



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 07:31 PM UTC

PDB ID : 1V8B / pdb_00001v8b
Title : Crystal structure of a hydrolase
Authors : Tanaka, N.; Nakanishi, M.; Kusakabe, Y.; Shiraiwa, K.; Kitade, Y.; Nakamura, K.T.
Deposited on : 2004-01-03
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)	:	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

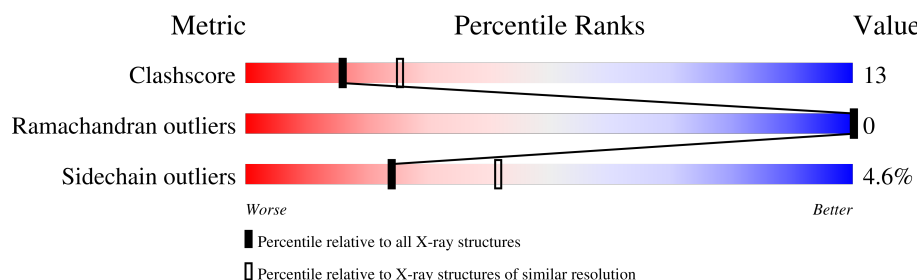
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.40 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))
Clashscore	190562	5391 (2.40-2.40)
Ramachandran outliers	187476	5320 (2.40-2.40)
Sidechain outliers	187428	5321 (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 $\leq 5\%$.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	479	70% 27% ..
1	B	479	70% 27% ..
1	C	479	72% 24% ..
1	D	479	71% 25% ..

2 Entry composition [i](#)

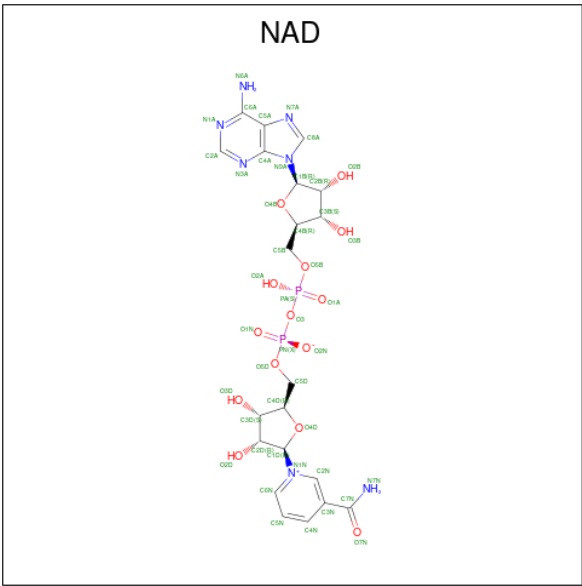
There are 4 unique types of molecules in this entry. The entry contains 15631 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 adenosylhomocysteinase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	476	Total	C	N	O	S	0	0	0
			3751	2381	630	714	26			
1	B	476	Total	C	N	O	S	0	0	0
			3751	2381	630	714	26			
1	C	476	Total	C	N	O	S	0	0	0
			3751	2381	630	714	26			
1	D	476	Total	C	N	O	S	0	0	0
			3751	2381	630	714	26			

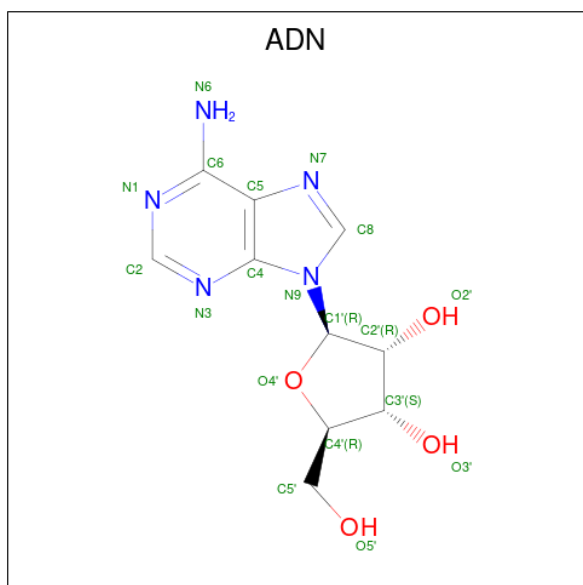
- Molecule 2 is NICOTINAMIDE-ADENINE-DINUCLEOTIDE (CCD ID: NAD) (formula: C₂₁H₂₇N₇O₁₄P₂).



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

- Molecule 3 is ADENOSINE (CCD ID: ADN) (formula: $C_{10}H_{13}N_5O_4$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	O	0	0
			19	10	5	4		
3	B	1	Total	C	N	O	0	0
			19	10	5	4		
3	C	1	Total	C	N	O	0	0
			19	10	5	4		
3	D	1	Total	C	N	O	0	0
			19	10	5	4		

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	83	Total	O	0	0
			83	83		
4	B	93	Total	O	0	0
			93	93		
4	C	94	Total	O	0	0
			94	94		

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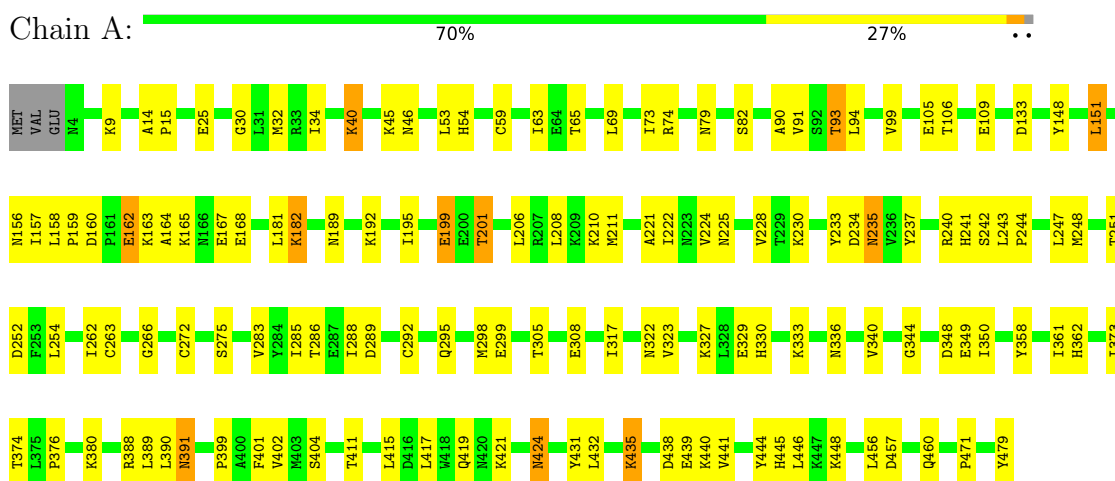
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	D	105	Total 105	O 105	0	0

3 Residue-property plots

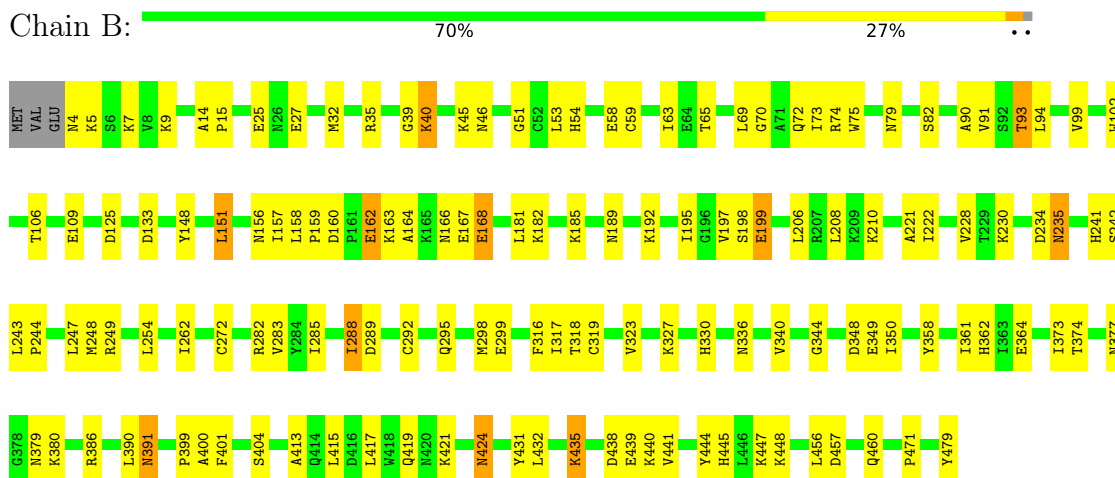
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded 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: adenosylhomocysteinase

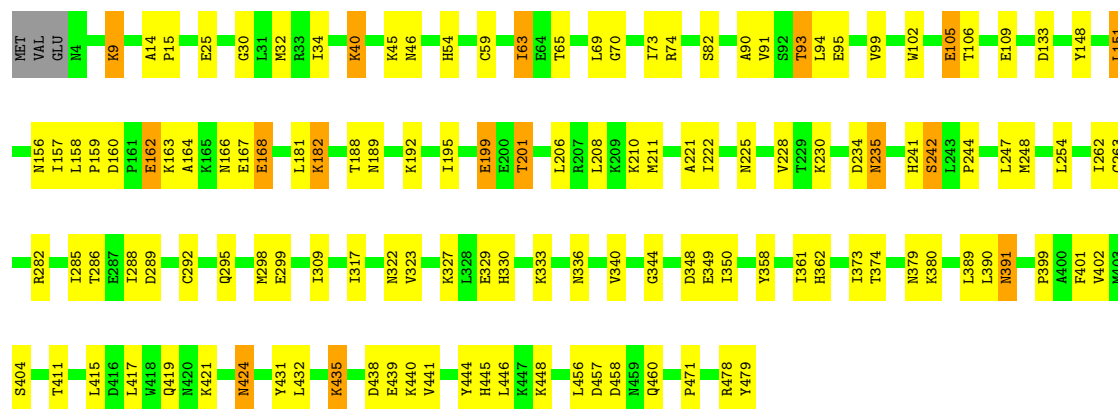


- Molecule 1: adenosylhomocysteinase



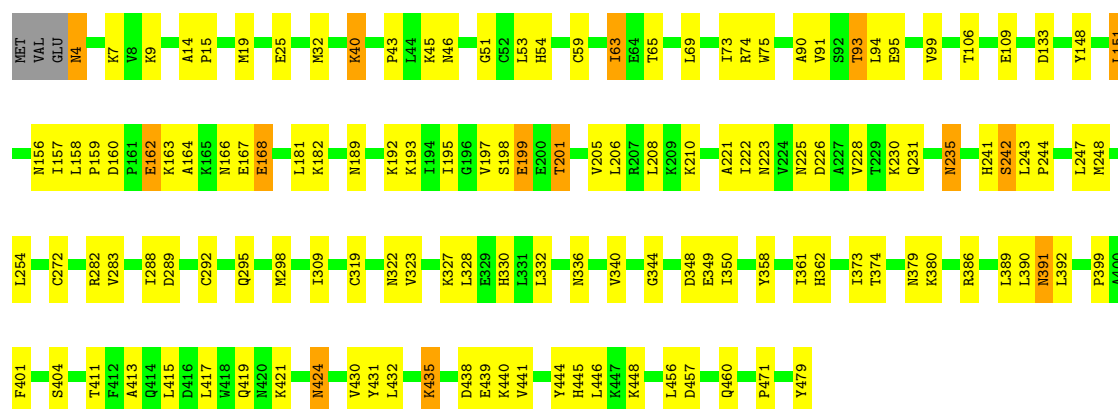
- Molecule 1: adenosylhomocysteinase





• Molecule 1: adenosylhomocysteinase

Chain D: 71% 25% . .



4 Data and refinement statistics

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

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	77.09Å 86.15Å 333.80Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	40.00 – 2.40	Depositor
% Data completeness (in resolution range)	(Not available) (40.00-2.40)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	0.12	Depositor
Refinement program	CNS	Depositor
R, R_{free}	0.214 , 0.240	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	15631	wwPDB-VP
Average B, all atoms (Å ²)	31.0	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: ADN, 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	0.45	0/3819	0.83	5/5159 (0.1%)
1	B	0.44	0/3819	0.83	4/5159 (0.1%)
1	C	0.45	0/3819	0.84	5/5159 (0.1%)
1	D	0.46	0/3819	0.82	5/5159 (0.1%)
All	All	0.45	0/15276	0.83	19/20636 (0.1%)

There are no bond length outliers.

All (19) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	288	ILE	N-CA-C	-6.91	106.76	113.53
1	B	283	VAL	N-CA-C	6.24	117.57	108.58
1	D	73	ILE	N-CA-C	6.12	117.57	108.46
1	C	74	ARG	N-CA-C	-5.92	98.76	108.76
1	A	74	ARG	N-CA-C	-5.78	98.99	108.76
1	A	73	ILE	N-CA-C	5.75	117.02	108.46
1	B	73	ILE	N-CA-C	5.74	117.01	108.46
1	A	201	THR	N-CA-C	5.72	119.01	110.14
1	D	74	ARG	N-CA-C	-5.70	99.12	108.76
1	C	73	ILE	N-CA-C	5.65	116.88	108.46
1	A	283	VAL	N-CA-C	5.64	116.70	108.58
1	B	74	ARG	N-CA-C	-5.57	99.34	108.76
1	D	283	VAL	N-CA-C	5.46	116.44	108.58
1	A	266	GLY	N-CA-C	-5.42	104.75	112.55
1	D	242	SER	N-CA-C	5.34	119.64	113.18
1	C	201	THR	N-CA-C	5.27	118.31	110.14
1	C	63	ILE	CB-CA-C	-5.13	105.40	111.97
1	D	63	ILE	CB-CA-C	-5.12	105.42	111.97
1	C	242	SER	N-CA-C	5.03	119.27	113.18

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	3751	0	3759	97	0
1	B	3751	0	3759	107	0
1	C	3751	0	3759	98	0
1	D	3751	0	3759	112	0
2	A	44	0	25	1	0
2	B	44	0	25	1	0
2	C	44	0	25	1	0
2	D	44	0	25	1	0
3	A	19	0	13	0	0
3	B	19	0	13	0	0
3	C	19	0	13	0	0
3	D	19	0	13	0	0
4	A	83	0	0	1	0
4	B	93	0	0	10	0
4	C	94	0	0	7	0
4	D	105	0	0	15	0
All	All	15631	0	15188	402	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 13.

All (402) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:40:LYS:HE3	1:B:40:LYS:H	1.29	0.94
1:C:40:LYS:HE3	1:C:40:LYS:H	1.29	0.94
1:D:40:LYS:HE3	1:D:40:LYS:H	1.31	0.94
1:A:40:LYS:H	1:A:40:LYS:HE3	1.32	0.92
1:D:282:ARG:HD2	4:D:3605:HOH:O	1.70	0.91
1:C:40:LYS:HE3	1:C:40:LYS:N	1.90	0.85
1:D:457:ASP:H	1:D:460:GLN:HE21	1.24	0.85

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:40:LYS:HE3	1:D:40:LYS:N	1.89	0.85
1:B:40:LYS:HE3	1:B:40:LYS:N	1.90	0.84
1:C:457:ASP:H	1:C:460:GLN:HE21	1.24	0.84
1:A:457:ASP:H	1:A:460:GLN:HE21	1.22	0.83
1:A:40:LYS:HE3	1:A:40:LYS:N	1.92	0.83
1:B:457:ASP:H	1:B:460:GLN:HE21	1.28	0.81
1:B:254:LEU:HD21	1:C:298:MET:HE1	1.64	0.79
1:D:15:PRO:HG2	4:D:3595:HOH:O	1.84	0.76
1:B:448:LYS:HE2	4:D:3520:HOH:O	1.86	0.75
1:A:298:MET:HE1	1:D:254:LEU:HD21	1.70	0.74
1:A:336:ASN:ND2	1:A:380:LYS:H	1.86	0.73
1:C:457:ASP:H	1:C:460:GLN:NE2	1.87	0.72
1:B:91:VAL:HG13	1:B:99:VAL:HG21	1.70	0.72
1:A:91:VAL:HG13	1:A:99:VAL:HG21	1.72	0.71
1:B:282:ARG:HD2	4:B:1590:HOH:O	1.91	0.71
1:C:91:VAL:HG13	1:C:99:VAL:HG21	1.73	0.71
1:C:336:ASN:ND2	1:C:380:LYS:H	1.89	0.70
1:D:235:ASN:N	1:D:235:ASN:HD22	1.88	0.70
1:B:336:ASN:ND2	1:B:380:LYS:H	1.90	0.69
1:B:235:ASN:N	1:B:235:ASN:HD22	1.87	0.69
1:C:235:ASN:HD22	1:C:235:ASN:N	1.90	0.69
1:D:336:ASN:ND2	1:D:380:LYS:H	1.91	0.69
1:D:91:VAL:HG13	1:D:99:VAL:HG21	1.74	0.69
1:A:457:ASP:H	1:A:460:GLN:NE2	1.90	0.69
1:A:222:ILE:HD11	1:A:417:LEU:HD13	1.75	0.68
1:D:391:ASN:HD22	1:D:391:ASN:H	1.39	0.68
1:B:457:ASP:H	1:B:460:GLN:NE2	1.92	0.68
1:C:440:LYS:HE2	1:C:444:TYR:OH	1.94	0.68
1:D:457:ASP:H	1:D:460:GLN:NE2	1.91	0.68
1:B:391:ASN:HD22	1:B:391:ASN:H	1.41	0.68
1:A:242:SER:HB2	1:A:391:ASN:HB2	1.78	0.65
1:B:242:SER:HB2	1:B:391:ASN:HB2	1.78	0.65
1:D:391:ASN:HD22	1:D:391:ASN:N	1.94	0.65
1:B:391:ASN:HD22	1:B:391:ASN:N	1.94	0.65
1:C:391:ASN:H	1:C:391:ASN:HD22	1.42	0.65
1:A:254:LEU:HD21	1:D:298:MET:HE1	1.78	0.65
1:A:440:LYS:HE2	1:A:444:TYR:OH	1.96	0.65
1:D:440:LYS:HE2	1:D:444:TYR:OH	1.97	0.64
1:D:206:LEU:HD13	1:D:210:LYS:HE2	1.79	0.64
1:A:235:ASN:HD22	1:A:235:ASN:N	1.96	0.63
1:B:440:LYS:HE2	1:B:444:TYR:OH	1.98	0.63

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:160:ASP:HB2	1:A:162:GLU:HG2	1.80	0.62
1:C:242:SER:HB2	1:C:391:ASN:HB2	1.81	0.62
1:B:435:LYS:HE3	1:B:479:TYR:OH	1.98	0.62
1:C:441:VAL:O	1:C:445:HIS:HD2	1.82	0.62
1:B:7:LYS:HB3	4:B:1526:HOH:O	1.99	0.62
1:D:404:SER:OG	1:D:445:HIS:HE1	1.82	0.62
1:D:401:PHE:HE1	1:D:448:LYS:HG2	1.65	0.62
1:D:435:LYS:HE3	1:D:479:TYR:OH	1.99	0.62
1:D:160:ASP:HB2	1:D:162:GLU:HG2	1.81	0.62
1:B:106:THR:OG1	1:B:109:GLU:HG3	2.00	0.62
1:A:439:GLU:OE1	1:A:471:PRO:HA	2.00	0.62
1:B:72:GLN:HG3	4:B:1587:HOH:O	2.00	0.62
1:C:158:LEU:HD11	1:C:181:LEU:HD21	1.81	0.62
1:C:160:ASP:HB2	1:C:162:GLU:HG2	1.81	0.62
1:A:441:VAL:O	1:A:445:HIS:HD2	1.83	0.61
1:C:391:ASN:HD21	2:C:501:NAD:H72N	1.48	0.61
1:D:53:LEU:HG	4:D:3547:HOH:O	1.99	0.61
1:B:160:ASP:HB2	1:B:162:GLU:HG2	1.81	0.61
1:C:391:ASN:HD22	1:C:391:ASN:N	1.99	0.61
1:A:391:ASN:H	1:A:391:ASN:HD22	1.47	0.61
1:A:151:LEU:HD12	1:A:157:ILE:HB	1.83	0.61
1:D:242:SER:HB2	1:D:391:ASN:HB2	1.82	0.60
1:B:158:LEU:HD11	1:B:181:LEU:HD21	1.83	0.60
1:B:298:MET:HE1	1:C:254:LEU:HD21	1.82	0.60
1:C:327:LYS:H	1:C:330:HIS:HD2	1.49	0.60
1:A:59:CYS:O	1:A:63:ILE:HG12	2.02	0.60
1:A:230:LYS:HZ2	1:A:235:ASN:HD21	1.50	0.60
1:A:327:LYS:H	1:A:330:HIS:HD2	1.50	0.60
1:C:206:LEU:HD13	1:C:210:LYS:HE2	1.84	0.59
1:D:391:ASN:HD21	2:D:501:NAD:H72N	1.50	0.59
1:B:230:LYS:HZ2	1:B:235:ASN:HD21	1.50	0.59
1:C:95:GLU:HG2	4:C:2570:HOH:O	2.01	0.59
1:C:299:GLU:HG2	4:D:3518:HOH:O	2.02	0.59
1:C:432:LEU:HD21	4:C:2537:HOH:O	2.02	0.59
1:C:344:GLY:HA3	1:C:349:GLU:OE2	2.02	0.59
1:D:106:THR:OG1	1:D:109:GLU:HG3	2.02	0.59
1:D:424:ASN:H	1:D:424:ASN:HD22	1.50	0.59
1:D:323:VAL:HG12	1:D:348:ASP:HB3	1.84	0.59
1:B:206:LEU:HD13	1:B:210:LYS:HE2	1.85	0.59
1:B:441:VAL:O	1:B:445:HIS:HD2	1.85	0.58
1:C:151:LEU:HD12	1:C:157:ILE:HB	1.85	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:439:GLU:OE1	1:C:471:PRO:HA	2.04	0.58
1:A:206:LEU:HD13	1:A:210:LYS:HE2	1.85	0.58
1:B:424:ASN:H	1:B:424:ASN:HD22	1.51	0.58
1:C:323:VAL:HG12	1:C:348:ASP:HB3	1.84	0.58
1:A:158:LEU:HD11	1:A:181:LEU:HD21	1.86	0.58
1:C:424:ASN:HD22	1:C:424:ASN:H	1.51	0.58
1:B:102:TRP:HZ3	4:B:1526:HOH:O	1.87	0.58
1:A:25:GLU:HG2	1:A:32:MET:SD	2.43	0.58
1:A:336:ASN:HD22	1:A:380:LYS:H	1.51	0.58
1:B:151:LEU:HD12	1:B:157:ILE:HB	1.85	0.57
1:A:435:LYS:HE3	1:A:479:TYR:OH	2.04	0.57
1:B:323:VAL:HG12	1:B:348:ASP:HB3	1.87	0.57
1:A:91:VAL:HA	1:A:94:LEU:HD23	1.87	0.57
1:C:230:LYS:HZ2	1:C:235:ASN:HD21	1.52	0.57
1:B:25:GLU:HG2	1:B:32:MET:SD	2.44	0.57
1:B:151:LEU:CD1	1:B:157:ILE:HB	2.34	0.57
1:D:441:VAL:O	1:D:445:HIS:HD2	1.88	0.57
1:C:222:ILE:HD11	1:C:417:LEU:HD13	1.87	0.57
1:A:151:LEU:CD1	1:A:157:ILE:HB	2.35	0.57
1:D:151:LEU:HD12	1:D:157:ILE:HB	1.87	0.57
1:A:391:ASN:HD22	1:A:391:ASN:N	2.02	0.56
1:B:424:ASN:H	1:B:424:ASN:ND2	2.02	0.56
1:D:25:GLU:HG2	1:D:32:MET:SD	2.45	0.56
1:A:323:VAL:HG12	1:A:348:ASP:HB3	1.88	0.56
1:B:404:SER:OG	1:B:445:HIS:HE1	1.88	0.56
1:D:91:VAL:HA	1:D:94:LEU:HD23	1.87	0.56
1:B:222:ILE:HD11	1:B:417:LEU:HD13	1.88	0.56
1:C:189:ASN:HD22	1:C:192:LYS:NZ	2.03	0.56
1:C:244:PRO:HB2	1:C:248:MET:HE2	1.88	0.55
1:D:230:LYS:HZ2	1:D:235:ASN:HD21	1.55	0.55
1:C:435:LYS:HE3	1:C:479:TYR:OH	2.05	0.55
1:D:223:ASN:HD21	1:D:226:ASP:CG	2.14	0.55
1:B:386:ARG:HD3	4:B:1567:HOH:O	2.07	0.55
1:C:59:CYS:O	1:C:63:ILE:HG12	2.06	0.55
1:C:151:LEU:CD1	1:C:157:ILE:HB	2.36	0.55
1:B:327:LYS:H	1:B:330:HIS:HD2	1.55	0.55
1:B:248:MET:HE1	1:D:248:MET:HE1	1.87	0.55
1:B:439:GLU:OE1	1:B:471:PRO:HA	2.07	0.55
1:C:133:ASP:HB3	1:C:199:GLU:OE2	2.07	0.55
1:D:424:ASN:H	1:D:424:ASN:ND2	2.04	0.55
1:C:25:GLU:HG2	1:C:32:MET:SD	2.47	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:282:ARG:HD2	4:C:2595:HOH:O	2.06	0.55
1:D:158:LEU:HD11	1:D:181:LEU:HD21	1.89	0.55
1:A:299:GLU:HG2	4:B:1510:HOH:O	2.07	0.55
1:C:91:VAL:HA	1:C:94:LEU:HD23	1.89	0.55
1:D:59:CYS:O	1:D:63:ILE:HG12	2.08	0.54
1:C:404:SER:OG	1:C:445:HIS:HE1	1.90	0.54
1:A:404:SER:OG	1:A:445:HIS:HE1	1.91	0.54
1:C:106:THR:OG1	1:C:109:GLU:HG3	2.07	0.54
1:B:133:ASP:HB3	1:B:199:GLU:OE2	2.07	0.54
1:C:424:ASN:H	1:C:424:ASN:ND2	2.05	0.54
1:D:65:THR:O	1:D:69:LEU:HG	2.07	0.54
1:A:106:THR:OG1	1:A:109:GLU:HG3	2.07	0.54
1:D:327:LYS:H	1:D:330:HIS:HD2	1.56	0.54
1:A:344:GLY:HA3	1:A:349:GLU:OE2	2.08	0.53
1:B:79:ASN:HB3	1:B:82:SER:OG	2.07	0.53
1:B:59:CYS:O	1:B:63:ILE:HG12	2.09	0.53
1:D:133:ASP:HB3	1:D:199:GLU:OE2	2.09	0.53
1:D:151:LEU:CD1	1:D:157:ILE:HB	2.38	0.53
1:A:424:ASN:HD22	1:A:424:ASN:H	1.57	0.53
1:C:358:TYR:HB3	1:C:361:ILE:HG13	1.91	0.53
1:B:391:ASN:HD21	2:B:501:NAD:H72N	1.57	0.52
1:C:241:HIS:CD2	1:C:399:PRO:HD3	2.44	0.52
1:D:344:GLY:HA3	1:D:349:GLU:OE2	2.09	0.52
1:B:340:VAL:HG12	1:B:350:ILE:HD13	1.90	0.52
4:A:581:HOH:O	1:B:299:GLU:HG2	2.09	0.52
1:A:391:ASN:HD21	2:A:501:NAD:H72N	1.57	0.52
1:B:125:ASP:HA	4:B:1579:HOH:O	2.09	0.52
1:D:223:ASN:ND2	1:D:226:ASP:CG	2.68	0.52
1:D:415:LEU:HD12	1:D:419:GLN:NE2	2.25	0.52
1:B:336:ASN:HD22	1:B:380:LYS:H	1.58	0.51
1:C:340:VAL:HG12	1:C:350:ILE:HD13	1.90	0.51
1:A:133:ASP:HB3	1:A:199:GLU:OE2	2.10	0.51
1:B:208:LEU:HD13	1:B:221:ALA:HB1	1.91	0.51
1:C:458:ASP:HB2	4:C:2548:HOH:O	2.10	0.51
1:D:225:ASN:HA	1:D:230:LYS:HD2	1.93	0.51
1:A:329:GLU:O	1:A:333:LYS:HE2	2.11	0.51
1:D:90:ALA:O	1:D:93:THR:HB	2.11	0.51
1:D:199:GLU:HG2	4:D:3599:HOH:O	2.10	0.51
1:D:439:GLU:OE1	1:D:471:PRO:HA	2.11	0.51
1:A:288:ILE:HG21	1:B:456:LEU:HD13	1.93	0.51
1:A:65:THR:O	1:A:69:LEU:HG	2.11	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:424:ASN:H	1:A:424:ASN:ND2	2.08	0.51
1:C:148:TYR:CE2	1:C:159:PRO:HB3	2.46	0.51
1:B:195:ILE:HD12	1:B:421:LYS:HB2	1.93	0.50
1:C:235:ASN:HD22	1:C:235:ASN:H	1.57	0.50
1:D:222:ILE:HD11	1:D:417:LEU:HD13	1.94	0.50
1:C:208:LEU:HG	4:C:2586:HOH:O	2.11	0.50
1:B:292:CYS:HA	1:B:295:GLN:HE21	1.75	0.50
1:B:27:GLU:O	1:B:401:PHE:HA	2.12	0.50
1:B:91:VAL:HA	1:B:94:LEU:HD23	1.94	0.50
1:D:431:TYR:C	1:D:432:LEU:HD12	2.37	0.50
1:C:160:ASP:O	1:C:163:LYS:HG2	2.12	0.50
1:D:340:VAL:HG12	1:D:350:ILE:HD13	1.93	0.50
1:D:292:CYS:HA	1:D:295:GLN:HE21	1.75	0.50
1:A:160:ASP:O	1:A:163:LYS:HG2	2.12	0.49
1:A:358:TYR:HB3	1:A:361:ILE:HG13	1.94	0.49
1:C:199:GLU:HG2	4:C:2590:HOH:O	2.12	0.49
1:D:14:ALA:N	1:D:15:PRO:HD2	2.27	0.49
1:B:14:ALA:N	1:B:15:PRO:HD2	2.28	0.49
1:B:364:GLU:OE1	1:D:19:MET:HE1	2.12	0.49
1:D:358:TYR:HB3	1:D:361:ILE:HG13	1.95	0.49
1:A:148:TYR:CE2	1:A:159:PRO:HB3	2.47	0.49
1:A:230:LYS:NZ	1:A:235:ASN:HD21	2.11	0.49
1:A:401:PHE:HE1	1:A:448:LYS:HG2	1.78	0.49
1:B:235:ASN:HD22	1:B:235:ASN:H	1.61	0.49
1:D:456:LEU:HB2	4:D:3604:HOH:O	2.12	0.49
1:A:195:ILE:HD12	1:A:421:LYS:HB2	1.95	0.48
1:D:230:LYS:HD3	1:D:230:LYS:C	2.38	0.48
1:B:358:TYR:HB3	1:B:361:ILE:HG13	1.95	0.48
1:C:344:GLY:O	1:C:389:LEU:HD21	2.13	0.48
1:D:51:GLY:HA3	1:D:75:TRP:CE3	2.48	0.48
1:A:262:ILE:HB	1:A:285:ILE:HD13	1.95	0.48
1:C:65:THR:O	1:C:69:LEU:HG	2.13	0.48
1:D:151:LEU:HD13	1:D:151:LEU:O	2.13	0.48
1:D:4:ASN:N	1:D:4:ASN:HD22	2.11	0.48
1:D:54:HIS:CD2	4:D:3547:HOH:O	2.66	0.48
1:D:424:ASN:HB2	4:D:3562:HOH:O	2.12	0.48
1:B:51:GLY:HA3	1:B:75:TRP:CE3	2.49	0.48
1:C:45:LYS:O	1:C:46:ASN:HB2	2.14	0.48
1:B:189:ASN:HD22	1:B:192:LYS:NZ	2.11	0.48
1:D:362:HIS:HB3	1:D:374:THR:HB	1.94	0.48
1:B:344:GLY:HA3	1:B:349:GLU:OE2	2.13	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:54:HIS:HD2	4:D:3547:HOH:O	1.95	0.48
1:A:40:LYS:H	1:A:40:LYS:CE	2.17	0.48
1:C:431:TYR:C	1:C:432:LEU:HD12	2.39	0.48
1:D:230:LYS:NZ	1:D:235:ASN:HD21	2.12	0.48
1:D:189:ASN:HD22	1:D:192:LYS:NZ	2.11	0.47
1:C:292:CYS:HA	1:C:295:GLN:HE21	1.79	0.47
1:C:415:LEU:HD12	1:C:419:GLN:NE2	2.28	0.47
1:D:225:ASN:O	1:D:231:GLN:HB3	2.14	0.47
1:C:401:PHE:HE1	1:C:448:LYS:HG2	1.79	0.47
1:A:415:LEU:HD12	1:A:419:GLN:NE2	2.28	0.47
1:A:189:ASN:HD22	1:A:192:LYS:NZ	2.12	0.47
1:B:317:ILE:HD12	1:B:317:ILE:N	2.30	0.47
1:C:288:ILE:HG21	1:D:456:LEU:HD13	1.97	0.47
1:D:244:PRO:HB2	1:D:248:MET:HE2	1.96	0.47
1:C:54:HIS:HD1	1:C:82:SER:CB	2.27	0.47
1:A:292:CYS:HA	1:A:295:GLN:HE21	1.78	0.47
1:C:230:LYS:HD3	1:C:230:LYS:C	2.40	0.47
1:C:340:VAL:CG1	1:C:350:ILE:HD13	2.44	0.47
1:D:336:ASN:HD22	1:D:380:LYS:H	1.61	0.47
1:C:336:ASN:HD22	1:C:380:LYS:H	1.58	0.47
1:B:288:ILE:HG13	1:B:289:ASP:N	2.30	0.47
1:B:415:LEU:HD12	1:B:419:GLN:NE2	2.30	0.47
1:D:148:TYR:CE2	1:D:159:PRO:HB3	2.49	0.47
1:B:362:HIS:HB3	1:B:374:THR:HB	1.96	0.47
1:C:162:GLU:C	1:C:164:ALA:H	2.23	0.47
1:C:424:ASN:HD22	1:C:424:ASN:N	2.10	0.46
1:D:197:VAL:HG22	1:D:198:SER:N	2.31	0.46
1:B:401:PHE:HE1	1:B:448:LYS:HG2	1.79	0.46
1:C:9:LYS:HG3	4:C:2588:HOH:O	2.14	0.46
1:D:344:GLY:O	1:D:389:LEU:HD21	2.15	0.46
1:B:160:ASP:O	1:B:163:LYS:HG2	2.16	0.46
1:B:230:LYS:C	1:B:230:LYS:HD3	2.41	0.46
4:B:1521:HOH:O	1:D:448:LYS:HE2	2.16	0.46
1:A:439:GLU:CD	1:A:471:PRO:HA	2.41	0.46
1:B:373:ILE:HD12	1:B:373:ILE:N	2.30	0.46
1:D:162:GLU:C	1:D:164:ALA:H	2.23	0.46
1:C:262:ILE:HB	1:C:285:ILE:HD13	1.98	0.46
1:D:40:LYS:H	1:D:40:LYS:CE	2.17	0.46
1:D:221:ALA:O	1:D:430:VAL:HA	2.16	0.46
1:B:65:THR:O	1:B:69:LEU:HG	2.16	0.46
1:C:288:ILE:HG13	1:C:289:ASP:N	2.31	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:40:LYS:H	1:C:40:LYS:CE	2.14	0.46
1:A:240:ARG:HG3	1:A:275:SER:HB3	1.98	0.45
1:A:340:VAL:HG12	1:A:350:ILE:HD13	1.97	0.45
1:B:249:ARG:NH1	4:B:1523:HOH:O	2.48	0.45
1:C:329:GLU:O	1:C:333:LYS:HE2	2.16	0.45
1:D:228:VAL:C	1:D:230:LYS:H	2.24	0.45
1:C:317:ILE:N	1:C:317:ILE:HD12	2.31	0.45
1:A:189:ASN:HA	1:A:192:LYS:HZ3	1.81	0.45
1:B:40:LYS:H	1:B:40:LYS:CE	2.15	0.45
1:C:189:ASN:HA	1:C:192:LYS:HZ3	1.82	0.45
1:A:14:ALA:N	1:A:15:PRO:HD2	2.32	0.45
1:A:162:GLU:C	1:A:164:ALA:H	2.25	0.45
1:A:373:ILE:N	1:A:373:ILE:HD12	2.31	0.45
1:A:431:TYR:C	1:A:432:LEU:HD12	2.42	0.45
1:A:456:LEU:HD13	1:B:288:ILE:HD13	1.98	0.45
1:C:456:LEU:HD13	1:D:288:ILE:HG21	1.98	0.45
1:A:241:HIS:CD2	1:A:399:PRO:HD3	2.51	0.45
1:B:340:VAL:CG1	1:B:350:ILE:HD13	2.46	0.45
1:B:148:TYR:CE2	1:B:159:PRO:HB3	2.51	0.45
1:B:244:PRO:HB2	1:B:248:MET:HE2	1.99	0.45
1:D:288:ILE:HG13	1:D:289:ASP:N	2.32	0.45
1:D:160:ASP:O	1:D:163:LYS:HG2	2.17	0.45
1:D:309:ILE:HG13	1:D:309:ILE:O	2.17	0.45
1:D:243:LEU:HD22	1:D:272:CYS:SG	2.57	0.45
1:A:340:VAL:CG1	1:A:350:ILE:HD13	2.47	0.45
1:C:373:ILE:N	1:C:373:ILE:HD12	2.32	0.45
1:A:228:VAL:C	1:A:230:LYS:H	2.26	0.44
1:B:162:GLU:C	1:B:164:ALA:H	2.25	0.44
1:A:234:ASP:HA	1:A:402:VAL:CG1	2.47	0.44
1:A:424:ASN:HD22	1:A:424:ASN:N	2.14	0.44
1:B:377:ASN:HD21	1:B:379:ASN:ND2	2.16	0.44
1:D:54:HIS:CE1	1:D:392:LEU:HD13	2.53	0.44
1:A:244:PRO:HB2	1:A:248:MET:HE2	1.99	0.44
1:A:390:LEU:C	1:A:390:LEU:HD12	2.43	0.44
1:D:7:LYS:HE3	4:D:3554:HOH:O	2.18	0.44
1:B:318:THR:HB	1:B:349:GLU:OE1	2.18	0.44
1:A:208:LEU:HD13	1:A:221:ALA:HB1	1.99	0.44
1:A:322:ASN:O	1:A:349:GLU:HG2	2.17	0.44
1:C:439:GLU:CD	1:C:471:PRO:HA	2.43	0.44
1:D:208:LEU:HD13	1:D:221:ALA:HB1	2.00	0.44
1:D:235:ASN:HD22	1:D:235:ASN:H	1.64	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:166:ASN:ND2	1:B:168:GLU:HB3	2.33	0.43
1:B:206:LEU:CD1	1:B:210:LYS:HE2	2.48	0.43
1:D:439:GLU:CD	1:D:471:PRO:HA	2.42	0.43
1:A:411:THR:O	1:A:415:LEU:HD23	2.17	0.43
1:B:431:TYR:C	1:B:432:LEU:HD12	2.43	0.43
1:B:439:GLU:CD	1:B:471:PRO:HA	2.43	0.43
1:D:373:ILE:HD12	1:D:373:ILE:N	2.33	0.43
1:C:195:ILE:HD12	1:C:421:LYS:HB2	2.00	0.43
1:C:160:ASP:C	1:C:162:GLU:H	2.25	0.43
1:D:45:LYS:O	1:D:46:ASN:HB2	2.19	0.43
1:D:166:ASN:ND2	1:D:168:GLU:HB3	2.33	0.43
1:A:251:THR:O	1:A:252:ASP:HB2	2.17	0.43
1:D:159:PRO:HD3	4:D:3603:HOH:O	2.18	0.43
1:A:222:ILE:CD1	1:A:417:LEU:HD13	2.46	0.43
1:C:14:ALA:N	1:C:15:PRO:HD2	2.34	0.43
1:C:45:LYS:HA	1:C:70:GLY:O	2.18	0.43
1:D:340:VAL:CG1	1:D:350:ILE:HD13	2.47	0.43
1:B:45:LYS:O	1:B:46:ASN:HB2	2.17	0.43
1:C:362:HIS:HB3	1:C:374:THR:HB	2.00	0.43
1:C:336:ASN:HD22	1:C:379:ASN:HA	1.84	0.43
1:C:390:LEU:C	1:C:390:LEU:HD12	2.44	0.43
1:D:95:GLU:HG2	4:D:3537:HOH:O	2.17	0.43
1:A:45:LYS:O	1:A:46:ASN:HB2	2.18	0.43
1:A:79:ASN:HB3	1:A:82:SER:OG	2.19	0.43
1:A:160:ASP:C	1:A:162:GLU:H	2.26	0.43
1:B:45:LYS:HA	1:B:70:GLY:O	2.19	0.43
1:B:413:ALA:O	1:B:417:LEU:HB2	2.18	0.43
1:B:447:LYS:HG3	4:B:1586:HOH:O	2.19	0.42
1:C:230:LYS:NZ	1:C:235:ASN:HD21	2.15	0.42
1:C:263:CYS:HA	1:C:286:THR:OG1	2.19	0.42
1:A:206:LEU:CD1	1:A:210:LYS:HE2	2.47	0.42
1:A:230:LYS:HD3	1:A:230:LYS:C	2.43	0.42
1:B:58:GLU:HG3	1:B:400:ALA:HA	2.01	0.42
1:C:90:ALA:O	1:C:93:THR:HB	2.19	0.42
1:D:424:ASN:HD22	1:D:424:ASN:N	2.09	0.42
1:C:166:ASN:ND2	1:C:168:GLU:HB3	2.34	0.42
1:D:391:ASN:N	1:D:391:ASN:ND2	2.66	0.42
1:B:391:ASN:N	1:B:391:ASN:ND2	2.66	0.42
1:A:317:ILE:N	1:A:317:ILE:HD12	2.34	0.42
1:D:390:LEU:HD12	1:D:390:LEU:C	2.44	0.42
1:A:182:LYS:HB2	1:A:182:LYS:NZ	2.35	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:91:VAL:CG1	1:B:99:VAL:HG21	2.44	0.42
1:B:241:HIS:CD2	1:B:399:PRO:HD3	2.53	0.42
1:C:102:TRP:O	1:C:105:GLU:HG2	2.19	0.42
1:C:411:THR:O	1:C:415:LEU:HD23	2.19	0.42
1:A:305:THR:OG1	1:A:308:GLU:HG3	2.20	0.42
1:D:43:PRO:CG	1:D:415:LEU:HD11	2.50	0.42
1:D:322:ASN:O	1:D:349:GLU:HG2	2.20	0.42
1:A:53:LEU:O	1:A:54:HIS:C	2.61	0.42
1:A:235:ASN:N	1:A:235:ASN:ND2	2.66	0.42
1:B:4:ASN:C	1:B:4:ASN:HD22	2.27	0.42
1:B:151:LEU:HD13	1:B:151:LEU:O	2.20	0.42
1:B:230:LYS:NZ	1:B:235:ASN:HD21	2.14	0.42
1:D:63:ILE:HD11	1:D:75:TRP:CE2	2.54	0.42
1:A:225:ASN:HA	1:A:230:LYS:HD2	2.02	0.41
1:B:424:ASN:HD22	1:B:424:ASN:N	2.10	0.41
1:C:309:ILE:O	1:C:309:ILE:HG13	2.20	0.41
1:A:199:GLU:O	1:A:224:VAL:HB	2.20	0.41
1:B:262:ILE:HB	1:B:285:ILE:HD13	2.02	0.41
1:C:182:LYS:HB2	1:C:182:LYS:NZ	2.35	0.41
1:A:263:CYS:HA	1:A:286:THR:OG1	2.20	0.41
1:A:288:ILE:HD13	1:B:456:LEU:HD13	2.02	0.41
1:A:243:LEU:HD22	1:A:272:CYS:HB3	2.03	0.41
1:B:336:ASN:HD22	1:B:379:ASN:HA	1.85	0.41
1:C:188:THR:O	1:C:192:LYS:HG3	2.20	0.41
1:C:478:ARG:CZ	1:D:228:VAL:HG22	2.50	0.41
1:D:160:ASP:C	1:D:162:GLU:H	2.28	0.41
1:A:288:ILE:HG13	1:A:289:ASP:N	2.35	0.41
1:A:362:HIS:HB3	1:A:374:THR:HB	2.01	0.41
1:B:158:LEU:CD1	1:B:181:LEU:HD21	2.50	0.41
1:B:160:ASP:C	1:B:162:GLU:H	2.27	0.41
1:B:197:VAL:HG22	1:B:198:SER:N	2.36	0.41
1:D:225:ASN:ND2	1:D:230:LYS:HZ2	2.19	0.41
1:A:424:ASN:HD22	1:A:424:ASN:C	2.28	0.41
1:C:208:LEU:HD13	1:C:221:ALA:HB1	2.02	0.41
1:D:241:HIS:CD2	1:D:399:PRO:HD3	2.55	0.41
1:A:233:TYR:HA	1:A:237:TYR:CD1	2.56	0.41
1:B:35:ARG:O	1:B:39:GLY:HA3	2.21	0.41
1:B:53:LEU:O	1:B:54:HIS:C	2.63	0.41
1:B:390:LEU:HD12	1:B:390:LEU:C	2.46	0.41
1:C:234:ASP:HA	1:C:402:VAL:CG1	2.51	0.41
1:D:206:LEU:CD1	1:D:210:LYS:HE2	2.48	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:328:LEU:HD13	1:D:332:LEU:HD22	2.03	0.41
1:D:386:ARG:HG3	4:D:3570:HOH:O	2.21	0.41
1:D:413:ALA:O	1:D:417:LEU:HB2	2.20	0.41
1:B:230:LYS:O	1:B:234:ASP:HB3	2.21	0.41
1:B:243:LEU:HD22	1:B:272:CYS:HB3	2.03	0.41
1:C:225:ASN:HA	1:C:230:LYS:HD2	2.03	0.41
1:C:322:ASN:O	1:C:349:GLU:HG2	2.21	0.41
1:A:30:GLY:O	1:A:34:ILE:HG12	2.21	0.40
1:A:208:LEU:HD23	1:A:211:MET:HE3	2.03	0.40
1:A:361:ILE:HD11	1:A:376:PRO:HD3	2.04	0.40
1:B:228:VAL:C	1:B:230:LYS:H	2.29	0.40
1:C:208:LEU:HD23	1:C:211:MET:HE3	2.03	0.40
1:D:336:ASN:HD22	1:D:379:ASN:HA	1.86	0.40
1:D:411:THR:HG22	1:D:415:LEU:HD23	2.03	0.40
1:A:90:ALA:O	1:A:93:THR:HB	2.22	0.40
1:A:388:ARG:O	1:A:389:LEU:C	2.63	0.40
1:B:90:ALA:O	1:B:93:THR:HB	2.21	0.40
1:C:30:GLY:O	1:C:34:ILE:HG12	2.21	0.40
1:D:195:ILE:HD12	1:D:421:LYS:HB2	2.03	0.40
1:A:165:LYS:HE3	1:A:165:LYS:HB2	1.94	0.40
1:D:53:LEU:O	1:D:54:HIS:C	2.64	0.40
1:D:193:LYS:HB2	4:D:3598:HOH:O	2.21	0.40
1:B:185:LYS:HA	1:B:185:LYS:HD3	1.92	0.40
1:B:316:PHE:C	1:B:317:ILE:HD12	2.46	0.40
1:C:228:VAL:C	1:C:230:LYS:H	2.30	0.40
1:D:201:THR:O	1:D:205:VAL:HG23	2.22	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	474/479 (99%)	451 (95%)	23 (5%)	0	100	100
1	B	474/479 (99%)	447 (94%)	27 (6%)	0	100	100
1	C	474/479 (99%)	447 (94%)	27 (6%)	0	100	100
1	D	474/479 (99%)	450 (95%)	24 (5%)	0	100	100
All	All	1896/1916 (99%)	1795 (95%)	101 (5%)	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	414/417 (99%)	395 (95%)	19 (5%)	24	41
1	B	414/417 (99%)	396 (96%)	18 (4%)	26	44
1	C	414/417 (99%)	395 (95%)	19 (5%)	24	41
1	D	414/417 (99%)	394 (95%)	20 (5%)	23	40
All	All	1656/1668 (99%)	1580 (95%)	76 (5%)	24	41

All (76) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	9	LYS
1	A	40	LYS
1	A	93	THR
1	A	105	GLU
1	A	151	LEU
1	A	156	ASN
1	A	162	GLU
1	A	167	GLU
1	A	168	GLU
1	A	182	LYS
1	A	199	GLU
1	A	201	THR
1	A	235	ASN

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Mol	Chain	Res	Type
1	A	247	LEU
1	A	391	ASN
1	A	424	ASN
1	A	435	LYS
1	A	438	ASP
1	A	446	LEU
1	B	5	LYS
1	B	9	LYS
1	B	40	LYS
1	B	93	THR
1	B	151	LEU
1	B	156	ASN
1	B	162	GLU
1	B	167	GLU
1	B	168	GLU
1	B	182	LYS
1	B	199	GLU
1	B	235	ASN
1	B	247	LEU
1	B	319	CYS
1	B	391	ASN
1	B	424	ASN
1	B	435	LYS
1	B	438	ASP
1	C	9	LYS
1	C	40	LYS
1	C	93	THR
1	C	105	GLU
1	C	151	LEU
1	C	156	ASN
1	C	162	GLU
1	C	167	GLU
1	C	168	GLU
1	C	182	LYS
1	C	199	GLU
1	C	201	THR
1	C	235	ASN
1	C	247	LEU
1	C	391	ASN
1	C	424	ASN
1	C	435	LYS
1	C	438	ASP

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Mol	Chain	Res	Type
1	C	446	LEU
1	D	4	ASN
1	D	9	LYS
1	D	40	LYS
1	D	93	THR
1	D	151	LEU
1	D	156	ASN
1	D	162	GLU
1	D	167	GLU
1	D	168	GLU
1	D	182	LYS
1	D	199	GLU
1	D	201	THR
1	D	235	ASN
1	D	247	LEU
1	D	319	CYS
1	D	391	ASN
1	D	424	ASN
1	D	435	LYS
1	D	438	ASP
1	D	446	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (67) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	42	GLN
1	A	178	ASN
1	A	189	ASN
1	A	225	ASN
1	A	235	ASN
1	A	295	GLN
1	A	330	HIS
1	A	336	ASN
1	A	391	ASN
1	A	410	GLN
1	A	414	GLN
1	A	419	GLN
1	A	424	ASN
1	A	445	HIS
1	A	460	GLN
1	B	42	GLN
1	B	166	ASN

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Mol	Chain	Res	Type
1	B	178	ASN
1	B	189	ASN
1	B	225	ASN
1	B	235	ASN
1	B	295	GLN
1	B	330	HIS
1	B	336	ASN
1	B	379	ASN
1	B	391	ASN
1	B	410	GLN
1	B	414	GLN
1	B	419	GLN
1	B	424	ASN
1	B	445	HIS
1	B	460	GLN
1	C	42	GLN
1	C	178	ASN
1	C	189	ASN
1	C	225	ASN
1	C	235	ASN
1	C	295	GLN
1	C	330	HIS
1	C	336	ASN
1	C	379	ASN
1	C	391	ASN
1	C	410	GLN
1	C	414	GLN
1	C	419	GLN
1	C	424	ASN
1	C	445	HIS
1	C	450	ASN
1	C	459	ASN
1	C	460	GLN
1	D	42	GLN
1	D	156	ASN
1	D	178	ASN
1	D	189	ASN
1	D	225	ASN
1	D	235	ASN
1	D	295	GLN
1	D	330	HIS
1	D	336	ASN

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Mol	Chain	Res	Type
1	D	377	ASN
1	D	391	ASN
1	D	410	GLN
1	D	414	GLN
1	D	419	GLN
1	D	424	ASN
1	D	445	HIS
1	D	460	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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

8 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	501	-	46,48,48	3.04	17 (36%)	64,73,73	2.18	21 (32%)
2	NAD	A	501	-	46,48,48	2.93	15 (32%)	64,73,73	2.02	17 (26%)
2	NAD	D	501	-	46,48,48	3.02	15 (32%)	64,73,73	2.00	20 (31%)
3	ADN	C	2502	-	21,21,21	0.98	1 (4%)	31,31,31	1.30	2 (6%)
3	ADN	A	502	-	21,21,21	0.85	1 (4%)	31,31,31	1.31	6 (19%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	NAD	C	501	-	46,48,48	3.03	14 (30%)	64,73,73	2.05	16 (25%)
3	ADN	B	1502	-	21,21,21	1.14	1 (4%)	31,31,31	1.36	6 (19%)
3	ADN	D	3502	-	21,21,21	0.92	0	31,31,31	1.22	3 (9%)

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	501	-	-	9/30/62/62	0/5/5/5
2	NAD	A	501	-	-	12/30/62/62	0/5/5/5
2	NAD	D	501	-	-	8/30/62/62	0/5/5/5
3	ADN	C	2502	-	-	0/6/22/22	0/3/3/3
3	ADN	A	502	-	-	0/6/22/22	0/3/3/3
2	NAD	C	501	-	-	10/30/62/62	0/5/5/5
3	ADN	B	1502	-	-	0/6/22/22	0/3/3/3
3	ADN	D	3502	-	-	0/6/22/22	0/3/3/3

All (64) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	501	NAD	C2N-N1N	10.35	1.46	1.35
2	B	501	NAD	C2N-N1N	9.34	1.45	1.35
2	A	501	NAD	C2N-N1N	9.21	1.45	1.35
2	D	501	NAD	C2N-N1N	9.20	1.45	1.35
2	C	501	NAD	C3N-C7N	8.67	1.63	1.50
2	A	501	NAD	C3N-C7N	8.46	1.63	1.50
2	D	501	NAD	C3N-C7N	8.44	1.63	1.50
2	B	501	NAD	C3N-C7N	8.27	1.62	1.50
2	D	501	NAD	C2A-N3A	6.28	1.45	1.33
2	D	501	NAD	C4A-N3A	6.13	1.45	1.34
2	B	501	NAD	C2A-N3A	6.13	1.44	1.33
2	A	501	NAD	C2A-N3A	5.95	1.44	1.33
2	A	501	NAD	C4A-N3A	5.94	1.45	1.34
2	B	501	NAD	C4A-N3A	5.88	1.45	1.34
2	C	501	NAD	C4A-N3A	5.73	1.45	1.34
2	C	501	NAD	C2A-N3A	5.55	1.43	1.33
2	C	501	NAD	C5N-C4N	5.26	1.47	1.38
2	B	501	NAD	C5A-C6A	5.16	1.55	1.41
2	D	501	NAD	C5N-C4N	4.98	1.47	1.38

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	501	NAD	C5N-C4N	4.86	1.47	1.38
2	A	501	NAD	C5N-C4N	4.74	1.47	1.38
2	D	501	NAD	O4D-C4D	4.68	1.55	1.45
2	B	501	NAD	O4D-C4D	4.64	1.55	1.45
2	C	501	NAD	O4D-C4D	4.53	1.55	1.45
2	D	501	NAD	C5A-C6A	4.51	1.53	1.41
2	C	501	NAD	C5A-C6A	4.45	1.53	1.41
2	A	501	NAD	C7N-N7N	4.44	1.41	1.33
2	A	501	NAD	C5A-C6A	4.37	1.53	1.41
2	C	501	NAD	C4N-C3N	4.26	1.45	1.39
2	B	501	NAD	C7N-N7N	4.10	1.40	1.33
2	C	501	NAD	C7N-N7N	4.09	1.40	1.33
2	A	501	NAD	O4D-C4D	3.97	1.53	1.45
2	D	501	NAD	C7N-N7N	3.97	1.40	1.33
2	B	501	NAD	C4N-C3N	3.55	1.44	1.39
2	A	501	NAD	C4N-C3N	3.38	1.44	1.39
2	B	501	NAD	PN-O3	3.36	1.63	1.59
2	D	501	NAD	C4N-C3N	3.27	1.44	1.39
2	B	501	NAD	C6A-N1A	3.20	1.44	1.35
2	D	501	NAD	C6A-N1A	3.18	1.44	1.35
2	D	501	NAD	O3D-C3D	-3.07	1.35	1.43
2	B	501	NAD	O3D-C3D	-2.98	1.35	1.43
2	A	501	NAD	C6A-N1A	2.85	1.43	1.35
2	C	501	NAD	C6A-N1A	2.79	1.43	1.35
2	C	501	NAD	O3D-C3D	-2.78	1.36	1.43
2	D	501	NAD	C3B-C4B	2.78	1.60	1.53
3	C	2502	ADN	C8-N9	2.71	1.42	1.37
2	C	501	NAD	C3B-C4B	2.68	1.59	1.53
2	A	501	NAD	O3D-C3D	-2.65	1.36	1.43
2	A	501	NAD	C6N-N1N	2.61	1.41	1.35
2	B	501	NAD	C3B-C4B	2.60	1.59	1.53
2	D	501	NAD	PN-O3	2.60	1.62	1.59
2	D	501	NAD	C6N-N1N	2.51	1.41	1.35
2	C	501	NAD	C6N-N1N	2.50	1.41	1.35
2	B	501	NAD	C6N-N1N	2.49	1.41	1.35
2	A	501	NAD	PN-O3	2.46	1.62	1.59
3	B	1502	ADN	C8-N9	2.41	1.41	1.37
2	A	501	NAD	C3B-C4B	2.40	1.59	1.53
2	B	501	NAD	PA-O3	-2.40	1.56	1.59
2	B	501	NAD	O3B-C3B	2.27	1.48	1.43
3	A	502	ADN	C8-N9	2.26	1.41	1.37
2	A	501	NAD	C3D-C4D	2.20	1.58	1.53

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	501	NAD	C4A-N9A	2.17	1.42	1.37
2	D	501	NAD	O3B-C3B	2.07	1.48	1.43
2	C	501	NAD	PN-O2N	-2.05	1.45	1.55

All (91) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	501	NAD	C6N-N1N-C2N	6.08	127.05	121.88
2	B	501	NAD	C6N-N1N-C2N	6.06	127.03	121.88
2	A	501	NAD	C6N-N1N-C2N	5.97	126.95	121.88
2	C	501	NAD	N3A-C2A-N1A	-5.91	119.63	128.58
2	B	501	NAD	N3A-C2A-N1A	-5.75	119.88	128.58
2	A	501	NAD	N3A-C2A-N1A	-5.44	120.35	128.58
2	C	501	NAD	C2A-N1A-C6A	5.22	127.30	118.73
2	B	501	NAD	C2N-C3N-C4N	5.16	124.26	118.26
2	D	501	NAD	N3A-C2A-N1A	-5.16	120.78	128.58
2	D	501	NAD	C2N-C3N-C4N	5.06	124.14	118.26
2	A	501	NAD	C2A-N1A-C6A	5.03	126.99	118.73
2	D	501	NAD	C6N-N1N-C2N	4.91	126.05	121.88
2	A	501	NAD	C2N-C3N-C4N	4.87	123.92	118.26
2	B	501	NAD	C2A-N1A-C6A	4.59	126.28	118.73
2	C	501	NAD	C2N-C3N-C4N	4.57	123.57	118.26
2	D	501	NAD	C2A-N1A-C6A	4.25	125.71	118.73
2	C	501	NAD	O2N-PN-O3	-4.20	95.92	107.27
2	D	501	NAD	C5N-C4N-C3N	-4.09	116.34	120.36
2	D	501	NAD	O2N-PN-O3	-3.91	96.71	107.27
2	B	501	NAD	C5A-C4A-N3A	-3.89	121.37	126.72
2	B	501	NAD	C5N-C4N-C3N	-3.74	116.69	120.36
2	B	501	NAD	O2N-PN-O3	-3.73	97.19	107.27
3	C	2502	ADN	O4'-C1'-N9	3.70	115.20	108.09
3	A	502	ADN	O4'-C1'-N9	3.69	115.17	108.09
2	A	501	NAD	O2N-PN-O3	-3.64	97.44	107.27
2	D	501	NAD	C5A-C4A-N3A	-3.49	121.92	126.72
3	B	1502	ADN	O4'-C1'-N9	3.43	114.68	108.09
2	B	501	NAD	C4A-N9A-C8A	-3.38	102.19	105.74
2	C	501	NAD	C5N-C4N-C3N	-3.34	117.08	120.36
3	D	3502	ADN	O4'-C1'-N9	3.28	114.39	108.09
2	B	501	NAD	O3D-C3D-C4D	-3.23	101.80	111.08
2	C	501	NAD	C5N-C6N-N1N	-3.20	116.02	120.38
2	A	501	NAD	C5N-C4N-C3N	-3.16	117.26	120.36
2	D	501	NAD	C4A-N9A-C8A	-3.15	102.43	105.74
2	B	501	NAD	C5N-C6N-N1N	-3.13	116.11	120.38

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	501	NAD	C5N-C6N-N1N	-3.10	116.16	120.38
2	B	501	NAD	C2A-N3A-C4A	3.10	119.40	111.83
2	D	501	NAD	C5N-C6N-N1N	-2.99	116.31	120.38
2	A	501	NAD	C2B-C3B-C4B	2.91	108.22	102.61
2	A	501	NAD	C4A-N9A-C8A	-2.86	102.74	105.74
2	A	501	NAD	C5A-C4A-N3A	-2.83	122.83	126.72
2	D	501	NAD	C2N-C3N-C7N	-2.67	111.74	119.46
2	B	501	NAD	C6N-N1N-C1D	-2.67	114.48	119.73
2	B	501	NAD	O4D-C4D-C3D	-2.64	99.92	105.15
2	C	501	NAD	C1B-N9A-C8A	2.60	132.87	127.09
2	C	501	NAD	C2B-C3B-C4B	2.58	107.59	102.61
2	C	501	NAD	C4A-N9A-C8A	-2.57	103.04	105.74
2	D	501	NAD	C2B-C3B-C4B	2.55	107.54	102.61
2	C	501	NAD	C5A-C4A-N3A	-2.54	123.22	126.72
2	B	501	NAD	C2B-C3B-C4B	2.51	107.45	102.61
2	D	501	NAD	O3D-C3D-C4D	-2.49	103.92	111.08
2	D	501	NAD	C2A-N3A-C4A	2.49	117.90	111.83
2	B	501	NAD	C5A-C4A-N9A	2.46	108.49	105.81
2	A	501	NAD	C1B-N9A-C8A	2.45	132.53	127.09
2	C	501	NAD	C2A-N3A-C4A	2.45	117.81	111.83
2	A	501	NAD	C6N-N1N-C1D	-2.43	114.97	119.73
2	A	501	NAD	O4B-C1B-C2B	2.43	111.81	106.62
2	B	501	NAD	C2N-C3N-C7N	-2.42	112.47	119.46
3	A	502	ADN	C4'-O4'-C1'	-2.41	104.15	109.47
3	A	502	ADN	N3-C2-N1	-2.40	124.94	128.58
3	B	1502	ADN	C4'-O4'-C1'	-2.40	104.16	109.47
3	D	3502	ADN	C4'-O4'-C1'	-2.33	104.32	109.47
2	C	501	NAD	C6N-N1N-C1D	-2.32	115.17	119.73
2	A	501	NAD	C2N-C3N-C7N	-2.32	112.76	119.46
2	C	501	NAD	C2N-C3N-C7N	-2.31	112.81	119.46
2	A	501	NAD	O2B-C2B-C1B	2.30	118.03	110.10
2	B	501	NAD	O7N-C7N-C3N	-2.29	116.80	119.60
3	C	2502	ADN	O5'-C5'-C4'	-2.24	103.70	111.33
2	B	501	NAD	C4A-C5A-N7A	-2.21	108.05	110.58
2	B	501	NAD	C1B-N9A-C8A	2.21	132.01	127.09
2	A	501	NAD	C2A-N3A-C4A	2.20	117.21	111.83
2	C	501	NAD	O4D-C4D-C3D	-2.19	100.80	105.15
2	D	501	NAD	C6N-N1N-C1D	-2.19	115.44	119.73
3	A	502	ADN	C6-C5-C4	-2.17	114.21	117.18
3	B	1502	ADN	C5'-C4'-C3'	-2.13	110.06	115.10
2	B	501	NAD	O2B-C2B-C1B	2.12	117.42	110.10
3	A	502	ADN	O5'-C5'-C4'	-2.11	104.14	111.33

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	501	NAD	O2B-C2B-C1B	2.11	117.36	110.10
3	B	1502	ADN	O5'-C5'-C4'	-2.10	104.17	111.33
2	D	501	NAD	C1B-N9A-C8A	2.10	131.75	127.09
3	D	3502	ADN	N3-C2-N1	-2.08	125.44	128.58
3	B	1502	ADN	O3'-C3'-C4'	-2.07	105.13	111.08
2	D	501	NAD	O4B-C1B-C2B	2.06	111.03	106.62
2	C	501	NAD	O2B-C2B-C3B	2.05	118.38	111.82
2	D	501	NAD	C6N-C5N-C4N	2.04	122.39	119.45
2	A	501	NAD	O7N-C7N-C3N	-2.04	117.11	119.60
2	D	501	NAD	N3A-C4A-N9A	2.02	130.61	127.17
2	D	501	NAD	O7N-C7N-C3N	-2.01	117.14	119.60
2	B	501	NAD	O3-PA-O1A	-2.01	104.66	110.70
3	A	502	ADN	C2'-C3'-C4'	2.00	106.48	102.61
3	B	1502	ADN	C2'-C3'-C4'	2.00	106.48	102.61

There are no chirality outliers.

All (39) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	501	NAD	C5B-O5B-PA-O1A
2	A	501	NAD	PN-O3-PA-O5B
2	A	501	NAD	O4D-C1D-N1N-C2N
2	A	501	NAD	O4D-C1D-N1N-C6N
2	A	501	NAD	C2D-C1D-N1N-C2N
2	A	501	NAD	C2D-C1D-N1N-C6N
2	B	501	NAD	PN-O3-PA-O5B
2	B	501	NAD	O4D-C1D-N1N-C2N
2	B	501	NAD	O4D-C1D-N1N-C6N
2	B	501	NAD	C2D-C1D-N1N-C2N
2	B	501	NAD	C2D-C1D-N1N-C6N
2	C	501	NAD	C5B-O5B-PA-O1A
2	C	501	NAD	PN-O3-PA-O5B
2	C	501	NAD	O4D-C1D-N1N-C2N
2	C	501	NAD	O4D-C1D-N1N-C6N
2	C	501	NAD	C2D-C1D-N1N-C2N
2	C	501	NAD	C2D-C1D-N1N-C6N
2	D	501	NAD	O4D-C1D-N1N-C2N
2	D	501	NAD	O4D-C1D-N1N-C6N
2	D	501	NAD	C2D-C1D-N1N-C2N
2	D	501	NAD	C2D-C1D-N1N-C6N
2	A	501	NAD	C3B-C4B-C5B-O5B
2	A	501	NAD	O4B-C4B-C5B-O5B

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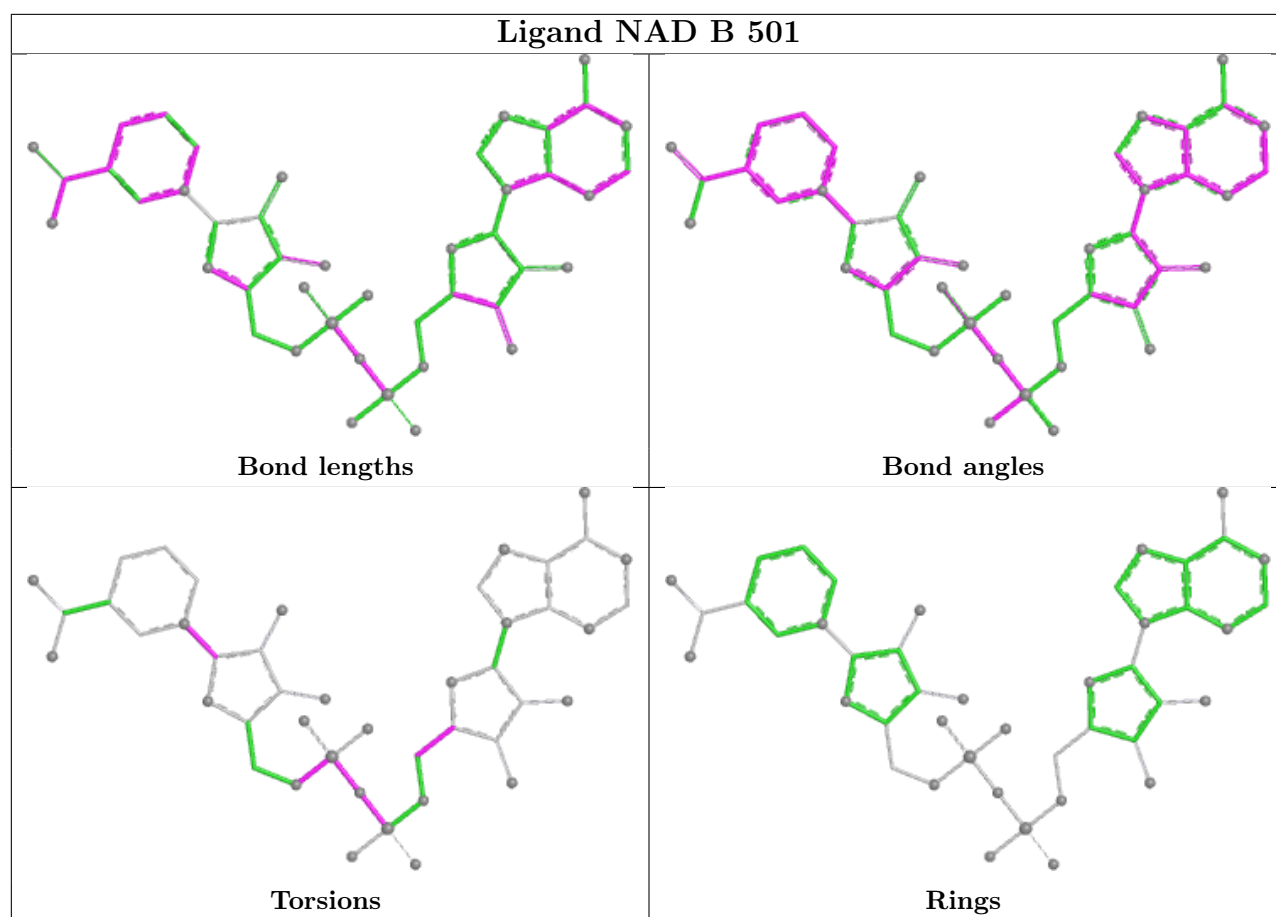
Mol	Chain	Res	Type	Atoms
2	D	501	NAD	PN-O3-PA-O5B
2	A	501	NAD	PA-O3-PN-O1N
2	B	501	NAD	PA-O3-PN-O1N
2	C	501	NAD	PA-O3-PN-O1N
2	D	501	NAD	PA-O3-PN-O1N
2	A	501	NAD	C5B-O5B-PA-O2A
2	A	501	NAD	C5B-O5B-PA-O3
2	B	501	NAD	C5D-O5D-PN-O1N
2	C	501	NAD	C5D-O5D-PN-O1N
2	D	501	NAD	C5D-O5D-PN-O1N
2	B	501	NAD	O4B-C4B-C5B-O5B
2	C	501	NAD	O4B-C4B-C5B-O5B
2	A	501	NAD	PA-O3-PN-O2N
2	B	501	NAD	PA-O3-PN-O2N
2	C	501	NAD	PA-O3-PN-O2N
2	D	501	NAD	PA-O3-PN-O2N

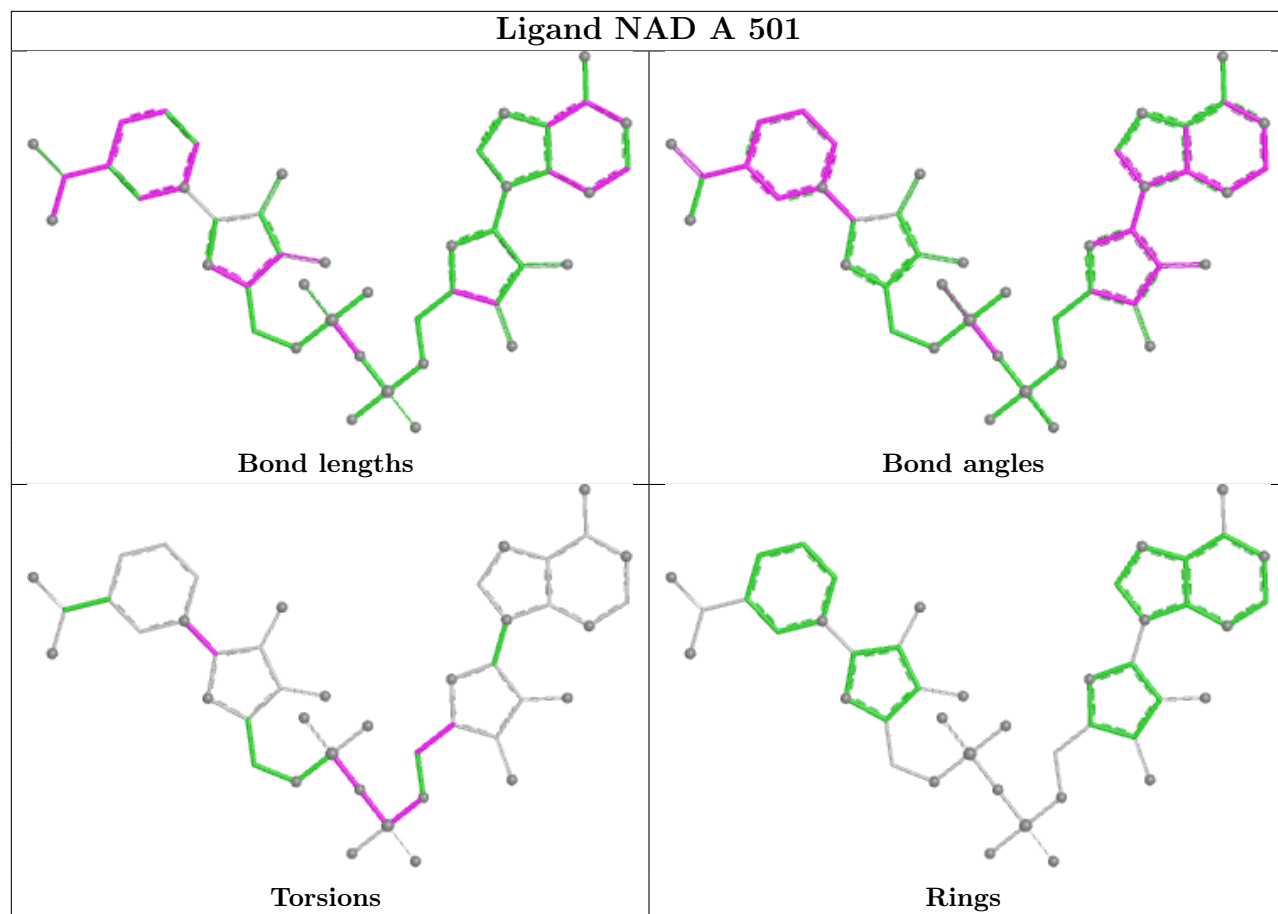
There are no ring outliers.

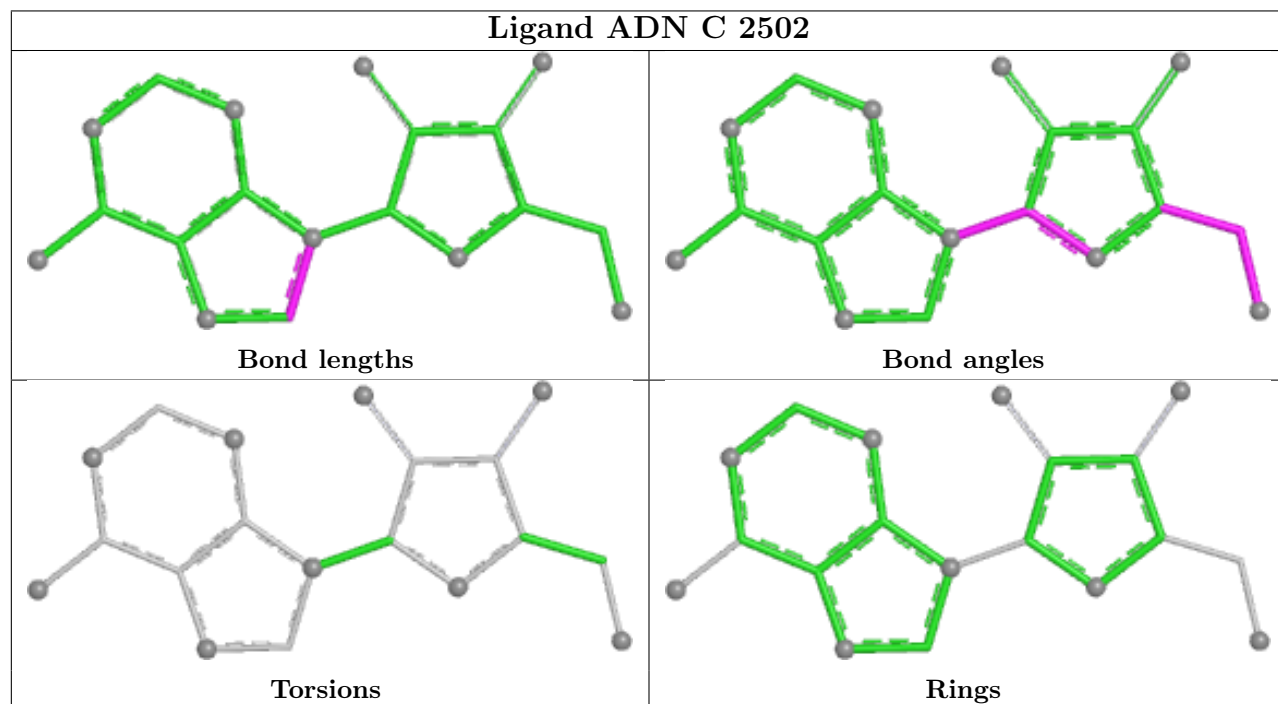
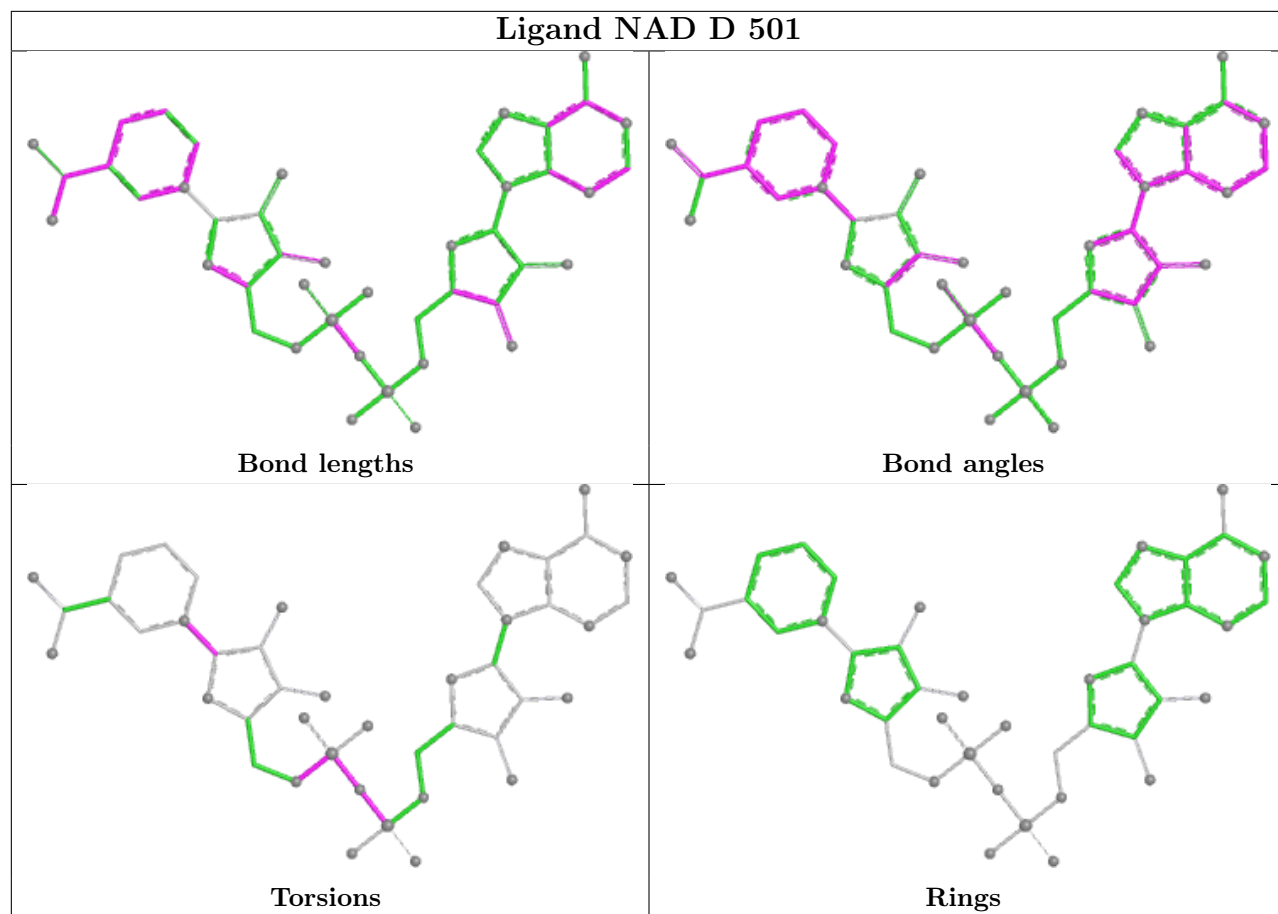
4 monomers are involved in 4 short contacts:

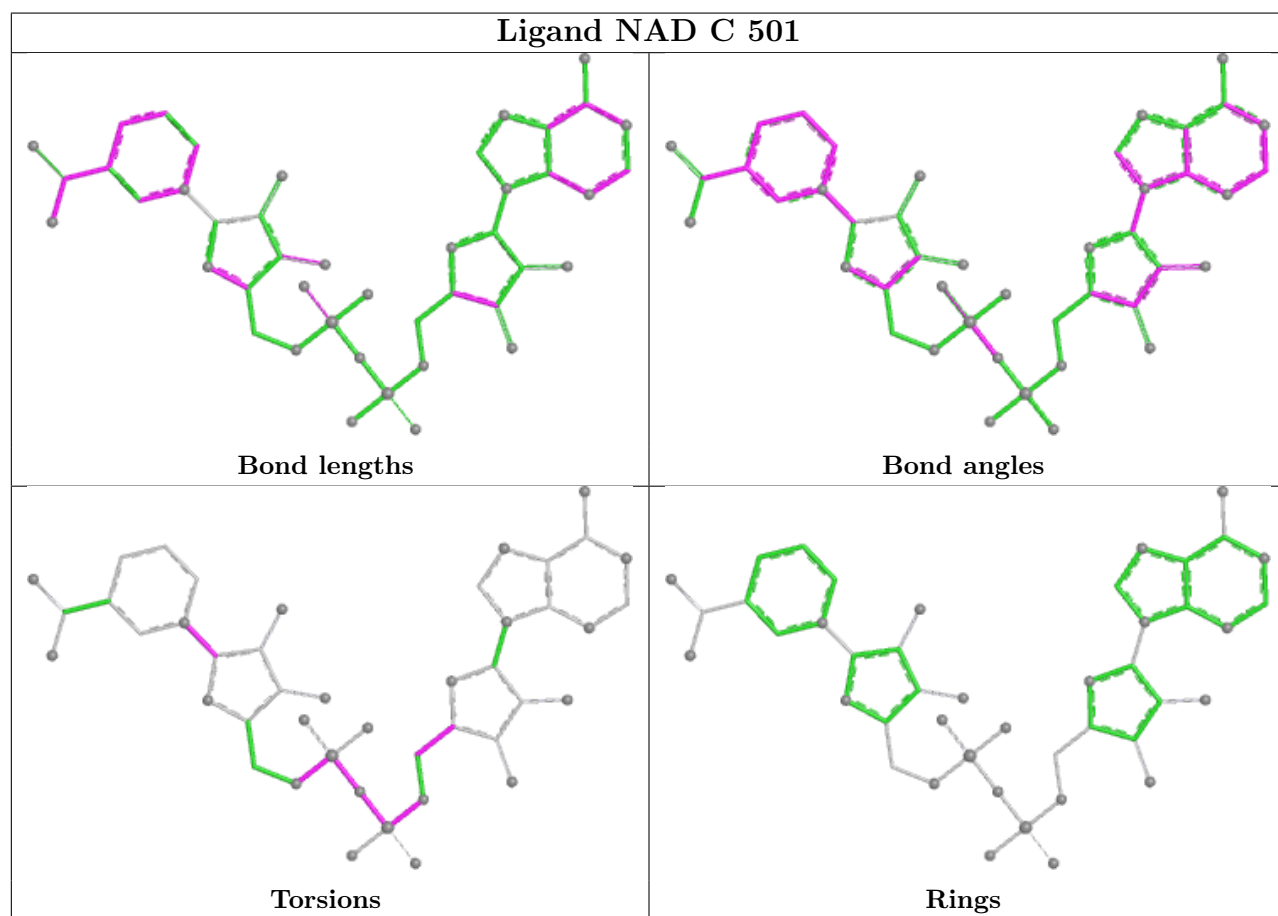
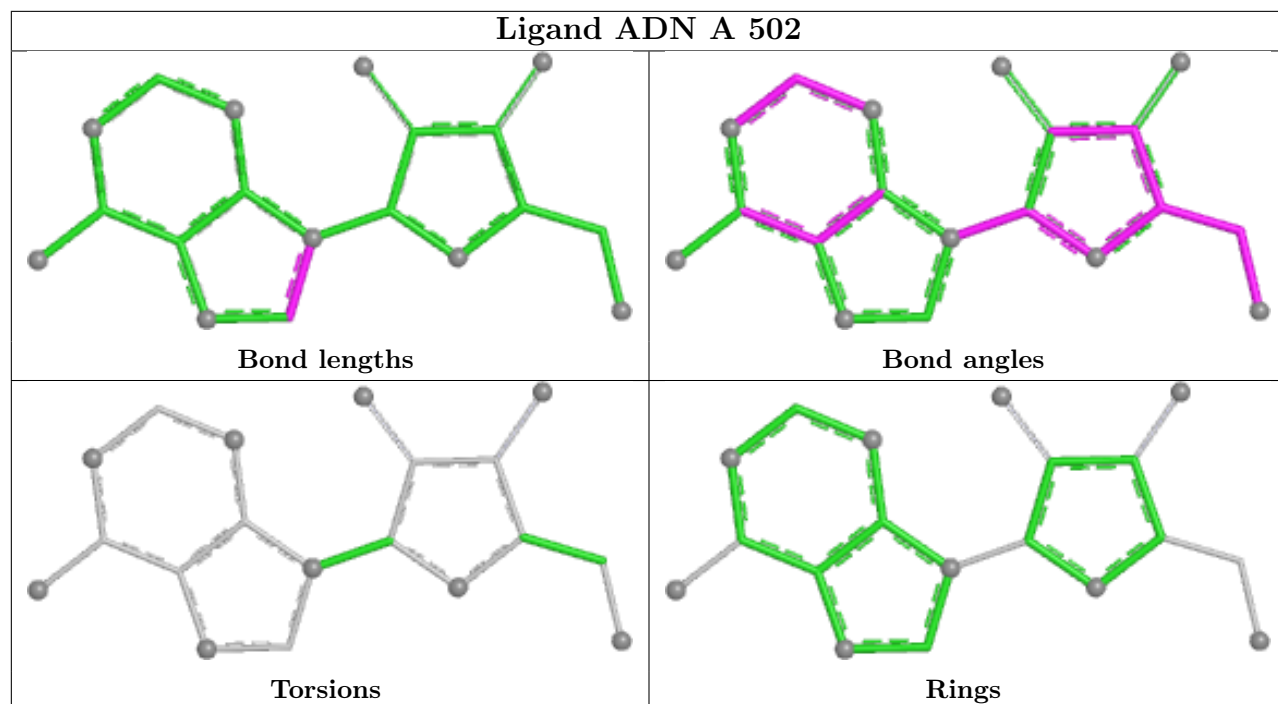
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	501	NAD	1	0
2	A	501	NAD	1	0
2	D	501	NAD	1	0
2	C	501	NAD	1	0

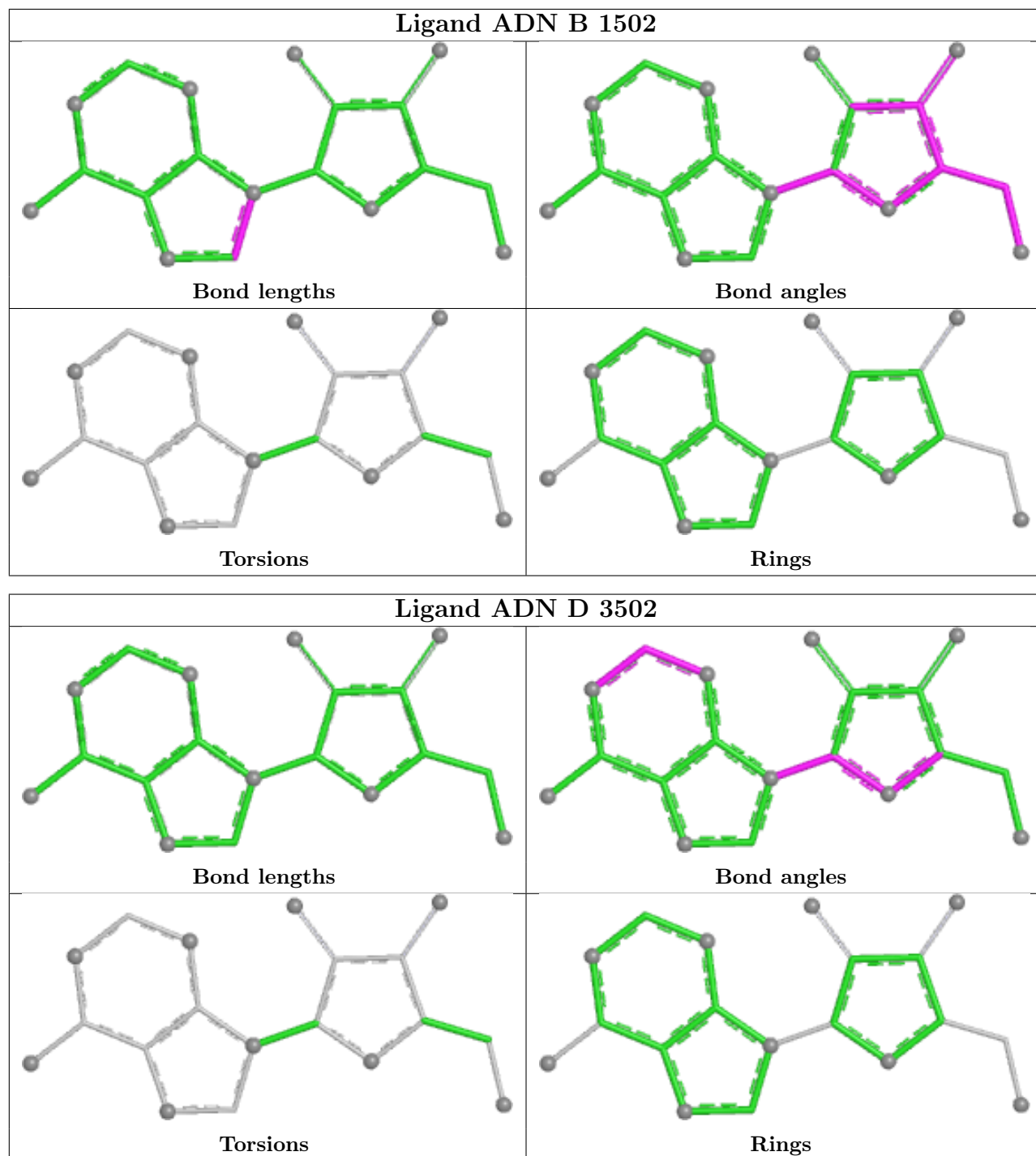
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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.