



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 09:48 PM UTC

PDB ID : 6TZ6 / pdb\_00006tz6  
Title : Crystal Structure of Candida Albicans Calcineurin A, Calcineurin B, FKBP12 and FK506 (Tacrolimus)  
Authors : Fox III, D.; Lukacs, C.M.  
Deposited on : 2019-08-10  
Resolution : 2.55 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 : 4-5-2 with Phenix2.0  
Mogul : 2022.3.0, CSD as543be (2022)  
Xtrriage (Phenix) : 2.0  
EDS : 3.0  
Buster-report : wwPDB partial adaption of 1.1.7 (2018)  
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)  
CCP4 : 9.0.010 (Gargrove)  
Density-Fitness : 1.0.12  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.49

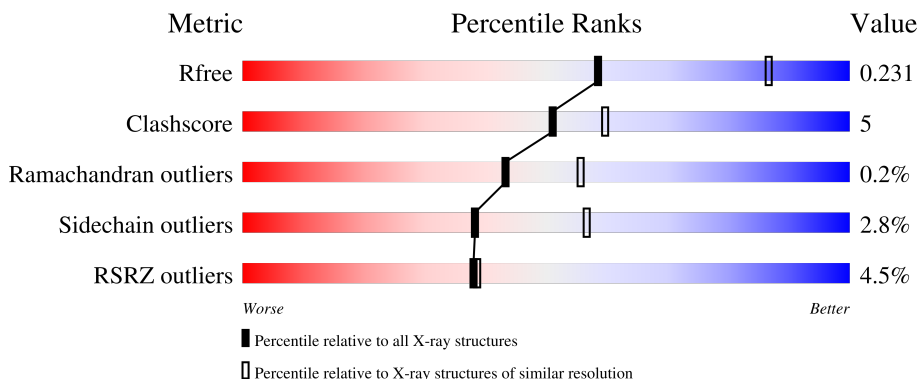
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.55 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



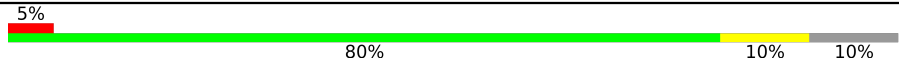
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	180053	1091 (2.54-2.54)
Clashscore	190562	1120 (2.54-2.54)
Ramachandran outliers	187476	1106 (2.54-2.54)
Sidechain outliers	187428	1106 (2.54-2.54)
RSRZ outliers	180081	1091 (2.54-2.54)

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	411	 77% 10% 12%
1	D	411	 72% 14% 14%
2	B	173	 72% 9% 18%
2	E	173	 72% 12% 16%
3	C	127	 85% 5% 9%

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Mol	Chain	Length	Quality of chain
3	F	127	 <p>A horizontal bar chart representing the quality of chain. The bar is divided into four segments: a small red segment at the beginning labeled '5%', a large green segment labeled '80%', a small yellow segment labeled '10%', and a small grey segment at the end labeled '10%'.</p>

## 2 Entry composition [i](#)

There are 10 unique types of molecules in this entry. The entry contains 9858 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 Serine/threonine-protein phosphatase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	361	2928	1890	488	530	20	0	5	0
1	D	352	2821	1822	467	514	18	0	3	0

There are 38 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	35	MET	-	expression tag	UNP C4YFI3
A	36	GLY	-	expression tag	UNP C4YFI3
A	37	SER	-	expression tag	UNP C4YFI3
A	38	SER	-	expression tag	UNP C4YFI3
A	39	HIS	-	expression tag	UNP C4YFI3
A	40	HIS	-	expression tag	UNP C4YFI3
A	41	HIS	-	expression tag	UNP C4YFI3
A	42	HIS	-	expression tag	UNP C4YFI3
A	43	HIS	-	expression tag	UNP C4YFI3
A	44	HIS	-	expression tag	UNP C4YFI3
A	45	SER	-	expression tag	UNP C4YFI3
A	46	SER	-	expression tag	UNP C4YFI3
A	47	GLY	-	expression tag	UNP C4YFI3
A	48	LEU	-	expression tag	UNP C4YFI3
A	49	VAL	-	expression tag	UNP C4YFI3
A	50	PRO	-	expression tag	UNP C4YFI3
A	51	ARG	-	expression tag	UNP C4YFI3
A	52	GLY	-	expression tag	UNP C4YFI3
A	53	SER	-	expression tag	UNP C4YFI3
D	35	MET	-	expression tag	UNP C4YFI3
D	36	GLY	-	expression tag	UNP C4YFI3
D	37	SER	-	expression tag	UNP C4YFI3
D	38	SER	-	expression tag	UNP C4YFI3
D	39	HIS	-	expression tag	UNP C4YFI3
D	40	HIS	-	expression tag	UNP C4YFI3

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Chain	Residue	Modelled	Actual	Comment	Reference
D	41	HIS	-	expression tag	UNP C4YFI3
D	42	HIS	-	expression tag	UNP C4YFI3
D	43	HIS	-	expression tag	UNP C4YFI3
D	44	HIS	-	expression tag	UNP C4YFI3
D	45	SER	-	expression tag	UNP C4YFI3
D	46	SER	-	expression tag	UNP C4YFI3
D	47	GLY	-	expression tag	UNP C4YFI3
D	48	LEU	-	expression tag	UNP C4YFI3
D	49	VAL	-	expression tag	UNP C4YFI3
D	50	PRO	-	expression tag	UNP C4YFI3
D	51	ARG	-	expression tag	UNP C4YFI3
D	52	GLY	-	expression tag	UNP C4YFI3
D	53	SER	-	expression tag	UNP C4YFI3

- Molecule 2 is a protein called Calcineurin subunit B.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	141	1012	641	164	202	5	0	0	0
2	E	146	1034	653	166	209	6	0	0	0

- Molecule 3 is a protein called FK506-binding protein 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	C	116	814	519	133	161	1	0	1	0
3	F	114	820	522	137	160	1	0	1	0

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	-2	GLY	-	expression tag	UNP P28870
C	-1	SER	-	expression tag	UNP P28870
C	0	HIS	-	expression tag	UNP P28870
F	-2	GLY	-	expression tag	UNP P28870
F	-1	SER	-	expression tag	UNP P28870
F	0	HIS	-	expression tag	UNP P28870

- Molecule 4 is PHOSPHATE ION (CCD ID: PO4) (formula: O<sub>4</sub>P).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total O P 5 4 1	0	0
4	D	1	Total O P 5 4 1	0	0
4	D	1	Total O P 5 4 1	0	0

- Molecule 5 is ZINC ION (CCD ID: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total Zn 1 1	0	0
5	D	1	Total Zn 1 1	0	0

- Molecule 6 is FE (III) ION (CCD ID: FE) (formula: Fe).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	1	Total Fe 1 1	0	0
6	D	1	Total Fe 1 1	0	0

- Molecule 7 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: C<sub>2</sub>H<sub>6</sub>O<sub>2</sub>).

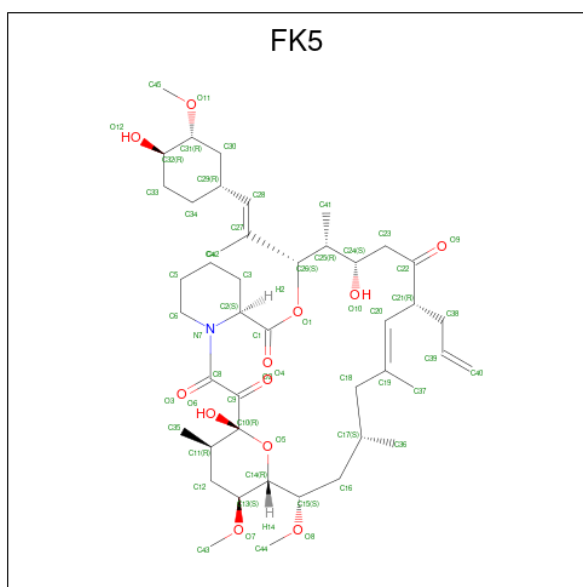


Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	1	Total C O 4 2 2	0	0
7	D	1	Total C O 4 2 2	0	0

- Molecule 8 is CALCIUM ION (CCD ID: CA) (formula: Ca).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	B	3	Total Ca 3 3	0	0
8	E	4	Total Ca 4 4	0	0

- Molecule 9 is 8-DEETHYL-8-[BUT-3-ENYL]-ASCOMYCIN (CCD ID: FK5) (formula: C<sub>44</sub>H<sub>69</sub>NO<sub>12</sub>) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	
9	C	1	Total	C	N	O	0	0
			57	44	1	12		
9	F	1	Total	C	N	O	0	0
			57	44	1	12		

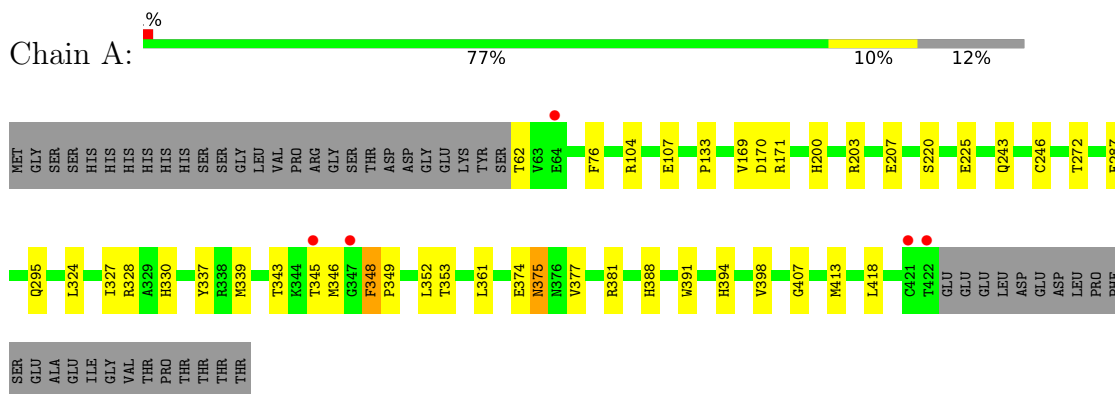
- Molecule 10 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
10	A	165	Total	O	0	0
			165	165		
10	B	7	Total	O	0	0
			7	7		
10	C	5	Total	O	0	0
			5	5		
10	D	92	Total	O	0	0
			92	92		
10	E	4	Total	O	0	0
			4	4		
10	F	8	Total	O	0	0
			8	8		

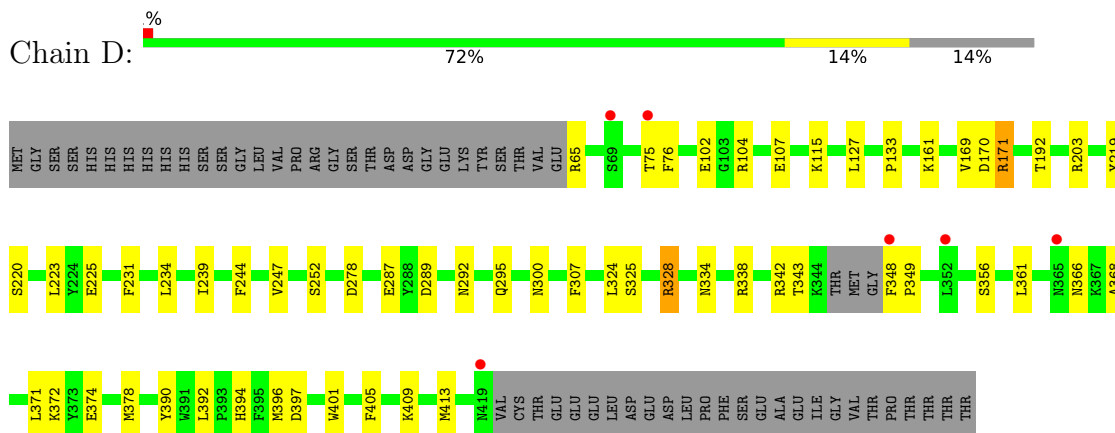
### 3 Residue-property plots [i](#)

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.

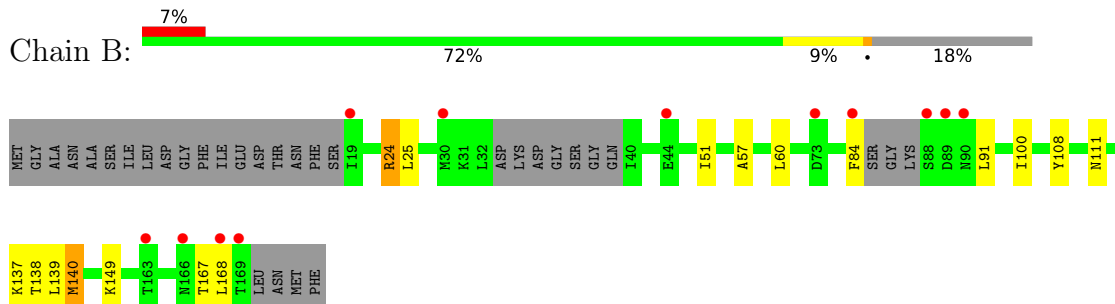
- Molecule 1: Serine/threonine-protein phosphatase



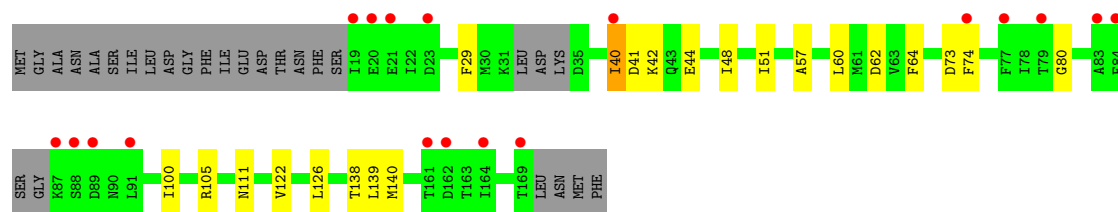
- Molecule 1: Serine/threonine-protein phosphatase



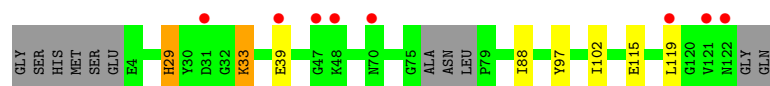
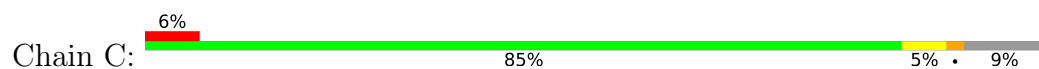
- Molecule 2: Calcineurin subunit B



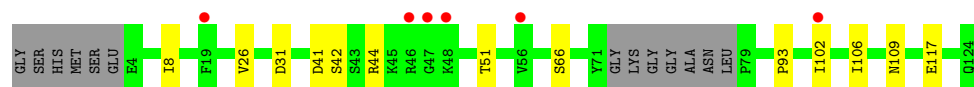
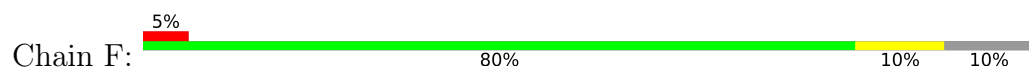
- Molecule 2: Calcineurin subunit B



- Molecule 3: FK506-binding protein 1



- Molecule 3: FK506-binding protein 1



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	62.47Å 142.85Å 175.61Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	35.00 – 2.55 35.00 – 2.55	Depositor EDS
% Data completeness (in resolution range)	98.5 (35.00-2.55) 98.5 (35.00-2.55)	Depositor EDS
$R_{merge}$	0.08	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.41 (at 2.54Å)	Xtrriage
Refinement program	PHENIX	Depositor
R, $R_{free}$	0.182 , 0.229 0.185 , 0.231	Depositor DCC
$R_{free}$ test set	2000 reflections (3.83%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	36.0	Xtrriage
Anisotropy	0.479	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.31 , 63.5	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	9858	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	52.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.79% 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: ZN, FE, FK5, EDO, CA, PO4

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	0.43	0/3029	0.60	0/4119
1	D	0.35	0/2914	0.53	0/3968
2	B	0.28	0/1022	0.43	0/1383
2	E	0.24	0/1045	0.39	0/1414
3	C	0.28	0/834	0.49	0/1144
3	F	0.25	0/840	0.41	0/1149
All	All	0.35	0/9684	0.52	0/13177

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	2928	0	2804	28	0
1	D	2821	0	2651	36	0
2	B	1012	0	882	13	0
2	E	1034	0	884	19	0
3	C	814	0	754	4	0
3	F	820	0	776	7	0
4	A	5	0	0	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	D	10	0	0	0	0
5	A	1	0	0	0	0
5	D	1	0	0	0	0
6	A	1	0	0	0	0
6	D	1	0	0	0	0
7	A	4	0	6	0	0
7	D	4	0	6	1	0
8	B	3	0	0	0	0
8	E	4	0	0	0	0
9	C	57	0	69	0	0
9	F	57	0	69	4	0
10	A	165	0	0	3	0
10	B	7	0	0	0	0
10	C	5	0	0	0	0
10	D	92	0	0	1	0
10	E	4	0	0	0	0
10	F	8	0	0	0	0
All	All	9858	0	8901	96	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 (96) 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:343:THR:HG22	1:A:345:THR:H	1.41	0.84
1:A:348:PHE:HD1	1:A:349:PRO:HD2	1.55	0.71
1:A:413:MET:HE1	2:B:57:ALA:HA	1.74	0.68
1:D:413:MET:HE2	2:E:60:LEU:HD23	1.74	0.68
1:D:203[A]:ARG:NH1	1:D:225:GLU:OE2	2.30	0.65
1:A:203[B]:ARG:NH2	1:A:225:GLU:OE2	2.31	0.63
1:D:171:ARG:HD3	1:D:361:LEU:HD21	1.80	0.62
2:B:84:PHE:HD1	2:B:168:LEU:HB3	1.66	0.60
1:D:334:ASN:HA	1:D:366:ASN:HB2	1.84	0.59
1:D:397:ASP:HB2	2:E:138:THR:HG23	1.84	0.58
2:B:111:ASN:HA	2:B:139:LEU:HD11	1.85	0.58
1:D:102:GLU:OE1	10:D:601:HOH:O	2.17	0.57
1:D:371:LEU:HD11	1:D:378:MET:HG3	1.86	0.57
1:A:413:MET:HE3	2:B:51:ILE:HG23	1.86	0.57
1:A:407:GLY:HA3	2:B:167:THR:HG21	1.87	0.57
2:E:111:ASN:HA	2:E:139:LEU:HD11	1.87	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:413:MET:HE3	2:E:51:ILE:HD13	1.88	0.55
1:D:107:GLU:OE2	1:D:220:SER:OG	2.20	0.55
2:B:108:TYR:CG	2:B:149:LYS:HE2	2.42	0.55
1:D:413:MET:HE1	2:E:57:ALA:HA	1.88	0.55
1:A:171:ARG:HD3	1:A:361:LEU:HD21	1.89	0.54
1:D:289:ASP:OD2	1:D:338:ARG:NH2	2.34	0.53
1:D:115:LYS:HE2	7:D:505:EDO:H12	1.91	0.53
1:D:231:PHE:HA	1:D:234:LEU:HD12	1.90	0.53
2:E:73:ASP:OD1	2:E:74:PHE:N	2.42	0.53
2:E:40:ILE:O	2:E:44:GLU:HB2	2.08	0.53
3:F:44:ARG:NH2	3:F:117:GLU:OE1	2.42	0.51
2:E:122:VAL:HG11	2:E:126:LEU:HB2	1.92	0.51
1:A:337:TYR:HA	1:A:353:THR:O	2.12	0.50
1:A:76:PHE:CD1	1:A:104:ARG:HG3	2.48	0.49
1:A:391:TRP:CE2	2:B:137:LYS:HE3	2.47	0.49
1:A:348:PHE:CD1	1:A:349:PRO:HD2	2.42	0.49
1:A:133:PRO:HB3	1:A:374:GLU:HB3	1.94	0.49
1:A:169:VAL:O	1:A:170:ASP:HB2	2.13	0.48
2:E:29:PHE:CE1	2:E:40:ILE:HD13	2.48	0.48
1:A:243:GLN:HB3	1:A:324:LEU:HD22	1.94	0.48
1:D:76:PHE:CZ	2:E:140:MET:HG2	2.48	0.48
2:E:41:ASP:OD1	2:E:42:LYS:N	2.47	0.48
3:C:88:ILE:HG12	3:C:115:GLU:HG3	1.95	0.47
1:D:401:TRP:CZ2	9:F:200:FK5:H401	2.49	0.47
1:D:76:PHE:CD1	1:D:104:ARG:HG3	2.50	0.47
1:D:413:MET:HE3	2:E:51:ILE:HG23	1.96	0.47
1:D:244:PHE:HD1	1:D:325:SER:HB3	1.80	0.46
1:D:324:LEU:HD23	1:D:348:PHE:CD2	2.50	0.46
3:F:8:ILE:HD11	3:F:66:SER:HA	1.97	0.46
2:B:84:PHE:CD1	2:B:168:LEU:HB3	2.48	0.46
1:A:374:GLU:O	1:A:377:VAL:N	2.36	0.46
1:A:413:MET:HE2	2:B:60:LEU:HD23	1.97	0.45
1:A:343:THR:HG22	1:A:345:THR:N	2.20	0.45
2:E:40:ILE:O	2:E:41:ASP:HB3	2.15	0.45
3:F:93:PRO:HB3	3:F:109:ASN:HA	1.99	0.45
1:A:413:MET:HG2	2:B:51:ILE:HG12	1.99	0.45
1:D:76:PHE:CG	1:D:104:ARG:HG3	2.52	0.45
3:F:41:ASP:OD1	3:F:42:SER:N	2.50	0.44
1:A:388:HIS:HD2	10:A:667:HOH:O	2.00	0.44
1:D:133:PRO:HB3	1:D:374:GLU:HB3	1.98	0.44
1:D:247:VAL:O	1:D:328:ARG:HA	2.18	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:244:PHE:CD1	1:D:325:SER:HB3	2.52	0.44
1:A:287:GLU:OE1	1:A:287:GLU:N	2.49	0.44
1:A:107:GLU:OE2	1:A:220:SER:OG	2.25	0.44
3:F:26:VAL:O	3:F:51:THR:HA	2.18	0.44
1:A:203[B]:ARG:NE	10:A:601:HOH:O	2.22	0.43
3:F:102:ILE:N	3:F:106:ILE:O	2.51	0.43
2:E:126:LEU:HD23	2:E:126:LEU:HA	1.67	0.43
1:D:169:VAL:O	1:D:170:ASP:HB2	2.17	0.43
9:F:200:FK5:H29	9:F:200:FK5:H421	1.86	0.43
1:D:287:GLU:OE1	1:D:287:GLU:N	2.52	0.43
1:D:356:SER:HA	1:D:368:ALA:HB1	2.00	0.43
1:A:287:GLU:N	1:A:287:GLU:CD	2.77	0.43
1:A:398:VAL:HG22	2:B:138:THR:HG21	1.99	0.43
9:F:200:FK5:H413	9:F:200:FK5:H232	1.84	0.43
1:D:392:LEU:HD12	1:D:396:MET:O	2.19	0.43
1:D:405:PHE:CE1	1:D:409:LYS:HE3	2.54	0.43
2:E:62:ASP:O	2:E:105:ARG:NH2	2.50	0.43
3:C:29:HIS:CD2	3:C:119:LEU:HD11	2.54	0.42
1:A:246:CYS:HA	1:A:327:ILE:O	2.19	0.42
1:D:127:LEU:HD11	1:D:239:ILE:HG12	2.02	0.42
3:F:31:ASP:HA	3:F:42:SER:HA	2.02	0.42
3:C:33:LYS:HB3	3:C:39:GLU:HA	2.00	0.42
9:F:200:FK5:H21	9:F:200:FK5:H371	1.87	0.42
1:A:339:MET:HG2	1:A:352:LEU:HD13	2.02	0.42
2:B:24:ARG:NE	2:B:25:LEU:HD23	2.35	0.41
1:D:390:TYR:CZ	2:E:126:LEU:HD21	2.55	0.41
1:D:219:TYR:HB2	1:D:223:LEU:HD22	2.02	0.41
1:D:252:SER:HB2	1:D:278:ASP:HB2	2.03	0.41
1:A:200:HIS:NE2	4:A:501:PO4:O1	2.54	0.41
2:B:140:MET:HE3	2:B:140:MET:HB2	1.93	0.41
1:D:170:ASP:O	1:D:171:ARG:HB2	2.20	0.41
1:A:330:HIS:HA	10:A:604:HOH:O	2.21	0.41
1:D:300:ASN:HB2	1:D:307:PHE:C	2.46	0.41
3:C:97:TYR:CD1	3:C:102:ILE:HG12	2.56	0.40
1:D:161:LYS:HG2	1:D:192:THR:HB	2.03	0.40
2:E:40:ILE:HD12	2:E:40:ILE:HA	1.83	0.40
1:D:342:ARG:HA	1:D:349:PRO:HA	2.03	0.40
2:E:48:ILE:HB	2:E:51:ILE:HD12	2.02	0.40
2:E:64:PHE:CE1	2:E:80:GLY:HA3	2.56	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	364/411 (89%)	350 (96%)	13 (4%)	1 (0%)	36	45
1	D	351/411 (85%)	336 (96%)	14 (4%)	1 (0%)	36	45
2	B	135/173 (78%)	133 (98%)	2 (2%)	0	100	100
2	E	140/173 (81%)	137 (98%)	3 (2%)	0	100	100
3	C	113/127 (89%)	108 (96%)	5 (4%)	0	100	100
3	F	111/127 (87%)	107 (96%)	4 (4%)	0	100	100
All	All	1214/1422 (85%)	1171 (96%)	41 (3%)	2 (0%)	43	56

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	375	ASN
1	D	171	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	317/369 (86%)	305 (96%)	12 (4%)	29	44
1	D	299/369 (81%)	291 (97%)	8 (3%)	39	58
2	B	91/150 (61%)	87 (96%)	4 (4%)	25	38
2	E	92/150 (61%)	90 (98%)	2 (2%)	45	64
3	C	80/105 (76%)	78 (98%)	2 (2%)	42	60

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
3	F	83/105 (79%)	83 (100%)	0	100	100
All	All	962/1248 (77%)	934 (97%)	28 (3%)	38	55

All (28) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	62	THR
1	A	207	GLU
1	A	272	THR
1	A	295	GLN
1	A	328	ARG
1	A	346	MET
1	A	348	PHE
1	A	375	ASN
1	A	381[A]	ARG
1	A	381[B]	ARG
1	A	394	HIS
1	A	418	LEU
2	B	24	ARG
2	B	91	LEU
2	B	100	ILE
2	B	140	MET
3	C	29	HIS
3	C	33	LYS
1	D	65	ARG
1	D	75	THR
1	D	292	ASN
1	D	295	GLN
1	D	328	ARG
1	D	343	THR
1	D	372	LYS
1	D	394	HIS
2	E	40	ILE
2	E	100	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	93	GLN
1	A	112	GLN
1	A	188	ASN

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Mol	Chain	Res	Type
1	A	295	GLN
1	D	92	HIS
1	D	143	GLN
1	D	188	ASN
1	D	204	HIS
1	D	394	HIS
2	E	132	GLN
3	F	7	GLN

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

### 5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

### 5.6 Ligand geometry [i](#)

Of 18 ligands modelled in this entry, 11 are monoatomic - leaving 7 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	$\# Z  > 2$
7	EDO	A	504	-	3,3,3	0.39	0	2,2,2	0.51	0
4	PO4	A	501	6,5	4,4,4	0.81	0	6,6,6	0.74	0
9	FK5	F	200	-	54,60,60	3.52	10 (18%)	64,86,86	1.62	13 (20%)
9	FK5	C	200	-	54,60,60	3.53	11 (20%)	64,86,86	1.64	10 (15%)
4	PO4	D	504	-	4,4,4	0.89	0	6,6,6	0.54	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
7	EDO	D	505	-	3,3,3	0.57	0	2,2,2	0.24	0
4	PO4	D	501	6,5	4,4,4	0.74	0	6,6,6	1.20	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
7	EDO	A	504	-	-	0/1/1/1	-
9	FK5	F	200	-	-	4/68/114/114	0/3/4/4
7	EDO	D	505	-	-	1/1/1/1	-
9	FK5	C	200	-	-	5/68/114/114	0/3/4/4

All (21) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
9	F	200	FK5	O9-C22	11.87	1.41	1.21
9	C	200	FK5	O9-C22	11.63	1.40	1.21
9	C	200	FK5	C8-C9	-10.85	1.39	1.53
9	F	200	FK5	O4-C9	10.76	1.41	1.22
9	C	200	FK5	O4-C9	10.60	1.40	1.22
9	C	200	FK5	C20-C19	9.77	1.47	1.33
9	F	200	FK5	C8-C9	-9.73	1.41	1.53
9	F	200	FK5	C20-C19	9.48	1.46	1.33
9	F	200	FK5	O3-C8	9.10	1.41	1.23
9	C	200	FK5	O3-C8	8.15	1.39	1.23
9	F	200	FK5	O2-C1	7.70	1.40	1.21
9	C	200	FK5	O2-C1	7.39	1.39	1.21
9	C	200	FK5	C28-C27	6.00	1.46	1.33
9	F	200	FK5	C28-C27	5.66	1.46	1.33
9	F	200	FK5	O6-C10	3.64	1.45	1.39
9	F	200	FK5	O1-C1	-3.58	1.26	1.34
9	C	200	FK5	O1-C1	-3.49	1.26	1.34
9	C	200	FK5	O6-C10	3.43	1.45	1.39
9	C	200	FK5	O5-C14	-2.88	1.39	1.44
9	F	200	FK5	C40-C39	2.85	1.47	1.29
9	C	200	FK5	C40-C39	2.85	1.47	1.29

All (23) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
9	F	200	FK5	C21-C20-C19	-6.14	121.78	127.63
9	C	200	FK5	O1-C1-C2	5.43	122.08	110.80
9	F	200	FK5	O1-C1-C2	5.05	121.29	110.80
9	C	200	FK5	C21-C20-C19	-4.96	122.90	127.63
9	C	200	FK5	O1-C26-C25	4.17	110.69	105.91
9	C	200	FK5	C9-C8-N7	3.79	123.58	119.25
9	C	200	FK5	O2-C1-C2	-2.95	117.94	124.46
9	C	200	FK5	O3-C8-N7	-2.88	116.54	122.17
9	F	200	FK5	O2-C1-C2	-2.72	118.45	124.46
9	F	200	FK5	C42-C27-C26	2.62	121.12	115.96
9	F	200	FK5	C12-C11-C10	2.45	112.87	110.51
9	C	200	FK5	C5-C6-N7	-2.37	106.98	110.65
9	C	200	FK5	C42-C27-C26	2.37	120.63	115.96
9	F	200	FK5	O3-C8-C9	2.27	120.02	116.28
9	F	200	FK5	C9-C8-N7	2.27	121.84	119.25
9	F	200	FK5	O1-C26-C25	2.22	108.45	105.91
9	C	200	FK5	O1-C1-O2	-2.20	119.97	123.95
9	C	200	FK5	O3-C8-C9	2.19	119.87	116.28
9	F	200	FK5	O5-C14-C13	-2.12	106.39	109.36
9	F	200	FK5	C37-C19-C20	-2.12	119.86	123.85
9	F	200	FK5	C23-C22-C21	2.06	121.02	117.92
9	F	200	FK5	O3-C8-N7	-2.06	118.14	122.17
9	F	200	FK5	O1-C1-O2	-2.05	120.24	123.95

There are no chirality outliers.

All (10) torsion outliers are listed below:

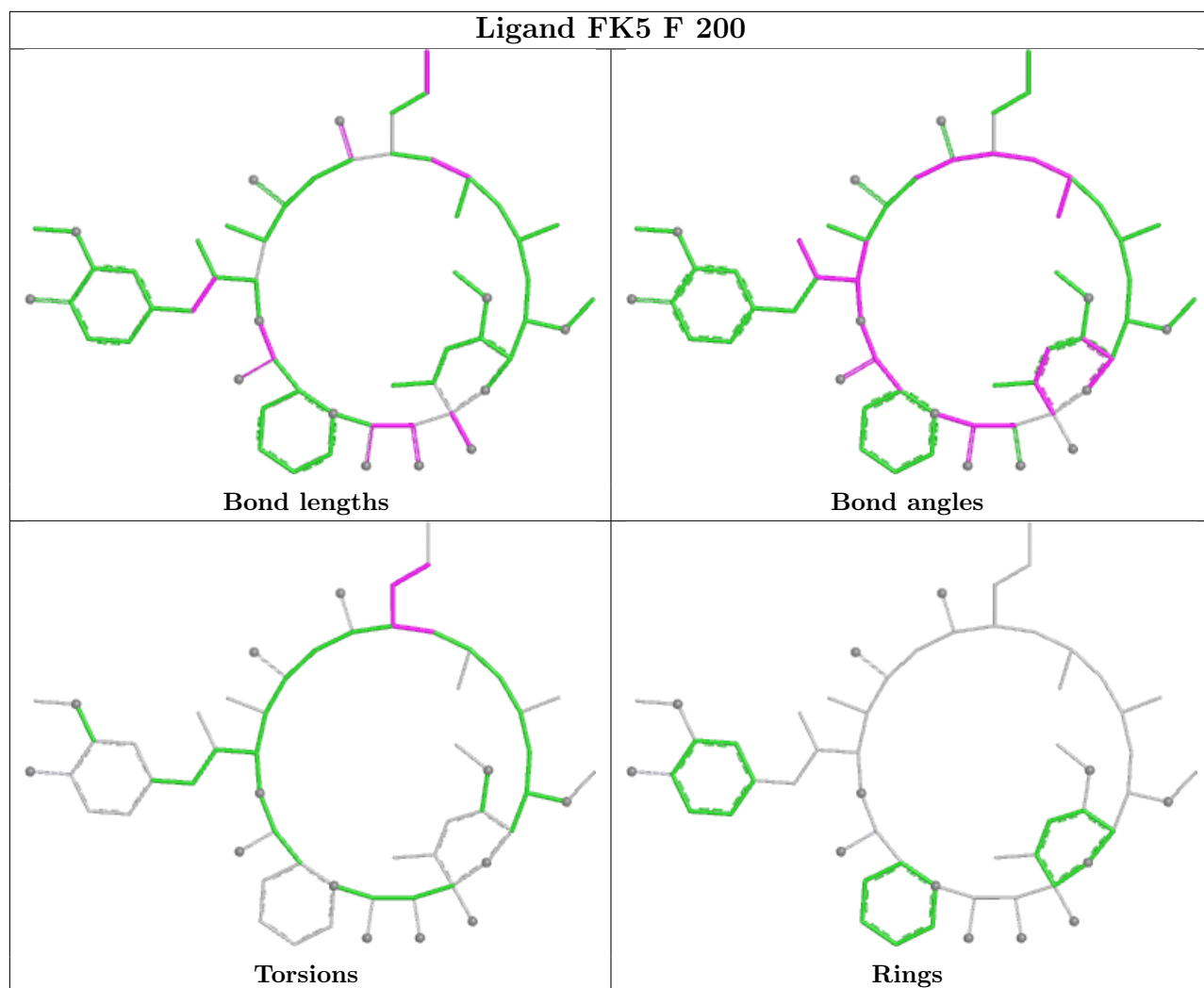
Mol	Chain	Res	Type	Atoms
9	C	200	FK5	C16-C17-C18-C19
9	F	200	FK5	C22-C21-C38-C39
9	F	200	FK5	C21-C38-C39-C40
7	D	505	EDO	O1-C1-C2-O2
9	C	200	FK5	C36-C17-C18-C19
9	C	200	FK5	C19-C20-C21-C22
9	F	200	FK5	C19-C20-C21-C22
9	C	200	FK5	C15-C16-C17-C36
9	C	200	FK5	C21-C38-C39-C40
9	F	200	FK5	C20-C21-C38-C39

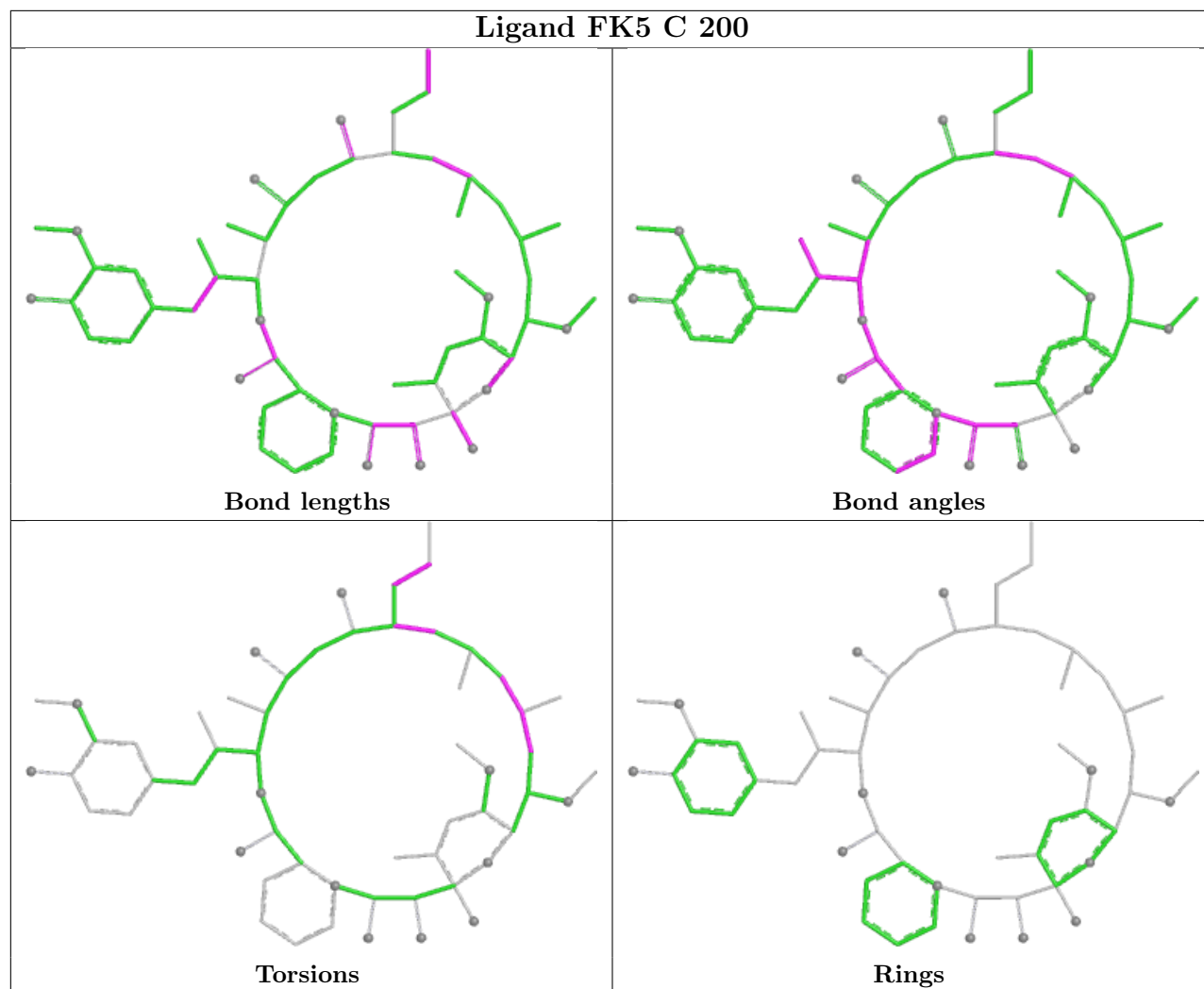
There are no ring outliers.

3 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	501	PO4	1	0
9	F	200	FK5	4	0
7	D	505	EDO	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, 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	361/411 (87%)	-0.49	5 (1%) 73 74	13, 30, 64, 123	5 (1%)
1	D	352/411 (85%)	-0.09	6 (1%) 69 69	17, 50, 80, 113	3 (0%)
2	B	141/173 (81%)	0.46	12 (8%) 16 16	29, 64, 97, 118	0
2	E	146/173 (84%)	0.67	18 (12%) 8 7	48, 75, 100, 121	0
3	C	116/127 (91%)	0.42	8 (6%) 23 22	28, 63, 98, 105	1 (0%)
3	F	114/127 (89%)	0.47	6 (5%) 32 31	41, 70, 90, 96	1 (0%)
All	All	1230/1422 (86%)	0.05	55 (4%) 38 38	13, 54, 93, 123	10 (0%)

All (55) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	90	ASN	3.1
1	A	345	THR	3.1
2	B	89	ASP	3.1
1	D	419	ASN	3.1
1	A	421	CYS	3.0
2	B	168	LEU	3.0
1	A	422	THR	3.0
2	B	84	PHE	3.0
2	E	89	ASP	2.9
2	E	169	THR	2.9
2	E	87	LYS	2.9
2	E	161	THR	2.9
3	F	48	LYS	2.8
2	B	73	ASP	2.8
3	C	47	GLY	2.7
2	E	88	SER	2.7
3	F	46[A]	ARG	2.6
2	B	163	THR	2.6
2	E	84	PHE	2.6

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Mol	Chain	Res	Type	RSRZ
2	E	79	THR	2.6
3	C	119	LEU	2.6
3	F	56	VAL	2.5
2	E	23	ASP	2.5
2	B	88	SER	2.5
1	D	75	THR	2.5
2	B	19	ILE	2.4
3	C	48	LYS	2.4
1	D	348	PHE	2.4
2	B	169	THR	2.4
2	E	20	GLU	2.4
2	E	164	ILE	2.4
3	F	47	GLY	2.3
2	B	166	ASN	2.3
3	C	70	ASN	2.3
2	E	162	ASP	2.2
3	C	31	ASP	2.2
2	B	44	GLU	2.2
2	E	91	LEU	2.2
2	E	19	ILE	2.2
1	A	64	GLU	2.2
1	D	365	ASN	2.2
2	E	21	GLU	2.2
3	C	39	GLU	2.2
3	C	122	ASN	2.1
1	D	352	LEU	2.1
2	E	83	ALA	2.1
3	F	19	PHE	2.1
2	E	74	PHE	2.1
2	E	77	PHE	2.1
2	E	40	ILE	2.1
2	B	30	MET	2.1
3	C	121	VAL	2.0
1	A	347	GLY	2.0
3	F	102	ILE	2.0
1	D	69	SER	2.0

## 6.2 Non-standard residues in protein, DNA, RNA chains

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

### 6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

### 6.4 Ligands [i](#)

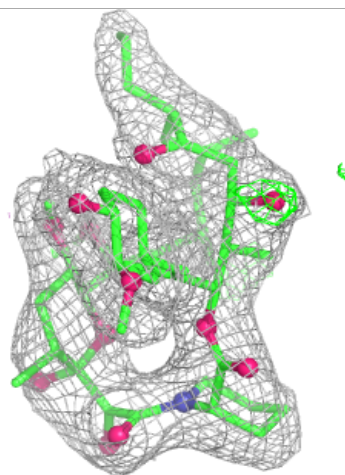
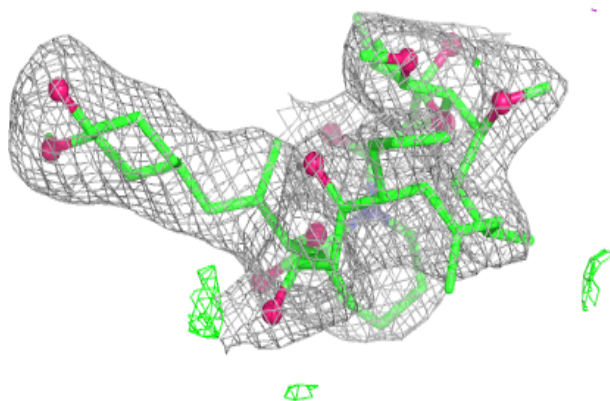
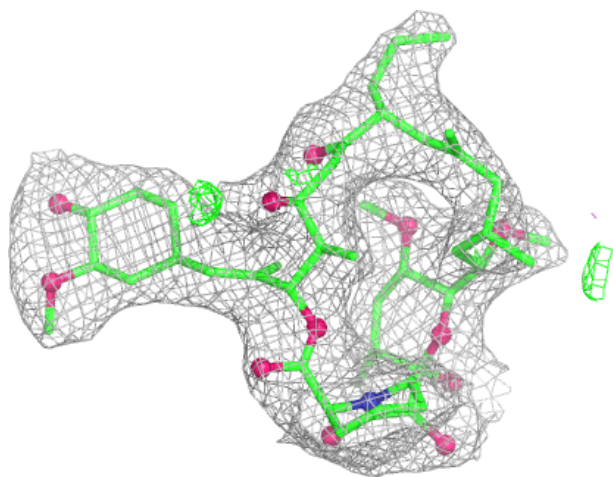
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q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

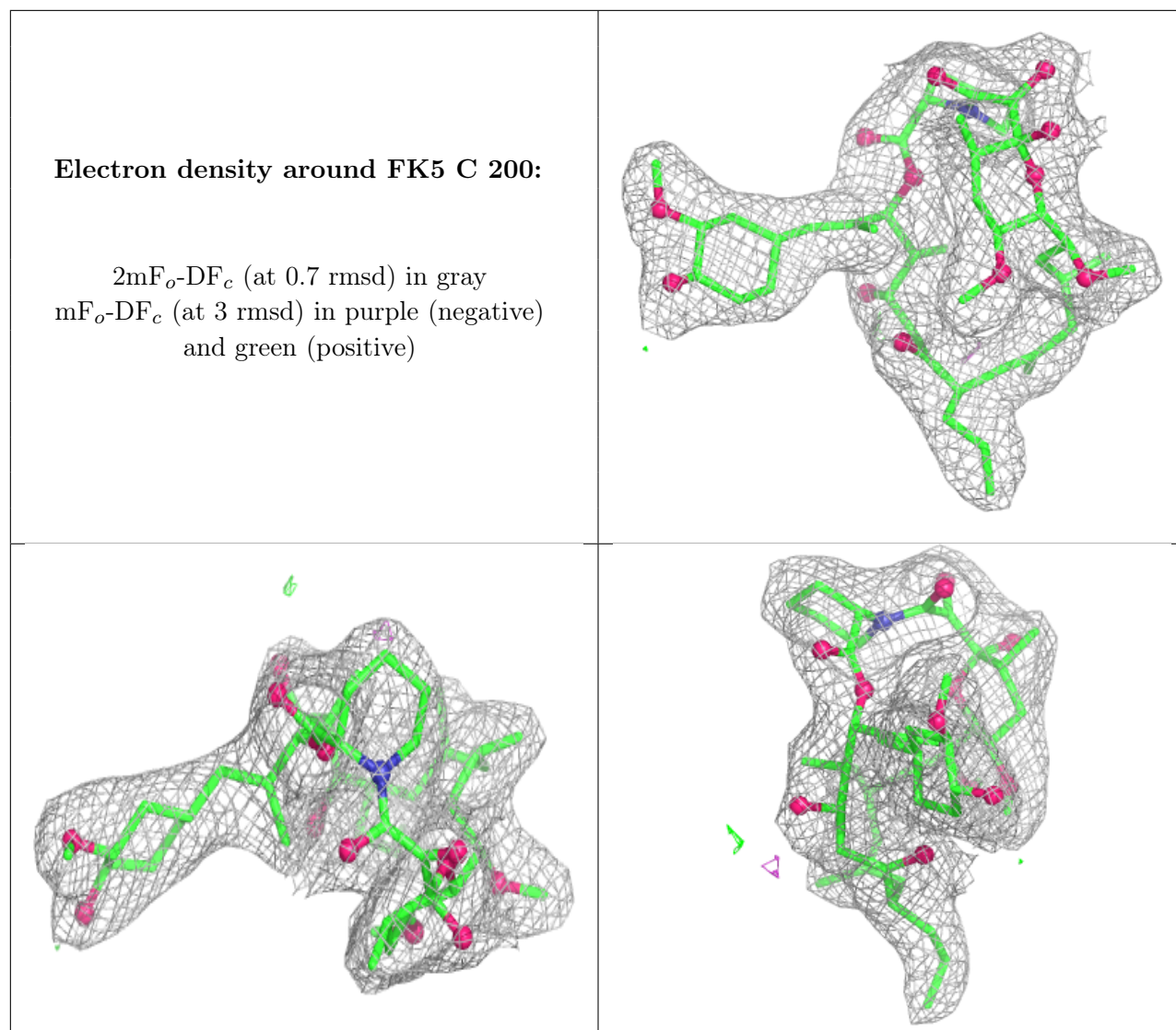
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
4	PO4	D	504	5/5	0.80	0.19	120,123,124,124	0
7	EDO	D	505	4/4	0.80	0.14	50,53,54,57	0
7	EDO	A	504	4/4	0.90	0.12	45,51,57,64	0
9	FK5	F	200	57/57	0.92	0.11	36,50,57,61	0
8	CA	E	203	1/1	0.95	0.06	80,80,80,80	0
8	CA	E	202	1/1	0.95	0.05	87,87,87,87	0
9	FK5	C	200	57/57	0.96	0.07	23,33,45,54	0
8	CA	B	202	1/1	0.97	0.05	79,79,79,79	0
8	CA	E	200	1/1	0.97	0.05	61,61,61,61	0
4	PO4	D	501	5/5	0.97	0.05	33,37,48,49	0
8	CA	E	201	1/1	0.98	0.04	67,67,67,67	0
5	ZN	D	502	1/1	0.99	0.03	46,46,46,46	0
8	CA	B	200	1/1	0.99	0.03	53,53,53,53	0
8	CA	B	201	1/1	0.99	0.03	53,53,53,53	0
6	FE	D	503	1/1	0.99	0.03	54,54,54,54	0
4	PO4	A	501	5/5	0.99	0.04	25,29,34,37	0
5	ZN	A	502	1/1	1.00	0.01	36,36,36,36	0
6	FE	A	503	1/1	1.00	0.03	41,41,41,41	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 FK5 F 200:**

$2mF_o-DF_c$  (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.