Full wwPDB X-ray Structure Validation Report (i)

Sep 20, 2023 – 12:46 AM EDT

PDB ID	:	5IQT
Title	:	WelO5 bound to Fe(II), Cl, 2-oxoglutarate, and 12-epifischerindole U
Authors	:	Mitchell, A.J.; Boal, A.K.
Deposited on	:	2016-03-11
Resolution	:	2.40 Å(reported)

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

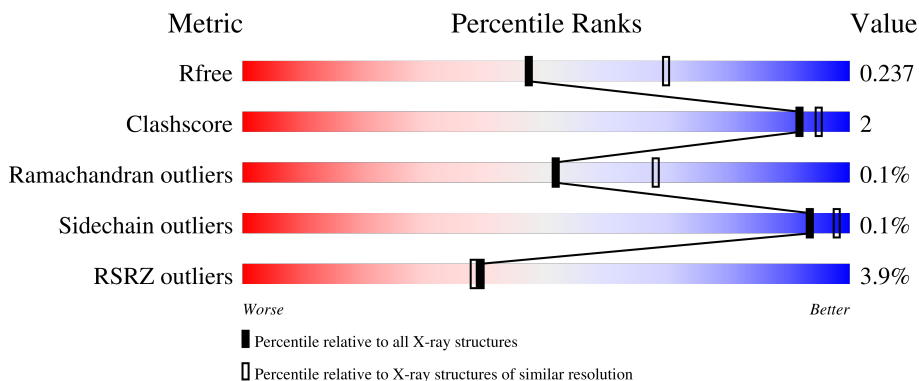|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.35.1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & 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 2.40 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	Percentile Ranks	Value
Rfree		0.237
Clashscore		2
Ramachandran outliers		0.1%
Sidechain outliers		0.1%
RSRZ outliers		3.9%

Worse   *Better*

▮ Percentile relative to all X-ray structures

◻ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	3907 (2.40-2.40)
Clashscore	141614	4398 (2.40-2.40)
Ramachandran outliers	138981	4318 (2.40-2.40)
Sidechain outliers	138945	4319 (2.40-2.40)
RSRZ outliers	127900	3811 (2.40-2.40)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=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	315	3% 86% • 11%
1	B	315	4% 86% • 11%
1	C	315	3% 87% • 12%

2 Entry composition ⓘ

There are 6 unique types of molecules in this entry. The entry contains 6938 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 WelO5.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	280	Total	C	N	O	S	0	2	0
			2223	1416	372	425	10			
1	B	280	Total	C	N	O	S	0	1	0
			2220	1414	374	422	10			
1	C	277	Total	C	N	O	S	0	2	0
			2198	1399	370	419	10			

There are 75 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-24	MET	-	initiating methionine	UNP A0A067YX61
A	-23	LYS	-	expression tag	UNP A0A067YX61
A	-22	HIS	-	expression tag	UNP A0A067YX61
A	-21	HIS	-	expression tag	UNP A0A067YX61
A	-20	HIS	-	expression tag	UNP A0A067YX61
A	-19	HIS	-	expression tag	UNP A0A067YX61
A	-18	HIS	-	expression tag	UNP A0A067YX61
A	-17	HIS	-	expression tag	UNP A0A067YX61
A	-16	HIS	-	expression tag	UNP A0A067YX61
A	-15	SER	-	expression tag	UNP A0A067YX61
A	-14	ASP	-	expression tag	UNP A0A067YX61
A	-13	TYR	-	expression tag	UNP A0A067YX61
A	-12	ASP	-	expression tag	UNP A0A067YX61
A	-11	ILE	-	expression tag	UNP A0A067YX61
A	-10	PRO	-	expression tag	UNP A0A067YX61
A	-9	THR	-	expression tag	UNP A0A067YX61
A	-8	THR	-	expression tag	UNP A0A067YX61
A	-7	GLU	-	expression tag	UNP A0A067YX61
A	-6	ASN	-	expression tag	UNP A0A067YX61
A	-5	LEU	-	expression tag	UNP A0A067YX61
A	-4	TYR	-	expression tag	UNP A0A067YX61
A	-3	PHE	-	expression tag	UNP A0A067YX61
A	-2	GLN	-	expression tag	UNP A0A067YX61

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Chain	Residue	Modelled	Actual	Comment	Reference
A	-1	GLY	-	expression tag	UNP A0A067YX61
A	0	SER	-	expression tag	UNP A0A067YX61
B	-24	MET	-	initiating methionine	UNP A0A067YX61
B	-23	LYS	-	expression tag	UNP A0A067YX61
B	-22	HIS	-	expression tag	UNP A0A067YX61
B	-21	HIS	-	expression tag	UNP A0A067YX61
B	-20	HIS	-	expression tag	UNP A0A067YX61
B	-19	HIS	-	expression tag	UNP A0A067YX61
B	-18	HIS	-	expression tag	UNP A0A067YX61
B	-17	HIS	-	expression tag	UNP A0A067YX61
B	-16	HIS	-	expression tag	UNP A0A067YX61
B	-15	SER	-	expression tag	UNP A0A067YX61
B	-14	ASP	-	expression tag	UNP A0A067YX61
B	-13	TYR	-	expression tag	UNP A0A067YX61
B	-12	ASP	-	expression tag	UNP A0A067YX61
B	-11	ILE	-	expression tag	UNP A0A067YX61
B	-10	PRO	-	expression tag	UNP A0A067YX61
B	-9	THR	-	expression tag	UNP A0A067YX61
B	-8	THR	-	expression tag	UNP A0A067YX61
B	-7	GLU	-	expression tag	UNP A0A067YX61
B	-6	ASN	-	expression tag	UNP A0A067YX61
B	-5	LEU	-	expression tag	UNP A0A067YX61
B	-4	TYR	-	expression tag	UNP A0A067YX61
B	-3	PHE	-	expression tag	UNP A0A067YX61
B	-2	GLN	-	expression tag	UNP A0A067YX61
B	-1	GLY	-	expression tag	UNP A0A067YX61
B	0	SER	-	expression tag	UNP A0A067YX61
C	-24	MET	-	initiating methionine	UNP A0A067YX61
C	-23	LYS	-	expression tag	UNP A0A067YX61
C	-22	HIS	-	expression tag	UNP A0A067YX61
C	-21	HIS	-	expression tag	UNP A0A067YX61
C	-20	HIS	-	expression tag	UNP A0A067YX61
C	-19	HIS	-	expression tag	UNP A0A067YX61
C	-18	HIS	-	expression tag	UNP A0A067YX61
C	-17	HIS	-	expression tag	UNP A0A067YX61
C	-16	HIS	-	expression tag	UNP A0A067YX61
C	-15	SER	-	expression tag	UNP A0A067YX61
C	-14	ASP	-	expression tag	UNP A0A067YX61
C	-13	TYR	-	expression tag	UNP A0A067YX61
C	-12	ASP	-	expression tag	UNP A0A067YX61
C	-11	ILE	-	expression tag	UNP A0A067YX61
C	-10	PRO	-	expression tag	UNP A0A067YX61

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Chain	Residue	Modelled	Actual	Comment	Reference
C	-9	THR	-	expression tag	UNP A0A067YX61
C	-8	THR	-	expression tag	UNP A0A067YX61
C	-7	GLU	-	expression tag	UNP A0A067YX61
C	-6	ASN	-	expression tag	UNP A0A067YX61
C	-5	LEU	-	expression tag	UNP A0A067YX61
C	-4	TYR	-	expression tag	UNP A0A067YX61
C	-3	PHE	-	expression tag	UNP A0A067YX61
C	-2	GLN	-	expression tag	UNP A0A067YX61
C	-1	GLY	-	expression tag	UNP A0A067YX61
C	0	SER	-	expression tag	UNP A0A067YX61

- Molecule 2 is FE (II) ION (three-letter code: FE2) (formula: Fe).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total 1	Fe 1	0	0
2	B	1	Total 1	Fe 1	0	0
2	C	1	Total 1	Fe 1	0	0

- Molecule 3 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total 1	Cl 1	0	0
3	B	1	Total 1	Cl 1	0	0
3	C	1	Total 1	Cl 1	0	0

- Molecule 4 is 2-OXOGLUTARIC ACID (three-letter code: AKG) (formula: $C_5H_6O_5$).

AKG
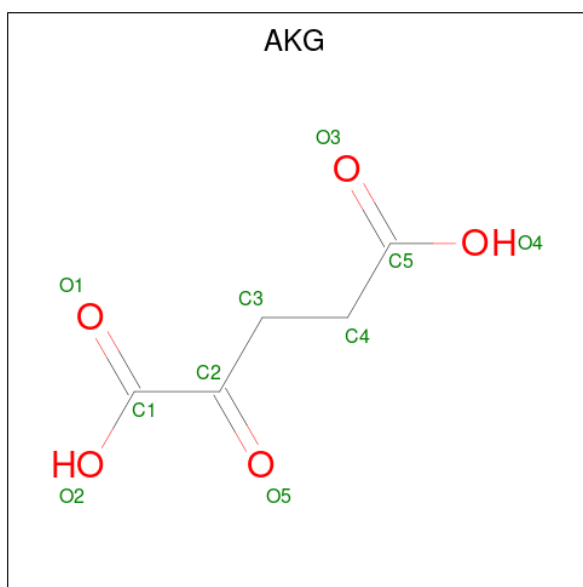
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total 10	C 5	O 5	0	0
4	B	1	Total 10	C 5	O 5	0	0
4	C	1	Total 10	C 5	O 5	0	0

- Molecule 5 is (6aS,9R,10R,10aS)-9-ethyl-10-isocyano-6,6,9-trimethyl-5,6,6a,7,8,9,10,10a-oct ahydroindeno[2,1-b]indole (three-letter code: 6CU) (formula: $C_{21}H_{26}N_2$).

6CU
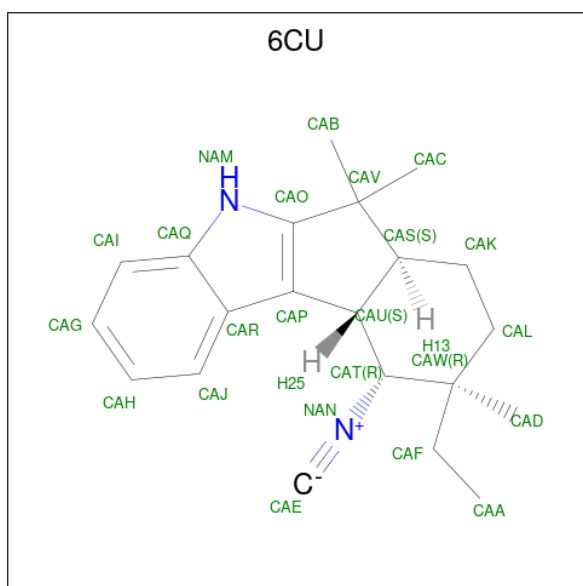
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total 23	C 21	N 2	0	0
5	B	1	Total 23	C 21	N 2	0	0

- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	90	Total 90	O 90	0	0
6	B	75	Total 75	O 75	0	0
6	C	50	Total 50	O 50	0	0

3 Residue-property plots ⓘ

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.
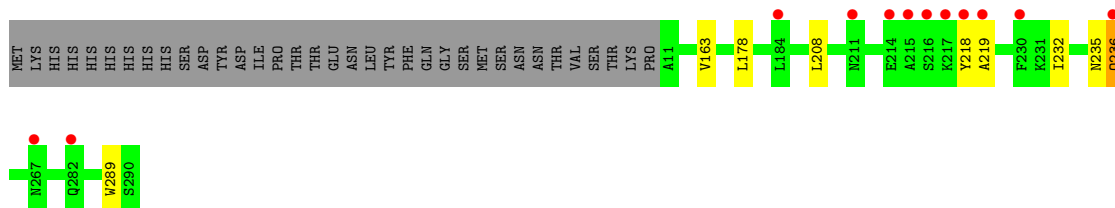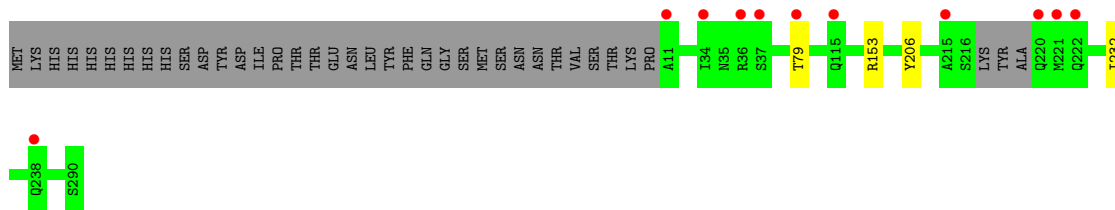
- Molecule 1: WelO5

Chain A:
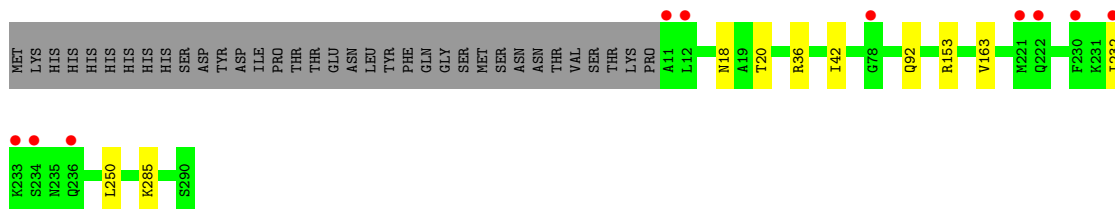
- Molecule 1: WelO5

Chain B:

- Molecule 1: WelO5

Chain C:

4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	71.05Å 83.07Å 141.94Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	50.00 – 2.40 41.11 – 2.39	Depositor EDS
% Data completeness (in resolution range)	99.2 (50.00-2.40) 99.3 (41.11-2.39)	Depositor EDS
R_{merge}	0.13	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.25 (at 2.39Å)	Xtriage
Refinement program	REFMAC 5.8.0073	Depositor
R, R_{free}	0.191 , 0.234 0.196 , 0.237	Depositor DCC
R_{free} test set	1731 reflections (5.11%)	wwPDB-VP
Wilson B-factor (Å^2)	38.4	Xtriage
Anisotropy	0.294	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.37 , 38.3	EDS
L-test for twinning[2]	$< \|L\| > = 0.49, < L^2 > = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	6938	wwPDB-VP
Average B, all atoms (Å^2)	46.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.21% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1]Intensities estimated from amplitudes.

[2]Theoretical values of $< \|L\| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: 6CU, CL, AKG, FE2

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	0.29	0/2281	0.48	0/3087
1	B	0.28	0/2275	0.49	0/3078
1	C	0.28	0/2255	0.47	0/3051
All	All	0.28	0/6811	0.48	0/9216

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 ⓘ

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	2223	0	2168	7	0
1	B	2220	0	2169	11	0
1	C	2198	0	2141	3	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
3	C	1	0	0	0	0
4	A	10	0	4	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	B	10	0	4	0	0
4	C	10	0	4	0	0
5	A	23	0	0	0	0
5	B	23	0	0	0	0
6	A	90	0	0	3	0
6	B	75	0	0	0	0
6	C	50	0	0	0	0
All	All	6938	0	6490	21	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 2.

All (21) 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:218:TYR:HB2	1:B:219:ALA:HA	1.65	0.79
1:C:79:THR:HG22	1:C:79:THR:O	2.03	0.57
1:B:235:ASN:HA	1:B:236:GLN:CB	2.33	0.57
1:B:235:ASN:HA	1:B:236:GLN:HB3	1.87	0.56
1:A:36:ARG:NH2	6:A:401:HOH:O	2.39	0.55
1:B:235:ASN:CA	1:B:236:GLN:HB3	2.38	0.53
1:B:235:ASN:CB	1:B:236:GLN:HB3	2.39	0.52
1:B:218:TYR:HB2	1:B:219:ALA:CA	2.41	0.48
1:A:92:GLN:NE2	6:A:403:HOH:O	2.46	0.47
1:C:206:TYR:CE1	1:C:232:ILE:HG23	2.50	0.46
1:B:235:ASN:HB3	1:B:236:GLN:HB3	1.97	0.46
1:B:163:VAL:HG21	1:B:232:ILE:HG13	1.97	0.46
1:A:163:VAL:HG21	1:A:232:ILE:HD13	1.99	0.45
1:A:42:ILE:HD13	1:A:250:LEU:HD13	1.98	0.44
1:B:235:ASN:CA	1:B:236:GLN:CB	2.94	0.44
1:A:18[B]:ASN:ND2	1:A:20:THR:OG1	2.47	0.44
1:A:153:ARG:HD2	1:A:153:ARG:N	2.33	0.43
1:B:218:TYR:CB	1:B:219:ALA:HA	2.42	0.42
1:B:178:LEU:HD21	1:B:289:TRP:CE2	2.55	0.42
1:C:153:ARG:N	1:C:153:ARG:HD2	2.35	0.42
1:A:285:LYS:NZ	6:A:404:HOH:O	2.54	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	280/315 (89%)	271 (97%)	9 (3%)	0	100	100
1	B	279/315 (89%)	272 (98%)	6 (2%)	1 (0%)	34	48
1	C	275/315 (87%)	273 (99%)	2 (1%)	0	100	100
All	All	834/945 (88%)	816 (98%)	17 (2%)	1 (0%)	51	68

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	236	GLN

5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	240/272 (88%)	240 (100%)	0	100	100
1	B	239/272 (88%)	238 (100%)	1 (0%)	91	96
1	C	238/272 (88%)	238 (100%)	0	100	100
All	All	717/816 (88%)	716 (100%)	1 (0%)	93	98

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	208	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (12) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	74	ASN
1	A	92	GLN
1	A	167	ASN
1	B	35	ASN
1	B	74	ASN
1	B	167	ASN
1	B	177	HIS
1	C	83	GLN
1	C	167	ASN
1	C	220	GLN
1	C	222	GLN
1	C	267	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 11 ligands modelled in this entry, 6 are monoatomic - leaving 5 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
5	6CU	A	304	-	21,26,26	3.42	8 (38%)	21,42,42	1.71	5 (23%)
5	6CU	B	304	-	21,26,26	3.38	8 (38%)	21,42,42	1.62	4 (19%)
4	AKG	B	303	2	9,9,9	2.03	1 (11%)	11,11,11	1.36	3 (27%)
4	AKG	A	303	2	9,9,9	1.91	1 (11%)	11,11,11	1.46	1 (9%)
4	AKG	C	303	2	9,9,9	1.88	1 (11%)	11,11,11	1.52	2 (18%)

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
5	6CU	A	304	-	-	0/3/41/41	0/4/4/4
5	6CU	B	304	-	-	3/3/41/41	0/4/4/4
4	AKG	B	303	2	-	0/9/9/9	-
4	AKG	A	303	2	-	1/9/9/9	-
4	AKG	C	303	2	-	1/9/9/9	-

All (19) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	B	304	6CU	CAP-CAU	-9.22	1.40	1.51
5	A	304	6CU	CAP-CAU	-9.05	1.41	1.51
5	B	304	6CU	CAP-CAR	-6.60	1.33	1.40
5	A	304	6CU	CAP-CAR	-6.59	1.33	1.40
5	B	304	6CU	CAV-CAO	-6.00	1.41	1.52
5	A	304	6CU	CAV-CAO	-5.98	1.41	1.52
4	B	303	AKG	C2-C1	-5.37	1.46	1.53
4	A	303	AKG	C2-C1	-5.01	1.46	1.53
5	A	304	6CU	CAU-CAS	-4.92	1.48	1.55
4	C	303	AKG	C2-C1	-4.90	1.47	1.53
5	B	304	6CU	CAI-CAQ	-4.38	1.34	1.41
5	A	304	6CU	CAI-CAQ	-4.35	1.34	1.41
5	B	304	6CU	CAU-CAS	-4.20	1.49	1.55
5	B	304	6CU	CAJ-CAR	-3.91	1.34	1.42
5	A	304	6CU	CAJ-CAR	-3.87	1.34	1.42
5	B	304	6CU	CAR-CAQ	-3.01	1.34	1.42
5	A	304	6CU	CAR-CAQ	-3.00	1.34	1.42
5	A	304	6CU	CAL-CAW	2.24	1.58	1.54
5	B	304	6CU	CAL-CAW	2.10	1.57	1.54

All (15) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
5	A	304	6CU	CAL-CAW-CAT	4.44	115.56	108.01
5	B	304	6CU	CAA-CAF-CAW	4.32	122.85	116.21
5	A	304	6CU	CAA-CAF-CAW	3.30	121.28	116.21
5	B	304	6CU	CAD-CAW-CAF	-2.64	104.94	109.03
5	B	304	6CU	CAL-CAW-CAT	2.41	112.11	108.01
4	B	303	AKG	C4-C3-C2	-2.30	108.69	113.03
5	A	304	6CU	CAD-CAW-CAF	-2.27	105.51	109.03
4	B	303	AKG	C3-C2-C1	2.26	120.16	115.97
4	C	303	AKG	C3-C2-C1	2.24	120.13	115.97
4	C	303	AKG	C4-C3-C2	-2.21	108.88	113.03
4	A	303	AKG	C4-C3-C2	-2.12	109.04	113.03
5	A	304	6CU	CAK-CAL-CAW	2.09	116.56	113.37
5	A	304	6CU	CAJ-CAR-CAQ	2.08	120.92	118.17
4	B	303	AKG	O1-C1-C2	-2.02	119.02	121.72
5	B	304	6CU	CAK-CAL-CAW	2.01	116.43	113.37

There are no chirality outliers.

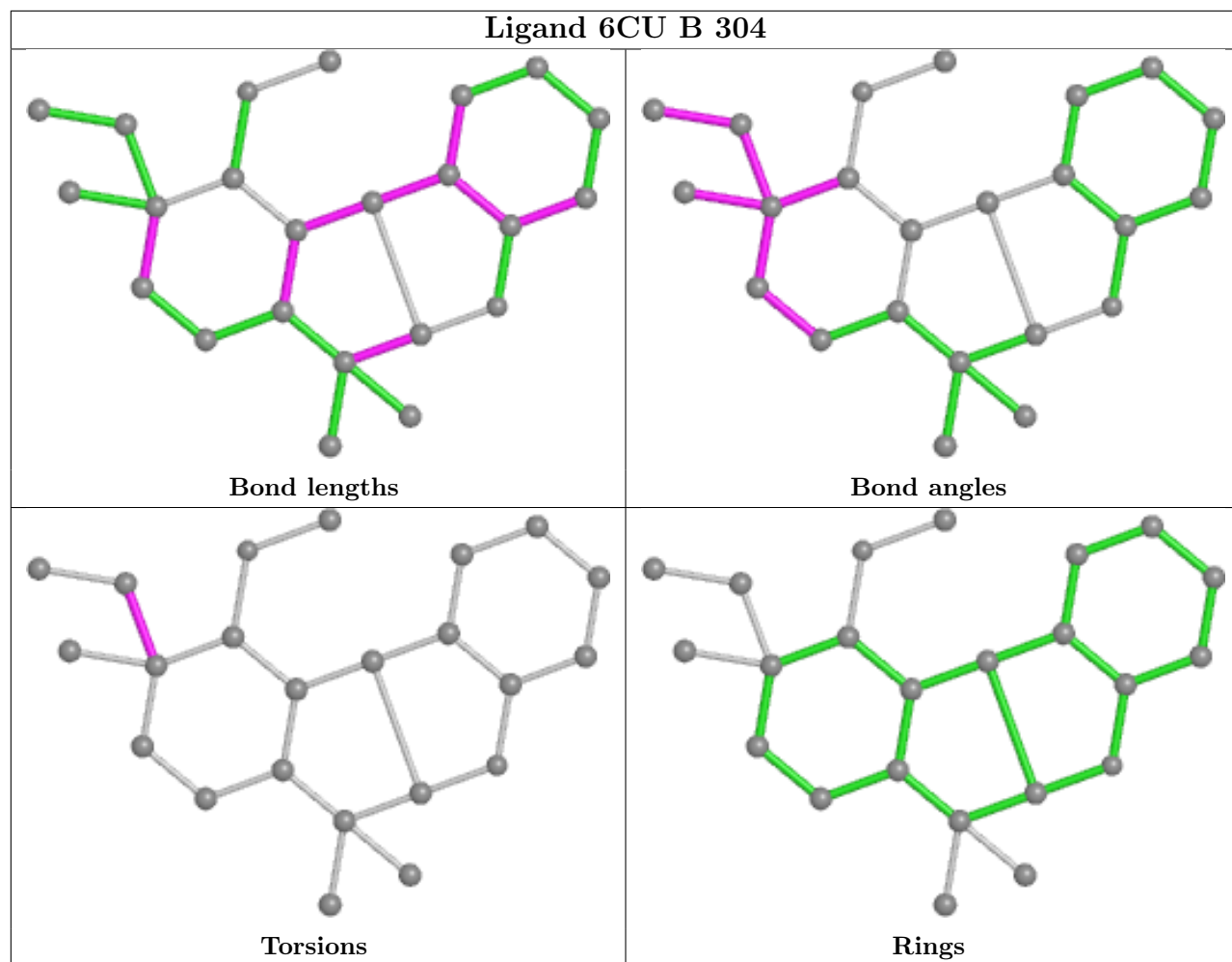All (5) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	B	304	6CU	CAA-CAF-CAW-CAD
5	B	304	6CU	CAA-CAF-CAW-CAT
5	B	304	6CU	CAA-CAF-CAW-CAL
4	A	303	AKG	C1-C2-C3-C4
4	C	303	AKG	C1-C2-C3-C4

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 then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

Ligand 6CU A 304

Bond lengths

Bond angles

Torsions

Rings

Ligand 6CU B 304

Bond lengths

Bond angles

Torsions

Rings
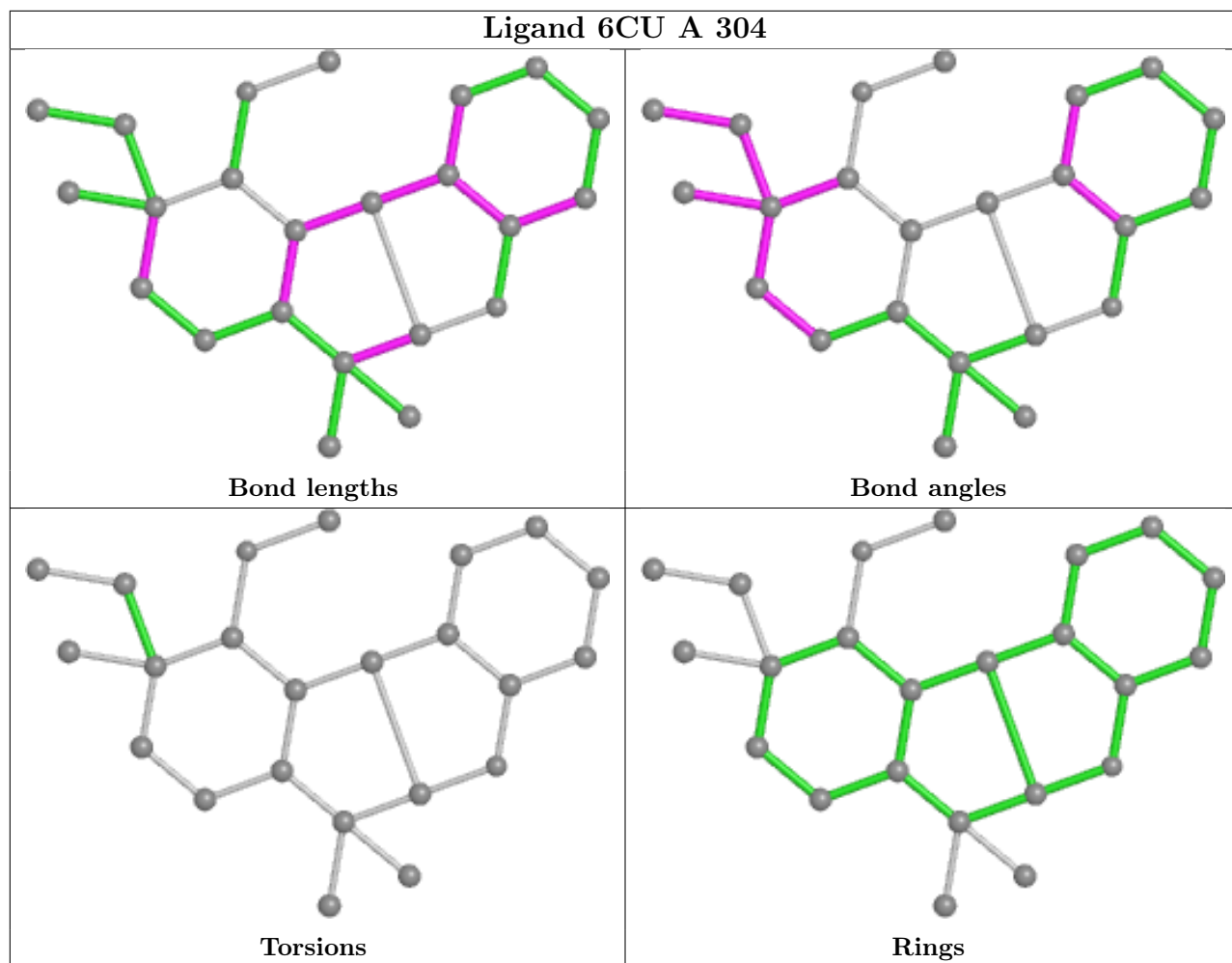
5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled 'Q< 0.9' lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2			OWAB(Å^2)	Q<0.9
1	A	280/315 (88%)	-0.15	10 (3%)	42	42	24, 37, 77, 96	0
1	B	280/315 (88%)	0.03	12 (4%)	35	33	30, 44, 75, 109	0
1	C	277/315 (87%)	-0.03	11 (3%)	38	37	29, 48, 79, 106	0
All	All	837/945 (88%)	-0.05	33 (3%)	39	38	24, 42, 77, 109	0

All (33) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	236	GLN	6.1
1	C	11	ALA	5.8
1	B	215	ALA	5.4
1	B	216	SER	4.8
1	B	217	LYS	4.8
1	B	219	ALA	4.5
1	B	230	PHE	4.5
1	A	233	LYS	4.5
1	B	184	LEU	4.4
1	A	232	ILE	4.2
1	A	234	SER	4.1
1	A	230	PHE	4.1
1	C	220	GLN	3.7
1	C	221	MET	3.5
1	B	267	ASN	3.4
1	B	218	TYR	3.4
1	A	222	GLN	3.3
1	A	236	GLN	3.1
1	C	36	ARG	3.0
1	B	214	GLU	2.9
1	C	238	GLN	2.7
1	B	282	GLN	2.6
1	A	78	GLY	2.5

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Mol	Chain	Res	Type	RSRZ
1	C	222	GLN	2.4
1	C	215	ALA	2.4
1	C	37	SER	2.3
1	A	11	ALA	2.2
1	A	12	LEU	2.2
1	A	221	MET	2.2
1	C	34	ILE	2.2
1	B	211	ASN	2.1
1	C	115	GLN	2.1
1	C	79	THR	2.1

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

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

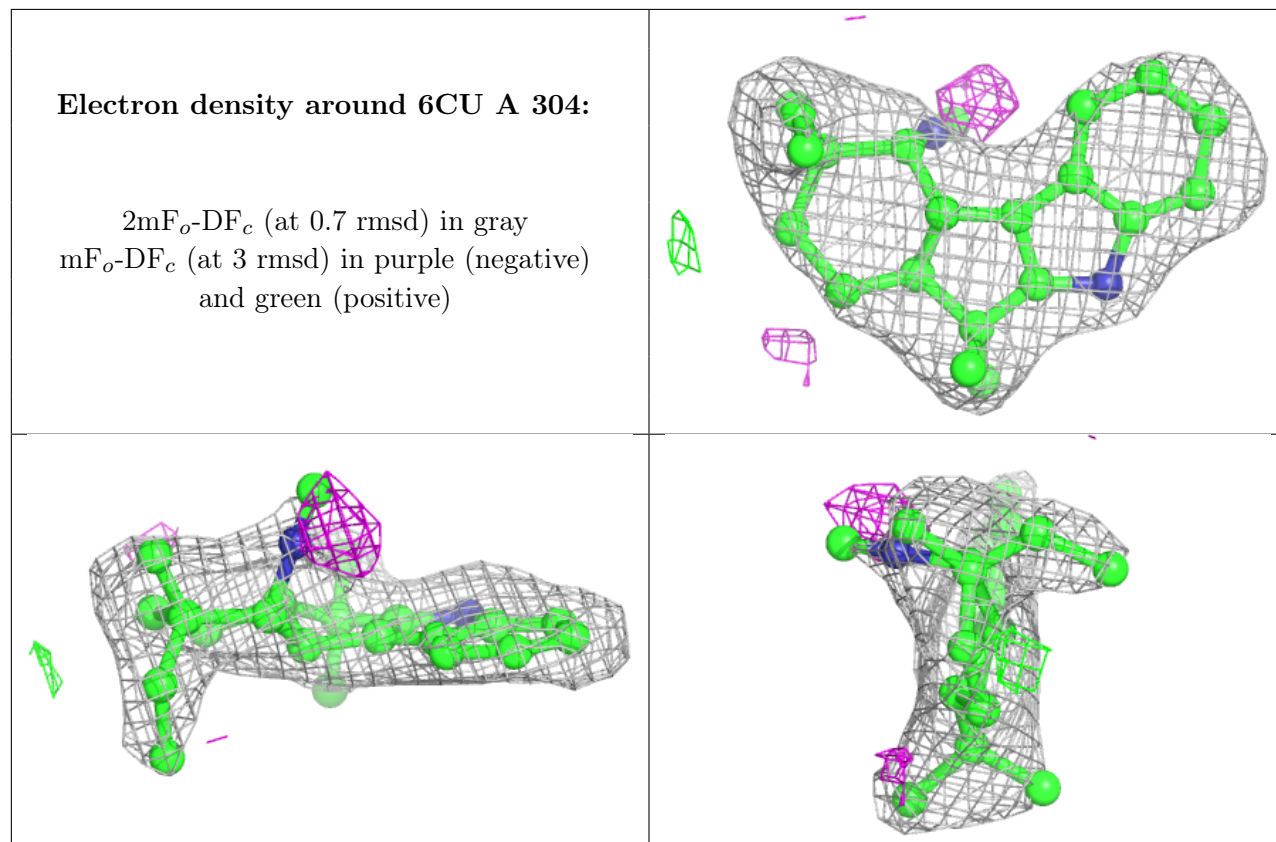## 6.3 Carbohydrates ⓘ

There are no monosaccharides in this entry.
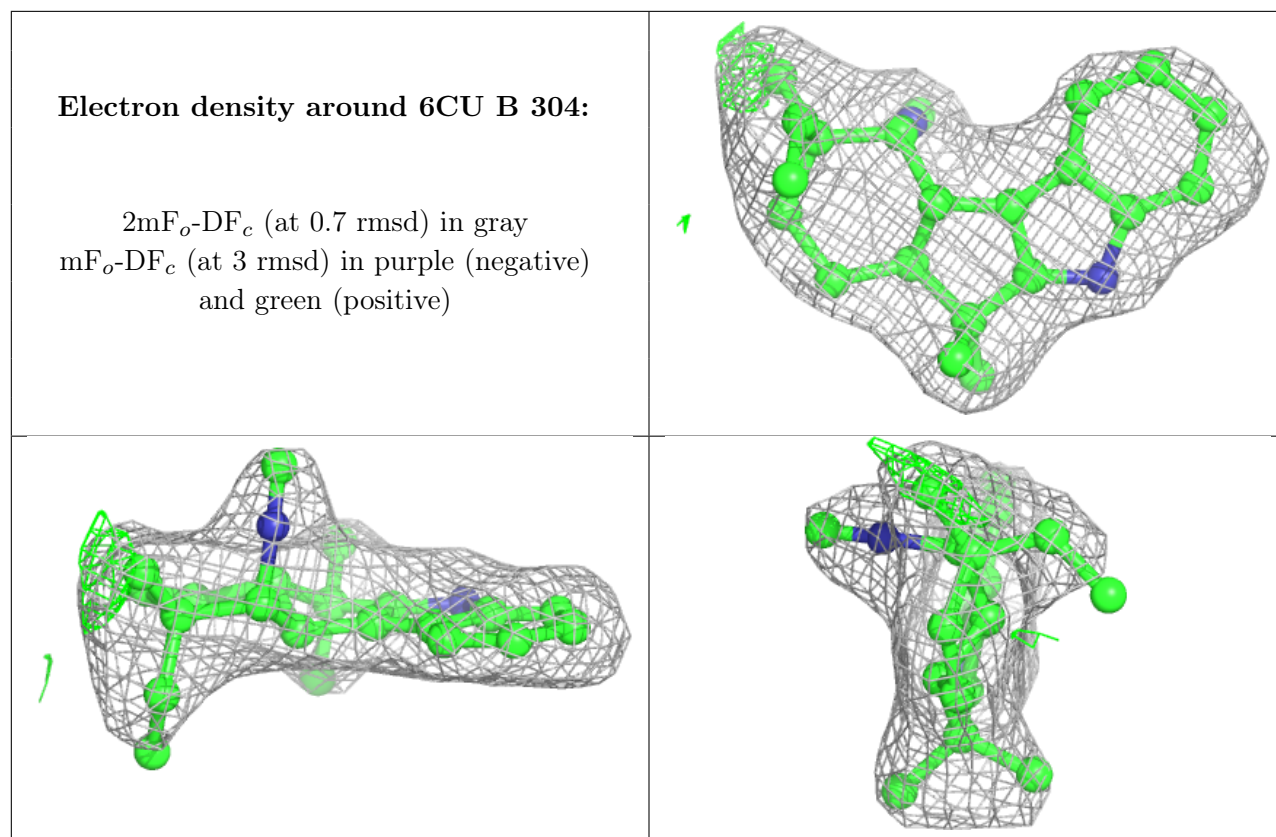
6.4 Ligands ⓘ

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, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
5	6CU	A	304	23/23	0.88	0.23	54,56,59,59	0
5	6CU	B	304	23/23	0.89	0.19	44,46,48,48	0
4	AKG	B	303	10/10	0.97	0.11	33,34,34,35	0
3	CL	A	302	1/1	0.97	0.17	66,66,66,66	0
3	CL	B	302	1/1	0.97	0.09	53,53,53,53	0
4	AKG	C	303	10/10	0.98	0.09	39,40,41,43	0
4	AKG	A	303	10/10	0.98	0.08	35,38,39,40	0
2	FE2	A	301	1/1	0.98	0.07	43,43,43,43	0
3	CL	C	302	1/1	0.99	0.13	55,55,55,55	0
2	FE2	B	301	1/1	0.99	0.13	40,40,40,40	0
2	FE2	C	301	1/1	0.99	0.08	39,39,39,39	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 6CU A 304:

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

Electron density around 6CU B 304:

$2mF_o$-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 ⓘ

There are no such residues in this entry.