



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 9, 2026 – 11:29 AM UTC

PDB ID : 3DLA / pdb_00003dla
Title : X-ray crystal structure of glutamine-dependent NAD⁺ synthetase from Mycobacterium tuberculosis bound to NaAD⁺ and DON
Authors : LaRonde-LeBlanc, N.A.; Resto, M.; Gerratana, B.
Deposited on : 2008-06-26
Resolution : 2.35 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

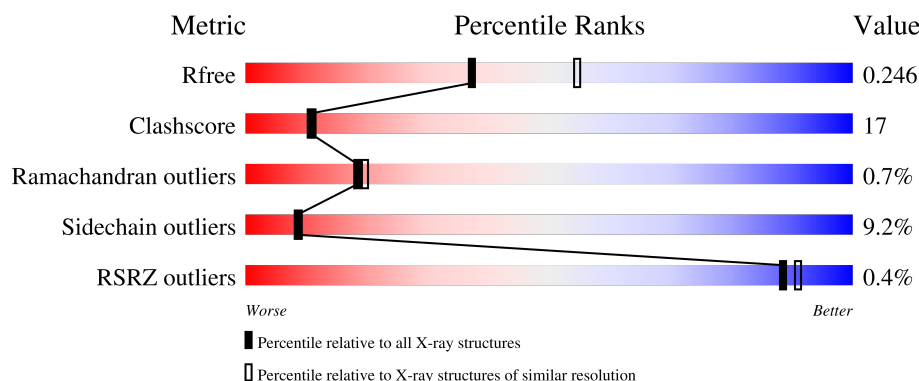
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.35 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	1596 (2.36-2.36)
Clashscore	190562	1663 (2.36-2.36)
Ramachandran outliers	187476	1646 (2.36-2.36)
Sidechain outliers	187428	1646 (2.36-2.36)
RSRZ outliers	180081	1598 (2.36-2.36)

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	680	 73% 20% 5% 2%
1	B	680	 71% 20% 5% 2%
1	C	680	 62% 29% 5% 2%
1	D	680	 69% 24% 5% 2%

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
4	GOL	C	683	-	-	X	-
4	GOL	D	682	-	-	X	-

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 22006 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.

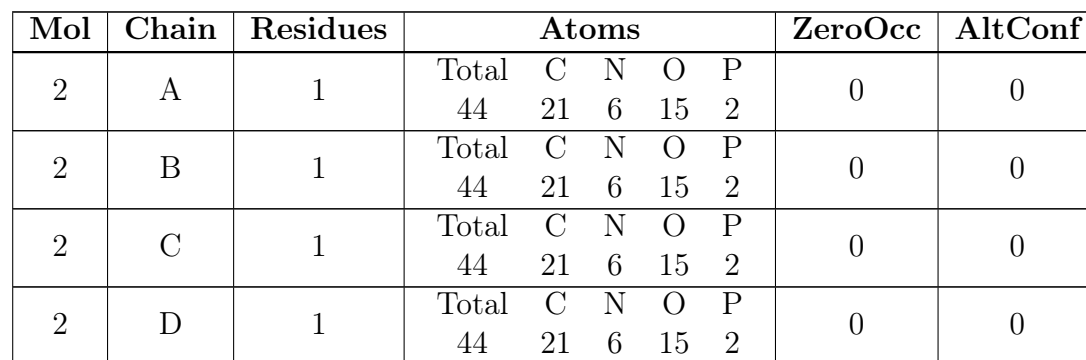
- Molecule 1 is a protein called Glutamine-dependent NAD(+) synthetase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	651	Total	C	N	O	S	0	1	0
			5014	3180	892	926	16			
1	B	649	Total	C	N	O	S	0	0	0
			5017	3179	896	926	16			
1	C	657	Total	C	N	O	S	8	2	0
			5117	3242	911	947	17			
1	D	657	Total	C	N	O	S	0	0	0
			5099	3229	910	944	16			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	0	SER	-	expression tag	UNP P0A5L6
B	0	SER	-	expression tag	UNP P0A5L6
C	0	SER	-	expression tag	UNP P0A5L6
D	0	SER	-	expression tag	UNP P0A5L6

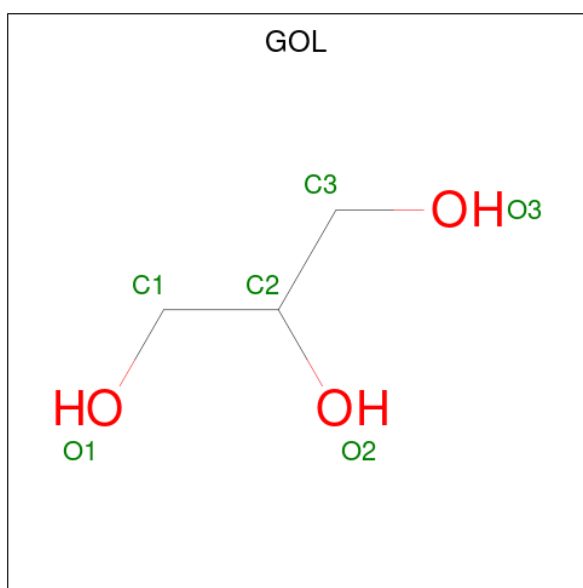
- Molecule 2 is NICOTINIC ACID ADENINE DINUCLEOTIDE (CCD ID: DND) (formula: $C_{21}H_{27}N_6O_{15}P_2$).



- ONL
-
- The diagram shows the chemical structure of L-glutamic acid, labeled 'ONL'. The structure is a five-carbon chain. The first carbon (left) is part of a carboxyl group with a red 'O' and a green 'OD' label. The second carbon is labeled 'CD' and is bonded to a green 'CE' group. The third carbon is labeled 'CG'. The fourth carbon is labeled 'CB' and is bonded to a green 'N' atom with a blue 'H₂N' group. The fifth carbon is labeled 'CA(S)' and is bonded to a green 'C' atom, which is part of a carboxyl group with a red 'O' and a green 'OXT' label. The 'O' label is positioned below the red 'O'.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	O	0	1
			20	12	2	6		
3	A	1	Total	C	N	O	0	0
			10	6	1	3		
3	A	1	Total	C	N	O	0	0
			10	6	1	3		
3	A	1	Total	C	N	O	0	0
			10	6	1	3		

- Molecule 4 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).



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

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	C	1	Total C O 6 3 3	0	0
4	C	1	Total C O 6 3 3	0	0
4	D	1	Total C O 6 3 3	0	0
4	D	1	Total C O 6 3 3	0	0
4	D	1	Total C O 6 3 3	0	0
4	D	1	Total C O 6 3 3	0	0
4	D	1	Total C O 6 3 3	0	0

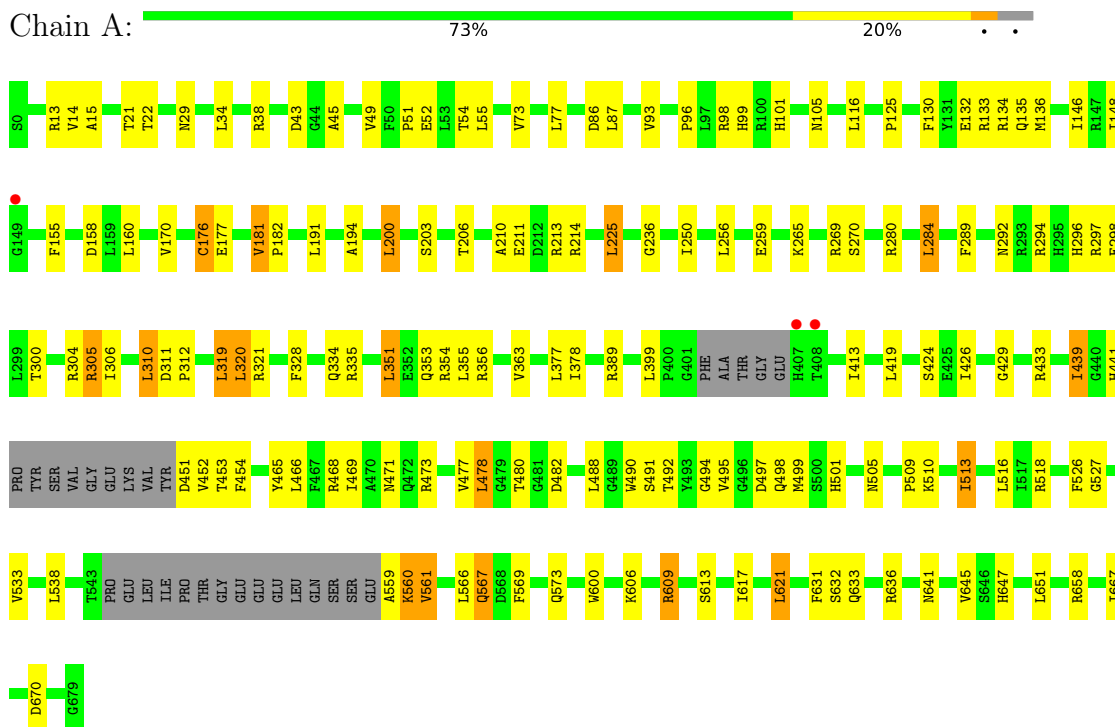
- Molecule 5 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	334	Total O 334 334	0	0
5	B	384	Total O 384 384	0	0
5	C	366	Total O 366 366	0	0
5	D	359	Total O 359 359	0	0

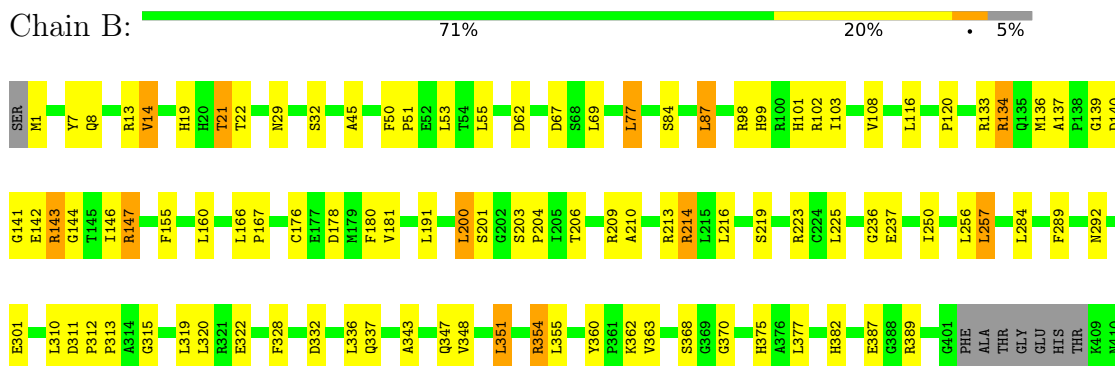
3 Residue-property plots

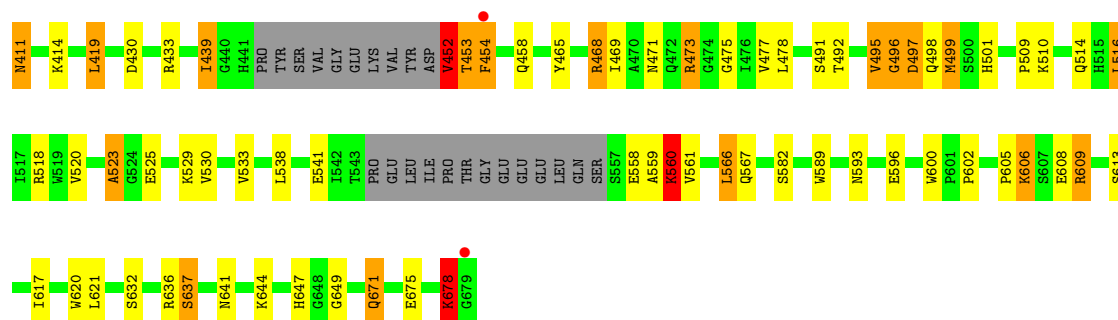
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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: Glutamine-dependent NAD(+) synthetase



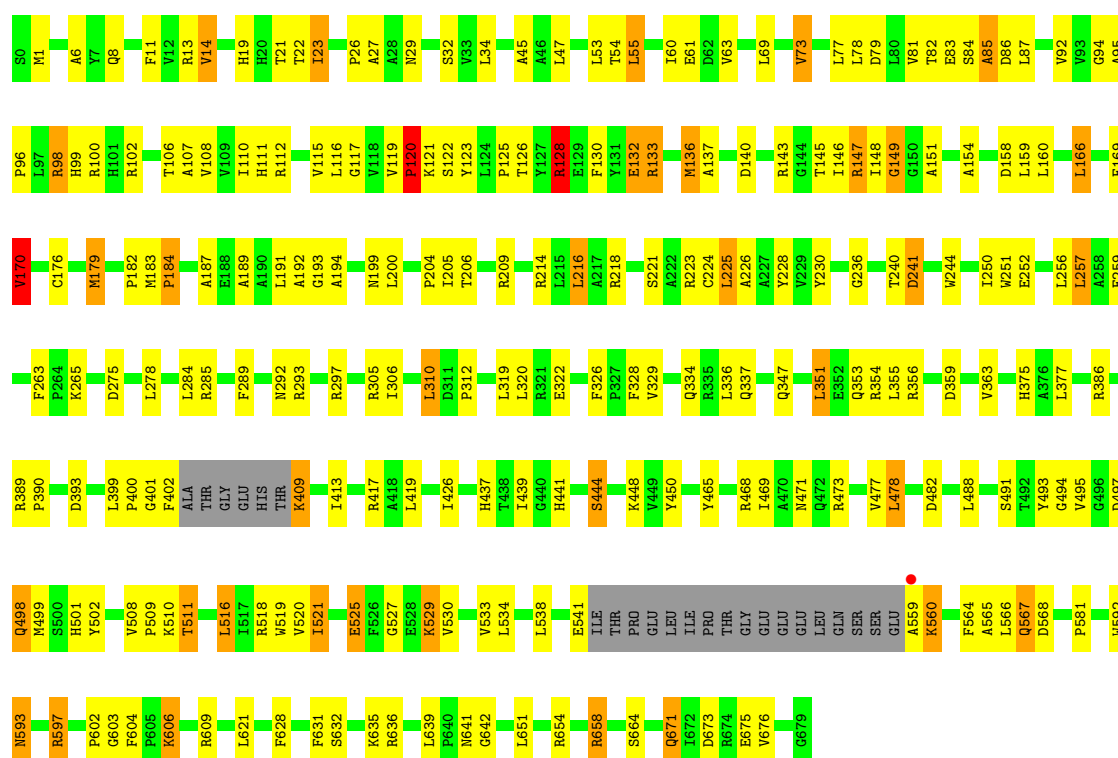
- Molecule 1: Glutamine-dependent NAD(+) synthetase





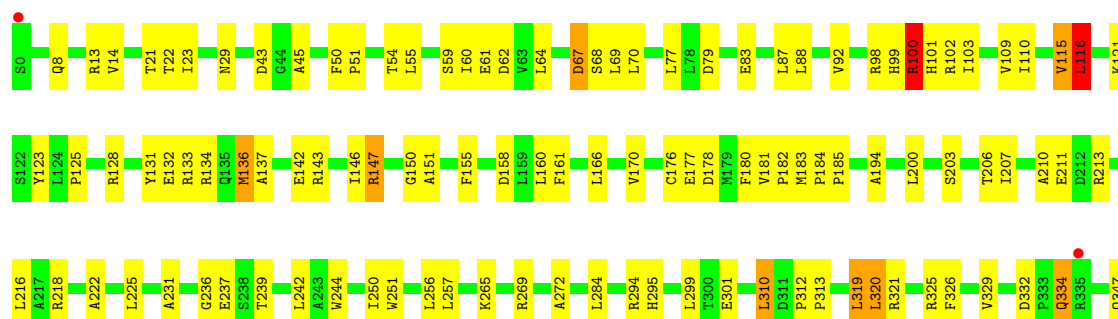
• Molecule 1: Glutamine-dependent NAD(+) synthetase

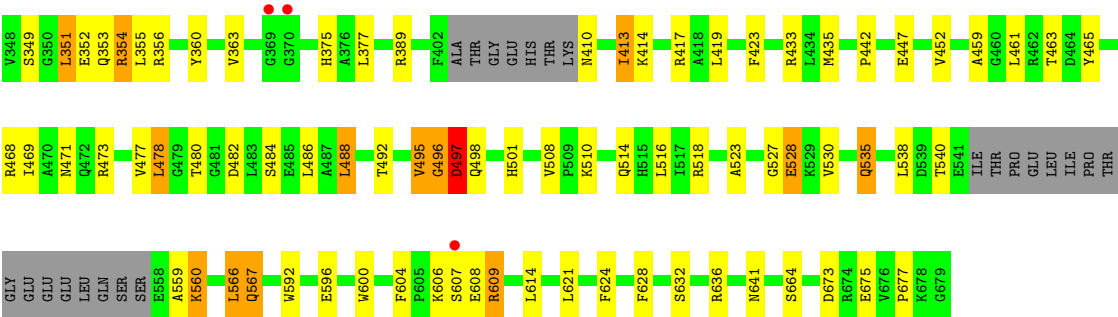
Chain C: 62% 29% 5%



• Molecule 1: Glutamine-dependent NAD(+) synthetase

Chain D: 69% 24% 7%





4 Data and refinement statistics

Property	Value	Source
Space group	P 41 21 2	Depositor
Cell constants a, b, c, α , β , γ	178.13Å 178.13Å 215.18Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	29.70 – 2.35 29.70 – 2.35	Depositor EDS
% Data completeness (in resolution range)	99.4 (29.70-2.35) 99.2 (29.70-2.35)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.14	Depositor
$\langle I/\sigma(I) \rangle$ ¹	172.61 (at 2.36Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.184 , 0.246 0.187 , 0.246	Depositor DCC
R_{free} test set	7144 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å ²)	31.0	Xtriage
Anisotropy	0.330	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 23.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.46$, $\langle L^2 \rangle = 0.29$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	22006	wwPDB-VP
Average B, all atoms (Å ²)	6.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 13.72% 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: ONL, GOL, DND

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	0.80	0/5128	0.99	6/6963 (0.1%)
1	B	0.90	0/5132	1.06	9/6969 (0.1%)
1	C	1.02	5/5237 (0.1%)	1.17	23/7111 (0.3%)
1	D	0.94	3/5219 (0.1%)	1.07	7/7089 (0.1%)
All	All	0.92	8/20716 (0.0%)	1.08	45/28132 (0.2%)

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	B	0	3
1	C	0	2
1	D	0	1
All	All	0	6

The worst 5 of 8 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	123	TYR	N-CA	8.40	1.56	1.46
1	D	103	ILE	C-O	7.24	1.33	1.24
1	C	73	VAL	CA-CB	6.79	1.61	1.54
1	C	187	ALA	CA-CB	6.29	1.63	1.53
1	D	121	LYS	N-CA	5.99	1.53	1.46

The worst 5 of 45 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	170	VAL	CB-CA-C	-7.45	101.31	110.99

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	216	LEU	CA-CB-CG	-6.75	92.67	116.30
1	C	631	PHE	N-CA-C	6.70	118.59	111.28
1	C	95	ALA	CA-C-N	6.67	128.18	119.84
1	C	95	ALA	C-N-CA	6.67	128.18	119.84

There are no chirality outliers.

5 of 6 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	496	GLY	Peptide
1	B	559	ALA	Peptide
1	B	560	LYS	Peptide
1	C	559	ALA	Peptide
1	C	560	LYS	Peptide

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	5014	0	4904	123	0
1	B	5017	0	4919	164	1
1	C	5117	0	5015	234	0
1	D	5099	0	4994	182	0
2	A	44	0	25	6	0
2	B	44	0	25	0	0
2	C	44	0	25	2	0
2	D	44	0	25	3	0
3	A	50	0	38	11	0
4	A	12	0	16	0	0
4	B	24	0	32	4	0
4	C	24	0	32	10	0
4	D	30	0	40	11	0
5	A	334	0	0	37	2
5	B	384	0	0	46	1
5	C	366	0	0	77	0
5	D	359	0	0	58	0
All	All	22006	0	20090	679	2

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 17.

The worst 5 of 679 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:495:VAL:HB	5:B:993:HOH:O	1.22	1.29
1:C:183[B]:MET:HE3	5:C:800:HOH:O	1.25	1.29
1:D:110:ILE:HA	5:D:970:HOH:O	1.36	1.24
1:D:147:ARG:HH11	1:D:147:ARG:CG	1.50	1.22
1:C:170:VAL:HG22	5:C:854:HOH:O	1.42	1.19

All (2) 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)
1:B:134:ARG:NE	5:A:809:HOH:O[8_665]	1.91	0.29
5:A:815:HOH:O	5:B:796:HOH:O[8_665]	2.11	0.09

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	644/680 (95%)	615 (96%)	28 (4%)	1 (0%)	43	52
1	B	641/680 (94%)	613 (96%)	24 (4%)	4 (1%)	21	24
1	C	653/680 (96%)	619 (95%)	27 (4%)	7 (1%)	11	11
1	D	651/680 (96%)	622 (96%)	24 (4%)	5 (1%)	16	17
All	All	2589/2720 (95%)	2469 (95%)	103 (4%)	17 (1%)	18	20

5 of 17 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	453	THR
1	B	497	ASP
1	B	176	CYS
1	C	128	ARG
1	C	176	CYS

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	512/549 (93%)	472 (92%)	40 (8%)	11	12
1	B	515/549 (94%)	463 (90%)	52 (10%)	7	6
1	C	529/549 (96%)	474 (90%)	55 (10%)	7	6
1	D	527/549 (96%)	482 (92%)	45 (8%)	10	11
All	All	2083/2196 (95%)	1891 (91%)	192 (9%)	8	9

5 of 192 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	284	LEU
1	C	658	ARG
1	C	322	GLU
1	C	498	GLN
1	D	87	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 61 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	641	ASN
1	D	567	GLN
1	C	347	GLN
1	D	535	GLN
1	D	641	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 ⓘ

24 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
3	ONL	A	802	1	8,9,9	0.84	0	8,11,11	1.34	2 (25%)
4	GOL	C	681	-	5,5,5	0.42	0	5,5,5	0.18	0
4	GOL	C	683	-	5,5,5	0.77	0	5,5,5	1.37	1 (20%)
2	DND	A	680	-	46,48,48	1.29	4 (8%)	64,73,73	1.63	10 (15%)
4	GOL	D	685	-	5,5,5	0.45	0	5,5,5	0.25	0
3	ONL	A	801[A]	1	8,9,9	0.83	0	8,11,11	1.47	2 (25%)
4	GOL	D	682	-	5,5,5	0.41	0	5,5,5	0.68	0
3	ONL	A	801[B]	1	8,9,9	0.77	1 (12%)	8,11,11	1.66	3 (37%)
3	ONL	A	800	1	8,9,9	0.70	0	8,11,11	1.40	2 (25%)
4	GOL	B	684	-	5,5,5	0.51	0	5,5,5	0.63	0
4	GOL	D	681	-	5,5,5	0.48	0	5,5,5	0.23	0
2	DND	C	680	-	46,48,48	1.21	4 (8%)	64,73,73	1.69	10 (15%)
4	GOL	B	683	-	5,5,5	0.59	0	5,5,5	1.04	0
4	GOL	A	804	-	5,5,5	0.44	0	5,5,5	0.36	0
3	ONL	A	803	1	8,9,9	0.72	0	8,11,11	1.18	1 (12%)
4	GOL	D	683	-	5,5,5	0.39	0	5,5,5	0.78	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	DND	D	680	-	46,48,48	0.97	1 (2%)	64,73,73	1.57	9 (14%)
4	GOL	A	805	-	5,5,5	0.49	0	5,5,5	1.00	0
4	GOL	C	684	-	5,5,5	0.53	0	5,5,5	0.79	0
4	GOL	D	684	-	5,5,5	0.48	0	5,5,5	0.32	0
4	GOL	B	682	-	5,5,5	0.54	0	5,5,5	0.32	0
4	GOL	B	681	-	5,5,5	0.40	0	5,5,5	0.66	0
4	GOL	C	682	-	5,5,5	0.41	0	5,5,5	0.55	0
2	DND	B	680	-	46,48,48	1.22	3 (6%)	64,73,73	1.76	11 (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
3	ONL	A	802	1	-	7/9/9/9	-
4	GOL	C	681	-	-	4/4/4/4	-
4	GOL	C	683	-	-	4/4/4/4	-
2	DND	A	680	-	-	15/30/62/62	0/5/5/5
4	GOL	D	685	-	-	4/4/4/4	-
3	ONL	A	801[A]	1	-	6/9/9/9	-
4	GOL	D	682	-	-	4/4/4/4	-
3	ONL	A	801[B]	1	-	3/9/9/9	-
3	ONL	A	800	1	-	7/9/9/9	-
4	GOL	B	684	-	-	2/4/4/4	-
4	GOL	D	681	-	-	4/4/4/4	-
2	DND	C	680	-	-	10/30/62/62	0/5/5/5
4	GOL	B	683	-	-	2/4/4/4	-
4	GOL	A	804	-	-	4/4/4/4	-
3	ONL	A	803	1	-	5/9/9/9	-
4	GOL	D	683	-	-	2/4/4/4	-
2	DND	D	680	-	-	5/30/62/62	0/5/5/5
4	GOL	A	805	-	-	3/4/4/4	-
4	GOL	C	684	-	-	2/4/4/4	-
4	GOL	D	684	-	-	1/4/4/4	-
4	GOL	B	682	-	-	4/4/4/4	-
4	GOL	B	681	-	-	2/4/4/4	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	GOL	C	682	-	-	2/4/4/4	-
2	DND	B	680	-	-	19/30/62/62	0/5/5/5

The worst 5 of 13 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	680	DND	PA-O3P	4.54	1.64	1.59
2	A	680	DND	PN-O3P	4.42	1.64	1.59
2	A	680	DND	PA-O3P	4.12	1.63	1.59
2	C	680	DND	PN-O3P	3.67	1.63	1.59
2	C	680	DND	PA-O3P	3.60	1.63	1.59

The worst 5 of 51 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	680	DND	N1A-C2A-N3A	-6.30	119.05	128.58
2	A	680	DND	N1A-C2A-N3A	-5.97	119.55	128.58
2	C	680	DND	N1A-C2A-N3A	-5.89	119.67	128.58
2	D	680	DND	N1A-C2A-N3A	-5.68	119.98	128.58
2	B	680	DND	C5A-C4A-N3A	-5.63	118.96	126.72

There are no chirality outliers.

5 of 121 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	680	DND	O4D-C1D-N1N-C6N
2	A	680	DND	C4N-C3N-C7N-O7N
2	A	680	DND	C2N-C3N-C7N-O7N
2	B	680	DND	C5D-O5D-PN-O11
2	B	680	DND	C5D-O5D-PN-O3P

There are no ring outliers.

15 monomers are involved in 47 short contacts:

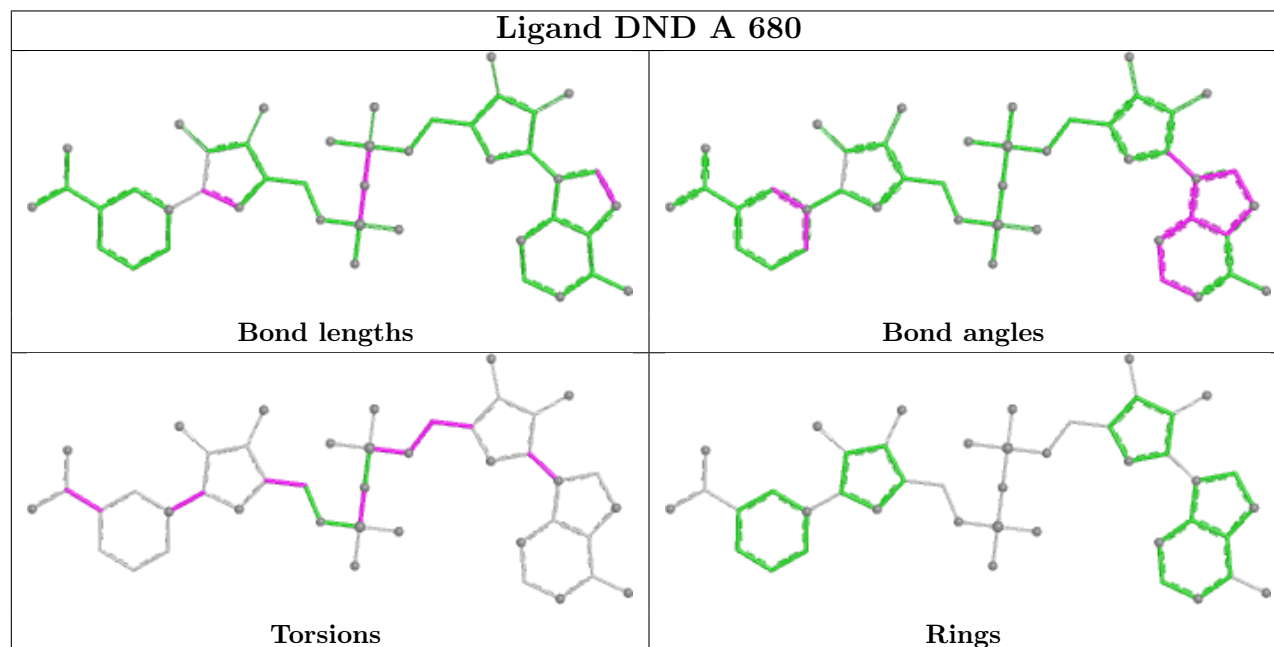
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	802	ONL	1	0
4	C	681	GOL	2	0
4	C	683	GOL	5	0
2	A	680	DND	6	0
3	A	801[A]	ONL	4	0

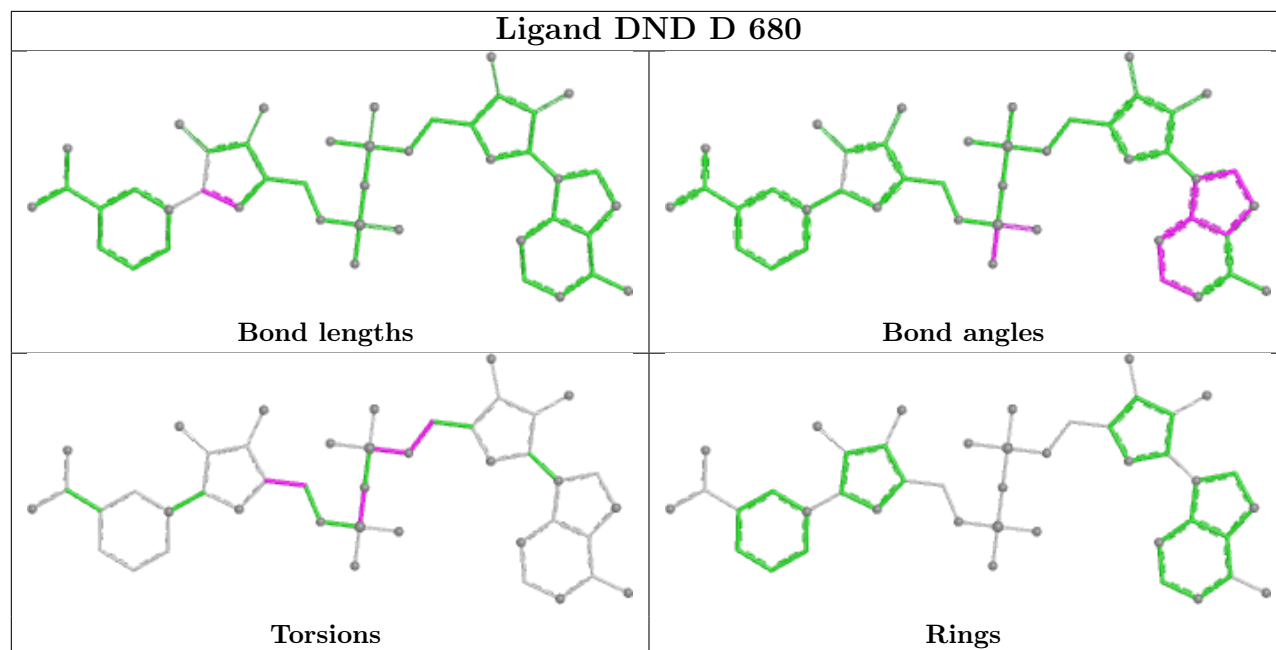
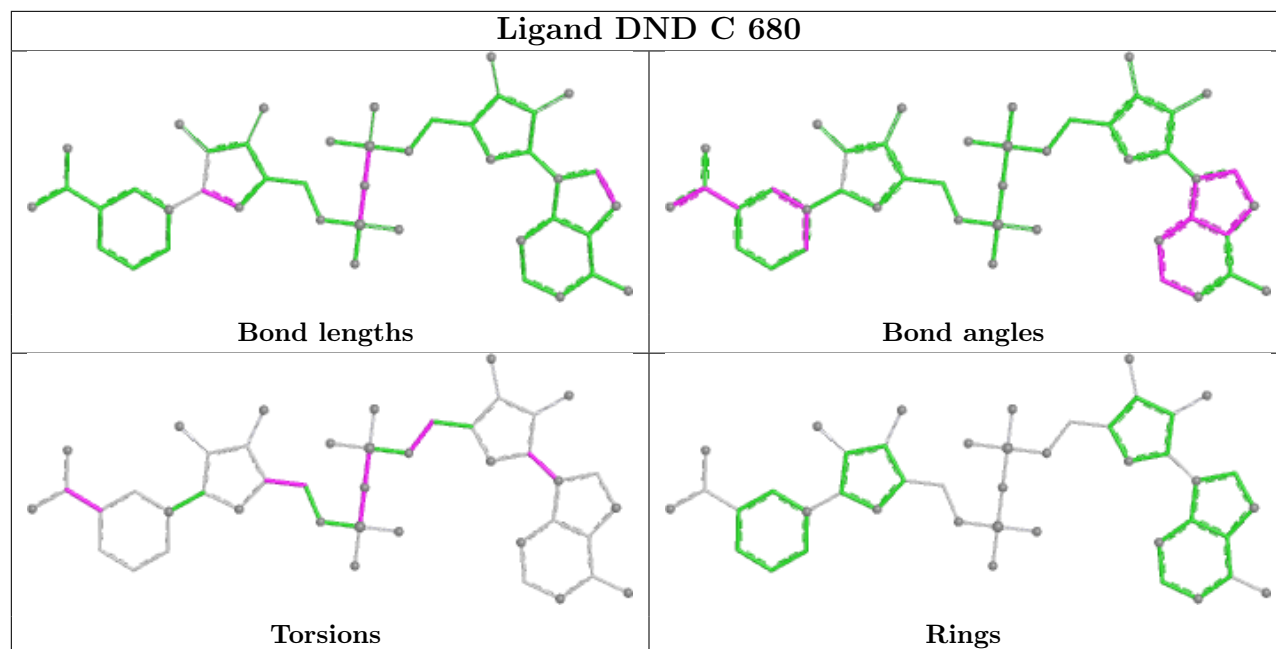
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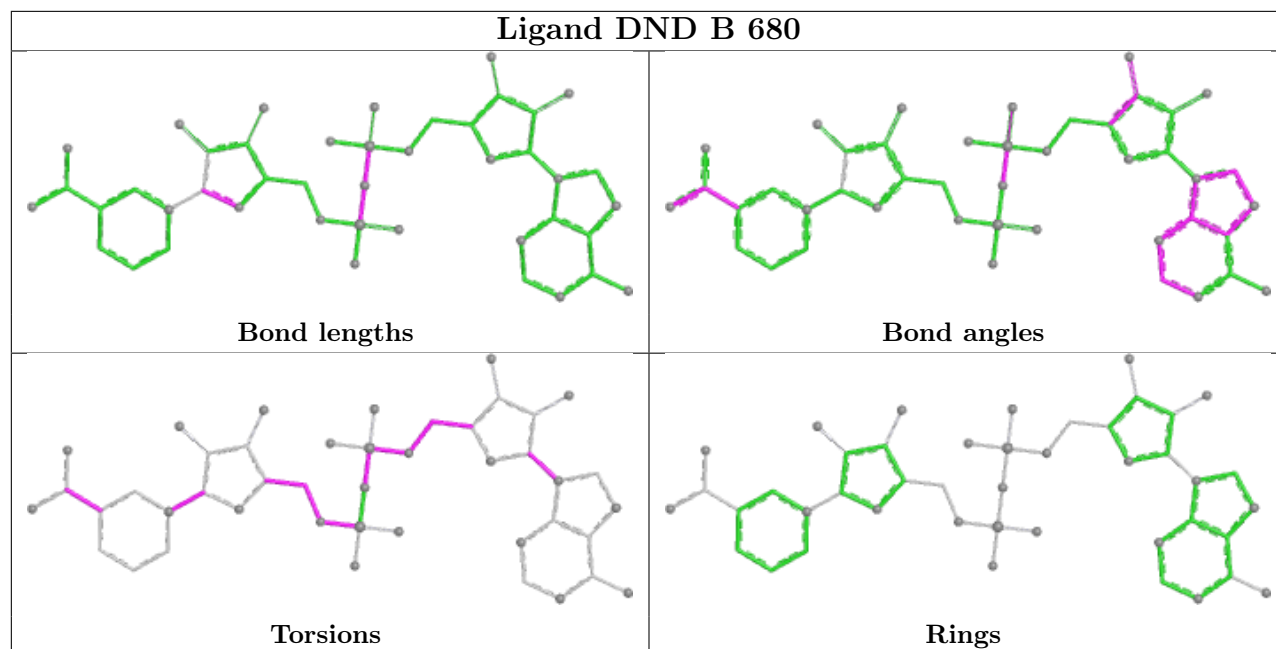
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Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	D	682	GOL	8	0
3	A	800	ONL	4	0
2	C	680	DND	2	0
3	A	803	ONL	2	0
4	D	683	GOL	3	0
2	D	680	DND	3	0
4	C	684	GOL	1	0
4	B	682	GOL	3	0
4	B	681	GOL	1	0
4	C	682	GOL	2	0

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 [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	651/680 (95%)	-0.22	3 (0%) 87 90	2, 5, 19, 41	1 (0%)
1	B	649/680 (95%)	-0.21	2 (0%) 90 92	2, 3, 17, 34	0
1	C	656/680 (96%)	-0.24	1 (0%) 91 92	2, 3, 15, 26	1 (0%)
1	D	657/680 (96%)	-0.09	5 (0%) 82 86	2, 3, 17, 25	0
All	All	2613/2720 (96%)	-0.19	11 (0%) 88 91	2, 4, 17, 41	2 (0%)

The worst 5 of 11 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	369	GLY	3.9
1	A	408	THR	3.8
1	B	454	PHE	3.1
1	D	370	GLY	2.7
1	D	0	SER	2.7

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](#)

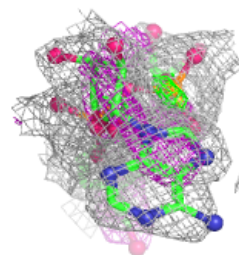
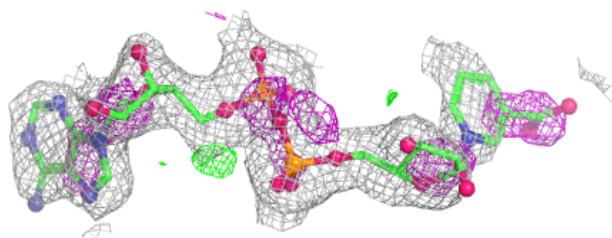
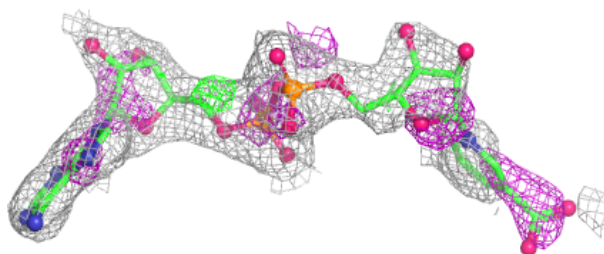
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q< 0.9’ lists 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
4	GOL	A	804	6/6	0.62	0.16	46,47,48,48	0
4	GOL	B	682	6/6	0.69	0.15	42,43,45,45	0
4	GOL	D	685	6/6	0.69	0.14	37,39,39,40	0
4	GOL	B	684	6/6	0.72	0.14	31,34,35,36	0
4	GOL	B	681	6/6	0.74	0.18	35,37,37,38	0
3	ONL	A	803	10/10	0.74	0.17	27,34,35,35	0
4	GOL	C	683	6/6	0.76	0.32	10,12,13,16	0
3	ONL	A	800	10/10	0.76	0.18	20,27,28,29	0
3	ONL	A	801[A]	10/10	0.77	0.16	2,2,2,2	10
3	ONL	A	801[B]	10/10	0.77	0.16	5,7,7,7	10
4	GOL	D	682	6/6	0.79	0.17	20,22,22,24	0
3	ONL	A	802	10/10	0.80	0.15	16,25,26,26	0
4	GOL	C	682	6/6	0.81	0.26	25,27,28,28	0
4	GOL	D	683	6/6	0.86	0.16	12,17,18,20	0
4	GOL	B	683	6/6	0.88	0.13	9,18,19,20	0
2	DND	A	680	44/44	0.89	0.11	25,29,59,61	0
4	GOL	C	681	6/6	0.89	0.12	21,25,27,28	0
4	GOL	C	684	6/6	0.89	0.12	8,11,12,14	0
4	GOL	D	681	6/6	0.91	0.16	16,18,19,19	0
4	GOL	A	805	6/6	0.91	0.14	7,9,9,10	0
4	GOL	D	684	6/6	0.92	0.18	5,6,7,8	0
2	DND	D	680	44/44	0.92	0.10	18,25,48,49	0
2	DND	C	680	44/44	0.93	0.09	14,18,36,36	0
2	DND	B	680	44/44	0.93	0.11	12,21,54,56	0

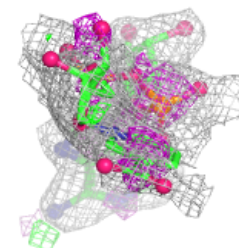
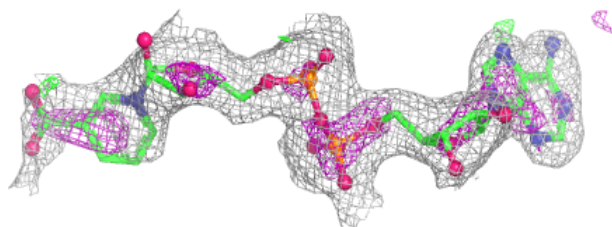
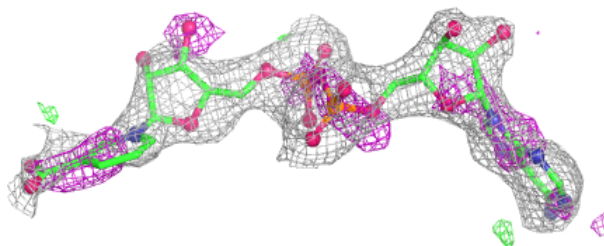
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around DND A 680:

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

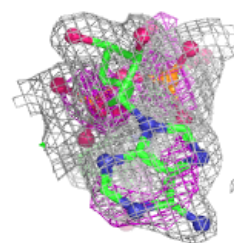
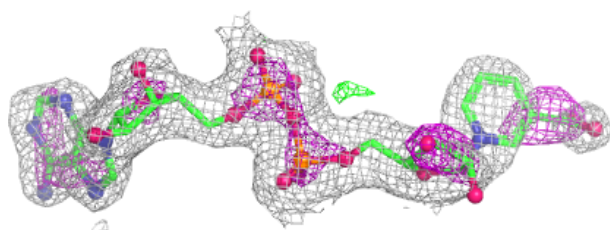
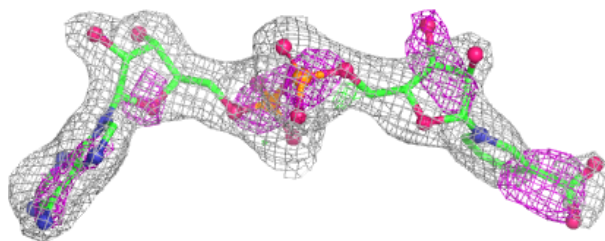
**Electron density around DND D 680:**

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

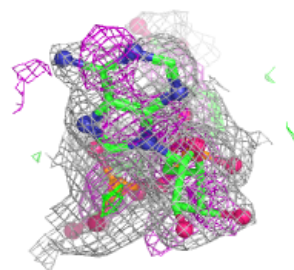
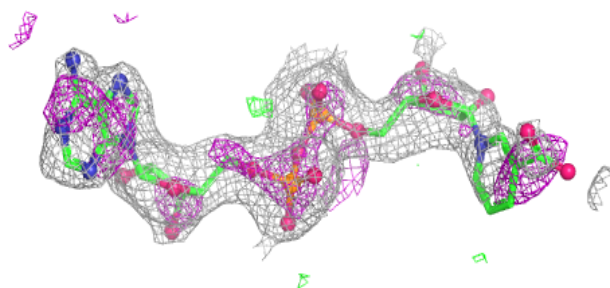
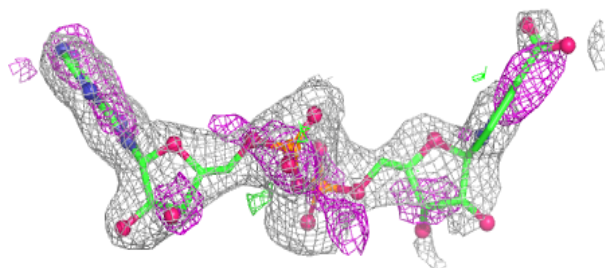


Electron density around DND C 680:

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

**Electron density around DND B 680:**

$2mF_o-DF_c$ (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.