



wwPDB X-ray Structure Validation Summary Report ⓘ

Jun 12, 2024 – 09:37 AM EDT

PDB ID : 1KY4
Title : S-Adenosylhomocysteine hydrolase refined with noncrystallographic restraints
Authors : Takata, Y.; Takusagawa, F.
Deposited on : 2002-02-03
Resolution : 2.80 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	:	4.02b-467
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36.2

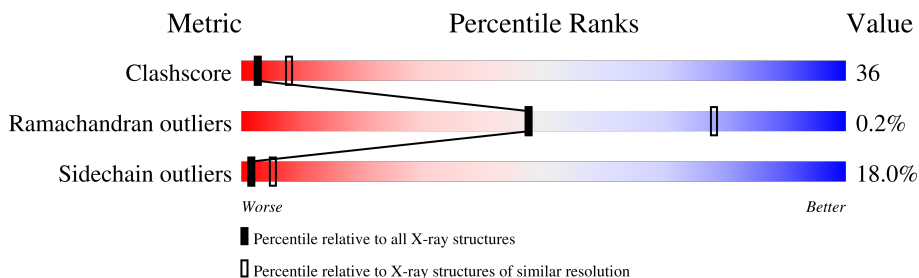
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.80 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))
Clashscore	141614	3569 (2.80-2.80)
Ramachandran outliers	138981	3498 (2.80-2.80)
Sidechain outliers	138945	3500 (2.80-2.80)

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 $\leq 5\%$.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	431	
1	B	431	
1	C	431	
1	D	431	

2 Entry composition ⓘ

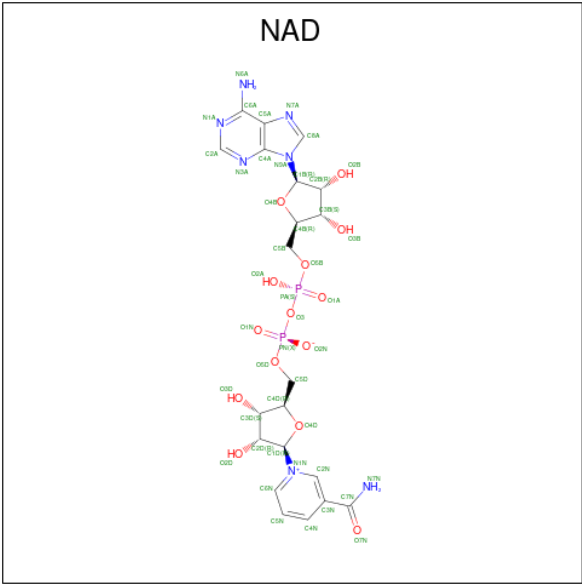
There are 3 unique types of molecules in this entry. The entry contains 13650 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 S-adenosylhomocysteine hydrolase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	428	Total	C	N	O	S	0	0	0
			3302	2098	568	611	25			
1	B	428	Total	C	N	O	S	0	0	0
			3302	2098	568	611	25			
1	C	428	Total	C	N	O	S	0	0	0
			3302	2098	568	611	25			
1	D	428	Total	C	N	O	S	0	0	0
			3302	2098	568	611	25			

- Molecule 2 is NICOTINAMIDE-ADENINE-DINUCLEOTIDE (three-letter code: 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.

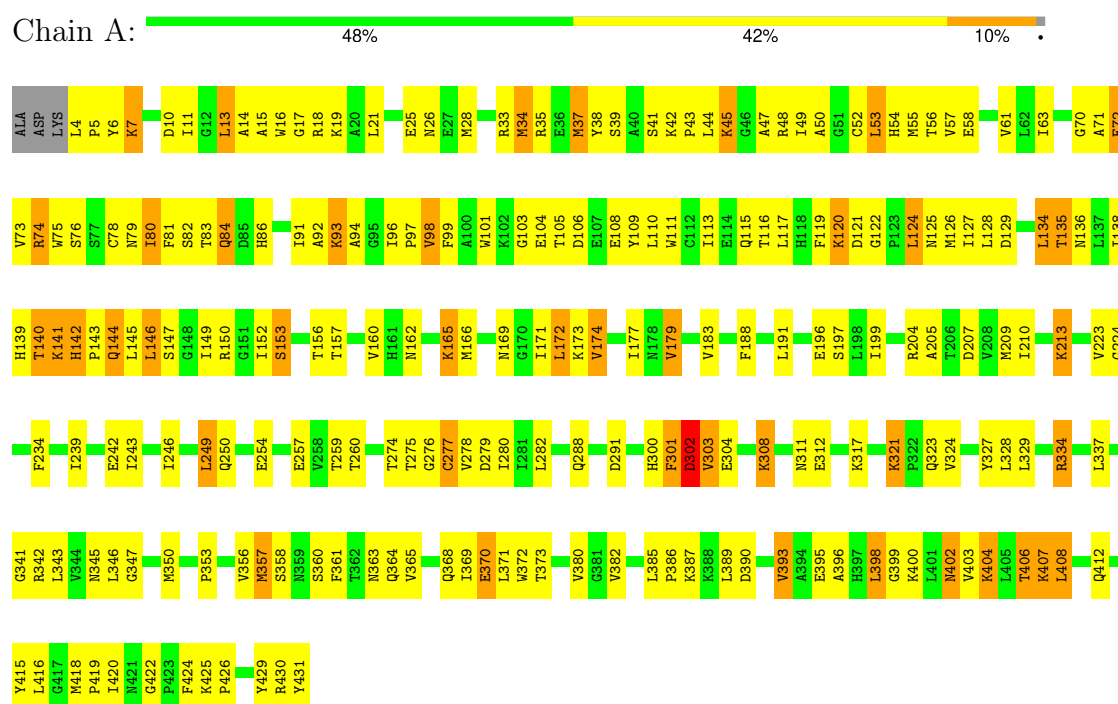
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	68	Total	O	0	0
			68	68		
3	B	75	Total	O	0	0
			75	75		
3	C	60	Total	O	0	0
			60	60		
3	D	63	Total	O	0	0
			63	63		

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.

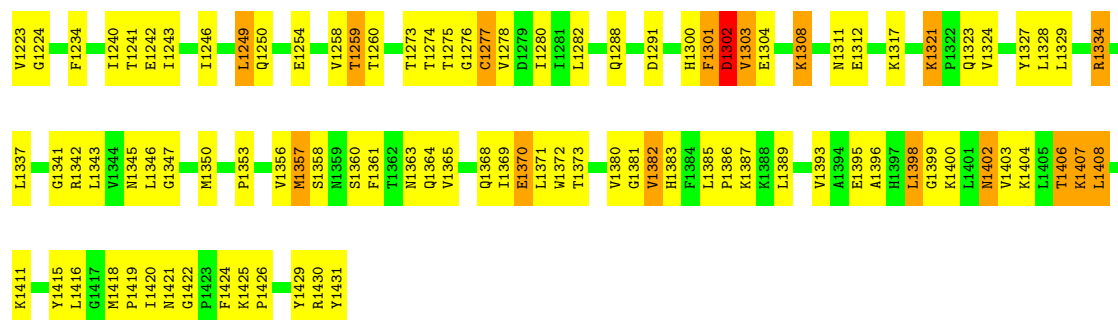
Note EDS was not executed.

• Molecule 1: S-adenosylhomocysteine hydrolase



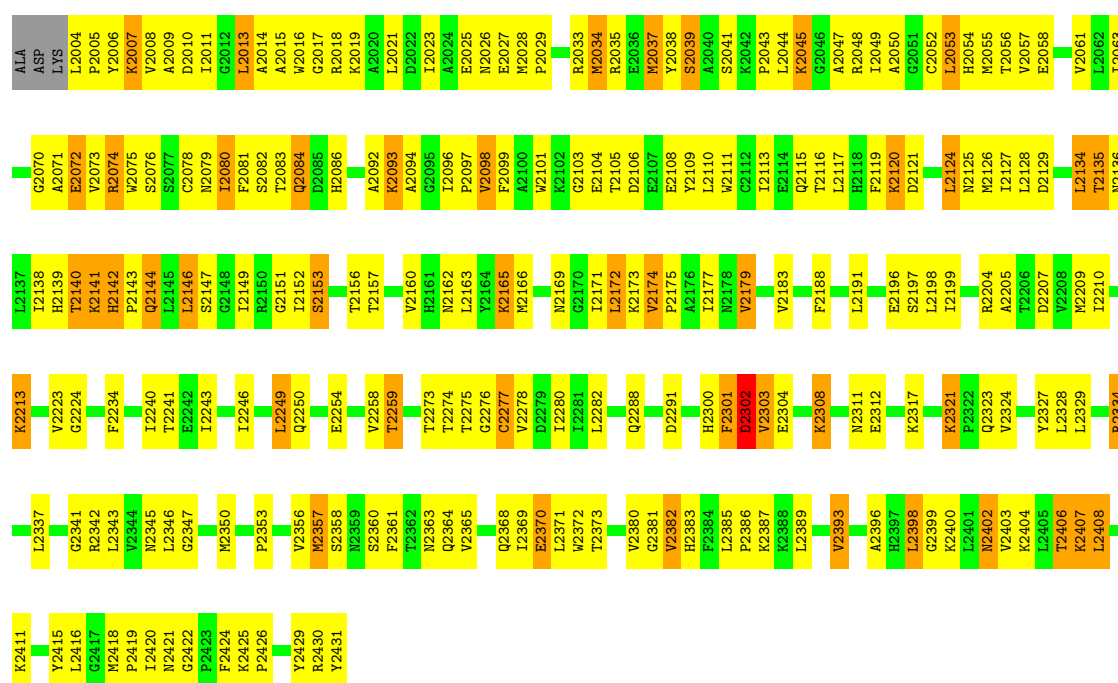
• Molecule 1: S-adenosylhomocysteine hydrolase





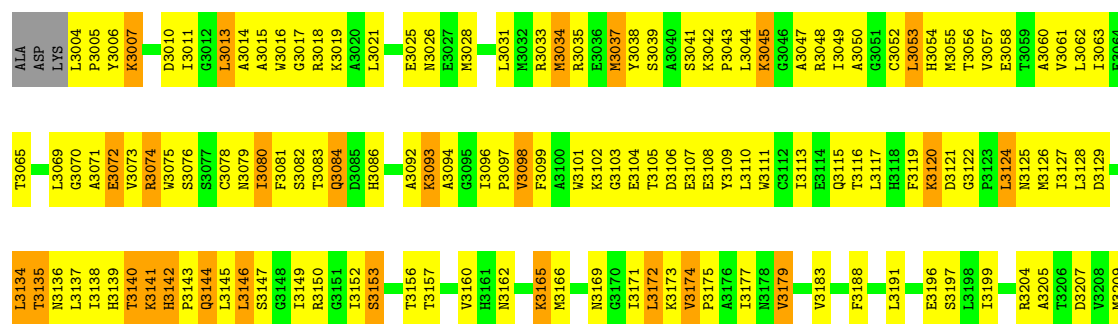
• Molecule 1: S-adenosylhomocysteine hydrolase

Chain C: 47% 42% 10%



• Molecule 1: S-adenosylhomocysteine hydrolase

Chain D: 45% 44% 10%



Q3323	I3210
V3324	
D3215	K3213
R3326	
Y3327	V3223
L3328	G3224
L3329	
	R3232
	G3233
	F3234
	L3239
	E3242
	I3243
	N3345
	I3246
	L3249
	Q3250
	E3254
	E3257
	V3258
	T3259
	I3260
	T3274
	T3275
	G3276
	G3277
	V3278
	D3279
	I3280
	L3281
	L3282
	Q3288
	D3291
	H3300
	F3301
	D3302
	V3303
	E3304
	K3308
	N3311
	E3312
	N3313
	K3317
	V3318
	N3319
	I3320
	K3321
	P3322
Q3323	
V3324	
D3325	
R3326	
Y3327	
L3328	
L3329	
	R3334
	F3234
	L3337
	R3342
	L3343
	V3344
	N3345
	I3346
	G3347
	M3350
	P3353
	V3356
	M3357
	S3358
	N3359
	S3360
	F3361
	T3362
	N3363
	Q3364
	V3365
	Q3368
	I3369
	E3370
	L3371
	W3372
	T3373
	V3380
	G3381
	V3382
	L3385
	P3386
	K3387
	K3388
	L3389
	V3393
	A3394
	E3395
	A3396
	H3397
	L3398
	G3399
	K3400
	L3401
R3402	
V3403	
K3404	
L3405	
T3406	
K3407	
L3408	
T3409	
	Q3412
	Y3415
	L3416
	G3417
	M3418
	P3419
	I3420
	N3421
	G3422
	P3423
	F3424
	K3425
	P3426
	Y3429
	R3430
	Y3431

4 Data and refinement statistics

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

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	94.76Å 134.48Å 102.26Å 90.00° 114.35° 90.00°	Depositor
Resolution (Å)	8.00 – 2.80	Depositor
% Data completeness (in resolution range)	(Not available) (8.00-2.80)	Depositor
R_{merge}	0.07	Depositor
R_{sym}	0.07	Depositor
Refinement program	X-PLOR 3.851	Depositor
R, R_{free}	0.228 , 0.278	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	13650	wwPDB-VP
Average B, all atoms (Å ²)	12.0	wwPDB-VP

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: 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	0.37	0/3367	0.63	1/4557 (0.0%)
1	B	0.37	0/3367	0.62	1/4557 (0.0%)
1	C	0.37	0/3367	0.62	1/4557 (0.0%)
1	D	0.37	0/3367	0.62	1/4557 (0.0%)
All	All	0.37	0/13468	0.62	4/18228 (0.0%)

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	3302	ASP	N-CA-C	5.47	125.76	111.00
1	A	302	ASP	N-CA-C	5.31	125.33	111.00
1	C	2302	ASP	N-CA-C	5.06	124.67	111.00
1	B	1302	ASP	N-CA-C	5.01	124.53	111.00

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	3302	0	3324	253	0
1	B	3302	0	3324	268	0
1	C	3302	0	3324	259	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	D	3302	0	3324	266	0
2	A	44	0	26	1	0
2	B	44	0	26	0	0
2	C	44	0	26	1	0
2	D	44	0	26	0	0
3	A	68	0	0	2	0
3	B	75	0	0	8	0
3	C	60	0	0	2	0
3	D	63	0	0	10	0
All	All	13650	0	13400	968	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 36.

The worst 5 of 968 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:C:2430:ARG:HB3	1:D:3430:ARG:HB3	1.25	1.15
1:A:430:ARG:HB3	1:B:1430:ARG:HB3	1.29	1.15
1:A:370:GLU:HG3	1:A:389:LEU:HD11	1.41	1.03
1:D:3370:GLU:HG3	1:D:3389:LEU:HD11	1.41	1.03
1:C:2370:GLU:HG3	1:C:2389:LEU:HD11	1.39	1.01

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	426/431 (99%)	409 (96%)	16 (4%)	1 (0%)	47 78
1	B	426/431 (99%)	407 (96%)	18 (4%)	1 (0%)	47 78

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	C	426/431 (99%)	410 (96%)	15 (4%)	1 (0%)	47	78
1	D	426/431 (99%)	408 (96%)	17 (4%)	1 (0%)	47	78
All	All	1704/1724 (99%)	1634 (96%)	66 (4%)	4 (0%)	47	78

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	302	ASP
1	B	1302	ASP
1	C	2302	ASP
1	D	3302	ASP

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	351/353 (99%)	288 (82%)	63 (18%)	2	5
1	B	351/353 (99%)	288 (82%)	63 (18%)	2	5
1	C	351/353 (99%)	287 (82%)	64 (18%)	1	5
1	D	351/353 (99%)	288 (82%)	63 (18%)	2	5
All	All	1404/1412 (99%)	1151 (82%)	253 (18%)	1	5

5 of 253 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	1382	VAL
1	D	3172	LEU
1	C	2110	LEU
1	D	3162	ASN
1	D	3308	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 31 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	1169	ASN
1	D	3144	GLN
1	C	2084	GLN
1	D	3300	HIS
1	D	3084	GLN

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 monosaccharides in this entry.

5.6 Ligand geometry [i](#)

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	A	432	-	42,48,48	2.29	9 (21%)	50,73,73	2.24	12 (24%)
2	NAD	B	1432	-	42,48,48	2.39	10 (23%)	50,73,73	2.27	13 (26%)
2	NAD	C	2432	-	42,48,48	2.42	9 (21%)	50,73,73	2.24	12 (24%)
2	NAD	D	3432	-	42,48,48	2.39	10 (23%)	50,73,73	2.24	12 (24%)

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	432	-	-	7/26/62/62	0/5/5/5
2	NAD	B	1432	-	-	7/26/62/62	0/5/5/5
2	NAD	C	2432	-	-	7/26/62/62	0/5/5/5
2	NAD	D	3432	-	-	7/26/62/62	0/5/5/5

The worst 5 of 38 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	2432	NAD	C5N-C4N	8.18	1.52	1.38
2	B	1432	NAD	C5N-C4N	8.07	1.52	1.38
2	D	3432	NAD	C5N-C4N	7.48	1.51	1.38
2	A	432	NAD	C5N-C4N	7.45	1.51	1.38
2	D	3432	NAD	C2N-N1N	6.75	1.42	1.35

The worst 5 of 49 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	432	NAD	O5D-PN-O1N	-6.76	82.16	108.94
2	C	2432	NAD	O5D-PN-O1N	-6.72	82.29	108.94
2	D	3432	NAD	O5D-PN-O1N	-6.65	82.59	108.94
2	B	1432	NAD	O5D-PN-O1N	-6.55	82.97	108.94
2	A	432	NAD	O3-PN-O1N	6.37	129.85	110.70

There are no chirality outliers.

5 of 28 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	432	NAD	O4D-C1D-N1N-C2N
2	A	432	NAD	O4D-C1D-N1N-C6N
2	A	432	NAD	C2D-C1D-N1N-C2N
2	A	432	NAD	C2D-C1D-N1N-C6N
2	B	1432	NAD	O4D-C1D-N1N-C2N

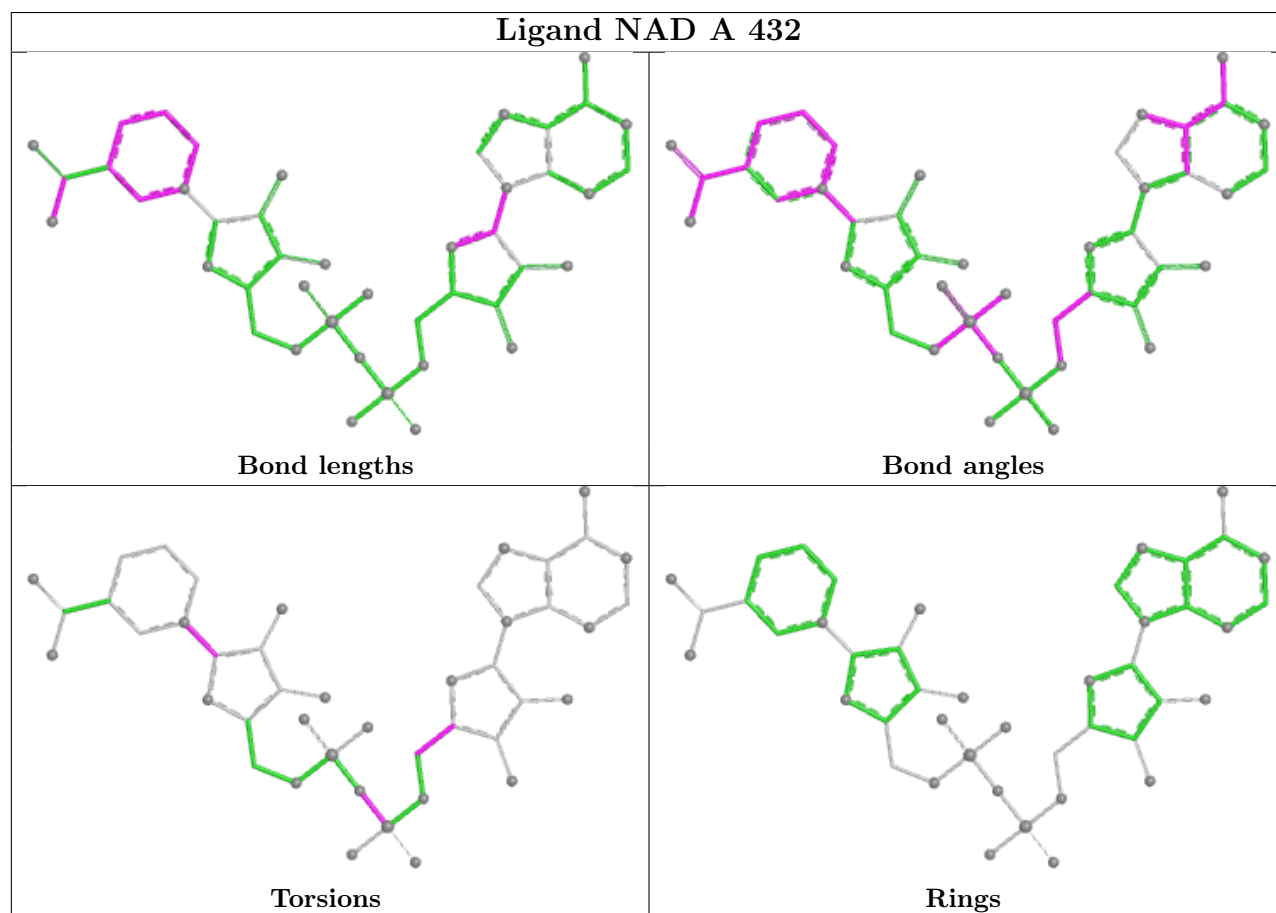
There are no ring outliers.

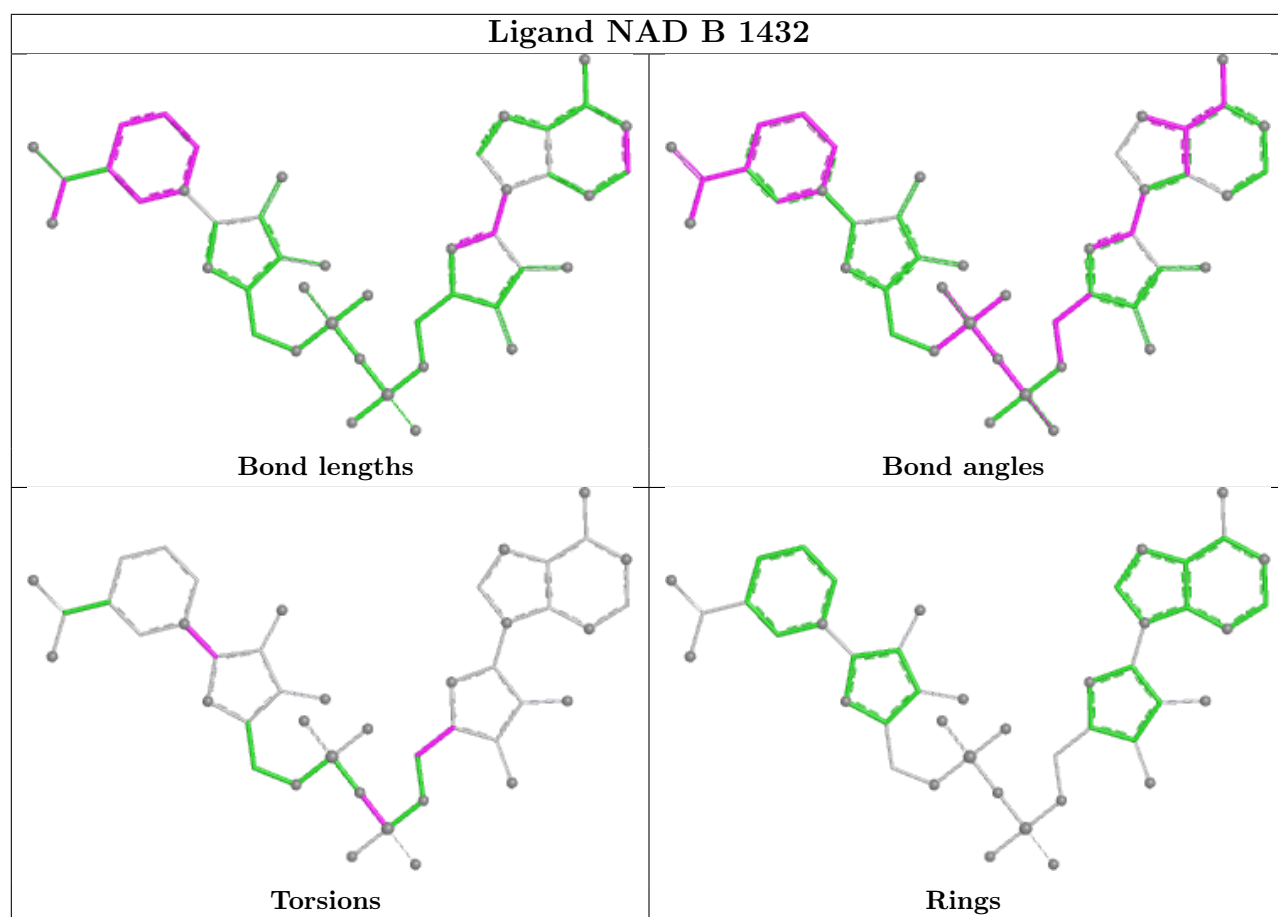
2 monomers are involved in 2 short contacts:

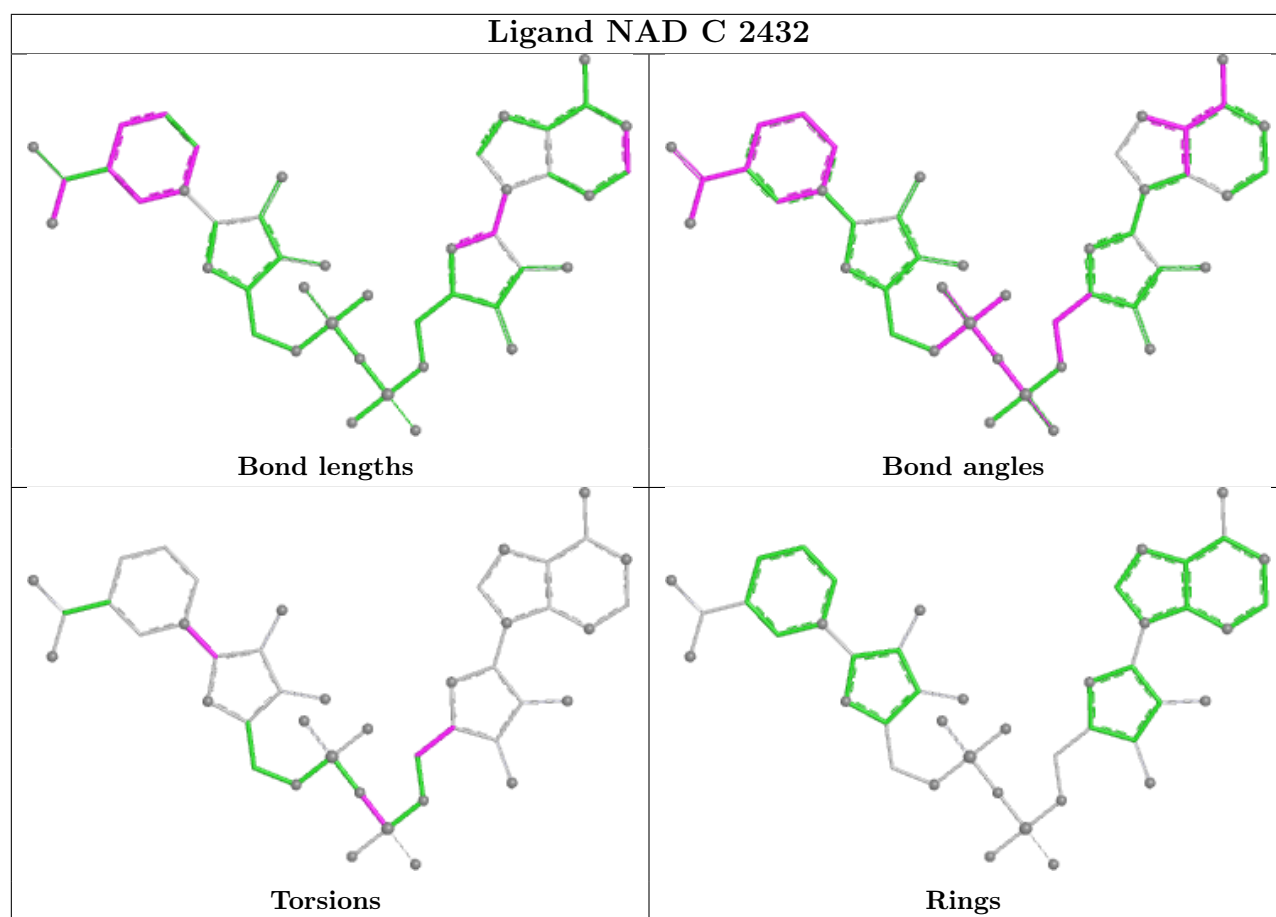
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	432	NAD	1	0
2	C	2432	NAD	1	0

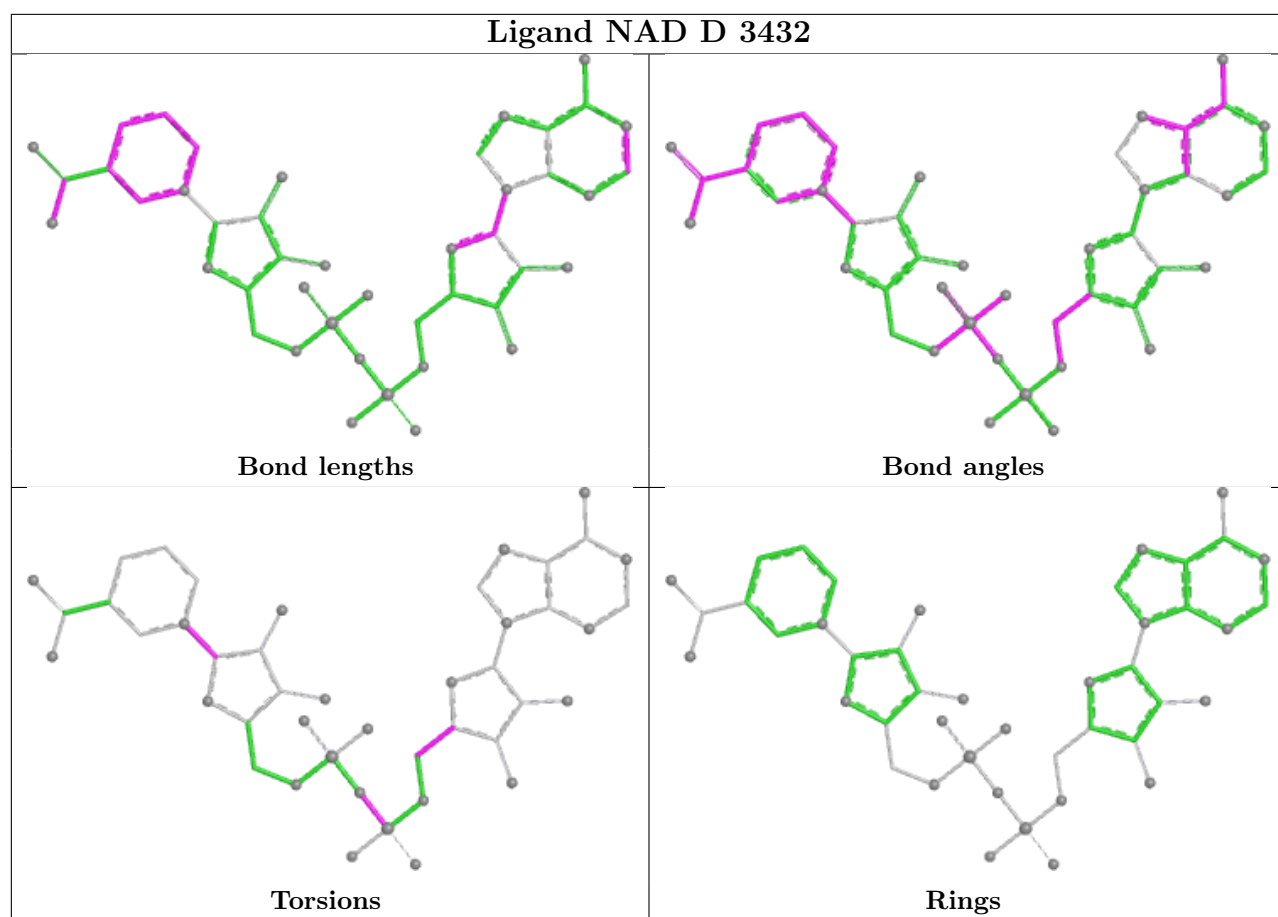
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths,

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.