



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 11:21 AM UTC

PDB ID : 1U7H / pdb_00001u7h
Title : Structure and a Proposed Mechanism for Ornithine Cyclodeaminase from *Pseudomonas putida*
Authors : Alam, S.; Goodman, J.L.; Wang, S.; Ruzicka, F.J.; Frey, P.A.; Wedekind, J.E.
Deposited on : 2004-08-03
Resolution : 1.80 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

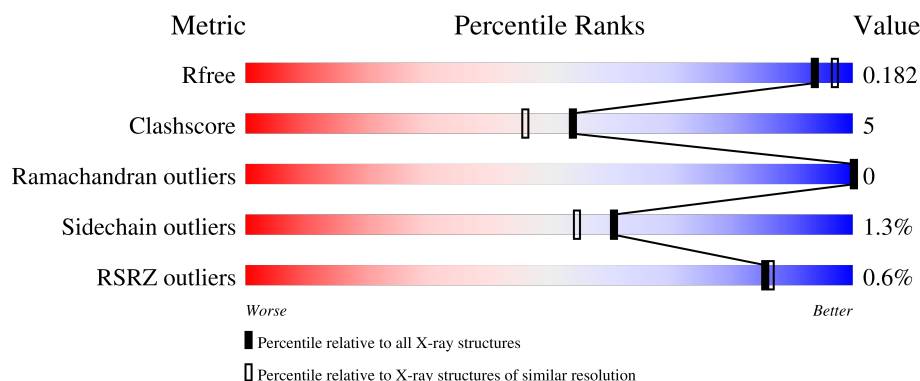
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.80 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	7662 (1.80-1.80)
Clashscore	190562	8479 (1.80-1.80)
Ramachandran outliers	187476	8391 (1.80-1.80)
Sidechain outliers	187428	8390 (1.80-1.80)
RSRZ outliers	180081	7663 (1.80-1.80)

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	350	
1	B	350	

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	MPD	B	903	-	-	X	-

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 6126 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 ornithine cyclodeaminase.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	341	Total	C	N	O	S	Se	0	0	0
			2624	1661	455	499	1	8			
1	B	340	Total	C	N	O	S	Se	0	0	0
			2623	1661	454	498	2	8			

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	10	MSE	MET	modified residue	UNP Q88H32
A	58	MSE	MET	modified residue	UNP Q88H32
A	86	MSE	MET	modified residue	UNP Q88H32
A	119	MSE	MET	modified residue	UNP Q88H32
A	132	MSE	MET	modified residue	UNP Q88H32
A	215	MSE	MET	modified residue	UNP Q88H32
A	220	MSE	MET	modified residue	UNP Q88H32
A	316	MSE	MET	modified residue	UNP Q88H32
B	10	MSE	MET	modified residue	UNP Q88H32
B	58	MSE	MET	modified residue	UNP Q88H32
B	86	MSE	MET	modified residue	UNP Q88H32
B	119	MSE	MET	modified residue	UNP Q88H32
B	132	MSE	MET	modified residue	UNP Q88H32
B	215	MSE	MET	modified residue	UNP Q88H32
B	220	MSE	MET	modified residue	UNP Q88H32
B	316	MSE	MET	modified residue	UNP Q88H32

- Molecule 2 is SODIUM ION (CCD ID: NA) (formula: Na).

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

- # NAD

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total 44	C 21	N 7	O 14	P 2	0	0
3	B	1	Total 44	C 21	N 7	O 14	P 2	0	0

-
- Chemical structure of 2-methylpentane-2,4-diol (MPD) showing stereochemistry. The structure is a 3D representation with a central carbon atom (C2) bonded to a methyl group (CM), a hydroxyl group (OH, O2), and two other groups. One group is a 1-hydroxyethyl group (C3-C4-C5) where C4 is bonded to a hydroxyl group (OH, O4) with a dashed bond, indicating it is pointing away from the viewer. The other group is a methyl group (C1).

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			8	6	2		
4	A	1	Total	C	O	0	0
			8	6	2		
4	A	1	Total	C	O	0	0
			8	6	2		
4	B	1	Total	C	O	0	0
			8	6	2		
4	B	1	Total	C	O	0	0
			8	6	2		

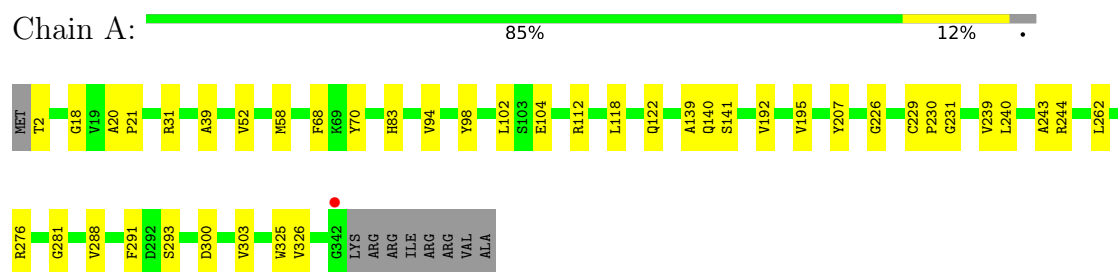
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	379	Total	O	0	0
			379	379		
5	B	370	Total	O	0	0
			370	370		

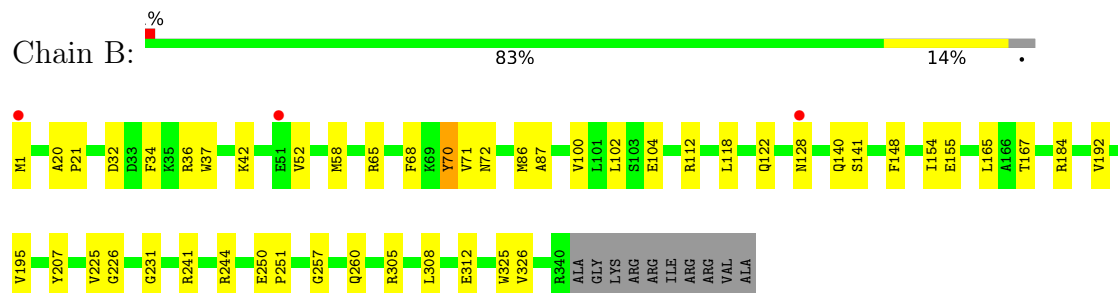
3 Residue-property plots

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: ornithine cyclodeaminase



- Molecule 1: ornithine cyclodeaminase



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	69.90Å 78.60Å 119.90Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	24.95 – 1.80 24.95 – 1.80	Depositor EDS
% Data completeness (in resolution range)	98.7 (24.95-1.80) 98.8 (24.95-1.80)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.08	Depositor
$\langle I/\sigma(I) \rangle$ ¹	9.72 (at 1.80Å)	Xtriage
Refinement program	CNS 1.1	Depositor
R, R_{free}	0.158 , 0.181 0.159 , 0.182	Depositor DCC
R_{free} test set	3102 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å ²)	12.5	Xtriage
Anisotropy	0.073	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 51.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	6126	wwPDB-VP
Average B, all atoms (Å ²)	15.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.34% 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: NA, NAD, MPD

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	0.35	0/2668	0.91	8/3614 (0.2%)
1	B	0.35	0/2667	0.91	7/3612 (0.2%)
All	All	0.35	0/5335	0.91	15/7226 (0.2%)

There are no bond length outliers.

All (15) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	141	SER	N-CA-C	7.59	120.22	111.11
1	B	104	GLU	N-CA-C	-7.39	100.30	110.35
1	A	104	GLU	N-CA-C	-7.25	100.28	110.50
1	B	141	SER	N-CA-C	7.24	119.80	111.11
1	A	226	GLY	N-CA-C	6.74	120.32	112.50
1	B	225	VAL	N-CA-C	6.63	117.51	111.81
1	B	226	GLY	N-CA-C	6.21	120.15	112.64
1	A	94	VAL	N-CA-C	5.71	116.44	110.62
1	A	244	ARG	N-CA-C	-5.54	99.69	108.73
1	B	244	ARG	N-CA-C	-5.50	99.77	108.73
1	A	102	LEU	N-CA-C	-5.42	100.07	108.90
1	A	281	GLY	N-CA-C	-5.30	100.61	113.18
1	B	102	LEU	N-CA-C	-5.15	100.51	108.90
1	A	239	VAL	N-CA-C	-5.08	105.59	110.72
1	B	70	TYR	N-CA-C	-5.04	101.03	109.24

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	2624	0	2611	21	0
1	B	2623	0	2615	29	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
3	A	44	0	26	2	0
3	B	44	0	26	1	0
4	A	24	0	42	3	0
4	B	16	0	28	6	0
5	A	379	0	0	3	0
5	B	370	0	0	5	0
All	All	6126	0	5348	53	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 5.

All (53) 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:39:ALA:HB2	4:A:902:MPD:H52	1.58	0.85
1:A:52:VAL:HG12	5:B:1249:HOH:O	1.80	0.81
1:B:100:VAL:HG21	4:B:903:MPD:HM3	1.64	0.79
1:B:325:TRP:CG	1:B:326:VAL:H	2.06	0.74
4:A:902:MPD:H51	5:A:1149:HOH:O	1.89	0.72
1:B:308:LEU:O	1:B:312:GLU:HG3	1.92	0.68
1:B:20:ALA:HB3	1:B:21:PRO:HD3	1.76	0.66
1:A:20:ALA:HB3	1:A:21:PRO:HD3	1.82	0.62
1:B:72:ASN:ND2	1:B:86:MSE:HB2	2.15	0.60
1:A:2:THR:N	1:A:98:TYR:HH	2.02	0.58
1:A:325:TRP:CE3	1:A:326:VAL:HG22	2.38	0.58
4:B:903:MPD:H4	5:B:1255:HOH:O	2.05	0.56
1:B:72:ASN:HD21	1:B:86:MSE:HB2	1.70	0.55
1:B:241:ARG:NH2	5:B:1280:HOH:O	2.40	0.55
1:A:207:TYR:CZ	1:A:231:GLY:HA2	2.42	0.54
1:B:65:ARG:HG2	4:B:903:MPD:H12	1.89	0.54
4:A:902:MPD:H53	5:A:1150:HOH:O	2.08	0.53

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:325:TRP:CG	1:B:326:VAL:N	2.74	0.53
1:B:207:TYR:CZ	1:B:231:GLY:HA2	2.44	0.52
1:B:118:LEU:O	1:B:122:GLN:HG3	2.11	0.50
1:B:100:VAL:HG21	4:B:903:MPD:CM	2.38	0.49
1:A:118:LEU:O	1:A:122:GLN:HG3	2.13	0.49
1:B:65:ARG:NE	1:B:305:ARG:HH11	2.10	0.48
1:A:58:MSE:O	1:A:68:PHE:HA	2.14	0.48
1:B:32:ASP:O	1:B:36:ARG:HG3	2.13	0.48
1:B:65:ARG:HD2	1:B:305:ARG:HD3	1.97	0.47
1:B:140:GLN:HG2	3:B:801:NAD:PN	2.55	0.46
1:B:250:GLU:HB3	1:B:251:PRO:HD3	1.97	0.46
1:B:34:PHE:O	1:B:37:TRP:HB2	2.15	0.46
1:A:325:TRP:CG	1:A:326:VAL:H	2.34	0.46
1:B:257:GLY:O	1:B:260:GLN:HG2	2.16	0.45
1:B:58:MSE:O	1:B:68:PHE:HA	2.17	0.45
1:A:83:HIS:HD2	5:B:1227:HOH:O	2.00	0.44
1:B:65:ARG:HG2	4:B:903:MPD:H32	1.99	0.44
1:B:71:VAL:HG23	1:B:87:ALA:HB2	2.00	0.43
1:B:192:VAL:O	1:B:195:VAL:HG22	2.18	0.43
1:B:148:PHE:HB3	1:B:154:ILE:HG13	2.01	0.43
1:B:52:VAL:HG22	5:B:1133:HOH:O	2.17	0.43
1:A:291:PHE:CE2	1:A:293:SER:HB2	2.52	0.43
1:A:140:GLN:HG2	3:A:802:NAD:PN	2.58	0.42
1:A:192:VAL:O	1:A:195:VAL:HG22	2.18	0.42
1:A:229:CYS:SG	1:A:230:PRO:HD2	2.60	0.41
1:A:240:LEU:CB	1:A:262:LEU:HD11	2.50	0.41
1:A:18:GLY:C	1:A:21:PRO:HD2	2.46	0.41
1:B:65:ARG:CG	4:B:903:MPD:H32	2.50	0.41
1:A:300:ASP:HA	1:A:303:VAL:HG12	2.02	0.41
1:B:37:TRP:NE1	1:B:42:LYS:HE3	2.36	0.41
1:B:167:THR:HG21	1:B:184:ARG:HD3	2.03	0.41
1:A:139:ALA:HB3	3:A:802:NAD:O1N	2.21	0.40
1:A:70:TYR:CD2	1:A:70:TYR:C	2.98	0.40
1:A:31:ARG:HD3	5:A:1227:HOH:O	2.21	0.40
1:A:243:ALA:HB1	1:A:288:VAL:O	2.20	0.40
1:B:70:TYR:CD2	1:B:70:TYR:C	2.99	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	339/350 (97%)	326 (96%)	13 (4%)	0	100	100
1	B	338/350 (97%)	327 (97%)	11 (3%)	0	100	100
All	All	677/700 (97%)	653 (96%)	24 (4%)	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	275/275 (100%)	273 (99%)	2 (1%)	76	73
1	B	276/275 (100%)	271 (98%)	5 (2%)	51	43
All	All	551/550 (100%)	544 (99%)	7 (1%)	61	54

All (7) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	112	ARG
1	A	276	ARG
1	B	1	MET
1	B	112	ARG
1	B	128	ASN
1	B	155	GLU
1	B	165	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	81	ASN
1	A	144	GLN
1	A	223	ASN
1	B	137	ASN
1	B	144	GLN
1	B	223	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 9 ligands modelled in this entry, 2 are monoatomic - leaving 7 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	MPD	A	904	-	7,7,7	0.44	0	9,10,10	0.70	0
3	NAD	B	801	-	46,48,48	2.80	13 (28%)	64,73,73	2.33	8 (12%)
3	NAD	A	802	-	46,48,48	2.76	12 (26%)	64,73,73	2.32	9 (14%)
4	MPD	B	905	-	7,7,7	0.45	0	9,10,10	0.66	0
4	MPD	A	902	-	7,7,7	0.54	0	9,10,10	0.68	0
4	MPD	B	903	-	7,7,7	0.60	0	9,10,10	0.83	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	MPD	A	901	-	7,7,7	0.47	0	9,10,10	0.66	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	MPD	A	904	-	-	0/5/5/5	-
3	NAD	B	801	-	-	3/30/62/62	0/5/5/5
3	NAD	A	802	-	-	3/30/62/62	0/5/5/5
4	MPD	B	905	-	-	0/5/5/5	-
4	MPD	A	902	-	-	1/5/5/5	-
4	MPD	B	903	-	-	2/5/5/5	-
4	MPD	A	901	-	-	0/5/5/5	-

All (25) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	802	NAD	C2N-N1N	9.98	1.45	1.35
3	B	801	NAD	C2N-N1N	9.21	1.45	1.35
3	B	801	NAD	C4N-C3N	9.00	1.53	1.39
3	A	802	NAD	C4N-C3N	8.84	1.52	1.39
3	B	801	NAD	C5N-C4N	7.17	1.51	1.38
3	A	802	NAD	C5N-C4N	6.88	1.50	1.38
3	B	801	NAD	C6N-N1N	5.18	1.47	1.35
3	A	802	NAD	C6N-N1N	4.86	1.46	1.35
3	B	801	NAD	PN-O3	4.67	1.64	1.59
3	A	802	NAD	PN-O3	3.84	1.63	1.59
3	B	801	NAD	C2A-N3A	3.73	1.40	1.33
3	A	802	NAD	C2A-N3A	3.63	1.40	1.33
3	B	801	NAD	C4A-N3A	3.46	1.40	1.34
3	A	802	NAD	C4A-N3A	3.39	1.40	1.34
3	B	801	NAD	O4D-C1D	3.26	1.45	1.40
3	A	802	NAD	C2N-C3N	-2.89	1.34	1.39
3	A	802	NAD	O4D-C1D	2.69	1.44	1.40
3	B	801	NAD	C2N-C3N	-2.59	1.34	1.39
3	B	801	NAD	O4D-C4D	2.55	1.50	1.45
3	A	802	NAD	C5A-N7A	-2.53	1.34	1.39
3	B	801	NAD	C5A-C6A	2.47	1.47	1.41
3	A	802	NAD	C5A-C6A	2.36	1.47	1.41
3	B	801	NAD	C5A-N7A	-2.35	1.34	1.39

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	802	NAD	O4D-C4D	2.07	1.49	1.45
3	B	801	NAD	C6N-C5N	2.01	1.42	1.38

All (17) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	801	NAD	C5N-C4N-C3N	-12.10	108.47	120.36
3	A	802	NAD	C5N-C4N-C3N	-11.90	108.66	120.36
3	A	802	NAD	C6N-N1N-C2N	-8.67	114.50	121.88
3	B	801	NAD	C6N-N1N-C2N	-8.55	114.61	121.88
3	B	801	NAD	N3A-C2A-N1A	-4.42	121.89	128.58
3	A	802	NAD	N3A-C2A-N1A	-4.42	121.90	128.58
3	A	802	NAD	C2A-N1A-C6A	4.35	125.88	118.73
3	B	801	NAD	C2A-N1A-C6A	4.32	125.83	118.73
3	B	801	NAD	C1B-N9A-C8A	2.86	133.45	127.09
3	A	802	NAD	C1B-N9A-C8A	2.84	133.39	127.09
3	B	801	NAD	C6N-C5N-C4N	-2.83	115.37	119.45
3	A	802	NAD	C6N-C5N-C4N	-2.73	115.52	119.45
3	A	802	NAD	C4A-N9A-C8A	-2.56	103.05	105.74
3	B	801	NAD	C4A-N9A-C8A	-2.54	103.07	105.74
3	B	801	NAD	C5A-N7A-C8A	2.34	107.12	103.45
3	A	802	NAD	C5A-N7A-C8A	2.32	107.09	103.45
3	A	802	NAD	O2B-C2B-C3B	2.13	118.63	111.82

There are no chirality outliers.

All (9) torsion outliers are listed below:

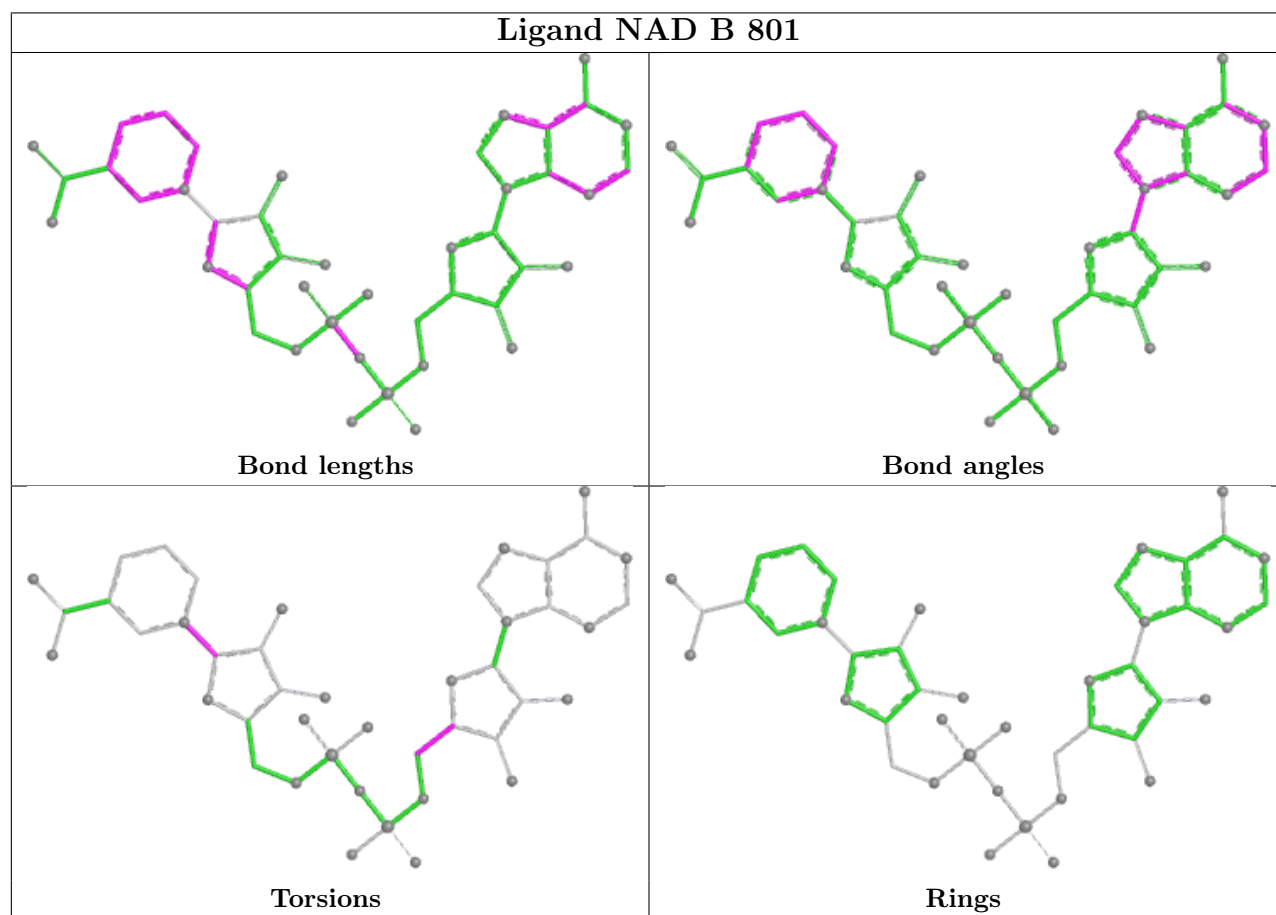
Mol	Chain	Res	Type	Atoms
3	A	802	NAD	O4D-C1D-N1N-C2N
3	A	802	NAD	C2D-C1D-N1N-C2N
3	B	801	NAD	O4D-C1D-N1N-C2N
3	B	801	NAD	C2D-C1D-N1N-C2N
4	A	902	MPD	O2-C2-C3-C4
4	B	903	MPD	O2-C2-C3-C4
3	B	801	NAD	O4B-C4B-C5B-O5B
4	B	903	MPD	C1-C2-C3-C4
3	A	802	NAD	O4B-C4B-C5B-O5B

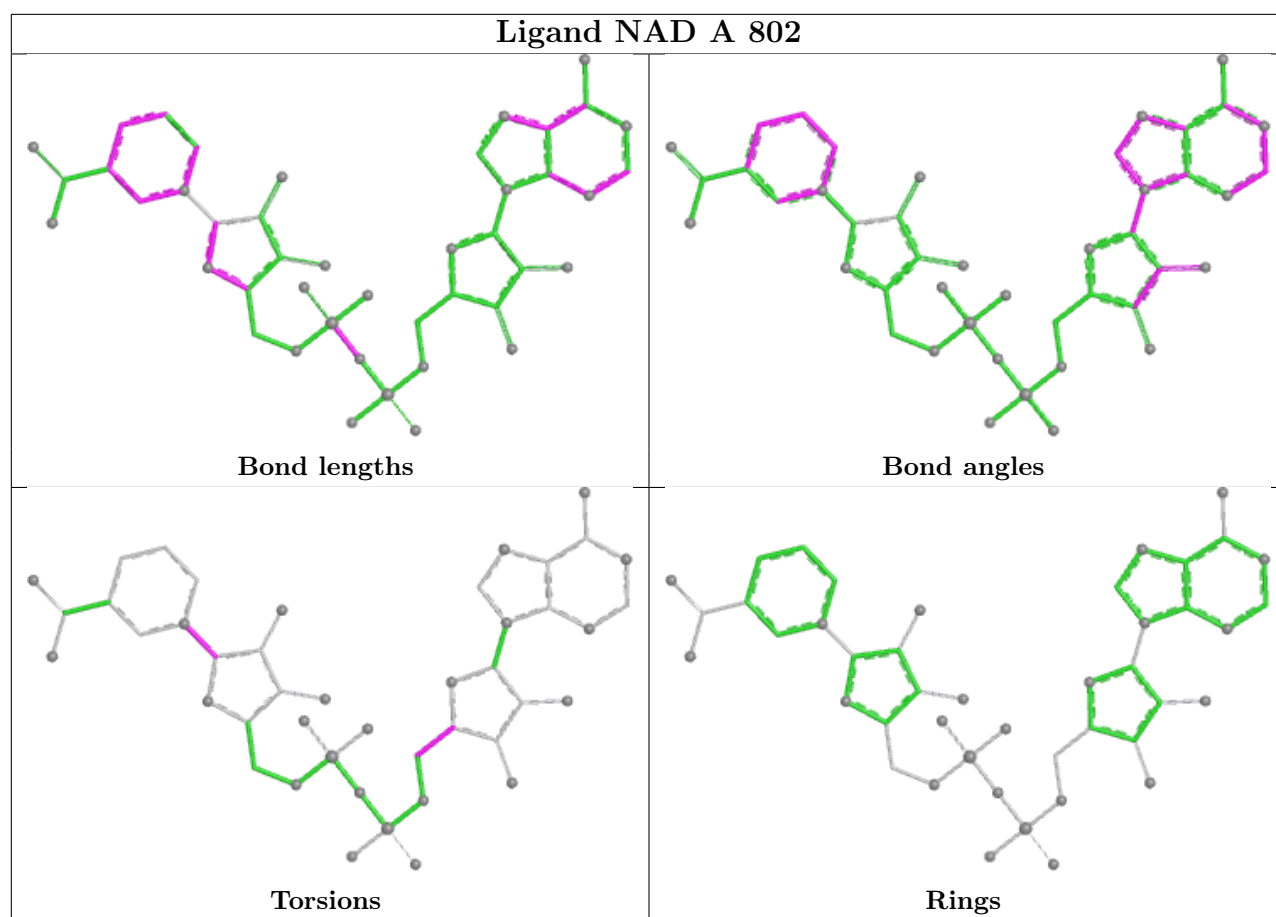
There are no ring outliers.

4 monomers are involved in 12 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	801	NAD	1	0
3	A	802	NAD	2	0
4	A	902	MPD	3	0
4	B	903	MPD	6	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	333/350 (95%)	-0.39	1 (0%) 90 90	6, 11, 22, 35	0
1	B	332/350 (94%)	-0.32	3 (0%) 81 81	5, 12, 22, 31	0
All	All	665/700 (95%)	-0.35	4 (0%) 85 86	5, 11, 22, 35	0

All (4) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	1	MET	7.5
1	B	128	ASN	3.0
1	B	51	GLU	2.6
1	A	342	GLY	2.4

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
4	MPD	A	902	8/8	0.56	0.26	38,40,42,43	0

Continued on next page...

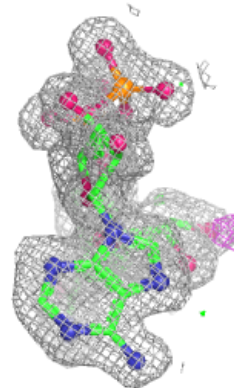
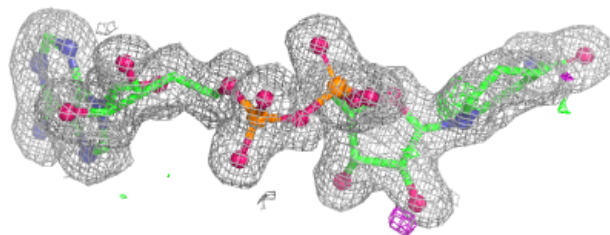
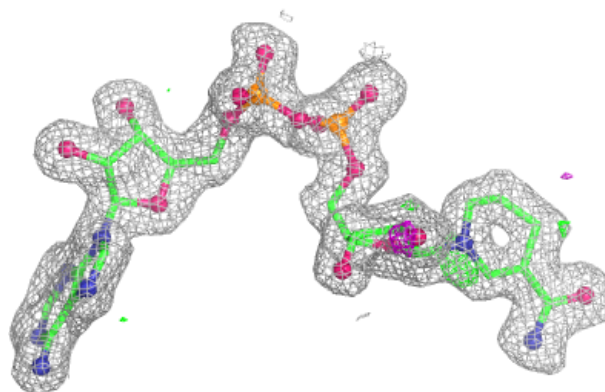
Continued from previous page...

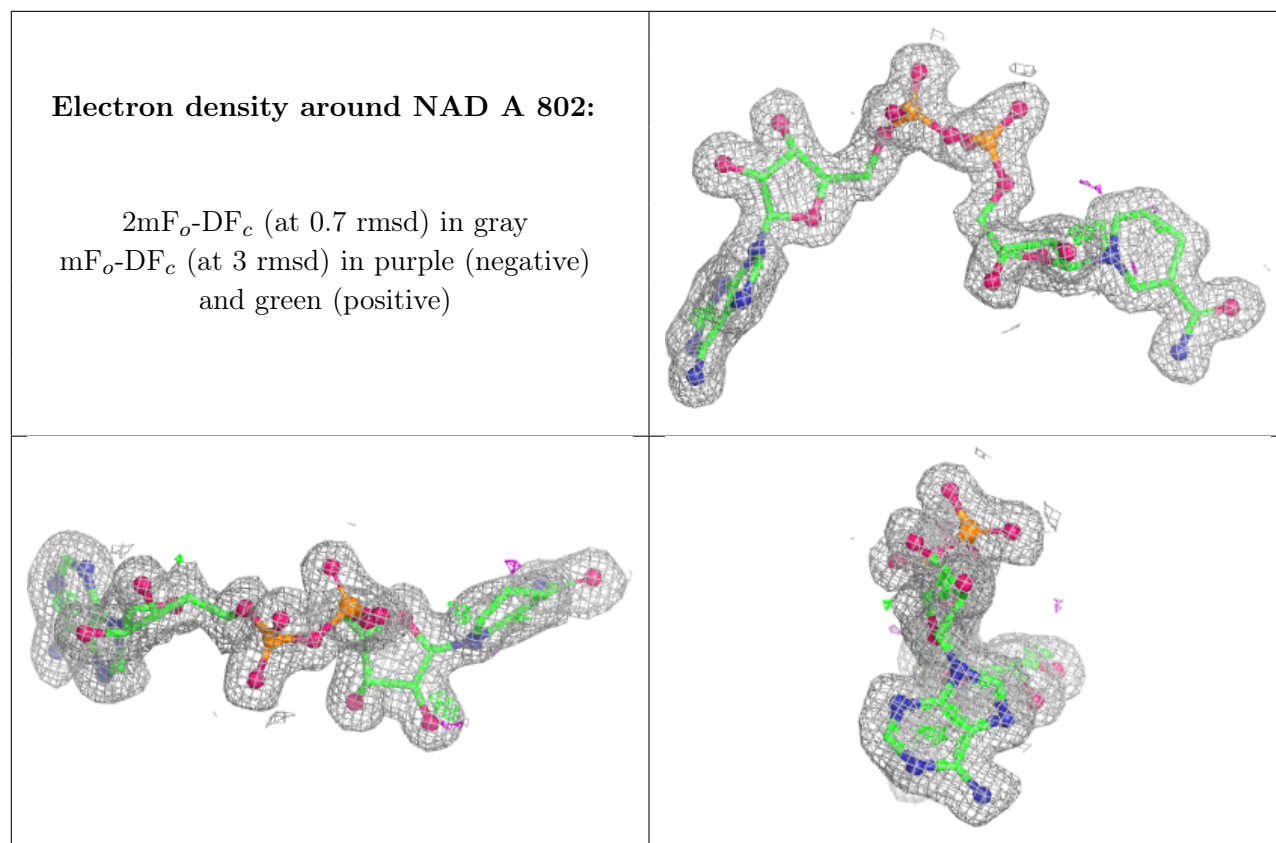
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
4	MPD	B	905	8/8	0.74	0.15	29,32,34,35	0
4	MPD	B	903	8/8	0.75	0.15	35,36,37,37	0
4	MPD	A	901	8/8	0.82	0.15	39,41,41,42	0
4	MPD	A	904	8/8	0.84	0.11	25,28,29,30	0
2	NA	B	912	1/1	0.89	0.09	15,15,15,15	0
2	NA	A	911	1/1	0.94	0.08	15,15,15,15	0
3	NAD	B	801	44/44	0.97	0.05	6,9,13,15	0
3	NAD	A	802	44/44	0.98	0.05	6,9,13,14	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 NAD B 801:

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





6.5 Other polymers ⓘ

There are no such residues in this entry.