



# wwPDB X-ray Structure Validation Summary Report ⓘ

May 15, 2020 – 08:59 am BST

PDB ID : 6HXO  
Title : Structure of the citryl-CoA lyase core module of Chlorobium limicola ATP citrate lyase (space group P21)  
Authors : Verstraete, K.; Verschueren, K.  
Deposited on : 2018-10-17  
Resolution : 1.50 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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.

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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 : 2.11  
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) : 2.11

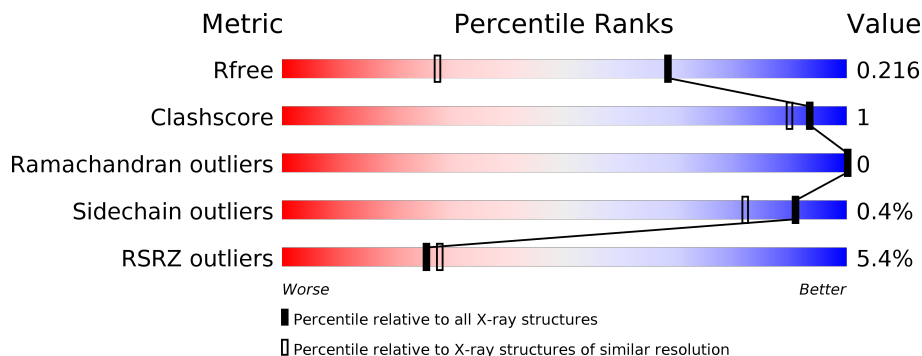
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.50 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.



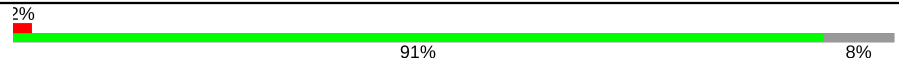
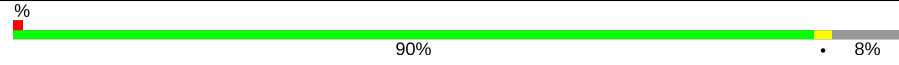
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	130704	2936 (1.50-1.50)
Clashscore	141614	3144 (1.50-1.50)
Ramachandran outliers	138981	3066 (1.50-1.50)
Sidechain outliers	138945	3064 (1.50-1.50)
RSRZ outliers	127900	2884 (1.50-1.50)

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 on 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	279	
1	B	279	
1	C	279	
1	D	279	
1	E	279	
1	F	279	

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Mol	Chain	Length	Quality of chain
1	G	279	 <p>2% 91% 8%</p>
1	H	279	 <p>% 90% 8%</p>

## 2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 16845 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-citrate lyase alpha-subunit.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	260	2011	1282	343	373	13	0	0	0
1	B	261	2035	1296	347	378	14	0	2	0
1	C	256	1988	1269	338	369	12	0	1	0
1	D	257	2003	1277	342	372	12	0	2	0
1	E	180	1379	876	235	258	10	0	0	0
1	F	260	2039	1301	346	379	13	0	3	0
1	G	256	1997	1272	340	373	12	0	2	0
1	H	256	1995	1271	339	373	12	0	2	0

There are 168 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	330	MET	-	initiating methionine	UNP Q9AJC4
A	331	GLY	-	expression tag	UNP Q9AJC4
A	332	SER	-	expression tag	UNP Q9AJC4
A	333	SER	-	expression tag	UNP Q9AJC4
A	334	HIS	-	expression tag	UNP Q9AJC4
A	335	HIS	-	expression tag	UNP Q9AJC4
A	336	HIS	-	expression tag	UNP Q9AJC4
A	337	HIS	-	expression tag	UNP Q9AJC4
A	338	HIS	-	expression tag	UNP Q9AJC4
A	339	HIS	-	expression tag	UNP Q9AJC4
A	340	SER	-	expression tag	UNP Q9AJC4
A	341	SER	-	expression tag	UNP Q9AJC4
A	342	GLY	-	expression tag	UNP Q9AJC4

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Chain	Residue	Modelled	Actual	Comment	Reference
A	343	LEU	-	expression tag	UNP Q9AJC4
A	344	VAL	-	expression tag	UNP Q9AJC4
A	345	PRO	-	expression tag	UNP Q9AJC4
A	346	ARG	-	expression tag	UNP Q9AJC4
A	347	GLY	-	expression tag	UNP Q9AJC4
A	348	SER	-	expression tag	UNP Q9AJC4
A	349	HIS	-	expression tag	UNP Q9AJC4
A	350	MET	-	expression tag	UNP Q9AJC4
B	330	MET	-	initiating methionine	UNP Q9AJC4
B	331	GLY	-	expression tag	UNP Q9AJC4
B	332	SER	-	expression tag	UNP Q9AJC4
B	333	SER	-	expression tag	UNP Q9AJC4
B	334	HIS	-	expression tag	UNP Q9AJC4
B	335	HIS	-	expression tag	UNP Q9AJC4
B	336	HIS	-	expression tag	UNP Q9AJC4
B	337	HIS	-	expression tag	UNP Q9AJC4
B	338	HIS	-	expression tag	UNP Q9AJC4
B	339	HIS	-	expression tag	UNP Q9AJC4
B	340	SER	-	expression tag	UNP Q9AJC4
B	341	SER	-	expression tag	UNP Q9AJC4
B	342	GLY	-	expression tag	UNP Q9AJC4
B	343	LEU	-	expression tag	UNP Q9AJC4
B	344	VAL	-	expression tag	UNP Q9AJC4
B	345	PRO	-	expression tag	UNP Q9AJC4
B	346	ARG	-	expression tag	UNP Q9AJC4
B	347	GLY	-	expression tag	UNP Q9AJC4
B	348	SER	-	expression tag	UNP Q9AJC4
B	349	HIS	-	expression tag	UNP Q9AJC4
B	350	MET	-	expression tag	UNP Q9AJC4
C	330	MET	-	initiating methionine	UNP Q9AJC4
C	331	GLY	-	expression tag	UNP Q9AJC4
C	332	SER	-	expression tag	UNP Q9AJC4
C	333	SER	-	expression tag	UNP Q9AJC4
C	334	HIS	-	expression tag	UNP Q9AJC4
C	335	HIS	-	expression tag	UNP Q9AJC4
C	336	HIS	-	expression tag	UNP Q9AJC4
C	337	HIS	-	expression tag	UNP Q9AJC4
C	338	HIS	-	expression tag	UNP Q9AJC4
C	339	HIS	-	expression tag	UNP Q9AJC4
C	340	SER	-	expression tag	UNP Q9AJC4
C	341	SER	-	expression tag	UNP Q9AJC4
C	342	GLY	-	expression tag	UNP Q9AJC4

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Chain	Residue	Modelled	Actual	Comment	Reference
C	343	LEU	-	expression tag	UNP Q9AJC4
C	344	VAL	-	expression tag	UNP Q9AJC4
C	345	PRO	-	expression tag	UNP Q9AJC4
C	346	ARG	-	expression tag	UNP Q9AJC4
C	347	GLY	-	expression tag	UNP Q9AJC4
C	348	SER	-	expression tag	UNP Q9AJC4
C	349	HIS	-	expression tag	UNP Q9AJC4
C	350	MET	-	expression tag	UNP Q9AJC4
D	330	MET	-	initiating methionine	UNP Q9AJC4
D	331	GLY	-	expression tag	UNP Q9AJC4
D	332	SER	-	expression tag	UNP Q9AJC4
D	333	SER	-	expression tag	UNP Q9AJC4
D	334	HIS	-	expression tag	UNP Q9AJC4
D	335	HIS	-	expression tag	UNP Q9AJC4
D	336	HIS	-	expression tag	UNP Q9AJC4
D	337	HIS	-	expression tag	UNP Q9AJC4
D	338	HIS	-	expression tag	UNP Q9AJC4
D	339	HIS	-	expression tag	UNP Q9AJC4
D	340	SER	-	expression tag	UNP Q9AJC4
D	341	SER	-	expression tag	UNP Q9AJC4
D	342	GLY	-	expression tag	UNP Q9AJC4
D	343	LEU	-	expression tag	UNP Q9AJC4
D	344	VAL	-	expression tag	UNP Q9AJC4
D	345	PRO	-	expression tag	UNP Q9AJC4
D	346	ARG	-	expression tag	UNP Q9AJC4
D	347	GLY	-	expression tag	UNP Q9AJC4
D	348	SER	-	expression tag	UNP Q9AJC4
D	349	HIS	-	expression tag	UNP Q9AJC4
D	350	MET	-	expression tag	UNP Q9AJC4
E	330	MET	-	initiating methionine	UNP Q9AJC4
E	331	GLY	-	expression tag	UNP Q9AJC4
E	332	SER	-	expression tag	UNP Q9AJC4
E	333	SER	-	expression tag	UNP Q9AJC4
E	334	HIS	-	expression tag	UNP Q9AJC4
E	335	HIS	-	expression tag	UNP Q9AJC4
E	336	HIS	-	expression tag	UNP Q9AJC4
E	337	HIS	-	expression tag	UNP Q9AJC4
E	338	HIS	-	expression tag	UNP Q9AJC4
E	339	HIS	-	expression tag	UNP Q9AJC4
E	340	SER	-	expression tag	UNP Q9AJC4
E	341	SER	-	expression tag	UNP Q9AJC4
E	342	GLY	-	expression tag	UNP Q9AJC4

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Chain	Residue	Modelled	Actual	Comment	Reference
E	343	LEU	-	expression tag	UNP Q9AJC4
E	344	VAL	-	expression tag	UNP Q9AJC4
E	345	PRO	-	expression tag	UNP Q9AJC4
E	346	ARG	-	expression tag	UNP Q9AJC4
E	347	GLY	-	expression tag	UNP Q9AJC4
E	348	SER	-	expression tag	UNP Q9AJC4
E	349	HIS	-	expression tag	UNP Q9AJC4
E	350	MET	-	expression tag	UNP Q9AJC4
F	330	MET	-	initiating methionine	UNP Q9AJC4
F	331	GLY	-	expression tag	UNP Q9AJC4
F	332	SER	-	expression tag	UNP Q9AJC4
F	333	SER	-	expression tag	UNP Q9AJC4
F	334	HIS	-	expression tag	UNP Q9AJC4
F	335	HIS	-	expression tag	UNP Q9AJC4
F	336	HIS	-	expression tag	UNP Q9AJC4
F	337	HIS	-	expression tag	UNP Q9AJC4
F	338	HIS	-	expression tag	UNP Q9AJC4
F	339	HIS	-	expression tag	UNP Q9AJC4
F	340	SER	-	expression tag	UNP Q9AJC4
F	341	SER	-	expression tag	UNP Q9AJC4
F	342	GLY	-	expression tag	UNP Q9AJC4
F	343	LEU	-	expression tag	UNP Q9AJC4
F	344	VAL	-	expression tag	UNP Q9AJC4
F	345	PRO	-	expression tag	UNP Q9AJC4
F	346	ARG	-	expression tag	UNP Q9AJC4
F	347	GLY	-	expression tag	UNP Q9AJC4
F	348	SER	-	expression tag	UNP Q9AJC4
F	349	HIS	-	expression tag	UNP Q9AJC4
F	350	MET	-	expression tag	UNP Q9AJC4
G	330	MET	-	initiating methionine	UNP Q9AJC4
G	331	GLY	-	expression tag	UNP Q9AJC4
G	332	SER	-	expression tag	UNP Q9AJC4
G	333	SER	-	expression tag	UNP Q9AJC4
G	334	HIS	-	expression tag	UNP Q9AJC4
G	335	HIS	-	expression tag	UNP Q9AJC4
G	336	HIS	-	expression tag	UNP Q9AJC4
G	337	HIS	-	expression tag	UNP Q9AJC4
G	338	HIS	-	expression tag	UNP Q9AJC4
G	339	HIS	-	expression tag	UNP Q9AJC4
G	340	SER	-	expression tag	UNP Q9AJC4
G	341	SER	-	expression tag	UNP Q9AJC4
G	342	GLY	-	expression tag	UNP Q9AJC4

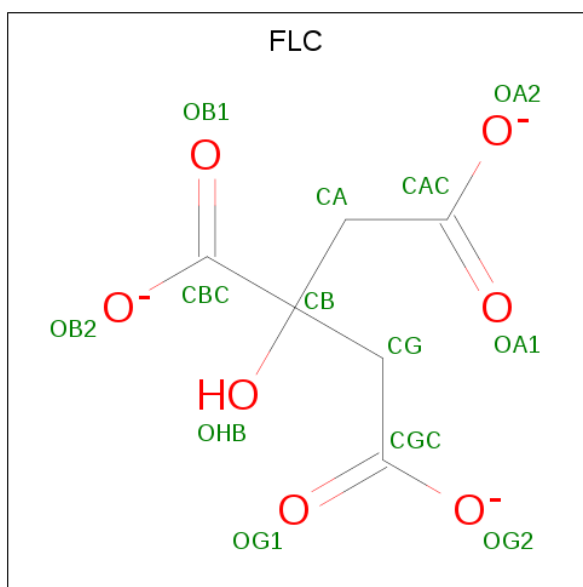
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Chain	Residue	Modelled	Actual	Comment	Reference
G	343	LEU	-	expression tag	UNP Q9AJC4
G	344	VAL	-	expression tag	UNP Q9AJC4
G	345	PRO	-	expression tag	UNP Q9AJC4
G	346	ARG	-	expression tag	UNP Q9AJC4
G	347	GLY	-	expression tag	UNP Q9AJC4
G	348	SER	-	expression tag	UNP Q9AJC4
G	349	HIS	-	expression tag	UNP Q9AJC4
G	350	MET	-	expression tag	UNP Q9AJC4
H	330	MET	-	initiating methionine	UNP Q9AJC4
H	331	GLY	-	expression tag	UNP Q9AJC4
H	332	SER	-	expression tag	UNP Q9AJC4
H	333	SER	-	expression tag	UNP Q9AJC4
H	334	HIS	-	expression tag	UNP Q9AJC4
H	335	HIS	-	expression tag	UNP Q9AJC4
H	336	HIS	-	expression tag	UNP Q9AJC4
H	337	HIS	-	expression tag	UNP Q9AJC4
H	338	HIS	-	expression tag	UNP Q9AJC4
H	339	HIS	-	expression tag	UNP Q9AJC4
H	340	SER	-	expression tag	UNP Q9AJC4
H	341	SER	-	expression tag	UNP Q9AJC4
H	342	GLY	-	expression tag	UNP Q9AJC4
H	343	LEU	-	expression tag	UNP Q9AJC4
H	344	VAL	-	expression tag	UNP Q9AJC4
H	345	PRO	-	expression tag	UNP Q9AJC4
H	346	ARG	-	expression tag	UNP Q9AJC4
H	347	GLY	-	expression tag	UNP Q9AJC4
H	348	SER	-	expression tag	UNP Q9AJC4
H	349	HIS	-	expression tag	UNP Q9AJC4
H	350	MET	-	expression tag	UNP Q9AJC4

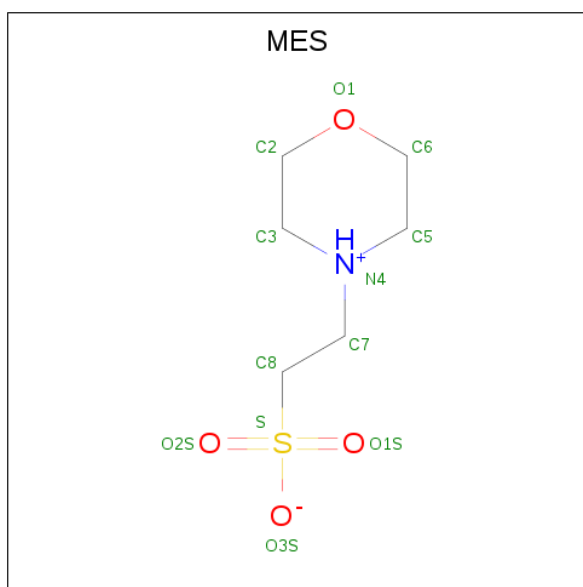
- Molecule 2 is CITRATE ANION (three-letter code: FLC) (formula: C<sub>6</sub>H<sub>5</sub>O<sub>7</sub>) (labeled as "Ligand of Interest" by author).





Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	O	0	0
			13	6	7		
2	B	1	Total	C	O	0	0
			13	6	7		
2	E	1	Total	C	O	0	0
			13	6	7		
2	F	1	Total	C	O	0	0
			13	6	7		
2	G	1	Total	C	O	0	0
			13	6	7		
2	H	1	Total	C	O	0	0
			13	6	7		

- Molecule 3 is 2-(N-MORPHOLINO)-ETHANESULFONIC ACID (three-letter code: MES) (formula: C<sub>6</sub>H<sub>13</sub>NO<sub>4</sub>S).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	S		
3	C	1	12	6	1	4	1	0	0
3	C	1	12	6	1	4	1	0	0
3	E	1	12	6	1	4	1	0	0

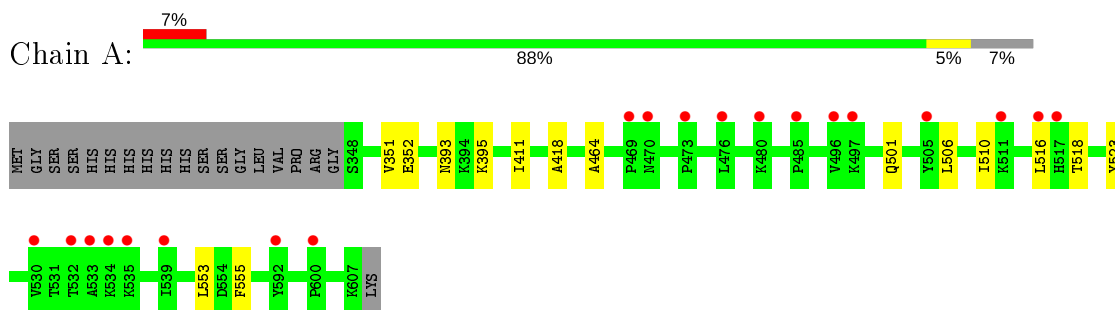
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	140	Total	O	0	0
			140	140		
4	B	201	Total	O	0	0
			201	201		
4	C	142	Total	O	0	0
			142	142		
4	D	159	Total	O	0	0
			159	159		
4	E	97	Total	O	0	0
			97	97		
4	F	168	Total	O	0	0
			168	168		
4	G	202	Total	O	0	0
			202	202		
4	H	175	Total	O	0	0
			175	175		

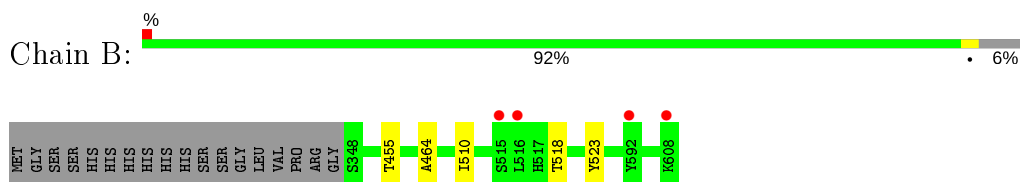
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA 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.

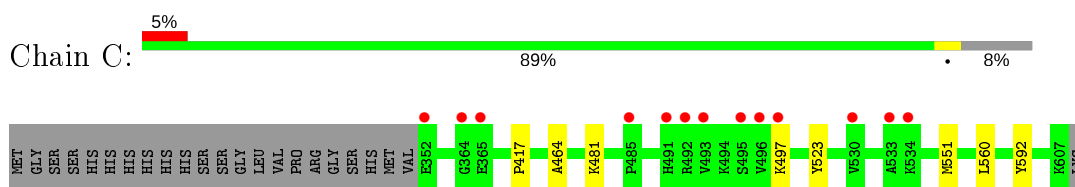
- Molecule 1: ATP-citrate lyase alpha-subunit



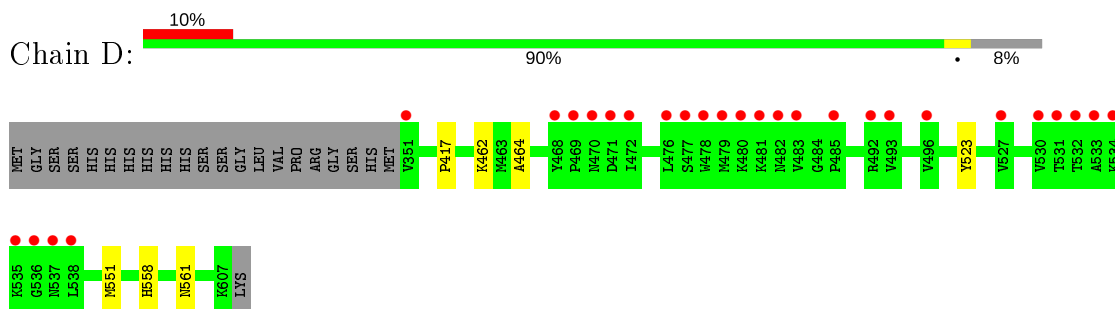
- Molecule 1: ATP-citrate lyase alpha-subunit



- Molecule 1: ATP-citrate lyase alpha-subunit



- Molecule 1: ATP-citrate lyase alpha-subunit



- Molecule 1: ATP-citrate lyase alpha-subunit



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	99.26Å 106.42Å 105.05Å 90.00° 102.11° 90.00°	Depositor
Resolution (Å)	48.53 – 1.50 48.53 – 1.50	Depositor EDS
% Data completeness (in resolution range)	97.6 (48.53-1.50) 97.5 (48.53-1.50)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.02 (at 1.50Å)	Xtrriage
Refinement program	BUSTER 2.10.2	Depositor
R, $R_{free}$	0.194 , 0.211 0.200 , 0.216	Depositor DCC
$R_{free}$ test set	16515 reflections (4.97%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	18.7	Xtrriage
Anisotropy	0.035	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.33 , 38.2	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	0.96	EDS
Total number of atoms	16845	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	28.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.37% 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: FLC, MES

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	0.53	1/2055 (0.0%)	0.59	0/2784
1	B	0.53	0/2079	0.56	0/2813
1	C	0.50	0/2031	0.56	0/2752
1	D	0.50	0/2047	0.57	0/2774
1	E	0.59	0/1407	0.64	1/1903 (0.1%)
1	F	0.51	0/2084	0.62	0/2824
1	G	0.52	0/2040	0.56	0/2764
1	H	0.52	0/2038	0.55	0/2761
All	All	0.52	1/15781 (0.0%)	0.58	1/21375 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	352	GLU	CD-OE2	-5.12	1.20	1.25

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	E	456	ASN	CB-CA-C	5.39	121.18	110.40

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	2011	0	2023	10	0
1	B	2035	0	2048	3	0
1	C	1988	0	2003	5	0
1	D	2003	0	2012	10	0
1	E	1379	0	1368	8	0
1	F	2039	0	2044	14	0
1	G	1997	0	2003	1	0
1	H	1995	0	2002	5	0
2	A	13	0	5	0	0
2	B	13	0	5	0	0
2	E	13	0	5	0	0
2	F	13	0	5	0	0
2	G	13	0	5	0	0
2	H	13	0	5	0	0
3	C	24	0	26	0	0
3	E	12	0	13	0	0
4	A	140	0	0	0	0
4	B	201	0	0	2	0
4	C	142	0	0	0	0
4	D	159	0	0	2	0
4	E	97	0	0	1	0
4	F	168	0	0	2	0
4	G	202	0	0	0	0
4	H	175	0	0	0	0
All	All	16845	0	15572	44	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 1.

The worst 5 of 44 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:558[B]:HIS:NE2	1:F:581:ASN:OD1	2.16	0.78
1:D:417:PRO:HG3	1:F:357:THR:HG21	1.69	0.75
1:D:558[B]:HIS:HD2	4:D:788:HOH:O	1.68	0.74
1:E:455:THR:HG22	1:E:560:LEU:HB2	1.74	0.69
1:F:492:ARG:NH1	4:F:1101:HOH:O	2.14	0.68

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	258/279 (92%)	254 (98%)	4 (2%)	0	100	100
1	B	261/279 (94%)	257 (98%)	4 (2%)	0	100	100
1	C	255/279 (91%)	251 (98%)	4 (2%)	0	100	100
1	D	257/279 (92%)	253 (98%)	4 (2%)	0	100	100
1	E	176/279 (63%)	176 (100%)	0	0	100	100
1	F	261/279 (94%)	257 (98%)	4 (2%)	0	100	100
1	G	256/279 (92%)	253 (99%)	3 (1%)	0	100	100
1	H	256/279 (92%)	253 (99%)	3 (1%)	0	100	100
All	All	1980/2232 (89%)	1954 (99%)	26 (1%)	0	100	100

There are no Ramachandran outliers to report.

### 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	218/234 (93%)	217 (100%)	1 (0%)	88	78
1	B	221/234 (94%)	221 (100%)	0	100	100
1	C	215/234 (92%)	214 (100%)	1 (0%)	88	78
1	D	217/234 (93%)	216 (100%)	1 (0%)	88	78
1	E	146/234 (62%)	143 (98%)	3 (2%)	53	23
1	F	221/234 (94%)	221 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	G	216/234 (92%)	216 (100%)	0	100	100
1	H	216/234 (92%)	216 (100%)	0	100	100
All	All	1670/1872 (89%)	1664 (100%)	6 (0%)	91	82

5 of 6 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	561	ASN
1	E	543	ASP
1	E	459	LYS
1	C	497	LYS
1	E	542	VAL

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	393	ASN
1	D	561	ASN
1	F	498	ASN

### 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 carbohydrates in this entry.

## 5.6 Ligand geometry [i](#)

9 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
3	MES	C	1002	-	12,12,12	0.72	0	14,16,16	0.31	0
3	MES	C	1001	-	12,12,12	0.79	0	14,16,16	0.68	0
2	FLC	E	1000	-	3,12,12	0.42	0	3,17,17	2.08	1 (33%)
3	MES	E	1001	-	12,12,12	0.82	0	14,16,16	0.82	1 (7%)
2	FLC	B	1000	-	3,12,12	0.48	0	3,17,17	2.37	1 (33%)
2	FLC	G	1000	-	3,12,12	0.36	0	3,17,17	1.96	1 (33%)
2	FLC	A	1000	-	3,12,12	0.34	0	3,17,17	2.04	1 (33%)
2	FLC	F	1000	-	3,12,12	0.54	0	3,17,17	1.53	1 (33%)
2	FLC	H	1000	-	3,12,12	0.33	0	3,17,17	1.96	1 (33%)

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	MES	C	1002	-	-	0/6/14/14	0/1/1/1
3	MES	C	1001	-	-	0/6/14/14	0/1/1/1
2	FLC	E	1000	-	-	0/6/16/16	-
3	MES	E	1001	-	-	3/6/14/14	0/1/1/1
2	FLC	B	1000	-	-	0/6/16/16	-
2	FLC	G	1000	-	-	0/6/16/16	-
2	FLC	A	1000	-	-	0/6/16/16	-
2	FLC	F	1000	-	-	3/6/16/16	-
2	FLC	H	1000	-	-	0/6/16/16	-

There are no bond length outliers.

The worst 5 of 7 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	1000	FLC	CB-CA-CAC	3.78	121.04	114.98
2	A	1000	FLC	CB-CA-CAC	3.25	120.18	114.98
2	H	1000	FLC	CB-CA-CAC	3.07	119.91	114.98
2	E	1000	FLC	CB-CA-CAC	2.98	119.76	114.98

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	G	1000	FLC	CB-CA-CAC	2.83	119.52	114.98

There are no chirality outliers.

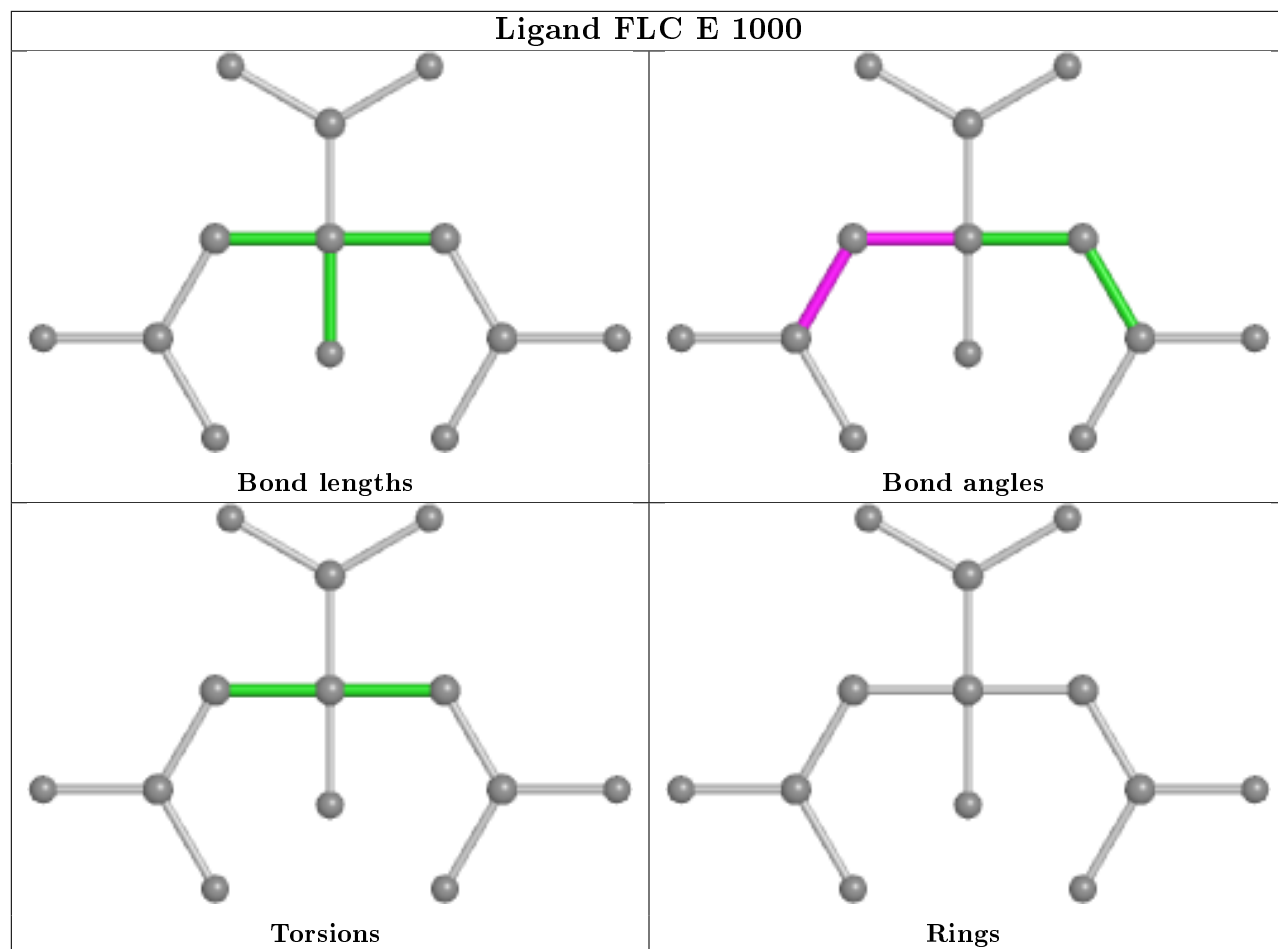
5 of 6 torsion outliers are listed below:

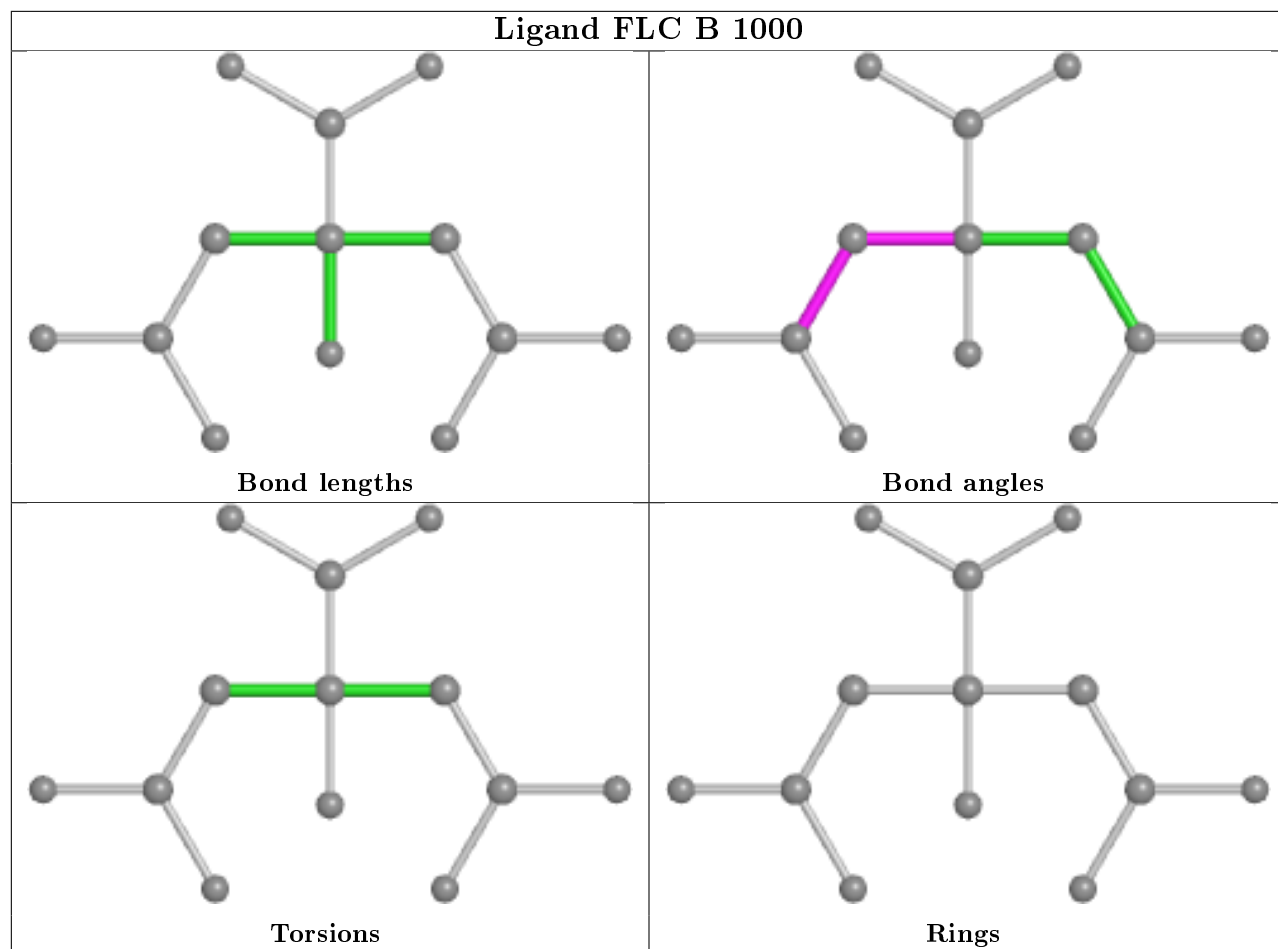
Mol	Chain	Res	Type	Atoms
3	E	1001	MES	C7-C8-S-O2S
2	F	1000	FLC	CAC-CA-CB-CBC
2	F	1000	FLC	CAC-CA-CB-OHB
2	F	1000	FLC	CAC-CA-CB-CG
3	E	1001	MES	C7-C8-S-O3S

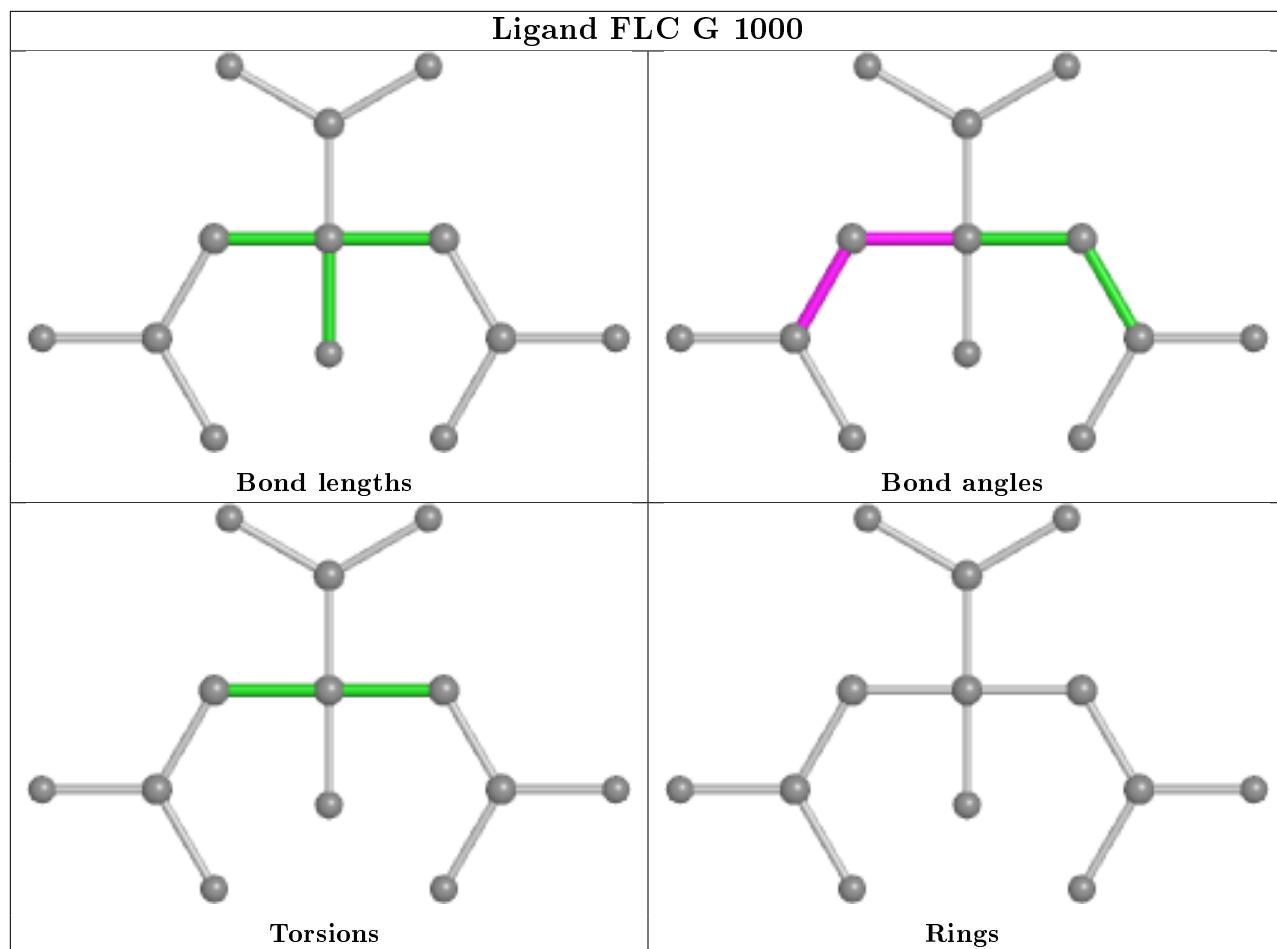
There are no ring outliers.

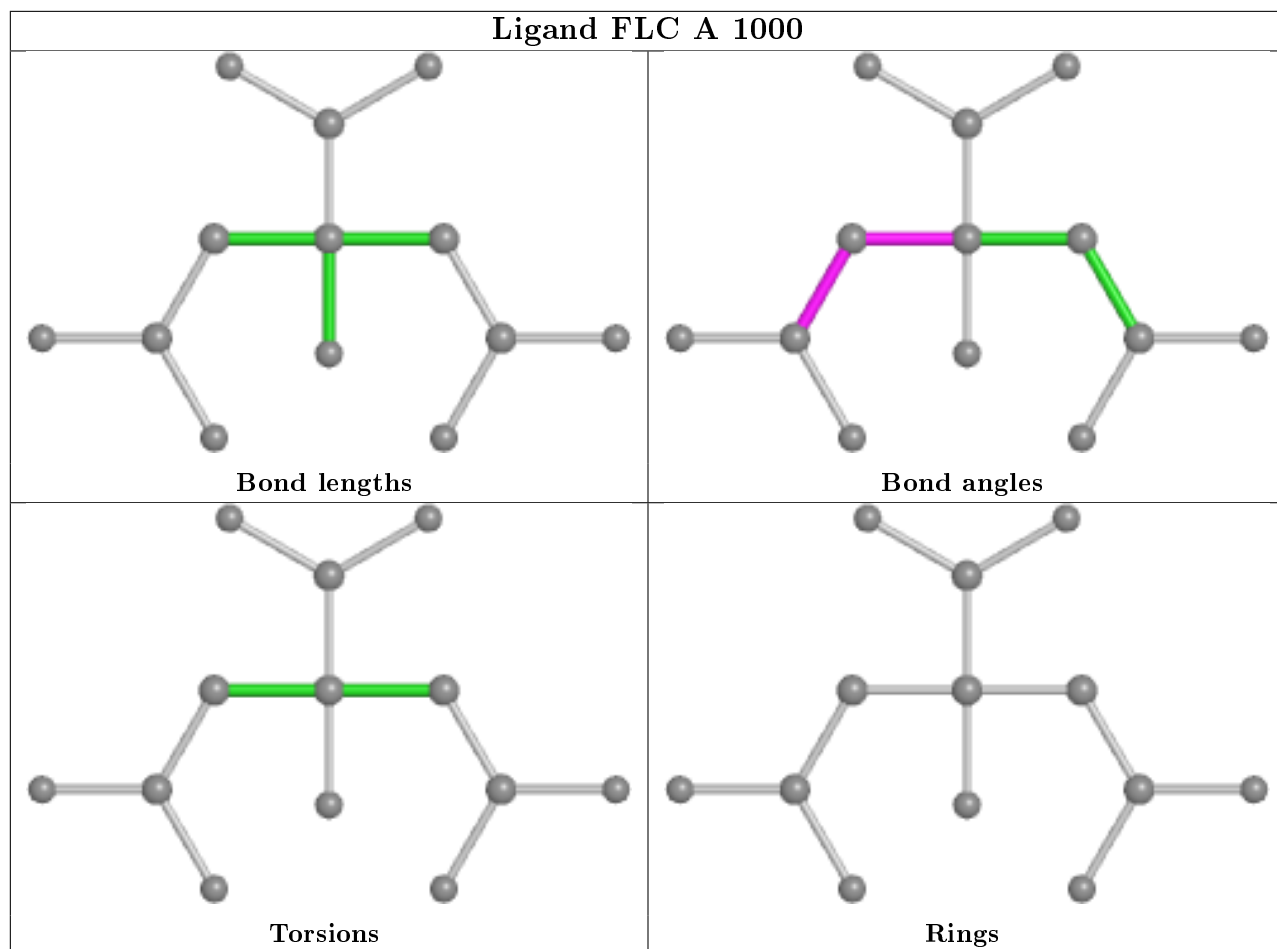
No monomer is involved in short contacts.

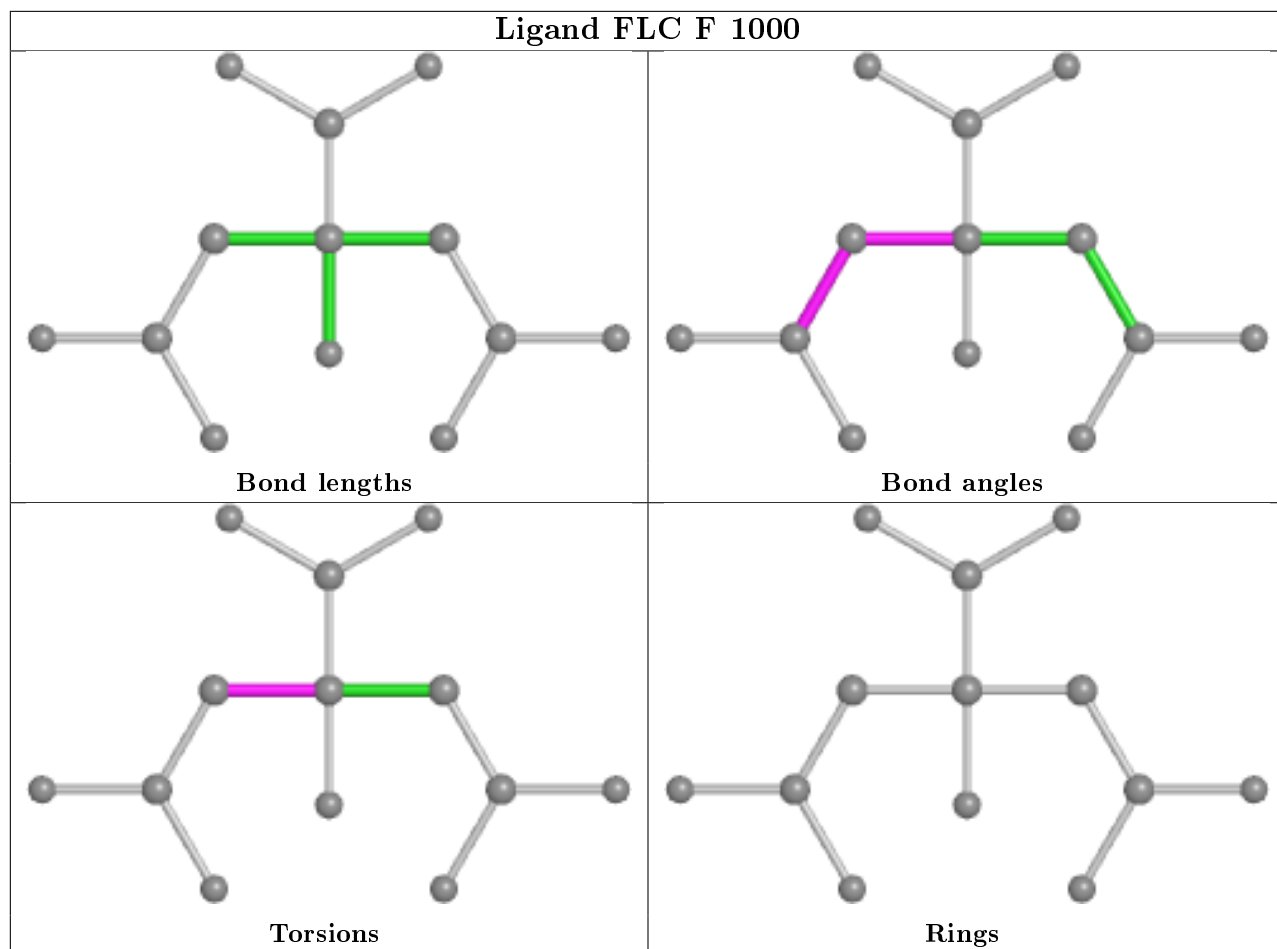
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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



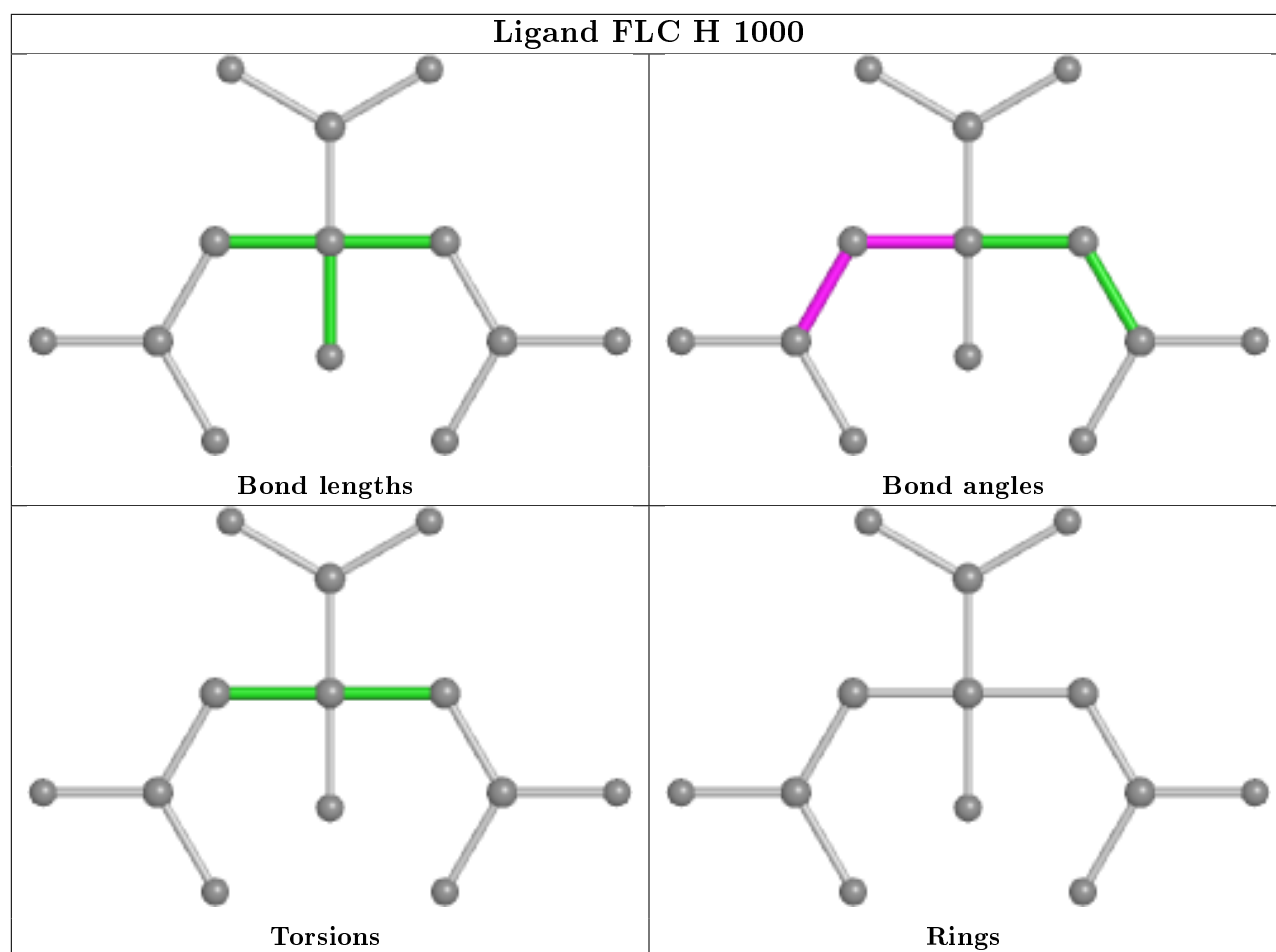












## 5.7 Other polymers [\(i\)](#)

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 [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

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	260/279 (93%)	0.56	20 (7%) 13 14	13, 26, 52, 71	0
1	B	261/279 (93%)	0.04	4 (1%) 73 78	13, 21, 42, 72	0
1	C	256/279 (91%)	0.35	13 (5%) 28 30	14, 28, 57, 89	0
1	D	257/279 (92%)	0.59	28 (10%) 5 5	15, 25, 61, 88	0
1	E	180/279 (64%)	0.42	15 (8%) 11 12	15, 24, 53, 82	0
1	F	260/279 (93%)	0.52	18 (6%) 16 17	15, 28, 59, 86	0
1	G	256/279 (91%)	0.13	5 (1%) 65 70	14, 22, 40, 63	0
1	H	256/279 (91%)	0.09	4 (1%) 72 77	13, 22, 40, 72	0
All	All	1986/2232 (88%)	0.34	107 (5%) 25 28	13, 24, 53, 89	0

The worst 5 of 107 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	493	VAL	8.9
1	E	542	VAL	7.5
1	F	533	ALA	6.9
1	D	477	SER	6.1
1	F	538[A]	LEU	5.8

### 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 carbohydrates in this entry.

## 6.4 Ligands

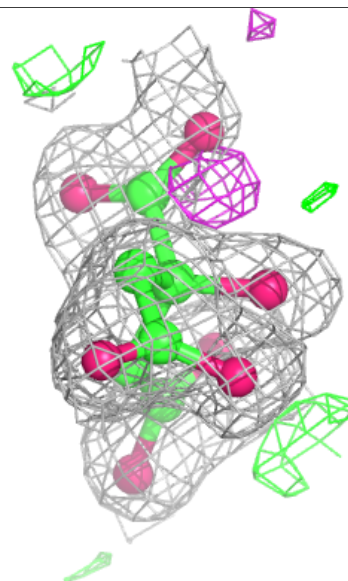
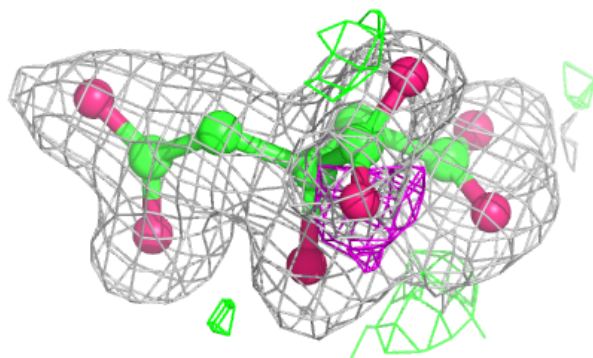
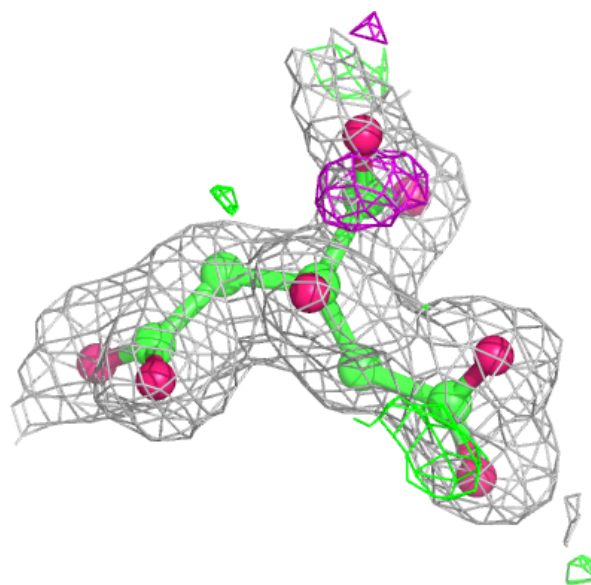
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q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

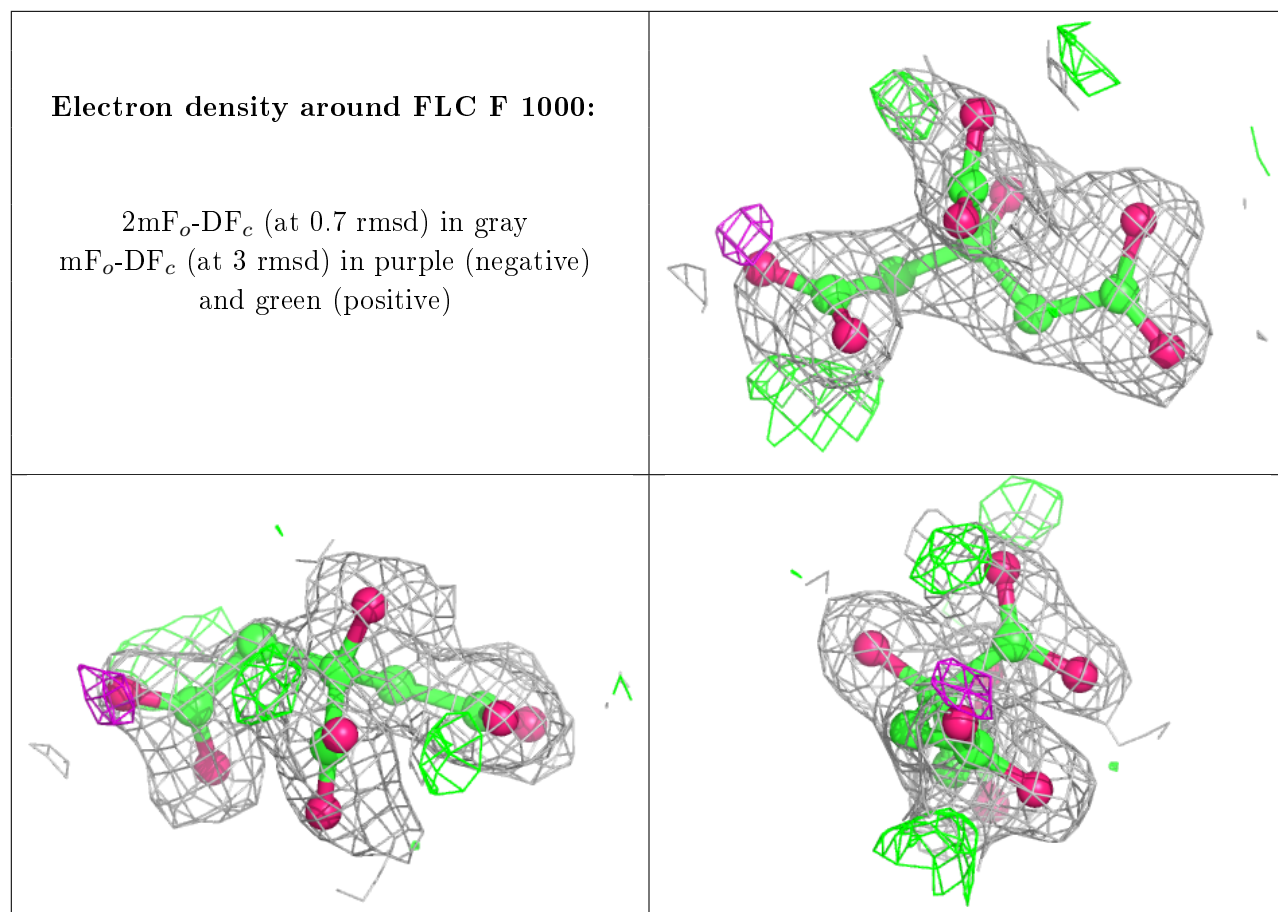
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
2	FLC	E	1000	13/13	0.78	0.17	33,37,39,42	0
3	MES	C	1001	12/12	0.88	0.26	39,47,53,54	0
2	FLC	F	1000	13/13	0.89	0.17	30,39,46,47	0
2	FLC	G	1000	13/13	0.94	0.08	17,19,23,24	0
2	FLC	H	1000	13/13	0.94	0.07	18,19,23,24	0
2	FLC	B	1000	13/13	0.95	0.08	14,17,21,21	0
2	FLC	A	1000	13/13	0.96	0.08	19,22,27,28	0
3	MES	C	1002	12/12	0.96	0.15	28,31,34,34	0
3	MES	E	1001	12/12	0.96	0.10	24,37,45,45	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 FLC E 1000:**

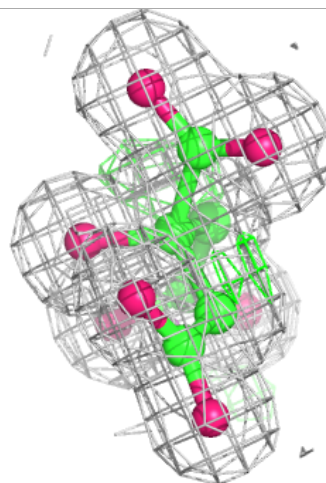
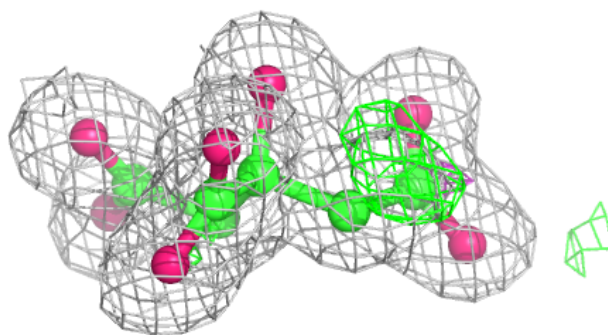
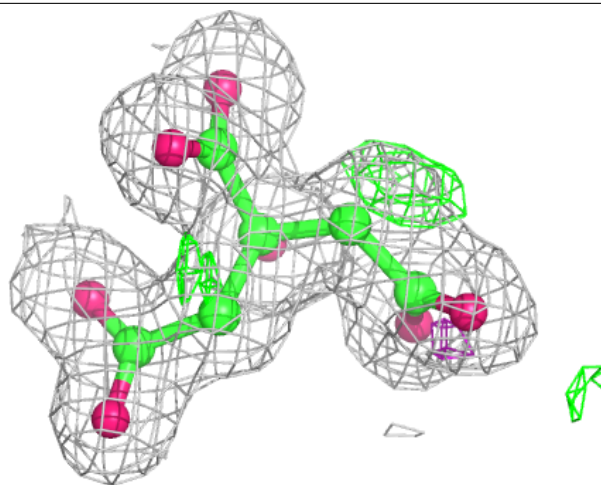
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)





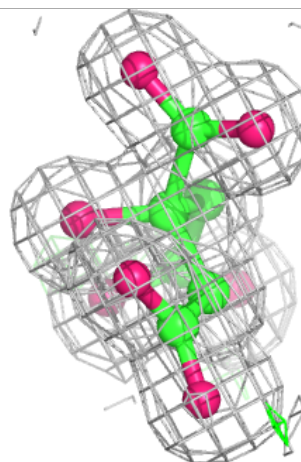
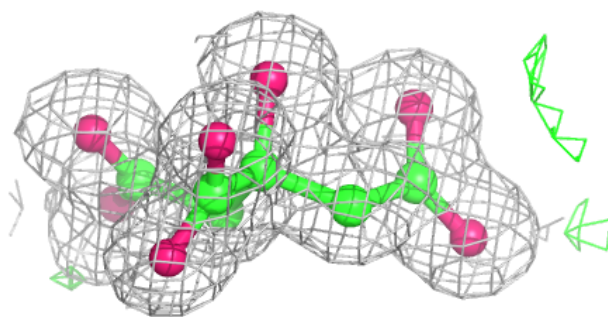
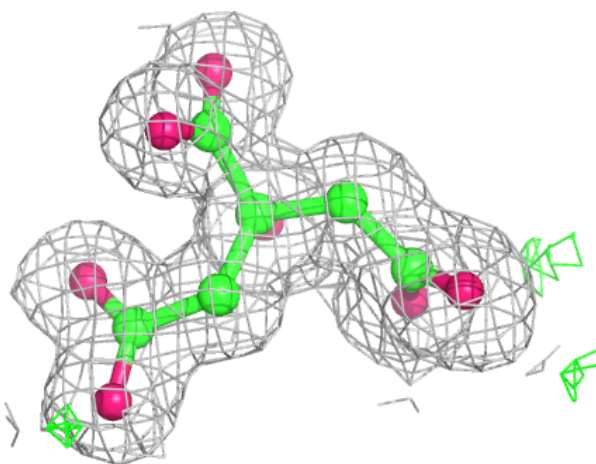
**Electron density around FLC G 1000:**

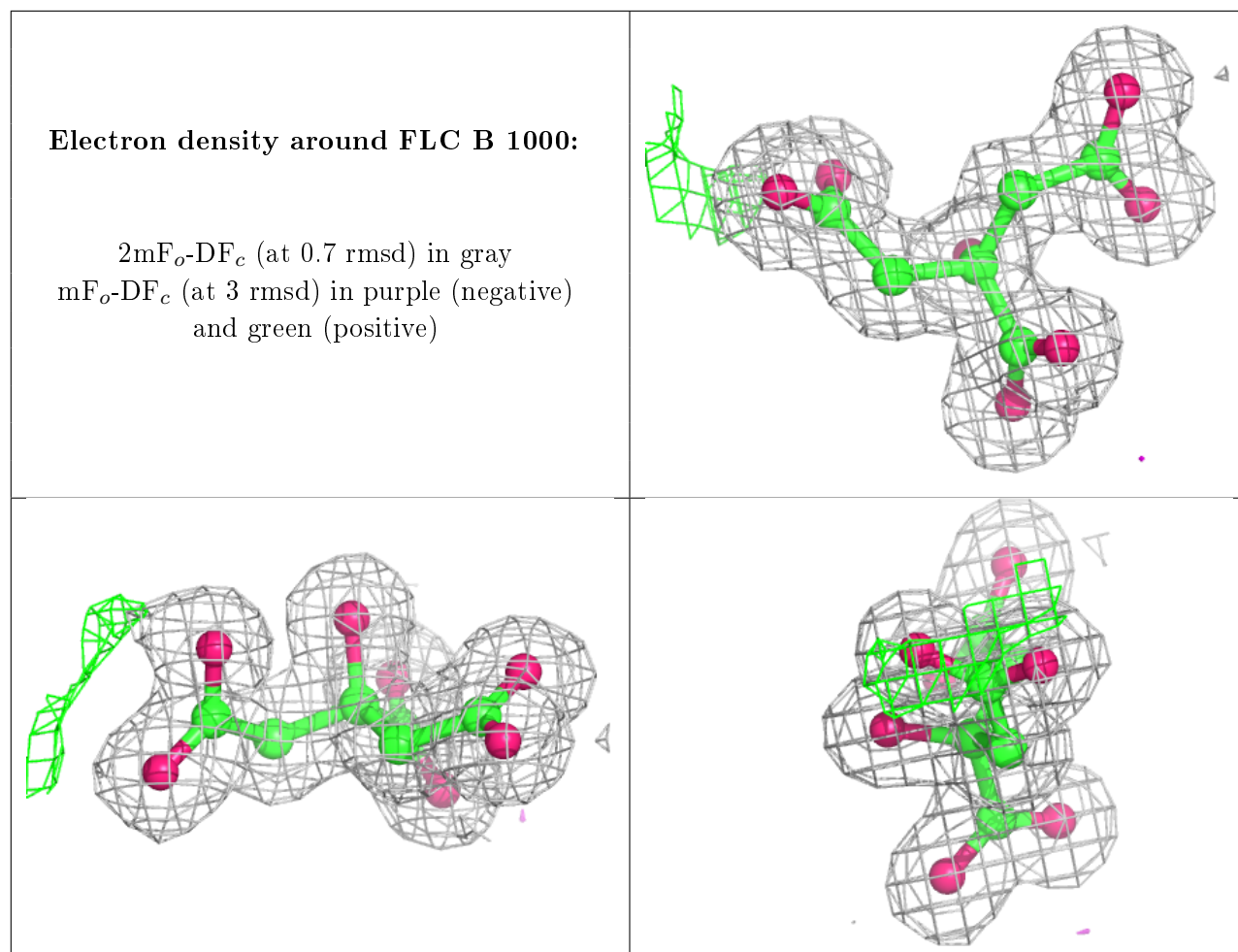
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



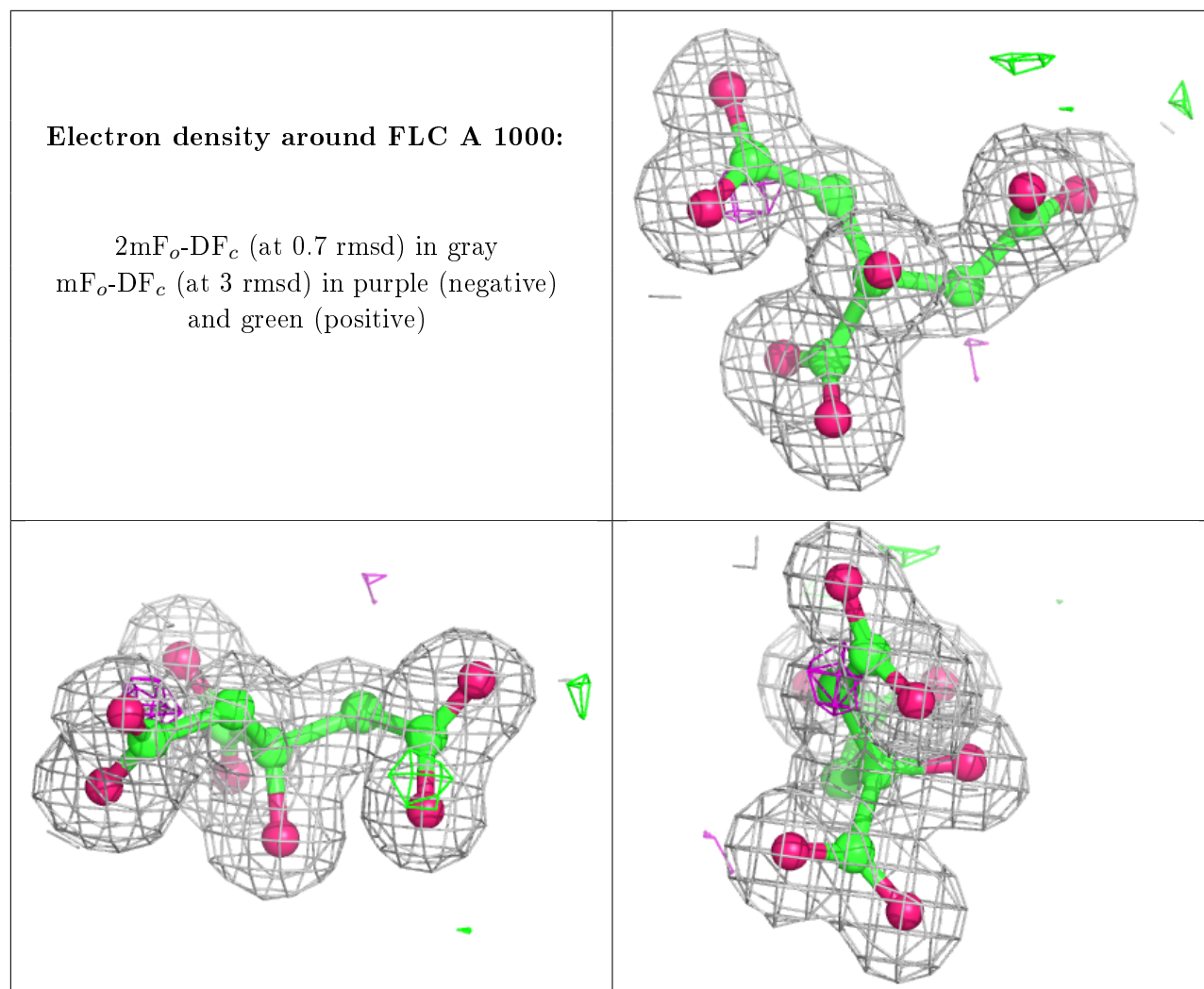
**Electron density around FLC H 1000:**

$2mF_o-DF_c$  (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.