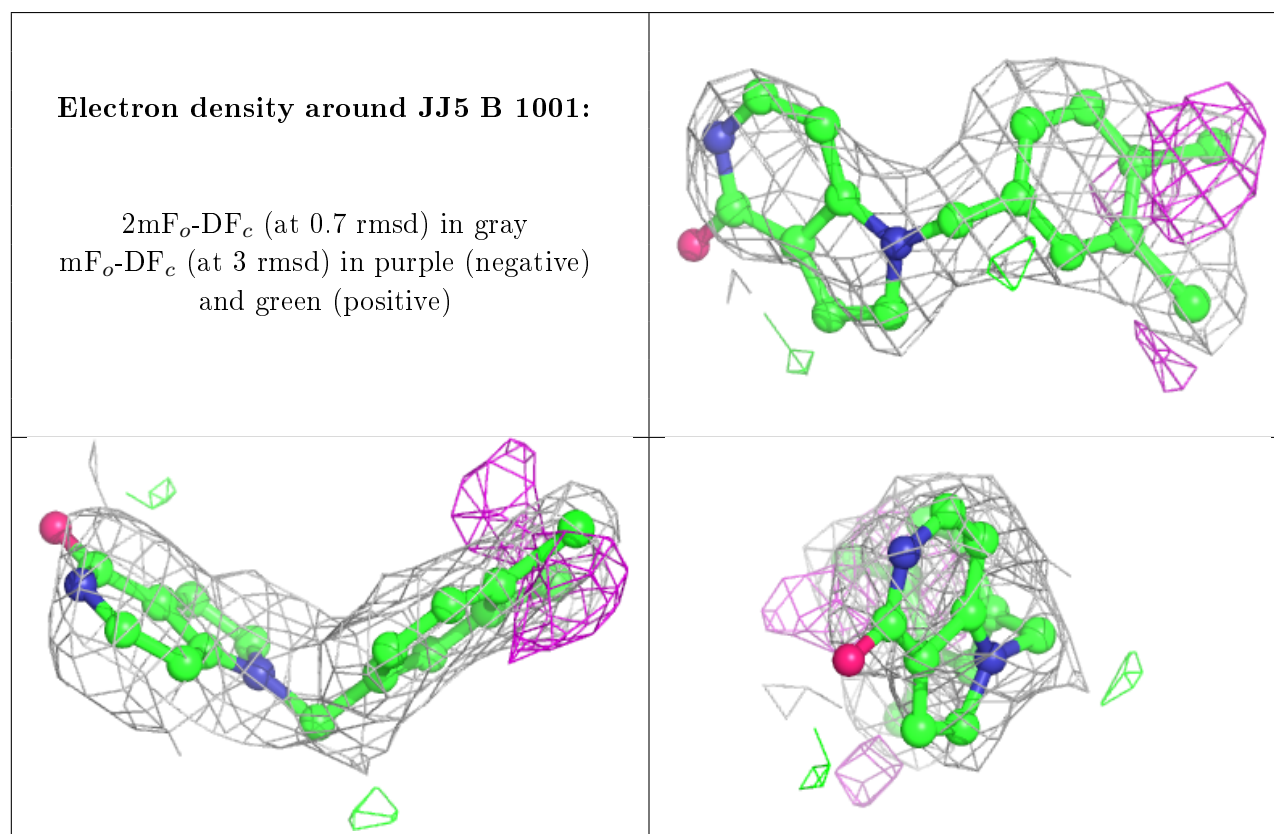
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
5	SEP	A	1004	11/11	0.64	0.31	100,104,115,120	0
2	JJ5	B	1001	19/19	0.74	0.29	84,103,122,128	0

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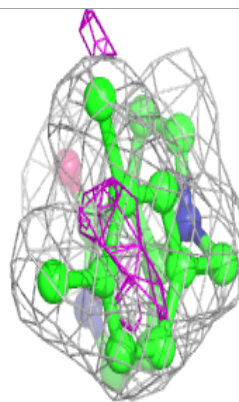
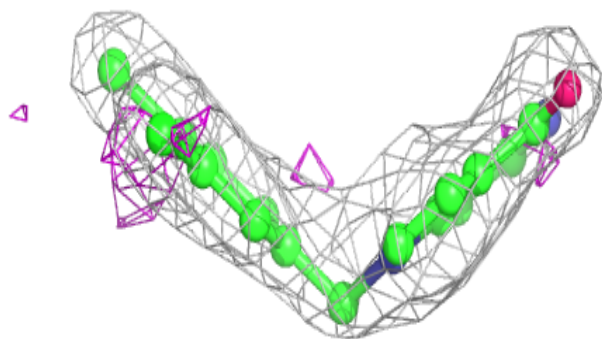
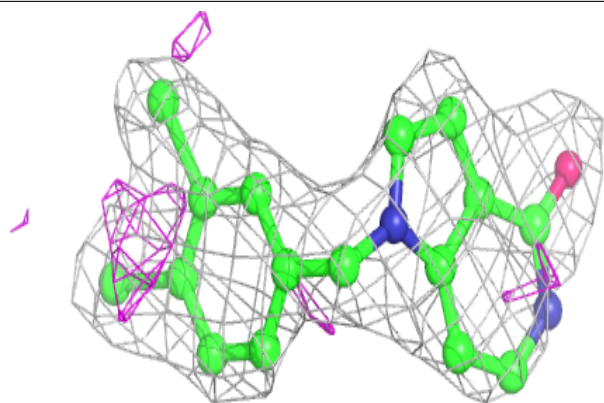
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
3	CIT	C	1002	13/13	0.83	0.18	81,87,111,113	0
2	JJ5	C	1001	19/19	0.86	0.19	81,93,102,102	0
3	CIT	B	1002	13/13	0.86	0.16	73,90,100,114	0
4	GOL	B	1003	6/6	0.88	0.19	60,64,69,73	0
3	CIT	D	1002	13/13	0.88	0.20	70,79,89,103	0
3	CIT	A	1002	13/13	0.92	0.24	64,73,94,101	0
2	JJ5	A	1001	19/19	0.93	0.12	56,63,73,74	0
2	JJ5	D	1001	19/19	0.93	0.14	62,67,80,80	0
4	GOL	C	1003	6/6	0.95	0.14	59,63,65,66	0
4	GOL	D	1003	6/6	0.96	0.16	50,51,55,63	0
4	GOL	A	1003	6/6	0.97	0.12	57,59,62,70	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.

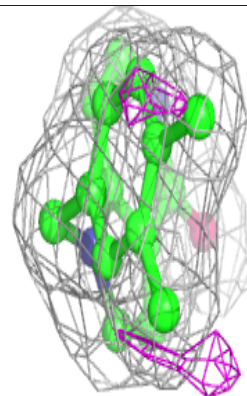
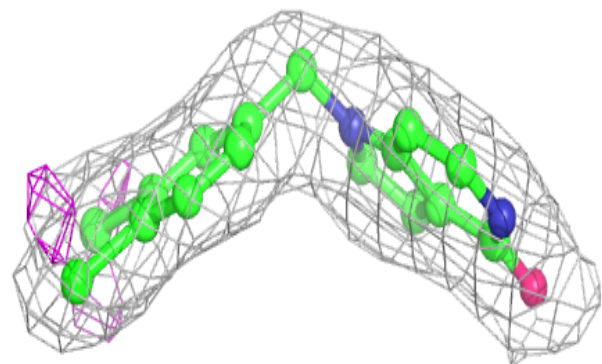
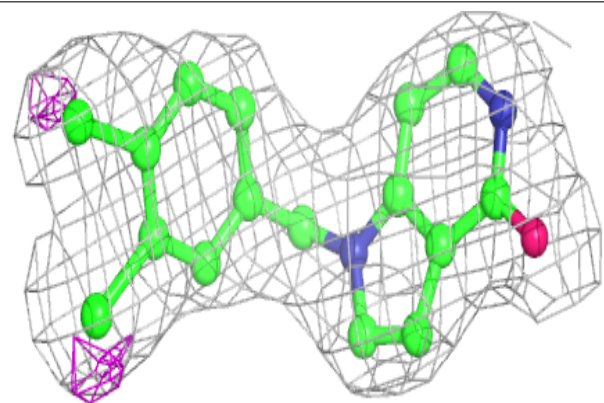


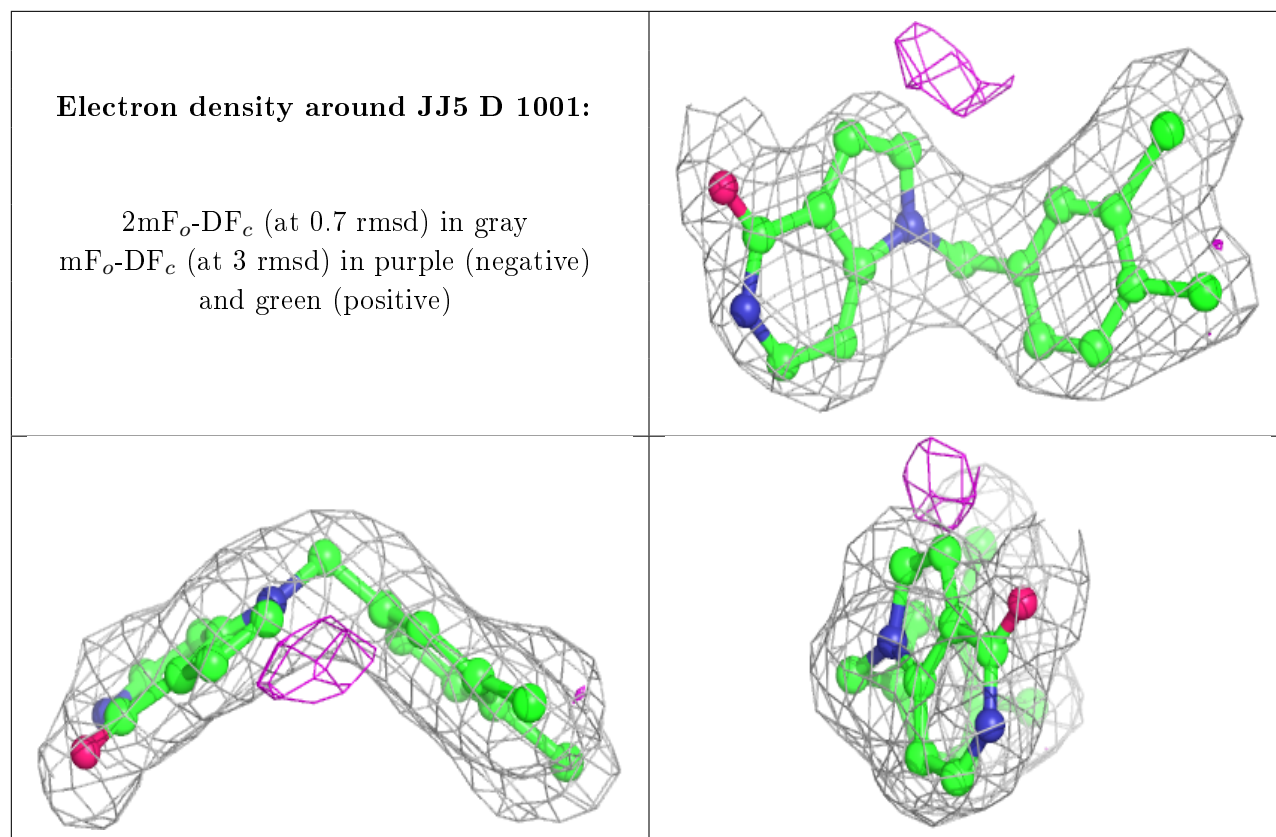
Electron density around JJ5 C 1001:

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

**Electron density around JJ5 A 1001:**

$2mF_o-DF_c$ (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.