



# Full wwPDB X-ray Structure Validation Report ⓘ

Sep 13, 2023 – 08:41 AM EDT

PDB ID : 4QSK  
Title : Crystal Structure of *L. monocytogenes* Pyruvate Carboxylase in complex with Cyclic-di-AMP  
Authors : Choi, P.H.; Tong, L.  
Deposited on : 2014-07-04  
Resolution : 2.70 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 : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.35.1  
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) : 2.35.1

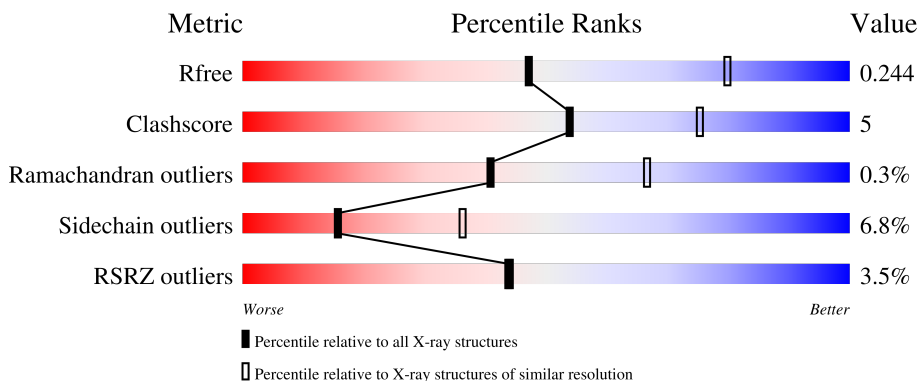
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.70 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	2808 (2.70-2.70)
Clashscore	141614	3122 (2.70-2.70)
Ramachandran outliers	138981	3069 (2.70-2.70)
Sidechain outliers	138945	3069 (2.70-2.70)
RSRZ outliers	127900	2737 (2.70-2.70)

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	1147	 3% 79% 13% • 6%
1	B	1147	 3% 78% 14% • 6%

## 2 Entry composition i

There are 4 unique types of molecules in this entry. The entry contains 16959 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.

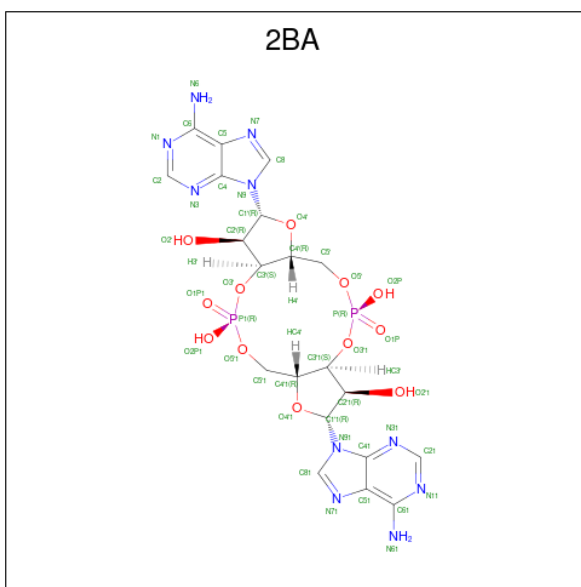
- Molecule 1 is a protein called Pyruvate carboxylase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	1073	Total 8438	C 5355	N 1433	O 1609	S 41	0	0	0
1	B	1073	Total 8449	C 5362	N 1433	O 1613	S 41	0	0	0

There are 2 discrepancies between the modelled and reference sequences:

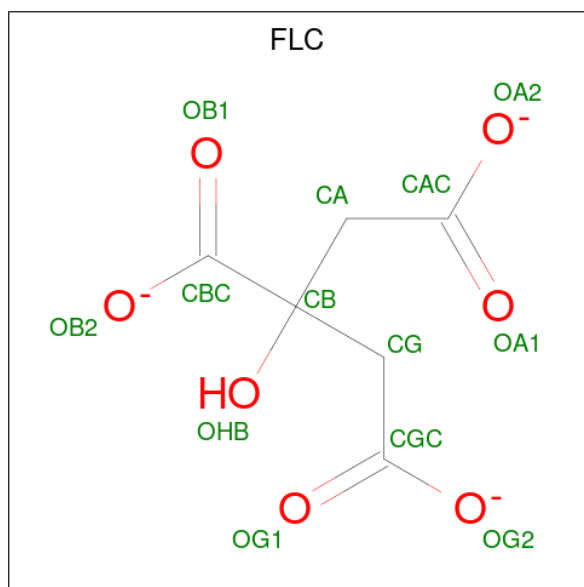
Chain	Residue	Modelled	Actual	Comment	Reference
A	0	MET	-	expression tag	UNP W6G6F5
B	0	MET	-	expression tag	UNP W6G6F5

- Molecule 2 is (2R,3R,3aS,5R,7aR,9R,10R,10aS,12R,14aR)-2,9-bis(6-amino-9H-purin-9-yl)oc tahydro-2H,7H-difuro[3,2-d:3',2'-j][1,3,7,9,2,8 ]tetraoxadiphosphacyclododecine-3,5,10,12-tet rol 5,12-dioxide (three-letter code: 2BA) (formula: C<sub>20</sub>H<sub>24</sub>N<sub>10</sub>O<sub>12</sub>P<sub>2</sub>).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			22	10	5	6	1		
2	B	1	Total	C	N	O	P	0	0
			22	10	5	6	1		

- Molecule 3 is CITRATE ANION (three-letter code: FLC) (formula:  $C_6H_5O_7$ ).



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		

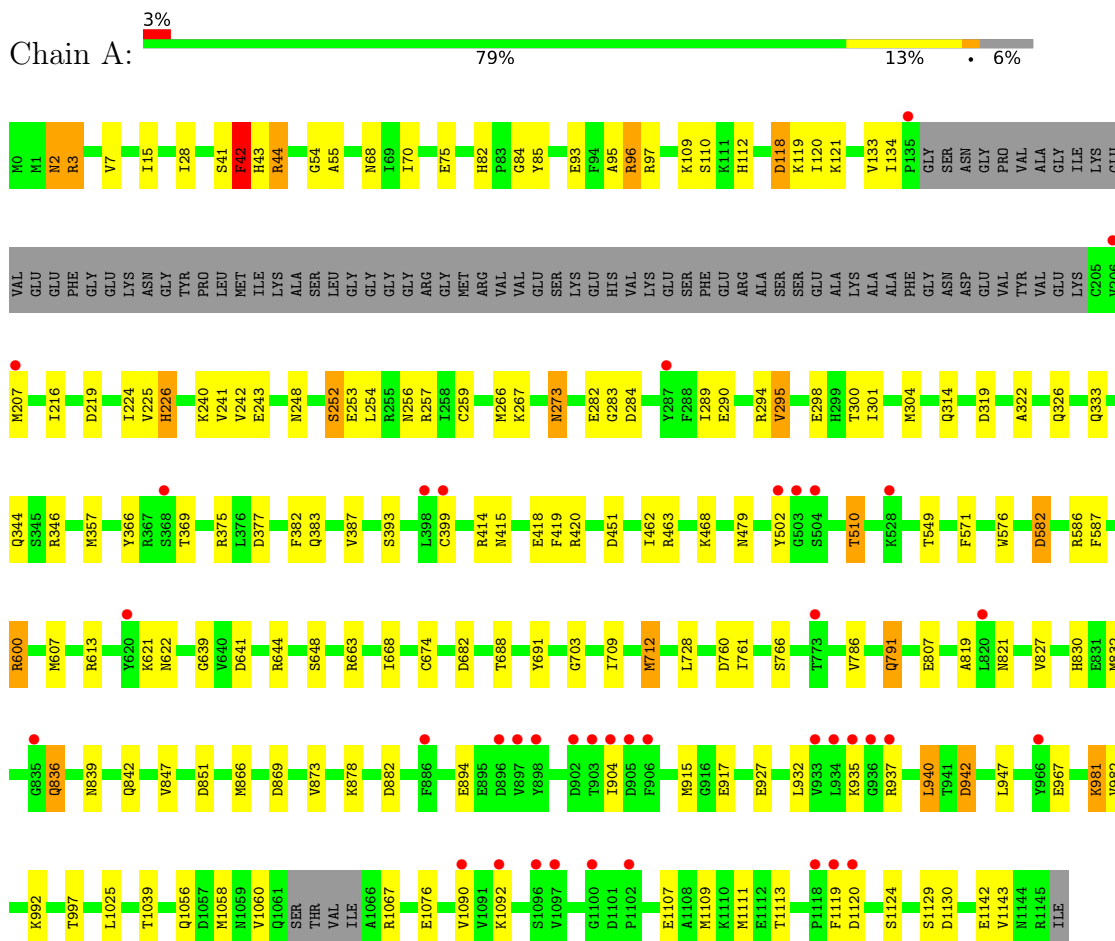
- Molecule 4 is MANGANESE (II) ION (three-letter code: MN) (formula: Mn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	Mn	0	0
			1	1		
4	B	1	Total	Mn	0	0
			1	1		

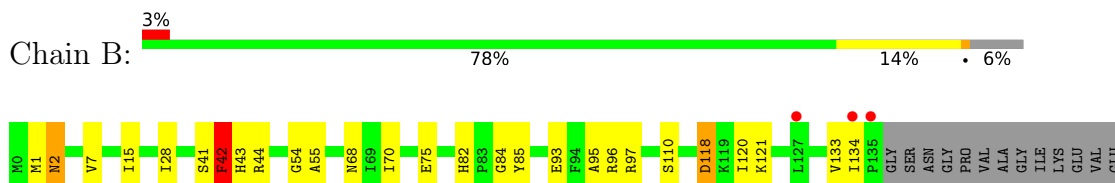
### 3 Residue-property plots i

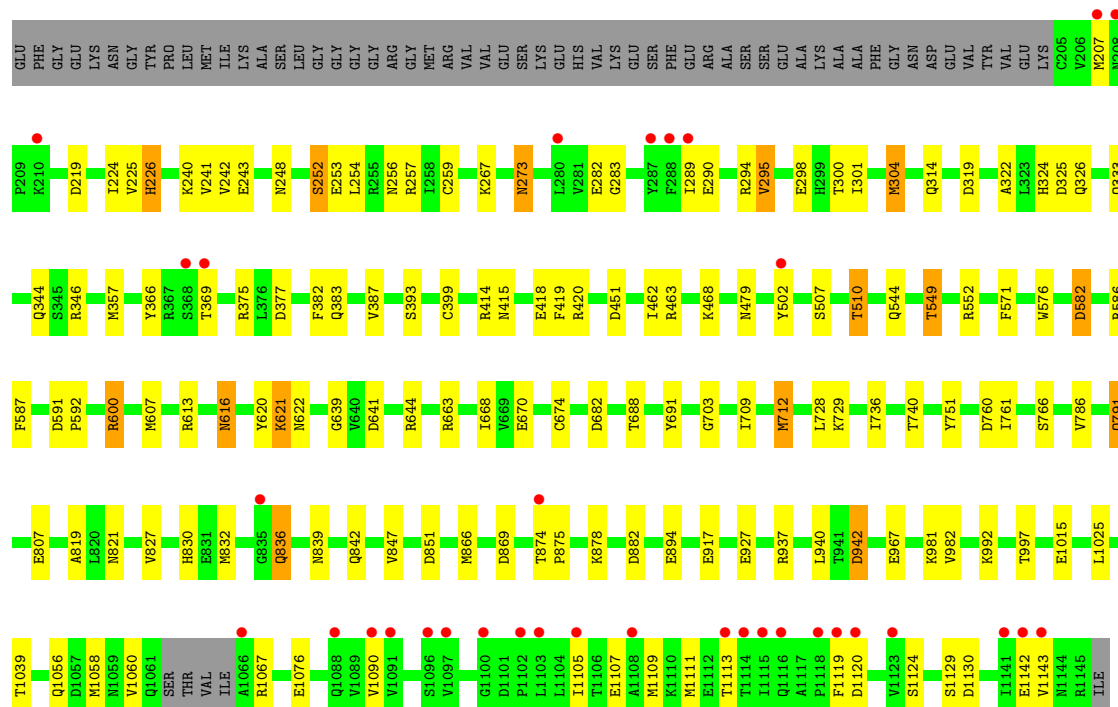
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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: Pyruvate carboxylase



- Molecule 1: Pyruvate carboxylase





## 4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	227.00Å 146.86Å 96.06Å 90.00° 103.54° 90.00°	Depositor
Resolution (Å)	45.68 – 2.70 45.64 – 2.70	Depositor EDS
% Data completeness (in resolution range)	96.9 (45.68-2.70) 96.9 (45.64-2.70)	Depositor EDS
$R_{merge}$	0.06	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.83 (at 2.69Å)	Xtrriage
Refinement program	REFMAC 5.7.0029	Depositor
R, $R_{free}$	0.198 , 0.242 0.198 , 0.244	Depositor DCC
$R_{free}$ test set	4086 reflections (4.99%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	65.2	Xtrriage
Anisotropy	0.113	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.31 , 40.2	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.51$ , $\langle L^2 \rangle = 0.35$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	16959	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	72.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.00% 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: MN, FLC, 2BA

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	0/8605	0.80	4/11659 (0.0%)
1	B	0.68	0/8616	0.82	3/11673 (0.0%)
All	All	0.64	0/17221	0.81	7/23332 (0.0%)

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	1

There are no bond length outliers.

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed( $^{\circ}$ )	Ideal( $^{\circ}$ )
1	B	42	PHE	CB-CA-C	6.27	122.93	110.40
1	A	420	ARG	NE-CZ-NH2	-5.54	117.53	120.30
1	A	42	PHE	CB-CA-C	5.36	121.11	110.40
1	A	420	ARG	NE-CZ-NH1	5.12	122.86	120.30
1	B	304	MET	CG-SD-CE	-5.06	92.10	100.20
1	A	96	ARG	NE-CZ-NH1	5.04	122.82	120.30
1	B	552	ARG	NE-CZ-NH1	5.02	122.81	120.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	621	LYS	Peptide



## 5.2 Too-close contacts

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	8438	0	8361	92	0
1	B	8449	0	8378	88	0
2	A	22	0	11	0	1
2	B	22	0	11	0	1
3	A	13	0	5	0	0
3	B	13	0	5	1	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
All	All	16959	0	16771	177	2

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 (177) 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:582:ASP:OD2	1:B:586:ARG:NH1	2.01	0.92
1:A:582:ASP:OD2	1:A:586:ARG:NH1	2.03	0.91
1:A:663:ARG:NH1	1:A:703:GLY:O	2.13	0.81
1:B:663:ARG:NH1	1:B:703:GLY:O	2.14	0.80
1:B:510:THR:HG21	1:B:571:PHE:O	1.82	0.80
1:A:904:ILE:O	1:A:935:LYS:NZ	2.14	0.80
1:A:510:THR:HG21	1:A:571:PHE:O	1.86	0.76
1:B:644:ARG:NH1	1:B:670:GLU:OE2	2.21	0.72
1:B:42:PHE:HB3	1:B:382:PHE:CE1	2.25	0.72
1:A:226:HIS:CD2	1:A:259:CYS:HB3	2.25	0.72
1:B:226:HIS:CD2	1:B:259:CYS:HB3	2.25	0.71
1:A:295:VAL:HG22	1:A:314:GLN:NE2	2.06	0.70
1:A:366:TYR:H	1:A:383:GLN:HE21	1.40	0.69
1:B:819:ALA:O	1:B:821:ASN:ND2	2.25	0.69
1:B:616:ASN:HB3	1:B:621:LYS:O	1.93	0.69
1:A:42:PHE:HB3	1:A:382:PHE:CE1	2.28	0.68
1:A:819:ALA:O	1:A:821:ASN:ND2	2.26	0.68
1:B:295:VAL:HG22	1:B:314:GLN:NE2	2.08	0.68
1:A:942:ASP:N	1:A:942:ASP:OD1	2.27	0.68

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:366:TYR:H	1:B:383:GLN:HE21	1.41	0.67
1:A:932:LEU:O	1:A:935:LYS:HE3	1.95	0.67
1:B:830:HIS:HD2	1:B:832:MET:H	1.42	0.67
1:A:830:HIS:HD2	1:A:832:MET:H	1.43	0.67
1:A:93:GLU:O	1:A:97:ARG:HB2	1.95	0.66
1:A:54:GLY:H	1:A:68:ASN:HD22	1.43	0.66
1:B:93:GLU:O	1:B:97:ARG:HB2	1.97	0.64
1:A:82:HIS:HD2	1:A:84:GLY:H	1.46	0.64
1:B:942:ASP:N	1:B:942:ASP:OD1	2.31	0.64
1:B:82:HIS:HD2	1:B:84:GLY:H	1.46	0.64
1:B:54:GLY:H	1:B:68:ASN:HD22	1.46	0.64
1:B:253:GLU:OE2	1:B:257:ARG:HD3	1.97	0.63
1:A:304:MET:CE	1:A:399:CYS:HB3	2.29	0.63
1:A:253:GLU:OE2	1:A:257:ARG:HD3	1.98	0.62
1:B:118:ASP:HB3	1:B:121:LYS:HG3	1.82	0.62
1:B:252:SER:O	1:B:256:ASN:ND2	2.31	0.61
1:B:420:ARG:NH1	3:B:1203:FLC:OA1	2.32	0.61
1:A:304:MET:HE3	1:A:399:CYS:HB3	1.82	0.61
1:B:304:MET:CE	1:B:399:CYS:HB3	2.31	0.60
1:B:304:MET:HE3	1:B:399:CYS:HB3	1.83	0.60
1:A:295:VAL:HG22	1:A:314:GLN:HE22	1.65	0.60
1:A:674:CYS:HB3	1:A:712:MET:HE1	1.84	0.59
1:A:674:CYS:CB	1:A:712:MET:HE1	2.33	0.59
1:A:252:SER:O	1:A:256:ASN:ND2	2.33	0.59
1:B:226:HIS:H	1:B:333:GLN:HE22	1.49	0.59
1:B:2:ASN:HB2	1:B:319:ASP:OD2	2.04	0.57
1:B:709:ILE:HD11	1:B:728:LEU:CD1	2.34	0.57
1:A:2:ASN:HB2	1:A:319:ASP:OD2	2.05	0.56
1:A:226:HIS:H	1:A:333:GLN:HE22	1.52	0.56
1:A:369:THR:CG2	1:A:415:ASN:HD22	2.19	0.56
1:A:709:ILE:HD11	1:A:728:LEU:CD1	2.35	0.56
1:B:369:THR:CG2	1:B:415:ASN:HD22	2.18	0.56
1:B:295:VAL:HG22	1:B:314:GLN:HE22	1.69	0.56
1:B:847:VAL:CG1	1:B:847:VAL:O	2.53	0.56
1:A:847:VAL:CG1	1:A:847:VAL:O	2.54	0.56
1:B:878:LYS:NZ	1:B:882:ASP:OD2	2.39	0.55
1:B:243:GLU:OE2	1:B:346:ARG:NH2	2.39	0.55
1:A:369:THR:HG21	1:A:415:ASN:HD22	1.72	0.55
1:B:369:THR:HG21	1:B:415:ASN:HD22	1.72	0.55
1:A:82:HIS:HE1	1:A:314:GLN:OE1	1.89	0.55
1:A:298:GLU:N	1:A:298:GLU:OE2	2.39	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:54:GLY:O	1:B:55:ALA:C	2.46	0.54
1:A:622:ASN:ND2	1:A:917:GLU:O	2.41	0.53
1:A:243:GLU:OE2	1:A:346:ARG:NH2	2.41	0.53
1:B:118:ASP:CB	1:B:121:LYS:HG3	2.39	0.53
1:A:3:ARG:NH1	1:A:319:ASP:O	2.41	0.52
1:B:298:GLU:O	1:B:301:ILE:HG12	2.09	0.52
1:B:82:HIS:HE1	1:B:314:GLN:OE1	1.92	0.52
1:B:298:GLU:N	1:B:298:GLU:OE2	2.42	0.52
1:A:82:HIS:CE1	1:A:314:GLN:OE1	2.63	0.52
1:B:468:LYS:HG2	1:B:992:LYS:O	2.09	0.51
1:A:15:ILE:HB	1:A:85:TYR:CE2	2.45	0.51
1:A:298:GLU:O	1:A:301:ILE:HG12	2.11	0.51
1:A:878:LYS:NZ	1:A:882:ASP:OD2	2.42	0.51
1:B:836:GLN:O	1:B:836:GLN:HG3	2.10	0.50
1:A:468:LYS:HG2	1:A:992:LYS:O	2.10	0.50
1:A:118:ASP:HB3	1:A:121:LYS:HG2	1.92	0.50
1:A:479:ASN:HD21	1:A:1058:MET:H	1.60	0.50
1:B:82:HIS:CE1	1:B:314:GLN:OE1	2.64	0.50
1:A:836:GLN:O	1:A:836:GLN:HG3	2.11	0.50
1:A:915:MET:O	1:A:940:LEU:HD12	2.12	0.50
1:A:510:THR:HG23	1:A:607:MET:HG3	1.93	0.50
1:A:915:MET:O	1:A:940:LEU:CD1	2.60	0.49
1:B:479:ASN:HD21	1:B:1058:MET:H	1.61	0.49
1:A:600:ARG:NH2	1:A:641:ASP:OD2	2.45	0.49
1:B:586:ARG:HD3	1:B:587:PHE:CZ	2.47	0.49
1:B:607:MET:HE1	1:B:668:ILE:HD12	1.94	0.48
1:B:600:ARG:NH2	1:B:641:ASP:OD2	2.46	0.48
1:A:241:VAL:HG12	1:A:242:VAL:HG23	1.94	0.47
1:A:289:ILE:HG13	1:A:290:GLU:HB2	1.95	0.47
1:B:15:ILE:HB	1:B:85:TYR:CE2	2.49	0.47
1:B:133:VAL:HG12	1:B:134:ILE:N	2.30	0.47
1:A:133:VAL:HG12	1:A:134:ILE:N	2.30	0.47
1:B:622:ASN:ND2	1:B:917:GLU:O	2.43	0.47
1:A:301:ILE:HA	1:A:304:MET:HE2	1.96	0.47
1:B:241:VAL:HG12	1:B:242:VAL:HG23	1.95	0.46
1:A:1090:VAL:HG12	1:A:1090:VAL:O	2.16	0.46
1:B:289:ILE:HG13	1:B:290:GLU:HB2	1.97	0.46
1:B:301:ILE:HA	1:B:304:MET:HE2	1.98	0.46
1:B:1090:VAL:HG12	1:B:1090:VAL:O	2.16	0.46
1:B:510:THR:HG23	1:B:607:MET:HG3	1.98	0.45
1:B:847:VAL:O	1:B:847:VAL:HG12	2.15	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:607:MET:HE1	1:A:668:ILE:HD12	1.97	0.45
1:A:225:VAL:CG1	1:A:226:HIS:N	2.80	0.45
1:A:712:MET:HE3	1:A:712:MET:HB3	1.73	0.45
1:A:942:ASP:OD2	1:A:947:LEU:HD21	2.17	0.45
1:B:1124:SER:HB3	1:B:1142:GLU:HB3	1.99	0.45
1:A:600:ARG:HG2	1:A:639:GLY:HA3	1.99	0.45
1:B:96:ARG:HH11	1:B:96:ARG:HG2	1.82	0.45
1:A:96:ARG:HG2	1:A:96:ARG:HH11	1.82	0.45
1:A:786:VAL:O	1:A:791:GLN:NE2	2.48	0.45
1:A:847:VAL:O	1:A:847:VAL:HG12	2.16	0.45
1:B:225:VAL:CG1	1:B:226:HIS:N	2.81	0.44
1:B:369:THR:OG1	1:B:415:ASN:ND2	2.50	0.44
1:A:54:GLY:O	1:A:55:ALA:C	2.56	0.44
1:B:760:ASP:C	1:B:761:ILE:HG13	2.38	0.44
1:A:1124:SER:HB3	1:A:1142:GLU:HB3	2.00	0.44
1:A:41:SER:OG	1:A:43:HIS:HD2	2.00	0.44
1:B:300:THR:HG22	1:B:375:ARG:CZ	2.47	0.44
1:B:786:VAL:O	1:B:791:GLN:NE2	2.50	0.43
1:A:95:ALA:O	1:A:96:ARG:C	2.56	0.43
1:B:620:TYR:CZ	1:B:621:LYS:HD3	2.53	0.43
1:A:502:TYR:CE1	1:B:75:GLU:HG2	2.53	0.43
1:B:95:ALA:O	1:B:96:ARG:C	2.56	0.43
1:B:219:ASP:OD2	1:B:322:ALA:HA	2.18	0.43
1:B:224:ILE:HD12	1:B:267:LYS:HA	2.00	0.43
1:B:1076:GLU:HG3	1:B:1143:VAL:O	2.19	0.43
1:A:44:ARG:NH2	1:B:1015:GLU:OE2	2.51	0.43
1:A:3:ARG:NH1	1:A:3:ARG:HB2	2.34	0.43
1:B:41:SER:OG	1:B:43:HIS:HD2	2.01	0.43
1:B:544:GLN:HG3	1:B:549:THR:OG1	2.19	0.43
1:B:1039:THR:HA	1:B:1056:GLN:HA	2.00	0.43
1:A:240:LYS:HB2	1:A:346:ARG:HH22	1.84	0.43
1:A:760:ASP:C	1:A:761:ILE:HG13	2.40	0.43
1:B:295:VAL:CG2	1:B:314:GLN:HE22	2.32	0.43
1:A:300:THR:HG22	1:A:375:ARG:CZ	2.49	0.42
1:A:344:GLN:HG3	1:A:399:CYS:SG	2.59	0.42
1:A:75:GLU:HG2	1:B:502:TYR:CE1	2.54	0.42
1:A:414:ARG:NH1	1:A:418:GLU:OE1	2.50	0.42
1:B:240:LYS:HB2	1:B:346:ARG:HH22	1.85	0.42
1:B:729:LYS:HD3	1:B:736:ILE:HD12	2.02	0.42
1:A:7:VAL:HG23	1:A:28:ILE:HG21	2.00	0.42
1:B:600:ARG:HG2	1:B:639:GLY:HA3	2.01	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:207:MET:HB2	1:A:282:GLU:OE2	2.20	0.42
1:B:7:VAL:HG23	1:B:28:ILE:HG21	2.00	0.42
1:A:981:LYS:HB2	1:A:981:LYS:HE3	1.88	0.42
1:A:1076:GLU:HG3	1:A:1143:VAL:O	2.20	0.42
1:A:224:ILE:HD12	1:A:267:LYS:HA	2.01	0.41
1:A:304:MET:HE1	1:A:399:CYS:CB	2.50	0.41
1:A:830:HIS:CD2	1:A:832:MET:HG3	2.55	0.41
1:A:866:MET:SD	1:A:894:GLU:HG3	2.60	0.41
1:B:616:ASN:CB	1:B:621:LYS:O	2.63	0.41
1:A:219:ASP:OD2	1:A:322:ALA:HA	2.19	0.41
1:A:369:THR:OG1	1:A:415:ASN:ND2	2.53	0.41
1:A:586:ARG:HD3	1:A:587:PHE:CZ	2.54	0.41
1:B:324:HIS:O	1:B:325:ASP:C	2.59	0.41
1:B:344:GLN:HG3	1:B:399:CYS:SG	2.61	0.41
1:B:414:ARG:NH1	1:B:418:GLU:OE1	2.52	0.41
1:B:830:HIS:CD2	1:B:832:MET:HG3	2.55	0.41
1:A:1039:THR:HA	1:A:1056:GLN:HA	2.02	0.41
1:B:591:ASP:HA	1:B:592:PRO:HD2	1.92	0.41
1:A:226:HIS:NE2	1:A:259:CYS:HB3	2.35	0.41
1:A:295:VAL:CG2	1:A:314:GLN:HE22	2.29	0.41
1:B:226:HIS:NE2	1:B:259:CYS:HB3	2.35	0.41
1:B:674:CYS:CB	1:B:712:MET:HE1	2.51	0.41
1:A:109:LYS:H	1:A:112:HIS:HD2	1.69	0.41
1:B:688:THR:O	1:B:691:TYR:HB3	2.20	0.41
1:B:740:THR:HG22	1:B:751:TYR:CE1	2.55	0.41
1:B:874:THR:HA	1:B:875:PRO:HA	1.91	0.41
1:B:207:MET:HB2	1:B:282:GLU:OE2	2.21	0.41
1:B:866:MET:SD	1:B:894:GLU:HG3	2.61	0.41
1:A:118:ASP:CB	1:A:121:LYS:HG2	2.50	0.41
1:A:216:ILE:HG13	1:A:266:MET:HG3	2.04	0.40
1:A:607:MET:HE2	1:A:641:ASP:HB3	2.03	0.40
1:B:712:MET:HB3	1:B:712:MET:HE3	1.52	0.40
1:A:282:GLU:O	1:A:284:ASP:N	2.54	0.40
1:A:688:THR:O	1:A:691:TYR:HB3	2.21	0.40
1:A:648:SER:HA	1:A:873:VAL:HG13	2.03	0.40

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

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:2000:2BA:P	2:A:2000:2BA:O3'[2_757]	1.79	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:1202:2BA:P	2:B:1202:2BA:O3'[2_757]	1.82	0.38

### 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	1067/1147 (93%)	1004 (94%)	60 (6%)	3 (0%)	41 66
1	B	1067/1147 (93%)	1007 (94%)	57 (5%)	3 (0%)	41 66
All	All	2134/2294 (93%)	2011 (94%)	117 (6%)	6 (0%)	41 66

All (6) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	283	GLY
1	B	283	GLY
1	A	273	ASN
1	B	273	ASN
1	A	869	ASP
1	B	869	ASP

#### 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	917/982 (93%)	855 (93%)	62 (7%)	16 36

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	B	920/982 (94%)	857 (93%)	63 (7%)	16	36
All	All	1837/1964 (94%)	1712 (93%)	125 (7%)	16	36

All (125) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	2	ASN
1	A	3	ARG
1	A	42	PHE
1	A	44	ARG
1	A	70	ILE
1	A	110	SER
1	A	118	ASP
1	A	119	LYS
1	A	120	ILE
1	A	226	HIS
1	A	248	ASN
1	A	252	SER
1	A	254	LEU
1	A	273	ASN
1	A	294	ARG
1	A	295	VAL
1	A	326	GLN
1	A	357	MET
1	A	377	ASP
1	A	387	VAL
1	A	393	SER
1	A	419	PHE
1	A	451	ASP
1	A	462	ILE
1	A	463	ARG
1	A	510	THR
1	A	549	THR
1	A	576	TRP
1	A	582	ASP
1	A	600	ARG
1	A	613	ARG
1	A	644	ARG
1	A	682	ASP
1	A	712	MET
1	A	766	SER
1	A	791	GLN

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	A	807	GLU
1	A	827	VAL
1	A	836	GLN
1	A	839	ASN
1	A	842	GLN
1	A	851	ASP
1	A	927	GLU
1	A	937	ARG
1	A	940	LEU
1	A	942	ASP
1	A	967	GLU
1	A	981	LYS
1	A	982	VAL
1	A	997	THR
1	A	1025	LEU
1	A	1060	VAL
1	A	1067	ARG
1	A	1092	LYS
1	A	1107	GLU
1	A	1109	MET
1	A	1111	MET
1	A	1113	THR
1	A	1119	PHE
1	A	1120	ASP
1	A	1129	SER
1	A	1130	ASP
1	B	1	MET
1	B	2	ASN
1	B	42	PHE
1	B	44	ARG
1	B	70	ILE
1	B	110	SER
1	B	118	ASP
1	B	120	ILE
1	B	226	HIS
1	B	248	ASN
1	B	252	SER
1	B	254	LEU
1	B	273	ASN
1	B	294	ARG
1	B	295	VAL
1	B	326	GLN

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	B	357	MET
1	B	377	ASP
1	B	387	VAL
1	B	393	SER
1	B	419	PHE
1	B	451	ASP
1	B	462	ILE
1	B	463	ARG
1	B	507	SER
1	B	510	THR
1	B	549	THR
1	B	576	TRP
1	B	582	ASP
1	B	600	ARG
1	B	613	ARG
1	B	616	ASN
1	B	621	LYS
1	B	682	ASP
1	B	712	MET
1	B	766	SER
1	B	791	GLN
1	B	807	GLU
1	B	827	VAL
1	B	836	GLN
1	B	839	ASN
1	B	842	GLN
1	B	851	ASP
1	B	927	GLU
1	B	937	ARG
1	B	940	LEU
1	B	942	ASP
1	B	967	GLU
1	B	981	LYS
1	B	982	VAL
1	B	997	THR
1	B	1025	LEU
1	B	1060	VAL
1	B	1067	ARG
1	B	1105	ILE
1	B	1107	GLU
1	B	1109	MET
1	B	1111	MET

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Mol	Chain	Res	Type
1	B	1113	THR
1	B	1119	PHE
1	B	1120	ASP
1	B	1129	SER
1	B	1130	ASP

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	43	HIS
1	A	68	ASN
1	A	82	HIS
1	A	112	HIS
1	A	223	ASN
1	A	292	ASN
1	A	312	GLN
1	A	333	GLN
1	A	383	GLN
1	A	415	ASN
1	A	479	ASN
1	A	746	ASN
1	A	797	GLN
1	A	821	ASN
1	A	830	HIS
1	B	43	HIS
1	B	68	ASN
1	B	82	HIS
1	B	112	HIS
1	B	223	ASN
1	B	292	ASN
1	B	312	GLN
1	B	333	GLN
1	B	383	GLN
1	B	415	ASN
1	B	479	ASN
1	B	616	ASN
1	B	746	ASN
1	B	797	GLN
1	B	821	ASN
1	B	830	HIS

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

There are no non-standard protein/DNA/RNA residues in this entry.

## 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 6 ligands modelled in this entry, 2 are monoatomic - leaving 4 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
3	FLC	A	2001	-	12,12,12	1.49	1 (8%)	17,17,17	2.18	8 (47%)
2	2BA	B	1202	-	18,24,50	1.24	3 (16%)	18,35,78	1.54	2 (11%)
3	FLC	B	1203	-	12,12,12	1.22	0	17,17,17	2.21	4 (23%)
2	2BA	A	2000	-	18,24,50	1.30	3 (16%)	18,35,78	1.48	3 (16%)

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
3	FLC	A	2001	-	-	2/16/16/16	-
2	2BA	B	1202	-	-	0/3/25/62	0/3/3/7
3	FLC	B	1203	-	-	0/16/16/16	-
2	2BA	A	2000	-	-	0/3/25/62	0/3/3/7

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	2001	FLC	CG-CB	3.54	1.58	1.53
2	A	2000	2BA	C2'-C1'	-2.30	1.50	1.53
2	B	1202	2BA	C2'-C1'	-2.22	1.50	1.53
2	A	2000	2BA	C5-C4	2.19	1.46	1.40
2	B	1202	2BA	C2-N3	2.16	1.35	1.32
2	B	1202	2BA	C5-C4	2.07	1.46	1.40
2	A	2000	2BA	C2-N3	2.01	1.35	1.32

All (17) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	1203	FLC	OB2-CBC-CB	6.08	123.61	113.05
3	A	2001	FLC	OHB-CB-CA	-4.16	99.67	109.40
2	B	1202	2BA	C1'-N9-C4	-3.75	120.05	126.64
2	A	2000	2BA	O5'-C5'-C4'	3.75	121.75	108.99
3	B	1203	FLC	OB1-CBC-CB	-3.70	117.01	122.25
3	A	2001	FLC	OB2-CBC-CB	3.51	119.14	113.05
2	B	1202	2BA	N3-C2-N1	-3.49	123.23	128.68
3	A	2001	FLC	CG-CB-CA	3.26	117.66	109.16
2	A	2000	2BA	N3-C2-N1	-3.22	123.65	128.68
3	B	1203	FLC	OG1-CGC-CG	-3.11	113.86	122.94
3	B	1203	FLC	OG2-CGC-CG	2.77	123.23	114.35
3	A	2001	FLC	OG2-CGC-CG	2.62	122.77	114.35
3	A	2001	FLC	OB1-CBC-CB	-2.56	118.62	122.25
3	A	2001	FLC	OA2-CAC-CA	2.49	122.34	114.35
2	A	2000	2BA	C4-C5-N7	-2.47	106.82	109.40
3	A	2001	FLC	OA2-CAC-OA1	-2.36	117.42	123.30
3	A	2001	FLC	OG2-CGC-OG1	-2.07	118.13	123.30

There are no chirality outliers.

All (2) torsion outliers are listed below:

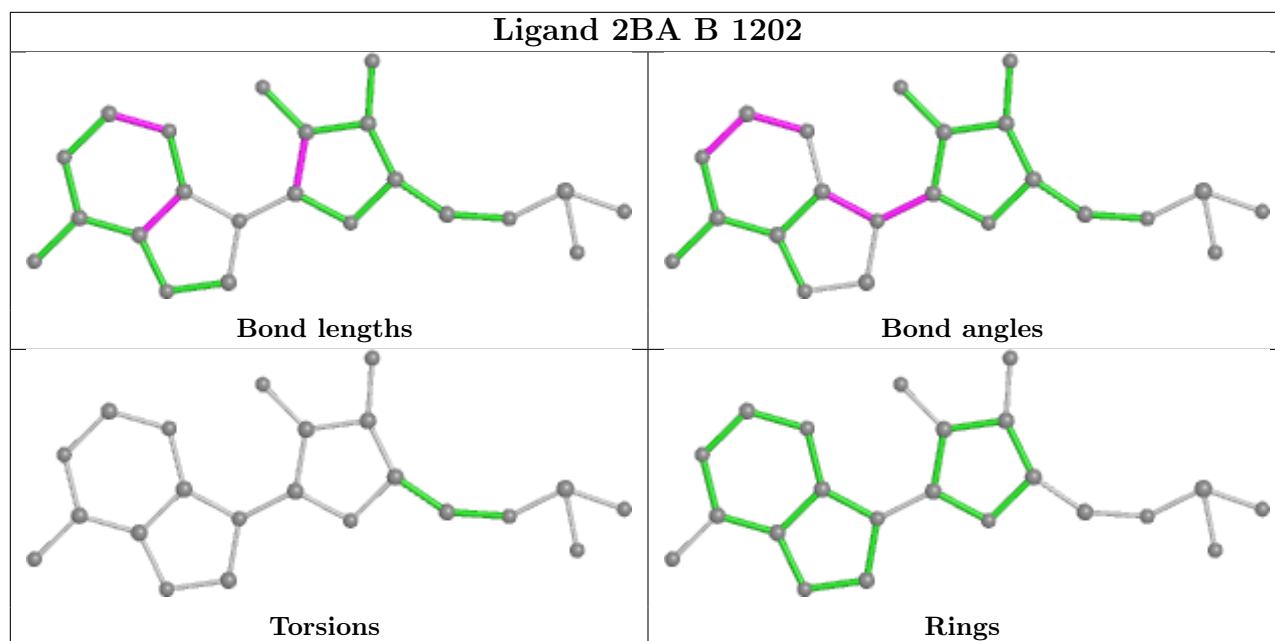
Mol	Chain	Res	Type	Atoms
3	A	2001	FLC	CB-CG-CGC-OG2
3	A	2001	FLC	CB-CG-CGC-OG1

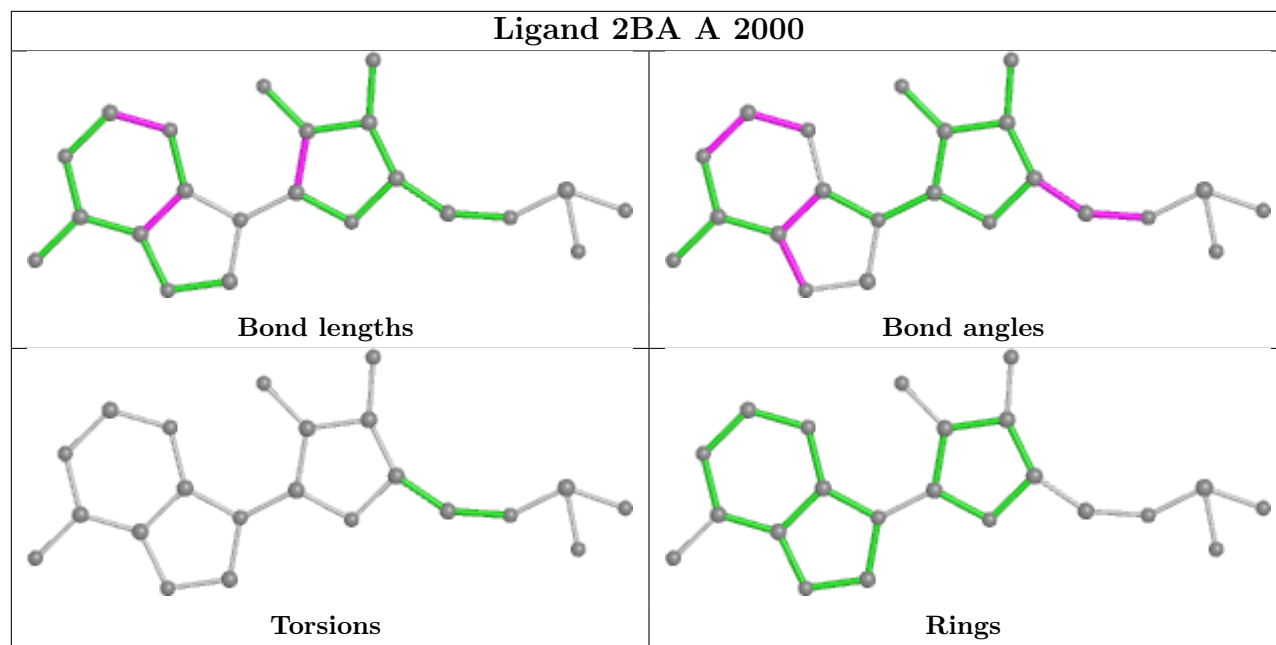
There are no ring outliers.

3 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	1202	2BA	0	1
3	B	1203	FLC	1	0
2	A	2000	2BA	0	1

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, 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	1073/1147 (93%)	0.00	39 (3%) 42 42	47, 73, 115, 152	0
1	B	1073/1147 (93%)	-0.14	37 (3%) 45 45	34, 64, 104, 140	0
All	All	2146/2294 (93%)	-0.07	76 (3%) 44 44	34, 68, 109, 152	0

All (76) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	906	PHE	5.7
1	B	1120	ASP	4.7
1	A	904	ILE	4.5
1	B	135	PRO	4.5
1	A	903	THR	4.4
1	A	934	LEU	4.2
1	B	1123	VAL	4.0
1	B	1100	GLY	4.0
1	A	502	TYR	3.9
1	A	207	MET	3.7
1	A	1090	VAL	3.6
1	B	1096	SER	3.3
1	B	287	TYR	3.3
1	A	905	ASP	3.3
1	A	135	PRO	3.2
1	A	1102	PRO	3.2
1	A	898	TYR	3.2
1	B	207	MET	3.2
1	A	936	GLY	3.1
1	A	1100	GLY	3.1
1	B	1097	VAL	3.1
1	A	886	PHE	3.1
1	A	933	VAL	3.0
1	B	134	ILE	3.0

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	B	210	LYS	2.9
1	B	835	GLY	2.9
1	A	897	VAL	2.9
1	A	528	LYS	2.9
1	B	1105	ILE	2.8
1	A	1118	PRO	2.8
1	B	1115	ILE	2.8
1	A	1120	ASP	2.8
1	A	620	TYR	2.7
1	B	1066	ALA	2.7
1	B	208	ASN	2.7
1	B	1113	THR	2.7
1	B	1141	ILE	2.6
1	B	1108	ALA	2.5
1	A	902	ASP	2.5
1	B	368	SER	2.4
1	B	1091	VAL	2.4
1	B	288	PHE	2.4
1	A	1096	SER	2.4
1	B	1143	VAL	2.4
1	A	503	GLY	2.4
1	B	1142	GLU	2.4
1	B	1116	GLN	2.4
1	A	937	ARG	2.3
1	B	874	THR	2.3
1	B	289	ILE	2.3
1	A	368	SER	2.3
1	A	1119	PHE	2.3
1	A	287	TYR	2.3
1	B	502	TYR	2.3
1	A	504	SER	2.2
1	B	1118	PRO	2.2
1	B	280	LEU	2.2
1	B	1103	LEU	2.2
1	B	1102	PRO	2.2
1	A	773	THR	2.2
1	A	1092	LYS	2.2
1	B	369	THR	2.2
1	A	206	VAL	2.2
1	A	1097	VAL	2.2
1	B	1088	GLN	2.1
1	B	1090	VAL	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	820	LEU	2.1
1	B	127	LEU	2.1
1	B	1119	PHE	2.1
1	A	896	ASP	2.1
1	B	1114	THR	2.1
1	A	398	LEU	2.0
1	A	935	LYS	2.0
1	A	966	TYR	2.0
1	A	835	GLY	2.0
1	A	399	CYS	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](#)

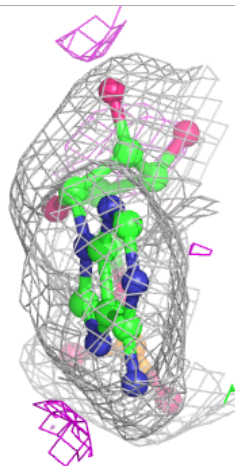
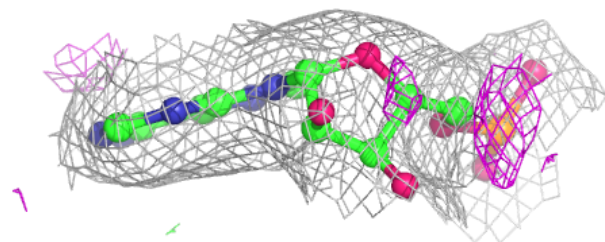
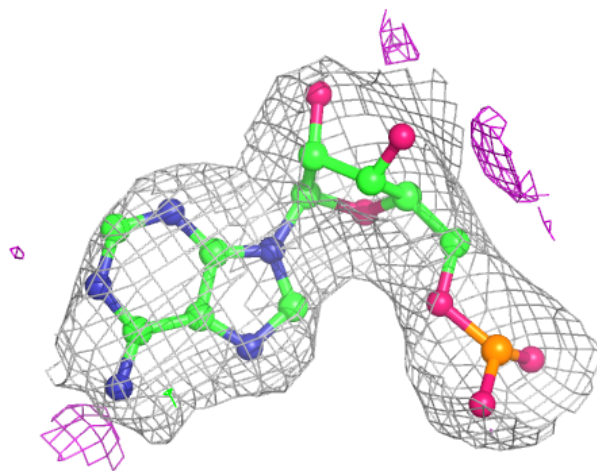
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q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

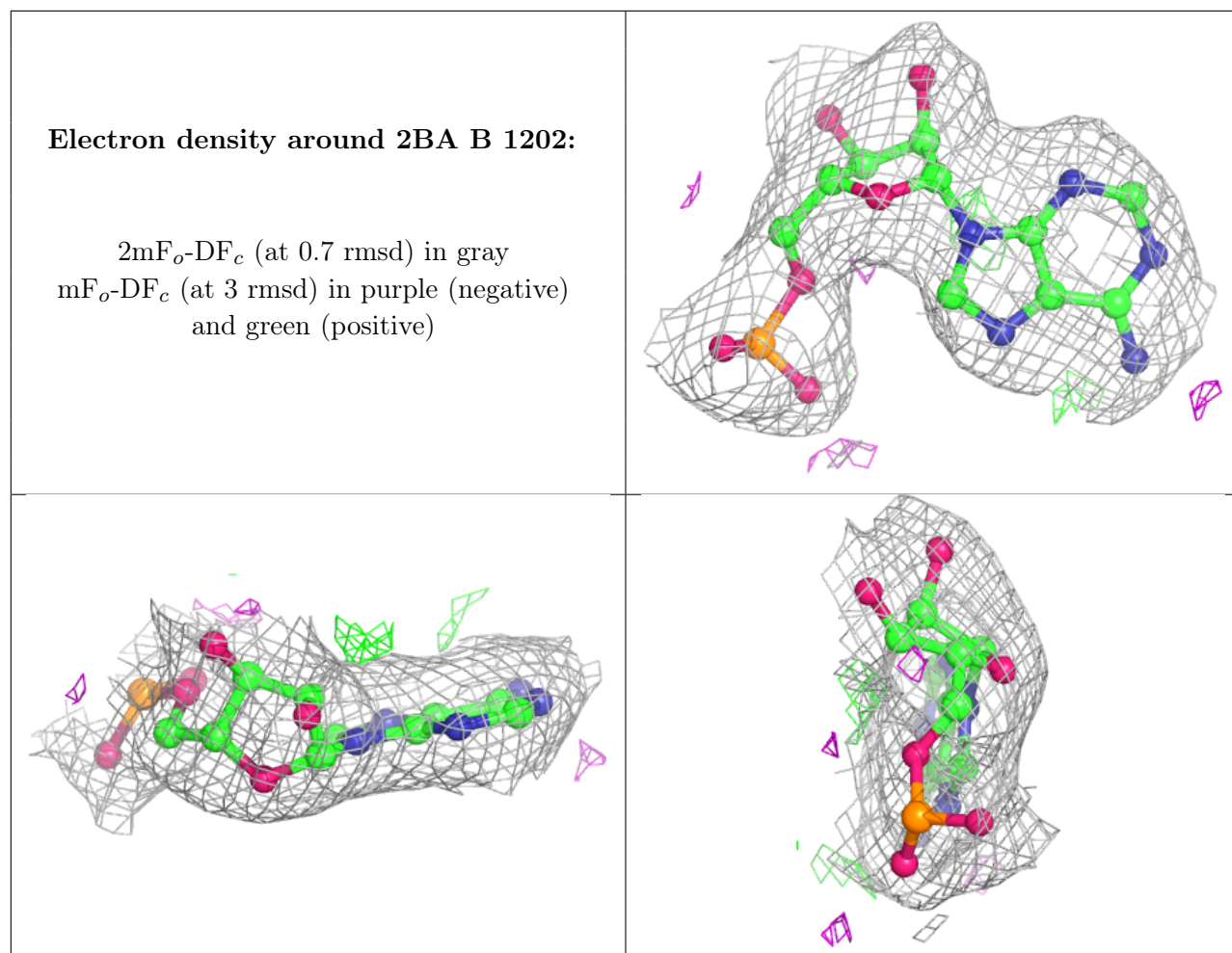
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
3	FLC	A	2001	13/13	0.92	0.13	73,82,88,91	0
3	FLC	B	1203	13/13	0.93	0.13	64,78,86,87	0
2	2BA	A	2000	22/44	0.97	0.12	52,62,76,79	0
4	MN	B	1201	1/1	0.97	0.27	65,65,65,65	0
2	2BA	B	1202	22/44	0.98	0.10	41,49,53,54	0
4	MN	A	2002	1/1	0.99	0.28	91,91,91,91	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 2BA A 2000:**

$2mF_o-DF_c$  (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.