



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 04:04 PM UTC

PDB ID : 1ENY / pdb_00001eny
Title : CRYSTAL STRUCTURE AND FUNCTION OF THE ISONIAZID TARGET
OF MYCOBACTERIUM TUBERCULOSIS
Authors : Dessen, A.; Quemard, A.; Blanchard, J.S.; Jacobs Jr., W.R.; Sacchettini, J.C.;
TB Structural Genomics Consortium (TBSGC)
Deposited on : 1995-01-27
Resolution : 2.20 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)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

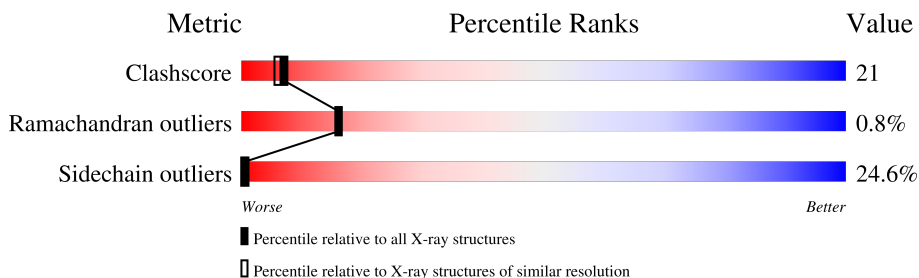
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.20 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))
Clashscore	190562	6851 (2.20-2.20)
Ramachandran outliers	187476	6768 (2.20-2.20)
Sidechain outliers	187428	6769 (2.20-2.20)

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 $\leq 5\%$.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	268	

2 Entry composition [i](#)

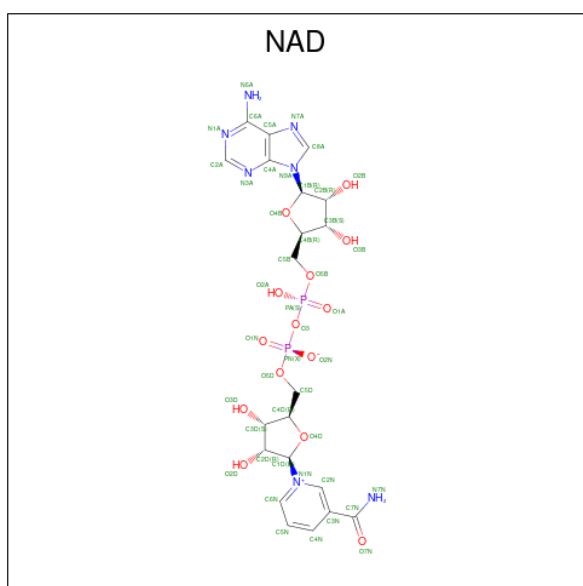
There are 3 unique types of molecules in this entry. The entry contains 2079 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 ENOYL-ACYL CARRIER PROTEIN (ACP) REDUCTASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	268	Total	C	N	O	S	0	0	0
			1994	1263	348	373	10			

- Molecule 2 is NICOTINAMIDE-ADENINE-DINUCLEOTIDE (CCD ID: NAD) (formula: $C_{21}H_{27}N_7O_{14}P_2$).

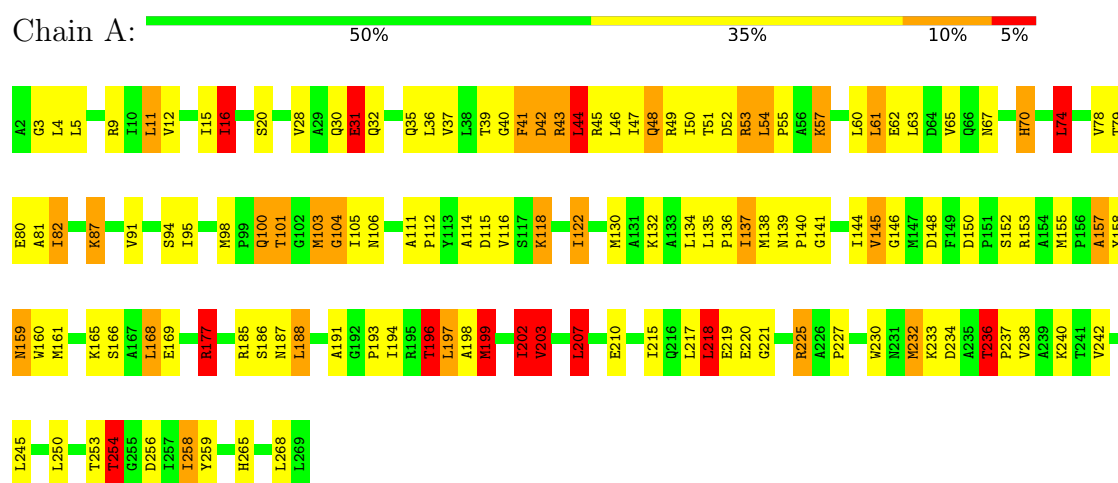


3 Residue-property plots

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. 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. 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.

Note EDS was not executed.

• Molecule 1: ENOYL-ACYL CARRIER PROTEIN (ACP) REDUCTASE



4 Data and refinement statistics

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 62 2 2	Depositor
Cell constants a, b, c, α , β , γ	100.14Å 100.14Å 140.45Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	(Not available) – 2.20	Depositor
% Data completeness (in resolution range)	(Not available) ((Not available)-2.20)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	TNT, X-PLOR	Depositor
R, R_{free}	0.196 , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	2079	wwPDB-VP
Average B, all atoms (Å ²)	29.0	wwPDB-VP

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	1.57	17/2032 (0.8%)	1.68	45/2758 (1.6%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	1	0

All (17) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	12	VAL	CA-C	-7.75	1.43	1.52
1	A	103	MET	N-CA	-7.43	1.36	1.46
1	A	157	ALA	C-O	-7.20	1.15	1.24
1	A	16	ILE	CA-CB	-7.03	1.44	1.54
1	A	40	GLY	CA-C	-6.85	1.46	1.52
1	A	161	MET	SD-CE	-5.70	1.65	1.79
1	A	150	ASP	C-O	-5.61	1.17	1.24
1	A	140	PRO	CA-C	-5.59	1.45	1.52
1	A	158	TYR	CA-C	-5.56	1.45	1.52
1	A	103	MET	CA-C	-5.54	1.45	1.52
1	A	188	LEU	CA-C	-5.34	1.46	1.52
1	A	114	ALA	CA-CB	-5.26	1.45	1.53
1	A	144	ILE	CA-CB	-5.25	1.48	1.54
1	A	91	VAL	CA-CB	-5.16	1.48	1.54
1	A	198	ALA	CA-CB	-5.15	1.45	1.53
1	A	199	MET	CA-C	-5.11	1.46	1.52
1	A	194	ILE	CA-C	5.06	1.58	1.52

All (45) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	16	ILE	CB-CA-C	10.08	127.82	111.29
1	A	37	VAL	N-CA-C	-8.70	96.87	108.35
1	A	145	VAL	CB-CA-C	-8.35	97.64	110.50
1	A	50	ILE	CB-CA-C	-8.34	101.30	111.97
1	A	81	ALA	N-CA-C	7.40	120.79	111.69
1	A	118	LYS	N-CA-C	-7.33	103.37	111.36
1	A	141	GLY	N-CA-C	-7.26	105.78	115.21
1	A	82	ILE	N-CA-C	-7.16	103.34	113.07
1	A	42	ASP	CB-CA-C	7.13	120.25	109.13
1	A	203	VAL	N-CA-C	-6.61	102.79	112.04
1	A	53	ARG	N-CA-C	-6.56	105.24	113.18
1	A	74	LEU	N-CA-C	6.50	118.91	111.11
1	A	122	ILE	CB-CA-C	-6.46	103.59	112.24
1	A	41	PHE	CA-C-N	-6.31	112.43	122.08
1	A	41	PHE	C-N-CA	-6.31	112.43	122.08
1	A	242	VAL	N-CA-C	-6.17	104.32	110.62
1	A	254	THR	CB-CA-C	-6.16	97.11	111.09
1	A	3	GLY	N-CA-C	-6.03	98.88	113.18
1	A	207	LEU	N-CA-C	-6.01	105.53	112.92
1	A	166	SER	N-CA-C	-5.94	104.72	111.07
1	A	202	ILE	N-CA-C	5.93	117.47	111.00
1	A	236	THR	N-CA-C	5.90	122.86	109.81
1	A	218	LEU	N-CA-C	-5.74	104.94	111.14
1	A	12	VAL	CA-C-N	-5.71	112.81	123.03
1	A	12	VAL	C-N-CA	-5.71	112.81	123.03
1	A	152	SER	N-CA-C	5.70	120.10	113.20
1	A	80	GLU	N-CA-C	-5.66	104.32	111.11
1	A	41	PHE	N-CA-C	5.52	122.55	110.80
1	A	196	THR	N-CA-C	-5.39	102.77	110.59
1	A	36	LEU	N-CA-C	5.38	118.43	110.46
1	A	94	SER	CA-C-N	-5.36	114.21	122.68
1	A	94	SER	C-N-CA	-5.36	114.21	122.68
1	A	225	ARG	NE-CZ-NH2	5.25	123.92	119.20
1	A	225	ARG	NE-CZ-NH1	-5.23	116.27	121.50
1	A	221	GLY	N-CA-C	-5.11	106.60	112.73
1	A	31	GLU	N-CA-C	-5.10	106.16	112.38
1	A	70	HIS	N-CA-C	-5.09	105.17	111.33
1	A	144	ILE	CB-CA-C	-5.07	103.84	110.98
1	A	177	ARG	CB-CG-CD	-5.05	99.69	111.30
1	A	44	LEU	N-CA-C	5.04	116.86	111.36
1	A	168	LEU	CB-CA-C	-5.04	102.43	110.79
1	A	227	PRO	CA-C-N	-5.01	114.89	122.76

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	227	PRO	C-N-CA	-5.01	114.89	122.76
1	A	139	ASN	CA-C-N	5.01	124.91	119.85
1	A	139	ASN	C-N-CA	5.01	124.91	119.85

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
1	A	236	THR	CA

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	1994	0	2011	85	0
2	A	44	0	26	3	0
3	A	41	0	0	2	0
All	All	2079	0	2037	85	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 21.

All (85) 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:186:SER:H	1:A:254:THR:HG22	1.27	0.99
1:A:74:LEU:HD13	1:A:134:LEU:HD21	1.45	0.98
1:A:98:MET:HE2	1:A:160:TRP:HB2	1.52	0.89
1:A:234:ASP:OD1	1:A:236:THR:HG23	1.78	0.83
1:A:43:ARG:O	1:A:47:ILE:HG13	1.83	0.79
1:A:219:GLU:CD	1:A:232:MET:HE3	2.07	0.78
1:A:104:GLY:CA	1:A:207:LEU:HD23	2.14	0.78
1:A:101:THR:HG21	1:A:115:ASP:OD2	1.85	0.77
1:A:98:MET:HE2	1:A:160:TRP:CB	2.14	0.76
1:A:193:PRO:HD2	1:A:230:TRP:NE1	2.05	0.72

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:185:ARG:HA	1:A:254:THR:CG2	2.19	0.71
1:A:61:LEU:HD23	1:A:61:LEU:N	2.05	0.71
1:A:16:ILE:HG22	1:A:20:SER:OG	1.90	0.71
1:A:104:GLY:HA2	1:A:207:LEU:HD23	1.72	0.70
1:A:87:LYS:HB3	1:A:137:ILE:O	1.91	0.70
1:A:4:LEU:H	1:A:32:GLN:HG3	1.56	0.69
1:A:78:VAL:O	1:A:82:ILE:HG12	1.91	0.69
1:A:202:ILE:HD12	1:A:202:ILE:O	1.97	0.65
1:A:51:THR:O	1:A:54:LEU:HB2	1.97	0.64
1:A:105:ILE:HG23	1:A:106:ASN:N	2.13	0.64
1:A:47:ILE:O	1:A:51:THR:HG23	1.96	0.64
1:A:98:MET:HE1	1:A:116:VAL:HA	1.80	0.64
1:A:186:SER:N	1:A:254:THR:HG22	2.08	0.63
1:A:46:LEU:O	1:A:46:LEU:HD12	1.99	0.62
1:A:44:LEU:HD21	1:A:62:GLU:HB2	1.83	0.61
1:A:60:LEU:C	1:A:61:LEU:HD23	2.25	0.61
1:A:145:VAL:HG12	1:A:146:GLY:N	2.15	0.61
1:A:54:LEU:HD12	1:A:55:PRO:HD3	1.82	0.60
1:A:4:LEU:HB3	1:A:32:GLN:HG2	1.82	0.60
1:A:185:ARG:HA	1:A:254:THR:HG23	1.85	0.59
1:A:4:LEU:N	1:A:32:GLN:HG3	2.18	0.59
1:A:191:ALA:HB3	2:A:500:NAD:C5N	2.34	0.57
1:A:199:MET:O	1:A:203:VAL:HG12	2.04	0.56
1:A:105:ILE:HG23	1:A:106:ASN:H	1.69	0.56
1:A:43:ARG:HB3	1:A:46:LEU:HB3	1.88	0.56
1:A:103:MET:O	1:A:157:ALA:O	2.24	0.56
1:A:28:VAL:HA	1:A:31:GLU:HG3	1.87	0.55
1:A:46:LEU:HD12	1:A:46:LEU:C	2.32	0.55
1:A:49:ARG:HG2	1:A:53:ARG:HH21	1.73	0.54
1:A:196:THR:HG22	1:A:199:MET:H	1.74	0.53
1:A:48:GLN:O	1:A:52:ASP:OD1	2.28	0.52
1:A:202:ILE:HD11	1:A:215:ILE:HG13	1.91	0.52
1:A:67:ASN:HD22	1:A:70:HIS:CD2	2.28	0.51
1:A:15:ILE:HG13	3:A:538:HOH:O	2.10	0.51
1:A:191:ALA:HB3	2:A:500:NAD:H5N	1.94	0.50
1:A:245:LEU:HD21	1:A:258:ILE:HD13	1.92	0.50
1:A:157:ALA:C	1:A:159:ASN:H	2.20	0.49
1:A:187:ASN:ND2	1:A:256:ASP:H	2.09	0.49
1:A:177:ARG:HH11	1:A:177:ARG:CG	2.24	0.49
1:A:135:LEU:N	1:A:136:PRO:CD	2.75	0.49
1:A:39:THR:HA	1:A:61:LEU:O	2.13	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:74:LEU:CD1	1:A:134:LEU:HD21	2.32	0.48
1:A:105:ILE:CG2	1:A:106:ASN:H	2.28	0.47
1:A:61:LEU:N	1:A:61:LEU:CD2	2.78	0.46
1:A:48:GLN:NE2	1:A:48:GLN:C	2.74	0.46
1:A:202:ILE:HD12	1:A:202:ILE:C	2.40	0.46
1:A:105:ILE:CG2	1:A:106:ASN:N	2.77	0.45
1:A:63:LEU:C	1:A:63:LEU:HD12	2.41	0.45
1:A:101:THR:HG21	1:A:115:ASP:CG	2.42	0.45
1:A:74:LEU:HD22	1:A:74:LEU:O	2.16	0.45
1:A:138:MET:HE2	1:A:138:MET:HB3	1.71	0.45
1:A:49:ARG:HG2	1:A:53:ARG:NH2	2.31	0.45
1:A:67:ASN:ND2	1:A:70:HIS:CD2	2.86	0.44
1:A:145:VAL:CG1	1:A:146:GLY:N	2.78	0.44
1:A:236:THR:N	1:A:237:PRO:HD2	2.32	0.44
1:A:44:LEU:CD2	1:A:62:GLU:HB2	2.47	0.44
1:A:187:ASN:ND2	1:A:256:ASP:CB	2.81	0.43
1:A:197:LEU:HD22	1:A:197:LEU:HA	1.53	0.43
1:A:259:TYR:CG	1:A:265:HIS:CE1	3.06	0.43
1:A:218:LEU:HD23	3:A:510:HOH:O	2.18	0.43
1:A:41:PHE:C	1:A:41:PHE:CD1	2.96	0.43
1:A:165:LYS:O	1:A:169:GLU:HG3	2.19	0.43
1:A:135:LEU:CB	1:A:136:PRO:HD3	2.49	0.42
1:A:268:LEU:HD12	1:A:268:LEU:HA	1.59	0.42
1:A:177:ARG:CG	1:A:177:ARG:NH1	2.82	0.42
1:A:111:ALA:HA	1:A:112:PRO:HD3	1.76	0.42
1:A:225:ARG:HH11	1:A:225:ARG:HD3	1.60	0.42
1:A:232:MET:HB2	1:A:232:MET:HE2	1.80	0.41
1:A:11:LEU:CD1	1:A:11:LEU:C	2.93	0.41
1:A:30:GLN:OE1	1:A:55:PRO:HD2	2.21	0.41
1:A:57:LYS:HB2	1:A:57:LYS:HE2	1.61	0.41
1:A:30:GLN:C	1:A:32:GLN:N	2.77	0.41
1:A:100:GLN:HE21	1:A:100:GLN:HB3	1.73	0.41
1:A:185:ARG:CA	1:A:254:THR:HG23	2.50	0.41
1:A:148:ASP:O	2:A:500:NAD:H6N	2.20	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	266/268 (99%)	243 (91%)	21 (8%)	2 (1%)	16	16

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	159	ASN
1	A	104	GLY

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	203/203 (100%)	153 (75%)	50 (25%)	1	0

All (50) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	5	LEU
1	A	9	ARG
1	A	11	LEU
1	A	16	ILE
1	A	31	GLU
1	A	35	GLN
1	A	42	ASP
1	A	43	ARG
1	A	44	LEU

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Mol	Chain	Res	Type
1	A	45	ARG
1	A	48	GLN
1	A	54	LEU
1	A	57	LYS
1	A	61	LEU
1	A	65	VAL
1	A	74	LEU
1	A	79	THR
1	A	87	LYS
1	A	95	ILE
1	A	100	GLN
1	A	101	THR
1	A	118	LYS
1	A	122	ILE
1	A	130	MET
1	A	132	LYS
1	A	137	ILE
1	A	153	ARG
1	A	155	MET
1	A	168	LEU
1	A	177	ARG
1	A	188	LEU
1	A	196	THR
1	A	197	LEU
1	A	199	MET
1	A	202	ILE
1	A	203	VAL
1	A	207	LEU
1	A	210	GLU
1	A	217	LEU
1	A	218	LEU
1	A	220	GLU
1	A	232	MET
1	A	233	LYS
1	A	236	THR
1	A	238	VAL
1	A	240	LYS
1	A	250	LEU
1	A	253	THR
1	A	254	THR
1	A	258	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such

sidechains are listed below:

Mol	Chain	Res	Type
1	A	35	GLN
1	A	48	GLN
1	A	66	GLN
1	A	67	ASN
1	A	86	ASN
1	A	100	GLN
1	A	187	ASN
1	A	224	GLN
1	A	265	HIS

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

1 ligand is 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	A	500	-	46,48,48	2.13	6 (13%)	64,73,73	2.91	17 (26%)

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	A	500	-	-	8/30/62/62	0/5/5/5

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	500	NAD	PN-O3	-8.68	1.50	1.59
2	A	500	NAD	PA-O3	-6.47	1.52	1.59
2	A	500	NAD	O7N-C7N	5.51	1.34	1.24
2	A	500	NAD	C2N-N1N	3.90	1.39	1.35
2	A	500	NAD	C5N-C4N	2.18	1.42	1.38
2	A	500	NAD	C6N-C5N	2.08	1.42	1.38

All (17) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	500	NAD	C2N-C3N-C4N	-9.03	107.75	118.26
2	A	500	NAD	C1B-N9A-C8A	7.82	144.45	127.09
2	A	500	NAD	C5N-C4N-C3N	7.80	128.03	120.36
2	A	500	NAD	O7N-C7N-N7N	-7.49	111.79	122.62
2	A	500	NAD	C4A-N9A-C1B	-6.19	112.16	126.63
2	A	500	NAD	C4D-O4D-C1D	-6.13	104.31	109.92
2	A	500	NAD	O2A-PA-O3	5.62	122.45	107.27
2	A	500	NAD	C3N-C7N-N7N	5.25	124.20	117.74
2	A	500	NAD	O3-PA-O1A	-4.81	96.24	110.70
2	A	500	NAD	O2N-PN-O3	3.91	117.85	107.27
2	A	500	NAD	C5N-C6N-N1N	-3.85	115.14	120.38
2	A	500	NAD	O5D-PN-O1N	-3.48	95.15	108.94
2	A	500	NAD	O7N-C7N-C3N	3.36	123.70	119.60
2	A	500	NAD	C2N-C3N-C7N	3.14	128.53	119.46
2	A	500	NAD	C4A-N9A-C8A	-2.29	103.33	105.74
2	A	500	NAD	O2N-PN-O1N	2.16	122.49	112.44
2	A	500	NAD	O3-PN-O1N	-2.02	104.62	110.70

There are no chirality outliers.

All (8) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	500	NAD	C5D-O5D-PN-O3
2	A	500	NAD	C5D-O5D-PN-O1N

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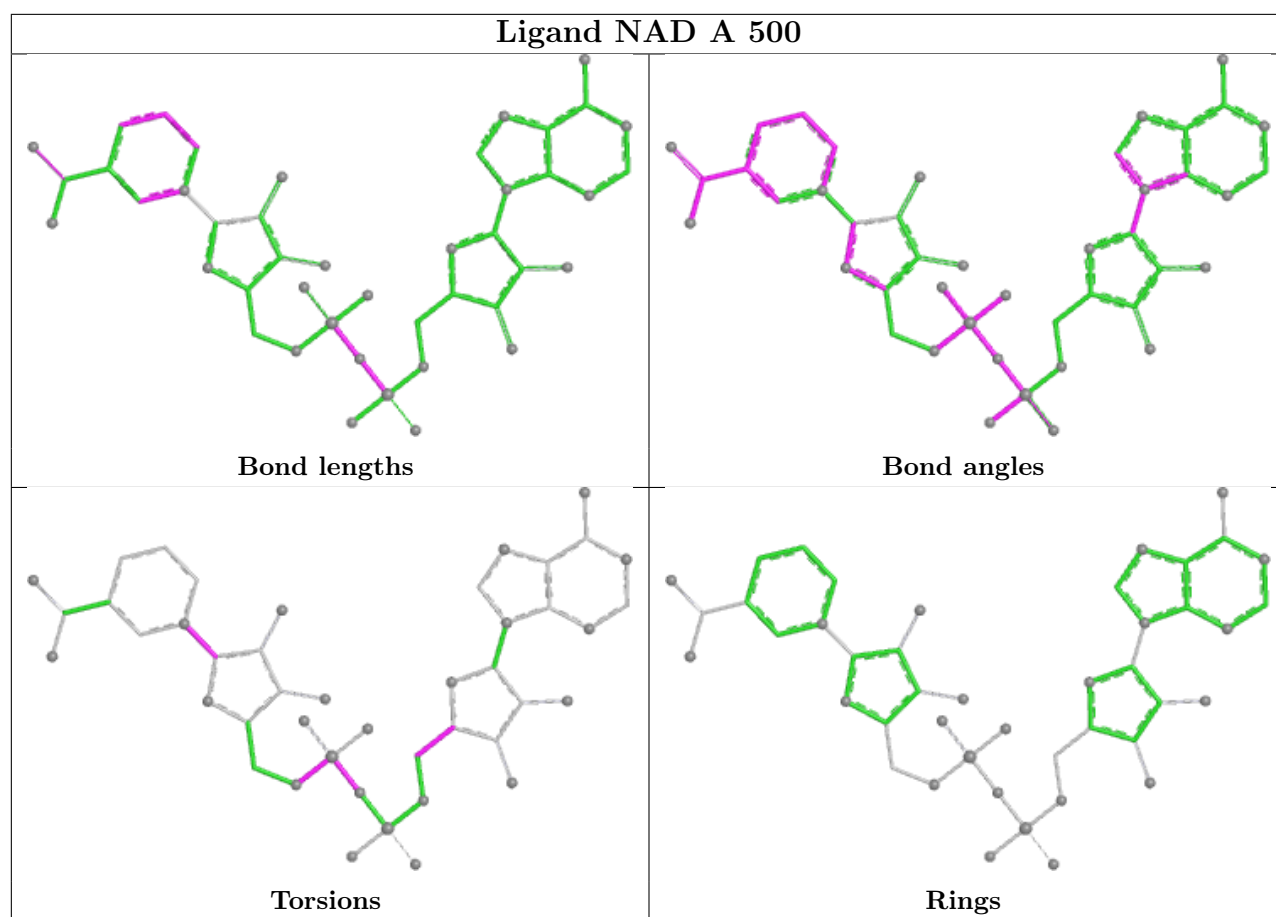
Mol	Chain	Res	Type	Atoms
2	A	500	NAD	C5D-O5D-PN-O2N
2	A	500	NAD	O4D-C1D-N1N-C2N
2	A	500	NAD	O4D-C1D-N1N-C6N
2	A	500	NAD	C2D-C1D-N1N-C6N
2	A	500	NAD	O4B-C4B-C5B-O5B
2	A	500	NAD	PA-O3-PN-O2N

There are no ring outliers.

1 monomer is involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	500	NAD	3	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

6.1 Protein, DNA and RNA chains

EDS was not executed - this section is therefore empty.

6.2 Non-standard residues in protein, DNA, RNA chains

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

6.4 Ligands

EDS was not executed - this section is therefore empty.

6.5 Other polymers

EDS was not executed - this section is therefore empty.