



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 10, 2026 – 09:29 PM UTC

PDB ID : 7RF9 / pdb_00007rf9
Title : O2-, PLP-dependent desaturase Plu4 intermediate-bound enzyme
Authors : Hoffarth, E.R.; Ryan, K.S.
Deposited on : 2021-07-13
Resolution : 1.93 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

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>.

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

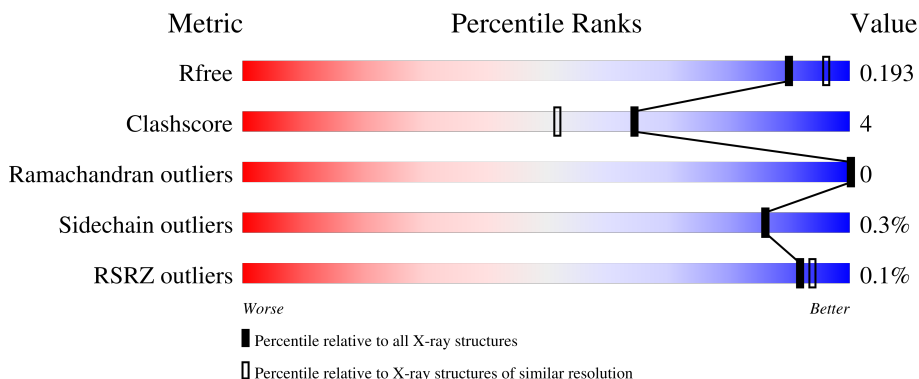
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION



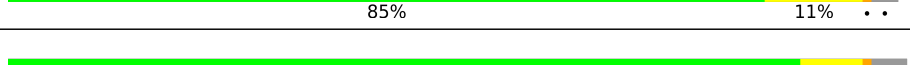

The reported resolution of this entry is 1.93 Å.

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	1188 (1.92-1.92)
Clashscore	190562	1209 (1.92-1.92)
Ramachandran outliers	187476	1195 (1.92-1.92)
Sidechain outliers	187428	1195 (1.92-1.92)
RSRZ outliers	180081	1188 (1.92-1.92)

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 $\leq 5\%$. 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	389	 89% 8% ..
1	B	389	 89% 8% .
1	C	389	 85% 11% ..
1	D	389	 89% 7% ..

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard

residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	BTB	B	501	-	-	X	-

2 Entry composition [i](#)

There are 8 unique types of molecules in this entry. The entry contains 13549 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 Aminotran_1_2 domain-containing protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	381	3058	1964	493	589	12	0	11	0
1	B	381	3028	1940	493	585	10	0	4	0
1	C	376	3046	1957	491	586	12	0	14	0
1	D	375	2998	1924	486	577	11	0	9	0

There are 32 discrepancies between the modelled and reference sequences:

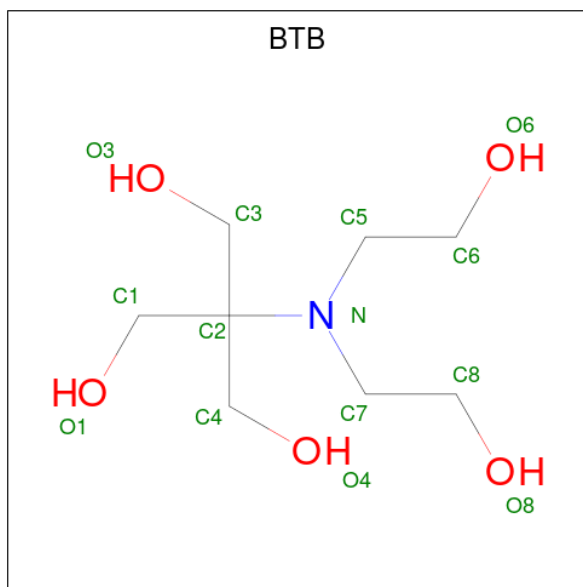
Chain	Residue	Modelled	Actual	Comment	Reference
A	382	LEU	-	expression tag	UNP A0A0C1MLE8
A	383	GLU	-	expression tag	UNP A0A0C1MLE8
A	384	HIS	-	expression tag	UNP A0A0C1MLE8
A	385	HIS	-	expression tag	UNP A0A0C1MLE8
A	386	HIS	-	expression tag	UNP A0A0C1MLE8
A	387	HIS	-	expression tag	UNP A0A0C1MLE8
A	388	HIS	-	expression tag	UNP A0A0C1MLE8
A	389	HIS	-	expression tag	UNP A0A0C1MLE8
B	382	LEU	-	expression tag	UNP A0A0C1MLE8
B	383	GLU	-	expression tag	UNP A0A0C1MLE8
B	384	HIS	-	expression tag	UNP A0A0C1MLE8
B	385	HIS	-	expression tag	UNP A0A0C1MLE8
B	386	HIS	-	expression tag	UNP A0A0C1MLE8
B	387	HIS	-	expression tag	UNP A0A0C1MLE8
B	388	HIS	-	expression tag	UNP A0A0C1MLE8
B	389	HIS	-	expression tag	UNP A0A0C1MLE8
C	382	LEU	-	expression tag	UNP A0A0C1MLE8
C	383	GLU	-	expression tag	UNP A0A0C1MLE8
C	384	HIS	-	expression tag	UNP A0A0C1MLE8
C	385	HIS	-	expression tag	UNP A0A0C1MLE8
C	386	HIS	-	expression tag	UNP A0A0C1MLE8

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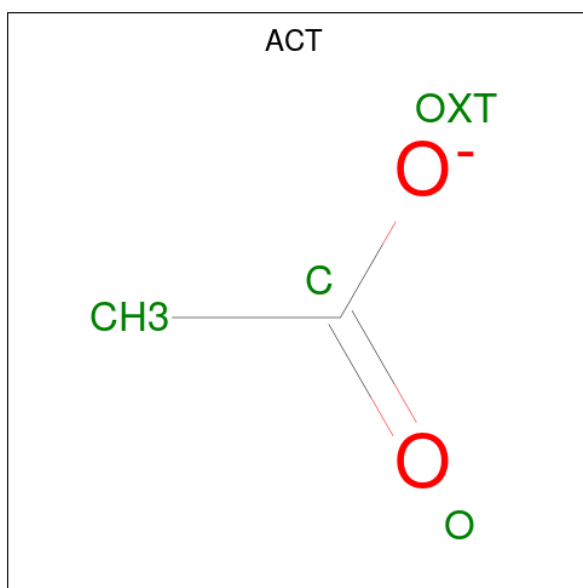
Chain	Residue	Modelled	Actual	Comment	Reference
C	387	HIS	-	expression tag	UNP A0A0C1MLE8
C	388	HIS	-	expression tag	UNP A0A0C1MLE8
C	389	HIS	-	expression tag	UNP A0A0C1MLE8
D	382	LEU	-	expression tag	UNP A0A0C1MLE8
D	383	GLU	-	expression tag	UNP A0A0C1MLE8
D	384	HIS	-	expression tag	UNP A0A0C1MLE8
D	385	HIS	-	expression tag	UNP A0A0C1MLE8
D	386	HIS	-	expression tag	UNP A0A0C1MLE8
D	387	HIS	-	expression tag	UNP A0A0C1MLE8
D	388	HIS	-	expression tag	UNP A0A0C1MLE8
D	389	HIS	-	expression tag	UNP A0A0C1MLE8

- Molecule 2 is 2-[BIS-(2-HYDROXY-ETHYL)-AMINO]-2-HYDROXYMETHYL-PROPAN E-1,3-DIOL (CCD ID: BTB) (formula: C₈H₁₉NO₅).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			14	8	1	5		
2	A	1	Total	C	N	O	0	0
			14	8	1	5		
2	B	1	Total	C	N	O	0	0
			14	8	1	5		
2	C	1	Total	C	N	O	0	0
			14	8	1	5		
2	D	1	Total	C	N	O	0	0
			14	8	1	5		

- Molecule 3 is ACETATE ION (CCD ID: ACT) (formula: $C_2H_3O_2$).

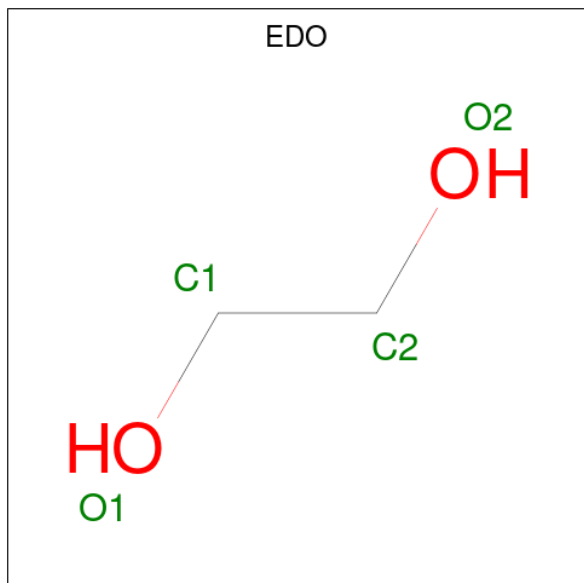


Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total C O 4 2 2	0	0
3	A	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0
3	C	1	Total C O 4 2 2	0	0
3	D	1	Total C O 4 2 2	0	0

- Molecule 4 is (2E)-5-carbamimidamido-2-{{(Z)-{3-hydroxy-2-methyl-5-[(phosphonoxy)methyl]pyridin-4(1H)-ylidene}methyl}imino}pentanoic acid (CCD ID: EJ1) (formula: $C_{14}H_{22}N_5O_7P$) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	O	0	0
			6	3	3		

- Molecule 6 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: C₂H₆O₂).



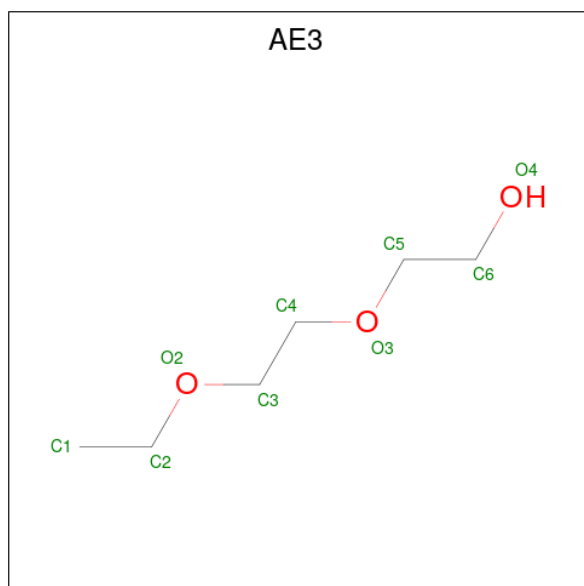
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	1	Total	C	O	0	0
			4	2	2		
6	A	1	Total	C	O	0	0
			4	2	2		
6	A	1	Total	C	O	0	0
			4	2	2		
6	A	1	Total	C	O	0	0
			4	2	2		
6	A	1	Total	C	O	0	0
			4	2	2		
6	A	1	Total	C	O	0	0
			4	2	2		
6	B	1	Total	C	O	0	0
			4	2	2		
6	B	1	Total	C	O	0	0
			4	2	2		
6	B	1	Total	C	O	0	0
			4	2	2		
6	C	1	Total	C	O	0	0
			4	2	2		
6	C	1	Total	C	O	0	0
			4	2	2		

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

- Molecule 7 is 2-(2-ETHOXYETHOXY)ETHANOL (CCD ID: AE3) (formula: C₆H₁₄O₃).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	C	1	Total C O 9 6 3	0	0

- Molecule 8 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	288	Total 288	O 288	0	0
8	B	265	Total 265	O 265	0	0
8	C	304	Total 304	O 304	0	0
8	D	273	Total 273	O 273	0	0

E360

LYS
LEU
GLU
HIS
HIS
HIS
HIS
HIS
HIS

4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	74.92Å 70.28Å 138.57Å 90.00° 98.11° 90.00°	Depositor
Resolution (Å)	38.33 – 1.93 38.33 – 1.93	Depositor EDS
% Data completeness (in resolution range)	98.7 (38.33-1.93) 98.6 (38.33-1.93)	Depositor EDS
R_{merge}	0.19	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.22 (at 1.92Å)	Xtrriage
Refinement program	PHENIX 1.14_3260	Depositor
R, R_{free}	0.151 , 0.194 0.152 , 0.193	Depositor DCC
R_{free} test set	5355 reflections (4.96%)	wwPDB-VP
Wilson B-factor (Å ²)	25.4	Xtrriage
Anisotropy	0.421	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 57.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	13549	wwPDB-VP
Average B, all atoms (Å ²)	30.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 32.95 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 8.6493e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

¹Intensities estimated from amplitudes.

²Theoretical 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: EJ1, GOL, BTB, EDO, ACT, AE3

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	0.75	4/3156 (0.1%)	1.05	34/4285 (0.8%)
1	B	0.69	7/3105 (0.2%)	0.82	12/4219 (0.3%)
1	C	0.80	3/3153 (0.1%)	1.22	53/4280 (1.2%)
1	D	0.70	2/3090 (0.1%)	0.94	26/4197 (0.6%)
All	All	0.74	16/12504 (0.1%)	1.02	125/16981 (0.7%)

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
1	B	0	2
1	C	0	2
1	D	0	1
All	All	0	6

The worst 5 of 16 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	189	THR	C-O	-7.41	1.15	1.24
1	B	116	TYR	C-O	-5.86	1.17	1.24
1	B	119	LEU	C-O	-5.78	1.17	1.24
1	C	310[A]	CYS	CA-C	5.70	1.59	1.52
1	C	310[B]	CYS	CA-C	5.70	1.59	1.52

The worst 5 of 125 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	77[A]	SER	N-CA-C	11.62	125.30	111.82
1	C	77[B]	SER	N-CA-C	11.62	125.30	111.82
1	A	272[A]	VAL	N-CA-C	11.25	122.10	110.62
1	A	272[B]	VAL	N-CA-C	11.25	122.10	110.62
1	A	37	VAL	CA-C-O	10.82	132.30	121.05

There are no chirality outliers.

5 of 6 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	323[A]	SER	Mainchain
1	B	202[A]	GLN	Mainchain
1	B	202[B]	GLN	Mainchain
1	C	68[A]	GLU	Mainchain
1	C	68[B]	GLU	Mainchain

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	3058	0	2967	23	0
1	B	3028	0	2913	20	0
1	C	3046	0	2967	24	0
1	D	2998	0	2896	22	0
2	A	28	0	38	5	0
2	B	14	0	17	7	0
2	C	14	0	19	5	0
2	D	14	0	19	0	0
3	A	8	0	6	0	0
3	B	4	0	3	1	0
3	C	4	0	3	0	0
3	D	4	0	3	0	0
4	A	27	0	0	1	0
4	B	27	0	0	0	0
4	C	27	0	0	0	0
4	D	27	0	0	4	0
5	A	6	0	8	0	0
6	A	24	0	36	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
6	B	12	0	18	0	0
6	C	16	0	24	0	0
6	D	24	0	36	4	0
7	C	9	0	14	0	0
8	A	288	0	0	5	0
8	B	265	0	0	4	0
8	C	304	0	0	10	1
8	D	273	0	0	3	1
All	All	13549	0	11987	95	1

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 4.

The worst 5 of 95 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:219:LYS:HE3	8:D:501:HOH:O	1.70	0.91
1:A:235:GLU:HG3	8:A:712:HOH:O	1.80	0.82
1:B:60:LYS:NZ	8:B:601:HOH:O	2.11	0.82
1:D:136:ASN:HD22	1:D:139:GLN:H	1.27	0.80
1:D:219:LYS:HZ1	4:D:403:EJ1:C4A	1.96	0.78

All (1) 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)
8:C:856:HOH:O	8:D:745:HOH:O[2_757]	2.19	0.01

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	266/389 (68%)	259 (97%)	7 (3%)	0	100	100
1	B	154/389 (40%)	152 (99%)	2 (1%)	0	100	100
1	C	160/389 (41%)	157 (98%)	3 (2%)	0	100	100
1	D	285/389 (73%)	277 (97%)	8 (3%)	0	100	100
All	All	865/1556 (56%)	845 (98%)	20 (2%)	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	325/345 (94%)	323 (99%)	2 (1%)	78	75
1	B	324/345 (94%)	322 (99%)	2 (1%)	78	75
1	C	332/345 (96%)	331 (100%)	1 (0%)	86	86
1	D	323/345 (94%)	323 (100%)	0	100	100
All	All	1304/1380 (94%)	1299 (100%)	5 (0%)	86	83

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	248[A]	ILE
1	A	248[B]	ILE
1	B	379	LEU
1	B	381	LYS
1	C	287	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 19 such sidechains are listed below:

Mol	Chain	Res	Type
1	D	136	ASN
1	D	306	GLN

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Mol	Chain	Res	Type
1	D	349	HIS
1	D	224	GLN
1	C	89	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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

35 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	$\# Z > 2$
4	EJ1	B	503	-	25,27,27	2.15	8 (32%)	29,37,37	1.48	5 (17%)
7	AE3	C	603	-	8,8,8	0.56	0	7,7,7	0.34	0
6	EDO	D	406	-	3,3,3	0.41	0	2,2,2	0.30	0
6	EDO	A	408	-	3,3,3	0.37	0	2,2,2	0.45	0
6	EDO	A	409	-	3,3,3	0.38	0	2,2,2	0.64	0
2	BTB	A	401	-	13,13,13	0.64	0	7,16,16	0.63	0
3	ACT	A	406	-	3,3,3	0.96	0	3,3,3	1.53	1 (33%)
2	BTB	D	401	-	13,13,13	0.51	0	7,16,16	0.59	0
3	ACT	A	402	-	3,3,3	1.55	1 (33%)	3,3,3	1.44	0
3	ACT	D	402	-	3,3,3	1.27	0	3,3,3	1.41	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	EJ1	D	403	-	25,27,27	2.10	6 (24%)	29,37,37	1.33	5 (17%)
6	EDO	A	411	-	3,3,3	0.47	0	2,2,2	0.31	0
6	EDO	C	608	-	3,3,3	0.50	0	2,2,2	0.18	0
3	ACT	B	502	-	3,3,3	1.30	0	3,3,3	1.42	0
6	EDO	A	410	-	3,3,3	0.40	0	2,2,2	0.59	0
6	EDO	D	404	-	3,3,3	0.49	0	2,2,2	0.31	0
6	EDO	D	408	-	3,3,3	0.59	0	2,2,2	0.16	0
5	GOL	A	405	-	5,5,5	1.07	0	5,5,5	0.93	0
6	EDO	D	409	-	3,3,3	0.41	0	2,2,2	0.41	0
2	BTB	A	404	-	13,13,13	0.50	0	7,16,16	0.78	0
3	ACT	C	604	-	3,3,3	1.53	1 (33%)	3,3,3	1.50	0
6	EDO	C	606	-	3,3,3	0.49	0	2,2,2	0.19	0
6	EDO	A	412	-	3,3,3	0.48	0	2,2,2	0.50	0
4	EJ1	C	601	-	25,27,27	2.04	7 (28%)	29,37,37	1.62	5 (17%)
6	EDO	D	405	-	3,3,3	0.46	0	2,2,2	0.38	0
6	EDO	B	504	-	3,3,3	0.44	0	2,2,2	0.40	0
6	EDO	B	506	-	3,3,3	0.43	0	2,2,2	0.34	0
2	BTB	B	501	-	13,13,13	1.91	3 (23%)	7,16,16	1.79	2 (28%)
2	BTB	C	602	-	13,13,13	0.65	0	7,16,16	0.87	0
4	EJ1	A	403	-	25,27,27	1.96	5 (20%)	29,37,37	1.65	6 (20%)
6	EDO	C	607	-	3,3,3	0.49	0	2,2,2	0.27	0
6	EDO	B	505	-	3,3,3	0.43	0	2,2,2	0.43	0
6	EDO	C	605	-	3,3,3	0.49	0	2,2,2	0.38	0
6	EDO	D	407	-	3,3,3	0.41	0	2,2,2	0.29	0
6	EDO	A	407	-	3,3,3	0.39	0	2,2,2	0.32	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	EJ1	B	503	-	-	4/20/22/22	0/1/1/1
7	AE3	C	603	-	-	4/6/6/6	-
6	EDO	D	406	-	-	0/1/1/1	-
6	EDO	A	408	-	-	0/1/1/1	-
6	EDO	A	409	-	-	0/1/1/1	-
2	BTB	A	401	-	-	4/21/21/21	-
2	BTB	D	401	-	-	4/21/21/21	-
6	EDO	A	411	-	-	0/1/1/1	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	EJ1	D	403	-	-	4/20/22/22	0/1/1/1
6	EDO	C	608	-	-	0/1/1/1	-
6	EDO	A	410	-	-	0/1/1/1	-
6	EDO	D	404	-	-	0/1/1/1	-
6	EDO	D	408	-	-	0/1/1/1	-
5	GOL	A	405	-	-	0/4/4/4	-
6	EDO	D	409	-	-	0/1/1/1	-
2	BTB	A	404	-	-	4/21/21/21	-
6	EDO	C	606	-	-	0/1/1/1	-
6	EDO	A	412	-	-	0/1/1/1	-
4	EJ1	C	601	-	-	2/20/22/22	0/1/1/1
6	EDO	D	405	-	-	0/1/1/1	-
6	EDO	B	504	-	-	0/1/1/1	-
6	EDO	B	506	-	-	0/1/1/1	-
2	BTB	B	501	-	-	10/21/21/21	-
2	BTB	C	602	-	-	5/21/21/21	-
4	EJ1	A	403	-	-	2/20/22/22	0/1/1/1
6	EDO	C	607	-	-	0/1/1/1	-
6	EDO	B	505	-	-	0/1/1/1	-
6	EDO	C	605	-	-	0/1/1/1	-
6	EDO	D	407	-	-	0/1/1/1	-
6	EDO	A	407	-	-	0/1/1/1	-

The worst 5 of 31 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	503	EJ1	CZ-NE	7.30	1.47	1.33
4	D	403	EJ1	CZ-NE	7.05	1.46	1.33
4	C	601	EJ1	CZ-NE	6.73	1.46	1.33
4	A	403	EJ1	CZ-NE	6.44	1.45	1.33
2	B	501	BTB	C3-C2	4.20	1.58	1.53

The worst 5 of 24 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	C	601	EJ1	C6-N1-C2	-4.78	120.23	124.20
4	A	403	EJ1	C6-N1-C2	-4.44	120.52	124.20
4	B	503	EJ1	C2A-C2-C3	-4.15	117.18	122.27
4	A	403	EJ1	C2A-C2-C3	-3.90	117.49	122.27
4	D	403	EJ1	C6-N1-C2	-3.64	121.18	124.20

There are no chirality outliers.

5 of 43 torsion outliers are listed below:

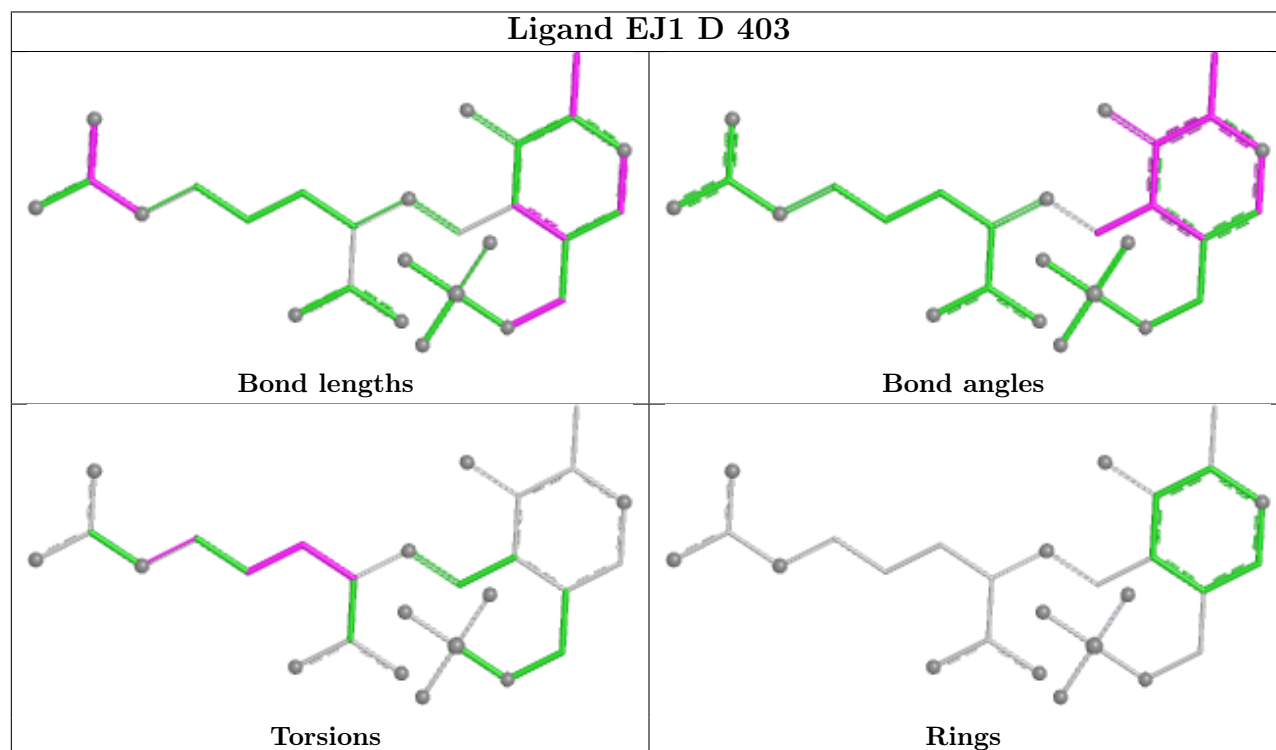
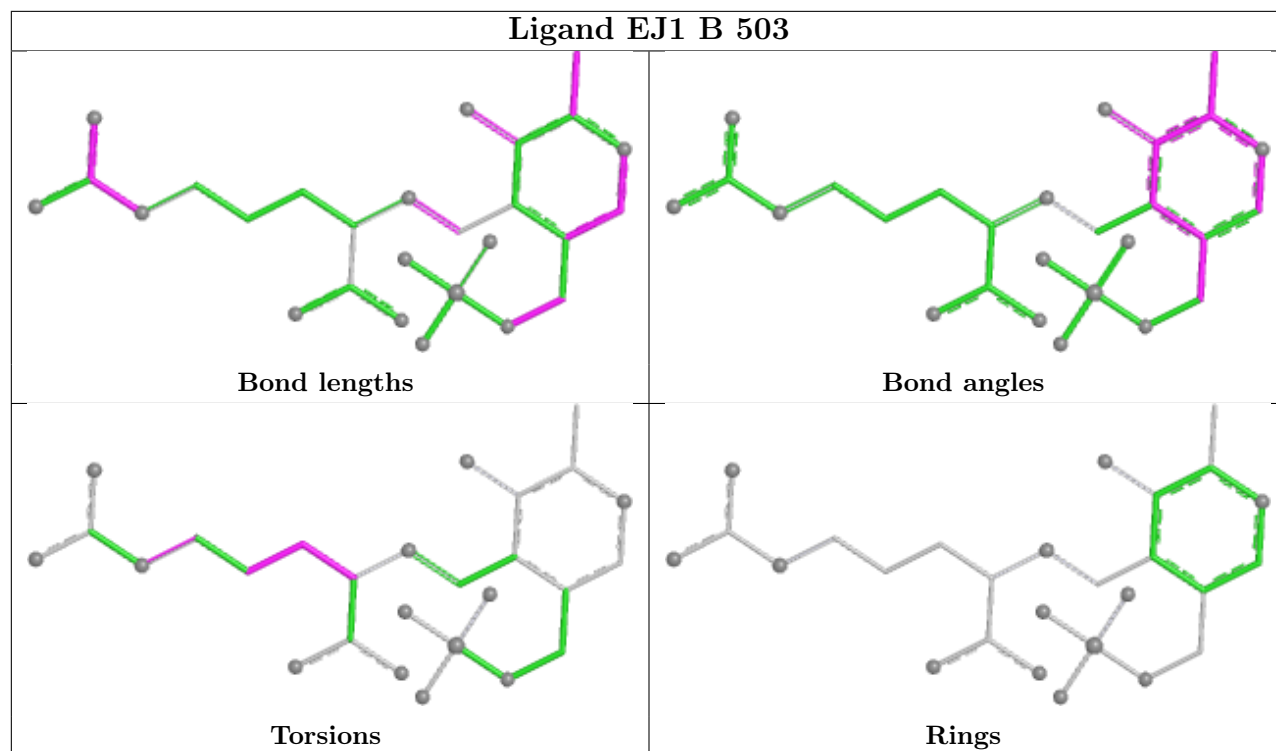
Mol	Chain	Res	Type	Atoms
2	A	401	BTB	C1-C2-C3-O3
2	A	401	BTB	C4-C2-C3-O3
2	A	401	BTB	N-C2-C3-O3
2	A	404	BTB	C3-C2-C4-O4
2	A	404	BTB	N-C2-C4-O4

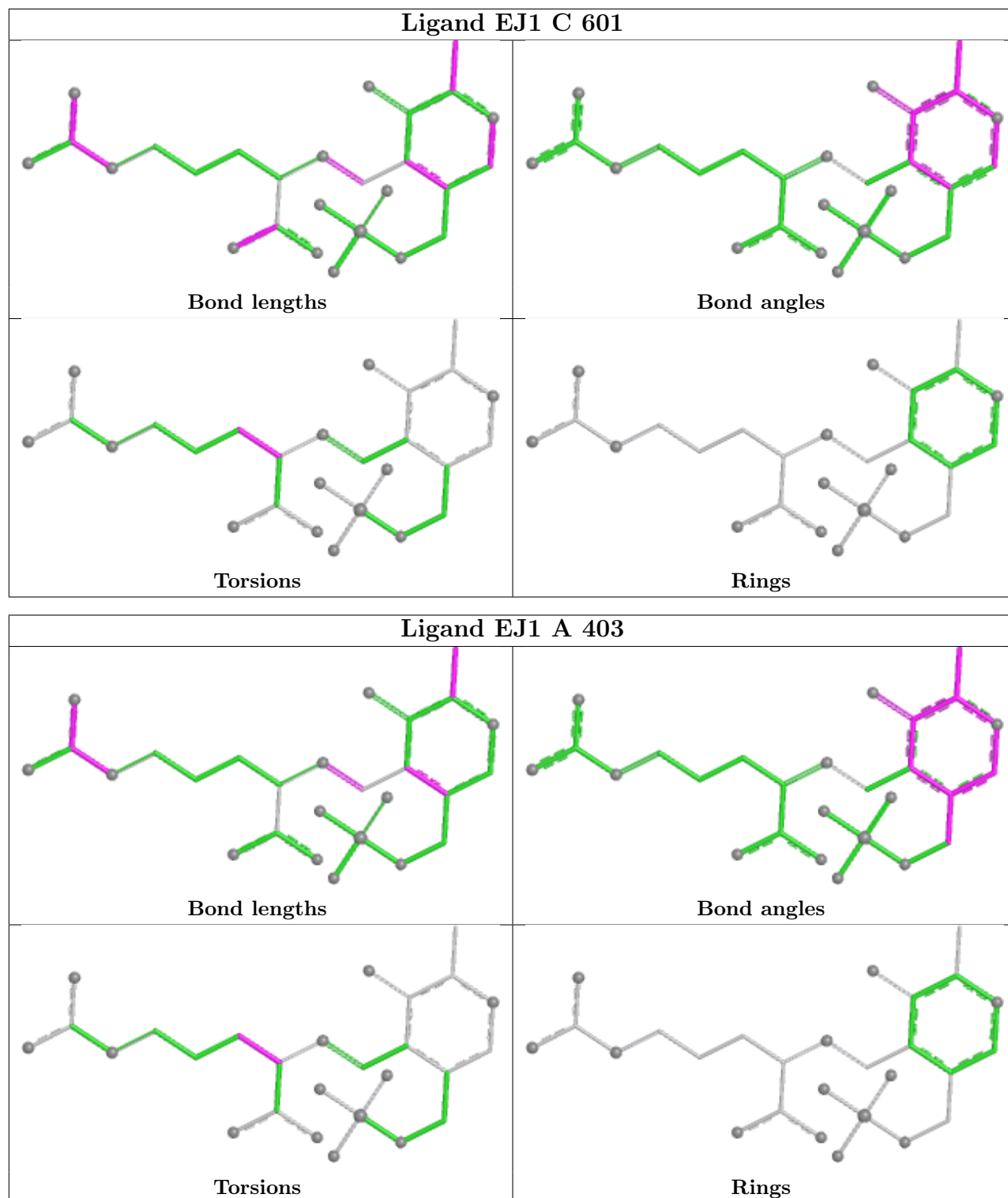
There are no ring outliers.

8 monomers are involved in 27 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	D	403	EJ1	4	0
3	B	502	ACT	1	0
6	D	409	EDO	2	0
2	A	404	BTB	5	0
2	B	501	BTB	7	0
2	C	602	BTB	5	0
4	A	403	EJ1	1	0
6	D	407	EDO	2	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

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, 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	381/389 (97%)	-0.45	0 100 100	13, 26, 47, 85	11 (2%)
1	B	381/389 (97%)	-0.36	1 (0%) 90 93	18, 30, 48, 75	4 (1%)
1	C	376/389 (96%)	-0.52	1 (0%) 90 93	14, 26, 42, 69	14 (3%)
1	D	375/389 (96%)	-0.47	0 100 100	13, 27, 46, 63	9 (2%)
All	All	1513/1556 (97%)	-0.45	2 (0%) 92 94	13, 27, 46, 85	38 (2%)

All (2) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	197	ASN	2.4
1	C	380	GLU	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 oligosaccharides in this entry.

6.4 Ligands [i](#)

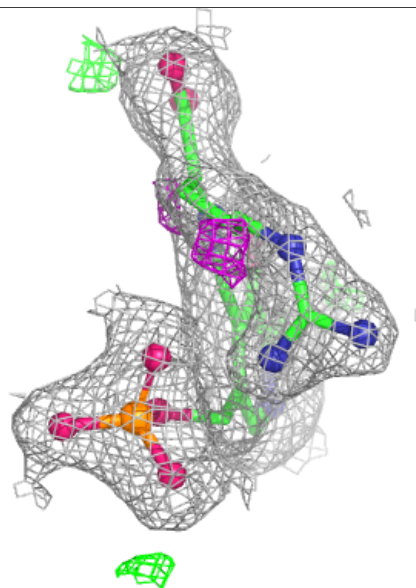
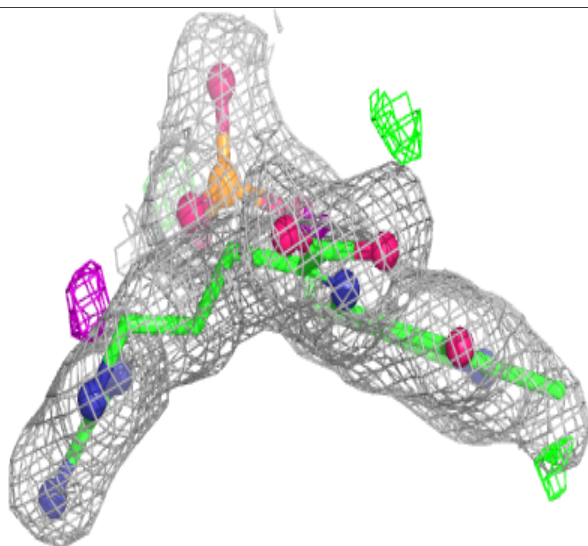
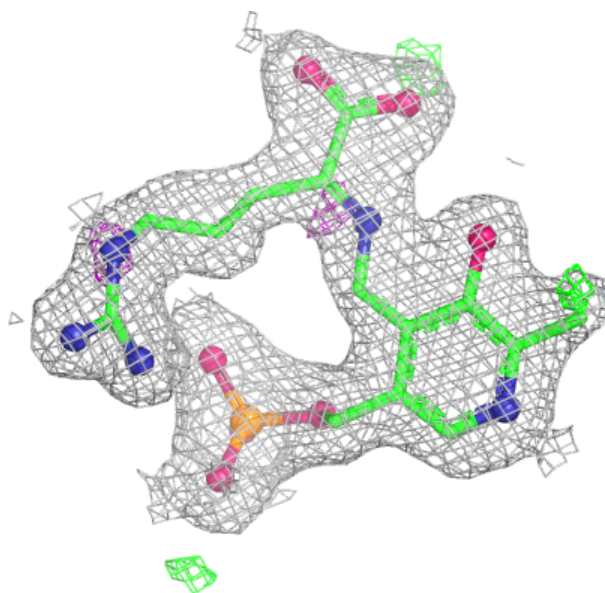
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q< 0.9’ lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
3	ACT	A	402	4/4	0.70	0.17	56,63,64,65	0
7	AE3	C	603	9/9	0.74	0.16	53,68,77,78	0
2	BTB	B	501	14/14	0.80	0.14	30,59,65,67	0
6	EDO	D	407	4/4	0.82	0.13	39,47,51,62	0
2	BTB	C	602	14/14	0.82	0.14	33,64,76,78	0
3	ACT	C	604	4/4	0.83	0.12	53,54,56,58	0
6	EDO	A	411	4/4	0.84	0.13	47,49,56,64	0
6	EDO	C	606	4/4	0.84	0.14	36,48,53,57	0
5	GOL	A	405	6/6	0.85	0.11	34,51,59,62	0
6	EDO	A	410	4/4	0.85	0.11	37,40,43,48	0
6	EDO	D	405	4/4	0.86	0.11	38,42,42,45	0
6	EDO	A	412	4/4	0.86	0.15	51,57,61,63	0
2	BTB	A	401	14/14	0.86	0.11	33,42,54,62	0
2	BTB	A	404	14/14	0.87	0.13	31,61,68,70	0
3	ACT	B	502	4/4	0.88	0.14	52,53,55,56	0
6	EDO	A	409	4/4	0.88	0.12	37,44,46,48	0
3	ACT	A	406	4/4	0.88	0.11	37,43,47,49	0
6	EDO	C	607	4/4	0.89	0.10	42,53,54,57	0
6	EDO	A	407	4/4	0.89	0.14	33,34,41,44	0
6	EDO	C	608	4/4	0.90	0.10	39,41,43,44	0
2	BTB	D	401	14/14	0.90	0.09	24,37,43,43	0
6	EDO	D	408	4/4	0.92	0.10	29,32,33,39	0
6	EDO	B	504	4/4	0.92	0.12	36,40,42,43	0
6	EDO	A	408	4/4	0.93	0.08	38,40,42,43	0
3	ACT	D	402	4/4	0.93	0.08	49,49,52,54	0
6	EDO	D	406	4/4	0.93	0.09	36,41,42,43	0
6	EDO	D	409	4/4	0.95	0.09	24,38,43,43	0
6	EDO	C	605	4/4	0.95	0.10	28,29,34,39	0
6	EDO	B	505	4/4	0.96	0.06	31,37,39,40	0
6	EDO	B	506	4/4	0.96	0.07	32,38,47,52	0
4	EJ1	B	503	27/27	0.96	0.06	17,27,35,38	0
4	EJ1	C	601	27/27	0.96	0.07	18,27,33,36	0
4	EJ1	A	403	27/27	0.97	0.06	17,26,34,36	0
4	EJ1	D	403	27/27	0.97	0.05	18,27,33,39	0
6	EDO	D	404	4/4	0.98	0.04	16,22,22,25	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.

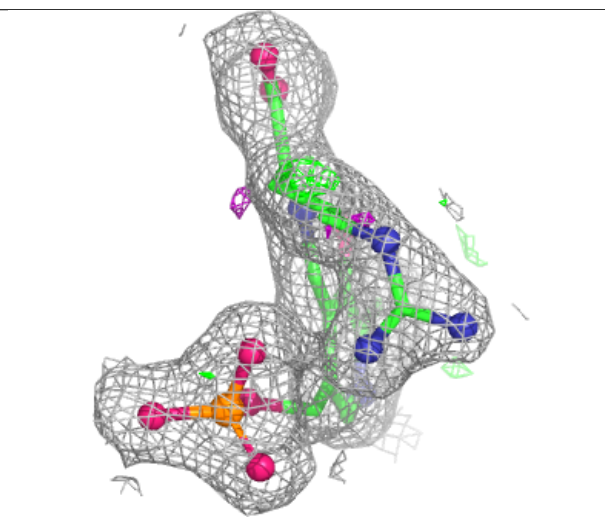
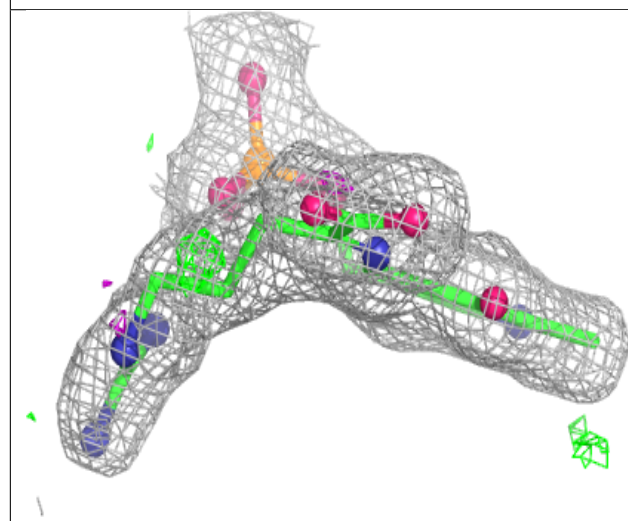
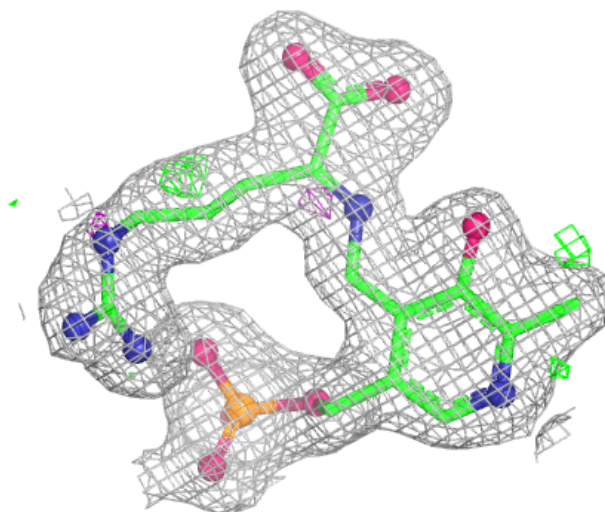
Electron density around EJ1 B 503:

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



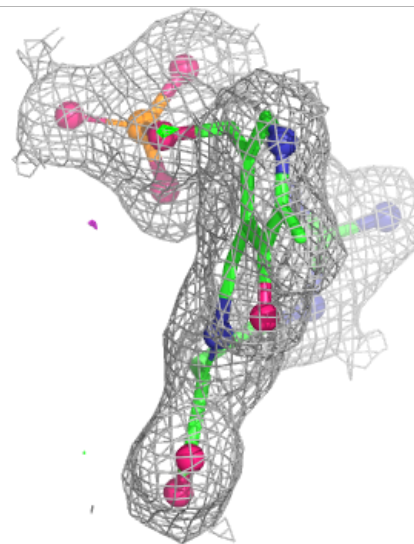
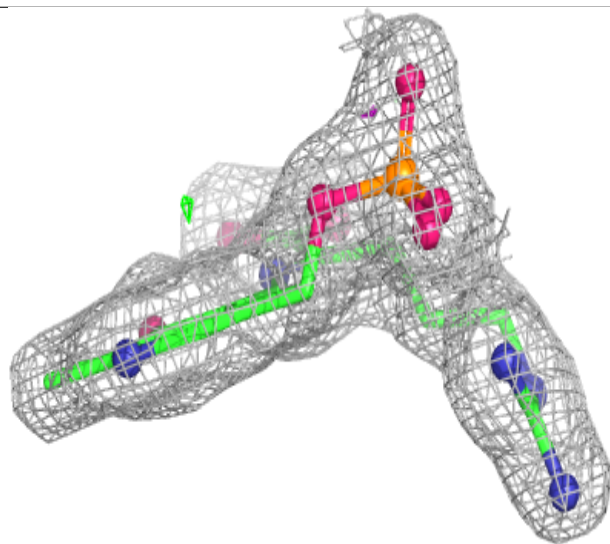
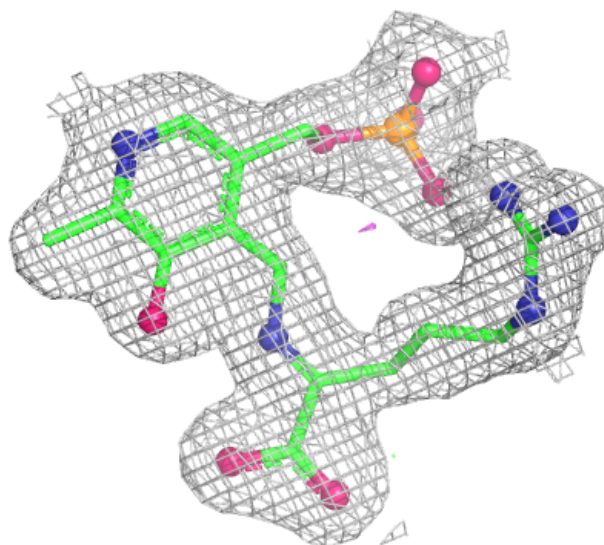
Electron density around EJ1 C 601:

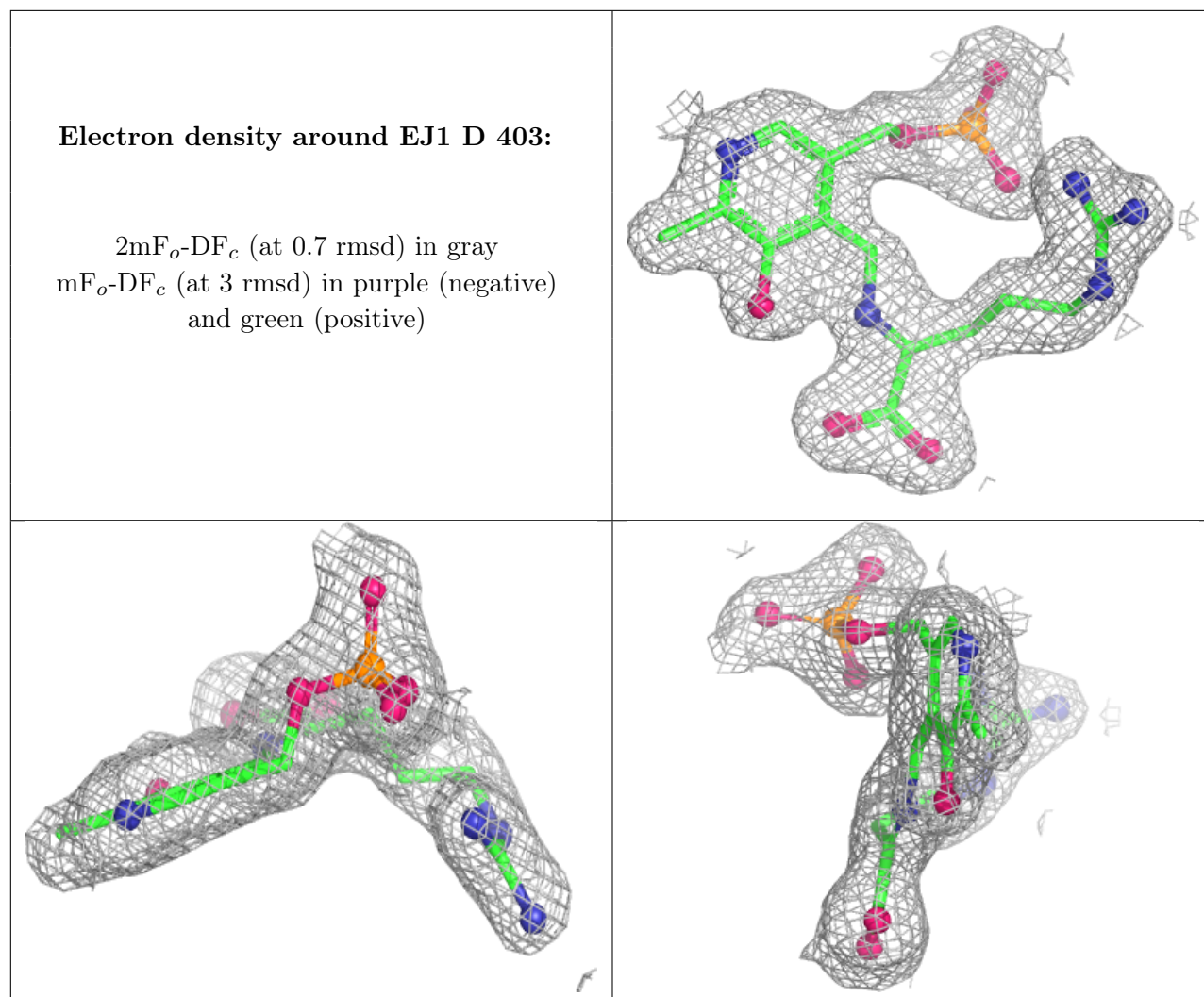
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around EJ1 A 403:

$2mF_o-DF_c$ (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.