



# Full wwPDB X-ray Structure Validation Report ⓘ

Oct 29, 2024 – 11:40 AM EDT

PDB ID : 4I3W  
Title : Structure of phosphonoacetaldehyde dehydrogenase in complex with glyceraldehyde-3-phosphate and cofactor NAD<sup>+</sup>  
Authors : Nair, S.K.; Agarwal, V.  
Deposited on : 2012-11-26  
Resolution : 2.24 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](mailto: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>.

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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) : 1.20.1  
EDS : 3.0  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)  
CCP4 : 9.0.003 (Gargrove)  
Density-Fitness : 1.0.11  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.39

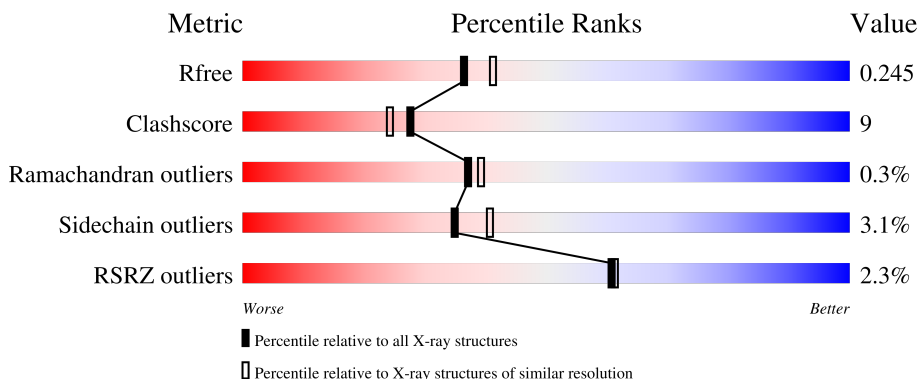
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.24 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.



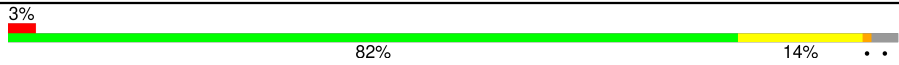

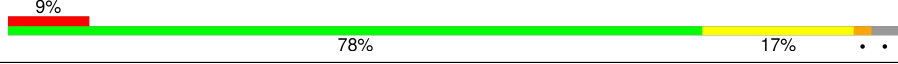
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	164625	3139 (2.26-2.22)
Clashscore	180529	3381 (2.26-2.22)
Ramachandran outliers	177936	3334 (2.26-2.22)
Sidechain outliers	177891	3335 (2.26-2.22)
RSRZ outliers	164620	3138 (2.26-2.22)

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  $\geq 3$ , 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	488	
1	B	488	
1	C	488	
1	D	488	
1	E	488	

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Mol	Chain	Length	Quality of chain
1	F	488	 <p>3% 82% 14% ..</p>
1	G	488	 <p>% 82% 14% ..</p>
1	H	488	 <p>9% 78% 17% ..</p>

## 2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 30963 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 Aldehyde dehydrogenase (NAD+).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	473	3626	2294	630	683	19	0	0	0
1	B	473	3626	2294	630	683	19	0	0	0
1	C	473	3626	2294	630	683	19	0	0	0
1	D	473	3626	2294	630	683	19	0	0	0
1	E	473	3626	2294	630	683	19	0	0	0
1	F	473	3626	2294	630	683	19	0	0	0
1	G	473	3626	2294	630	683	19	0	0	0
1	H	473	3626	2294	630	683	19	0	0	0

There are 24 discrepancies between the modelled and reference sequences:

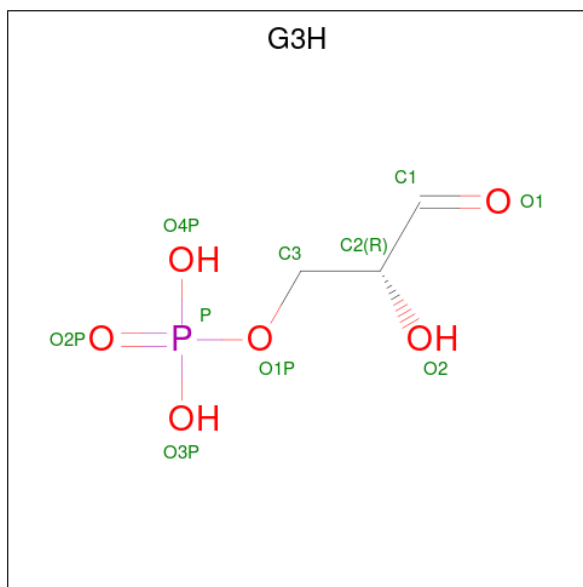
Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	GLY	-	expression tag	UNP Q92UV7
A	-1	SER	-	expression tag	UNP Q92UV7
A	0	HIS	-	expression tag	UNP Q92UV7
B	-2	GLY	-	expression tag	UNP Q92UV7
B	-1	SER	-	expression tag	UNP Q92UV7
B	0	HIS	-	expression tag	UNP Q92UV7
C	-2	GLY	-	expression tag	UNP Q92UV7
C	-1	SER	-	expression tag	UNP Q92UV7
C	0	HIS	-	expression tag	UNP Q92UV7
D	-2	GLY	-	expression tag	UNP Q92UV7
D	-1	SER	-	expression tag	UNP Q92UV7
D	0	HIS	-	expression tag	UNP Q92UV7
E	-2	GLY	-	expression tag	UNP Q92UV7

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Chain	Residue	Modelled	Actual	Comment	Reference
E	-1	SER	-	expression tag	UNP Q92UV7
E	0	HIS	-	expression tag	UNP Q92UV7
F	-2	GLY	-	expression tag	UNP Q92UV7
F	-1	SER	-	expression tag	UNP Q92UV7
F	0	HIS	-	expression tag	UNP Q92UV7
G	-2	GLY	-	expression tag	UNP Q92UV7
G	-1	SER	-	expression tag	UNP Q92UV7
G	0	HIS	-	expression tag	UNP Q92UV7
H	-2	GLY	-	expression tag	UNP Q92UV7
H	-1	SER	-	expression tag	UNP Q92UV7
H	0	HIS	-	expression tag	UNP Q92UV7

- Molecule 2 is GLYCERALDEHYDE-3-PHOSPHATE (three-letter code: G3H) (formula:  $C_3H_7O_6P$ ).



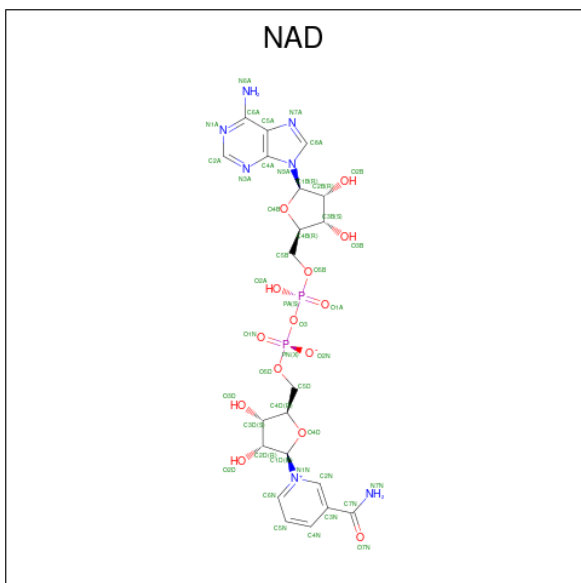
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	O	P	0	0
			10	3	6	1		
2	B	1	Total	C	O	P	0	0
			10	3	6	1		
2	C	1	Total	C	O	P	0	0
			10	3	6	1		
2	D	1	Total	C	O	P	0	0
			10	3	6	1		
2	E	1	Total	C	O	P	0	0
			10	3	6	1		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	F	1	Total	C	O	P	0	0
			10	3	6	1		
2	G	1	Total	C	O	P	0	0
			10	3	6	1		
2	H	1	Total	C	O	P	0	0
			10	3	6	1		

- Molecule 3 is NICOTINAMIDE-ADENINE-DINUCLEOTIDE (three-letter code: NAD) (formula:  $C_{21}H_{27}N_7O_{14}P_2$ ).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
3	A	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
3	B	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
3	C	1	Total	C	N	O	P	0	0
			35	15	5	13	2		
3	D	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
3	E	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
3	F	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
3	G	1	Total	C	N	O	P	0	0
			27	10	5	10	2		

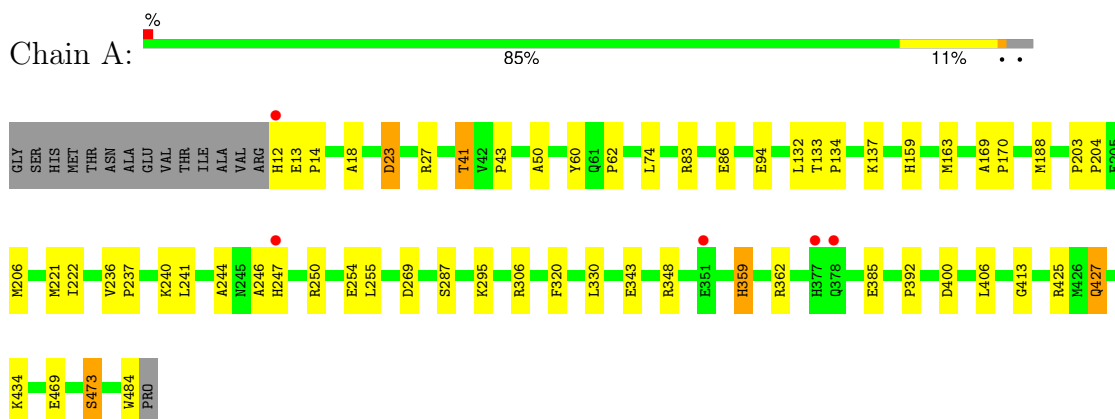
- Molecule 4 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	259	Total O 259 259	0	0
4	B	247	Total O 247 247	0	0
4	C	260	Total O 260 260	0	0
4	D	201	Total O 201 201	0	0
4	E	206	Total O 206 206	0	0
4	F	214	Total O 214 214	0	0
4	G	163	Total O 163 163	0	0
4	H	128	Total O 128 128	0	0

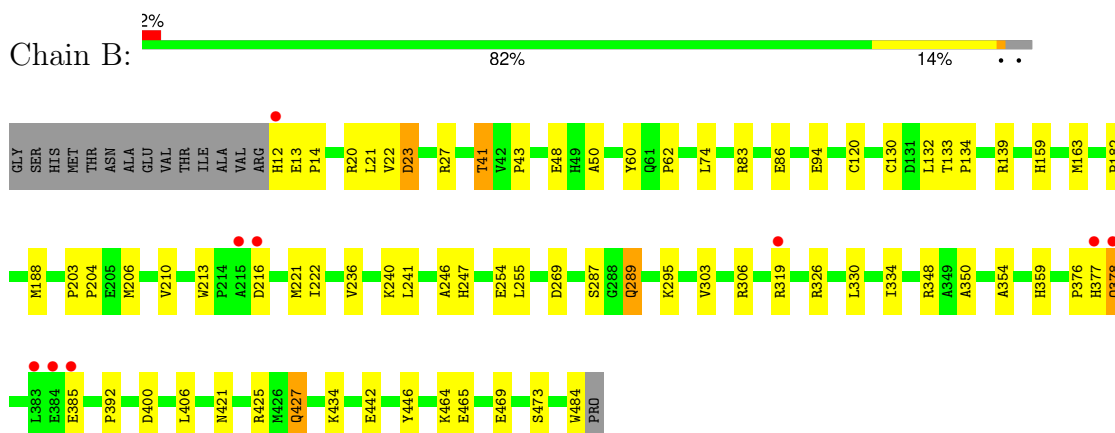
### 3 Residue-property plots [i](#)

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.

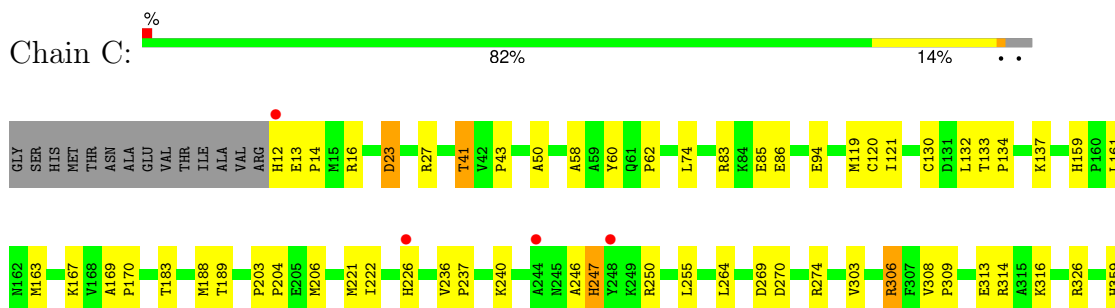
- Molecule 1: Aldehyde dehydrogenase (NAD<sup>+</sup>)



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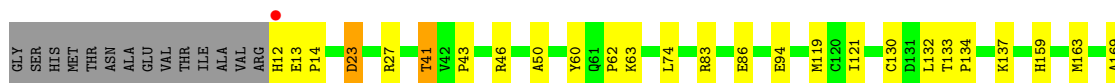
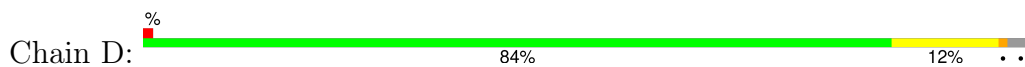
- Molecule 1: Aldehyde dehydrogenase (NAD<sup>+</sup>)



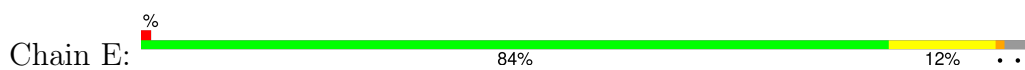




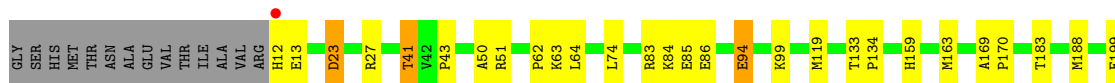
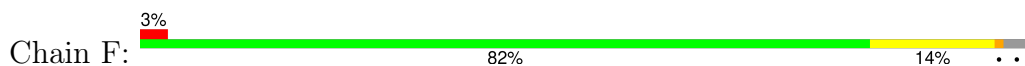
- Molecule 1: Aldehyde dehydrogenase (NAD<sup>+</sup>)



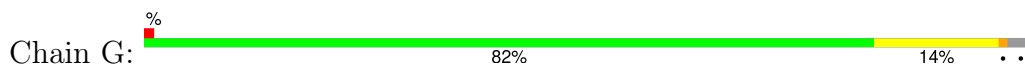
- Molecule 1: Aldehyde dehydrogenase (NAD<sup>+</sup>)



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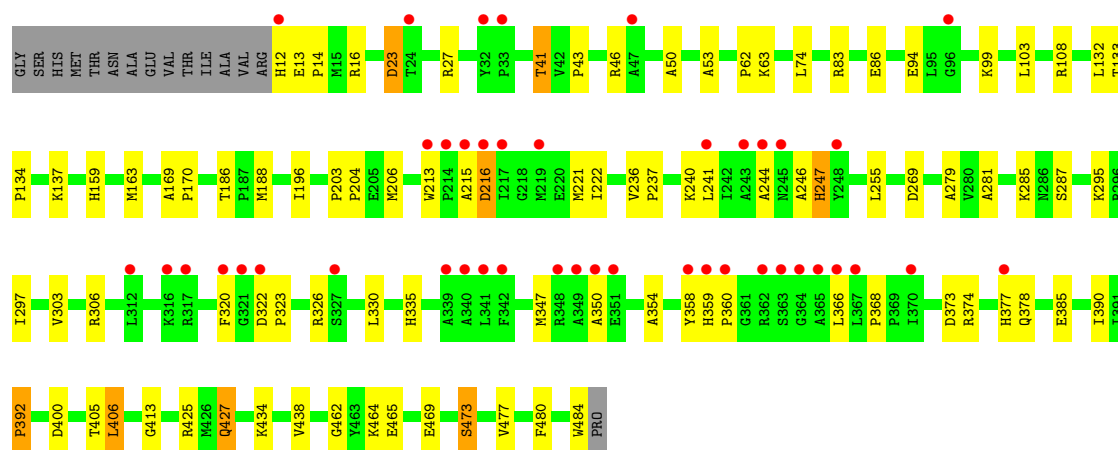
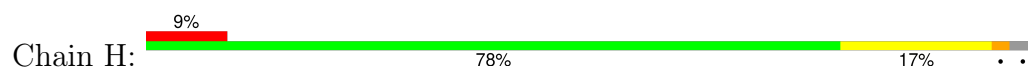


- Molecule 1: Aldehyde dehydrogenase (NAD<sup>+</sup>)





• Molecule 1: Aldehyde dehydrogenase (NAD<sup>+</sup>)



## 4 Data and refinement statistics i

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	94.45Å 172.71Å 139.78Å 90.00° 106.90° 90.00°	Depositor
Resolution (Å)	24.97 – 2.24 24.97 – 2.24	Depositor EDS
% Data completeness (in resolution range)	97.1 (24.97-2.24) 97.0 (24.97-2.24)	Depositor EDS
$R_{merge}$	0.11	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.92 (at 2.24Å)	Xtrriage
Refinement program	REFMAC, PHENIX 1.7.1_743	Depositor
R, $R_{free}$	0.204 , 0.249 0.201 , 0.245	Depositor DCC
$R_{free}$ test set	9987 reflections (5.04%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	23.0	Xtrriage
Anisotropy	0.037	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 37.4	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	0.018 for h,-k,-h-l	Xtrriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	30963	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	24.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.69% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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 [i](#)

### 5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: G3H, 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	0.65	0/3698	0.67	0/5030
1	B	0.69	3/3698 (0.1%)	0.67	0/5030
1	C	0.65	2/3698 (0.1%)	0.68	1/5030 (0.0%)
1	D	0.62	0/3698	0.65	0/5030
1	E	0.63	1/3698 (0.0%)	0.67	1/5030 (0.0%)
1	F	0.65	0/3698	0.67	2/5030 (0.0%)
1	G	0.64	1/3698 (0.0%)	0.66	1/5030 (0.0%)
1	H	0.70	0/3698	0.69	1/5030 (0.0%)
All	All	0.65	7/29584 (0.0%)	0.67	6/40240 (0.0%)

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	120	CYS	CB-SG	-10.02	1.65	1.82
1	B	289	GLN	CD-OE1	-8.75	1.04	1.24
1	B	289	GLN	CD-NE2	-8.68	1.11	1.32
1	G	120	CYS	CB-SG	-8.45	1.67	1.82
1	C	120	CYS	CB-SG	-7.68	1.69	1.82
1	C	473	SER	CB-OG	-5.80	1.34	1.42
1	E	120	CYS	CB-SG	-5.13	1.73	1.81

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	F	348	ARG	NE-CZ-NH2	-7.39	116.61	120.30
1	H	216	ASP	CB-CG-OD1	-7.26	111.76	118.30
1	E	425	ARG	NE-CZ-NH2	-5.43	117.58	120.30
1	F	348	ARG	NE-CZ-NH1	5.33	122.96	120.30
1	C	306	ARG	NE-CZ-NH1	5.12	122.86	120.30
1	G	373	ASP	CB-CG-OD1	5.07	122.86	118.30

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	3626	0	3654	53	1
1	B	3626	0	3654	70	1
1	C	3626	0	3654	78	2
1	D	3626	0	3654	60	1
1	E	3626	0	3654	58	0
1	F	3626	0	3654	96	1
1	G	3626	0	3654	61	0
1	H	3626	0	3654	104	0
2	A	10	0	4	0	0
2	B	10	0	4	0	0
2	C	10	0	4	0	0
2	D	10	0	4	0	0
2	E	10	0	4	1	0
2	F	10	0	4	0	0
2	G	10	0	4	0	0
2	H	10	0	4	1	0
3	A	27	0	12	0	0
3	B	27	0	12	0	0
3	C	35	0	19	1	0
3	D	27	0	11	1	0
3	E	27	0	12	0	0
3	F	27	0	12	1	0
3	G	27	0	12	0	0
4	A	259	0	0	8	1
4	B	247	0	0	16	0
4	C	260	0	0	19	1
4	D	201	0	0	10	0
4	E	206	0	0	11	0
4	F	214	0	0	21	1
4	G	163	0	0	13	1
4	H	128	0	0	24	0
All	All	30963	0	29354	524	5

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 9.

All (524) 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:F:348:ARG:HD3	1:H:216:ASP:CG	1.38	1.42
1:A:359:HIS:O	1:E:326:ARG:HD2	1.27	1.29
1:F:348:ARG:CD	1:H:216:ASP:CG	2.01	1.28
1:F:348:ARG:HD3	1:H:216:ASP:OD1	1.14	1.24
4:A:856:HOH:O	1:E:319:ARG:HD2	1.34	1.23
1:F:221:MET:SD	4:F:808:HOH:O	2.01	1.19
1:B:216:ASP:HB2	4:B:815:HOH:O	1.44	1.18
1:F:348:ARG:CD	1:H:216:ASP:OD1	1.92	1.16
1:E:99:LYS:NZ	4:E:605:HOH:O	1.68	1.14
1:E:85:GLU:OE1	4:E:605:HOH:O	1.69	1.10
1:B:48:GLU:OE1	4:B:803:HOH:O	1.70	1.09
1:H:326:ARG:NH1	4:H:615:HOH:O	1.83	1.09
1:F:344:GLU:OE1	1:H:215:ALA:O	1.71	1.09
1:E:221:MET:SD	4:E:803:HOH:O	2.08	1.08
1:F:119:MET:HE1	4:F:651:HOH:O	1.54	1.07
1:H:216:ASP:HB2	4:H:633:HOH:O	1.53	1.06
1:C:326:ARG:NH1	4:C:605:HOH:O	1.85	1.06
1:D:206:MET:SD	4:D:628:HOH:O	2.13	1.05
1:E:206:MET:SD	4:E:762:HOH:O	2.15	1.05
1:B:326:ARG:NH1	4:B:604:HOH:O	1.92	1.02
1:H:347:MET:HE1	4:H:692:HOH:O	1.59	0.99
1:E:12:HIS:N	4:E:652:HOH:O	1.94	0.98
1:D:221:MET:SD	4:D:801:HOH:O	2.26	0.92
1:G:306:ARG:NH1	4:G:757:HOH:O	2.03	0.92
1:H:12:HIS:N	4:H:725:HOH:O	2.02	0.91
1:A:50:ALA:HB1	1:A:221:MET:HE2	1.53	0.91
1:E:50:ALA:HB1	1:E:221:MET:HE2	1.51	0.90
1:F:50:ALA:HB1	1:F:221:MET:HE2	1.54	0.89
1:G:50:ALA:HB1	1:G:221:MET:CE	2.04	0.88
1:B:348:ARG:NH1	4:B:783:HOH:O	1.88	0.88
1:G:50:ALA:HB1	1:G:221:MET:HE2	1.55	0.87
1:C:377:HIS:ND1	1:C:406:LEU:HD11	1.90	0.86
1:A:50:ALA:HB1	1:A:221:MET:CE	2.06	0.86
1:F:351:GLU:OE1	1:H:213:TRP:HB3	1.75	0.86
1:F:344:GLU:CD	1:H:215:ALA:O	2.13	0.85
1:G:427:GLN:HG3	4:G:628:HOH:O	1.76	0.85
1:F:50:ALA:HB1	1:F:221:MET:CE	2.06	0.85

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:351:GLU:OE2	1:H:215:ALA:HB2	1.75	0.85
1:C:50:ALA:HB1	1:C:221:MET:HE2	1.58	0.85
1:C:203:PRO:HG2	1:C:206:MET:HE3	1.57	0.84
1:F:62:PRO:HB3	1:F:206:MET:HE2	1.59	0.84
1:B:203:PRO:HG2	1:B:206:MET:HE3	1.58	0.84
1:D:23:ASP:OD1	1:D:27:ARG:NH1	2.09	0.83
1:F:348:ARG:HB2	1:H:216:ASP:OD1	1.78	0.83
1:B:50:ALA:HB1	1:B:221:MET:HE2	1.58	0.83
1:B:421:ASN:HB3	4:D:715:HOH:O	1.79	0.83
1:G:23:ASP:OD1	1:G:27:ARG:NH1	2.10	0.83
1:F:85:GLU:OE1	4:F:803:HOH:O	1.94	0.83
1:H:484:TRP:C	4:H:722:HOH:O	2.17	0.83
1:E:23:ASP:OD1	1:E:27:ARG:NH1	2.12	0.82
1:B:378:GLN:NE2	4:B:837:HOH:O	2.13	0.82
1:D:50:ALA:HB1	1:D:221:MET:HE2	1.60	0.82
1:F:99:LYS:NZ	4:F:803:HOH:O	1.98	0.82
1:E:50:ALA:HB1	1:E:221:MET:CE	2.09	0.82
1:F:348:ARG:CG	1:H:216:ASP:OD1	2.28	0.81
1:F:348:ARG:CD	1:H:216:ASP:OD2	2.27	0.81
1:D:50:ALA:HB1	1:D:221:MET:CE	2.11	0.80
1:C:50:ALA:HB1	1:C:221:MET:CE	2.11	0.80
1:H:196:ILE:O	4:H:650:HOH:O	2.00	0.79
1:F:23:ASP:OD1	1:F:27:ARG:NH1	2.14	0.79
1:H:62:PRO:HB3	1:H:206:MET:HE2	1.64	0.79
1:G:12:HIS:N	4:G:683:HOH:O	2.15	0.79
1:F:348:ARG:HD2	1:H:216:ASP:OD2	1.82	0.79
1:H:50:ALA:HB1	1:H:221:MET:HE2	1.65	0.79
1:F:344:GLU:OE1	1:H:216:ASP:HA	1.83	0.78
1:A:23:ASP:OD1	1:A:27:ARG:NH1	2.17	0.78
1:F:348:ARG:HD2	1:H:216:ASP:CG	2.02	0.78
1:E:203:PRO:HG2	1:E:206:MET:HE3	1.65	0.78
1:G:203:PRO:HG2	1:G:206:MET:HE3	1.65	0.77
1:D:203:PRO:HG2	1:D:206:MET:HE3	1.65	0.77
1:F:351:GLU:OE2	1:H:215:ALA:CB	2.31	0.77
1:H:53:ALA:O	4:H:622:HOH:O	2.01	0.77
1:H:103:LEU:HD11	4:H:615:HOH:O	1.85	0.77
1:H:23:ASP:OD1	1:H:27:ARG:NH1	2.18	0.76
1:F:318:LEU:O	4:F:755:HOH:O	2.01	0.76
1:B:484:TRP:C	4:B:842:HOH:O	2.25	0.75
1:C:85:GLU:OE2	4:C:605:HOH:O	2.03	0.75
1:H:405:THR:O	4:H:667:HOH:O	2.05	0.74

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:484:TRP:C	4:A:804:HOH:O	2.23	0.74
1:B:50:ALA:HB1	1:B:221:MET:CE	2.16	0.74
1:H:50:ALA:HB1	1:H:221:MET:CE	2.17	0.74
1:B:23:ASP:OD1	1:B:27:ARG:NH1	2.21	0.74
1:A:203:PRO:HG2	1:A:206:MET:HE3	1.67	0.74
1:F:348:ARG:CB	1:H:216:ASP:OD1	2.36	0.73
1:H:287:SER:OG	4:H:694:HOH:O	1.99	0.73
1:C:427:GLN:HG3	4:C:611:HOH:O	1.88	0.73
1:B:21:LEU:O	1:F:247:HIS:NE2	2.18	0.72
1:F:464:LYS:HE2	4:F:731:HOH:O	1.90	0.72
1:E:50:ALA:CB	1:E:221:MET:CE	2.68	0.72
1:A:27:ARG:HE	1:A:41:THR:HG23	1.55	0.71
1:F:248:TYR:C	4:F:638:HOH:O	2.27	0.71
1:B:20:ARG:HB3	1:F:247:HIS:HE1	1.55	0.70
1:C:23:ASP:OD1	1:C:27:ARG:NH1	2.24	0.70
1:G:50:ALA:CB	1:G:221:MET:CE	2.69	0.70
1:G:347:MET:HE3	4:G:761:HOH:O	1.92	0.70
1:F:50:ALA:CB	1:F:221:MET:CE	2.69	0.69
1:C:50:ALA:CB	1:C:221:MET:CE	2.70	0.69
1:H:203:PRO:HG2	1:H:206:MET:HE3	1.74	0.69
1:D:27:ARG:HE	1:D:41:THR:HG23	1.58	0.69
1:A:50:ALA:CB	1:A:221:MET:CE	2.70	0.69
1:B:62:PRO:HB3	1:B:206:MET:CE	2.23	0.68
1:C:427:GLN:NE2	4:C:762:HOH:O	2.26	0.68
1:F:85:GLU:OE2	4:F:802:HOH:O	2.11	0.68
1:C:58:ALA:CB	1:C:226:HIS:ND1	2.57	0.68
1:F:427:GLN:NE2	4:F:681:HOH:O	2.25	0.68
1:A:427:GLN:HG3	4:A:611:HOH:O	1.94	0.67
1:H:94:GLU:OE2	1:H:188:MET:N	2.21	0.67
1:F:203:PRO:HG2	1:F:206:MET:HE3	1.74	0.67
1:B:94:GLU:OE2	1:B:188:MET:N	2.23	0.67
1:C:163:MET:HE2	4:C:849:HOH:O	1.94	0.67
1:D:50:ALA:CB	1:D:221:MET:CE	2.73	0.67
1:F:199:GLU:HG2	4:F:774:HOH:O	1.94	0.67
1:A:137:LYS:HE3	1:F:442:GLU:OE2	1.92	0.67
1:G:62:PRO:HB3	1:G:206:MET:HE2	1.77	0.66
1:B:21:LEU:N	1:F:247:HIS:CE1	2.64	0.66
1:H:62:PRO:HB3	1:H:206:MET:CE	2.25	0.66
1:B:62:PRO:HB3	1:B:206:MET:HE2	1.78	0.65
1:A:244:ALA:HB1	1:B:21:LEU:HD12	1.78	0.65
1:B:20:ARG:HB3	1:F:247:HIS:CE1	2.32	0.65

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:94:GLU:OE2	1:F:188:MET:N	2.24	0.65
1:B:20:ARG:NH2	1:F:223:THR:HG21	2.12	0.65
1:B:213:TRP:O	4:B:815:HOH:O	2.14	0.65
1:A:359:HIS:O	1:E:326:ARG:CD	2.23	0.64
1:H:427:GLN:HG3	4:H:616:HOH:O	1.96	0.64
1:E:27:ARG:HE	1:E:41:THR:HG23	1.62	0.64
1:D:27:ARG:HE	1:D:41:THR:CG2	2.10	0.64
1:C:377:HIS:NE2	1:C:378:GLN:OE1	2.31	0.64
1:D:94:GLU:OE2	1:D:188:MET:N	2.23	0.64
1:G:484:TRP:C	4:G:710:HOH:O	2.36	0.64
1:F:344:GLU:OE2	1:H:215:ALA:O	2.16	0.63
1:F:27:ARG:HE	1:F:41:THR:HG23	1.63	0.63
1:F:51:ARG:HD2	4:F:794:HOH:O	1.97	0.63
1:A:27:ARG:HE	1:A:41:THR:CG2	2.12	0.63
1:F:62:PRO:CB	1:F:206:MET:HE2	2.28	0.63
1:F:62:PRO:HB3	1:F:206:MET:CE	2.29	0.63
1:B:50:ALA:CB	1:B:221:MET:CE	2.77	0.62
1:E:94:GLU:OE2	1:E:188:MET:N	2.25	0.62
1:G:12:HIS:HA	1:G:41:THR:HG22	1.81	0.62
1:F:351:GLU:OE1	1:H:213:TRP:CB	2.45	0.62
1:B:269:ASP:OD1	1:B:306:ARG:HD2	2.00	0.62
1:C:314:ARG:HG2	4:C:835:HOH:O	1.99	0.62
1:B:376:PRO:HB3	4:B:837:HOH:O	2.00	0.62
1:C:27:ARG:HE	1:C:41:THR:HG23	1.64	0.62
1:H:133:THR:HB	1:H:134:PRO:HD2	1.81	0.62
1:E:62:PRO:HB3	1:E:206:MET:CE	2.29	0.62
1:A:269:ASP:OD1	1:A:306:ARG:HD2	2.00	0.61
1:H:50:ALA:CB	1:H:221:MET:CE	2.79	0.61
1:B:159:HIS:HB2	1:B:163:MET:HG2	1.82	0.61
1:D:378:GLN:O	4:D:659:HOH:O	2.16	0.61
1:B:27:ARG:HE	1:B:41:THR:HG23	1.66	0.61
1:B:21:LEU:H	1:F:247:HIS:CE1	2.19	0.60
1:G:62:PRO:HB3	1:G:206:MET:CE	2.30	0.60
1:H:62:PRO:CB	1:H:206:MET:HE2	2.31	0.60
1:A:348:ARG:HG2	4:A:815:HOH:O	2.02	0.60
1:G:94:GLU:OE2	1:G:188:MET:N	2.26	0.60
1:C:119:MET:HE3	1:D:121:ILE:HD11	1.84	0.60
1:D:159:HIS:HB2	1:D:163:MET:HG2	1.84	0.60
1:H:12:HIS:HA	1:H:41:THR:HG22	1.84	0.60
1:F:348:ARG:CG	1:H:216:ASP:CG	2.69	0.59
1:E:159:HIS:HB2	1:E:163:MET:HG2	1.84	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:377:HIS:HD2	1:C:378:GLN:N	1.99	0.59
1:C:121:ILE:HD11	1:D:119:MET:HE2	1.84	0.59
1:F:348:ARG:HD3	1:H:216:ASP:CB	2.26	0.59
1:E:12:HIS:HA	1:E:41:THR:HG22	1.83	0.59
1:B:216:ASP:OD2	4:B:644:HOH:O	2.16	0.59
1:C:313:GLU:OE1	4:C:801:HOH:O	2.16	0.59
1:F:27:ARG:HE	1:F:41:THR:CG2	2.16	0.59
1:E:27:ARG:HE	1:E:41:THR:CG2	2.16	0.59
1:G:27:ARG:HE	1:G:41:THR:HG23	1.67	0.59
1:C:27:ARG:HE	1:C:41:THR:CG2	2.16	0.59
1:D:383:LEU:HD23	4:D:659:HOH:O	2.02	0.59
1:B:27:ARG:HE	1:B:41:THR:CG2	2.16	0.58
1:C:377:HIS:CD2	1:C:378:GLN:OE1	2.56	0.58
1:D:464:LYS:HE2	4:D:700:HOH:O	2.03	0.58
1:A:13:GLU:O	1:A:43:PRO:HD3	2.04	0.58
1:F:133:THR:HB	1:F:134:PRO:HD2	1.85	0.58
1:E:119:MET:HE1	4:E:628:HOH:O	2.04	0.57
1:E:269:ASP:OD1	1:E:306:ARG:HD2	2.05	0.57
1:C:159:HIS:HB2	1:C:163:MET:HG2	1.86	0.57
1:D:133:THR:HB	1:D:134:PRO:HD2	1.85	0.57
1:H:27:ARG:HE	1:H:41:THR:HG23	1.68	0.57
4:A:856:HOH:O	1:E:319:ARG:CD	2.14	0.57
1:G:427:GLN:O	1:G:427:GLN:OE1	2.21	0.57
1:H:169:ALA:HB3	1:H:170:PRO:HD3	1.87	0.57
1:A:12:HIS:HA	1:A:41:THR:HG22	1.86	0.57
1:C:303:VAL:HG12	1:C:306:ARG:NH2	2.20	0.56
1:E:51:ARG:HD2	4:E:759:HOH:O	2.03	0.56
1:F:159:HIS:HB2	1:F:163:MET:HG2	1.87	0.56
1:H:373:ASP:OD1	1:H:374:ARG:N	2.38	0.56
1:G:236:VAL:O	1:G:240:LYS:HG2	2.04	0.56
1:G:222:ILE:HG23	1:G:246:ALA:HB2	1.87	0.56
1:H:464:LYS:HE2	4:H:689:HOH:O	2.04	0.56
1:G:133:THR:HB	1:G:134:PRO:HD2	1.87	0.56
1:H:13:GLU:O	1:H:43:PRO:HD3	2.05	0.56
1:B:236:VAL:O	1:B:240:LYS:HG2	2.05	0.56
1:A:159:HIS:HB2	1:A:163:MET:HG2	1.88	0.56
1:A:240:LYS:HE2	4:A:683:HOH:O	2.05	0.56
1:D:27:ARG:NE	1:D:41:THR:HG23	2.21	0.56
1:F:326:ARG:NH1	4:F:802:HOH:O	2.38	0.56
1:A:62:PRO:HB3	1:A:206:MET:CE	2.36	0.56
4:B:712:HOH:O	1:C:247:HIS:HB2	2.05	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:121:ILE:HD11	1:D:119:MET:CE	2.36	0.56
1:H:222:ILE:HG23	1:H:246:ALA:HB2	1.88	0.56
1:F:188:MET:HE1	4:F:722:HOH:O	2.04	0.55
1:E:133:THR:HB	1:E:134:PRO:HD2	1.88	0.55
1:C:247:HIS:HA	4:C:752:HOH:O	2.05	0.55
1:E:222:ILE:HG23	1:E:246:ALA:HB2	1.87	0.55
1:D:137:LYS:HE3	1:E:442:GLU:OE2	2.07	0.55
1:C:203:PRO:CG	1:C:206:MET:HE3	2.34	0.54
1:E:85:GLU:HA	4:E:605:HOH:O	2.06	0.54
1:F:473:SER:O	4:F:810:HOH:O	2.18	0.54
1:F:484:TRP:C	4:F:665:HOH:O	2.45	0.54
1:F:348:ARG:NH2	4:F:670:HOH:O	2.40	0.54
1:H:159:HIS:HB2	1:H:163:MET:HG2	1.90	0.54
1:B:442:GLU:OE2	1:C:137:LYS:HE3	2.07	0.54
1:D:269:ASP:OD1	1:D:306:ARG:HD2	2.07	0.54
1:H:295:LYS:HB3	4:H:638:HOH:O	2.08	0.54
1:A:133:THR:HB	1:A:134:PRO:HD2	1.89	0.54
1:G:216:ASP:OD2	4:G:645:HOH:O	2.18	0.54
1:H:236:VAL:O	1:H:240:LYS:HG2	2.08	0.54
1:G:269:ASP:OD1	1:G:306:ARG:HD2	2.07	0.54
1:A:27:ARG:NE	1:A:41:THR:HG23	2.23	0.54
1:C:12:HIS:HA	1:C:41:THR:HG22	1.88	0.54
1:E:60:TYR:HE2	1:E:206:MET:HE2	1.74	0.53
1:A:62:PRO:HB3	1:A:206:MET:HE2	1.90	0.53
1:E:303:VAL:HG12	1:E:306:ARG:NH2	2.23	0.53
1:H:27:ARG:HE	1:H:41:THR:CG2	2.20	0.53
1:A:359:HIS:O	1:E:326:ARG:HB2	2.07	0.53
1:D:60:TYR:HE2	1:D:206:MET:HE2	1.73	0.53
1:G:27:ARG:HE	1:G:41:THR:CG2	2.21	0.53
1:C:400:ASP:OD2	1:C:425:ARG:HD2	2.09	0.53
1:C:60:TYR:HE2	1:C:206:MET:HE2	1.73	0.53
1:C:378:GLN:CD	4:C:726:HOH:O	2.47	0.53
1:C:133:THR:HB	1:C:134:PRO:HD2	1.91	0.53
1:E:62:PRO:HB3	1:E:206:MET:HE2	1.90	0.53
1:H:12:HIS:HA	4:H:717:HOH:O	2.08	0.53
1:H:133:THR:HB	1:H:134:PRO:CD	2.39	0.53
1:H:366:LEU:HD23	4:H:718:HOH:O	2.09	0.53
1:H:400:ASP:OD2	1:H:425:ARG:HD2	2.08	0.53
1:F:163:MET:HA	1:F:163:MET:HE2	1.91	0.53
1:B:203:PRO:CG	1:B:206:MET:HE3	2.35	0.52
1:C:469:GLU:O	1:C:473:SER:HB3	2.08	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:13:GLU:O	1:D:43:PRO:HD3	2.10	0.52
1:D:303:VAL:HG12	1:D:306:ARG:NH2	2.25	0.52
1:D:446:TYR:OH	1:E:130:CYS:HB3	2.09	0.52
1:C:13:GLU:O	1:C:43:PRO:HD3	2.09	0.52
1:E:236:VAL:O	1:E:240:LYS:HG2	2.09	0.52
1:E:484:TRP:C	4:E:708:HOH:O	2.47	0.52
1:E:50:ALA:HB2	1:E:221:MET:HE3	1.92	0.52
1:C:269:ASP:OD1	1:C:306:ARG:HD2	2.08	0.52
1:F:12:HIS:HA	1:F:41:THR:HG22	1.92	0.52
1:F:236:VAL:O	1:F:240:LYS:HG2	2.09	0.52
1:F:469:GLU:O	1:F:473:SER:HB2	2.10	0.52
1:F:269:ASP:OD1	1:F:306:ARG:HD2	2.10	0.52
1:G:12:HIS:CD2	1:G:41:THR:HG21	2.45	0.52
1:G:368:PRO:HB2	4:G:759:HOH:O	2.09	0.52
1:C:27:ARG:NE	1:C:41:THR:HG23	2.25	0.52
1:F:203:PRO:HG2	1:F:206:MET:CE	2.39	0.52
1:G:427:GLN:OE1	1:G:427:GLN:C	2.48	0.52
1:G:269:ASP:N	4:G:757:HOH:O	2.42	0.52
1:H:303:VAL:HG12	1:H:306:ARG:NH2	2.24	0.52
1:C:477:VAL:O	4:C:828:HOH:O	2.19	0.51
1:D:83:ARG:HD2	1:D:86:GLU:OE1	2.11	0.51
1:B:427:GLN:HG3	4:B:658:HOH:O	2.09	0.51
1:D:12:HIS:HA	1:D:41:THR:HG22	1.91	0.51
1:E:295:LYS:HE2	1:E:385:GLU:HG3	1.93	0.51
2:E:501:G3H:O4P	2:E:501:G3H:O1	2.29	0.51
1:B:133:THR:HB	1:B:134:PRO:HD2	1.93	0.51
1:F:50:ALA:CB	1:F:221:MET:HE3	2.40	0.51
1:F:27:ARG:NE	1:F:41:THR:HG23	2.26	0.51
1:G:62:PRO:CB	1:G:206:MET:HE2	2.40	0.51
1:G:426:MET:HG2	1:G:440:ILE:HD12	1.92	0.51
1:A:400:ASP:OD2	1:A:425:ARG:HD2	2.11	0.51
1:B:12:HIS:HA	1:B:41:THR:HG22	1.92	0.51
1:A:60:TYR:HE2	1:A:206:MET:HE2	1.76	0.50
1:C:62:PRO:HB3	1:C:206:MET:CE	2.40	0.50
1:B:27:ARG:NE	1:B:41:THR:HG23	2.26	0.50
1:D:12:HIS:CD2	1:D:41:THR:HG21	2.46	0.50
1:F:344:GLU:OE1	1:H:216:ASP:CA	2.58	0.50
1:G:159:HIS:HB2	1:G:163:MET:HG2	1.94	0.50
1:B:22:VAL:HG13	1:F:245:ASN:OD1	2.11	0.50
1:B:378:GLN:O	4:B:752:HOH:O	2.20	0.50
1:G:400:ASP:OD2	1:G:425:ARG:HD2	2.10	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:50:ALA:CB	1:A:221:MET:HE3	2.42	0.50
1:G:279:ALA:HB1	1:G:297:ILE:HD13	1.93	0.50
1:C:274:ARG:NH1	4:C:812:HOH:O	2.45	0.50
1:E:13:GLU:O	1:E:43:PRO:HD3	2.12	0.50
1:E:27:ARG:NE	1:E:41:THR:HG23	2.25	0.50
1:G:50:ALA:HB2	1:G:221:MET:HE3	1.94	0.50
1:G:400:ASP:OD2	1:G:425:ARG:CD	2.60	0.50
1:A:94:GLU:OE2	1:A:188:MET:N	2.27	0.49
1:C:400:ASP:OD2	1:C:425:ARG:CD	2.60	0.49
1:D:62:PRO:HB3	1:D:206:MET:CE	2.41	0.49
1:F:50:ALA:HB2	1:F:221:MET:HE3	1.93	0.49
1:D:222:ILE:HG23	1:D:246:ALA:HB2	1.94	0.49
1:G:50:ALA:CB	1:G:221:MET:HE3	2.41	0.49
1:A:295:LYS:HE2	1:A:385:GLU:HG3	1.93	0.49
1:C:377:HIS:CD2	1:C:378:GLN:N	2.79	0.49
1:D:62:PRO:HB3	1:D:206:MET:HE2	1.93	0.49
1:D:130:CYS:HB3	1:E:446:TYR:OH	2.12	0.49
1:F:303:VAL:HG12	1:F:306:ARG:NH2	2.28	0.49
1:G:469:GLU:O	1:G:473:SER:HB2	2.12	0.49
1:B:60:TYR:HE2	1:B:206:MET:HE2	1.77	0.49
1:D:203:PRO:CG	1:D:206:MET:HE3	2.41	0.49
1:D:469:GLU:O	1:D:473:SER:HB2	2.12	0.49
1:G:111:ASP:HA	4:G:730:HOH:O	2.12	0.49
1:A:348:ARG:NE	4:A:815:HOH:O	2.35	0.49
1:E:400:ASP:OD2	1:E:425:ARG:HD2	2.12	0.49
1:E:94:GLU:HG2	1:E:186:THR:HA	1.95	0.49
1:F:348:ARG:HG3	1:H:216:ASP:OD2	2.12	0.49
1:H:473:SER:HB2	4:H:663:HOH:O	2.12	0.49
1:C:378:GLN:NE2	4:C:726:HOH:O	2.44	0.49
1:F:348:ARG:CG	1:H:216:ASP:OD2	2.61	0.49
1:H:287:SER:HA	1:H:330:LEU:CD1	2.42	0.49
1:G:133:THR:HB	1:G:134:PRO:CD	2.43	0.48
1:A:50:ALA:HB2	1:A:221:MET:HE3	1.95	0.48
1:C:50:ALA:HB2	1:C:221:MET:HE3	1.94	0.48
1:D:236:VAL:HB	1:D:237:PRO:HD3	1.95	0.48
1:F:169:ALA:HB3	1:F:170:PRO:HD3	1.96	0.48
1:H:46:ARG:NH2	4:H:629:HOH:O	2.34	0.48
1:B:446:TYR:OH	1:C:130:CYS:HB3	2.13	0.48
1:D:236:VAL:O	1:D:240:LYS:HG2	2.13	0.48
1:G:236:VAL:HB	1:G:237:PRO:HD3	1.96	0.48
1:D:295:LYS:HE2	1:D:385:GLU:HG3	1.94	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:287:SER:HA	1:A:330:LEU:CD1	2.44	0.48
1:E:50:ALA:CB	1:E:221:MET:HE3	2.42	0.48
1:G:94:GLU:HG2	1:G:186:THR:HA	1.96	0.48
1:B:400:ASP:OD2	1:B:425:ARG:HD2	2.13	0.48
1:G:303:VAL:HG12	1:G:306:ARG:NH2	2.29	0.48
1:G:83:ARG:HD2	1:G:86:GLU:OE1	2.13	0.48
1:C:83:ARG:HD2	1:C:86:GLU:OE1	2.14	0.48
1:A:244:ALA:CB	1:B:21:LEU:HD12	2.44	0.47
1:B:469:GLU:O	1:B:473:SER:HB2	2.14	0.47
1:F:133:THR:HB	1:F:134:PRO:CD	2.43	0.47
1:E:427:GLN:HG3	4:E:630:HOH:O	2.13	0.47
1:G:268:SER:C	4:G:757:HOH:O	2.52	0.47
1:G:369:PRO:C	4:G:759:HOH:O	2.52	0.47
1:E:236:VAL:HB	1:E:237:PRO:HD3	1.96	0.47
1:H:269:ASP:OD1	1:H:306:ARG:HD2	2.15	0.47
1:E:400:ASP:OD2	1:E:425:ARG:CD	2.62	0.47
1:D:94:GLU:HG2	1:D:186:THR:HA	1.95	0.47
1:F:308:VAL:HB	1:F:309:PRO:HD3	1.95	0.47
1:F:427:GLN:HG3	4:F:658:HOH:O	2.14	0.47
1:G:250:ARG:HD3	1:H:462:GLY:HA3	1.96	0.47
1:F:183:THR:HB	3:F:502:NAD:H3B	1.97	0.47
1:H:400:ASP:OD2	1:H:425:ARG:CD	2.63	0.47
1:B:62:PRO:CB	1:B:206:MET:HE2	2.45	0.47
1:B:303:VAL:HG12	1:B:306:ARG:NH2	2.30	0.47
1:C:222:ILE:HG23	1:C:246:ALA:HB2	1.96	0.47
1:A:169:ALA:HB3	1:A:170:PRO:HD3	1.97	0.47
1:G:203:PRO:CG	1:G:206:MET:HE3	2.43	0.47
1:F:13:GLU:O	1:F:43:PRO:HD3	2.15	0.47
1:F:254:GLU:HB3	4:F:741:HOH:O	2.15	0.47
1:F:64:LEU:HG	1:F:206:MET:HE1	1.97	0.46
1:D:50:ALA:CB	1:D:221:MET:HE3	2.44	0.46
1:H:27:ARG:NE	1:H:41:THR:HG23	2.30	0.46
1:H:203:PRO:HG2	1:H:206:MET:CE	2.44	0.46
1:A:320:PHE:HA	1:A:330:LEU:O	2.15	0.46
1:C:119:MET:CE	1:D:121:ILE:HD11	2.44	0.46
1:F:236:VAL:HB	1:F:237:PRO:HD3	1.96	0.46
1:H:247:HIS:CD2	4:H:659:HOH:O	2.69	0.46
1:E:133:THR:HB	1:E:134:PRO:CD	2.45	0.46
1:D:163:MET:HA	1:D:163:MET:HE2	1.98	0.46
1:E:469:GLU:O	1:E:473:SER:HB3	2.16	0.46
1:G:442:GLU:OE2	1:H:137:LYS:HE3	2.15	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:94:GLU:OE2	1:D:188:MET:HB2	2.16	0.46
1:F:222:ILE:HG23	1:F:246:ALA:HB2	1.97	0.46
1:C:167:LYS:NZ	4:C:632:HOH:O	2.48	0.46
1:G:169:ALA:HB3	1:G:170:PRO:HD3	1.96	0.46
1:C:62:PRO:HB3	1:C:206:MET:HE2	1.97	0.46
1:H:236:VAL:HB	1:H:237:PRO:HD3	1.97	0.46
1:A:83:ARG:HD2	1:A:86:GLU:OE1	2.15	0.45
1:D:46:ARG:NH1	4:D:758:HOH:O	2.41	0.45
1:F:83:ARG:HD2	1:F:86:GLU:OE1	2.16	0.45
1:H:377:HIS:ND1	1:H:406:LEU:HD11	2.31	0.45
1:C:119:MET:CE	4:D:639:HOH:O	2.64	0.45
1:E:169:ALA:HB3	1:E:170:PRO:HD3	1.98	0.45
1:G:326:ARG:HD3	4:G:644:HOH:O	2.15	0.45
1:B:83:ARG:HD2	1:B:86:GLU:OE1	2.17	0.45
1:H:469:GLU:O	1:H:473:SER:HB3	2.16	0.45
1:B:348:ARG:HD3	4:B:783:HOH:O	2.14	0.45
1:F:63:LYS:HA	1:F:63:LYS:HD3	1.78	0.45
1:G:27:ARG:NE	1:G:41:THR:HG23	2.31	0.45
1:C:133:THR:HB	1:C:134:PRO:CD	2.47	0.45
1:C:447:ARG:HD2	4:C:612:HOH:O	2.17	0.45
1:D:400:ASP:OD2	1:D:425:ARG:CD	2.64	0.45
1:H:27:ARG:HH21	1:H:41:THR:HG23	1.81	0.45
1:A:133:THR:HB	1:A:134:PRO:CD	2.46	0.45
1:B:400:ASP:OD2	1:B:425:ARG:CD	2.64	0.45
1:C:94:GLU:OE2	1:C:188:MET:N	2.35	0.45
1:G:13:GLU:O	1:G:43:PRO:HD3	2.16	0.45
1:B:13:GLU:O	1:B:43:PRO:HD3	2.16	0.45
1:G:203:PRO:HG2	1:G:206:MET:CE	2.42	0.45
1:H:335:HIS:HB2	4:H:728:HOH:O	2.16	0.45
1:G:60:TYR:HE2	1:G:206:MET:HE2	1.82	0.45
1:B:295:LYS:HE2	1:B:385:GLU:HG3	1.99	0.44
1:C:119:MET:HE3	1:D:121:ILE:CD1	2.45	0.44
1:D:400:ASP:OD2	1:D:425:ARG:HD2	2.17	0.44
1:E:350:ALA:HA	1:E:354:ALA:HB3	1.99	0.44
1:F:163:MET:HA	1:F:163:MET:CE	2.47	0.44
1:H:244:ALA:O	1:H:247:HIS:CD2	2.70	0.44
1:A:244:ALA:HB1	1:B:21:LEU:CD1	2.45	0.44
1:C:12:HIS:N	4:C:660:HOH:O	2.50	0.44
1:C:58:ALA:HB2	1:C:226:HIS:ND1	2.29	0.44
1:F:203:PRO:HA	1:F:204:PRO:HD3	1.82	0.44
1:H:13:GLU:HA	1:H:14:PRO:HD3	1.84	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:400:ASP:OD2	1:A:425:ARG:CD	2.65	0.44
1:D:63:LYS:HA	1:D:63:LYS:HD3	1.78	0.44
1:H:12:HIS:CA	4:H:717:HOH:O	2.63	0.44
1:H:108:ARG:HH12	2:H:501:G3H:P	2.40	0.44
1:G:370:ILE:N	4:G:759:HOH:O	2.51	0.44
1:C:183:THR:HB	3:C:502:NAD:H3B	2.00	0.44
1:C:308:VAL:HB	1:C:309:PRO:HD3	2.00	0.44
1:D:50:ALA:CB	1:D:221:MET:HE2	2.38	0.44
1:C:58:ALA:HB3	1:C:226:HIS:ND1	2.31	0.44
1:H:14:PRO:O	1:H:16:ARG:NH1	2.47	0.44
1:B:377:HIS:NE2	1:B:378:GLN:OE1	2.51	0.44
1:B:20:ARG:NE	4:B:731:HOH:O	2.44	0.43
1:C:247:HIS:HA	4:C:720:HOH:O	2.17	0.43
1:G:464:LYS:HE3	1:H:477:VAL:HB	1.99	0.43
1:H:350:ALA:HA	1:H:354:ALA:HB3	1.99	0.43
1:H:484:TRP:C	4:H:601:HOH:O	2.55	0.43
1:D:214:PRO:HB3	3:D:502:NAD:C5A	2.48	0.43
1:D:247:HIS:CD2	4:D:775:HOH:O	2.70	0.43
1:H:27:ARG:HA	1:H:27:ARG:HD2	1.79	0.43
1:H:63:LYS:HA	1:H:63:LYS:HD3	1.81	0.43
1:H:203:PRO:HA	1:H:204:PRO:HD3	1.87	0.43
1:H:295:LYS:HE2	1:H:385:GLU:HG3	2.00	0.43
1:G:438:VAL:O	1:H:480:PHE:HA	2.17	0.43
1:H:27:ARG:HH21	1:H:41:THR:CG2	2.32	0.43
1:D:247:HIS:HD2	4:D:775:HOH:O	2.02	0.43
1:H:83:ARG:HD2	1:H:86:GLU:OE1	2.19	0.43
1:A:13:GLU:HA	1:A:14:PRO:HD3	1.91	0.43
1:A:27:ARG:HA	1:A:27:ARG:HD2	1.81	0.43
1:B:222:ILE:HG23	1:B:246:ALA:HB2	2.01	0.43
1:E:62:PRO:HB3	1:E:206:MET:HE1	2.01	0.43
1:H:99:LYS:CE	4:H:615:HOH:O	2.66	0.43
1:A:62:PRO:CB	1:A:206:MET:HE2	2.48	0.43
1:C:236:VAL:HB	1:C:237:PRO:HD3	1.99	0.43
1:A:18:ALA:HA	1:A:204:PRO:O	2.19	0.43
1:A:254:GLU:HB3	4:A:765:HOH:O	2.17	0.43
1:B:130:CYS:HB3	1:C:446:TYR:OH	2.19	0.43
1:H:94:GLU:HG2	1:H:186:THR:HA	2.01	0.43
1:A:27:ARG:HH21	1:A:41:THR:CG2	2.31	0.42
1:A:469:GLU:O	1:A:473:SER:HB2	2.18	0.42
1:C:169:ALA:HB3	1:C:170:PRO:HD3	2.00	0.42
1:A:27:ARG:HH21	1:A:41:THR:HG23	1.84	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:289:GLN:HE22	1:B:334:ILE:N	2.17	0.42
1:E:83:ARG:HD2	1:E:86:GLU:OE1	2.19	0.42
1:F:248:TYR:HA	4:F:638:HOH:O	2.18	0.42
1:F:287:SER:HA	1:F:330:LEU:CD1	2.49	0.42
1:A:203:PRO:HA	1:A:204:PRO:HD3	1.82	0.42
1:D:203:PRO:HA	1:D:204:PRO:HD3	1.82	0.42
1:E:377:HIS:NE2	1:E:378:GLN:OE1	2.52	0.42
1:H:320:PHE:CE1	1:H:368:PRO:HB3	2.54	0.42
1:C:27:ARG:HA	1:C:27:ARG:HD2	1.83	0.42
1:F:377:HIS:CG	1:F:406:LEU:HD11	2.55	0.42
1:D:12:HIS:CD2	1:D:41:THR:CG2	3.03	0.42
1:E:390:ILE:O	1:E:392:PRO:HD3	2.20	0.42
1:F:248:TYR:CA	4:F:638:HOH:O	2.67	0.42
1:H:281:ALA:O	1:H:285:LYS:HG2	2.19	0.42
1:A:343:GLU:OE1	1:A:362:ARG:HD3	2.20	0.42
1:D:50:ALA:HB2	1:D:221:MET:HE3	2.00	0.42
1:D:169:ALA:HB3	1:D:170:PRO:HD3	2.02	0.42
1:E:287:SER:HA	1:E:330:LEU:CD1	2.50	0.42
1:F:400:ASP:OD2	1:F:425:ARG:HD2	2.20	0.42
1:A:222:ILE:HG23	1:A:246:ALA:HB2	2.02	0.42
1:E:62:PRO:CB	1:E:206:MET:HE2	2.50	0.42
1:H:322:ASP:HA	1:H:323:PRO:HD3	1.87	0.42
1:C:316:LYS:NZ	4:C:811:HOH:O	2.51	0.42
1:F:277:ASP:OD1	1:F:314:ARG:NE	2.48	0.42
1:H:99:LYS:HE3	4:H:615:HOH:O	2.19	0.42
1:B:287:SER:HA	1:B:330:LEU:CD1	2.50	0.41
1:C:50:ALA:CB	1:C:221:MET:HE2	2.36	0.41
1:E:71:LYS:HB2	4:E:805:HOH:O	2.19	0.41
1:F:484:TRP:C	4:F:609:HOH:O	2.58	0.41
1:H:279:ALA:HB1	1:H:297:ILE:HD13	2.02	0.41
1:C:236:VAL:O	1:C:240:LYS:HG2	2.20	0.41
1:C:264:LEU:HD12	1:C:420:THR:HB	2.01	0.41
1:E:163:MET:HE2	1:E:163:MET:HA	2.02	0.41
1:G:480:PHE:HA	1:H:438:VAL:O	2.20	0.41
1:H:358:TYR:CZ	1:H:360:PRO:HG3	2.55	0.41
1:A:236:VAL:O	1:A:240:LYS:HG2	2.21	0.41
1:C:14:PRO:O	1:C:16:ARG:NH1	2.49	0.41
1:C:306:ARG:NH2	4:C:853:HOH:O	2.53	0.41
1:G:322:ASP:HA	1:G:323:PRO:HD3	1.93	0.41
1:H:240:LYS:HB3	4:H:665:HOH:O	2.19	0.41
1:A:236:VAL:HB	1:A:237:PRO:HD3	2.02	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:13:GLU:HA	1:B:14:PRO:HD3	1.90	0.41
1:B:21:LEU:N	1:F:247:HIS:HE1	2.15	0.41
1:C:203:PRO:HA	1:C:204:PRO:HD3	1.79	0.41
1:G:27:ARG:HD2	1:G:27:ARG:HA	1.79	0.41
1:C:163:MET:HA	1:C:163:MET:CE	2.51	0.41
1:C:247:HIS:CA	4:C:720:HOH:O	2.67	0.41
1:D:133:THR:HB	1:D:134:PRO:CD	2.48	0.41
1:F:351:GLU:OE2	1:H:215:ALA:HB3	2.16	0.41
1:B:133:THR:HB	1:B:134:PRO:CD	2.50	0.41
1:D:27:ARG:HH21	1:D:41:THR:CG2	2.32	0.41
1:D:350:ALA:HA	1:D:354:ALA:HB3	2.02	0.41
1:F:380:ASP:OD2	1:H:46:ARG:HD3	2.20	0.41
1:H:94:GLU:HG3	1:H:188:MET:HE2	2.03	0.41
1:B:50:ALA:HB2	1:B:221:MET:HE3	2.01	0.41
1:F:350:ALA:HA	1:F:354:ALA:HB3	2.03	0.41
1:A:12:HIS:CD2	1:A:41:THR:HG21	2.56	0.40
1:B:12:HIS:N	1:B:12:HIS:ND1	2.69	0.40
1:B:139:ARG:HD2	1:C:446:TYR:CE2	2.57	0.40
1:B:254:GLU:HB3	4:B:676:HOH:O	2.21	0.40
1:B:350:ALA:HA	1:B:354:ALA:HB3	2.03	0.40
1:E:163:MET:HA	1:E:163:MET:CE	2.51	0.40
1:G:88:SER:HB2	1:G:102:SER:OG	2.22	0.40
1:H:390:ILE:O	1:H:392:PRO:HD3	2.21	0.40
1:G:32:TYR:HB2	1:G:39:VAL:CG1	2.51	0.40
1:B:50:ALA:CB	1:B:221:MET:HE3	2.51	0.40
1:B:203:PRO:HA	1:B:204:PRO:HD3	1.86	0.40
1:B:464:LYS:HE2	4:B:756:HOH:O	2.22	0.40
1:C:161:LEU:HB2	1:C:189:THR:HG21	2.04	0.40
1:C:377:HIS:CD2	1:C:377:HIS:C	2.94	0.40
1:D:13:GLU:HA	1:D:14:PRO:HD3	1.89	0.40
1:C:27:ARG:HH21	1:C:41:THR:CG2	2.34	0.40
1:D:377:HIS:NE2	1:D:378:GLN:OE1	2.54	0.40
1:F:295:LYS:HE2	1:F:385:GLU:HG3	2.03	0.40
1:B:163:MET:HA	1:B:163:MET:HE2	2.04	0.40
1:B:182:PRO:HD2	1:B:210:VAL:O	2.21	0.40
1:G:308:VAL:HB	1:G:309:PRO:HD3	2.04	0.40

All (5) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:319:ARG:NH1	1:C:270:ASP:OD1[2_655]	1.76	0.44
1:D:344:GLU:OE2	1:F:84:LYS:NZ[1_554]	1.82	0.38
4:F:609:HOH:O	4:G:735:HOH:O[1_455]	1.85	0.35
4:A:831:HOH:O	4:C:625:HOH:O[2_655]	2.13	0.07
1:A:12:HIS:CD2	1:C:85:GLU:CB[2_655]	2.14	0.06

## 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	471/488 (96%)	452 (96%)	17 (4%)	2 (0%)	30	31
1	B	471/488 (96%)	454 (96%)	16 (3%)	1 (0%)	44	49
1	C	471/488 (96%)	453 (96%)	16 (3%)	2 (0%)	30	31
1	D	471/488 (96%)	455 (97%)	16 (3%)	0	100	100
1	E	471/488 (96%)	455 (97%)	15 (3%)	1 (0%)	44	49
1	F	471/488 (96%)	452 (96%)	18 (4%)	1 (0%)	44	49
1	G	471/488 (96%)	456 (97%)	14 (3%)	1 (0%)	44	49
1	H	471/488 (96%)	453 (96%)	16 (3%)	2 (0%)	30	31
All	All	3768/3904 (96%)	3630 (96%)	128 (3%)	10 (0%)	37	39

All (10) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	392	PRO
1	H	392	PRO
1	A	392	PRO
1	B	392	PRO
1	E	392	PRO
1	F	392	PRO
1	G	392	PRO
1	H	413	GLY

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Mol	Chain	Res	Type
1	A	413	GLY
1	C	413	GLY

### 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	389/401 (97%)	376 (97%)	13 (3%)	33	38
1	B	389/401 (97%)	376 (97%)	13 (3%)	33	38
1	C	389/401 (97%)	376 (97%)	13 (3%)	33	38
1	D	389/401 (97%)	377 (97%)	12 (3%)	35	41
1	E	389/401 (97%)	378 (97%)	11 (3%)	38	44
1	F	389/401 (97%)	379 (97%)	10 (3%)	41	47
1	G	389/401 (97%)	377 (97%)	12 (3%)	35	41
1	H	389/401 (97%)	375 (96%)	14 (4%)	30	34
All	All	3112/3208 (97%)	3014 (97%)	98 (3%)	35	41

All (98) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	23	ASP
1	A	41	THR
1	A	74	LEU
1	A	132	LEU
1	A	241	LEU
1	A	247	HIS
1	A	250	ARG
1	A	255	LEU
1	A	359	HIS
1	A	406	LEU
1	A	427	GLN
1	A	434	LYS
1	A	473	SER

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	B	23	ASP
1	B	41	THR
1	B	74	LEU
1	B	132	LEU
1	B	241	LEU
1	B	247	HIS
1	B	255	LEU
1	B	359	HIS
1	B	378	GLN
1	B	406	LEU
1	B	427	GLN
1	B	434	LYS
1	B	465	GLU
1	C	23	ASP
1	C	41	THR
1	C	74	LEU
1	C	132	LEU
1	C	247	HIS
1	C	250	ARG
1	C	255	LEU
1	C	359	HIS
1	C	377	HIS
1	C	406	LEU
1	C	427	GLN
1	C	434	LYS
1	C	473	SER
1	D	23	ASP
1	D	41	THR
1	D	74	LEU
1	D	132	LEU
1	D	241	LEU
1	D	247	HIS
1	D	255	LEU
1	D	359	HIS
1	D	406	LEU
1	D	427	GLN
1	D	434	LYS
1	D	473	SER
1	E	23	ASP
1	E	41	THR
1	E	74	LEU
1	E	132	LEU

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	E	247	HIS
1	E	255	LEU
1	E	359	HIS
1	E	406	LEU
1	E	427	GLN
1	E	434	LYS
1	E	473	SER
1	F	23	ASP
1	F	41	THR
1	F	74	LEU
1	F	94	GLU
1	F	247	HIS
1	F	255	LEU
1	F	359	HIS
1	F	406	LEU
1	F	427	GLN
1	F	434	LYS
1	G	23	ASP
1	G	41	THR
1	G	74	LEU
1	G	132	LEU
1	G	241	LEU
1	G	247	HIS
1	G	250	ARG
1	G	255	LEU
1	G	359	HIS
1	G	406	LEU
1	G	427	GLN
1	G	434	LYS
1	H	23	ASP
1	H	41	THR
1	H	74	LEU
1	H	132	LEU
1	H	241	LEU
1	H	247	HIS
1	H	255	LEU
1	H	359	HIS
1	H	378	GLN
1	H	406	LEU
1	H	427	GLN
1	H	434	LYS
1	H	465	GLU

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Mol	Chain	Res	Type
1	H	473	SER

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	247	HIS
1	B	247	HIS
1	B	289	GLN
1	B	427	GLN
1	C	247	HIS
1	D	247	HIS
1	D	427	GLN
1	E	247	HIS
1	H	247	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](#)

15 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	G3H	A	501	1	8,9,9	0.86	0	7,12,12	1.36	1 (14%)
2	G3H	H	501	1	8,9,9	0.65	0	7,12,12	1.88	2 (28%)
3	NAD	E	502	-	24,29,48	1.21	3 (12%)	29,45,73	1.46	3 (10%)
3	NAD	A	502	-	24,29,48	1.44	4 (16%)	29,45,73	1.76	6 (20%)
3	NAD	D	502	-	24,29,48	1.41	5 (20%)	29,45,73	1.38	5 (17%)
2	G3H	G	501	1	8,9,9	0.49	0	7,12,12	1.88	3 (42%)
2	G3H	E	501	1	8,9,9	0.63	0	7,12,12	1.29	1 (14%)
3	NAD	B	502	-	24,29,48	1.22	5 (20%)	29,45,73	1.58	5 (17%)
3	NAD	C	502	-	34,38,48	1.33	5 (14%)	39,58,73	1.56	5 (12%)
3	NAD	F	502	-	24,29,48	1.27	3 (12%)	29,45,73	1.49	4 (13%)
2	G3H	D	501	1	8,9,9	0.79	0	7,12,12	1.15	1 (14%)
2	G3H	B	501	1	8,9,9	0.71	0	7,12,12	1.80	2 (28%)
3	NAD	G	502	-	24,29,48	1.17	3 (12%)	29,45,73	1.72	7 (24%)
2	G3H	C	501	1	8,9,9	0.81	0	7,12,12	1.91	3 (42%)
2	G3H	F	501	1	8,9,9	0.84	0	7,12,12	2.43	4 (57%)

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	G3H	A	501	1	-	5/7/8/8	-
2	G3H	H	501	1	-	5/7/8/8	-
3	NAD	E	502	-	-	0/12/32/62	0/3/3/5
3	NAD	A	502	-	-	0/12/32/62	0/3/3/5
3	NAD	D	502	-	-	1/12/32/62	0/3/3/5
2	G3H	G	501	1	-	5/7/8/8	-
2	G3H	E	501	1	-	5/7/8/8	-
3	NAD	B	502	-	-	1/12/32/62	0/3/3/5
3	NAD	C	502	-	-	3/18/51/62	0/4/4/5
3	NAD	F	502	-	-	2/12/32/62	0/3/3/5
2	G3H	D	501	1	-	5/7/8/8	-
2	G3H	B	501	1	-	4/7/8/8	-
3	NAD	G	502	-	-	4/12/32/62	0/3/3/5
2	G3H	C	501	1	-	5/7/8/8	-
2	G3H	F	501	1	-	5/7/8/8	-



All (28) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	502	NAD	C2D-C3D	-3.66	1.47	1.53
3	A	502	NAD	C2B-C3B	-3.40	1.44	1.53
3	F	502	NAD	C2B-C3B	-3.29	1.44	1.53
3	D	502	NAD	PA-O3	3.05	1.62	1.59
3	C	502	NAD	C2A-N3A	2.95	1.36	1.32
3	A	502	NAD	O4B-C1B	-2.87	1.37	1.40
3	B	502	NAD	C2B-C3B	-2.79	1.45	1.53
3	D	502	NAD	C2A-N3A	2.77	1.36	1.32
3	C	502	NAD	C2B-C3B	-2.71	1.46	1.53
3	G	502	NAD	C2B-C3B	-2.63	1.46	1.53
3	D	502	NAD	O2B-C2B	-2.55	1.36	1.43
3	E	502	NAD	C2B-C3B	-2.54	1.46	1.53
3	A	502	NAD	C2A-N3A	2.40	1.35	1.32
3	F	502	NAD	O2B-C2B	-2.38	1.37	1.43
3	D	502	NAD	C2B-C3B	-2.27	1.47	1.53
3	B	502	NAD	O2B-C2B	-2.27	1.37	1.43
3	G	502	NAD	O2B-C2B	-2.25	1.37	1.43
3	C	502	NAD	O2B-C2B	-2.21	1.37	1.43
3	B	502	NAD	C1B-N9A	-2.19	1.44	1.49
3	A	502	NAD	C6A-N6A	2.17	1.41	1.34
3	E	502	NAD	O2B-C2B	-2.13	1.37	1.43
3	D	502	NAD	C6A-N6A	2.13	1.41	1.34
3	E	502	NAD	C6A-N6A	2.09	1.41	1.34
3	B	502	NAD	PN-O5D	2.09	1.62	1.54
3	B	502	NAD	C6A-N6A	2.09	1.41	1.34
3	G	502	NAD	C2A-N3A	2.08	1.35	1.32
3	C	502	NAD	C6A-N6A	2.06	1.41	1.34
3	F	502	NAD	C6A-N6A	2.01	1.41	1.34

All (52) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	G	502	NAD	N3A-C2A-N1A	-4.56	122.48	128.67
3	E	502	NAD	N3A-C2A-N1A	-4.45	122.63	128.67
3	F	502	NAD	N3A-C2A-N1A	-4.41	122.68	128.67
3	A	502	NAD	N3A-C2A-N1A	-4.37	122.74	128.67
3	G	502	NAD	O4B-C1B-N9A	4.15	114.25	108.75
3	B	502	NAD	C4B-O4B-C1B	-3.98	106.28	109.92
3	C	502	NAD	N3A-C2A-N1A	-3.95	123.31	128.67
3	E	502	NAD	C4B-O4B-C1B	-3.91	106.34	109.92
3	A	502	NAD	O4B-C1B-N9A	3.73	113.69	108.75
3	A	502	NAD	C4B-O4B-C1B	-3.68	106.56	109.92

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	502	NAD	N3A-C2A-N1A	-3.61	123.77	128.67
2	F	501	G3H	O2-C2-C1	3.57	116.72	109.03
3	B	502	NAD	N3A-C2A-N1A	-3.56	123.84	128.67
2	H	501	G3H	O4P-P-O1P	-3.37	97.88	106.67
3	C	502	NAD	O2N-PN-O3	3.27	116.11	107.27
3	G	502	NAD	O2A-PA-O3	3.26	116.08	107.27
2	F	501	G3H	O3P-P-O2P	3.12	123.00	110.83
3	F	502	NAD	C4B-O4B-C1B	-3.11	107.07	109.92
2	F	501	G3H	O1P-P-O2P	-3.08	98.13	106.44
2	C	501	G3H	O3P-P-O1P	-3.06	98.68	106.67
2	C	501	G3H	O4P-P-O3P	2.92	118.74	107.80
2	B	501	G3H	O4P-P-O1P	-2.86	99.22	106.67
3	D	502	NAD	O2N-PN-O3	2.81	114.07	104.64
3	G	502	NAD	O2N-PN-O1N	-2.81	99.90	110.83
3	F	502	NAD	C4A-C5A-N7A	-2.76	106.42	109.34
3	D	502	NAD	C4A-C5A-N7A	-2.75	106.44	109.34
3	B	502	NAD	O2N-PN-O1N	-2.65	100.49	110.83
2	F	501	G3H	O4P-P-O1P	-2.65	99.75	106.67
3	E	502	NAD	C4A-C5A-N7A	-2.60	106.59	109.34
3	A	502	NAD	N6A-C6A-N1A	2.56	123.80	118.33
3	C	502	NAD	O4B-C1B-N9A	2.51	112.08	108.75
3	A	502	NAD	O2N-PN-O3	2.51	113.06	104.64
3	G	502	NAD	O2A-PA-O1A	-2.48	100.90	112.44
2	H	501	G3H	O4P-P-O3P	2.47	117.05	107.80
3	B	502	NAD	O4B-C1B-N9A	2.43	111.97	108.75
3	B	502	NAD	C4A-C5A-N7A	-2.35	106.85	109.34
2	G	501	G3H	O4P-P-O3P	2.33	116.56	107.80
2	G	501	G3H	O2-C2-C1	2.32	114.03	109.03
2	B	501	G3H	O4P-P-O3P	2.25	116.23	107.80
3	C	502	NAD	C4A-C5A-N7A	-2.24	106.97	109.34
2	C	501	G3H	O2-C2-C1	2.20	113.76	109.03
2	G	501	G3H	O1P-P-O2P	-2.19	100.52	106.44
3	A	502	NAD	O2N-PN-O1N	-2.19	102.31	110.83
3	C	502	NAD	O3-PA-O1A	-2.17	104.17	110.70
3	G	502	NAD	C4A-C5A-N7A	-2.14	107.08	109.34
3	D	502	NAD	O2N-PN-O1N	-2.13	102.52	110.83
3	F	502	NAD	O2N-PN-O3	2.11	111.70	104.64
3	G	502	NAD	O4B-C4B-C3B	2.08	109.28	105.15
2	D	501	G3H	O4P-P-O3P	2.06	115.53	107.80
2	E	501	G3H	O4P-P-O3P	2.05	115.49	107.80
3	D	502	NAD	O4B-C1B-N9A	2.03	111.44	108.75
2	A	501	G3H	O2-C2-C1	2.00	113.34	109.03

There are no chirality outliers.

All (50) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	501	G3H	C1-C2-C3-O1P
2	A	501	G3H	O2-C2-C3-O1P
2	A	501	G3H	C3-O1P-P-O3P
2	A	501	G3H	C3-O1P-P-O4P
2	B	501	G3H	C3-O1P-P-O2P
2	B	501	G3H	C3-O1P-P-O3P
2	B	501	G3H	C3-O1P-P-O4P
2	C	501	G3H	C1-C2-C3-O1P
2	C	501	G3H	O2-C2-C3-O1P
2	C	501	G3H	C3-O1P-P-O2P
2	C	501	G3H	C3-O1P-P-O3P
2	C	501	G3H	C3-O1P-P-O4P
2	D	501	G3H	C1-C2-C3-O1P
2	D	501	G3H	O2-C2-C3-O1P
2	D	501	G3H	C3-O1P-P-O2P
2	D	501	G3H	C3-O1P-P-O3P
2	D	501	G3H	C3-O1P-P-O4P
2	E	501	G3H	C1-C2-C3-O1P
2	E	501	G3H	O2-C2-C3-O1P
2	E	501	G3H	C3-O1P-P-O2P
2	E	501	G3H	C3-O1P-P-O3P
2	E	501	G3H	C3-O1P-P-O4P
2	F	501	G3H	C1-C2-C3-O1P
2	F	501	G3H	O2-C2-C3-O1P
2	F	501	G3H	C3-O1P-P-O2P
2	F	501	G3H	C3-O1P-P-O3P
2	F	501	G3H	C3-O1P-P-O4P
2	G	501	G3H	C1-C2-C3-O1P
2	G	501	G3H	O2-C2-C3-O1P
2	G	501	G3H	C3-O1P-P-O2P
2	G	501	G3H	C3-O1P-P-O3P
2	G	501	G3H	C3-O1P-P-O4P
2	H	501	G3H	C1-C2-C3-O1P
2	H	501	G3H	O2-C2-C3-O1P
2	H	501	G3H	C3-O1P-P-O2P
2	H	501	G3H	C3-O1P-P-O3P
2	H	501	G3H	C3-O1P-P-O4P
3	B	502	NAD	C5B-O5B-PA-O1A
3	D	502	NAD	PN-O3-PA-O5B
3	F	502	NAD	C5B-O5B-PA-O2A

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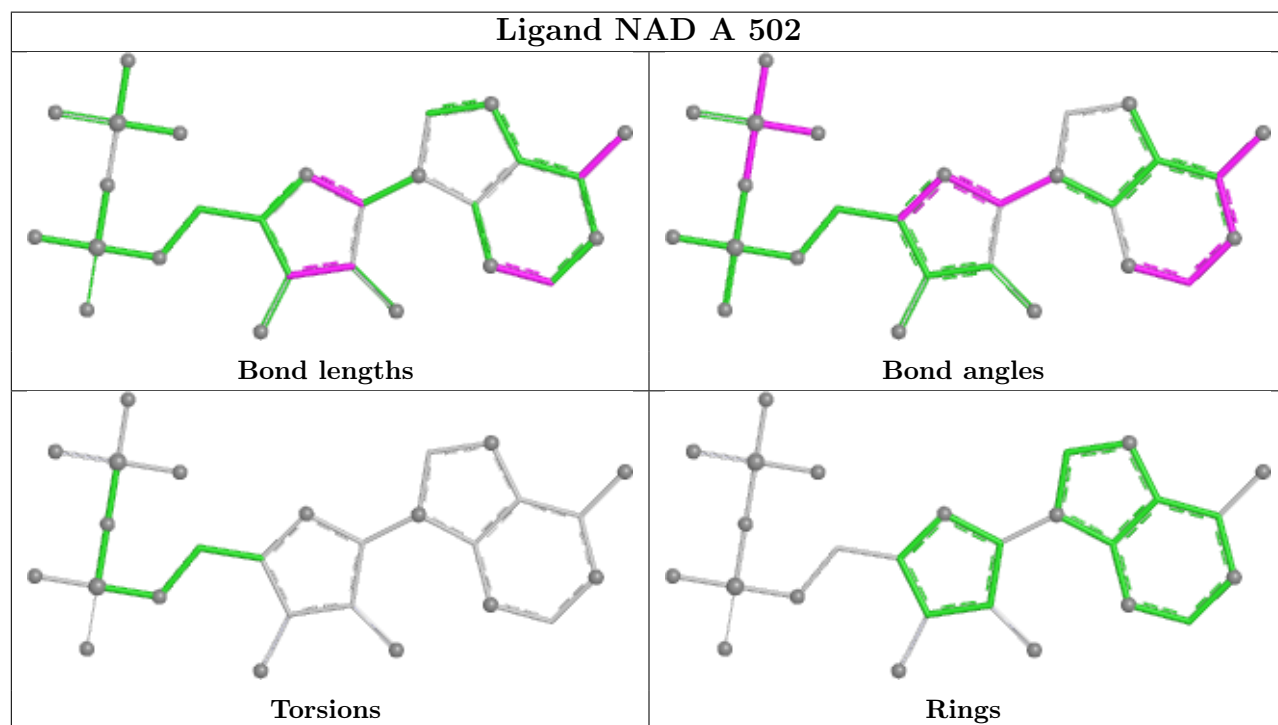
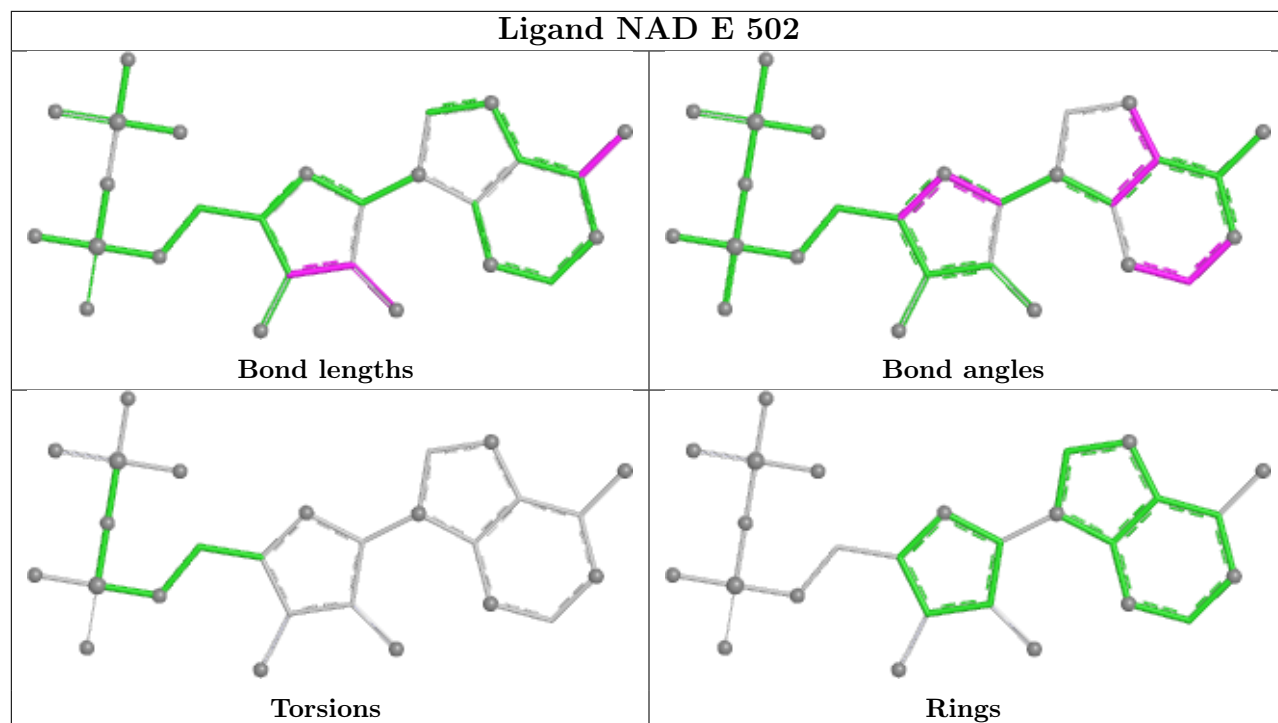
Mol	Chain	Res	Type	Atoms
3	F	502	NAD	C5B-O5B-PA-O3
3	G	502	NAD	PN-O3-PA-O5B
3	G	502	NAD	PA-O3-PN-O2N
3	C	502	NAD	O4D-C4D-C5D-O5D
3	C	502	NAD	C3D-C4D-C5D-O5D
2	A	501	G3H	C3-O1P-P-O2P
3	C	502	NAD	C5D-O5D-PN-O1N
2	B	501	G3H	C2-C3-O1P-P
3	G	502	NAD	PA-O3-PN-O1N
3	G	502	NAD	PA-O3-PN-O5D

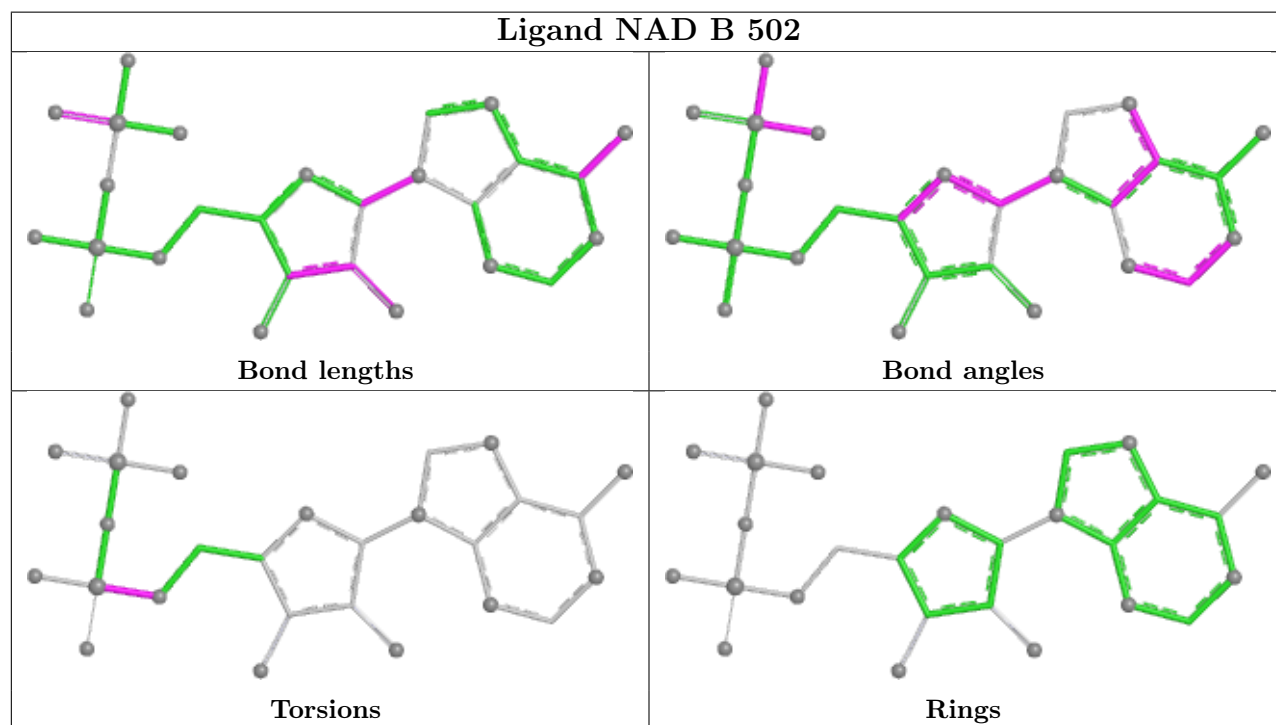
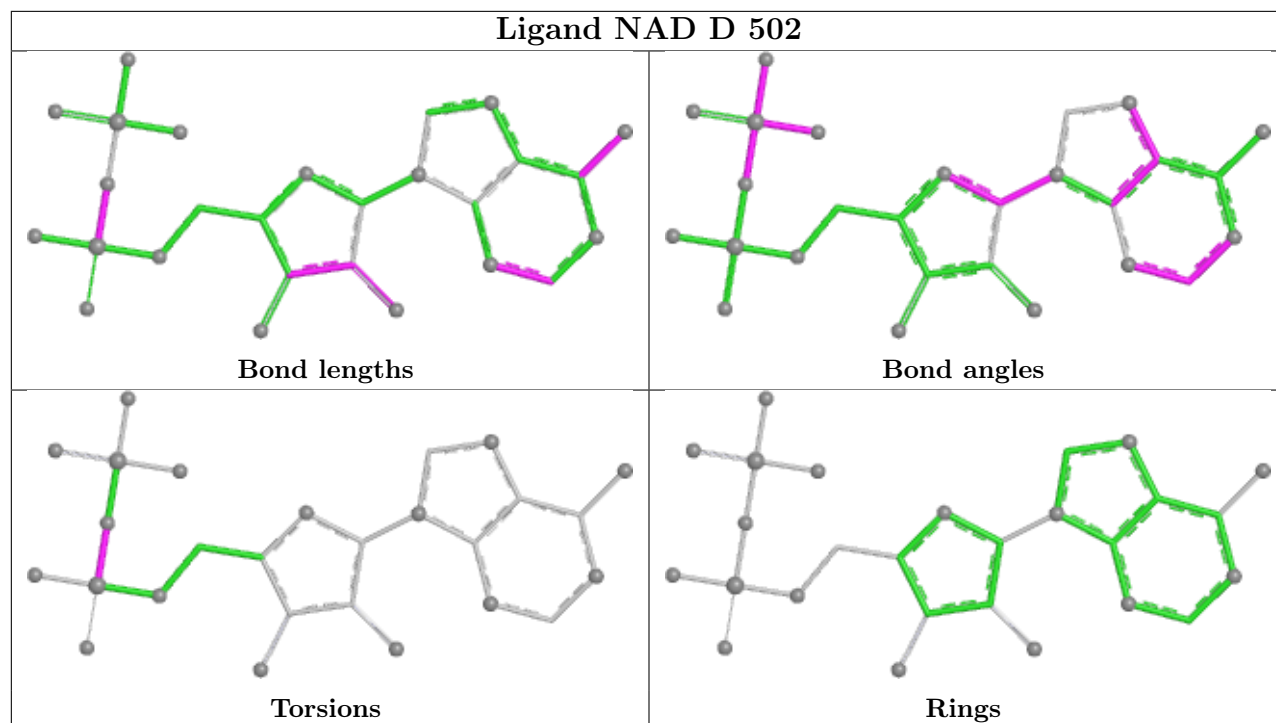
There are no ring outliers.

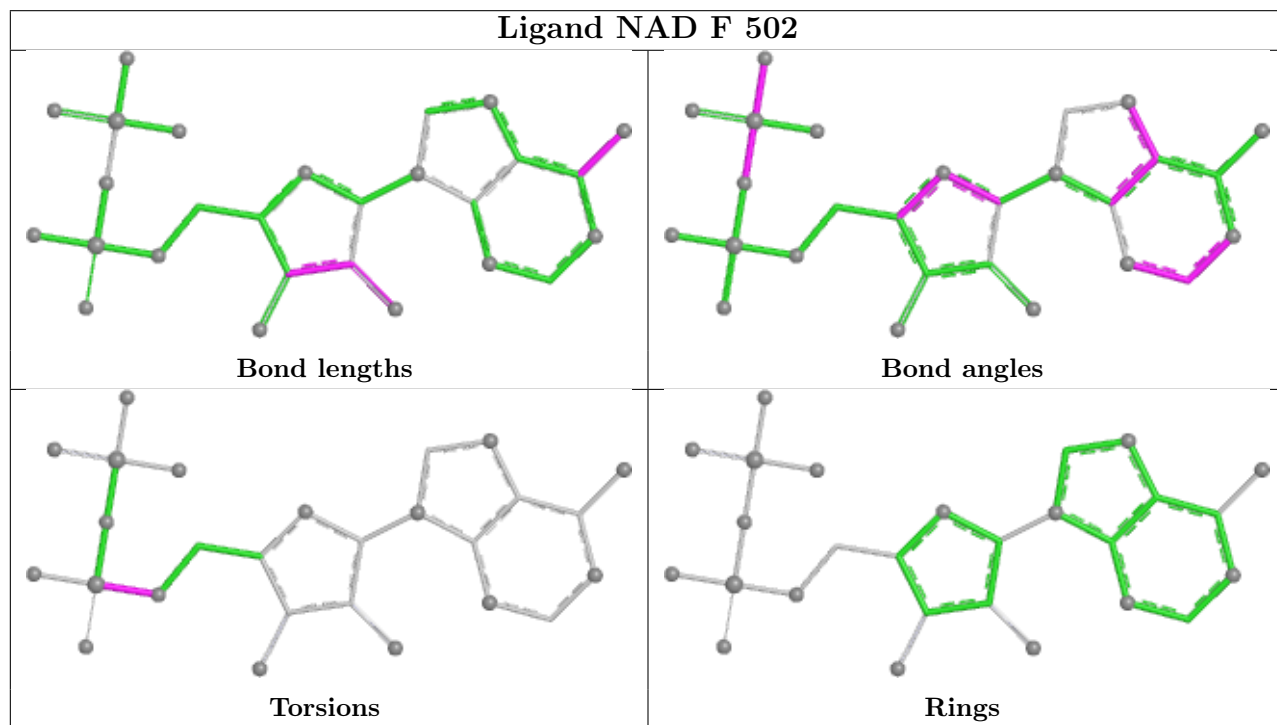
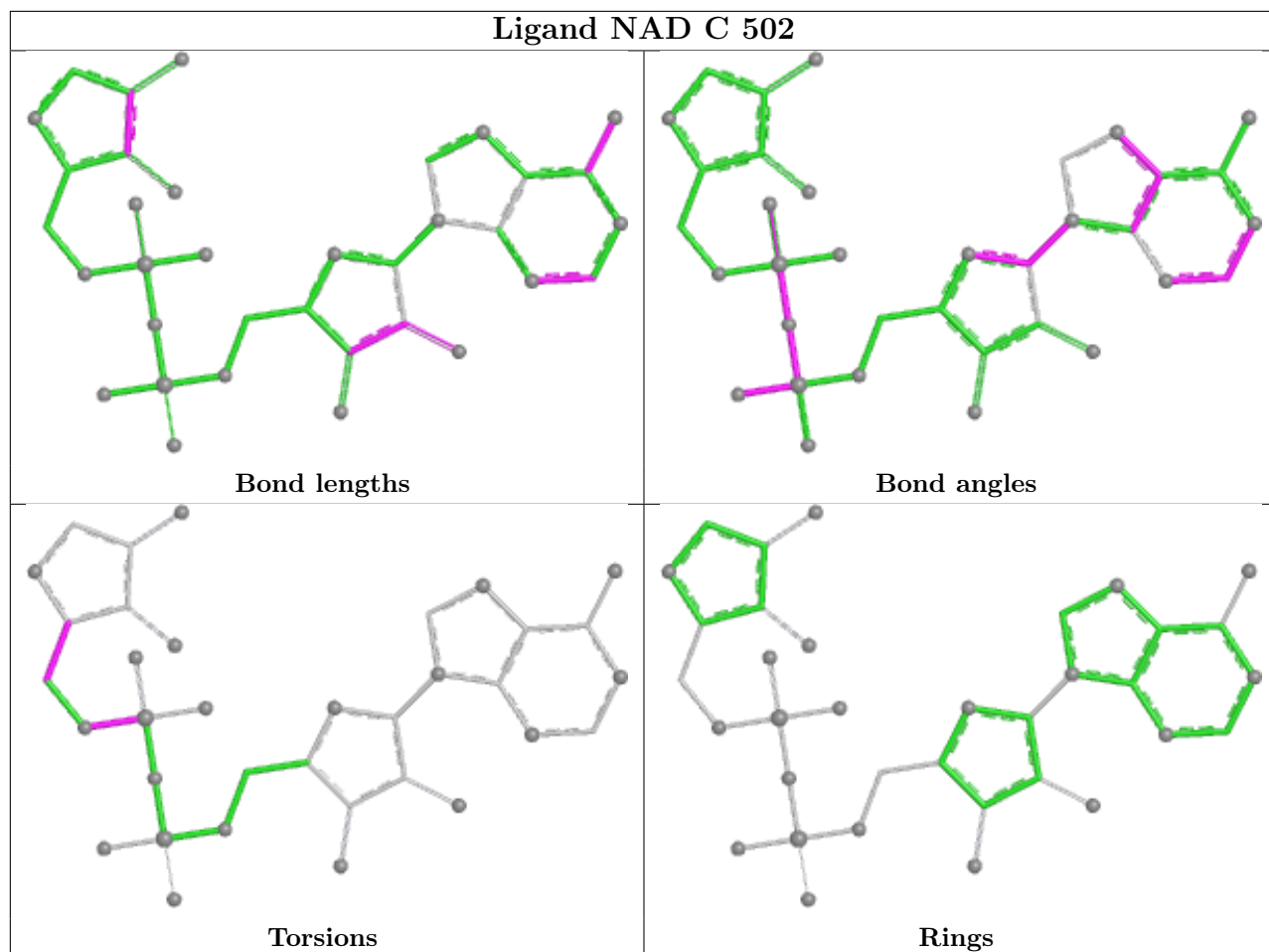
5 monomers are involved in 5 short contacts:

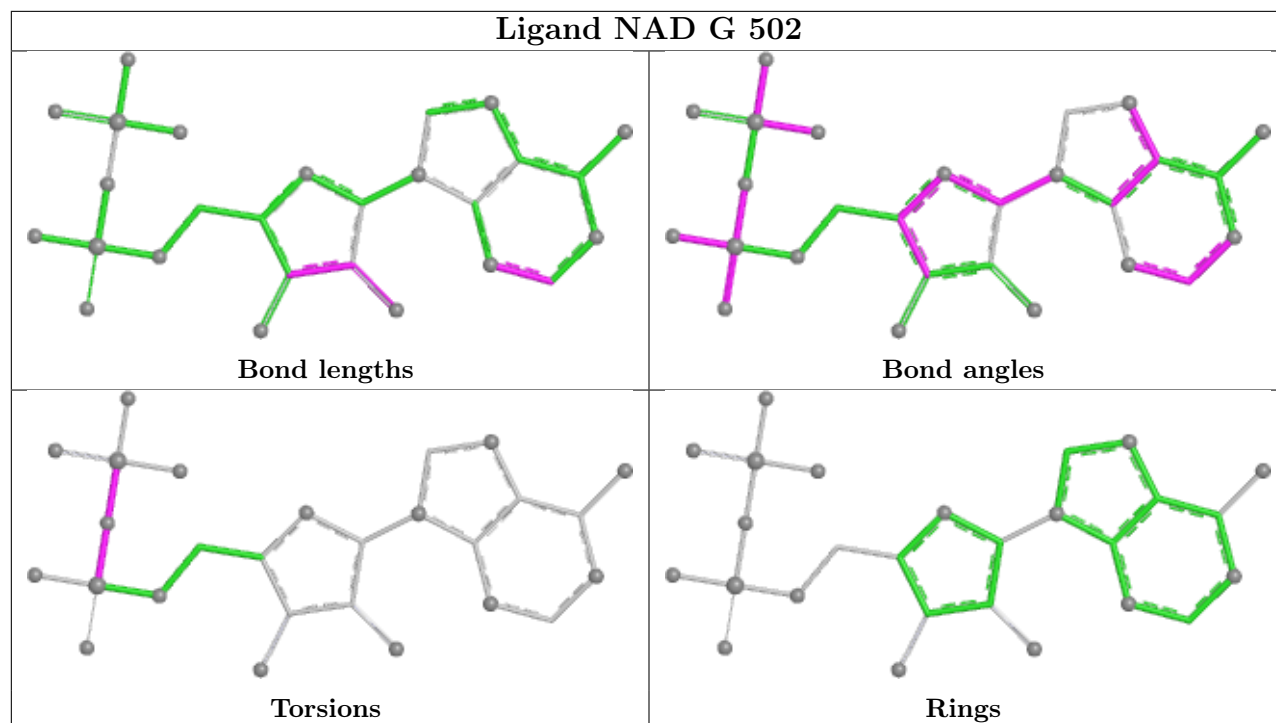
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	H	501	G3H	1	0
3	D	502	NAD	1	0
2	E	501	G3H	1	0
3	C	502	NAD	1	0
3	F	502	NAD	1	0

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

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, 95<sup>th</sup> percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	473/488 (96%)	-0.34	5 (1%) 77 79	11, 20, 37, 59	0
1	B	473/488 (96%)	-0.23	9 (1%) 66 66	12, 20, 39, 60	0
1	C	473/488 (96%)	-0.39	5 (1%) 77 79	12, 20, 38, 56	0
1	D	473/488 (96%)	-0.31	3 (0%) 85 87	12, 22, 40, 61	0
1	E	473/488 (96%)	-0.39	5 (1%) 77 79	12, 21, 39, 60	0
1	F	473/488 (96%)	-0.15	13 (2%) 56 56	11, 22, 40, 60	0
1	G	473/488 (96%)	-0.22	3 (0%) 85 87	13, 22, 41, 60	0
1	H	473/488 (96%)	0.67	43 (9%) 16 16	12, 25, 44, 61	0
All	All	3784/3904 (96%)	-0.17	86 (2%) 61 61	11, 22, 40, 61	0

All (86) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	H	215	ALA	7.9
1	H	216	ASP	4.9
1	H	365	ALA	4.5
1	B	12	HIS	4.0
1	B	377	HIS	4.0
1	H	213	TRP	4.0
1	F	351	GLU	4.0
1	F	344	GLU	3.9
1	H	219	MET	3.9
1	A	247	HIS	3.9
1	H	244	ALA	3.8
1	G	12	HIS	3.8
1	H	364	GLY	3.6
1	F	247	HIS	3.3
1	C	12	HIS	3.2
1	A	12	HIS	3.2

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	H	241	LEU	3.1
1	C	248	TYR	3.1
1	H	248	TYR	3.1
1	B	216	ASP	3.0
1	H	349	ALA	3.0
1	H	359	HIS	2.9
1	E	241	LEU	2.9
1	H	342	PHE	2.9
1	B	378	GLN	2.9
1	H	366	LEU	2.9
1	F	12	HIS	2.9
1	H	12	HIS	2.9
1	F	348	ARG	2.8
1	F	241	LEU	2.8
1	H	350	ALA	2.8
1	H	245	ASN	2.8
1	H	363	SER	2.7
1	H	340	ALA	2.7
1	H	47	ALA	2.7
1	F	350	ALA	2.6
1	H	377	HIS	2.6
1	F	319	ARG	2.6
1	H	321	GLY	2.6
1	H	214	PRO	2.6
1	B	215	ALA	2.5
1	G	248	TYR	2.5
1	D	12	HIS	2.5
1	H	217	ILE	2.5
1	E	248	TYR	2.5
1	H	360	PRO	2.5
1	A	377	HIS	2.5
1	G	27	ARG	2.5
1	H	33	PRO	2.5
1	H	351	GLU	2.4
1	B	383	LEU	2.4
1	H	243	ALA	2.4
1	C	244	ALA	2.4
1	H	362	ARG	2.3
1	H	358	TYR	2.3
1	A	378	GLN	2.3
1	F	317	ARG	2.2
1	E	12	HIS	2.2

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Mol	Chain	Res	Type	RSRZ
1	F	377	HIS	2.2
1	H	370	ILE	2.2
1	H	96	GLY	2.2
1	E	247	HIS	2.2
1	H	24	THR	2.2
1	H	320	PHE	2.2
1	B	384	GLU	2.2
1	B	385	GLU	2.2
1	H	341	LEU	2.2
1	C	226	HIS	2.2
1	C	377	HIS	2.2
1	H	32	TYR	2.2
1	H	316	LYS	2.2
1	E	319	ARG	2.1
1	F	383	LEU	2.1
1	F	248	TYR	2.1
1	H	327	SER	2.1
1	D	247	HIS	2.1
1	D	241	LEU	2.1
1	H	312	LEU	2.1
1	H	339	ALA	2.1
1	H	317	ARG	2.1
1	H	367	LEU	2.1
1	A	351	GLU	2.0
1	H	348	ARG	2.0
1	F	245	ASN	2.0
1	B	319	ARG	2.0
1	H	322	ASP	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 monosaccharides in this entry.

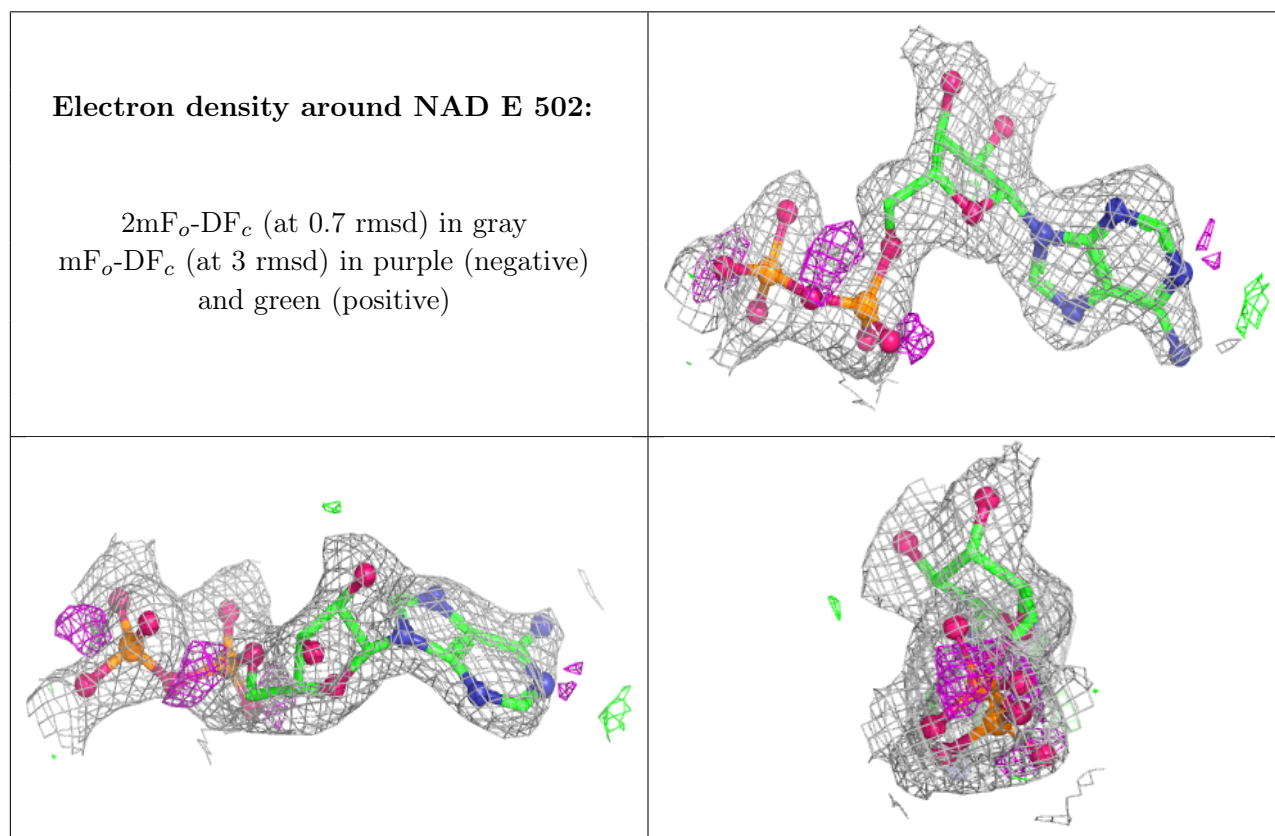
## 6.4 Ligands [i](#)

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, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

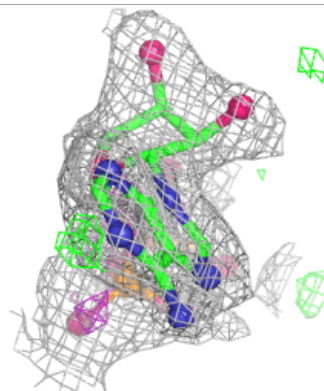
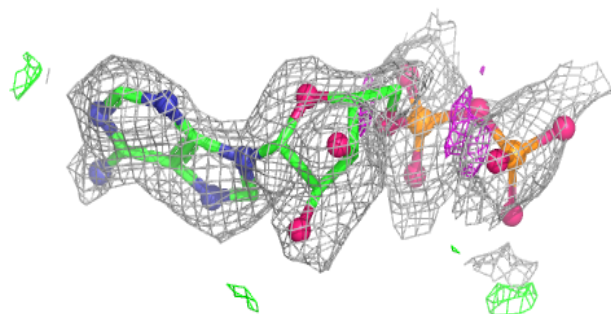
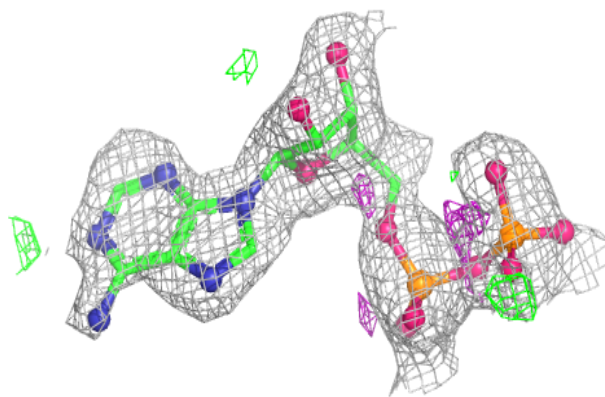
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
3	NAD	E	502	27/44	0.86	0.10	25,43,57,70	0
3	NAD	F	502	27/44	0.87	0.11	19,31,67,78	7
3	NAD	G	502	27/44	0.89	0.09	22,38,63,92	0
3	NAD	D	502	27/44	0.90	0.09	24,34,47,77	0
2	G3H	H	501	10/10	0.90	0.10	31,38,46,51	0
3	NAD	B	502	27/44	0.92	0.08	18,26,38,49	0
2	G3H	F	501	10/10	0.93	0.09	21,28,38,42	0
3	NAD	C	502	35/44	0.93	0.08	16,28,50,63	0
2	G3H	G	501	10/10	0.95	0.08	26,36,46,50	0
3	NAD	A	502	27/44	0.95	0.07	12,25,37,49	0
2	G3H	C	501	10/10	0.96	0.09	17,29,40,44	0
2	G3H	D	501	10/10	0.96	0.08	23,30,45,48	0
2	G3H	A	501	10/10	0.96	0.08	20,28,37,41	0
2	G3H	B	501	10/10	0.96	0.09	20,30,43,44	0
2	G3H	E	501	10/10	0.97	0.08	18,32,45,47	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.

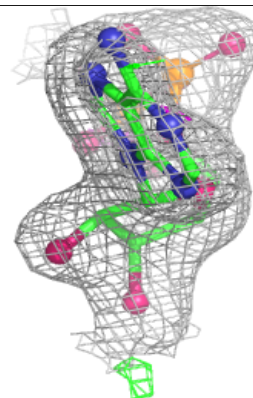
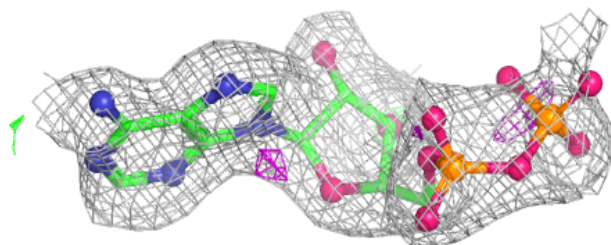
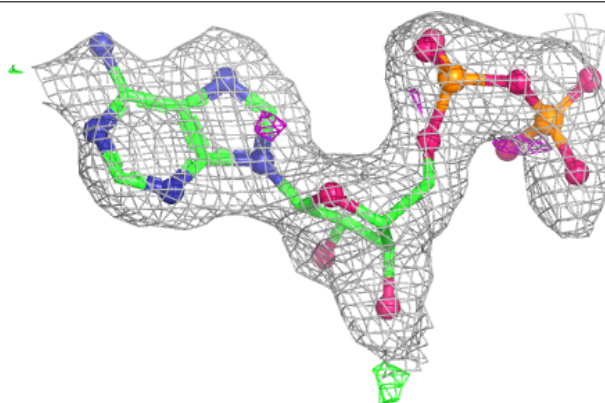


**Electron density around NAD F 502:**

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

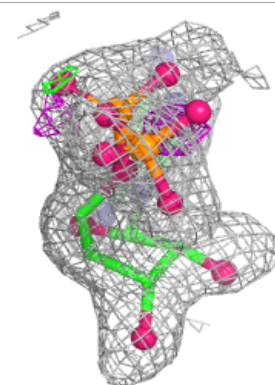
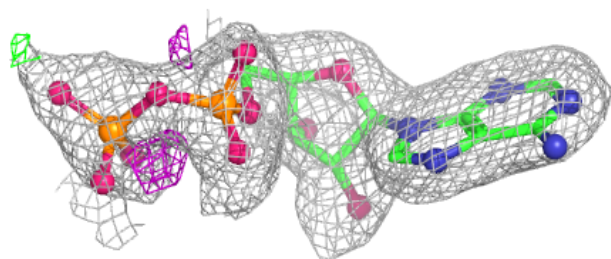
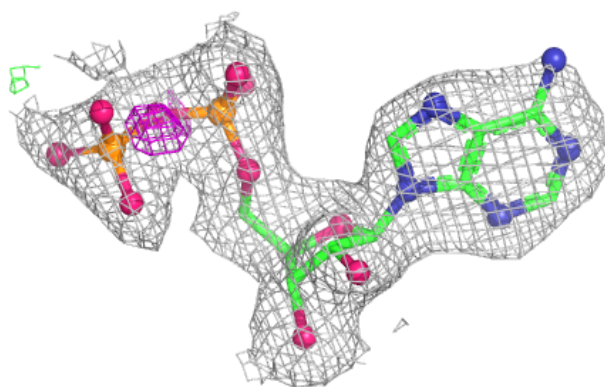
**Electron density around NAD G 502:**

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

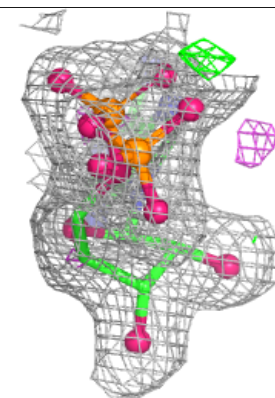
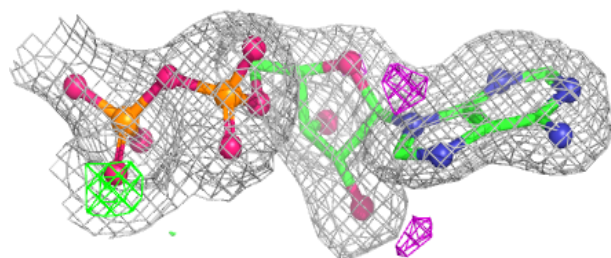
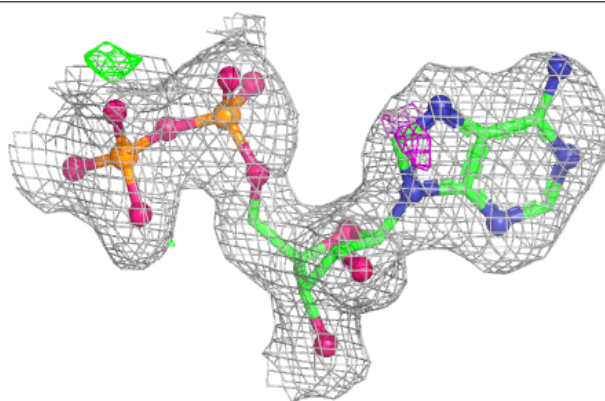


**Electron density around NAD D 502:**

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

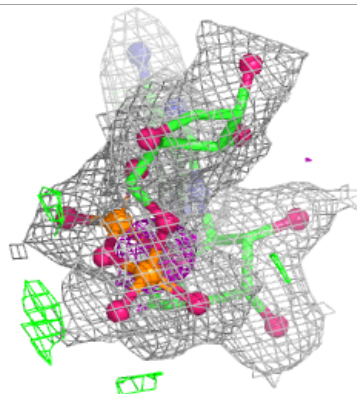
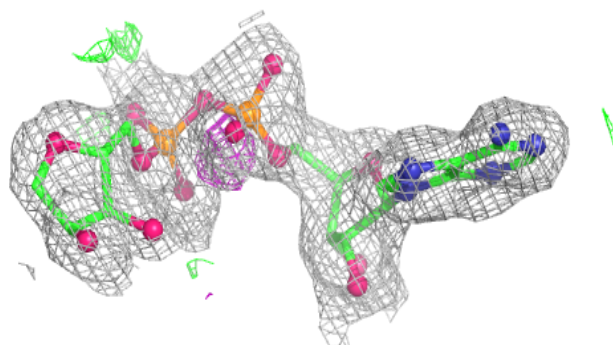
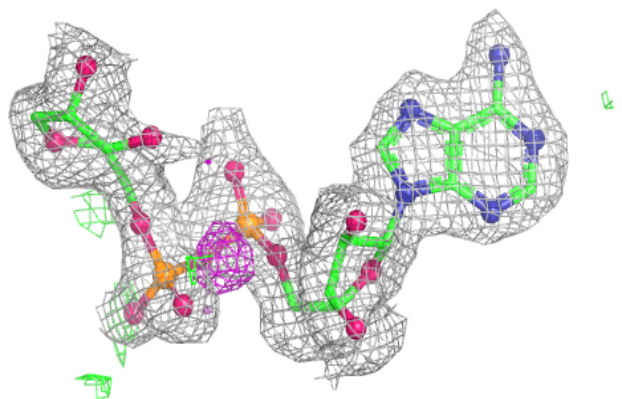
**Electron density around NAD B 502:**

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

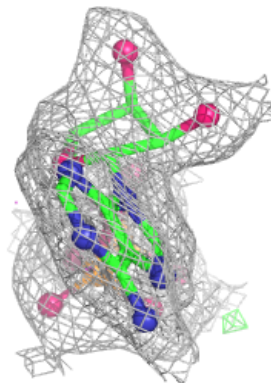
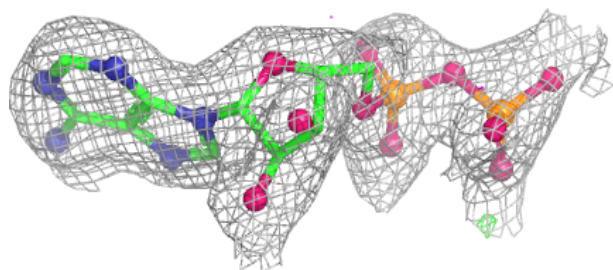
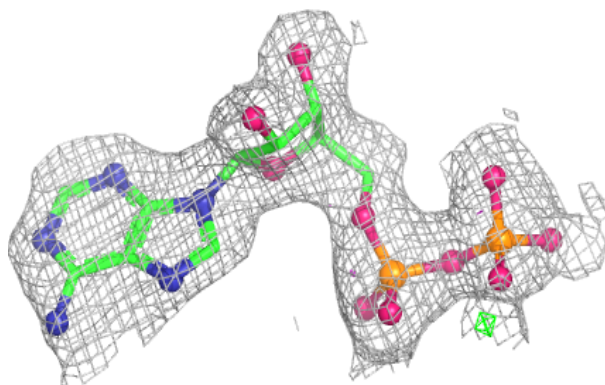


**Electron density around NAD C 502:**

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

**Electron density around NAD A 502:**

$2mF_o-DF_c$  (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.