



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 20, 2026 – 01:27 AM UTC

PDB ID : 3T88 / pdb_00003t88
Title : Crystal structure of Escherichia coli MenB in complex with substrate analogue, OSB-NCoA
Authors : Li, H.-J.; Li, X.; Liu, N.; Zhang, H.; Truglio, J.; Mishra, S.; Kisker, C.; Garcia-Diaz, M.; Tonge, P.
Deposited on : 2011-08-01
Resolution : 2.00 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:

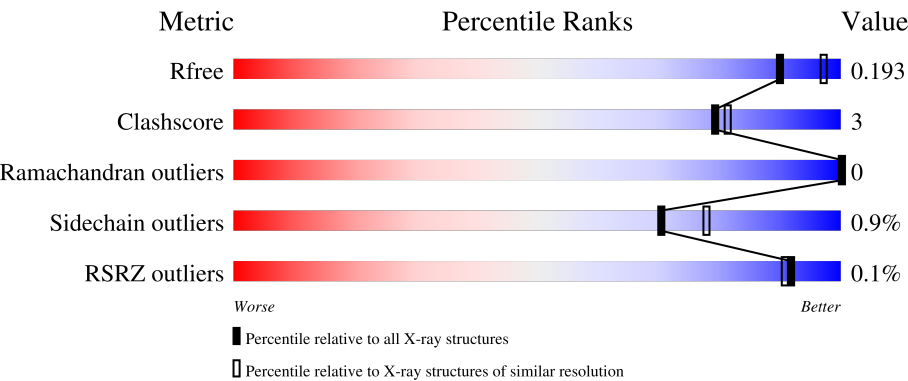
MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal 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 i

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.00 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	10052 (2.00-2.00)
Clashscore	190562	11152 (2.00-2.00)
Ramachandran outliers	187476	11031 (2.00-2.00)
Sidechain outliers	187428	11029 (2.00-2.00)
RSRZ outliers	180081	10067 (2.00-2.00)

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	289	92%5%.
1	B	289	94%. .
1	C	289	93%. .
1	D	289	89%8%.

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Mol	Chain	Length	Quality of chain
1	E	289	 91% 6% •
1	F	289	 91% 6% •

2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 14295 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 1,4-Dihydroxy-2-naphthoyl-CoA synthase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	281	Total	C	N	O	S	0	1	0
			2171	1357	389	406	19			
1	B	281	Total	C	N	O	S	0	2	0
			2167	1356	388	404	19			
1	C	281	Total	C	N	O	S	0	3	0
			2174	1362	389	404	19			
1	D	281	Total	C	N	O	S	0	3	0
			2175	1365	390	401	19			
1	E	281	Total	C	N	O	S	0	1	0
			2157	1350	386	402	19			
1	F	281	Total	C	N	O	S	0	2	0
			2160	1354	386	401	19			

There are 24 discrepancies between the modelled and reference sequences:

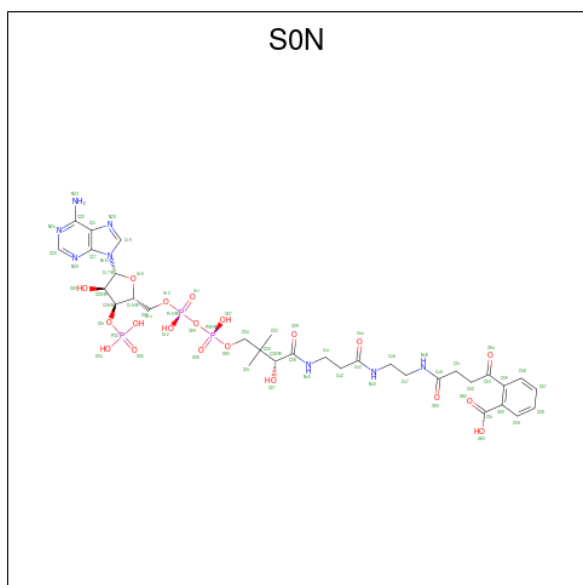
Chain	Residue	Modelled	Actual	Comment	Reference
A	-3	GLY	-	expression tag	UNP P0ABU0
A	-2	SER	-	expression tag	UNP P0ABU0
A	-1	HIS	-	expression tag	UNP P0ABU0
A	0	MET	-	expression tag	UNP P0ABU0
B	-3	GLY	-	expression tag	UNP P0ABU0
B	-2	SER	-	expression tag	UNP P0ABU0
B	-1	HIS	-	expression tag	UNP P0ABU0
B	0	MET	-	expression tag	UNP P0ABU0
C	-3	GLY	-	expression tag	UNP P0ABU0
C	-2	SER	-	expression tag	UNP P0ABU0
C	-1	HIS	-	expression tag	UNP P0ABU0
C	0	MET	-	expression tag	UNP P0ABU0
D	-3	GLY	-	expression tag	UNP P0ABU0
D	-2	SER	-	expression tag	UNP P0ABU0
D	-1	HIS	-	expression tag	UNP P0ABU0
D	0	MET	-	expression tag	UNP P0ABU0
E	-3	GLY	-	expression tag	UNP P0ABU0

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Chain	Residue	Modelled	Actual	Comment	Reference
E	-2	SER	-	expression tag	UNP P0ABU0
E	-1	HIS	-	expression tag	UNP P0ABU0
E	0	MET	-	expression tag	UNP P0ABU0
F	-3	GLY	-	expression tag	UNP P0ABU0
F	-2	SER	-	expression tag	UNP P0ABU0
F	-1	HIS	-	expression tag	UNP P0ABU0
F	0	MET	-	expression tag	UNP P0ABU0

- Molecule 2 is o-succinylbenzoyl-N-coenzyme A (CCD ID: S0N) (formula: $C_{32}H_{45}N_8O_{20}P_3$).

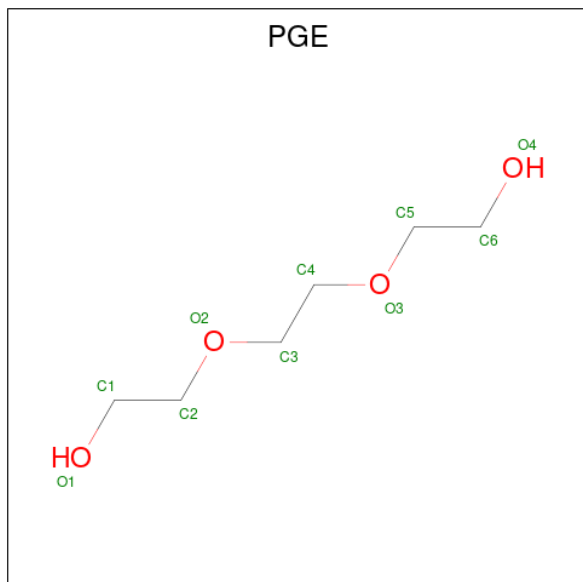


Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			63	32	8	20	3		
2	B	1	Total	C	N	O	P	0	0
			63	32	8	20	3		
2	C	1	Total	C	N	O	P	0	0
			63	32	8	20	3		
2	D	1	Total	C	N	O	P	0	0
			63	32	8	20	3		
2	E	1	Total	C	N	O	P	0	0
			63	32	8	20	3		
2	F	1	Total	C	N	O	P	0	0
			63	32	8	20	3		

- Molecule 3 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

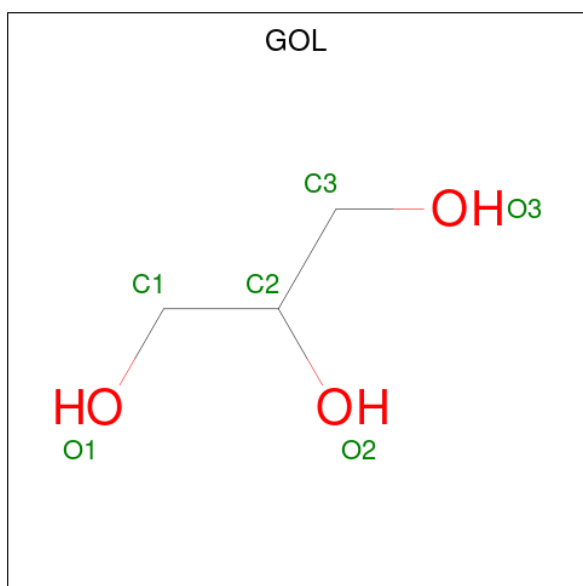
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total Cl 1 1	0	0
3	B	1	Total Cl 1 1	0	0
3	C	1	Total Cl 1 1	0	0
3	D	1	Total Cl 1 1	0	0
3	E	1	Total Cl 1 1	0	0
3	F	1	Total Cl 1 1	0	0

- Molecule 4 is TRIETHYLENE GLYCOL (CCD ID: PGE) (formula: $C_6H_{14}O_4$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C O 10 6 4	0	0
4	B	1	Total C O 10 6 4	0	0
4	C	1	Total C O 10 6 4	0	0
4	D	1	Total C O 10 6 4	0	0
4	E	1	Total C O 10 6 4	0	0
4	F	1	Total C O 10 6 4	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	0	0
			6	3	3		
5	B	1	Total	C	O	0	0
			6	3	3		
5	C	1	Total	C	O	0	0
			6	3	3		
5	D	1	Total	C	O	0	0
			6	3	3		
5	E	1	Total	C	O	0	0
			6	3	3		
5	F	1	Total	C	O	0	0
			6	3	3		

- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	135	Total	O	0	0
			135	135		
6	B	137	Total	O	0	0
			137	137		
6	C	133	Total	O	0	0
			133	133		
6	D	150	Total	O	0	0
			150	150		
6	E	130	Total	O	0	0
			130	130		

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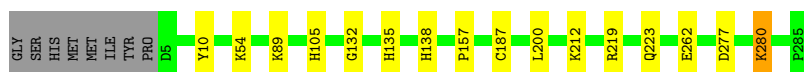
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	F	126	Total 126	O 126	0	0

3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

- Molecule 1: 1,4-Dihydroxy-2-naphthoyl-CoA synthase

Chain A: 

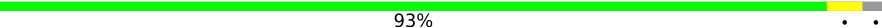


- Molecule 1: 1,4-Dihydroxy-2-naphthoyl-CoA synthase

Chain B: 



- Molecule 1: 1,4-Dihydroxy-2-naphthoyl-CoA synthase

Chain C: 



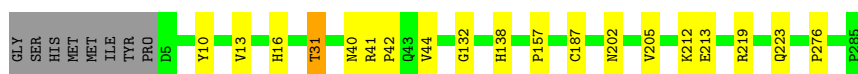
- Molecule 1: 1,4-Dihydroxy-2-naphthoyl-CoA synthase

Chain D: 



- Molecule 1: 1,4-Dihydroxy-2-naphthoyl-CoA synthase

Chain E: 



- Molecule 1: 1,4-Dihydroxy-2-naphthoyl-CoA synthase

Chain F: 



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, α , β , γ	140.49Å 141.79Å 89.12Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	44.80 – 2.00 44.80 – 2.00	Depositor EDS
% Data completeness (in resolution range)	99.6 (44.80-2.00) 99.6 (44.80-2.00)	Depositor EDS
R_{merge}	0.16	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.65 (at 2.00Å)	Xtriage
Refinement program	PHENIX	Depositor
R, R_{free}	0.155 , 0.195 0.154 , 0.193	Depositor DCC
R_{free} test set	6053 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å ²)	21.4	Xtriage
Anisotropy	0.446	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 42.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	0.014 for k,h,-l	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	14295	wwPDB-VP
Average B, all atoms (Å ²)	22.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.69% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: CL, PGE, GOL, S0N

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	0.45	0/2216	0.72	0/2988
1	B	0.43	0/2215	0.72	0/2988
1	C	0.45	0/2225	0.71	0/3001
1	D	0.46	0/2226	0.73	0/3002
1	E	0.43	0/2202	0.71	0/2970
1	F	0.42	0/2208	0.71	0/2980
All	All	0.44	0/13292	0.72	0/17929

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	2171	0	2108	11	0
1	B	2167	0	2104	6	0
1	C	2174	0	2122	8	0
1	D	2175	0	2120	17	0
1	E	2157	0	2087	11	0
1	F	2160	0	2088	10	0
2	A	63	0	40	5	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	63	0	40	2	0
2	C	63	0	40	2	0
2	D	63	0	40	4	0
2	E	63	0	40	3	0
2	F	63	0	40	3	0
3	A	1	0	0	1	0
3	B	1	0	0	1	0
3	C	1	0	0	1	0
3	D	1	0	0	1	0
3	E	1	0	0	1	0
3	F	1	0	0	1	0
4	A	10	0	14	3	0
4	B	10	0	14	1	0
4	C	10	0	14	0	0
4	D	10	0	14	0	0
4	E	10	0	14	0	0
4	F	10	0	14	1	0
5	A	6	0	8	1	0
5	B	6	0	8	0	0
5	C	6	0	8	0	0
5	D	6	0	8	0	0
5	E	6	0	8	0	0
5	F	6	0	8	0	0
6	A	135	0	0	0	0
6	B	137	0	0	1	0
6	C	133	0	0	1	0
6	D	150	0	0	0	0
6	E	130	0	0	1	0
6	F	126	0	0	0	0
All	All	14295	0	13001	71	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.

The worst 5 of 71 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:F:205:VAL:HG11	1:F:213:GLU:HG3	1.66	0.76
5:A:303:GOL:H31	1:C:188:ARG:HH22	1.63	0.64
1:A:54:LYS:HD2	4:A:302:PGE:H4	1.81	0.62
2:E:700:S0N:H51	2:E:700:S0N:O62	2.00	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:132:GLY:HA3	2:D:600:S0N:H47A	1.83	0.61

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	280/289 (97%)	276 (99%)	4 (1%)	0	100	100
1	B	281/289 (97%)	277 (99%)	4 (1%)	0	100	100
1	C	282/289 (98%)	278 (99%)	4 (1%)	0	100	100
1	D	282/289 (98%)	278 (99%)	4 (1%)	0	100	100
1	E	280/289 (97%)	274 (98%)	6 (2%)	0	100	100
1	F	281/289 (97%)	276 (98%)	5 (2%)	0	100	100
All	All	1686/1734 (97%)	1659 (98%)	27 (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	221/232 (95%)	219 (99%)	2 (1%)	70	78
1	B	220/232 (95%)	218 (99%)	2 (1%)	70	78

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	C	222/232 (96%)	221 (100%)	1 (0%)	81	87
1	D	219/232 (94%)	217 (99%)	2 (1%)	70	78
1	E	218/232 (94%)	215 (99%)	3 (1%)	59	66
1	F	217/232 (94%)	215 (99%)	2 (1%)	70	78
All	All	1317/1392 (95%)	1305 (99%)	12 (1%)	70	78

5 of 12 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	E	13	VAL
1	E	31	THR
1	F	138	HIS
1	E	138	HIS
1	B	138	HIS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 11 such sidechains are listed below:

Mol	Chain	Res	Type
1	F	16	HIS
1	F	40	ASN
1	F	243	GLN
1	F	223	GLN
1	C	223	GLN

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 24 ligands modelled in this entry, 6 are monoatomic - leaving 18 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	PGE	A	302	-	9,9,9	0.42	0	8,8,8	0.38	0
5	GOL	B	403	-	5,5,5	0.40	0	5,5,5	0.35	0
5	GOL	F	803	-	5,5,5	0.27	0	5,5,5	0.61	0
5	GOL	E	703	-	5,5,5	0.24	0	5,5,5	0.56	0
2	S0N	E	700	-	64,66,66	2.16	18 (28%)	92,97,97	1.93	15 (16%)
4	PGE	C	502	-	9,9,9	0.45	0	8,8,8	0.23	0
4	PGE	E	702	-	9,9,9	0.45	0	8,8,8	0.45	0
4	PGE	F	802	-	9,9,9	0.49	0	8,8,8	0.34	0
2	S0N	F	800	-	64,66,66	2.14	15 (23%)	92,97,97	1.91	18 (19%)
4	PGE	B	402	-	9,9,9	0.43	0	8,8,8	0.28	0
5	GOL	D	603	-	5,5,5	0.34	0	5,5,5	0.35	0
5	GOL	A	303	-	5,5,5	0.25	0	5,5,5	0.67	0
4	PGE	D	602	-	9,9,9	0.45	0	8,8,8	0.30	0
2	S0N	C	500	-	64,66,66	2.17	16 (25%)	92,97,97	2.12	14 (15%)
2	S0N	B	400	-	64,66,66	2.28	20 (31%)	92,97,97	1.83	21 (22%)
2	S0N	D	600	-	64,66,66	2.21	15 (23%)	92,97,97	1.89	19 (20%)
5	GOL	C	503	-	5,5,5	0.30	0	5,5,5	0.39	0
2	S0N	A	300	-	64,66,66	2.31	20 (31%)	92,97,97	1.99	16 (17%)

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	PGE	A	302	-	-	6/7/7/7	-
5	GOL	B	403	-	-	1/4/4/4	-
5	GOL	F	803	-	-	0/4/4/4	-
5	GOL	E	703	-	-	2/4/4/4	-
2	S0N	E	700	-	-	11/64/80/80	0/4/4/4

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	PGE	C	502	-	-	1/7/7/7	-
4	PGE	E	702	-	-	5/7/7/7	-
4	PGE	F	802	-	-	1/7/7/7	-
2	S0N	F	800	-	-	14/64/80/80	0/4/4/4
4	PGE	B	402	-	-	5/7/7/7	-
5	GOL	D	603	-	-	0/4/4/4	-
5	GOL	A	303	-	-	3/4/4/4	-
4	PGE	D	602	-	-	1/7/7/7	-
2	S0N	C	500	-	-	11/64/80/80	0/4/4/4
2	S0N	B	400	-	-	10/64/80/80	0/4/4/4
2	S0N	D	600	-	-	13/64/80/80	0/4/4/4
5	GOL	C	503	-	-	0/4/4/4	-
2	S0N	A	300	-	-	14/64/80/80	0/4/4/4

The worst 5 of 104 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	300	S0N	C49-N48	6.61	1.49	1.33
2	A	300	S0N	C43-N45	6.49	1.48	1.33
2	D	600	S0N	C43-N45	6.40	1.48	1.33
2	D	600	S0N	C38-N40	6.16	1.48	1.33
2	B	400	S0N	C43-N45	5.89	1.47	1.33

The worst 5 of 103 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	300	S0N	C41-C42-C43	-10.09	95.58	112.39
2	C	500	S0N	C51-C52-C53	-9.93	100.47	112.60
2	C	500	S0N	C41-C42-C43	-9.14	97.17	112.39
2	E	700	S0N	C41-C42-C43	-8.69	97.91	112.39
2	F	800	S0N	C41-C42-C43	-8.28	98.60	112.39

There are no chirality outliers.

5 of 98 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	300	S0N	C52-C53-C55-C60
2	A	300	S0N	O54-C53-C55-C60
2	B	400	S0N	C52-C53-C55-C60
2	C	500	S0N	C52-C53-C55-C60

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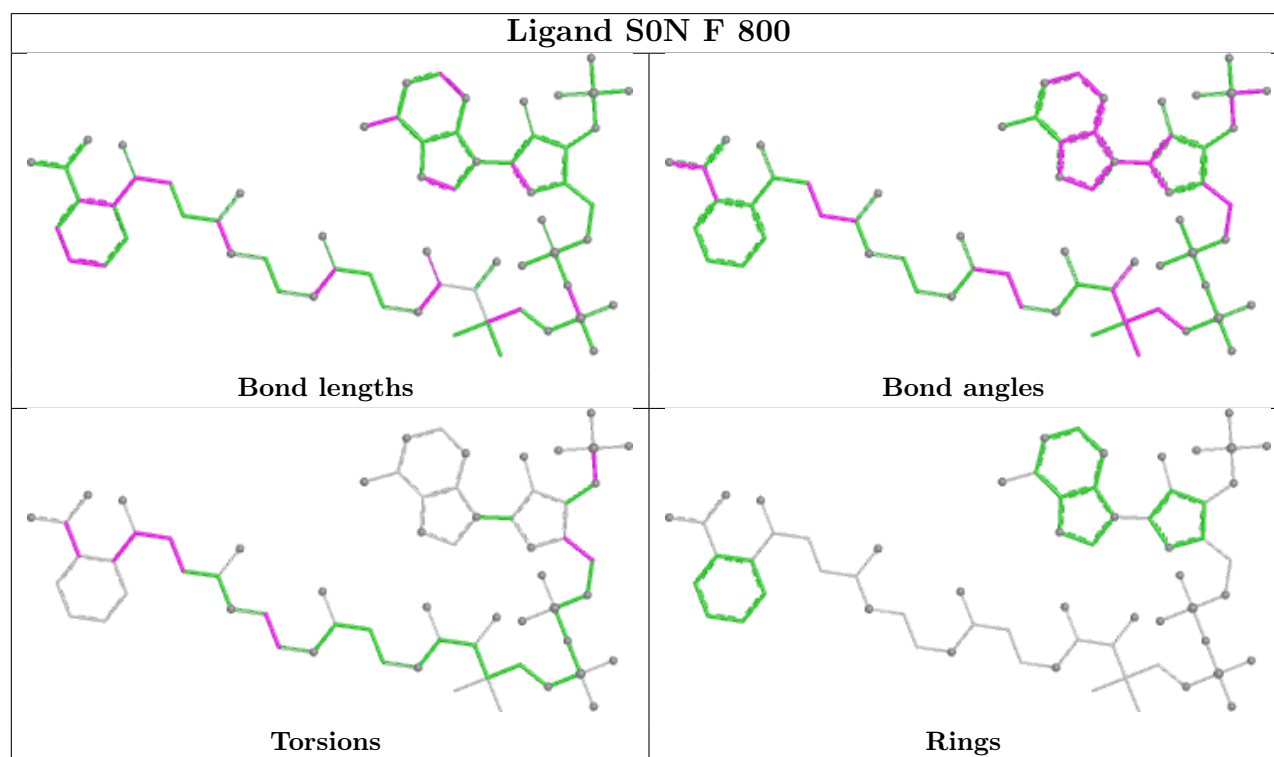
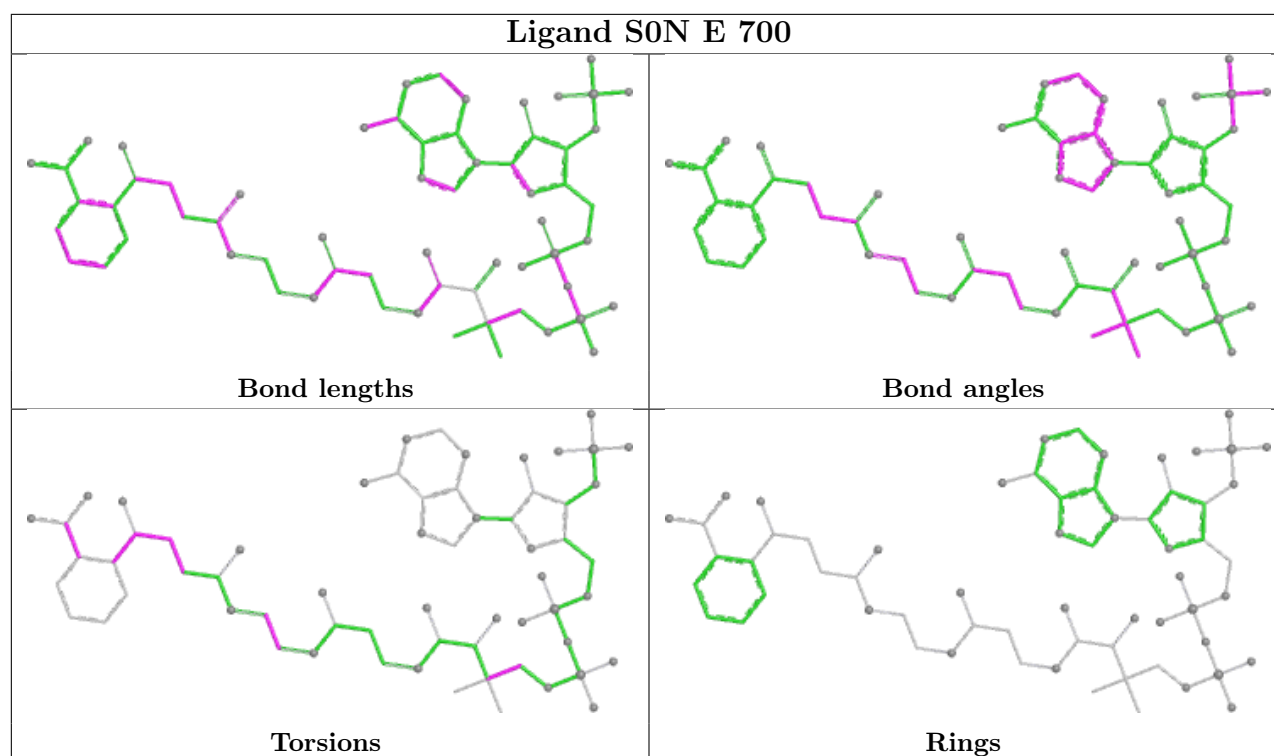
Mol	Chain	Res	Type	Atoms
2	D	600	S0N	C01-C02-C04-O05

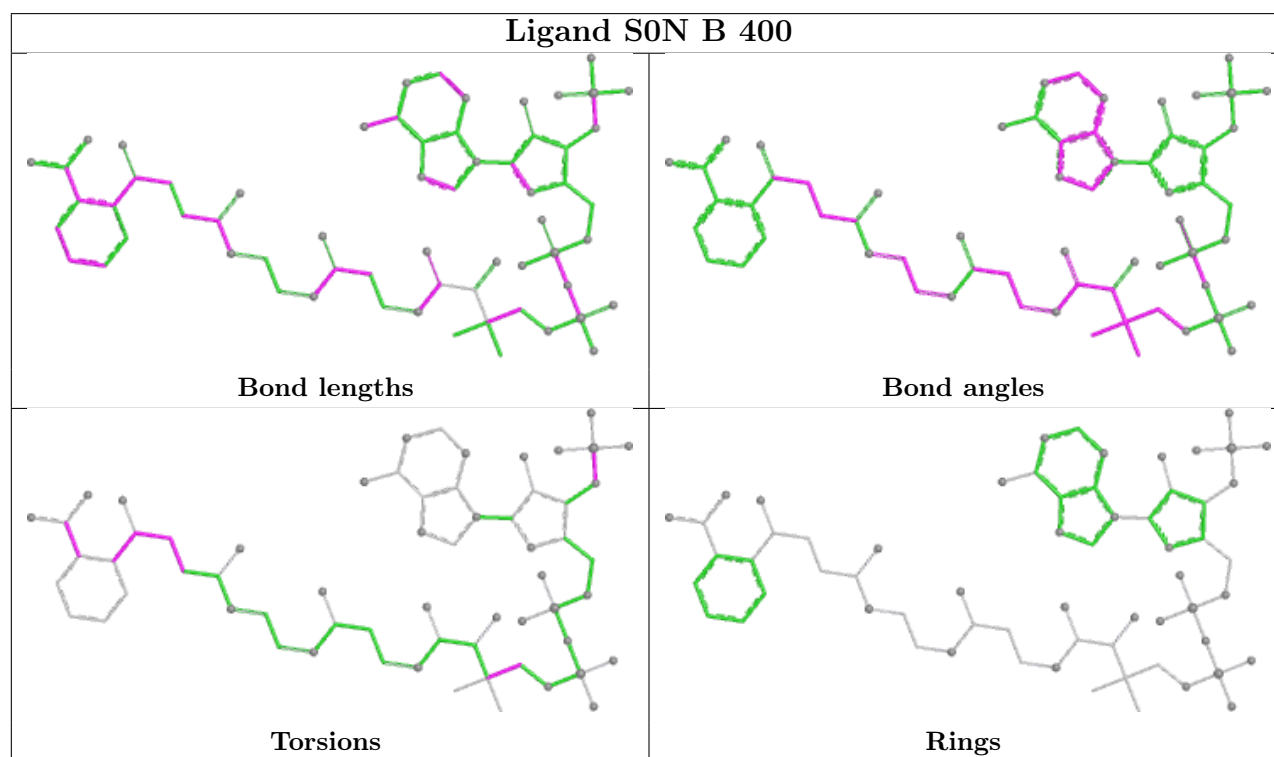
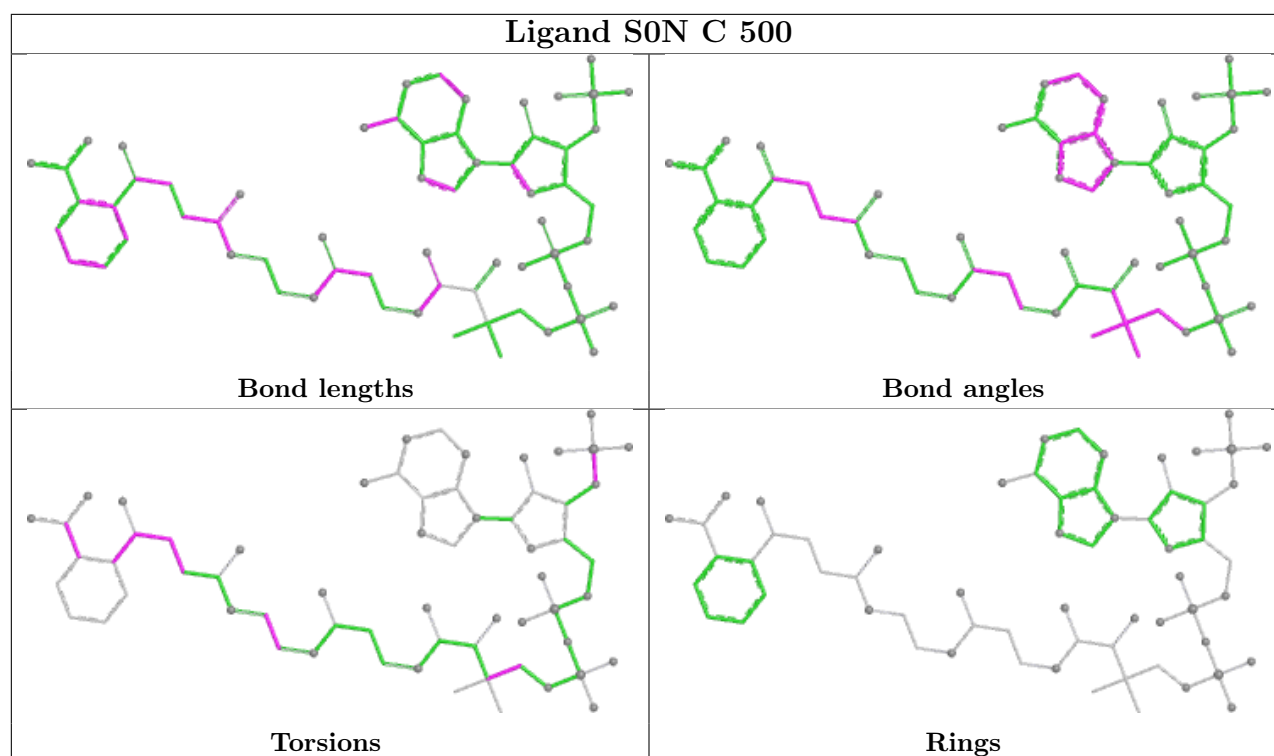
There are no ring outliers.

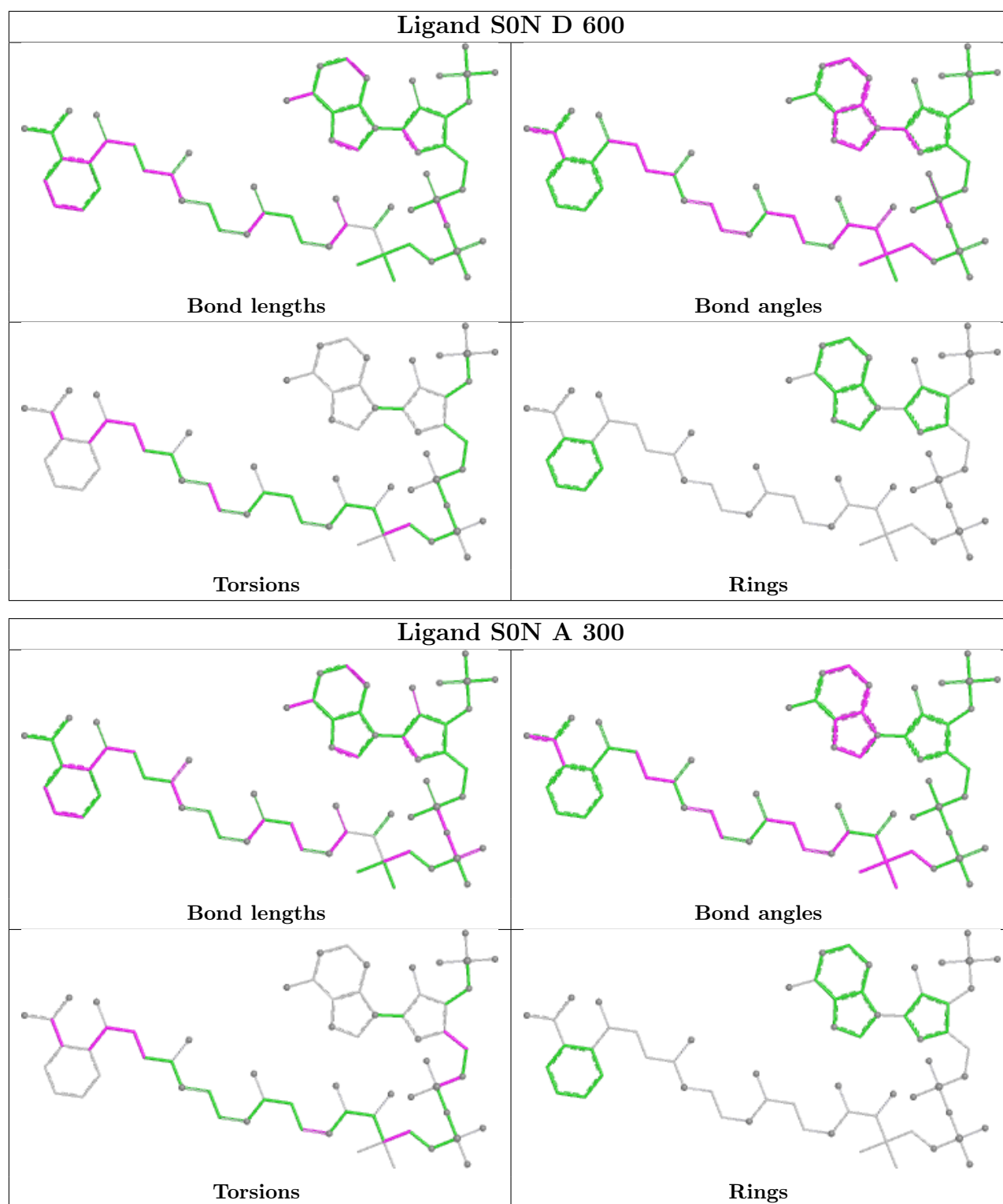
10 monomers are involved in 25 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	302	PGE	3	0
2	E	700	S0N	3	0
4	F	802	PGE	1	0
2	F	800	S0N	3	0
4	B	402	PGE	1	0
5	A	303	GOL	1	0
2	C	500	S0N	2	0
2	B	400	S0N	2	0
2	D	600	S0N	4	0
2	A	300	S0N	5	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(Å²)	Q<0.9	
1	A	281/289 (97%)	-0.47	0	100	100	11, 20, 33, 49	1 (0%)
1	B	281/289 (97%)	-0.54	0	100	100	11, 19, 34, 45	2 (0%)
1	C	281/289 (97%)	-0.55	0	100	100	9, 19, 32, 44	3 (1%)
1	D	281/289 (97%)	-0.61	0	100	100	9, 18, 28, 46	3 (1%)
1	E	281/289 (97%)	-0.38	0	100	100	11, 22, 37, 46	1 (0%)
1	F	281/289 (97%)	-0.40	1 (0%)	88	88	11, 22, 34, 50	2 (0%)
All	All	1686/1734 (97%)	-0.49	1 (0%)	92	91	9, 20, 34, 50	12 (0%)

All (1) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	F	16	HIS	2.1

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](#)

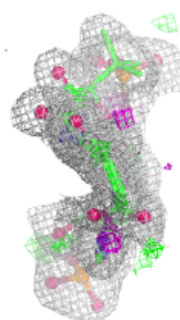
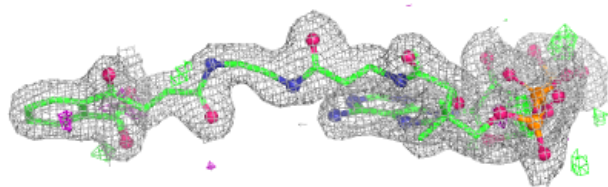
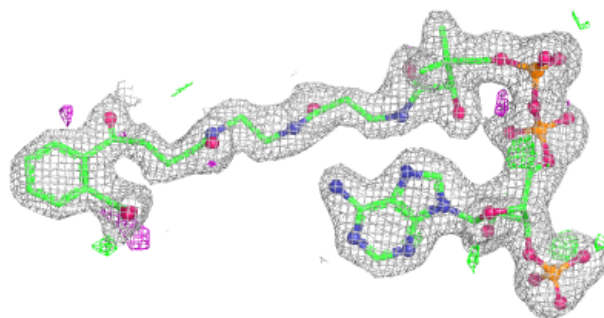
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q< 0.9’ lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
5	GOL	A	303	6/6	0.87	0.11	27,33,37,37	0
4	PGE	B	402	10/10	0.88	0.12	25,33,46,48	0
4	PGE	A	302	10/10	0.90	0.10	28,35,45,48	0
5	GOL	F	803	6/6	0.90	0.10	31,33,40,41	0
5	GOL	E	703	6/6	0.91	0.10	29,35,37,39	0
4	PGE	F	802	10/10	0.91	0.10	30,36,45,47	0
4	PGE	C	502	10/10	0.93	0.08	25,33,41,53	0
4	PGE	D	602	10/10	0.93	0.09	22,32,49,52	0
2	S0N	F	800	63/63	0.93	0.08	24,31,41,49	0
5	GOL	C	503	6/6	0.94	0.09	27,29,31,34	0
2	S0N	A	300	63/63	0.94	0.07	18,27,36,46	0
4	PGE	E	702	10/10	0.94	0.09	25,34,49,55	0
2	S0N	E	700	63/63	0.95	0.07	18,25,33,49	0
2	S0N	B	400	63/63	0.95	0.07	18,23,32,33	0
2	S0N	D	600	63/63	0.95	0.07	16,22,34,40	0
5	GOL	D	603	6/6	0.96	0.09	24,28,28,33	0
5	GOL	B	403	6/6	0.96	0.06	24,26,29,30	0
2	S0N	C	500	63/63	0.96	0.06	16,23,32,35	0
3	CL	A	301	1/1	0.97	0.04	22,22,22,22	0
3	CL	F	801	1/1	0.97	0.05	27,27,27,27	0
3	CL	E	701	1/1	0.98	0.04	23,23,23,23	0
3	CL	D	601	1/1	0.99	0.03	20,20,20,20	0
3	CL	B	401	1/1	0.99	0.03	20,20,20,20	0
3	CL	C	501	1/1	0.99	0.03	20,20,20,20	0

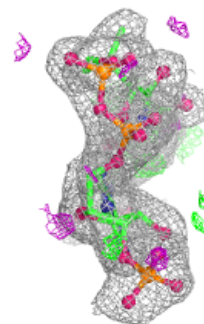
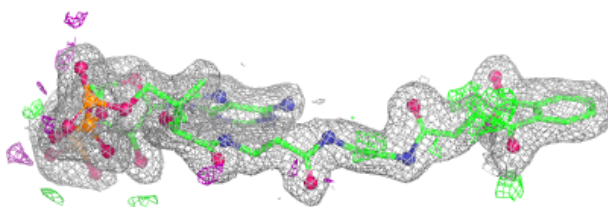
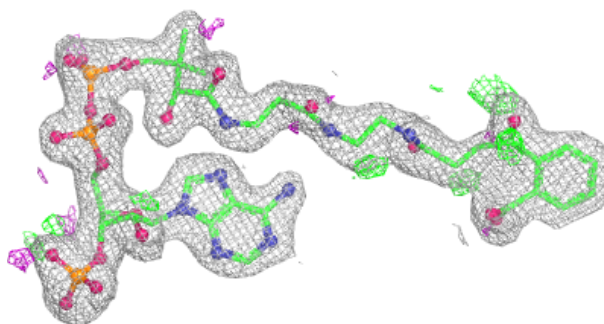
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around S0N F 800:

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

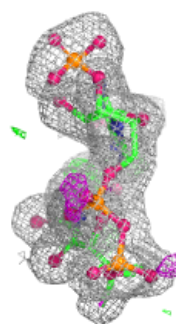
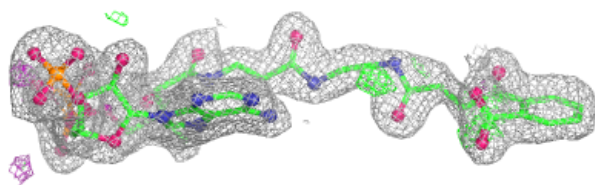
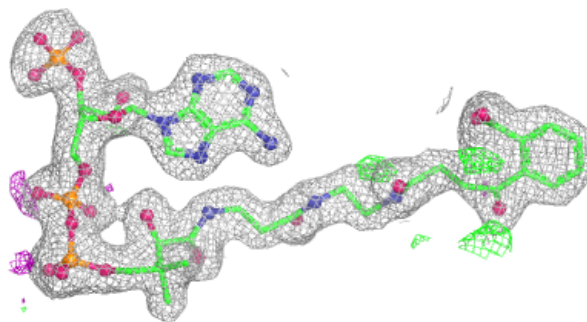
**Electron density around S0N A 300:**

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

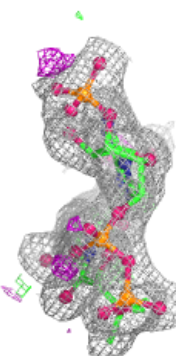
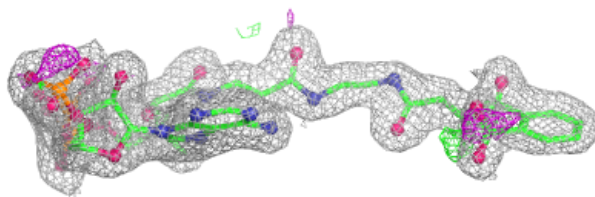
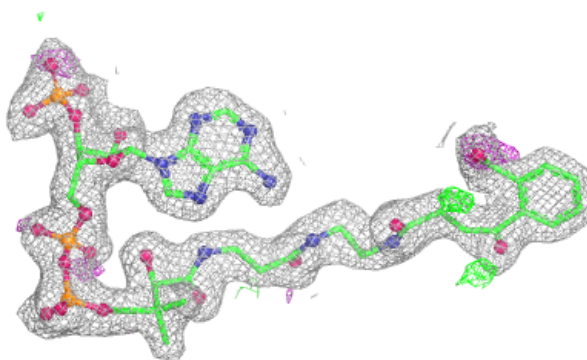


Electron density around S0N E 700:

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 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

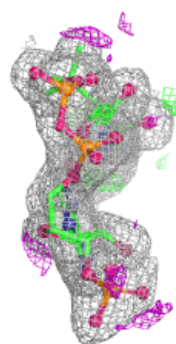
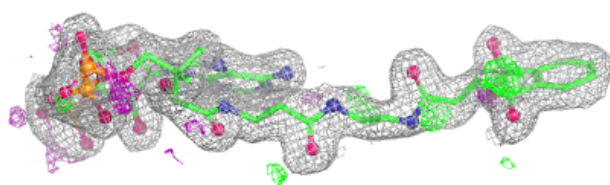
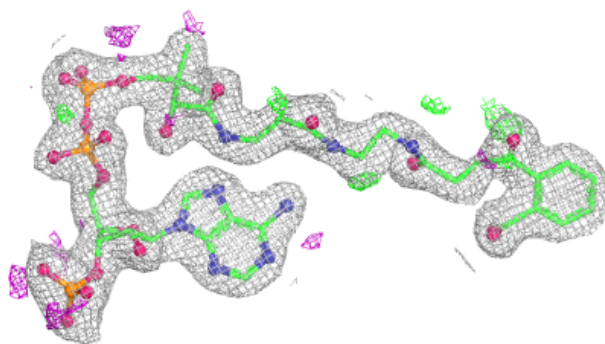
**Electron density around S0N B 400:**

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and green (positive)

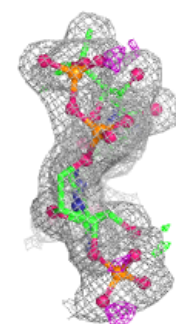
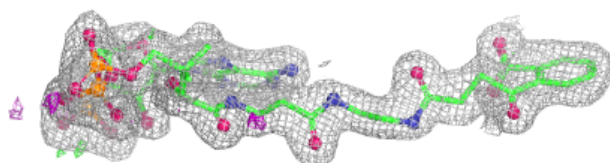
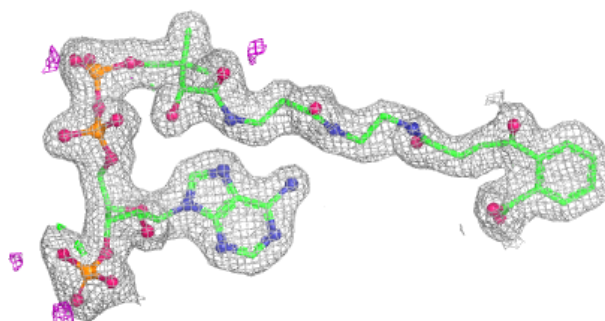


Electron density around S0N D 600:

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

**Electron density around S0N C 500:**

$2mF_o-DF_c$ (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.