



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 02:11 PM UTC

PDB ID : 3DOC / pdb_00003doc
Title : Crystal Structure of TrkA glyceraldehyde-3-phosphate dehydrogenase from *Brucella melitensis*
Authors : Seattle Structural Genomics Center for Infectious Disease (SSGCID)
Deposited on : 2008-07-03
Resolution : 2.40 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

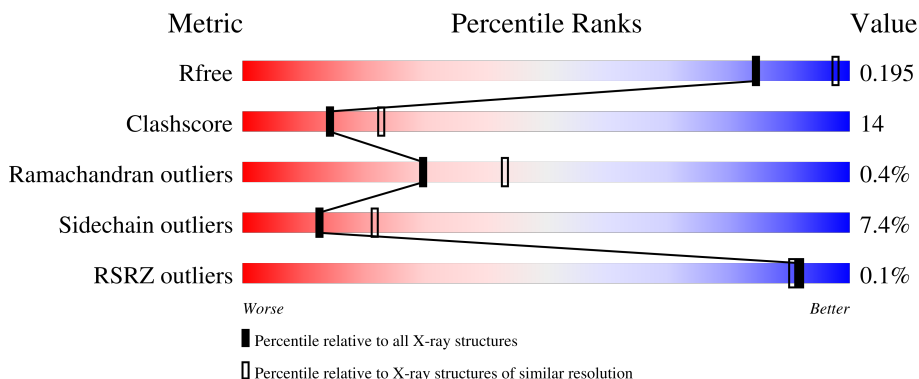
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.40 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	4912 (2.40-2.40)
Clashscore	190562	5391 (2.40-2.40)
Ramachandran outliers	187476	5320 (2.40-2.40)
Sidechain outliers	187428	5321 (2.40-2.40)
RSRZ outliers	180081	4916 (2.40-2.40)

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	335	
1	B	335	
1	C	335	
1	D	335	

2 Entry composition [i](#)

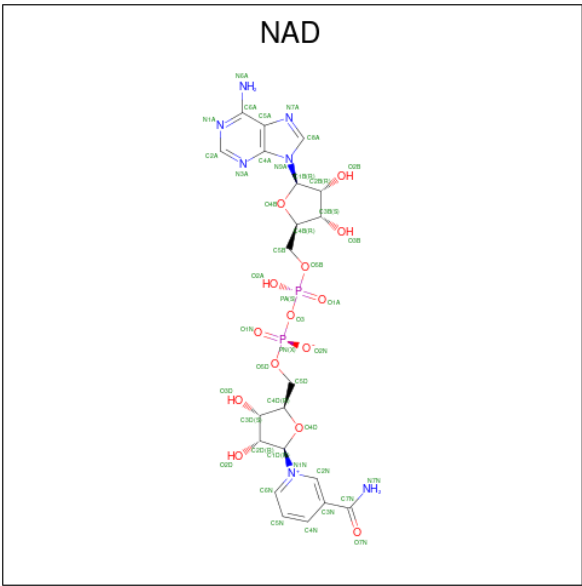
There are 3 unique types of molecules in this entry. The entry contains 10861 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 glyceraldehyde 3-phosphate dehydrogenase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	335	Total	C	N	O	S	0	0	0
			2543	1592	451	490	10			
1	B	335	Total	C	N	O	S	0	0	0
			2535	1587	450	488	10			
1	C	335	Total	C	N	O	S	0	0	0
			2547	1595	452	490	10			
1	D	334	Total	C	N	O	S	0	0	0
			2539	1590	451	489	9			

- Molecule 2 is NICOTINAMIDE-ADENINE-DINUCLEOTIDE (CCD ID: NAD) (formula: C₂₁H₂₇N₇O₁₄P₂).



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

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

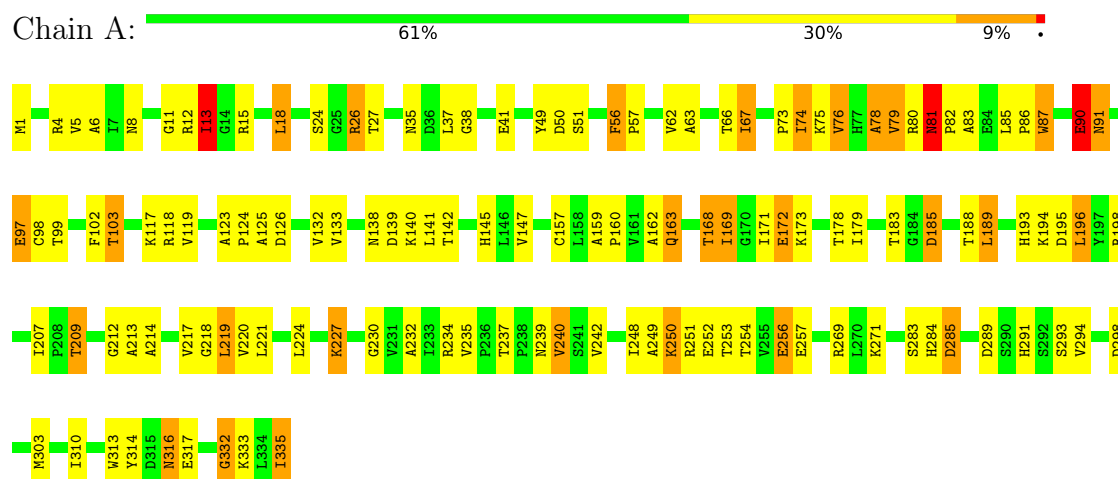
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	121	Total	O	0	0
			121	121		
3	B	147	Total	O	0	0
			147	147		
3	C	139	Total	O	0	0
			139	139		
3	D	114	Total	O	0	0
			114	114		

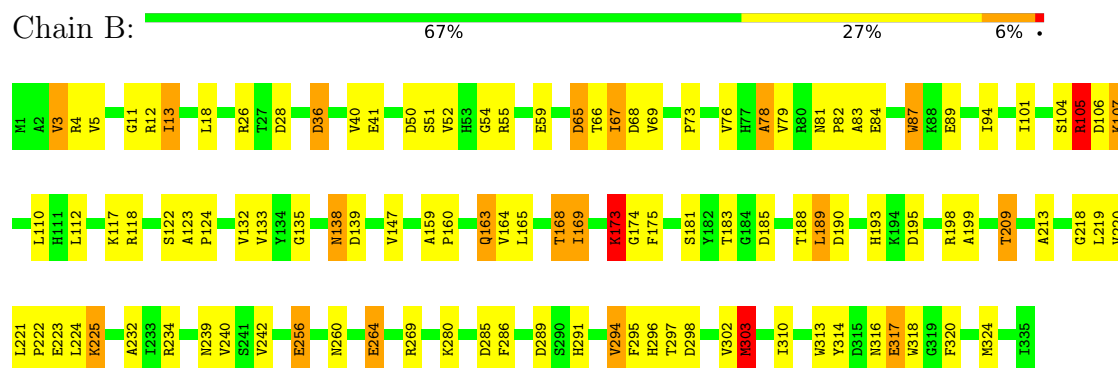
3 Residue-property plots

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.

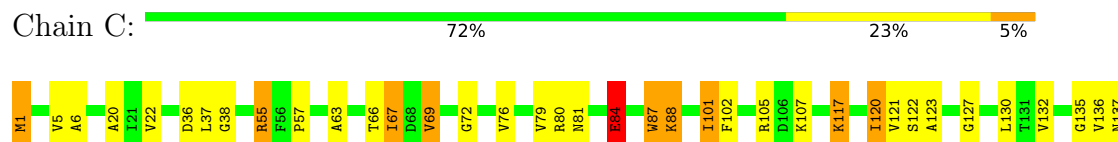
- Molecule 1: glyceraldehyde 3-phosphate dehydrogenase

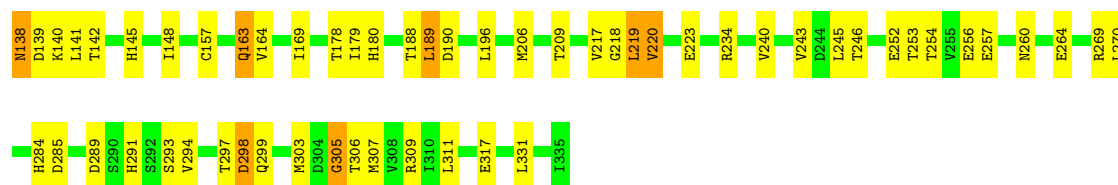


- Molecule 1: glyceraldehyde 3-phosphate dehydrogenase

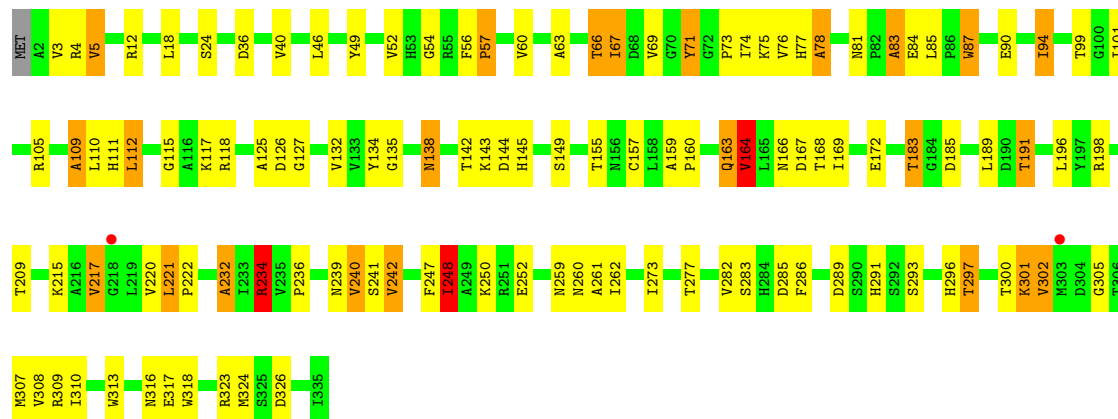


- Molecule 1: glyceraldehyde 3-phosphate dehydrogenase





- Molecule 1: glyceraldehyde 3-phosphate dehydrogenase



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	71.97Å 106.33Å 90.78Å 90.00° 107.89° 90.00°	Depositor
Resolution (Å)	50.00 – 2.40 50.00 – 2.40	Depositor EDS
% Data completeness (in resolution range)	96.9 (50.00-2.40) 97.0 (50.00-2.40)	Depositor EDS
R_{merge}	0.15	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.06 (at 2.39Å)	Xtriage
Refinement program	REFMAC refmac_5.4.0067	Depositor
R, R_{free}	0.185 , 0.225 0.189 , 0.195	Depositor DCC
R_{free} test set	2484 reflections (4.91%)	wwPDB-VP
Wilson B-factor (Å ²)	24.8	Xtriage
Anisotropy	0.076	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 36.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	10861	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 3.94% 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:
NAD

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	1.60	44/2586 (1.7%)	1.22	23/3515 (0.7%)
1	B	1.46	43/2578 (1.7%)	1.17	13/3506 (0.4%)
1	C	1.47	32/2590 (1.2%)	1.16	14/3519 (0.4%)
1	D	1.59	50/2582 (1.9%)	1.19	14/3509 (0.4%)
All	All	1.53	169/10336 (1.6%)	1.19	64/14049 (0.5%)

All (169) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	335	ILE	C-OXT	-13.79	0.95	1.23
1	B	67	ILE	C-O	-9.30	1.14	1.24
1	A	284	HIS	C-N	-9.00	1.22	1.33
1	A	67	ILE	CA-CB	-8.77	1.42	1.54
1	C	178	THR	C-O	-8.77	1.13	1.24
1	C	285	ASP	C-O	-8.21	1.13	1.24
1	B	78	ALA	CA-CB	-8.09	1.45	1.53
1	A	74	ILE	C-O	-7.97	1.15	1.24
1	A	316	ASN	C-O	-7.82	1.14	1.24
1	D	78	ALA	CA-CB	-7.75	1.46	1.53
1	A	214	ALA	C-O	-7.51	1.15	1.24
1	A	171	ILE	C-O	-7.43	1.16	1.24
1	A	67	ILE	C-O	-7.39	1.16	1.24
1	A	195	ASP	C-O	-7.33	1.15	1.24
1	B	317	GLU	C-O	-7.26	1.15	1.24
1	B	36	ASP	C-O	-7.17	1.18	1.24
1	A	249	ALA	CA-CB	-7.12	1.42	1.53
1	B	318	TRP	C-O	-7.11	1.15	1.23
1	D	240	VAL	C-O	-7.06	1.15	1.24
1	D	12	ARG	C-O	-7.05	1.16	1.24
1	D	302	VAL	C-O	-6.95	1.16	1.24
1	C	317	GLU	C-O	-6.94	1.16	1.24

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	162	ALA	CA-CB	-6.92	1.42	1.53
1	C	36	ASP	C-O	-6.88	1.17	1.24
1	D	125	ALA	C-O	-6.83	1.16	1.24
1	B	50	ASP	C-O	-6.81	1.15	1.24
1	D	99	THR	C-O	-6.77	1.15	1.24
1	A	4	ARG	C-O	-6.70	1.15	1.24
1	D	164	VAL	C-O	-6.67	1.16	1.24
1	D	261	ALA	CA-CB	-6.67	1.42	1.53
1	A	196	LEU	C-O	-6.60	1.15	1.24
1	A	138	ASN	CB-CG	-6.59	1.35	1.52
1	D	316	ASN	C-O	-6.57	1.16	1.24
1	B	297	THR	C-O	-6.51	1.15	1.24
1	D	242	VAL	C-O	-6.50	1.16	1.23
1	B	54	GLY	C-O	-6.49	1.15	1.24
1	C	243	VAL	C-O	-6.47	1.17	1.24
1	C	257	GLU	C-O	-6.45	1.16	1.24
1	D	54	GLY	C-O	-6.42	1.15	1.23
1	C	163	GLN	C-O	-6.41	1.16	1.24
1	A	76	VAL	CA-CB	-6.41	1.46	1.54
1	D	248	ILE	C-O	-6.40	1.16	1.24
1	C	120	ILE	C-O	-6.32	1.17	1.24
1	B	302	VAL	C-O	-6.27	1.17	1.24
1	B	52	VAL	C-O	-6.26	1.17	1.23
1	D	232	ALA	C-O	-6.21	1.16	1.23
1	B	69	VAL	CA-CB	-6.19	1.46	1.54
1	A	251	ARG	C-O	-6.18	1.16	1.23
1	A	163	GLN	C-O	-6.17	1.17	1.24
1	B	174	GLY	C-O	-6.17	1.17	1.23
1	C	121	VAL	C-O	-6.14	1.16	1.24
1	D	221	LEU	C-O	-6.14	1.17	1.24
1	C	188	THR	C-O	-6.13	1.16	1.24
1	D	285	ASP	C-O	-6.11	1.16	1.24
1	C	5	VAL	C-O	-6.09	1.17	1.24
1	A	213	ALA	C-O	-6.09	1.16	1.24
1	B	51	SER	C-O	-6.09	1.16	1.24
1	D	109	ALA	CA-CB	-6.09	1.42	1.53
1	B	5	VAL	C-O	-6.06	1.17	1.24
1	B	188	THR	C-O	-6.06	1.16	1.24
1	C	138	ASN	C-O	-6.05	1.16	1.24
1	B	41	GLU	C-O	-6.04	1.16	1.24
1	D	109	ALA	C-O	-6.03	1.16	1.24
1	C	123	ALA	C-O	-6.01	1.16	1.24

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	295	PHE	C-O	-6.01	1.16	1.23
1	A	97	GLU	C-O	-6.00	1.16	1.23
1	A	285	ASP	C-N	-6.00	1.25	1.33
1	B	189	LEU	C-O	-5.99	1.16	1.23
1	D	317	GLU	C-O	-5.97	1.17	1.24
1	B	65	ASP	C-O	-5.95	1.15	1.23
1	D	236	PRO	C-O	-5.94	1.16	1.24
1	D	66	THR	C-O	-5.93	1.16	1.24
1	A	294	VAL	C-O	-5.88	1.17	1.24
1	C	136	VAL	C-O	-5.88	1.16	1.24
1	D	163	GLN	C-O	-5.88	1.17	1.24
1	D	222	PRO	C-O	-5.87	1.17	1.24
1	D	262	ILE	C-O	-5.84	1.17	1.24
1	B	163	GLN	C-O	-5.83	1.17	1.24
1	D	83	ALA	CA-CB	-5.82	1.43	1.53
1	D	126	ASP	C-O	-5.82	1.16	1.24
1	C	256	GLU	C-O	-5.78	1.17	1.24
1	C	117	LYS	C-O	-5.78	1.16	1.24
1	C	6	ALA	N-CA	-5.74	1.39	1.46
1	D	5	VAL	C-O	-5.74	1.18	1.24
1	A	317	GLU	C-O	-5.73	1.16	1.23
1	A	212	GLY	C-O	-5.73	1.16	1.23
1	D	115	GLY	C-O	-5.73	1.18	1.24
1	D	125	ALA	CA-CB	-5.73	1.44	1.53
1	A	5	VAL	C-O	-5.70	1.17	1.24
1	C	20	ALA	CA-CB	-5.68	1.44	1.53
1	A	332	GLY	C-O	-5.67	1.17	1.23
1	D	24	SER	C-O	-5.64	1.16	1.24
1	D	166	ASN	C-O	-5.63	1.17	1.24
1	D	239	ASN	C-O	-5.63	1.16	1.23
1	D	234	ARG	C-O	-5.60	1.17	1.23
1	D	283	SER	C-O	-5.56	1.17	1.24
1	D	307	MET	C-O	-5.55	1.17	1.24
1	D	4	ARG	C-O	-5.53	1.17	1.24
1	B	26	ARG	C-O	-5.52	1.17	1.23
1	D	301	LYS	C-O	-5.51	1.17	1.23
1	B	320	PHE	C-O	-5.51	1.17	1.24
1	D	57	PRO	C-O	-5.50	1.16	1.24
1	B	314	TYR	C-O	-5.49	1.17	1.23
1	B	139	ASP	C-O	-5.48	1.17	1.24
1	D	46	LEU	C-O	-5.47	1.17	1.24
1	B	147	VAL	C-O	-5.46	1.17	1.24

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	294	VAL	C-O	-5.45	1.17	1.24
1	B	218	GLY	C-O	-5.45	1.16	1.23
1	B	213	ALA	C-O	-5.43	1.17	1.24
1	D	286	PHE	C-O	-5.43	1.16	1.24
1	B	298	ASP	C-O	-5.42	1.17	1.24
1	A	188	THR	C-O	-5.41	1.17	1.24
1	A	173	LYS	C-O	-5.40	1.16	1.23
1	D	112	LEU	C-O	-5.39	1.17	1.24
1	B	4	ARG	C-O	-5.39	1.17	1.24
1	D	71	TYR	C-O	-5.39	1.18	1.24
1	B	55	ARG	C-O	-5.38	1.17	1.23
1	D	241	SER	C-O	-5.36	1.16	1.23
1	B	68	ASP	C-O	-5.36	1.18	1.24
1	C	102	PHE	C-O	-5.34	1.17	1.23
1	D	318	TRP	C-O	-5.34	1.17	1.24
1	A	56	PHE	C-O	-5.34	1.16	1.24
1	B	28	ASP	C-O	-5.33	1.17	1.24
1	D	60	VAL	C-O	-5.33	1.18	1.24
1	D	282	VAL	C-O	-5.32	1.17	1.23
1	A	248	ILE	C-O	-5.32	1.18	1.24
1	D	300	THR	C-O	-5.31	1.17	1.23
1	B	316	ASN	C-O	-5.31	1.17	1.24
1	B	256	GLU	C-O	-5.30	1.17	1.24
1	A	126	ASP	C-O	-5.29	1.17	1.24
1	B	296	HIS	C-O	-5.28	1.16	1.23
1	C	179	ILE	C-O	-5.27	1.18	1.24
1	C	180	HIS	C-O	-5.27	1.17	1.23
1	A	172	GLU	C-O	-5.26	1.17	1.24
1	A	79	VAL	CA-CB	-5.24	1.47	1.54
1	A	214	ALA	CA-CB	-5.24	1.45	1.53
1	A	139	ASP	C-O	-5.23	1.16	1.24
1	A	78	ALA	CA-CB	-5.22	1.45	1.52
1	B	286	PHE	C-O	-5.22	1.17	1.24
1	D	111	HIS	C-O	-5.22	1.17	1.24
1	A	6	ALA	C-O	-5.21	1.17	1.24
1	B	225	LYS	C-O	-5.19	1.17	1.23
1	C	190	ASP	C-O	-5.18	1.17	1.23
1	B	213	ALA	CA-CB	-5.18	1.45	1.53
1	C	57	PRO	C-O	-5.18	1.17	1.24
1	C	122	SER	C-O	-5.18	1.16	1.23
1	D	310	ILE	C-O	-5.17	1.17	1.23
1	A	18	LEU	C-O	-5.16	1.18	1.24

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	79	VAL	C-O	-5.16	1.18	1.24
1	A	138	ASN	C-O	-5.15	1.18	1.24
1	C	37	LEU	C-O	-5.14	1.17	1.24
1	B	173	LYS	C-O	-5.14	1.17	1.24
1	B	79	VAL	C-O	-5.13	1.18	1.24
1	B	303	MET	C-O	-5.13	1.18	1.24
1	D	67	ILE	C-O	-5.12	1.18	1.24
1	A	50	ASP	C-O	-5.12	1.17	1.24
1	A	189	LEU	C-O	-5.12	1.17	1.23
1	D	167	ASP	C-O	-5.11	1.17	1.24
1	C	218	GLY	C-O	-5.11	1.17	1.23
1	B	165	LEU	C-O	-5.10	1.17	1.24
1	A	218	GLY	C-O	-5.10	1.18	1.24
1	B	264	GLU	N-CA	-5.08	1.40	1.46
1	A	90	GLU	CB-CG	-5.07	1.37	1.52
1	A	314	TYR	C-O	-5.06	1.18	1.23
1	C	189	LEU	C-O	-5.04	1.17	1.23
1	C	137	ASN	C-O	-5.03	1.17	1.24
1	A	80	ARG	CA-C	-5.03	1.46	1.52
1	C	298	ASP	C-O	-5.02	1.17	1.24
1	C	55	ARG	C-O	-5.02	1.17	1.23

All (64) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	297	THR	N-CA-C	8.74	120.81	111.28
1	C	80	ARG	N-CA-C	7.99	119.77	111.14
1	B	294	VAL	CB-CA-C	7.73	120.68	111.32
1	A	139	ASP	N-CA-C	7.47	122.08	113.19
1	A	5	VAL	N-CA-C	7.44	120.20	108.89
1	D	283	SER	N-CA-C	7.27	119.20	111.28
1	A	51	SER	N-CA-C	7.26	121.72	113.01
1	B	294	VAL	N-CA-C	7.16	118.11	106.72
1	D	259	ASN	N-CA-C	7.11	119.65	111.11
1	C	220	VAL	N-CA-C	-7.11	102.94	113.39
1	D	132	VAL	N-CA-C	6.91	117.84	108.17
1	A	13	ILE	N-CA-C	6.85	117.55	110.36
1	A	230	GLY	N-CA-C	6.85	120.87	110.18
1	B	28	ASP	N-CA-C	6.80	121.03	112.87
1	B	264	GLU	CB-CA-C	6.79	122.23	110.68
1	C	5	VAL	N-CA-C	6.35	118.64	108.85
1	B	26	ARG	N-CA-C	6.33	119.46	109.96

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	264	GLU	N-CA-C	6.25	118.89	111.33
1	A	81	ASN	N-CA-C	6.20	119.32	109.40
1	C	164	VAL	N-CA-C	6.12	116.79	110.36
1	D	52	VAL	CB-CA-C	-6.09	105.66	111.44
1	D	94	ILE	N-CA-C	6.08	116.87	108.12
1	C	72	GLY	CA-C-N	5.99	126.34	119.93
1	C	72	GLY	C-N-CA	5.99	126.34	119.93
1	D	101	ILE	N-CA-C	5.99	118.91	113.10
1	A	37	LEU	N-CA-C	5.86	120.43	113.28
1	C	306	THR	N-CA-C	5.85	122.25	114.12
1	A	219	LEU	CA-CB-CG	5.80	136.62	116.30
1	D	24	SER	N-CA-C	5.79	120.35	113.28
1	C	38	GLY	CA-C-N	5.78	125.80	119.90
1	C	38	GLY	C-N-CA	5.78	125.80	119.90
1	A	132	VAL	N-CA-C	5.73	116.19	108.17
1	A	213	ALA	N-CA-C	5.72	118.46	111.82
1	B	105	ARG	N-CA-C	5.70	118.43	111.82
1	D	77	HIS	N-CA-C	5.68	118.50	109.81
1	A	49	TYR	N-CA-C	5.66	117.93	108.02
1	B	163	GLN	N-CA-C	5.60	118.11	111.33
1	D	191	THR	N-CA-C	5.54	117.51	108.76
1	C	256	GLU	N-CA-C	5.52	116.97	111.07
1	A	271	LYS	N-CA-C	5.50	118.29	110.10
1	B	132	VAL	N-CA-C	5.47	115.77	108.11
1	A	214	ALA	N-CA-C	5.47	117.32	111.36
1	C	55	ARG	N-CA-C	5.45	118.35	110.28
1	B	69	VAL	N-CA-C	5.44	117.34	112.17
1	D	66	THR	N-CA-C	5.42	118.24	109.40
1	B	5	VAL	N-CA-C	5.36	117.11	108.85
1	A	38	GLY	CA-C-N	5.35	125.51	119.90
1	A	38	GLY	C-N-CA	5.35	125.51	119.90
1	A	163	GLN	N-CA-C	5.30	116.86	111.14
1	A	13	ILE	N-CA-CB	5.29	116.39	110.51
1	D	260	ASN	N-CA-C	5.29	117.05	111.28
1	D	69	VAL	N-CA-C	5.28	117.19	112.17
1	A	138	ASN	N-CA-CB	-5.25	102.18	110.06
1	C	84	GLU	N-CA-C	5.25	119.79	113.17
1	D	285	ASP	N-CA-C	5.14	118.32	111.75
1	A	103	THR	N-CA-C	5.12	118.79	112.54
1	C	284	HIS	N-CA-C	5.09	117.57	111.71
1	A	188	THR	N-CA-CB	5.09	117.61	110.12
1	A	256	GLU	N-CA-C	5.07	116.81	111.28

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	207	ILE	CA-C-N	5.06	124.97	119.76
1	A	207	ILE	C-N-CA	5.06	124.97	119.76
1	D	317	GLU	N-CA-C	5.06	117.57	111.40
1	B	213	ALA	N-CA-C	5.03	116.85	111.36
1	B	297	THR	N-CA-C	5.03	121.52	110.80

There are no chirality outliers.

There are no planarity outliers.

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	2543	0	2551	106	0
1	B	2535	0	2534	78	0
1	C	2547	0	2562	46	0
1	D	2539	0	2550	65	0
2	A	44	0	26	20	0
2	B	44	0	26	2	0
2	C	44	0	26	0	0
2	D	44	0	26	0	0
3	A	121	0	0	3	0
3	B	147	0	0	9	0
3	C	139	0	0	2	0
3	D	114	0	0	1	0
All	All	10861	0	10301	291	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 14.

All (291) 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:198:ARG:NH2	1:A:234:ARG:HH11	1.08	1.43
1:A:198:ARG:NH2	1:A:234:ARG:NH1	1.88	1.22
1:B:81:ASN:HD21	1:B:83:ALA:HB3	1.00	1.17

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:198:ARG:HH22	1:A:234:ARG:NH1	1.44	1.13
1:A:66:THR:HG21	1:A:73:PRO:HB3	1.30	1.11
1:B:183:THR:HG23	1:B:185:ASP:OD1	1.50	1.10
1:B:3:VAL:HG22	3:B:975:HOH:O	1.55	1.05
1:B:81:ASN:HD22	1:B:84:GLU:HG3	1.21	1.01
1:A:66:THR:CG2	1:A:73:PRO:HB3	1.89	1.01
1:A:168:THR:HG22	1:A:169:ILE:HD12	1.44	1.00
1:A:11:GLY:HA3	2:A:901:NAD:H4B	1.44	0.99
1:D:296:HIS:CD2	1:D:313:TRP:HE1	1.83	0.97
1:A:163:GLN:OE1	1:A:269:ARG:NH2	1.96	0.95
1:D:168:THR:HG22	1:D:169:ILE:HG13	1.48	0.95
1:B:81:ASN:ND2	1:B:83:ALA:HB3	1.82	0.94
1:B:183:THR:CG2	1:B:234:ARG:HH22	1.83	0.92
1:B:81:ASN:HD22	1:B:84:GLU:CG	1.81	0.92
1:B:163:GLN:OE1	1:B:269:ARG:NH2	2.02	0.92
1:B:168:THR:HG22	1:B:169:ILE:HG22	1.51	0.91
1:A:13:ILE:CG2	2:A:901:NAD:H51N	2.02	0.90
1:A:13:ILE:HG22	2:A:901:NAD:H51N	1.54	0.89
1:A:11:GLY:CA	2:A:901:NAD:H4B	2.01	0.89
1:C:219:LEU:HD13	1:C:219:LEU:O	1.72	0.88
1:B:183:THR:HG22	1:B:234:ARG:NH2	1.88	0.88
1:D:296:HIS:HD2	1:D:313:TRP:HE1	0.91	0.87
1:B:66:THR:HG21	1:B:73:PRO:HB3	1.55	0.87
1:A:11:GLY:HA3	2:A:901:NAD:C4B	2.05	0.87
1:B:183:THR:HG22	1:B:234:ARG:HH22	1.41	0.86
1:A:12:ARG:HG3	2:A:901:NAD:O2A	1.74	0.86
1:C:1:MET:CG	1:C:1:MET:O	2.21	0.86
1:D:71:TYR:CD1	1:D:71:TYR:O	2.30	0.85
1:D:71:TYR:O	1:D:71:TYR:HD1	1.58	0.84
1:A:198:ARG:HH22	1:A:234:ARG:HH11	0.85	0.84
1:C:1:MET:O	1:C:1:MET:HG3	1.76	0.83
1:A:11:GLY:CA	2:A:901:NAD:O3B	2.28	0.81
1:B:81:ASN:ND2	1:B:84:GLU:HG3	1.95	0.81
1:D:183:THR:CG2	1:D:185:ASP:OD1	2.29	0.81
1:A:172:GLU:HG3	1:A:250:LYS:HD2	1.63	0.80
1:D:296:HIS:HD2	1:D:313:TRP:NE1	1.76	0.80
1:B:105:ARG:O	1:B:105:ARG:HG3	1.81	0.80
1:A:172:GLU:CG	1:A:250:LYS:HD2	2.13	0.79
1:A:209:THR:HG21	1:A:234:ARG:HE	1.46	0.79
1:B:168:THR:HG22	1:B:169:ILE:CG2	2.13	0.78
1:B:82:PRO:HG2	1:B:110:LEU:HD12	1.64	0.78

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:198:ARG:CZ	1:A:234:ARG:HH11	1.96	0.77
1:A:198:ARG:CZ	1:A:234:ARG:NH1	2.47	0.77
1:B:3:VAL:CG2	3:B:975:HOH:O	2.18	0.77
1:A:11:GLY:HA2	2:A:901:NAD:O3B	1.84	0.77
1:D:81:ASN:HB3	1:D:84:GLU:HG3	1.67	0.76
1:C:260:ASN:HB2	3:C:919:HOH:O	1.85	0.76
1:B:59:GLU:HG3	3:B:1059:HOH:O	1.85	0.75
1:C:303:MET:HB2	1:C:307:MET:HB3	1.67	0.75
1:B:183:THR:CG2	1:B:185:ASP:OD1	2.33	0.75
1:B:138:ASN:HD22	1:B:138:ASN:H	1.34	0.75
1:A:185:ASP:OD2	1:A:198:ARG:NH1	2.21	0.73
1:B:209:THR:HG21	1:B:234:ARG:HE	1.53	0.73
1:C:219:LEU:O	1:C:219:LEU:CD1	2.37	0.73
1:D:209:THR:HG21	1:D:234:ARG:HD2	1.71	0.73
1:B:66:THR:CG2	1:B:73:PRO:HB3	2.18	0.72
1:D:66:THR:HG21	1:D:73:PRO:HB3	1.71	0.72
1:A:24:SER:OG	1:A:26:ARG:HG2	1.90	0.71
1:A:11:GLY:HA3	2:A:901:NAD:O5B	1.91	0.70
1:A:11:GLY:N	2:A:901:NAD:H4B	2.06	0.70
1:D:67:ILE:HG12	1:D:76:VAL:HG21	1.74	0.69
1:D:183:THR:HG23	1:D:185:ASP:OD1	1.91	0.69
1:C:163:GLN:OE1	1:C:269:ARG:NH2	2.21	0.69
1:B:67:ILE:HG12	1:B:76:VAL:HG21	1.73	0.69
1:B:310:ILE:HD12	1:B:310:ILE:C	2.18	0.68
1:A:13:ILE:N	2:A:901:NAD:O2N	2.18	0.68
1:A:185:ASP:OD1	1:A:198:ARG:NH1	2.26	0.67
1:C:87:TRP:HE3	1:C:87:TRP:HA	1.59	0.67
1:B:138:ASN:H	1:B:138:ASN:ND2	1.91	0.67
1:D:66:THR:CG2	1:D:73:PRO:CB	2.72	0.67
1:A:123:ALA:HB1	1:A:124:PRO:HD2	1.76	0.67
1:A:183:THR:HG22	1:A:234:ARG:HH22	1.60	0.66
1:B:13:ILE:HG22	2:B:901:NAD:O2N	1.95	0.66
1:A:185:ASP:CG	1:A:198:ARG:NH1	2.54	0.66
1:C:69:VAL:O	1:C:69:VAL:CG1	2.44	0.66
1:D:66:THR:CG2	1:D:73:PRO:HB3	2.25	0.66
1:B:183:THR:HG21	1:B:234:ARG:HH22	1.59	0.65
1:C:63:ALA:O	1:C:66:THR:OG1	2.12	0.65
1:C:87:TRP:HA	1:C:87:TRP:CE3	2.29	0.65
1:D:138:ASN:H	1:D:138:ASN:HD22	1.43	0.65
1:A:168:THR:CG2	1:A:169:ILE:HD12	2.25	0.65
1:B:160:PRO:O	1:B:164:VAL:HG23	1.96	0.64

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:66:THR:HG21	1:D:73:PRO:CB	2.28	0.64
1:A:13:ILE:HG21	2:A:901:NAD:H51N	1.79	0.63
1:A:209:THR:HG22	1:A:232:ALA:HB3	1.80	0.62
1:C:69:VAL:O	1:C:69:VAL:HG13	1.99	0.62
1:B:13:ILE:CD1	1:B:122:SER:HB2	2.30	0.62
1:A:13:ILE:HG22	2:A:901:NAD:O2N	2.00	0.62
1:C:219:LEU:CD1	1:C:219:LEU:C	2.72	0.62
1:A:11:GLY:H	2:A:901:NAD:H4B	1.63	0.61
1:B:89:GLU:OE1	1:B:89:GLU:N	2.20	0.61
1:B:13:ILE:CG2	2:B:901:NAD:O2N	2.50	0.60
1:C:157:CYS:HA	1:C:293:SER:HB2	1.83	0.60
1:C:135:GLY:H	1:C:138:ASN:ND2	1.99	0.60
1:A:224:LEU:O	1:A:227:LYS:HB2	2.02	0.59
1:A:141:LEU:HA	1:A:145:HIS:HD2	1.65	0.59
1:D:87:TRP:HA	1:D:87:TRP:CE3	2.37	0.59
1:A:67:ILE:HG23	1:A:67:ILE:O	2.01	0.59
1:C:142:THR:H	1:C:145:HIS:CD2	2.21	0.59
1:A:1:MET:HE3	3:A:984:HOH:O	2.03	0.58
1:A:15:ARG:NH2	3:A:929:HOH:O	2.30	0.58
1:A:172:GLU:HG2	1:A:250:LYS:HD2	1.84	0.58
1:B:256:GLU:O	1:B:260:ASN:HB2	2.04	0.58
1:D:185:ASP:OD2	1:D:198:ARG:NH1	2.32	0.58
1:A:11:GLY:CA	2:A:901:NAD:C4B	2.74	0.58
1:A:87:TRP:HA	1:A:87:TRP:CE3	2.39	0.57
1:D:87:TRP:HA	1:D:87:TRP:HE3	1.68	0.57
1:D:75:LYS:HG2	1:D:90:GLU:OE2	2.04	0.57
1:B:104:SER:HB3	1:B:107:LYS:HD3	1.85	0.57
1:B:135:GLY:H	1:B:138:ASN:ND2	2.02	0.57
1:B:67:ILE:CG1	1:B:76:VAL:HG21	2.35	0.57
1:D:66:THR:HG23	1:D:73:PRO:CB	2.35	0.57
1:A:289:ASP:OD1	1:A:291:HIS:HD2	1.87	0.57
1:C:105:ARG:HD2	1:C:127:GLY:O	2.04	0.57
1:C:142:THR:H	1:C:145:HIS:HD2	1.53	0.56
1:D:67:ILE:HG12	1:D:76:VAL:CG2	2.35	0.56
1:D:142:THR:H	1:D:145:HIS:CD2	2.24	0.56
1:D:135:GLY:H	1:D:138:ASN:ND2	2.02	0.56
1:A:87:TRP:HA	1:A:87:TRP:HE3	1.71	0.56
1:A:256:GLU:H	1:A:256:GLU:CD	2.14	0.55
1:B:82:PRO:HG2	1:B:110:LEU:CD1	2.35	0.55
1:B:242:VAL:HB	1:B:313:TRP:CE3	2.41	0.55
1:A:66:THR:HG23	1:A:73:PRO:HB3	1.81	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:66:THR:CG2	1:D:73:PRO:HB2	2.36	0.55
1:C:67:ILE:HG23	1:C:76:VAL:HG21	1.90	0.54
1:D:5:VAL:HG12	1:D:94:ILE:HB	1.88	0.54
1:D:67:ILE:CG1	1:D:76:VAL:HG21	2.36	0.54
1:C:1:MET:O	1:C:1:MET:HG2	2.07	0.54
1:B:183:THR:CG2	1:B:234:ARG:NH2	2.55	0.54
1:C:252:GLU:CG	1:C:305:GLY:HA3	2.38	0.54
1:D:252:GLU:HG2	1:D:305:GLY:HA3	1.90	0.54
1:A:142:THR:H	1:A:145:HIS:CD2	2.27	0.53
1:B:40:VAL:HG12	1:B:67:ILE:HD11	1.91	0.53
1:B:209:THR:HG22	1:B:232:ALA:HB3	1.90	0.53
1:A:310:ILE:C	1:A:310:ILE:HD12	2.33	0.53
1:D:66:THR:HG23	1:D:73:PRO:HB2	1.91	0.53
1:B:13:ILE:HD13	1:B:122:SER:HB2	1.90	0.53
1:D:67:ILE:O	1:D:74:ILE:N	2.40	0.53
1:D:209:THR:CG2	1:D:234:ARG:HD2	2.39	0.52
1:A:67:ILE:O	1:A:67:ILE:CG2	2.55	0.52
1:A:183:THR:CG2	1:A:234:ARG:HH22	2.22	0.52
1:C:219:LEU:C	1:C:219:LEU:HD12	2.35	0.51
1:D:163:GLN:HB2	1:D:221:LEU:HD11	1.91	0.51
1:A:242:VAL:HB	1:A:313:TRP:CE3	2.46	0.51
1:A:81:ASN:ND2	1:A:83:ALA:H	2.07	0.51
1:B:133:VAL:HG23	1:B:220:VAL:HG11	1.93	0.51
1:D:71:TYR:CD1	1:D:71:TYR:C	2.87	0.51
1:A:239:ASN:O	1:A:240:VAL:HB	2.10	0.51
1:A:13:ILE:HG23	1:A:98:CYS:HB3	1.92	0.51
1:B:87:TRP:HA	1:B:87:TRP:CE3	2.46	0.51
1:B:87:TRP:HA	1:B:87:TRP:HE3	1.76	0.51
1:B:291:HIS:HE1	3:B:991:HOH:O	1.93	0.51
1:A:159:ALA:N	1:A:160:PRO:CD	2.74	0.50
1:B:117:LYS:O	1:B:118:ARG:HG2	2.10	0.50
1:A:35:ASN:CG	1:A:85:LEU:HD21	2.35	0.50
1:A:67:ILE:CG2	1:A:74:ILE:HB	2.41	0.50
1:D:85:LEU:HD13	1:D:87:TRP:CZ2	2.46	0.50
1:D:138:ASN:H	1:D:138:ASN:ND2	2.09	0.50
1:B:89:GLU:H	1:B:89:GLU:CD	2.17	0.50
1:B:221:LEU:HD13	1:B:224:LEU:HD12	1.94	0.50
1:C:130:LEU:HD23	1:C:132:VAL:CG2	2.41	0.50
1:A:253:THR:OG1	1:A:254:THR:N	2.46	0.49
1:B:239:ASN:OD1	1:B:317:GLU:HG3	2.12	0.49
1:A:99:THR:HG1	1:A:102:PHE:HD2	1.59	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:11:GLY:CA	2:A:901:NAD:C3B	2.90	0.49
1:A:11:GLY:N	2:A:901:NAD:O3B	2.46	0.49
1:A:240:VAL:H	1:A:316:ASN:ND2	2.11	0.49
1:A:81:ASN:HA	1:A:82:PRO:HD3	1.64	0.49
1:D:209:THR:HG21	1:D:234:ARG:CD	2.39	0.49
1:C:88:LYS:NZ	3:C:1004:HOH:O	2.22	0.49
1:C:217:VAL:C	1:C:219:LEU:N	2.70	0.49
1:B:36:ASP:O	1:B:78:ALA:HA	2.12	0.48
1:A:66:THR:CG2	1:A:73:PRO:CB	2.77	0.48
1:C:87:TRP:CE3	1:C:87:TRP:CA	2.97	0.48
1:B:94:ILE:HG12	1:B:118:ARG:HB2	1.95	0.48
1:A:157:CYS:HA	1:A:293:SER:HB2	1.95	0.48
1:B:13:ILE:HD11	1:B:122:SER:HB2	1.95	0.48
1:B:117:LYS:C	1:B:118:ARG:HG2	2.39	0.48
1:C:141:LEU:HD22	1:C:331:LEU:HD13	1.95	0.48
1:D:157:CYS:HA	1:D:293:SER:HB2	1.95	0.48
1:D:105:ARG:HG3	1:D:127:GLY:O	2.13	0.48
1:A:67:ILE:HG22	1:A:74:ILE:HB	1.95	0.48
1:B:285:ASP:O	1:C:55:ARG:NH2	2.40	0.48
1:A:123:ALA:HB1	1:A:124:PRO:CD	2.42	0.48
1:B:67:ILE:HG12	1:B:76:VAL:CG2	2.40	0.48
1:A:283:SER:HB3	1:C:206:MET:HB2	1.95	0.48
1:C:81:ASN:HD22	1:C:84:GLU:CG	2.27	0.48
1:B:280:LYS:NZ	3:B:1050:HOH:O	2.47	0.48
1:B:303:MET:HE3	3:B:1044:HOH:O	2.12	0.48
1:D:56:PHE:HA	1:D:57:PRO:HD3	1.71	0.47
1:D:289:ASP:OD1	1:D:291:HIS:HD2	1.97	0.47
1:D:40:VAL:CG1	1:D:67:ILE:HD11	2.45	0.47
1:A:8:ASN:OD1	1:A:35:ASN:HB3	2.15	0.47
1:D:40:VAL:HG12	1:D:67:ILE:HD11	1.96	0.47
1:A:66:THR:HG23	1:A:73:PRO:CB	2.43	0.47
1:A:141:LEU:HA	1:A:145:HIS:CD2	2.47	0.47
1:A:169:ILE:HD11	1:A:257:GLU:HG2	1.95	0.47
1:A:90:GLU:O	1:A:91:ASN:CB	2.60	0.47
1:A:332:GLY:HA2	1:A:335:ILE:HD12	1.96	0.47
1:D:36:ASP:O	1:D:78:ALA:HA	2.15	0.47
1:A:133:VAL:HG23	1:A:220:VAL:HG11	1.96	0.47
1:A:90:GLU:O	1:A:91:ASN:HB2	2.14	0.47
1:C:245:LEU:O	1:C:309:ARG:HA	2.14	0.46
1:D:83:ALA:HB2	1:D:110:LEU:HB3	1.96	0.46
1:D:172:GLU:OE1	1:D:250:LYS:HG2	2.14	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:163:GLN:HB2	1:A:221:LEU:HD11	1.97	0.46
1:D:117:LYS:O	1:D:118:ARG:HD3	2.16	0.46
1:A:316:ASN:O	2:A:901:NAD:H4N	2.15	0.46
1:B:195:ASP:OD2	1:B:198:ARG:HD3	2.15	0.46
1:D:142:THR:OG1	1:D:144:ASP:HB2	2.14	0.46
1:A:217:VAL:HA	1:A:220:VAL:HG22	1.97	0.46
1:A:99:THR:OG1	1:A:102:PHE:HD2	1.97	0.46
1:B:65:ASP:OD1	1:B:65:ASP:N	2.43	0.46
1:C:217:VAL:C	1:C:219:LEU:H	2.22	0.46
1:C:22:VAL:HG21	1:C:69:VAL:CG1	2.45	0.46
1:D:248:ILE:N	1:D:248:ILE:HD13	2.29	0.46
1:A:41:GLU:OE2	1:A:62:VAL:HG11	2.16	0.46
1:A:1:MET:HE3	1:A:1:MET:HB3	1.77	0.46
1:A:86:PRO:O	1:A:90:GLU:HG3	2.16	0.45
1:A:117:LYS:O	1:A:118:ARG:HD3	2.15	0.45
1:D:155:THR:HG23	1:D:217:VAL:HG23	1.98	0.45
1:A:185:ASP:CG	1:A:198:ARG:HH11	2.18	0.45
1:D:160:PRO:O	1:D:164:VAL:HG13	2.17	0.45
1:A:285:ASP:OD1	1:D:49:TYR:HB3	2.16	0.45
1:C:299:GLN:HG3	1:C:311:LEU:HD23	1.99	0.45
1:A:103:THR:O	1:A:125:ALA:HB1	2.16	0.45
1:C:217:VAL:O	1:C:219:LEU:N	2.50	0.45
1:B:175:PHE:CE2	1:D:309:ARG:HG3	2.51	0.45
1:C:289:ASP:OD1	1:C:291:HIS:HD2	2.00	0.45
1:D:63:ALA:O	1:D:66:THR:HB	2.16	0.45
1:B:193:HIS:HB3	1:B:199:ALA:HB2	2.00	0.44
1:A:198:ARG:NH1	1:A:234:ARG:NH1	2.66	0.44
1:C:107:LYS:HE2	1:C:107:LYS:HB3	1.78	0.44
1:A:11:GLY:HA3	2:A:901:NAD:C5B	2.47	0.44
1:A:240:VAL:H	1:A:316:ASN:HD21	1.65	0.44
1:D:291:HIS:HE1	3:D:937:HOH:O	2.00	0.44
1:B:122:SER:HB3	1:B:324:MET:HE2	2.00	0.44
1:C:101:ILE:HD13	1:C:101:ILE:HA	1.72	0.44
1:C:252:GLU:HG2	1:C:305:GLY:HA3	1.99	0.44
1:C:22:VAL:HG21	1:C:69:VAL:HG11	2.00	0.44
1:D:247:PHE:C	1:D:248:ILE:HD13	2.43	0.43
1:A:11:GLY:HA3	2:A:901:NAD:C3B	2.48	0.43
1:A:235:VAL:O	1:A:237:THR:N	2.49	0.43
1:C:81:ASN:ND2	1:C:84:GLU:CG	2.82	0.43
1:C:253:THR:OG1	1:C:254:THR:N	2.50	0.43
1:A:239:ASN:O	1:A:240:VAL:CB	2.66	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:256:GLU:CD	1:A:256:GLU:N	2.77	0.43
1:D:159:ALA:HB3	1:D:160:PRO:HD3	1.99	0.43
1:D:209:THR:HG23	1:D:232:ALA:HB3	2.00	0.43
1:D:215:LYS:HB3	1:D:215:LYS:HE3	1.71	0.43
1:A:193:HIS:ND1	1:A:194:LYS:N	2.67	0.43
1:B:310:ILE:HD12	1:B:310:ILE:O	2.19	0.42
1:A:63:ALA:O	1:A:66:THR:HB	2.20	0.42
1:B:123:ALA:HB1	1:B:124:PRO:HD2	2.01	0.42
1:A:298:ASP:HB2	3:A:902:HOH:O	2.19	0.42
1:B:40:VAL:CG1	1:B:67:ILE:HD11	2.49	0.42
1:B:66:THR:HG22	3:B:1053:HOH:O	2.17	0.42
1:C:209:THR:HG21	1:C:234:ARG:HE	1.84	0.42
1:B:289:ASP:OD1	1:B:291:HIS:HD2	2.03	0.42
1:D:109:ALA:O	1:D:112:LEU:HB2	2.18	0.42
1:D:134:TYR:CZ	1:D:326:ASP:HB3	2.55	0.42
1:B:135:GLY:H	1:B:138:ASN:HD21	1.68	0.42
1:D:277:THR:O	1:D:297:THR:HB	2.20	0.42
1:B:159:ALA:N	1:B:160:PRO:CD	2.82	0.42
1:A:178:THR:HG23	1:A:178:THR:O	2.20	0.41
1:C:120:ILE:HG12	1:C:148:ILE:CG1	2.50	0.41
1:A:172:GLU:HG3	1:A:250:LYS:CD	2.44	0.41
1:B:190:ASP:HA	1:B:199:ALA:O	2.21	0.41
1:B:310:ILE:C	1:B:310:ILE:CD1	2.89	0.41
1:C:270:LEU:HD23	1:C:270:LEU:HA	1.74	0.41
1:A:56:PHE:HA	1:A:57:PRO:HD3	1.87	0.41
1:A:183:THR:HG23	1:A:185:ASP:OD1	2.20	0.41
1:D:289:ASP:OD1	1:D:291:HIS:CD2	2.74	0.41
1:D:323:ARG:O	1:D:324:MET:C	2.63	0.41
1:B:222:PRO:C	1:B:224:LEU:H	2.29	0.41
1:B:303:MET:CB	3:B:1051:HOH:O	2.68	0.41
1:B:173:LYS:HE3	1:B:173:LYS:HB3	1.85	0.41
1:B:224:LEU:HD23	1:B:224:LEU:HA	1.76	0.41
1:D:67:ILE:HD12	1:D:67:ILE:HG23	1.82	0.41
1:C:139:ASP:OD1	1:C:140:LYS:N	2.54	0.40
1:A:303:MET:HB2	1:A:303:MET:HE3	1.78	0.40
1:A:78:ALA:C	1:A:79:VAL:HG23	2.47	0.40
1:A:119:VAL:HB	1:A:147:VAL:HG13	2.03	0.40
1:A:189:LEU:HD22	3:B:1069:HOH:O	2.20	0.40
1:B:11:GLY:O	1:B:12:ARG:C	2.64	0.40
1:D:302:VAL:HG22	1:D:308:VAL:HG22	2.04	0.40
1:B:81:ASN:ND2	1:B:84:GLU:CG	2.64	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:104:SER:HB3	1:B:107:LYS:HB2	2.04	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	333/335 (99%)	314 (94%)	18 (5%)	1 (0%)	36	50
1	B	333/335 (99%)	308 (92%)	24 (7%)	1 (0%)	36	50
1	C	333/335 (99%)	311 (93%)	20 (6%)	2 (1%)	21	32
1	D	332/335 (99%)	310 (93%)	21 (6%)	1 (0%)	36	50
All	All	1331/1340 (99%)	1243 (93%)	83 (6%)	5 (0%)	30	43

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	240	VAL
1	B	240	VAL
1	C	240	VAL
1	C	305	GLY
1	D	240	VAL

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	275/276 (100%)	252 (92%)	23 (8%)	10	17
1	B	273/276 (99%)	251 (92%)	22 (8%)	11	18
1	C	276/276 (100%)	259 (94%)	17 (6%)	16	29
1	D	275/276 (100%)	256 (93%)	19 (7%)	14	24
All	All	1099/1104 (100%)	1018 (93%)	81 (7%)	13	22

All (81) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	13	ILE
1	A	18	LEU
1	A	26	ARG
1	A	27	THR
1	A	75	LYS
1	A	76	VAL
1	A	81	ASN
1	A	87	TRP
1	A	90	GLU
1	A	91	ASN
1	A	97	GLU
1	A	140	LYS
1	A	168	THR
1	A	169	ILE
1	A	179	ILE
1	A	185	ASP
1	A	196	LEU
1	A	209	THR
1	A	219	LEU
1	A	227	LYS
1	A	250	LYS
1	A	252	GLU
1	A	333	LYS
1	B	3	VAL
1	B	13	ILE
1	B	18	LEU
1	B	87	TRP
1	B	101	ILE
1	B	105	ARG
1	B	106	ASP
1	B	107	LYS
1	B	112	LEU
1	B	138	ASN

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Mol	Chain	Res	Type
1	B	168	THR
1	B	169	ILE
1	B	173	LYS
1	B	181	SER
1	B	189	LEU
1	B	209	THR
1	B	219	LEU
1	B	223	GLU
1	B	225	LYS
1	B	264	GLU
1	B	294	VAL
1	B	303	MET
1	C	1	MET
1	C	67	ILE
1	C	69	VAL
1	C	84	GLU
1	C	87	TRP
1	C	88	LYS
1	C	101	ILE
1	C	117	LYS
1	C	169	ILE
1	C	189	LEU
1	C	196	LEU
1	C	219	LEU
1	C	220	VAL
1	C	223	GLU
1	C	246	THR
1	C	264	GLU
1	C	298	ASP
1	D	3	VAL
1	D	18	LEU
1	D	87	TRP
1	D	138	ASN
1	D	143	LYS
1	D	149	SER
1	D	164	VAL
1	D	183	THR
1	D	189	LEU
1	D	191	THR
1	D	196	LEU
1	D	217	VAL
1	D	220	VAL

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Mol	Chain	Res	Type
1	D	234	ARG
1	D	242	VAL
1	D	248	ILE
1	D	273	ILE
1	D	297	THR
1	D	301	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (32) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	77	HIS
1	A	81	ASN
1	A	145	HIS
1	A	150	ASN
1	A	259	ASN
1	A	284	HIS
1	A	291	HIS
1	A	316	ASN
1	B	16	ASN
1	B	77	HIS
1	B	81	ASN
1	B	138	ASN
1	B	150	ASN
1	B	259	ASN
1	B	291	HIS
1	B	316	ASN
1	C	77	HIS
1	C	81	ASN
1	C	138	ASN
1	C	145	HIS
1	C	259	ASN
1	C	284	HIS
1	C	291	HIS
1	C	316	ASN
1	D	16	ASN
1	D	138	ASN
1	D	145	HIS
1	D	150	ASN
1	D	156	ASN
1	D	259	ASN
1	D	291	HIS
1	D	296	HIS

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 ⓘ

4 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$
2	NAD	B	901	-	46,48,48	1.71	6 (13%)	64,73,73	1.70	12 (18%)
2	NAD	A	901	-	46,48,48	1.76	6 (13%)	64,73,73	1.50	9 (14%)
2	NAD	C	901	-	46,48,48	1.63	5 (10%)	64,73,73	1.76	11 (17%)
2	NAD	D	901	-	46,48,48	1.67	4 (8%)	64,73,73	1.72	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
2	NAD	B	901	-	-	7/30/62/62	0/5/5/5
2	NAD	A	901	-	-	7/30/62/62	0/5/5/5
2	NAD	C	901	-	-	5/30/62/62	0/5/5/5
2	NAD	D	901	-	-	7/30/62/62	0/5/5/5

All (21) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	901	NAD	O7N-C7N	9.40	1.41	1.24
2	B	901	NAD	O7N-C7N	9.00	1.40	1.24
2	D	901	NAD	O7N-C7N	8.77	1.40	1.24
2	C	901	NAD	O7N-C7N	8.29	1.39	1.24
2	D	901	NAD	C8A-N7A	2.96	1.37	1.31
2	C	901	NAD	PA-O3	2.84	1.62	1.59
2	A	901	NAD	C2A-N1A	2.80	1.38	1.33
2	B	901	NAD	C2A-N3A	2.70	1.38	1.33
2	B	901	NAD	C2A-N1A	2.70	1.38	1.33
2	D	901	NAD	C2A-N1A	2.70	1.38	1.33
2	A	901	NAD	C2A-N3A	2.65	1.38	1.33
2	D	901	NAD	C2A-N3A	2.65	1.38	1.33
2	B	901	NAD	PN-O3	2.58	1.62	1.59
2	C	901	NAD	C8A-N7A	2.53	1.36	1.31
2	C	901	NAD	C2A-N1A	2.47	1.38	1.33
2	B	901	NAD	PA-O3	2.46	1.62	1.59
2	C	901	NAD	C2A-N3A	2.45	1.38	1.33
2	A	901	NAD	PA-O3	2.45	1.62	1.59
2	A	901	NAD	C8A-N7A	2.26	1.36	1.31
2	A	901	NAD	PN-O3	2.22	1.61	1.59
2	B	901	NAD	C8A-N7A	2.09	1.35	1.31

All (43) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	901	NAD	N3A-C2A-N1A	-6.04	119.44	128.58
2	D	901	NAD	N3A-C2A-N1A	-5.92	119.61	128.58
2	A	901	NAD	N3A-C2A-N1A	-5.67	120.00	128.58
2	B	901	NAD	N3A-C2A-N1A	-5.22	120.68	128.58
2	B	901	NAD	C5A-C4A-N3A	-4.76	120.17	126.72
2	C	901	NAD	N9A-C8A-N7A	-4.47	107.59	113.94
2	C	901	NAD	C3N-C7N-N7N	4.41	123.17	117.74
2	B	901	NAD	N9A-C8A-N7A	-4.32	107.81	113.94
2	C	901	NAD	C5A-C4A-N3A	-4.31	120.78	126.72
2	D	901	NAD	C5A-C4A-N3A	-4.19	120.94	126.72
2	D	901	NAD	N9A-C8A-N7A	-3.99	108.28	113.94
2	D	901	NAD	O7N-C7N-C3N	-3.88	114.85	119.60
2	C	901	NAD	O7N-C7N-C3N	-3.81	114.94	119.60
2	A	901	NAD	C5A-C4A-N3A	-3.80	121.48	126.72
2	C	901	NAD	C5A-N7A-C8A	3.79	109.41	103.45
2	B	901	NAD	C5A-N7A-C8A	3.77	109.38	103.45
2	A	901	NAD	N9A-C8A-N7A	-3.73	108.64	113.94

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	901	NAD	C2A-N3A-C4A	3.71	120.89	111.83
2	D	901	NAD	C5A-N7A-C8A	3.69	109.25	103.45
2	D	901	NAD	C2A-N3A-C4A	3.60	120.62	111.83
2	B	901	NAD	C2A-N3A-C4A	3.55	120.51	111.83
2	D	901	NAD	C4A-C5A-N7A	-3.32	106.79	110.58
2	A	901	NAD	C5A-N7A-C8A	3.26	108.57	103.45
2	D	901	NAD	C2N-C3N-C4N	3.20	121.98	118.26
2	A	901	NAD	C2A-N3A-C4A	3.16	119.55	111.83
2	D	901	NAD	C3N-C7N-N7N	3.13	121.59	117.74
2	B	901	NAD	O7N-C7N-C3N	-3.11	115.80	119.60
2	C	901	NAD	C4A-C5A-N7A	-3.01	107.14	110.58
2	B	901	NAD	N3A-C4A-N9A	2.89	132.09	127.17
2	B	901	NAD	C4A-C5A-N7A	-2.88	107.28	110.58
2	B	901	NAD	C3N-C7N-N7N	2.61	120.96	117.74
2	C	901	NAD	N3A-C4A-N9A	2.61	131.61	127.17
2	B	901	NAD	C2N-C3N-C4N	2.54	121.21	118.26
2	A	901	NAD	O7N-C7N-C3N	-2.45	116.60	119.60
2	C	901	NAD	C2N-C3N-C4N	2.44	121.09	118.26
2	A	901	NAD	C4A-C5A-N7A	-2.41	107.83	110.58
2	C	901	NAD	C4A-N9A-C8A	2.39	108.25	105.74
2	A	901	NAD	N3A-C4A-N9A	2.30	131.07	127.17
2	A	901	NAD	C3N-C7N-N7N	2.24	120.49	117.74
2	D	901	NAD	C5A-C4A-N9A	2.18	108.19	105.81
2	D	901	NAD	N3A-C4A-N9A	2.18	130.87	127.17
2	B	901	NAD	C6A-C5A-C4A	2.17	120.14	117.18
2	B	901	NAD	C4N-C3N-C7N	-2.01	115.59	121.06

There are no chirality outliers.

All (26) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	901	NAD	C5B-O5B-PA-O1A
2	A	901	NAD	O4D-C1D-N1N-C2N
2	B	901	NAD	O4D-C1D-N1N-C2N
2	B	901	NAD	O4D-C1D-N1N-C6N
2	B	901	NAD	C2D-C1D-N1N-C6N
2	C	901	NAD	O4D-C1D-N1N-C2N
2	C	901	NAD	O4D-C1D-N1N-C6N
2	C	901	NAD	C2D-C1D-N1N-C6N
2	D	901	NAD	O4D-C1D-N1N-C2N
2	D	901	NAD	O4D-C1D-N1N-C6N
2	A	901	NAD	O4B-C4B-C5B-O5B

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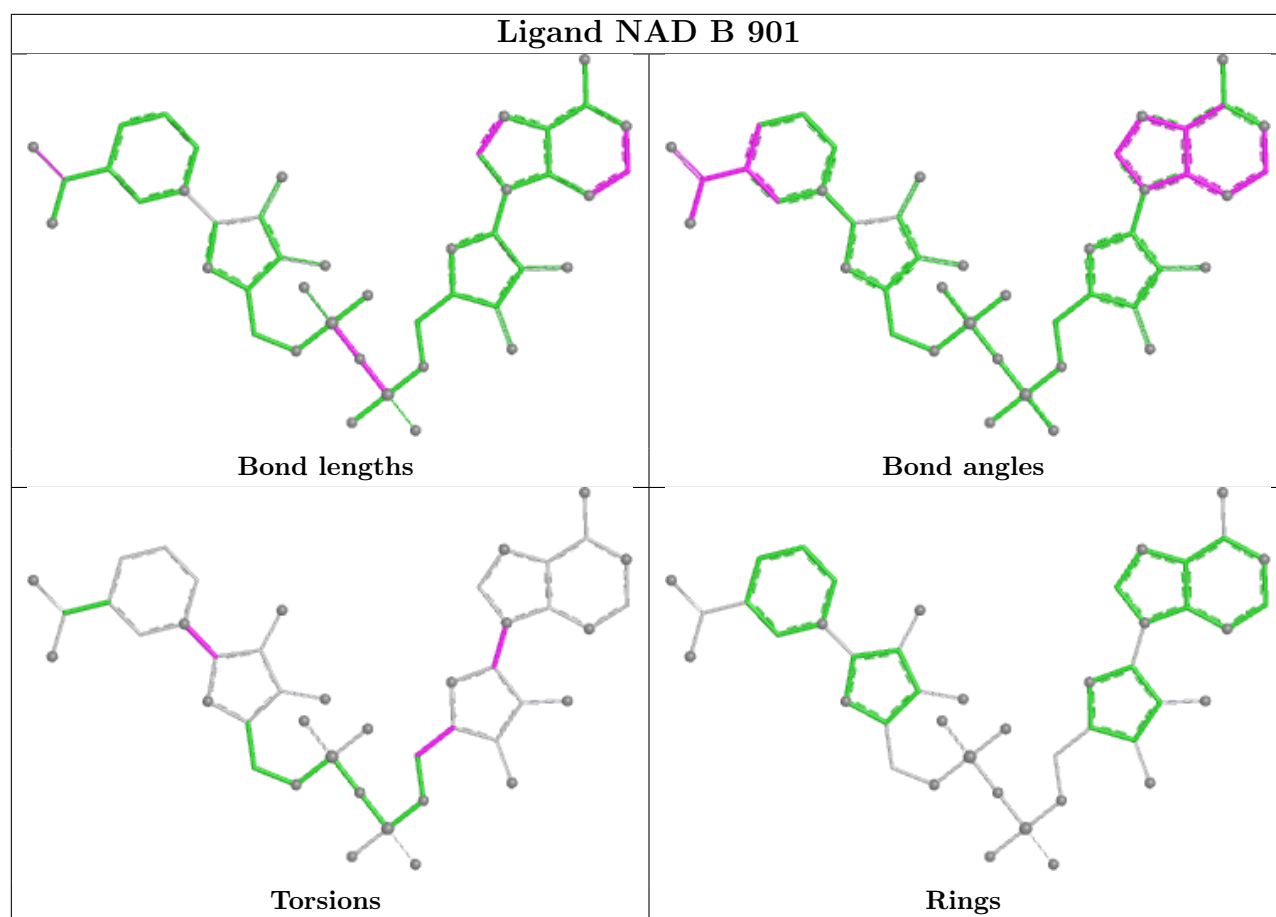
Mol	Chain	Res	Type	Atoms
2	A	901	NAD	C3B-C4B-C5B-O5B
2	B	901	NAD	O4B-C4B-C5B-O5B
2	D	901	NAD	O4B-C4B-C5B-O5B
2	A	901	NAD	C5B-O5B-PA-O2A
2	A	901	NAD	C5B-O5B-PA-O3
2	D	901	NAD	C5B-O5B-PA-O2A
2	B	901	NAD	C2D-C1D-N1N-C2N
2	C	901	NAD	C2D-C1D-N1N-C2N
2	D	901	NAD	C2D-C1D-N1N-C2N
2	D	901	NAD	C2D-C1D-N1N-C6N
2	C	901	NAD	O4B-C4B-C5B-O5B
2	A	901	NAD	O4D-C1D-N1N-C6N
2	B	901	NAD	C3B-C4B-C5B-O5B
2	D	901	NAD	C3B-C4B-C5B-O5B
2	B	901	NAD	C2B-C1B-N9A-C8A

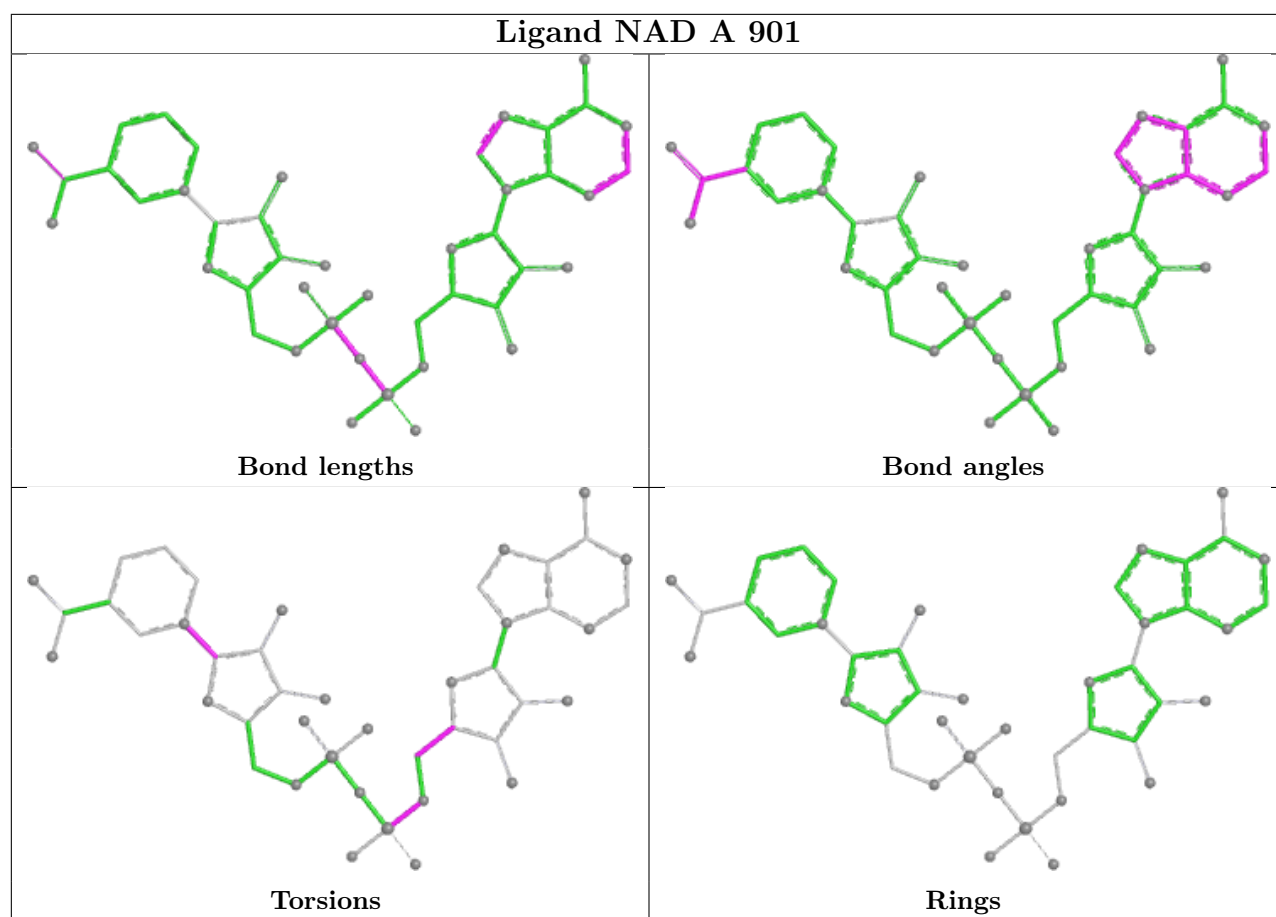
There are no ring outliers.

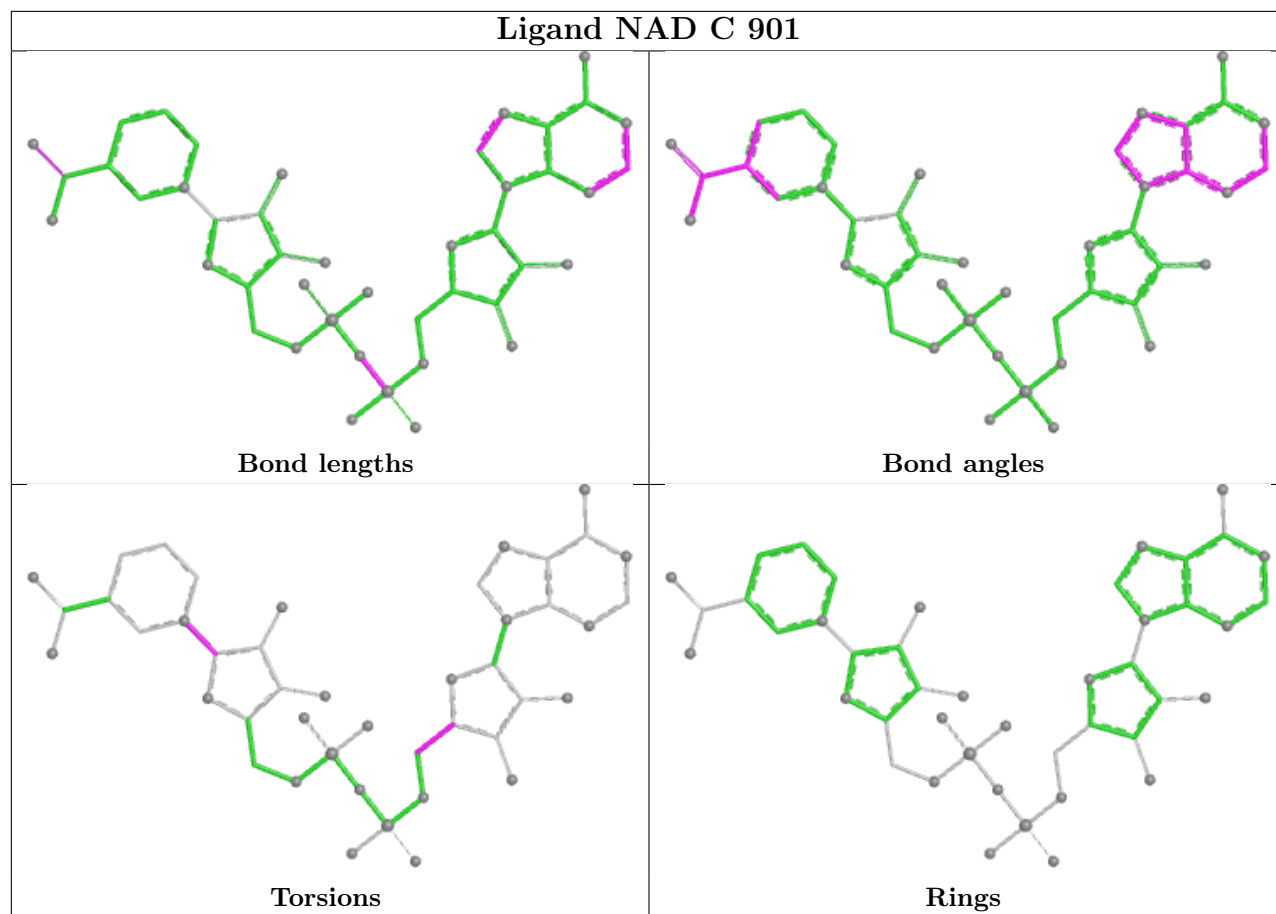
2 monomers are involved in 22 short contacts:

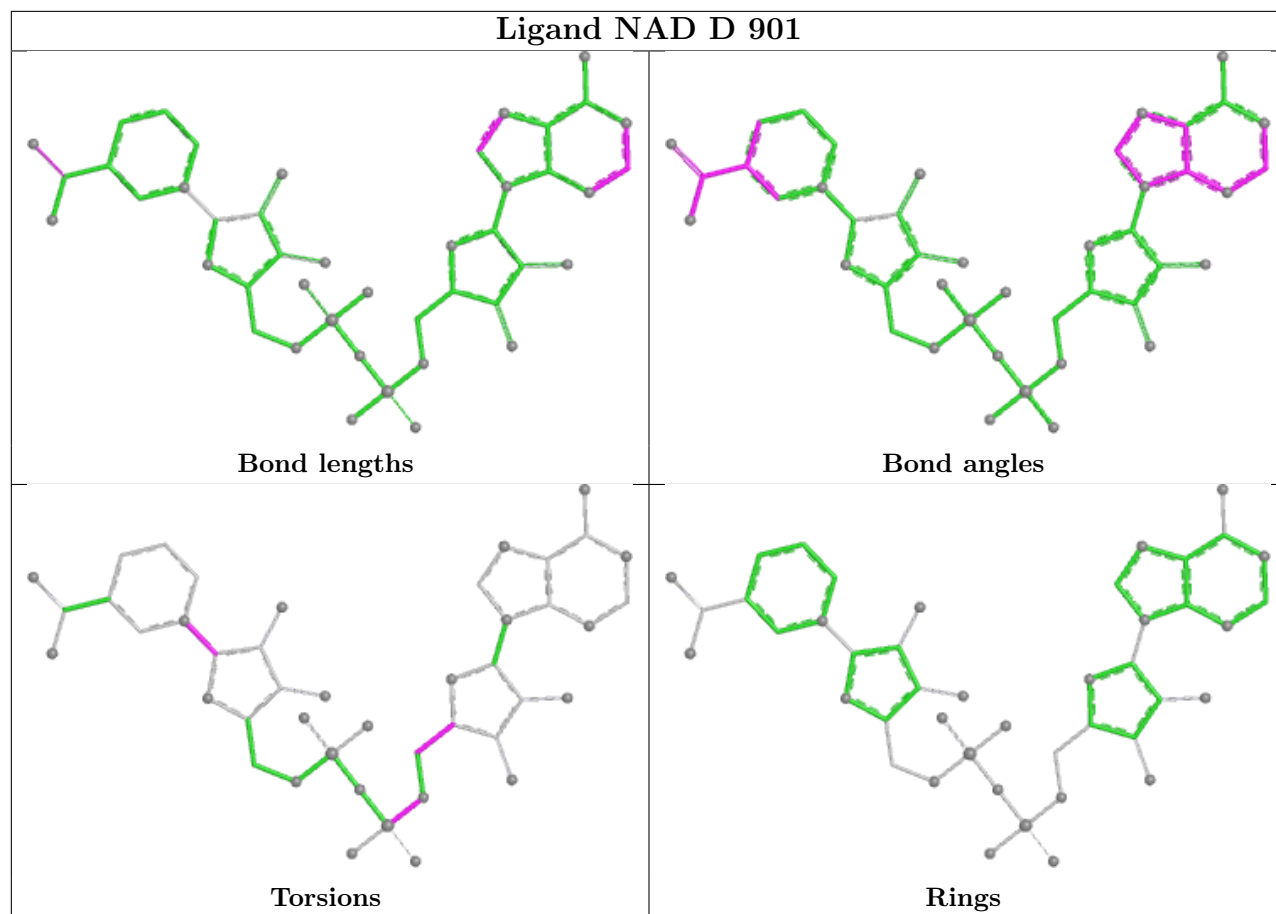
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	901	NAD	2	0
2	A	901	NAD	20	0

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(Å²)	Q<0.9	
1	A	335/335 (100%)	-0.36	0	100	100	10, 21, 36, 44	0
1	B	335/335 (100%)	-0.35	0	100	100	9, 24, 37, 42	0
1	C	335/335 (100%)	-0.40	0	100	100	8, 21, 34, 41	0
1	D	334/335 (99%)	-0.32	2 (0%)	85	83	10, 22, 34, 41	0
All	All	1339/1340 (99%)	-0.36	2 (0%)	92	90	8, 22, 35, 44	0

All (2) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	303	MET	2.6
1	D	218	GLY	2.0

6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates [i](#)

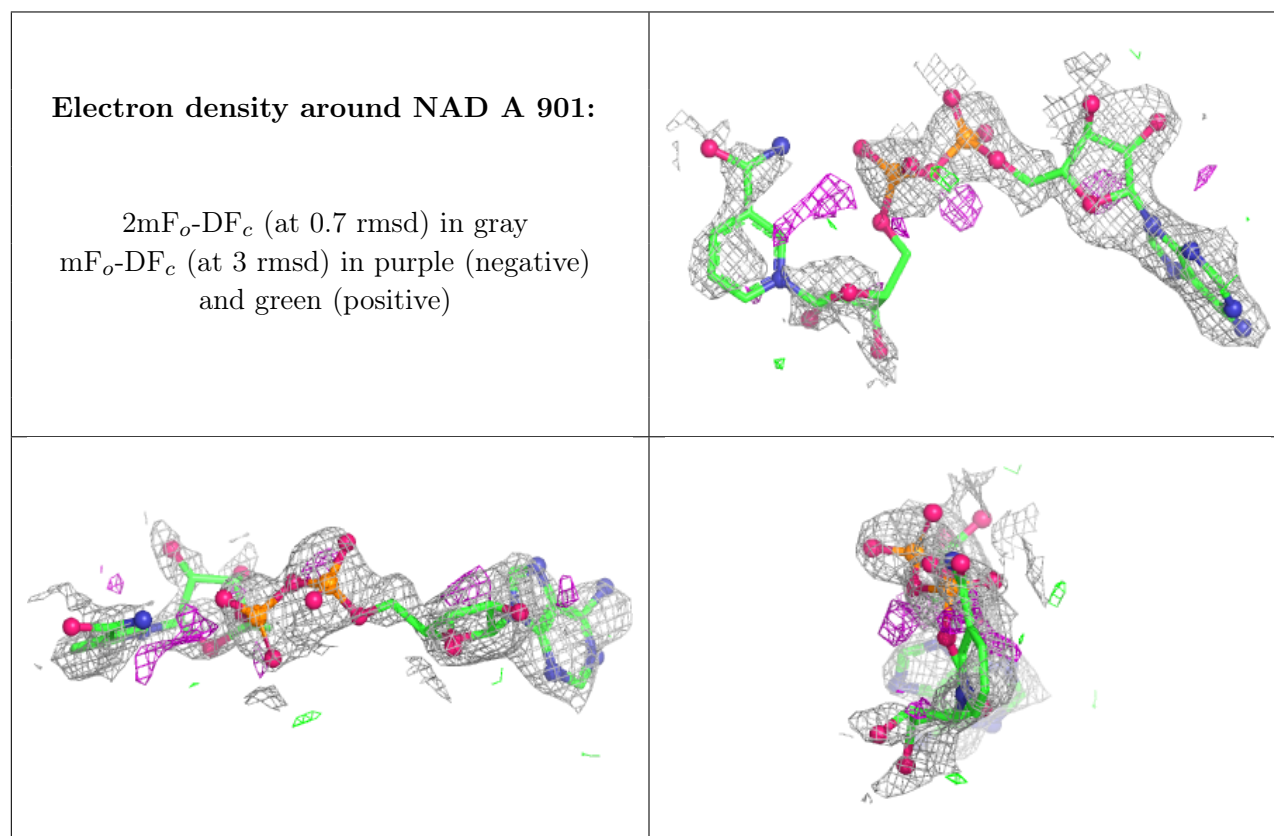
There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

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

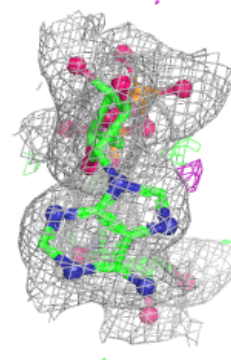
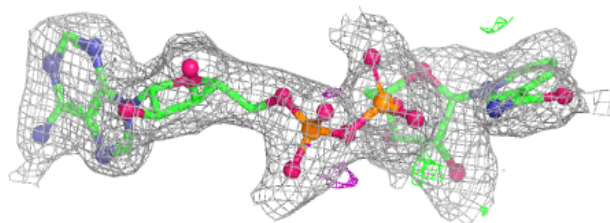
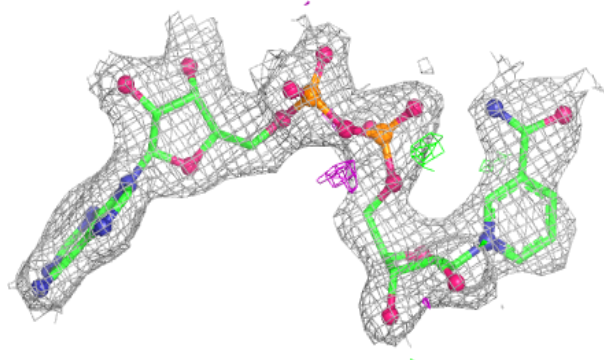
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	NAD	A	901	44/44	0.78	0.20	68,72,75,75	0
2	NAD	B	901	44/44	0.96	0.07	17,25,27,28	0
2	NAD	C	901	44/44	0.97	0.06	12,17,19,20	0
2	NAD	D	901	44/44	0.97	0.06	13,17,23,24	0

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.

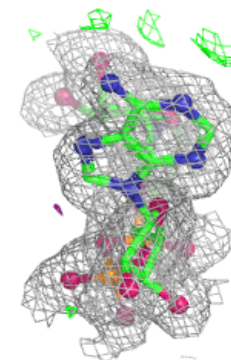
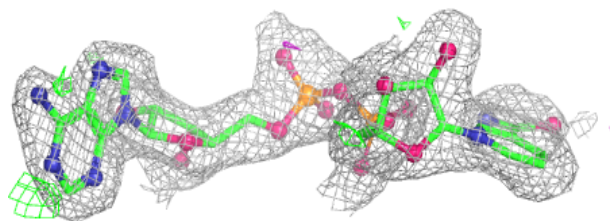
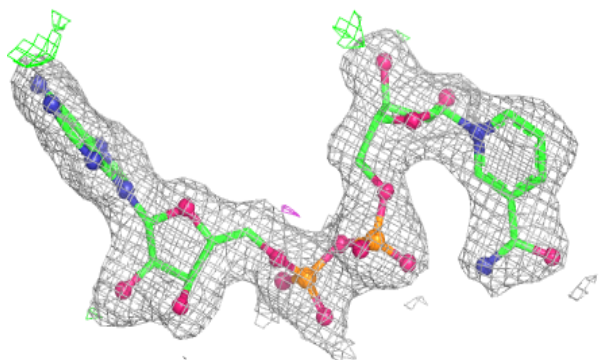


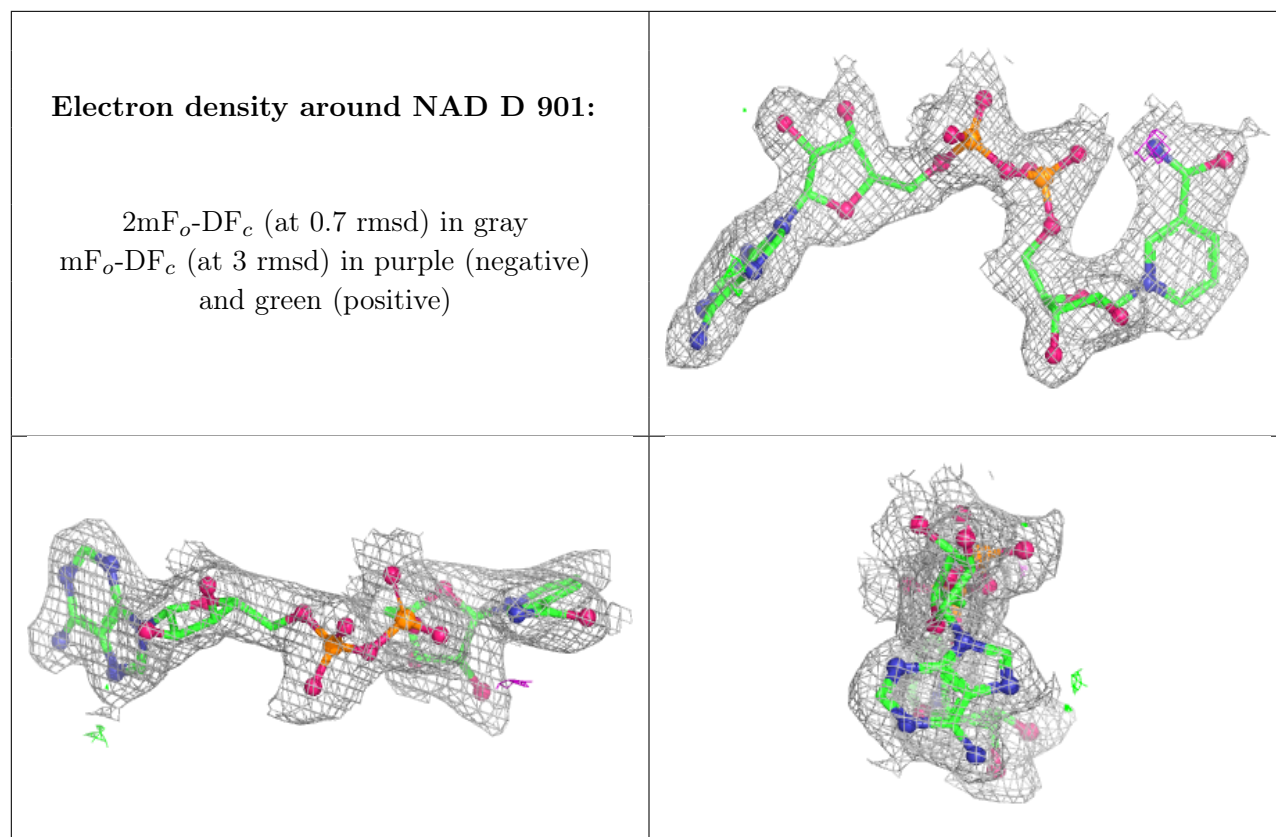
Electron density around NAD B 901:

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

**Electron density around NAD C 901:**

$2mF_o-DF_c$ (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.