



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 12:57 PM UTC

PDB ID : 7C0R / pdb_00007c0r
Title : Crystal structure of a dinucleotide-binding protein (F79A) of ABC transporter endogenously bound to uridylyl-3'-5'-phospho-guanosine (Form I)
Authors : Kanaujia, S.P.; Chandravanshi, M.; Samanta, R.
Deposited on : 2020-05-01
Resolution : 1.77 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

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)
Xtriage (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

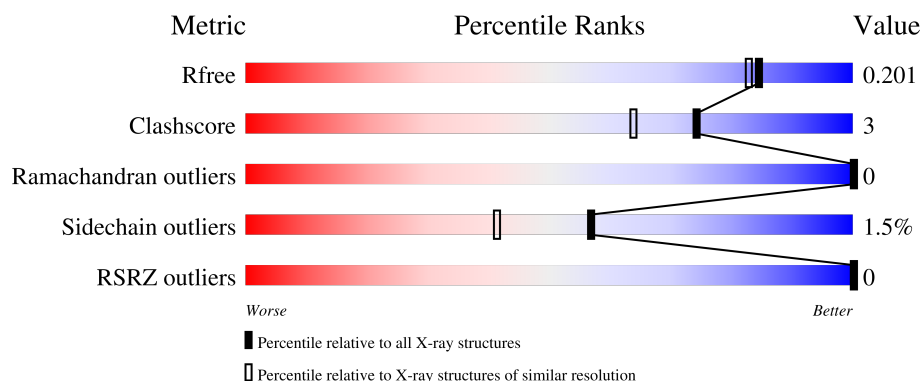
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.77 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	1365 (1.78-1.78)
Clashscore	190562	1395 (1.78-1.78)
Ramachandran outliers	187476	1382 (1.78-1.78)
Sidechain outliers	187428	1382 (1.78-1.78)
RSRZ outliers	180081	1365 (1.78-1.78)

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	406	
1	B	406	

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 6984 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 Sugar ABC transporter, periplasmic sugar-binding protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	397	Total	C	N	O	S	0	1	0
			3058	1975	517	562	4			
1	B	396	Total	C	N	O	S	0	4	0
			3062	1979	513	566	4			

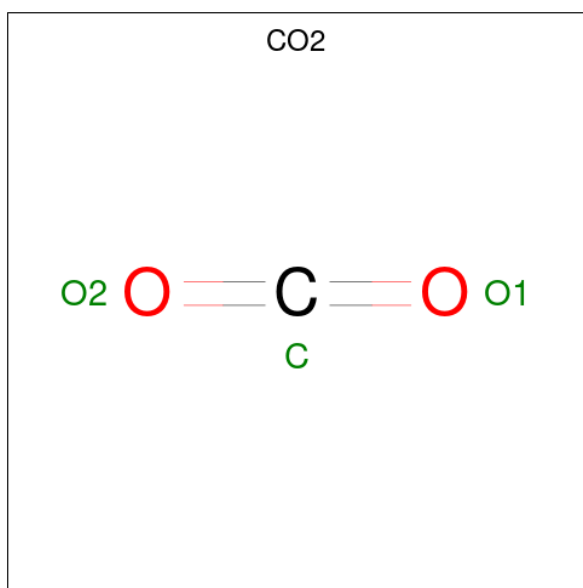
There are 18 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-1	MET	-	initiating methionine	UNP Q5SLB4
A	0	MET	-	expression tag	UNP Q5SLB4
A	79	ALA	PHE	engineered mutation	UNP Q5SLB4
A	399	HIS	-	expression tag	UNP Q5SLB4
A	400	HIS	-	expression tag	UNP Q5SLB4
A	401	HIS	-	expression tag	UNP Q5SLB4
A	402	HIS	-	expression tag	UNP Q5SLB4
A	403	HIS	-	expression tag	UNP Q5SLB4
A	404	HIS	-	expression tag	UNP Q5SLB4
B	-1	MET	-	initiating methionine	UNP Q5SLB4
B	0	MET	-	expression tag	UNP Q5SLB4
B	79	ALA	PHE	engineered mutation	UNP Q5SLB4
B	399	HIS	-	expression tag	UNP Q5SLB4
B	400	HIS	-	expression tag	UNP Q5SLB4
B	401	HIS	-	expression tag	UNP Q5SLB4
B	402	HIS	-	expression tag	UNP Q5SLB4
B	403	HIS	-	expression tag	UNP Q5SLB4
B	404	HIS	-	expression tag	UNP Q5SLB4

- Molecule 2 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

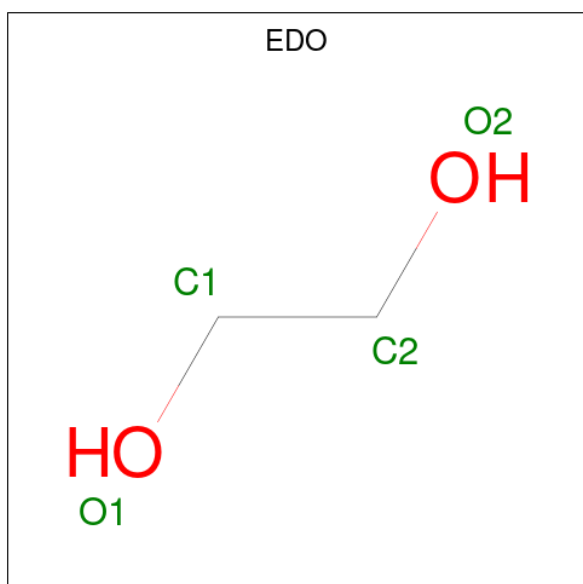
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	2	Total	Cl	0	0
			2	2		

- Molecule 3 is CARBON DIOXIDE (CCD ID: CO2) (formula: CO₂).



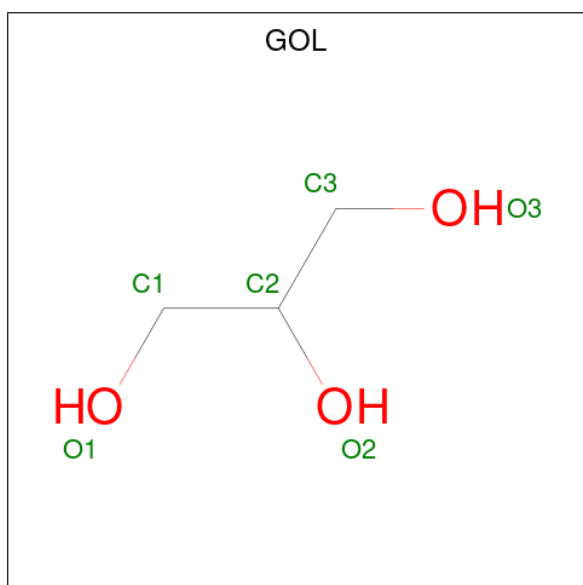
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			3	1	2		
3	A	1	Total	C	O	0	0
			3	1	2		
3	A	1	Total	C	O	0	0
			3	1	2		
3	B	1	Total	C	O	0	0
			3	1	2		

- Molecule 4 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: C₂H₆O₂).



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

- Molecule 5 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).



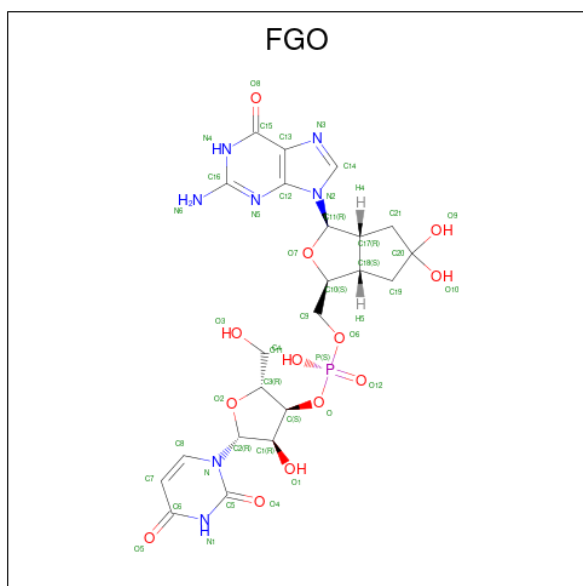
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total C O 6 3 3	0	0
5	A	1	Total C O 6 3 3	0	0

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

- Molecule 6 is [(1S,3R,3aR,6aS)-3-(2-azanyl-6-oxidanylidene-1H-purin-9-yl)-5,5-bis(oxidanyl)-1,3,3a,4,6,6a-hexahydrocyclopenta[c]furan-1-yl)methyl [(2R,3S,4R,5R)-5-[2,4-bis(oxidanylidene)pyrimidin-1-yl]-2-(hydroxymethyl)-4-oxidanyl-oxolan-3-yl] hydrogen phosphate (CCD ID: FGO) (formula: C₂₂H₂₈N₇O₁₃P) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
6	A	1	Total	C	N	O	P	0	0
			43	22	7	13	1		
6	B	1	Total	C	N	O	P	0	0
			43	22	7	13	1		

- Molecule 7 is water.

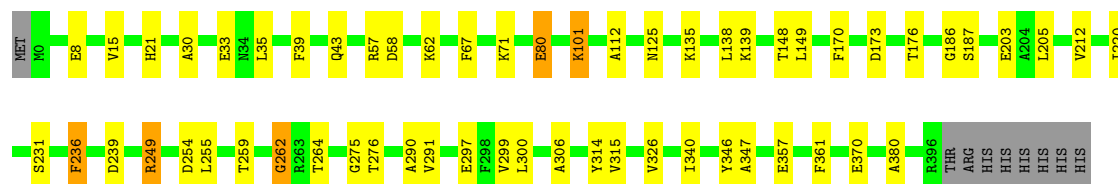
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	342	Total	O	0	0
			342	342		
7	B	358	Total	O	0	0
			358	358		

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.

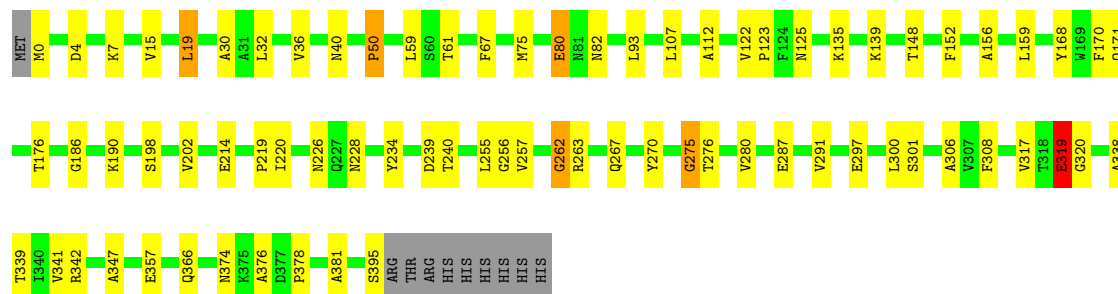
- Molecule 1: Sugar ABC transporter, periplasmic sugar-binding protein

Chain A: 



- Molecule 1: Sugar ABC transporter, periplasmic sugar-binding protein

Chain B: 



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	58.39Å 121.58Å 66.19Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	60.79 – 1.77 60.79 – 1.77	Depositor EDS
% Data completeness (in resolution range)	95.1 (60.79-1.77) 94.5 (60.79-1.77)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.18 (at 1.77Å)	Xtriage
Refinement program	REFMAC 5.8.0258	Depositor
R, R_{free}	0.143 , 0.182 (Not available) , 0.201	Depositor DCC
R_{free} test set	4254 reflections (4.76%)	wwPDB-VP
Wilson B-factor (Å ²)	17.9	Xtriage
Anisotropy	0.457	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.39 , 31.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.44$, $\langle L^2 \rangle = 0.27$	Xtriage
Estimated twinning fraction	0.389 for h,-k,-l	Xtriage
Reported twinning fraction	0.633 for H, K, L 0.367 for -h,-k,l	Depositor
Outliers	0 of 85004 reflections	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	6984	wwPDB-VP
Average B, all atoms (Å ²)	20.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.73% of the height of the origin peak. No significant pseudotranslation is detected.*

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: EDO, FGO, GOL, CO2, CL

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	1.47	23/3130 (0.7%)	1.51	11/4246 (0.3%)
1	B	1.47	33/3143 (1.0%)	1.57	23/4264 (0.5%)
All	All	1.47	56/6273 (0.9%)	1.54	34/8510 (0.4%)

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	2

All (56) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	297	GLU	CD-OE2	9.77	1.44	1.25
1	B	152	PHE	C-O	8.44	1.33	1.24
1	A	276	THR	C-O	8.08	1.33	1.23
1	B	240	THR	C-O	7.81	1.32	1.23
1	A	326	VAL	C-O	7.66	1.33	1.24
1	A	290	ALA	C-O	7.37	1.32	1.24
1	B	220	ILE	C-O	7.32	1.32	1.24
1	B	159	LEU	C-O	7.21	1.32	1.24
1	B	291	VAL	C-O	7.03	1.32	1.24
1	B	75	MET	C-O	6.89	1.32	1.23
1	B	256	GLY	C-O	6.79	1.32	1.23
1	A	314	TYR	C-O	6.78	1.33	1.23
1	A	30	ALA	C-O	6.73	1.31	1.24
1	B	262	GLY	C-O	6.71	1.31	1.23
1	B	276	THR	C-O	6.63	1.32	1.23
1	A	300	LEU	C-O	6.61	1.32	1.24

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	205	LEU	C-O	6.58	1.31	1.24
1	A	340	ILE	C-O	6.52	1.31	1.24
1	A	80	GLU	CD-OE2	6.46	1.37	1.25
1	B	255	LEU	C-O	6.39	1.31	1.23
1	A	291	VAL	C-O	6.38	1.31	1.24
1	B	300	LEU	C-O	6.23	1.32	1.24
1	A	212	VAL	C-O	6.19	1.31	1.24
1	B	257	VAL	C-O	6.18	1.30	1.24
1	A	203	GLU	C-O	6.07	1.31	1.24
1	B	107	LEU	C-O	-6.05	1.16	1.24
1	B	381	ALA	C-O	5.99	1.31	1.24
1	A	315	VAL	N-CA	5.97	1.50	1.46
1	B	30	ALA	C-O	5.94	1.31	1.24
1	A	347	ALA	C-O	5.91	1.30	1.24
1	B	263	ARG	C-O	5.87	1.30	1.24
1	B	297	GLU	CD-OE2	5.82	1.36	1.25
1	B	306	ALA	C-O	-5.78	1.17	1.24
1	B	376	ALA	C-O	5.74	1.30	1.23
1	A	259	THR	C-O	5.74	1.31	1.23
1	A	262	GLY	C-O	5.73	1.30	1.23
1	B	317	VAL	C-O	5.69	1.31	1.24
1	B	80	GLU	CD-OE2	5.69	1.36	1.25
1	A	380	ALA	C-O	5.65	1.30	1.24
1	A	186	GLY	C-O	5.61	1.31	1.23
1	B	19	LEU	C-O	5.61	1.30	1.24
1	B	270	TYR	C-O	5.52	1.30	1.23
1	A	21	HIS	CE1-NE2	5.51	1.38	1.32
1	A	340	ILE	N-CA	5.50	1.52	1.46
1	B	301	SER	CA-CB	-5.39	1.43	1.52
1	B	341	VAL	C-O	5.29	1.30	1.24
1	B	59	LEU	C-O	5.29	1.30	1.24
1	B	186	GLY	C-O	5.22	1.30	1.23
1	B	275	GLY	C-O	5.20	1.32	1.23
1	B	40	ASN	C-O	-5.18	1.17	1.24
1	A	33	GLU	C-O	5.17	1.30	1.24
1	B	228	ASN	C-O	-5.13	1.17	1.24
1	B	347	ALA	C-O	5.06	1.29	1.23
1	B	219	PRO	C-O	5.03	1.29	1.23
1	A	101	LYS	C-O	5.00	1.30	1.24
1	B	32	LEU	C-O	5.00	1.29	1.24

All (34) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	239	ASP	CA-CB-CG	8.85	121.45	112.60
1	A	239	ASP	CA-CB-CG	8.09	120.69	112.60
1	B	297	GLU	CB-CG-CD	7.72	125.72	112.60
1	A	71	LYS	CB-CA-C	-7.48	101.39	112.09
1	B	171	GLN	CB-CG-CD	7.26	124.95	112.60
1	B	107	LEU	CA-C-O	-7.19	111.97	120.10
1	A	255	LEU	CA-C-N	6.77	129.37	122.80
1	A	255	LEU	C-N-CA	6.77	129.37	122.80
1	B	168	TYR	CA-C-O	-6.68	113.43	120.58
1	A	8	GLU	CB-CG-CD	6.58	123.79	112.60
1	B	374	ASN	CB-CA-C	-6.34	100.74	111.02
1	B	61	THR	CA-CB-OG1	-6.29	100.17	109.60
1	B	319	GLU	CB-CG-CD	6.18	123.11	112.60
1	B	80	GLU	CB-CG-CD	6.01	122.82	112.60
1	A	67	PHE	CA-CB-CG	5.94	119.74	113.80
1	B	220	ILE	CA-C-O	-5.89	114.17	120.59
1	B	156	ALA	CA-C-O	-5.81	114.39	120.55
1	A	236	PHE	CB-CA-C	-5.77	99.61	110.16
1	A	138	LEU	CA-C-O	-5.69	114.85	120.82
1	A	173	ASP	CA-CB-CG	5.61	118.21	112.60
1	B	202	VAL	CA-C-O	-5.51	115.54	121.27
1	B	287	GLU	CB-CG-CD	5.48	121.92	112.60
1	B	357[A]	GLU	CB-CA-C	5.46	119.45	110.88
1	B	357[B]	GLU	CB-CA-C	5.46	119.45	110.88
1	B	82	ASN	CA-CB-CG	5.39	117.99	112.60
1	B	366	GLN	CA-C-O	-5.39	114.83	120.55
1	B	395	SER	CA-C-O	-5.34	111.71	120.80
1	B	308	PHE	CB-CA-C	5.27	119.15	110.88
1	A	220	ILE	CA-C-O	-5.26	114.94	120.57
1	A	306	ALA	CA-C-O	-5.20	115.36	120.82
1	B	50	PRO	CB-CA-C	-5.18	104.32	111.21
1	B	338	ALA	CA-C-O	-5.15	115.09	120.55
1	B	339	THR	CA-CB-OG1	-5.12	101.92	109.60
1	B	67	PHE	CA-CB-CG	5.04	118.84	113.80

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	236	PHE	Mainchain
1	A	346	TYR	Mainchain

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	3058	0	3092	17	0
1	B	3062	0	3096	16	0
2	A	2	0	0	1	0
3	A	9	0	0	0	0
3	B	3	0	0	0	0
4	A	8	0	12	0	0
4	B	32	0	48	6	0
5	A	12	0	16	2	0
5	B	12	0	16	1	0
6	A	43	0	0	1	0
6	B	43	0	0	0	0
7	A	342	0	0	7	0
7	B	358	0	0	3	0
All	All	6984	0	6280	39	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 3.

All (39) 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:357:GLU:OE2	6:A:510:FGO:N6	2.08	0.86
4:B:506:EDO:C1	7:B:741:HOH:O	2.37	0.72
1:B:93:LEU:HD12	1:B:280:VAL:HG12	1.79	0.65
1:A:58:ASP:O	1:A:62:LYS:HG3	1.98	0.62
2:A:501:CL:CL	7:A:735:HOH:O	2.53	0.61
4:B:506:EDO:H12	7:B:741:HOH:O	2.01	0.60
1:A:249:ARG:HH21	1:A:249:ARG:CB	2.15	0.60
1:B:342:ARG:HD3	4:B:507:EDO:H21	1.85	0.59
1:B:234:TYR:HB3	5:B:510:GOL:H31	1.88	0.55
1:A:139:LYS:HE2	7:A:869:HOH:O	2.08	0.53
1:B:0:MET:HB3	1:B:4:ASP:HB2	1.89	0.53
1:B:319:GLU:HG2	1:B:320:GLY:N	2.25	0.51
4:B:506:EDO:H11	7:B:741:HOH:O	2.07	0.50
1:A:254:ASP:OD1	7:A:601:HOH:O	2.20	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:35:LEU:HD21	1:A:299:VAL:HG22	1.97	0.46
1:B:19:LEU:C	1:B:19:LEU:HD23	2.41	0.45
1:B:214:GLU:OE1	4:B:505:EDO:O2	2.35	0.44
1:A:80:GLU:HG2	1:A:112:ALA:HB1	2.00	0.44
1:B:125:ASN:O	1:B:275:GLY:HA3	2.18	0.44
1:B:122:VAL:O	1:B:123:PRO:C	2.60	0.43
1:A:148:THR:HA	1:A:262:GLY:O	2.18	0.43
1:A:57:ARG:HD2	1:A:361:PHE:CD2	2.54	0.43
1:A:370:GLU:HG2	7:A:860:HOH:O	2.18	0.43
1:A:101:LYS:HA	1:A:101:LYS:HD2	1.81	0.42
1:A:39:PHE:O	1:A:43:GLN:HG2	2.19	0.42
5:A:508:GOL:H11	7:A:768:HOH:O	2.19	0.42
1:B:148:THR:HA	1:B:262:GLY:O	2.19	0.42
1:A:170:PHE:HB2	1:A:176:THR:HG21	2.00	0.42
1:B:135:LYS:O	1:B:139:LYS:HG3	2.19	0.42
1:B:36:VAL:HG21	1:B:50:PRO:HG3	2.01	0.42
5:A:508:GOL:H31	7:A:768:HOH:O	2.20	0.42
1:A:135:LYS:NZ	7:A:606:HOH:O	2.37	0.41
1:B:80:GLU:HG2	1:B:112:ALA:HB1	2.01	0.41
1:B:267:GLN:HB2	4:B:508:EDO:H11	2.02	0.41
1:B:170:PHE:HB2	1:B:176:THR:HG21	2.03	0.41
1:A:149:LEU:HD23	1:A:149:LEU:HA	1.90	0.41
1:A:125:ASN:O	1:A:275:GLY:HA3	2.21	0.40
1:B:190:LYS:HE3	1:B:198:SER:HB3	2.03	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	396/406 (98%)	392 (99%)	4 (1%)	0	100 100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	398/406 (98%)	393 (99%)	5 (1%)	0	100	100
All	All	794/812 (98%)	785 (99%)	9 (1%)	0	100	100

There are no Ramachandran outliers to report.

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	310/318 (98%)	306 (99%)	4 (1%)	61	46
1	B	312/318 (98%)	307 (98%)	5 (2%)	55	38
All	All	622/636 (98%)	613 (99%)	9 (1%)	57	44

All (9) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	15	VAL
1	A	187	SER
1	A	249	ARG
1	A	264	THR
1	B	7	LYS
1	B	15	VAL
1	B	226	ASN
1	B	319	GLU
1	B	378	PRO

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	209	GLN
1	A	366	GLN
1	B	171	GLN
1	B	374	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 oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 22 ligands modelled in this entry, 2 are monoatomic - leaving 20 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$
4	EDO	B	504	-	3,3,3	0.28	0	2,2,2	0.51	0
5	GOL	B	510	-	5,5,5	0.11	0	5,5,5	0.44	0
5	GOL	B	511	-	5,5,5	0.17	0	5,5,5	0.48	0
4	EDO	B	505	-	3,3,3	0.17	0	2,2,2	0.10	0
4	EDO	B	506	-	3,3,3	0.41	0	2,2,2	0.22	0
6	FGO	B	512	-	48,48,48	1.54	9 (18%)	64,75,75	2.29	23 (35%)
4	EDO	A	507	-	3,3,3	0.23	0	2,2,2	0.06	0
5	GOL	A	509	-	5,5,5	0.16	0	5,5,5	0.70	0
3	CO2	A	505	-	2,2,2	0.45	0	1,1,1	1.49	0
4	EDO	B	507	-	3,3,3	0.33	0	2,2,2	0.36	0
4	EDO	B	503	-	3,3,3	0.22	0	2,2,2	0.02	0
4	EDO	A	506	-	3,3,3	0.32	0	2,2,2	0.07	0
4	EDO	B	509	-	3,3,3	0.13	0	2,2,2	0.65	0
3	CO2	A	503	-	2,2,2	0.38	0	1,1,1	0.85	0
3	CO2	A	504	-	2,2,2	0.01	0	1,1,1	0.96	0
6	FGO	A	510	-	48,48,48	1.71	9 (18%)	64,75,75	2.34	25 (39%)
5	GOL	A	508	-	5,5,5	0.19	0	5,5,5	0.45	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	EDO	B	502	-	3,3,3	0.17	0	2,2,2	0.25	0
3	CO2	B	501	-	2,2,2	0.43	0	1,1,1	1.65	0
4	EDO	B	508	-	3,3,3	0.34	0	2,2,2	1.03	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	EDO	A	506	-	-	1/1/1/1	-
4	EDO	B	504	-	-	0/1/1/1	-
4	EDO	B	505	-	-	0/1/1/1	-
4	EDO	B	507	-	-	1/1/1/1	-
5	GOL	A	508	-	-	4/4/4/4	-
4	EDO	B	506	-	-	1/1/1/1	-
4	EDO	B	509	-	-	0/1/1/1	-
5	GOL	B	510	-	-	1/4/4/4	-
6	FGO	B	512	-	-	0/21/63/63	0/6/6/6
4	EDO	A	507	-	-	1/1/1/1	-
5	GOL	A	509	-	-	3/4/4/4	-
4	EDO	B	502	-	-	1/1/1/1	-
6	FGO	A	510	-	-	0/21/63/63	0/6/6/6
5	GOL	B	511	-	-	2/4/4/4	-
4	EDO	B	508	-	-	1/1/1/1	-
4	EDO	B	503	-	-	0/1/1/1	-

All (18) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	A	510	FGO	C19-C18	-6.03	1.44	1.53
6	B	512	FGO	O5-C6	3.86	1.32	1.24
6	A	510	FGO	C6-N1	-3.72	1.32	1.38
6	B	512	FGO	C19-C18	-3.42	1.48	1.53
6	B	512	FGO	C12-N2	-3.41	1.29	1.38
6	A	510	FGO	C12-N2	-3.35	1.29	1.38
6	A	510	FGO	C13-C12	3.31	1.47	1.38
6	B	512	FGO	C6-N1	-3.06	1.33	1.38
6	B	512	FGO	C21-C20	3.01	1.58	1.52
6	A	510	FGO	O5-C6	2.82	1.30	1.24
6	B	512	FGO	C13-C12	2.67	1.46	1.38
6	A	510	FGO	C16-N5	2.57	1.39	1.33

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	B	512	FGO	O8-C15	2.52	1.28	1.23
6	B	512	FGO	O7-C10	-2.45	1.39	1.45
6	A	510	FGO	O2-C3	-2.39	1.39	1.45
6	B	512	FGO	C8-C7	2.32	1.40	1.35
6	A	510	FGO	C18-C17	-2.21	1.49	1.55
6	A	510	FGO	C8-C7	2.21	1.40	1.35

All (48) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	B	512	FGO	C17-C18-C10	5.52	114.89	103.66
6	A	510	FGO	N1-C5-N	5.26	121.73	114.89
6	A	510	FGO	O8-C15-C13	-5.21	112.79	126.53
6	A	510	FGO	C17-C18-C10	4.79	113.40	103.66
6	A	510	FGO	C7-C6-N1	4.77	121.48	114.80
6	B	512	FGO	O8-C15-C13	-4.68	114.19	126.53
6	B	512	FGO	C18-C17-C11	-4.67	94.36	102.73
6	A	510	FGO	C6-N1-C5	-4.56	120.95	126.61
6	B	512	FGO	C6-N1-C5	-4.53	121.00	126.61
6	A	510	FGO	O8-C15-N4	4.51	128.59	120.11
6	B	512	FGO	N1-C5-N	4.50	120.75	114.89
6	B	512	FGO	C7-C6-N1	4.44	121.03	114.80
6	A	510	FGO	O5-C6-N1	-4.37	112.93	119.27
6	B	512	FGO	O7-C10-C18	-4.36	96.81	104.88
6	A	510	FGO	O10-C20-C21	4.14	124.27	110.56
6	B	512	FGO	O10-C20-C21	4.06	123.99	110.56
6	A	510	FGO	O9-C20-C21	3.91	123.49	110.56
6	B	512	FGO	O8-C15-N4	3.85	127.35	120.11
6	B	512	FGO	N2-C12-N5	3.75	133.44	125.95
6	B	512	FGO	C14-N2-C12	3.73	113.02	106.03
6	B	512	FGO	O5-C6-N1	-3.41	114.33	119.27
6	B	512	FGO	C19-C18-C17	3.23	110.17	103.77
6	A	510	FGO	O7-C10-C18	-3.07	99.21	104.88
6	A	510	FGO	O7-C11-N2	-3.04	101.47	108.36
6	A	510	FGO	C18-C17-C11	-3.02	97.33	102.73
6	A	510	FGO	C19-C18-C17	3.01	109.72	103.77
6	A	510	FGO	C13-C12-N5	-3.01	123.61	128.39
6	A	510	FGO	N2-C12-N5	2.90	131.75	125.95
6	B	512	FGO	O7-C11-N2	-2.78	102.05	108.36
6	A	510	FGO	N6-C16-N5	-2.75	114.30	119.67
6	B	512	FGO	C11-N2-C12	-2.69	118.53	126.49
6	B	512	FGO	C13-C12-N5	-2.62	124.22	128.39

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	A	510	FGO	C2-N-C8	2.53	126.19	120.78
6	A	510	FGO	C16-N4-C15	-2.53	120.53	125.11
6	A	510	FGO	O4-C5-N1	-2.53	116.83	121.49
6	B	512	FGO	C21-C17-C18	-2.46	98.89	103.77
6	A	510	FGO	C11-N2-C12	-2.45	119.26	126.49
6	B	512	FGO	O9-C20-C21	2.31	118.22	110.56
6	A	510	FGO	O7-C10-C9	2.28	116.64	109.33
6	B	512	FGO	C16-N4-C15	-2.28	120.97	125.11
6	A	510	FGO	C14-N2-C12	2.20	110.16	106.03
6	B	512	FGO	O2-C3-C4	2.18	113.83	109.22
6	B	512	FGO	C16-N5-C12	2.17	116.04	112.30
6	A	510	FGO	C21-C17-C18	-2.15	99.51	103.77
6	A	510	FGO	O-P-O12	-2.12	103.02	109.81
6	B	512	FGO	O1-C1-C	2.10	117.07	111.19
6	B	512	FGO	C13-C15-N4	2.05	118.46	113.25
6	A	510	FGO	C13-C15-N4	2.03	118.42	113.25

There are no chirality outliers.

All (16) torsion outliers are listed below:

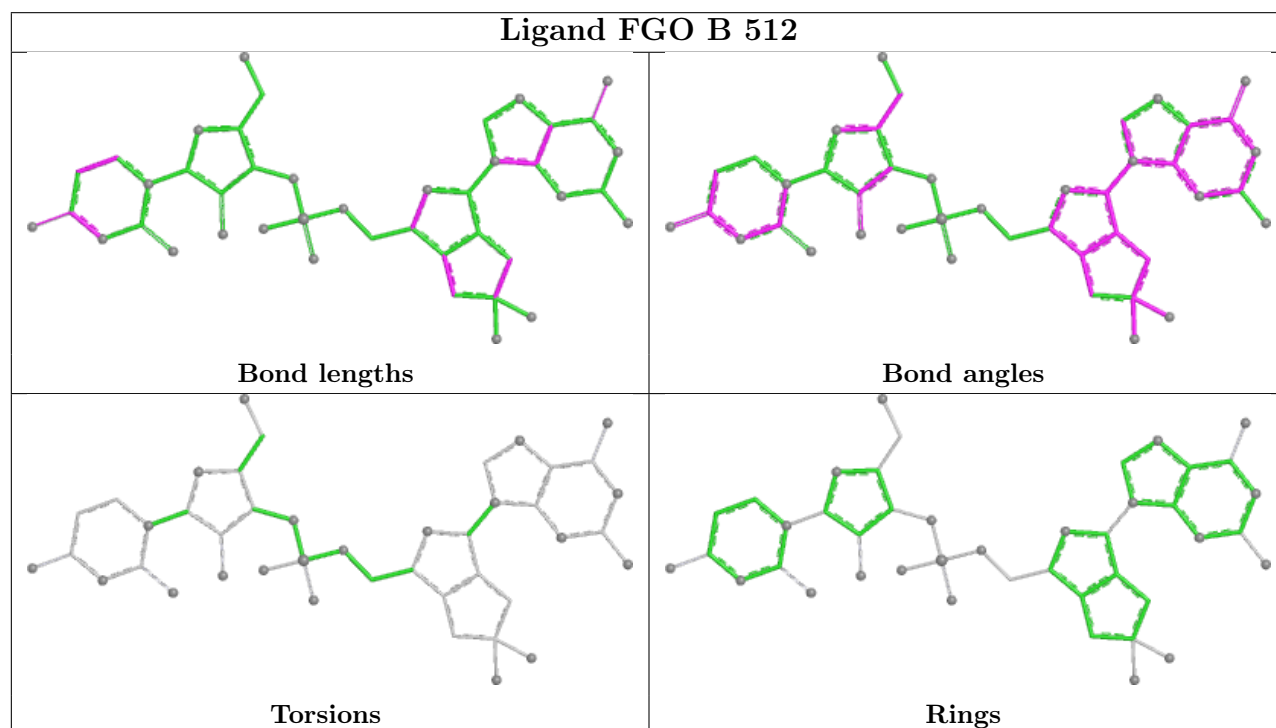
Mol	Chain	Res	Type	Atoms
5	A	508	GOL	O1-C1-C2-C3
5	A	508	GOL	C1-C2-C3-O3
5	A	509	GOL	O1-C1-C2-C3
5	B	511	GOL	O1-C1-C2-C3
5	A	508	GOL	O2-C2-C3-O3
5	B	511	GOL	O1-C1-C2-O2
4	B	508	EDO	O1-C1-C2-O2
5	A	509	GOL	O2-C2-C3-O3
4	A	507	EDO	O1-C1-C2-O2
4	B	502	EDO	O1-C1-C2-O2
4	B	507	EDO	O1-C1-C2-O2
5	A	508	GOL	O1-C1-C2-O2
5	A	509	GOL	O1-C1-C2-O2
4	B	506	EDO	O1-C1-C2-O2
5	B	510	GOL	O1-C1-C2-C3
4	A	506	EDO	O1-C1-C2-O2

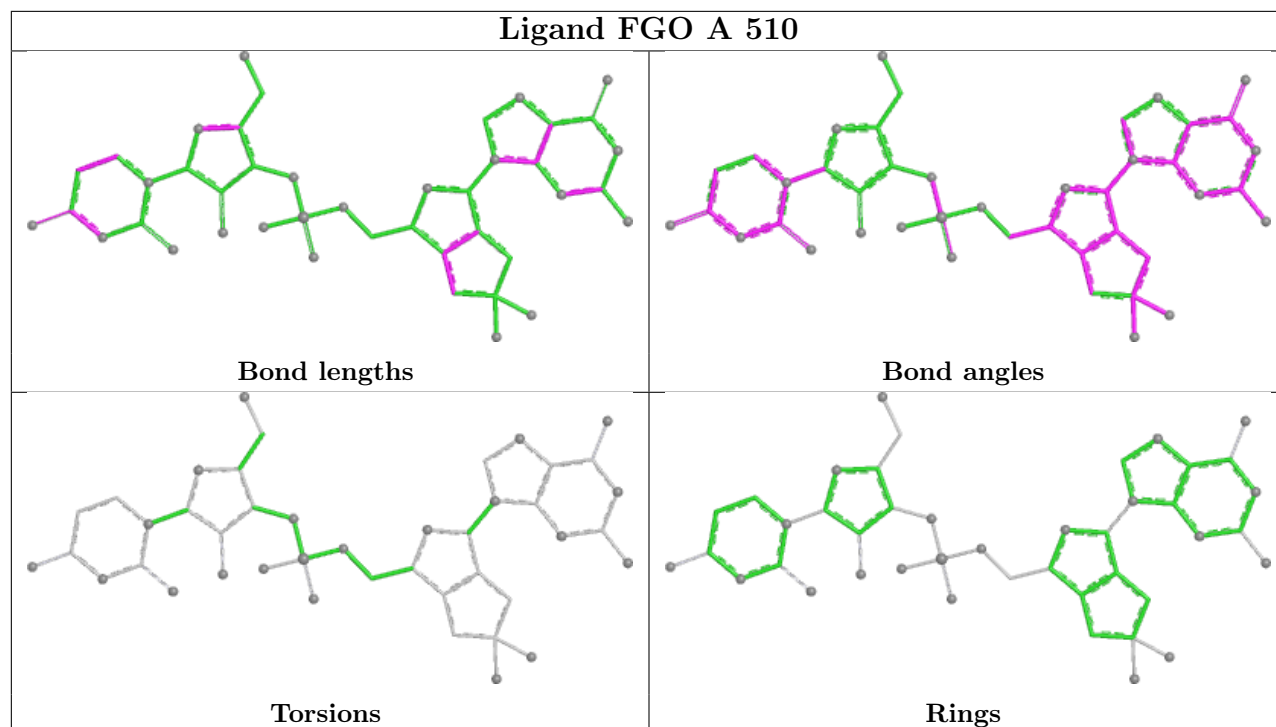
There are no ring outliers.

7 monomers are involved in 10 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	B	510	GOL	1	0
4	B	505	EDO	1	0
4	B	506	EDO	3	0
4	B	507	EDO	1	0
6	A	510	FGO	1	0
5	A	508	GOL	2	0
4	B	508	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 [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	397/406 (97%)	-1.41	0 100 100	10, 17, 33, 53	1 (0%)
1	B	396/406 (97%)	-1.40	0 100 100	8, 17, 32, 70	4 (1%)
All	All	793/812 (97%)	-1.40	0 100 100	8, 17, 33, 70	5 (0%)

There are no RSRZ outliers to report.

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.

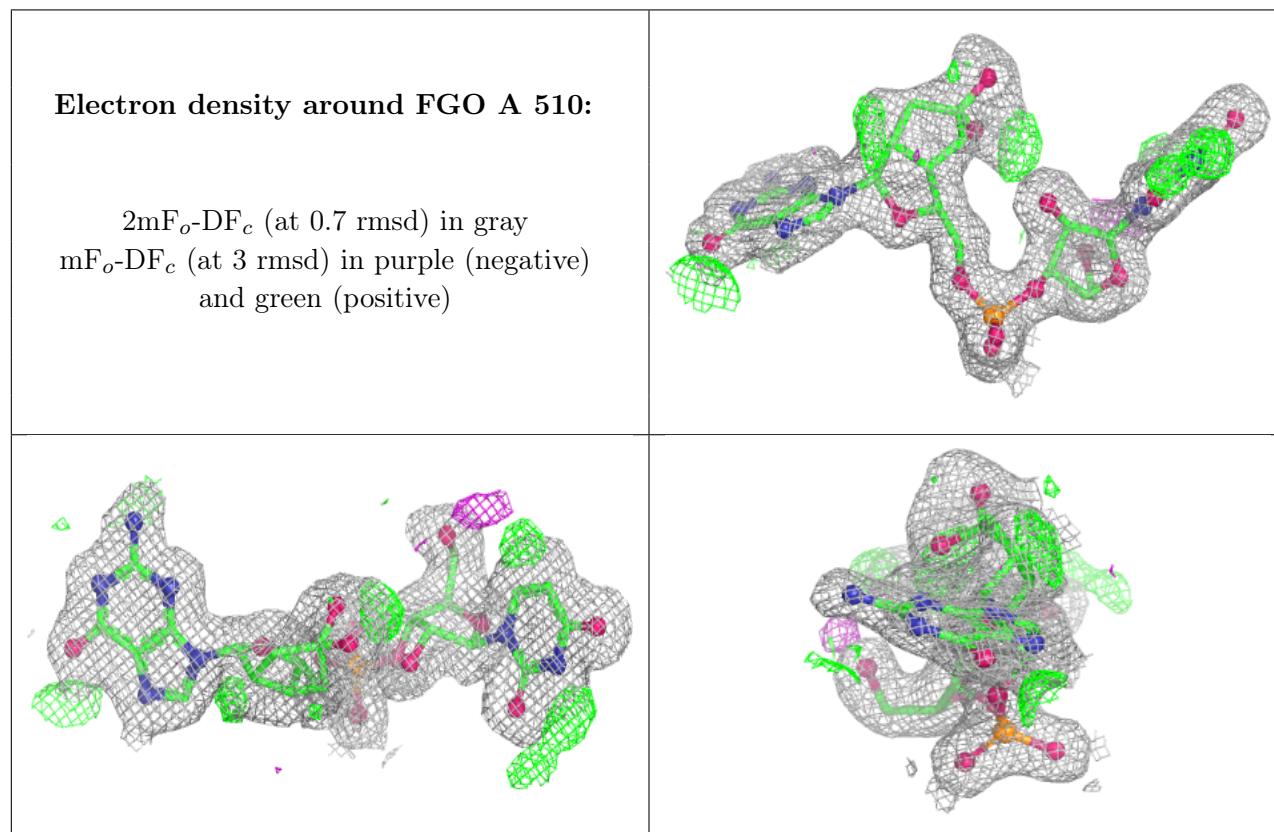
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	CO2	A	503	3/3	0.98	0.08	37,37,46,48	0
3	CO2	A	504	3/3	0.98	0.05	41,41,45,45	0
4	EDO	B	502	4/4	0.98	0.06	32,41,42,42	0
4	EDO	B	505	4/4	0.98	0.05	39,42,42,46	0
4	EDO	A	506	4/4	0.99	0.04	22,25,27,31	0
4	EDO	A	507	4/4	0.99	0.04	27,28,29,34	0
3	CO2	A	505	3/3	0.99	0.04	22,22,28,37	0

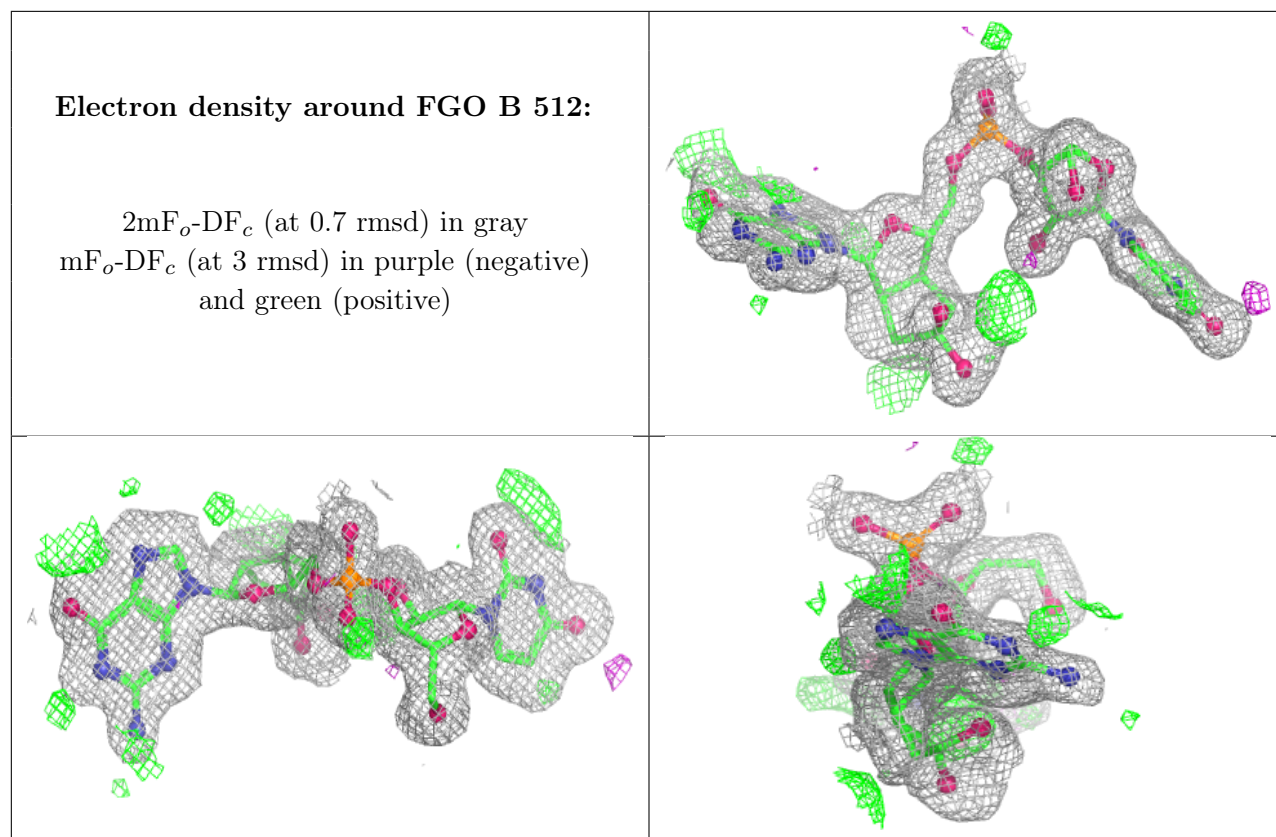
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
4	EDO	B	503	4/4	0.99	0.04	23,30,30,32	0
4	EDO	B	504	4/4	0.99	0.03	20,20,24,25	0
3	CO2	B	501	3/3	0.99	0.05	23,23,23,35	0
4	EDO	B	506	4/4	0.99	0.03	22,29,32,39	0
4	EDO	B	507	4/4	0.99	0.04	30,33,34,36	0
4	EDO	B	508	4/4	0.99	0.05	21,21,27,29	0
4	EDO	B	509	4/4	0.99	0.04	27,30,32,37	0
5	GOL	A	508	6/6	0.99	0.04	30,38,41,43	0
5	GOL	B	510	6/6	0.99	0.03	19,25,27,30	0
5	GOL	B	511	6/6	0.99	0.04	16,19,21,27	0
6	FGO	A	510	43/43	0.99	0.03	10,19,29,34	0
2	CL	A	502	1/1	1.00	0.03	33,33,33,33	0
2	CL	A	501	1/1	1.00	0.07	33,33,33,33	0
5	GOL	A	509	6/6	1.00	0.03	20,25,29,35	0
6	FGO	B	512	43/43	1.00	0.02	10,19,29,38	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.





6.5 Other polymers [i](#)

There are no such residues in this entry.