



# Full wwPDB X-ray Structure Validation Report ⓘ

Jun 23, 2024 – 04:48 AM EDT

PDB ID : 6QU4  
Title : Crystal Structure of Phosphofructokinase from Trypanosoma brucei in complex with an allosteric inhibitor ctcb405  
Authors : McNae, I.W.; Dornan, J.; Walkinshaw, M.D.  
Deposited on : 2019-02-26  
Resolution : 2.75 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](mailto: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>.

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The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity	:	4.02b-467
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.20.1
EDS	:	2.37.1
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)	:	2.37.1

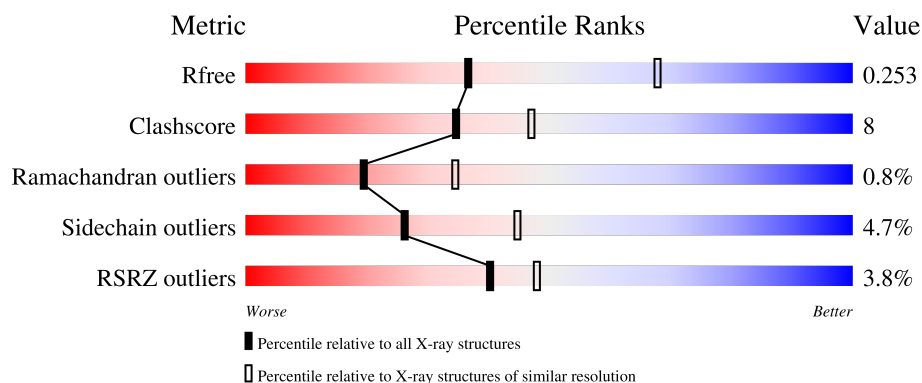
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.75 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	1235 (2.78-2.74)
Clashscore	141614	1277 (2.78-2.74)
Ramachandran outliers	138981	1257 (2.78-2.74)
Sidechain outliers	138945	1257 (2.78-2.74)
RSRZ outliers	127900	1207 (2.78-2.74)

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  $\geq 3$ , 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

There are 5 unique types of molecules in this entry. The entry contains 14089 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
1	A	456	Total	C	N	O	S	0	0	0
			3503	2191	641	654	17			
1	B	439	Total	C	N	O	S	0	0	0
			3387	2124	619	628	16			
1	C	461	Total	C	N	O	S	0	0	0
			3570	2237	652	664	17			
1	D	439	Total	C	N	O	S	0	0	0
			3385	2119	619	631	16			

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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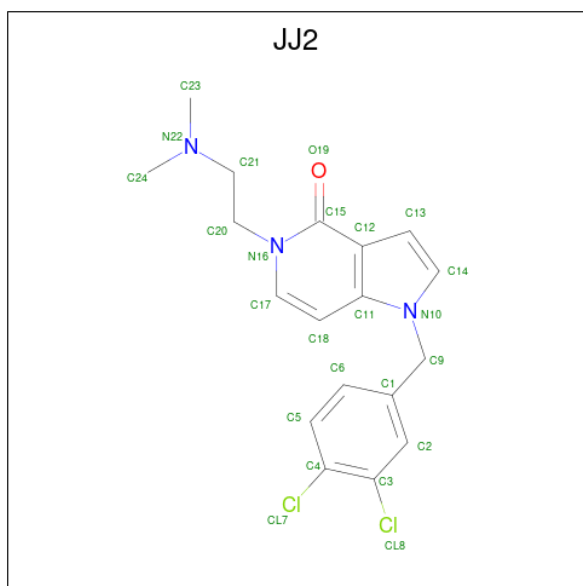
Chain	Residue	Modelled	Actual	Comment	Reference
B	-18	GLY	-	expression tag	UNP O15648
B	-17	SER	-	expression tag	UNP O15648
B	-16	SER	-	expression tag	UNP O15648
B	-15	HIS	-	expression tag	UNP O15648
B	-14	HIS	-	expression tag	UNP O15648
B	-13	HIS	-	expression tag	UNP O15648
B	-12	HIS	-	expression tag	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]-5-[2-(dimethylamino)ethyl]pyrrolo[3,2-c]pyridine-4-one (three-letter code: JJ2) (formula: C<sub>18</sub>H<sub>19</sub>Cl<sub>2</sub>N<sub>3</sub>O).



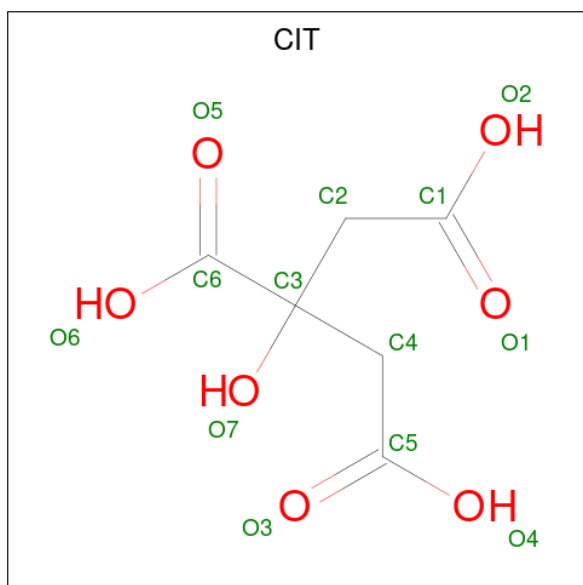
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	Cl	N	O	0
			24	18	2	3	1	
2	B	1	Total	C	Cl	N	O	0
			24	18	2	3	1	

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	C	1	Total	C	Cl	N	O	0	0
			24	18	2	3	1		
2	D	1	Total	C	Cl	N	O	0	0
			24	18	2	3	1		

- Molecule 3 is CITRIC ACID (three-letter code: CIT) (formula:  $C_6H_8O_7$ ).



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:  $C_3H_8O_3$ ).



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		

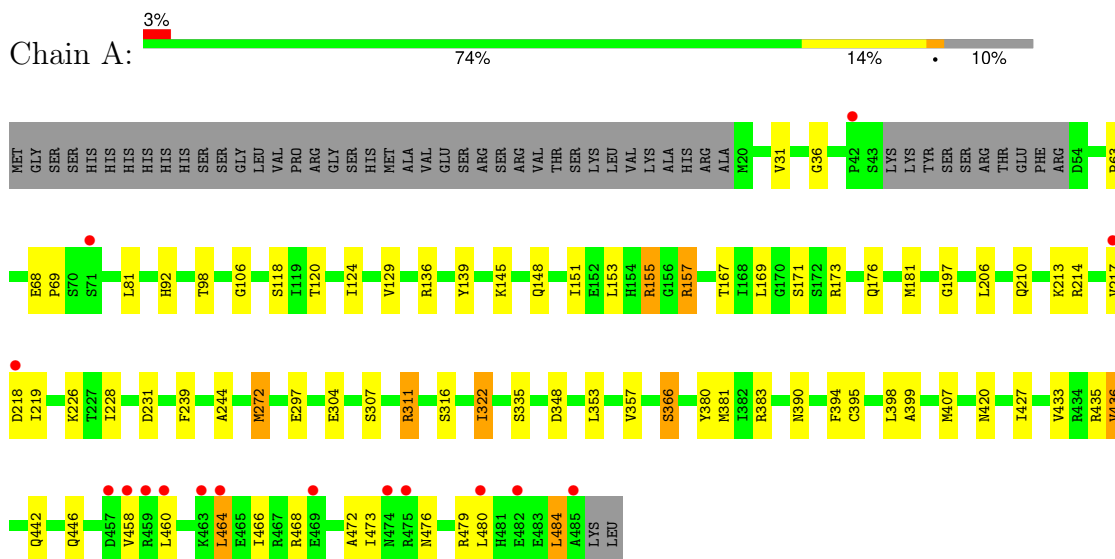
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	24	Total	O	0	0
			24	24		
5	B	22	Total	O	0	0
			22	22		
5	C	14	Total	O	0	0
			14	14		
5	D	12	Total	O	0	0
			12	12		

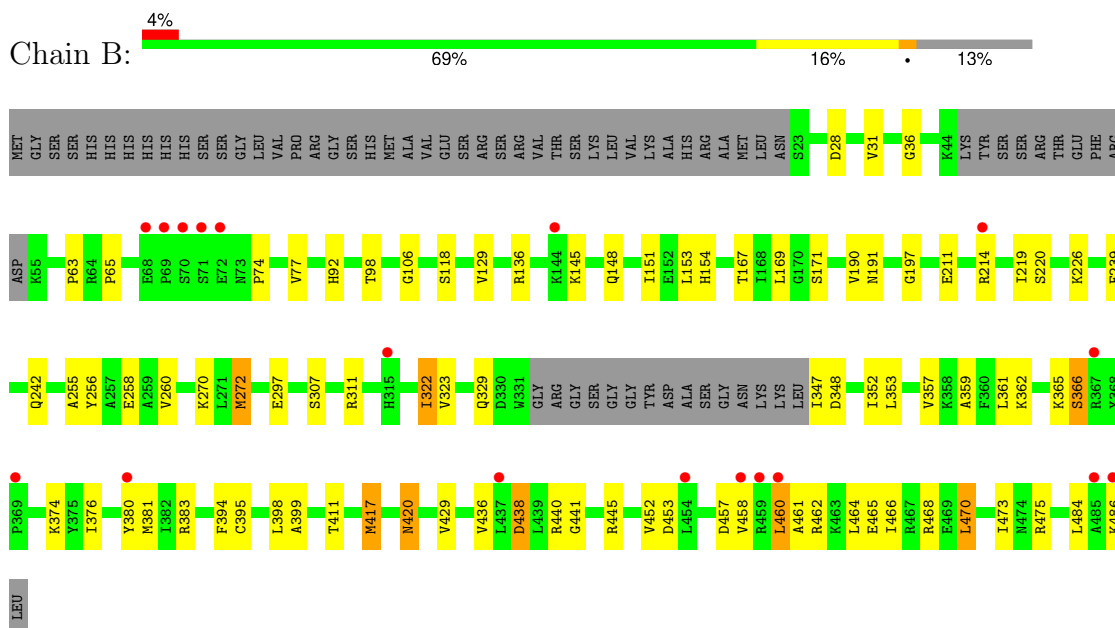
### 3 Residue-property plots [i](#)

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

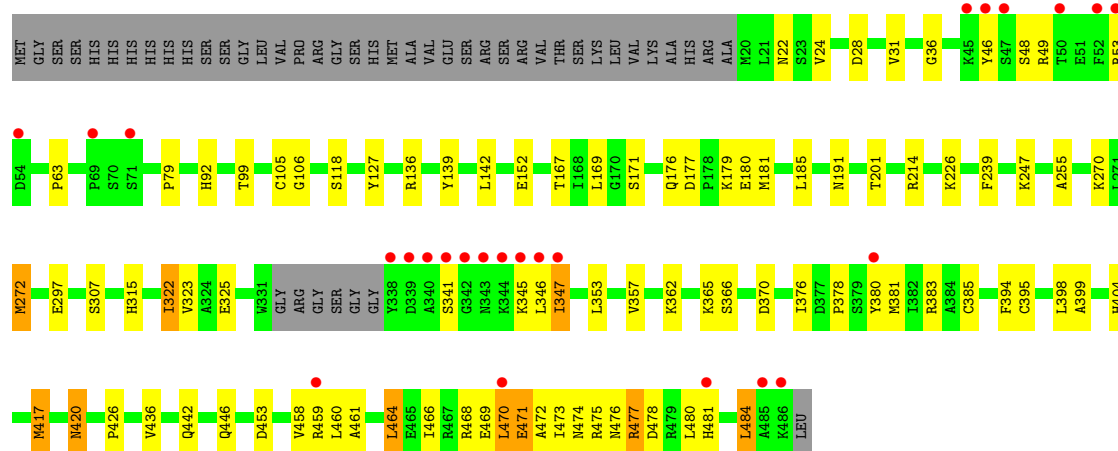
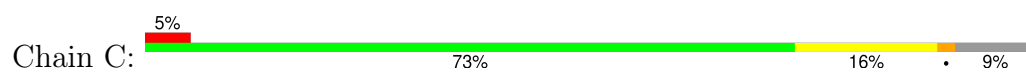


- Molecule 1: ATP-dependent 6-phosphofructokinase

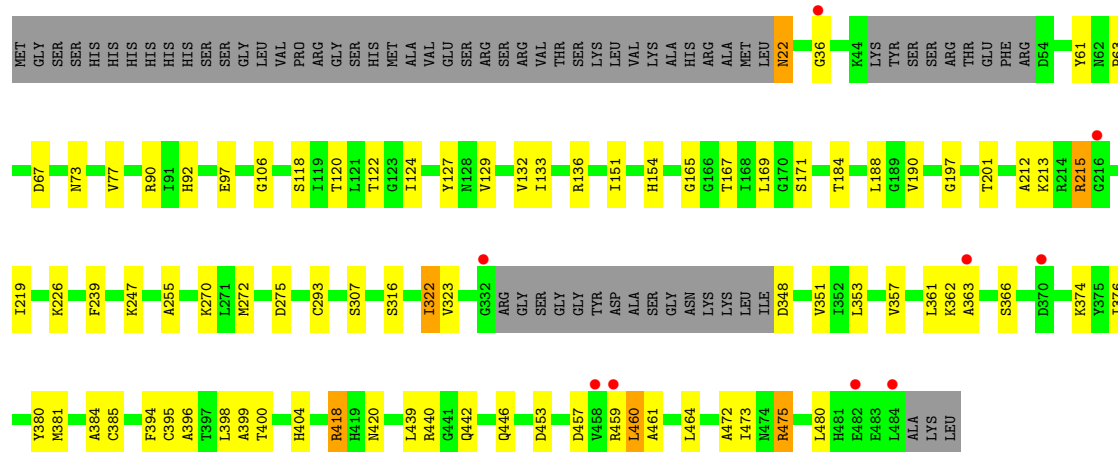


- Molecule 1: ATP-dependent 6-phosphofructokinase





- Molecule 1: ATP-dependent 6-phosphofructokinase



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	150.58Å 165.09Å 83.38Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.02 – 2.75 48.02 – 2.75	Depositor EDS
% Data completeness (in resolution range)	93.0 (48.02-2.75) 93.0 (48.02-2.75)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.73 (at 2.77Å)	Xtriage
Refinement program	REFMAC 5.8.0241	Depositor
R, $R_{free}$	0.218 , 0.257 0.215 , 0.253	Depositor DCC
$R_{free}$ test set	2503 reflections (4.91%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	41.6	Xtriage
Anisotropy	1.172	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.32 , 33.2	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.30$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	14089	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	62.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.25% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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, JJ2

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	0.68	0/3562	0.82	0/4821
1	B	0.66	0/3444	0.80	0/4662
1	C	0.67	0/3631	0.81	0/4912
1	D	0.67	0/3442	0.84	0/4660
All	All	0.67	0/14079	0.82	0/19055

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	D	0	1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	D	363	ALA	Peptide

### 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	3503	0	3541	56	0
1	B	3387	0	3437	77	0
1	C	3570	0	3617	73	0
1	D	3385	0	3421	54	0
2	A	24	0	0	0	0
2	B	24	0	0	0	0
2	C	24	0	0	0	0
2	D	24	0	0	0	0
3	A	13	0	5	1	0
3	B	13	0	5	0	0
3	C	13	0	5	1	0
3	D	13	0	5	1	0
4	A	6	0	8	0	0
4	B	6	0	8	0	0
4	C	6	0	8	0	0
4	D	6	0	8	1	0
5	A	24	0	0	1	0
5	B	22	0	0	0	0
5	C	14	0	0	0	0
5	D	12	0	0	0	0
All	All	14089	0	14068	232	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 8.

All (232) 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:B:417:MET:HE1	1:B:420:ASN:HA	1.22	1.16
1:C:417:MET:HE1	1:C:420:ASN:HA	1.21	1.11
1:C:49:ARG:HA	1:D:440:ARG:HH22	1.14	1.08
1:B:329:GLN:OE1	1:B:347:ILE:CG2	2.15	0.94
1:C:63:PRO:HB3	1:D:63:PRO:HB3	1.51	0.92
1:A:468:ARG:NH2	1:B:129:VAL:O	2.04	0.90
1:D:457:ASP:HB3	1:D:460:LEU:HD22	1.52	0.89
1:A:466:ILE:HG21	1:C:484:LEU:HD11	1.56	0.88
1:C:417:MET:CE	1:C:420:ASN:HA	2.06	0.83
1:B:417:MET:CE	1:B:420:ASN:HA	2.06	0.83
1:C:476:ASN:O	1:C:480:LEU:HD13	1.79	0.82
1:C:99:THR:H	1:C:191:ASN:ND2	1.81	0.78
1:B:417:MET:HE1	1:B:420:ASN:CA	2.09	0.77
1:C:417:MET:HE1	1:C:420:ASN:CA	2.09	0.77

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:460:LEU:HD23	1:D:461:ALA:N	2.00	0.77
1:B:329:GLN:OE1	1:B:347:ILE:HG21	1.84	0.77
1:A:484:LEU:HD11	1:C:466:ILE:HG21	1.68	0.75
1:B:220:SER:HA	1:B:411:THR:OG1	1.86	0.75
1:C:460:LEU:HD12	1:C:461:ALA:N	2.03	0.74
1:C:315:HIS:HD2	1:C:458:VAL:HG22	1.54	0.73
1:B:190:VAL:O	1:B:219:ILE:HD11	1.89	0.73
1:B:359:ALA:HB2	1:C:341:SER:HB3	1.70	0.73
1:A:272:MET:HE1	1:A:383:ARG:HG3	1.71	0.72
1:B:258:GLU:OE2	1:C:383:ARG:NH2	2.21	0.72
1:B:473:ILE:HG23	1:D:473:ILE:HG23	1.72	0.72
1:D:122:THR:OG1	1:D:400:THR:HG22	1.90	0.72
1:C:471:GLU:O	1:C:475:ARG:HG3	1.90	0.72
1:D:212:ALA:O	1:D:215:ARG:O	2.08	0.71
1:A:206:LEU:HD23	1:A:427:ILE:HG22	1.72	0.71
1:C:99:THR:H	1:C:191:ASN:HD22	1.39	0.70
1:B:272:MET:HE1	1:B:383:ARG:HG3	1.74	0.70
1:C:48:SER:O	1:D:440:ARG:NH2	2.25	0.69
1:B:190:VAL:O	1:B:219:ILE:CD1	2.41	0.68
1:B:357:VAL:O	1:B:361:LEU:HD22	1.94	0.68
1:C:22:ASN:HD22	1:C:24:VAL:HG12	1.58	0.67
1:A:124:ILE:HD12	1:B:468:ARG:NE	2.10	0.67
1:B:357:VAL:O	1:B:361:LEU:CD2	2.43	0.67
1:D:357:VAL:O	1:D:361:LEU:CD2	2.43	0.67
1:D:357:VAL:O	1:D:361:LEU:HD23	1.94	0.66
1:C:181:MET:O	1:C:185:LEU:HD12	1.97	0.65
1:D:61:TYR:O	1:D:418:ARG:NH1	2.29	0.65
1:B:438:ASP:OD1	1:B:441:GLY:N	2.31	0.64
1:A:98:THR:HG21	1:A:407:MET:HE1	1.79	0.64
1:C:315:HIS:CD2	1:C:458:VAL:HG22	2.32	0.64
1:C:466:ILE:HG22	1:C:470:LEU:CD1	2.28	0.63
1:D:460:LEU:HD23	1:D:461:ALA:H	1.61	0.63
1:B:348:ASP:O	1:B:352:ILE:HD13	1.98	0.62
1:B:464:LEU:HD12	1:B:464:LEU:H	1.64	0.62
1:A:460:LEU:C	1:A:460:LEU:HD23	2.20	0.62
1:B:329:GLN:OE1	1:B:347:ILE:HG22	1.99	0.62
1:A:206:LEU:HD23	1:A:427:ILE:CG2	2.30	0.61
1:C:46:TYR:OH	1:C:53:ARG:N	2.33	0.61
1:B:98:THR:HA	1:B:191:ASN:OD1	2.01	0.61
1:A:484:LEU:HD12	1:A:484:LEU:H	1.66	0.60
1:D:293:CYS:O	4:D:1003:GOL:H12	2.01	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:472:ALA:HB1	1:D:154:HIS:CE1	2.36	0.60
1:A:129:VAL:O	1:B:468:ARG:NH1	2.34	0.60
1:C:22:ASN:ND2	1:C:24:VAL:HG12	2.16	0.60
1:C:272:MET:HE2	1:C:272:MET:HA	1.83	0.60
1:B:362:LYS:O	1:B:365:LYS:HG3	2.02	0.59
1:B:211:GLU:HA	1:B:214:ARG:NH1	2.17	0.59
1:B:272:MET:HE1	1:B:383:ARG:CG	2.32	0.59
1:A:272:MET:CE	1:A:383:ARG:HG3	2.32	0.58
1:D:190:VAL:O	1:D:219:ILE:CD1	2.52	0.57
1:B:466:ILE:HG22	1:B:470:LEU:CD1	2.34	0.57
1:C:49:ARG:HA	1:D:440:ARG:NH2	2.00	0.57
1:A:98:THR:HG21	1:A:407:MET:CE	2.35	0.56
1:C:477:ARG:HG3	1:C:478:ASP:N	2.19	0.56
1:B:311:ARG:HD2	1:B:458:VAL:HG21	1.88	0.55
1:D:212:ALA:CB	1:D:219:ILE:HG21	2.36	0.55
1:A:155:ARG:NH2	1:B:465:GLU:HA	2.22	0.55
1:C:466:ILE:HG22	1:C:470:LEU:HD11	1.89	0.54
1:B:258:GLU:HG2	1:B:374:LYS:HG3	1.88	0.54
1:C:127:TYR:OH	1:C:404:HIS:HD2	1.91	0.54
1:C:353:LEU:O	1:C:357:VAL:HG23	2.08	0.54
1:D:247:LYS:HE3	1:D:385:CYS:SG	2.47	0.54
1:B:460:LEU:HD13	1:B:461:ALA:N	2.22	0.54
1:A:353:LEU:O	1:A:357:VAL:HG23	2.08	0.53
1:A:460:LEU:HD23	1:A:464:LEU:HD21	1.89	0.53
1:B:380:TYR:CB	1:C:376:ILE:HG12	2.38	0.53
1:C:152:GLU:HG3	1:D:475:ARG:NE	2.23	0.53
1:A:157:ARG:O	1:A:157:ARG:HD3	2.08	0.53
1:C:471:GLU:HA	1:C:474:ASN:ND2	2.24	0.53
1:D:353:LEU:O	1:D:357:VAL:HG23	2.09	0.53
1:B:460:LEU:HD13	1:B:460:LEU:C	2.30	0.52
1:B:28:ASP:HB3	1:B:429:VAL:CG2	2.40	0.52
1:C:477:ARG:HE	1:C:481:HIS:CD2	2.27	0.52
1:A:217:VAL:HG23	1:A:219:ILE:HD13	1.90	0.52
1:D:127:TYR:OH	1:D:404:HIS:HD2	1.92	0.52
1:A:81:LEU:HD21	1:B:74:PRO:HG3	1.92	0.51
1:B:353:LEU:O	1:B:357:VAL:HG23	2.10	0.51
1:C:475:ARG:O	1:C:478:ASP:OD1	2.29	0.51
1:C:460:LEU:O	1:C:464:LEU:HD12	2.10	0.51
1:D:396:ALA:O	1:D:400:THR:HG23	2.09	0.51
1:A:272:MET:HE1	1:A:383:ARG:CG	2.41	0.51
1:A:390:ASN:ND2	1:B:242:GLN:OE1	2.43	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:472:ALA:HB1	1:B:154:HIS:CE1	2.45	0.51
1:C:49:ARG:CA	1:D:440:ARG:HH22	2.04	0.51
1:B:460:LEU:O	1:B:464:LEU:HD12	2.11	0.50
1:A:173:ARG:HH12	3:A:1002:CIT:C5	2.24	0.50
1:C:139:TYR:HB3	1:C:181:MET:HE2	1.94	0.50
1:C:468:ARG:NH2	1:D:129:VAL:O	2.38	0.50
1:B:376:ILE:HG12	1:C:380:TYR:CB	2.42	0.50
1:B:440:ARG:HG2	1:B:445:ARG:NH2	2.27	0.50
1:A:383:ARG:HD3	5:A:1124:HOH:O	2.11	0.50
1:D:357:VAL:O	1:D:361:LEU:HD22	2.12	0.50
1:B:466:ILE:HG22	1:B:470:LEU:HD11	1.94	0.50
1:B:272:MET:CE	1:B:383:ARG:HG3	2.41	0.49
1:A:476:ASN:HA	1:A:479:ARG:HG2	1.95	0.49
1:D:22:ASN:OD1	1:D:22:ASN:N	2.45	0.49
1:B:272:MET:CE	1:B:383:ARG:CG	2.90	0.49
1:B:28:ASP:HB3	1:B:429:VAL:HG22	1.94	0.49
1:B:466:ILE:HG23	1:D:480:LEU:HD22	1.94	0.49
1:B:220:SER:CA	1:B:411:THR:OG1	2.58	0.49
1:B:255:ALA:HB2	1:B:376:ILE:HD13	1.93	0.49
1:D:255:ALA:HB2	1:D:376:ILE:CD1	2.43	0.49
1:B:118:SER:HB3	1:B:399:ALA:HB3	1.95	0.48
1:D:118:SER:HB3	1:D:399:ALA:HB3	1.95	0.48
1:C:118:SER:HB3	1:C:399:ALA:HB3	1.95	0.48
1:D:132:VAL:C	1:D:133:ILE:HD12	2.34	0.48
1:D:201:THR:OG1	3:D:1002:CIT:O2	2.32	0.48
1:C:466:ILE:HG22	1:C:470:LEU:HD12	1.95	0.48
1:A:476:ASN:O	1:A:480:LEU:HD12	2.14	0.48
1:C:417:MET:CE	1:C:420:ASN:CA	2.82	0.48
1:A:106:GLY:O	1:A:171:SER:OG	2.28	0.47
1:A:473:ILE:HG23	1:C:473:ILE:HG23	1.96	0.47
1:A:176:GLN:HB2	1:A:181:MET:HE2	1.95	0.47
1:C:458:VAL:CG1	1:C:459:ARG:N	2.77	0.47
1:A:118:SER:HB3	1:A:399:ALA:HB3	1.96	0.47
1:D:106:GLY:O	1:D:171:SER:OG	2.28	0.47
1:A:311:ARG:HH11	1:A:311:ARG:HB2	1.80	0.47
1:A:239:PHE:HB2	1:A:395:CYS:SG	2.55	0.47
1:B:106:GLY:O	1:B:171:SER:OG	2.31	0.47
1:A:394:PHE:CE2	1:A:398:LEU:HD11	2.50	0.47
1:B:239:PHE:HB2	1:B:395:CYS:SG	2.55	0.47
1:B:457:ASP:CG	1:B:460:LEU:HB3	2.35	0.47
1:A:155:ARG:CZ	1:B:465:GLU:HA	2.45	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:394:PHE:CE2	1:D:398:LEU:HD11	2.50	0.46
1:B:357:VAL:O	1:B:361:LEU:HD23	2.13	0.46
1:B:417:MET:CE	1:B:420:ASN:CA	2.81	0.46
1:B:394:PHE:CE2	1:B:398:LEU:HD11	2.50	0.46
1:C:46:TYR:O	1:C:49:ARG:HG2	2.14	0.46
1:C:201:THR:OG1	3:C:1002:CIT:O1	2.33	0.46
1:C:442:GLN:HG3	1:C:446:GLN:HE21	1.81	0.46
1:D:184:THR:HG22	1:D:188:LEU:HD12	1.97	0.46
1:A:217:VAL:CG2	1:A:219:ILE:HD13	2.45	0.46
1:A:145:LYS:O	1:A:148:GLN:HG2	2.15	0.46
1:B:145:LYS:O	1:B:148:GLN:HG2	2.16	0.46
1:C:181:MET:O	1:C:185:LEU:CD1	2.63	0.46
1:B:136:ARG:HA	1:B:169:LEU:O	2.16	0.46
1:D:136:ARG:HD3	1:D:151:ILE:HG13	1.97	0.46
1:C:247:LYS:HE3	1:C:385:CYS:SG	2.56	0.46
1:D:239:PHE:HB2	1:D:395:CYS:SG	2.56	0.46
1:B:464:LEU:HD12	1:B:464:LEU:N	2.30	0.45
1:C:239:PHE:HB2	1:C:395:CYS:SG	2.57	0.45
1:A:63:PRO:HB3	1:B:63:PRO:HB3	1.99	0.45
1:C:394:PHE:CE2	1:C:398:LEU:HD11	2.51	0.45
1:D:348:ASP:O	1:D:351:VAL:HG22	2.16	0.45
1:D:442:GLN:HG3	1:D:446:GLN:HE21	1.81	0.45
1:B:255:ALA:HB2	1:B:376:ILE:CD1	2.47	0.45
1:C:255:ALA:HB2	1:C:376:ILE:HD13	1.98	0.44
1:A:272:MET:CE	1:A:383:ARG:CG	2.94	0.44
1:D:472:ALA:HA	1:D:475:ARG:NH2	2.33	0.44
1:C:458:VAL:HG13	1:C:459:ARG:N	2.32	0.44
1:D:255:ALA:HB2	1:D:376:ILE:HD13	1.99	0.44
1:C:469:GLU:O	1:C:473:ILE:HG12	2.17	0.44
1:A:136:ARG:HA	1:A:169:LEU:O	2.18	0.44
1:A:139:TYR:HB3	1:A:181:MET:HE2	2.00	0.44
1:C:176:GLN:HB2	1:C:181:MET:CE	2.47	0.44
1:C:106:GLY:O	1:C:171:SER:OG	2.28	0.44
1:D:133:ILE:HD12	1:D:133:ILE:N	2.32	0.43
1:C:136:ARG:HA	1:C:169:LEU:O	2.18	0.43
1:B:36:GLY:O	1:B:92:HIS:CD2	2.71	0.43
1:A:36:GLY:O	1:A:92:HIS:ND1	2.34	0.43
1:A:197:GLY:HA2	1:A:226:LYS:HE3	2.00	0.43
1:C:79:PRO:HA	1:D:73:ASN:HA	2.00	0.43
1:B:197:GLY:HA2	1:B:226:LYS:HE3	2.01	0.43
1:B:297:GLU:HG2	1:B:436:VAL:HG13	1.99	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:297:GLU:HG2	1:A:436:VAL:HG13	2.00	0.43
1:D:36:GLY:O	1:D:92:HIS:CD2	2.71	0.43
1:D:197:GLY:HA2	1:D:226:LYS:HE3	2.00	0.43
1:A:176:GLN:HB2	1:A:181:MET:CE	2.49	0.43
1:B:380:TYR:CG	1:B:381:MET:N	2.87	0.43
1:A:231:ASP:HA	1:A:435:ARG:HB3	2.01	0.42
1:C:176:GLN:HB2	1:C:181:MET:HE2	2.00	0.42
1:A:228:ILE:HD11	1:A:244:ALA:HB2	2.01	0.42
1:A:68:GLU:HB3	1:A:69:PRO:HD2	2.02	0.42
1:C:28:ASP:O	1:C:426:PRO:HG2	2.20	0.42
1:C:362:LYS:O	1:C:365:LYS:HG3	2.19	0.42
1:B:256:TYR:CZ	1:B:260:VAL:HG11	2.55	0.42
1:D:120:THR:O	1:D:124:ILE:HG12	2.20	0.42
1:D:380:TYR:CG	1:D:381:MET:N	2.88	0.42
1:C:36:GLY:O	1:C:92:HIS:ND1	2.34	0.42
1:C:105:CYS:O	1:C:226:LYS:HE2	2.19	0.42
1:A:218:ASP:C	1:A:219:ILE:HD12	2.41	0.42
1:B:466:ILE:HG22	1:B:470:LEU:HD12	2.02	0.42
1:C:22:ASN:HD21	1:C:24:VAL:HB	1.85	0.42
1:B:322:ILE:N	1:B:322:ILE:CD1	2.83	0.41
1:B:466:ILE:O	1:B:470:LEU:HD12	2.20	0.41
1:D:212:ALA:CB	1:D:219:ILE:CG2	2.98	0.41
1:D:322:ILE:N	1:D:322:ILE:CD1	2.83	0.41
1:B:65:PRO:HB3	1:B:74:PRO:HB2	2.03	0.41
1:B:151:ILE:HD11	1:B:153:LEU:HD21	2.02	0.41
1:B:460:LEU:O	1:B:464:LEU:CD1	2.67	0.41
1:D:322:ILE:N	1:D:322:ILE:HD12	2.35	0.41
1:A:218:ASP:O	1:A:219:ILE:HD12	2.20	0.41
1:C:322:ILE:CD1	1:C:322:ILE:N	2.83	0.41
1:C:380:TYR:CG	1:C:381:MET:N	2.88	0.41
1:A:322:ILE:HD12	1:A:322:ILE:N	2.35	0.41
1:A:322:ILE:N	1:A:322:ILE:CD1	2.83	0.41
1:B:270:LYS:HA	1:B:323:VAL:O	2.20	0.41
1:D:212:ALA:HB1	1:D:219:ILE:CG2	2.50	0.41
1:A:120:THR:O	1:A:124:ILE:HG12	2.20	0.41
1:B:462:ARG:O	1:B:466:ILE:HD12	2.20	0.41
1:C:376:ILE:HG22	1:C:378:PRO:HD3	2.02	0.41
1:D:136:ARG:HA	1:D:169:LEU:O	2.21	0.41
1:A:151:ILE:HA	1:B:475:ARG:NH2	2.36	0.41
1:A:442:GLN:HG3	1:A:446:GLN:HE21	1.86	0.41
1:B:322:ILE:N	1:B:322:ILE:HD12	2.36	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:151:ILE:HD11	1:A:153:LEU:HD21	2.02	0.41
1:D:165:GLY:HA3	1:D:384:ALA:O	2.21	0.41
1:D:270:LYS:HA	1:D:323:VAL:O	2.21	0.41
1:C:255:ALA:HB2	1:C:376:ILE:CD1	2.50	0.40
1:A:380:TYR:CG	1:A:381:MET:N	2.88	0.40
1:C:297:GLU:HG2	1:C:436:VAL:HG13	2.02	0.40
1:B:118:SER:CB	1:B:399:ALA:HB3	2.51	0.40
1:C:177:ASP:O	1:C:180:GLU:HG2	2.21	0.40
1:C:46:TYR:OH	1:C:53:ARG:CA	2.69	0.40
1:C:142:LEU:CD2	1:C:185:LEU:HD11	2.52	0.40
1:D:97:GLU:HA	1:D:97:GLU:OE1	2.20	0.40
1:B:417:MET:HE2	1:B:420:ASN:C	2.42	0.40
1:C:270:LYS:HA	1:C:323:VAL:O	2.22	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	452/507 (89%)	432 (96%)	15 (3%)	5 (1%)	14	25
1	B	433/507 (85%)	415 (96%)	15 (4%)	3 (1%)	22	39
1	C	457/507 (90%)	438 (96%)	15 (3%)	4 (1%)	17	31
1	D	433/507 (85%)	413 (95%)	18 (4%)	2 (0%)	29	47
All	All	1775/2028 (88%)	1698 (96%)	63 (4%)	14 (1%)	19	34

All (14) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	484	LEU
1	A	348	ASP

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Mol	Chain	Res	Type
1	A	484	LEU
1	B	484	LEU
1	C	272	MET
1	A	335	SER
1	C	347	ILE
1	D	272	MET
1	A	272	MET
1	A	366	SER
1	B	272	MET
1	B	366	SER
1	C	366	SER
1	D	366	SER

### 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	377/422 (89%)	359 (95%)	18 (5%)	25	44
1	B	366/422 (87%)	352 (96%)	14 (4%)	33	53
1	C	386/422 (92%)	368 (95%)	18 (5%)	26	45
1	D	366/422 (87%)	345 (94%)	21 (6%)	20	36
All	All	1495/1688 (89%)	1424 (95%)	71 (5%)	26	45

All (71) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	31	VAL
1	A	155	ARG
1	A	157	ARG
1	A	167	THR
1	A	210	GLN
1	A	213	LYS
1	A	214	ARG
1	A	304	GLU
1	A	307	SER

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Mol	Chain	Res	Type
1	A	311	ARG
1	A	316	SER
1	A	322	ILE
1	A	366	SER
1	A	420	ASN
1	A	433	VAL
1	A	436	VAL
1	A	458	VAL
1	A	464	LEU
1	B	31	VAL
1	B	77	VAL
1	B	167	THR
1	B	307	SER
1	B	322	ILE
1	B	366	SER
1	B	417	MET
1	B	420	ASN
1	B	438	ASP
1	B	452	VAL
1	B	453	ASP
1	B	460	LEU
1	B	470	LEU
1	B	486	LYS
1	C	31	VAL
1	C	167	THR
1	C	179	LYS
1	C	214	ARG
1	C	307	SER
1	C	322	ILE
1	C	325	GLU
1	C	345	LYS
1	C	346	LEU
1	C	347	ILE
1	C	370	ASP
1	C	417	MET
1	C	420	ASN
1	C	453	ASP
1	C	464	LEU
1	C	470	LEU
1	C	471	GLU
1	C	477	ARG
1	D	22	ASN

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Mol	Chain	Res	Type
1	D	67	ASP
1	D	77	VAL
1	D	90	ARG
1	D	167	THR
1	D	213	LYS
1	D	215	ARG
1	D	275	ASP
1	D	307	SER
1	D	316	SER
1	D	322	ILE
1	D	362	LYS
1	D	374	LYS
1	D	418	ARG
1	D	420	ASN
1	D	439	LEU
1	D	453	ASP
1	D	459	ARG
1	D	460	LEU
1	D	464	LEU
1	D	475	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (31) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	22	ASN
1	A	154	HIS
1	A	160	ASN
1	A	163	HIS
1	A	242	GLN
1	A	315	HIS
1	A	390	ASN
1	A	442	GLN
1	A	446	GLN
1	B	92	HIS
1	B	154	HIS
1	C	22	ASN
1	C	160	ASN
1	C	163	HIS
1	C	191	ASN
1	C	315	HIS
1	C	390	ASN
1	C	404	HIS

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Mol	Chain	Res	Type
1	C	442	GLN
1	C	446	GLN
1	C	476	ASN
1	C	481	HIS
1	D	22	ASN
1	D	92	HIS
1	D	160	ASN
1	D	163	HIS
1	D	242	GLN
1	D	390	ASN
1	D	404	HIS
1	D	442	GLN
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](#)

12 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	JJ2	C	1001	-	24,26,26	1.28	4 (16%)	30,37,37	1.74	4 (13%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
2	JJ2	D	1001	-	24,26,26	1.26	4 (16%)	30,37,37	1.99	5 (16%)
3	CIT	C	1002	-	12,12,12	1.14	1 (8%)	17,17,17	1.13	2 (11%)
2	JJ2	B	1001	-	24,26,26	1.38	3 (12%)	30,37,37	2.11	6 (20%)
4	GOL	C	1003	-	5,5,5	0.17	0	5,5,5	0.41	0
4	GOL	D	1003	-	5,5,5	0.12	0	5,5,5	0.33	0
3	CIT	A	1002	-	12,12,12	1.20	1 (8%)	17,17,17	1.12	2 (11%)
3	CIT	B	1002	-	12,12,12	1.22	1 (8%)	17,17,17	1.16	2 (11%)
2	JJ2	A	1001	-	24,26,26	1.33	3 (12%)	30,37,37	1.99	4 (13%)
3	CIT	D	1002	-	12,12,12	1.26	1 (8%)	17,17,17	1.03	2 (11%)
4	GOL	A	1003	-	5,5,5	0.15	0	5,5,5	0.38	0
4	GOL	B	1003	-	5,5,5	0.12	0	5,5,5	0.32	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	JJ2	C	1001	-	-	0/9/9/9	0/3/3/3
2	JJ2	D	1001	-	-	0/9/9/9	0/3/3/3
3	CIT	C	1002	-	-	9/16/16/16	-
2	JJ2	B	1001	-	-	0/9/9/9	0/3/3/3
4	GOL	C	1003	-	-	4/4/4/4	-
4	GOL	D	1003	-	-	4/4/4/4	-
3	CIT	A	1002	-	-	8/16/16/16	-
3	CIT	B	1002	-	-	8/16/16/16	-
2	JJ2	A	1001	-	-	0/9/9/9	0/3/3/3
3	CIT	D	1002	-	-	11/16/16/16	-
4	GOL	A	1003	-	-	2/4/4/4	-
4	GOL	B	1003	-	-	4/4/4/4	-

All (18) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	1001	JJ2	C17-C18	3.75	1.41	1.33
2	B	1001	JJ2	C3-CL8	3.58	1.82	1.73
2	A	1001	JJ2	C17-C18	3.55	1.40	1.33
2	C	1001	JJ2	C17-C18	3.38	1.40	1.33
2	D	1001	JJ2	C17-C18	3.31	1.40	1.33

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	1001	JJ2	C3-CL8	3.20	1.81	1.73
2	C	1001	JJ2	C3-CL8	2.85	1.80	1.73
2	D	1001	JJ2	C3-CL8	2.82	1.80	1.73
2	A	1001	JJ2	C4-CL7	2.66	1.79	1.73
3	B	1002	CIT	C3-C6	2.57	1.56	1.53
3	D	1002	CIT	C3-C6	2.51	1.56	1.53
3	A	1002	CIT	C3-C6	2.47	1.56	1.53
2	D	1001	JJ2	C4-CL7	2.40	1.79	1.73
2	B	1001	JJ2	C4-CL7	2.39	1.79	1.73
2	C	1001	JJ2	C15-N16	2.20	1.42	1.39
2	C	1001	JJ2	C4-CL7	2.05	1.78	1.73
2	D	1001	JJ2	C15-N16	2.05	1.41	1.39
3	C	1002	CIT	C3-C6	2.04	1.55	1.53

All (27) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	1001	JJ2	C12-C15-N16	8.97	119.08	113.76
2	A	1001	JJ2	C12-C15-N16	8.58	118.85	113.76
2	D	1001	JJ2	C12-C15-N16	8.43	118.77	113.76
2	C	1001	JJ2	C12-C15-N16	7.36	118.13	113.76
2	A	1001	JJ2	C17-N16-C15	-4.08	120.06	122.89
2	D	1001	JJ2	C1-C9-N10	-3.75	105.81	112.35
2	B	1001	JJ2	C17-N16-C15	-3.53	120.44	122.89
2	B	1001	JJ2	C1-C9-N10	-3.24	106.70	112.35
2	A	1001	JJ2	C1-C9-N10	-3.20	106.76	112.35
2	C	1001	JJ2	C17-N16-C15	-3.11	120.73	122.89
2	B	1001	JJ2	C2-C3-CL8	2.99	123.35	118.45
2	C	1001	JJ2	C1-C9-N10	-2.98	107.16	112.35
2	D	1001	JJ2	C17-N16-C15	-2.96	120.83	122.89
2	D	1001	JJ2	C14-N10-C11	2.72	111.34	108.28
3	C	1002	CIT	O5-C6-C3	-2.57	117.12	122.09
3	B	1002	CIT	O5-C6-C3	-2.56	117.13	122.09
3	B	1002	CIT	O6-C6-C3	2.53	117.98	113.14
2	C	1001	JJ2	C14-N10-C11	2.31	110.88	108.28
3	A	1002	CIT	O5-C6-C3	-2.30	117.64	122.09
3	C	1002	CIT	O6-C6-C3	2.26	117.47	113.14
2	D	1001	JJ2	C2-C3-CL8	2.24	122.12	118.45
2	B	1001	JJ2	C9-N10-C14	-2.21	121.47	124.73
2	B	1001	JJ2	C14-N10-C11	2.18	110.73	108.28
3	A	1002	CIT	O6-C6-C3	2.10	117.17	113.14
3	D	1002	CIT	O6-C6-C3	2.06	117.09	113.14

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	1002	CIT	O5-C6-C3	-2.04	118.15	122.09
2	A	1001	JJ2	C14-N10-C11	2.02	110.55	108.28

There are no chirality outliers.

All (50) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	1002	CIT	O7-C3-C6-O5
3	A	1002	CIT	O7-C3-C6-O6
3	A	1002	CIT	C4-C3-C6-O5
3	A	1002	CIT	C4-C3-C6-O6
3	B	1002	CIT	O7-C3-C6-O5
3	B	1002	CIT	O7-C3-C6-O6
3	B	1002	CIT	C4-C3-C6-O5
3	B	1002	CIT	C4-C3-C6-O6
3	D	1002	CIT	O7-C3-C4-C5
3	D	1002	CIT	O7-C3-C6-O5
3	D	1002	CIT	O7-C3-C6-O6
4	C	1003	GOL	O1-C1-C2-C3
4	C	1003	GOL	C1-C2-C3-O3
4	D	1003	GOL	O1-C1-C2-C3
3	C	1002	CIT	C2-C3-C4-C5
3	C	1002	CIT	C6-C3-C4-C5
3	D	1002	CIT	C6-C3-C4-C5
4	A	1003	GOL	C1-C2-C3-O3
4	B	1003	GOL	O1-C1-C2-C3
4	B	1003	GOL	C1-C2-C3-O3
4	D	1003	GOL	C1-C2-C3-O3
3	C	1002	CIT	C4-C3-C6-O6
3	D	1002	CIT	C4-C3-C6-O5
3	D	1002	CIT	C4-C3-C6-O6
4	B	1003	GOL	O2-C2-C3-O3
4	C	1003	GOL	O1-C1-C2-O2
4	C	1003	GOL	O2-C2-C3-O3
3	D	1002	CIT	C2-C3-C4-C5
3	C	1002	CIT	O7-C3-C4-C5
3	C	1002	CIT	O7-C3-C6-O6
4	A	1003	GOL	O2-C2-C3-O3
4	B	1003	GOL	O1-C1-C2-O2
4	D	1003	GOL	O1-C1-C2-O2
3	C	1002	CIT	C2-C3-C6-O6
3	D	1002	CIT	C2-C3-C6-O6

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Mol	Chain	Res	Type	Atoms
4	D	1003	GOL	O2-C2-C3-O3
3	B	1002	CIT	C2-C3-C6-O5
3	B	1002	CIT	C2-C3-C6-O6
3	C	1002	CIT	C2-C3-C6-O5
3	C	1002	CIT	C4-C3-C6-O5
3	D	1002	CIT	C2-C3-C6-O5
3	D	1002	CIT	O2-C1-C2-C3
3	B	1002	CIT	C1-C2-C3-C6
3	C	1002	CIT	O7-C3-C6-O5
3	A	1002	CIT	C3-C4-C5-O4
3	A	1002	CIT	O1-C1-C2-C3
3	A	1002	CIT	C3-C4-C5-O3
3	D	1002	CIT	O1-C1-C2-C3
3	A	1002	CIT	O2-C1-C2-C3
3	B	1002	CIT	C1-C2-C3-O7

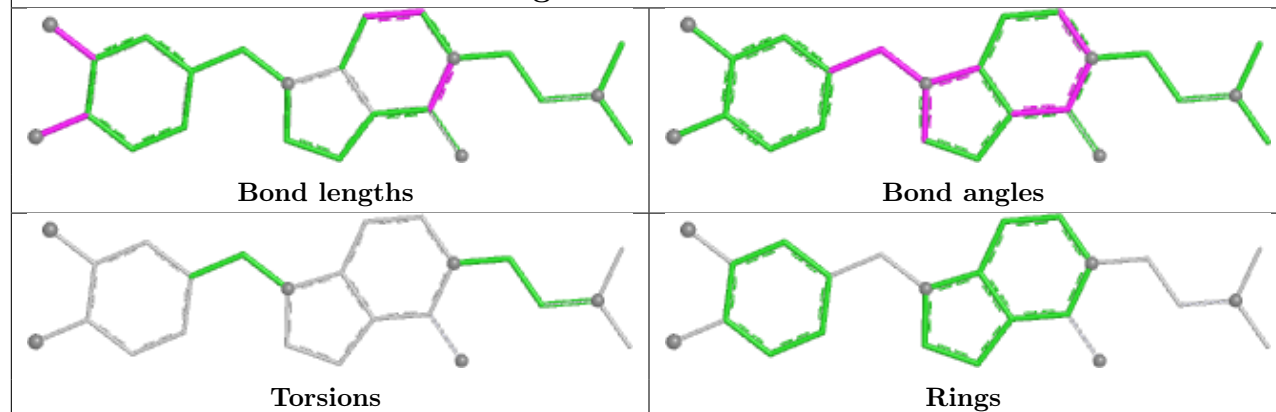
There are no ring outliers.

4 monomers are involved in 4 short contacts:

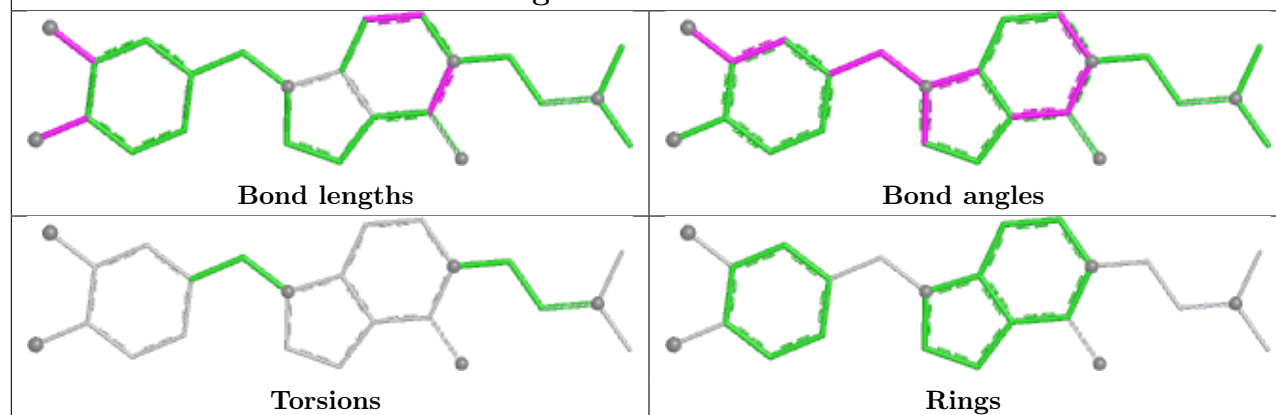
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	C	1002	CIT	1	0
4	D	1003	GOL	1	0
3	A	1002	CIT	1	0
3	D	1002	CIT	1	0

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.

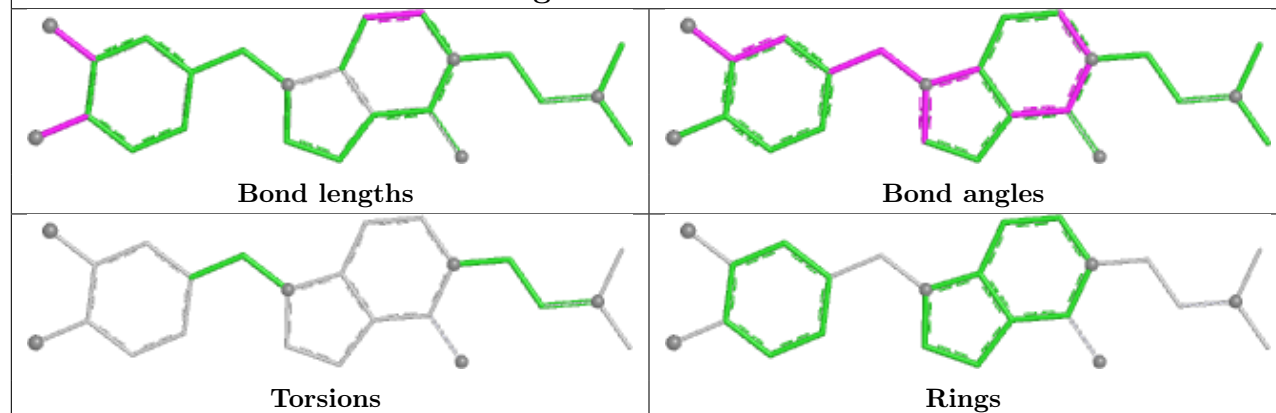
## Ligand JJ2 C 1001

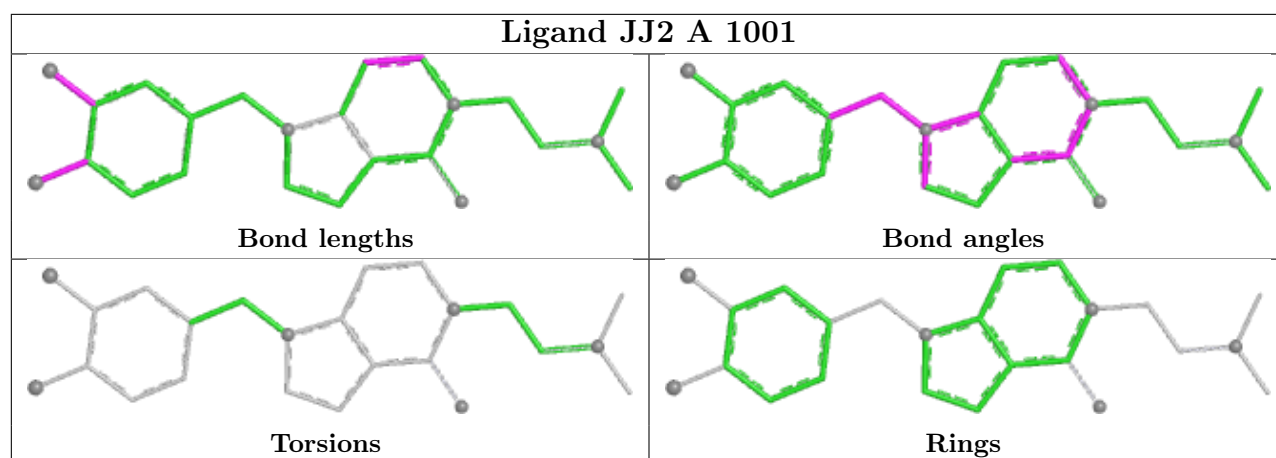


## Ligand JJ2 D 1001



## Ligand JJ2 B 1001





## 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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	456/507 (89%)	0.28	16 (3%) 44 52	30, 57, 103, 132	0
1	B	439/507 (86%)	0.18	18 (4%) 37 44	35, 59, 96, 126	0
1	C	461/507 (90%)	0.28	25 (5%) 25 31	29, 53, 112, 137	0
1	D	439/507 (86%)	0.09	9 (2%) 63 72	32, 56, 90, 105	0
All	All	1795/2028 (88%)	0.21	68 (3%) 40 48	29, 57, 102, 137	0

All (68) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	338	TYR	6.5
1	C	340	ALA	6.5
1	B	69	PRO	6.3
1	C	343	ASN	6.1
1	A	485	ALA	6.0
1	C	339	ASP	5.6
1	C	342	GLY	5.6
1	C	341	SER	5.5
1	C	345	LYS	4.6
1	C	53	ARG	4.4
1	A	217	VAL	4.3
1	C	50	THR	4.2
1	C	344	LYS	3.9
1	B	459	ARG	3.9
1	C	346	LEU	3.9
1	D	484	LEU	3.8
1	C	485	ALA	3.8
1	A	480	LEU	3.8
1	B	70	SER	3.6
1	B	315	HIS	3.4
1	C	347	ILE	3.3

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Mol	Chain	Res	Type	RSRZ
1	C	45	LYS	3.2
1	A	458	VAL	3.2
1	C	52	PHE	3.1
1	C	459	ARG	3.1
1	C	486	LYS	3.0
1	D	216	GLY	3.0
1	A	218	ASP	2.8
1	C	69	PRO	2.8
1	D	332	GLY	2.7
1	D	363	ALA	2.7
1	B	72	GLU	2.7
1	A	475	ARG	2.7
1	A	459	ARG	2.7
1	D	458	VAL	2.7
1	C	71	SER	2.6
1	B	367	ARG	2.6
1	B	458	VAL	2.6
1	A	457	ASP	2.6
1	B	486	LYS	2.6
1	A	469	GLU	2.5
1	A	464	LEU	2.5
1	B	369	PRO	2.5
1	B	460	LEU	2.4
1	C	46	TYR	2.4
1	C	47	SER	2.4
1	B	71	SER	2.4
1	A	463	LYS	2.4
1	B	380	TYR	2.3
1	D	459	ARG	2.3
1	D	482	GLU	2.3
1	A	460	LEU	2.2
1	D	370	ASP	2.2
1	A	482	GLU	2.2
1	B	437	LEU	2.2
1	B	454	LEU	2.2
1	D	36	GLY	2.2
1	B	485	ALA	2.2
1	C	481	HIS	2.1
1	B	68	GLU	2.1
1	A	474	ASN	2.1
1	A	71	SER	2.1
1	C	54	ASP	2.1

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Mol	Chain	Res	Type	RSRZ
1	B	214	ARG	2.1
1	C	470	LEU	2.0
1	C	380	TYR	2.0
1	B	144	LYS	2.0
1	A	42	PRO	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](#)

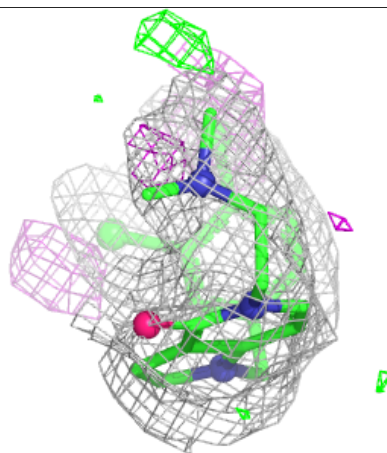
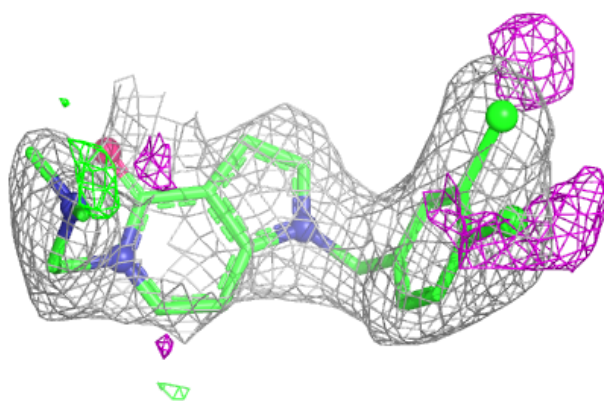
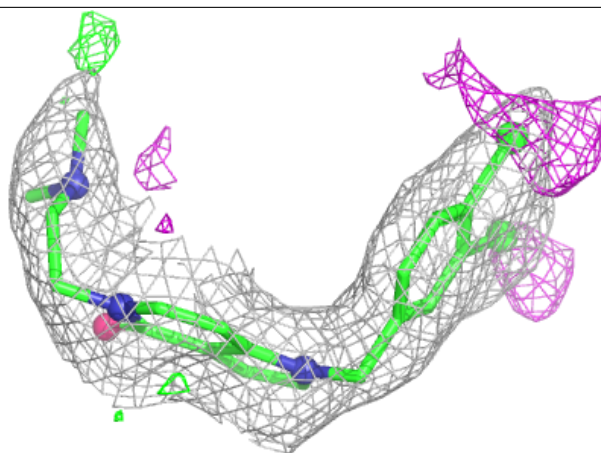
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
3	CIT	A	1002	13/13	0.83	0.26	59,69,93,94	0
3	CIT	B	1002	13/13	0.83	0.31	61,71,94,102	0
3	CIT	C	1002	13/13	0.86	0.31	69,80,90,96	0
3	CIT	D	1002	13/13	0.89	0.20	60,76,91,99	0
4	GOL	C	1003	6/6	0.90	0.18	32,33,38,38	0
4	GOL	A	1003	6/6	0.92	0.19	35,37,38,43	0
2	JJ2	D	1001	24/24	0.93	0.22	41,58,68,74	0
2	JJ2	B	1001	24/24	0.94	0.21	37,68,78,85	0
2	JJ2	A	1001	24/24	0.94	0.18	27,53,68,78	0
4	GOL	B	1003	6/6	0.95	0.23	40,45,49,49	0
2	JJ2	C	1001	24/24	0.95	0.17	43,58,64,67	0
4	GOL	D	1003	6/6	0.97	0.17	29,29,33,37	0

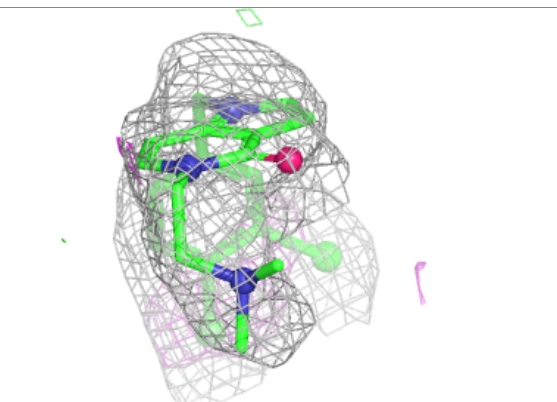
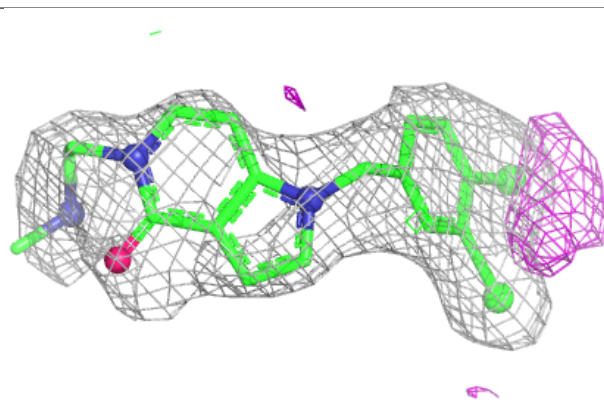
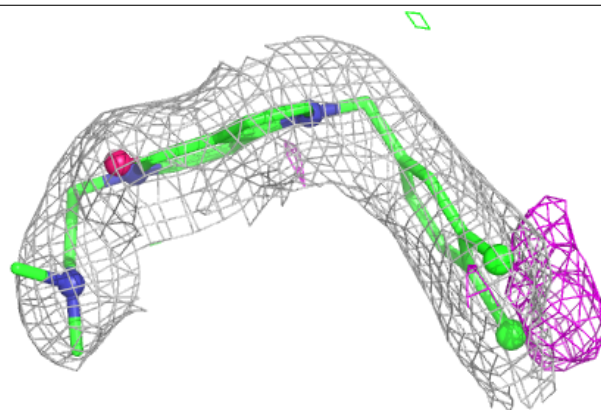
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

**Electron density around JJ2 D 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 JJ2 B 1001:**

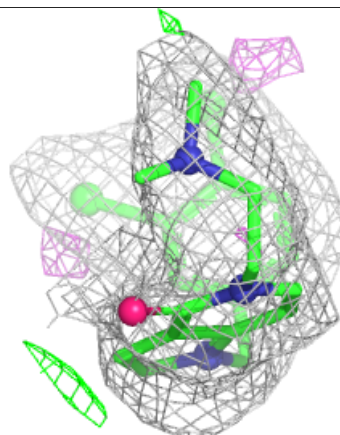
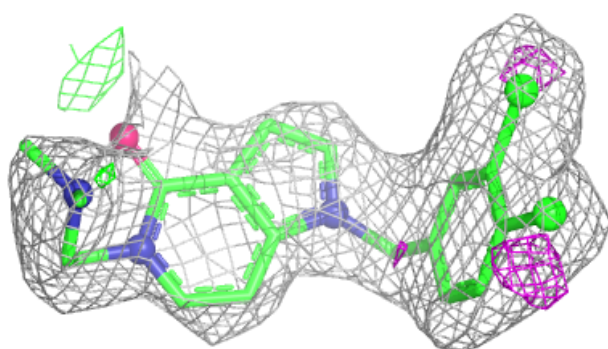
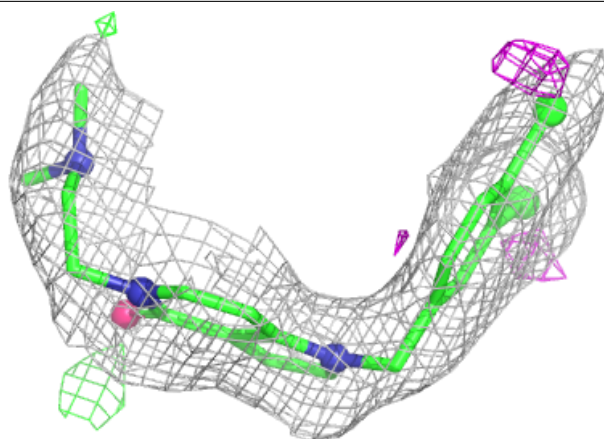
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)





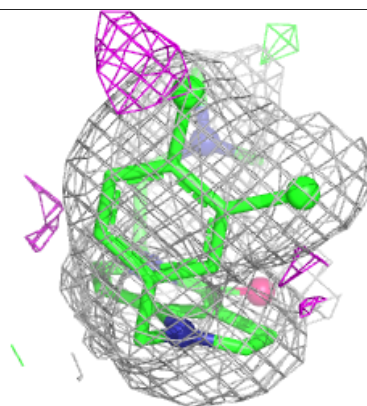
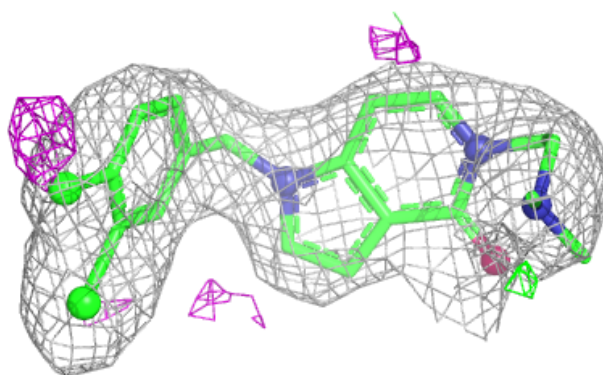
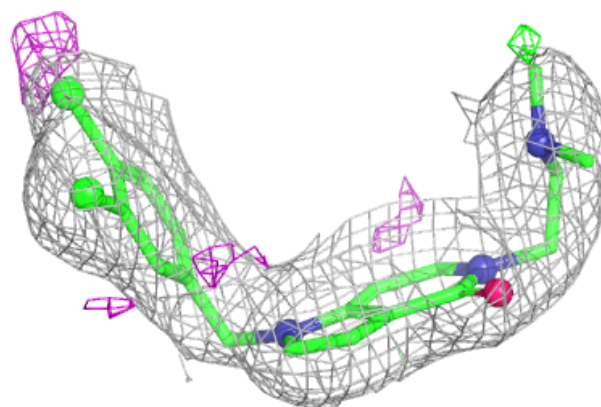
**Electron density around JJ2 A 1001:**

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



**Electron density around JJ2 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)



## 6.5 Other polymers [i](#)

There are no such residues in this entry.