



Full wwPDB X-ray Structure Validation Report ⓘ

Jan 14, 2026 – 08:45 pm GMT

PDB ID : 9IDQ / pdb_00009idq
Title : Human Deoxyhypusine Synthase Fragment Screening Campaign - ligand VT00193
Authors : Wilk, P.; Water-Wilk, E.; Krojer, T.; Grudnik, P.
Deposited on : 2025-02-15
Resolution : 1.39 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	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.47

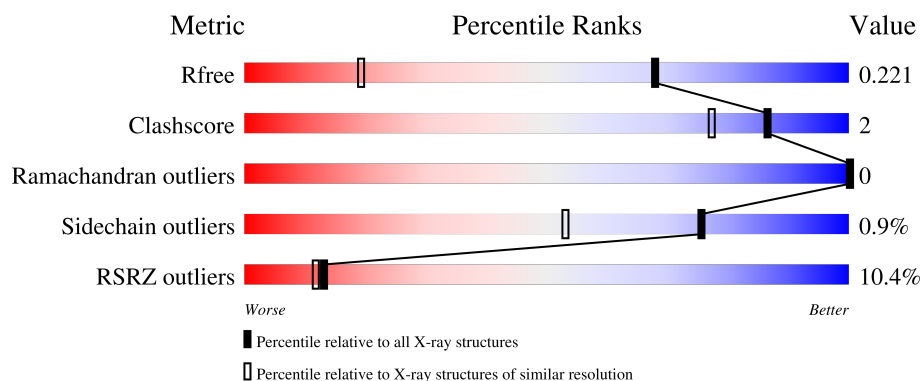
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.39 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	2247 (1.40-1.40)
Clashscore	180529	2446 (1.40-1.40)
Ramachandran outliers	177936	2398 (1.40-1.40)
Sidechain outliers	177891	2397 (1.40-1.40)
RSRZ outliers	164620	2246 (1.40-1.40)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	369	12% 87% 7% 5%
1	B	369	7% 86% • • 9%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	A1I2L	A	403	-	X	-	-
3	A1I2L	B	404	-	X	-	-

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 6049 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 Deoxyhypusine synthase.

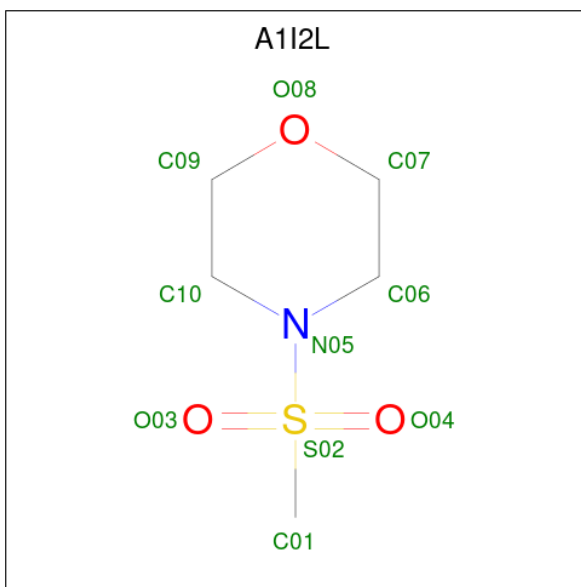
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	350	Total	C	N	O	S	0	5	0
			2756	1755	468	517	16			
1	B	336	Total	C	N	O	S	0	6	0
			2666	1699	451	499	17			

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



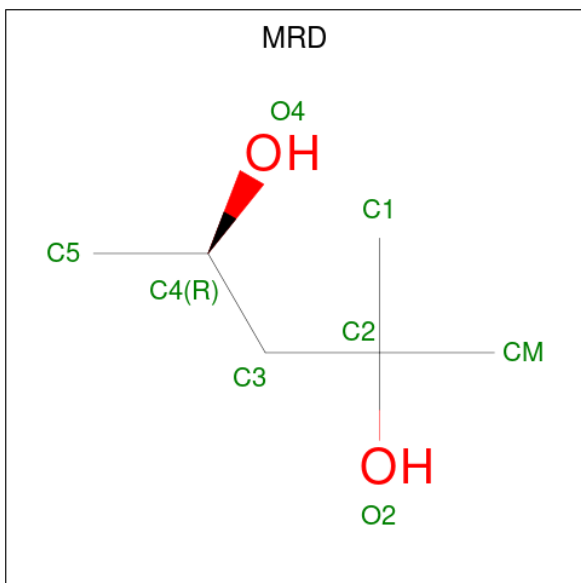
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			44	21	7	14	2		
2	B	1	Total	C	N	O	P	0	0
			44	21	7	14	2		

- Molecule 3 is 4-methylsulfonylmorpholine (CCD ID: A1I2L) (formula: $C_5H_{11}NO_3S$) (labeled as "Ligand of Interest" by depositor).



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

- Molecule 4 is (4R)-2-METHYLPENTANE-2,4-DIOL (CCD ID: MRD) (formula: C₆H₁₄O₂).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	B	1	Total	C	O	0	0
			8	6	2		

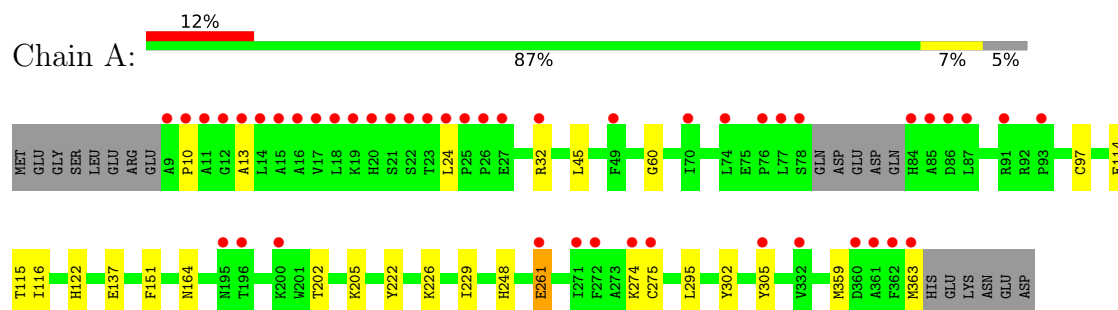
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	248	Total	O	0	1
			249	249		
5	B	242	Total	O	0	0
			242	242		

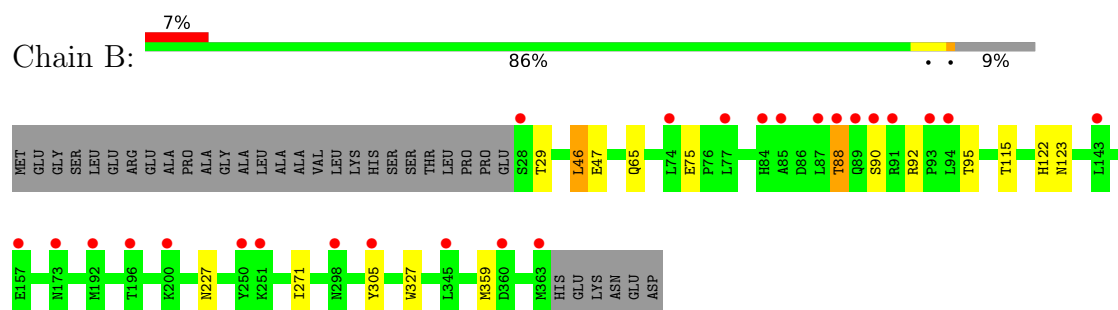
3 Residue-property plots [i](#)

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: Deoxyhypusine synthase



• Molecule 1: Deoxyhypusine synthase



4 Data and refinement statistics

Property	Value	Source
Space group	P 32 2 1	Depositor
Cell constants a, b, c, α , β , γ	104.89Å 104.89Å 160.19Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	46.03 – 1.39 46.03 – 1.39	Depositor EDS
% Data completeness (in resolution range)	99.7 (46.03-1.39) 99.7 (46.03-1.39)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.01 (at 1.39Å)	Xtriage
Refinement program	REFMAC 5.8.0419	Depositor
R, R_{free}	0.196 , 0.212 0.205 , 0.221	Depositor DCC
R_{free} test set	10050 reflections (4.92%)	wwPDB-VP
Wilson B-factor (Å ²)	26.1	Xtriage
Anisotropy	0.088	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 36.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	0.014 for -h,-k,l	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	6049	wwPDB-VP
Average B, all atoms (Å ²)	31.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.08% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: A1I2L, NAD, MRD, CSS

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\# Z > 5$	RMSZ	$\# Z > 5$
1	A	1.17	6/2814 (0.2%)	1.34	10/3815 (0.3%)
1	B	1.15	6/2730 (0.2%)	1.25	7/3699 (0.2%)
All	All	1.16	12/5544 (0.2%)	1.30	17/7514 (0.2%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
1	B	0	2

All (12) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	46[A]	LEU	N-CA	7.50	1.56	1.46
1	B	46[B]	LEU	N-CA	7.50	1.56	1.46
1	B	65	GLN	CD-OE1	6.99	1.36	1.23
1	B	271	ILE	C-O	-6.64	1.16	1.24
1	A	122	HIS	CE1-NE2	6.11	1.38	1.32
1	A	60	GLY	C-O	5.32	1.30	1.23
1	A	248	HIS	C-O	5.29	1.30	1.24
1	A	261[A]	GLU	C-O	5.24	1.30	1.24
1	A	261[B]	GLU	C-O	5.24	1.30	1.24
1	A	114	GLU	N-CA	5.24	1.52	1.46
1	B	46[A]	LEU	CA-C	5.11	1.59	1.52
1	B	46[B]	LEU	CA-C	5.11	1.59	1.52

All (17) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	65	GLN	CG-CD-NE2	-9.28	102.49	116.40
1	A	229	ILE	O-C-N	8.07	126.46	121.37
1	B	29	THR	CA-CB-OG1	-6.50	99.85	109.60
1	B	65	GLN	OE1-CD-NE2	6.45	129.05	122.60
1	A	116	ILE	O-C-N	5.45	127.44	121.83
1	B	47	GLU	CB-CG-CD	5.45	121.87	112.60
1	B	46[A]	LEU	CA-C-O	-5.30	112.86	119.38
1	B	46[B]	LEU	CA-C-O	-5.30	112.86	119.38
1	A	151	PHE	CA-C-O	-5.26	114.97	120.55
1	A	305	TYR	CA-CB-CG	5.22	123.30	113.90
1	B	305	TYR	CA-CB-CG	5.21	123.28	113.90
1	A	229	ILE	CA-C-O	-5.15	115.33	119.25
1	A	24	LEU	CA-C-N	5.08	125.61	120.38
1	A	24	LEU	C-N-CA	5.08	125.61	120.38
1	A	261[A]	GLU	CA-C-O	5.07	125.80	119.97
1	A	261[B]	GLU	CA-C-O	5.07	125.80	119.97
1	A	202	THR	O-C-N	-5.06	118.47	121.71

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	46[A]	LEU	Mainchain
1	B	46[B]	LEU	Mainchain

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	2756	0	2739	17	0
1	B	2666	0	2658	6	0
2	A	44	0	26	0	0
2	B	44	0	26	0	0
3	A	20	0	0	0	0
3	B	20	0	0	0	0
4	B	8	0	14	0	0
5	A	249	0	0	7	1
5	B	242	0	0	2	1

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
All	All	6049	0	5463	22	1

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 2.

All (22) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:274:LYS:HE2	5:A:558:HOH:O	1.62	0.99
1:A:261[A]:GLU:HG2	5:A:513[A]:HOH:O	1.76	0.83
1:A:32:ARG:NH1	5:A:502:HOH:O	2.12	0.81
1:A:137[B]:GLU:OE1	5:A:501:HOH:O	2.08	0.71
1:B:75:GLU:OE1	5:B:502:HOH:O	2.14	0.66
1:A:226:LYS:NZ	5:A:505:HOH:O	2.33	0.57
1:A:97:CYS:SG	1:A:275:CYS:SG	3.04	0.55
1:A:359:MET:HE3	1:A:359:MET:O	2.06	0.55
1:A:295:LEU:O	1:A:295:LEU:HD12	2.10	0.50
1:B:88:THR:O	5:B:503:HOH:O	2.19	0.50
1:A:275:CYS:HB2	5:A:714:HOH:O	2.16	0.46
1:A:275:CYS:SG	1:A:302:TYR:HE2	2.39	0.46
1:A:359:MET:HE3	1:A:359:MET:HA	1.97	0.46
1:A:222:TYR:OH	1:A:226:LYS:NZ	2.48	0.45
1:B:123:ASN:OD1	1:B:227:ASN:HB3	2.20	0.42
1:A:359:MET:HE2	1:A:363:MET:SD	2.60	0.42
1:A:10:PRO:O	1:A:13:ALA:HB3	2.19	0.42
1:A:164:ASN:HB3	1:B:327:TRP:CE2	2.55	0.42
1:A:205:LYS:NZ	5:A:513[A]:HOH:O	2.53	0.42
1:B:122:HIS:CE1	1:B:359[B]:MET:HE1	2.55	0.41
1:B:92:ARG:NH1	1:B:123:ASN:OD1	2.37	0.40

All (1) 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)
5:A:711:HOH:O	5:B:713:HOH:O[4_555]	2.07	0.13

5.3 Torsion angles

5.3.1 Protein backbone

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	350/369 (95%)	345 (99%)	5 (1%)	0	100	100
1	B	339/369 (92%)	333 (98%)	6 (2%)	0	100	100
All	All	689/738 (93%)	678 (98%)	11 (2%)	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	296/309 (96%)	295 (100%)	1 (0%)	91	78
1	B	289/309 (94%)	285 (99%)	4 (1%)	62	35
All	All	585/618 (95%)	580 (99%)	5 (1%)	75	53

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	115	THR
1	B	88	THR
1	B	90	SER
1	B	95	THR
1	B	115	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	228	HIS

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

2 non-standard protein/DNA/RNA residues 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	$\# Z > 2$
1	CSS	B	177	1	4,6,7	0.79	0	1,6,8	0.59	0
1	CSS	A	177	1	4,6,7	0.81	0	1,6,8	0.31	0

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
1	CSS	B	177	1	-	0/1/5/7	-
1	CSS	A	177	1	-	0/1/5/7	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

7 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	402	-	42,48,48	1.21	3 (7%)	50,73,73	1.17	3 (6%)
3	A1I2L	A	402	-	10,10,10	1.51	2 (20%)	14,14,14	5.17	7 (50%)
3	A1I2L	A	403	-	10,10,10	1.83	3 (30%)	14,14,14	6.63	8 (57%)
4	MRD	B	401	-	7,7,7	0.25	0	9,10,10	0.82	0
2	NAD	A	401	-	42,48,48	1.03	3 (7%)	50,73,73	1.38	5 (10%)
3	A1I2L	B	403	-	10,10,10	1.51	2 (20%)	14,14,14	5.18	7 (50%)
3	A1I2L	B	404	-	10,10,10	1.83	3 (30%)	14,14,14	6.62	8 (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	NAD	B	402	-	-	4/26/62/62	0/5/5/5
3	A1I2L	A	402	-	-	3/6/14/14	0/1/1/1
3	A1I2L	A	403	-	-	6/6/14/14	0/1/1/1
4	MRD	B	401	-	-	0/5/5/5	-
2	NAD	A	401	-	-	4/26/62/62	0/5/5/5
3	A1I2L	B	403	-	-	3/6/14/14	0/1/1/1
3	A1I2L	B	404	-	-	6/6/14/14	0/1/1/1

All (16) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	402	NAD	C2N-N1N	4.91	1.40	1.35
3	B	404	A1I2L	C06-N05	-2.98	1.44	1.47
3	A	403	A1I2L	C06-N05	-2.96	1.44	1.47
3	B	403	A1I2L	S02-N05	2.82	1.67	1.63
3	A	402	A1I2L	S02-N05	2.80	1.66	1.63
3	A	403	A1I2L	S02-N05	2.73	1.66	1.63
3	B	404	A1I2L	S02-N05	2.73	1.66	1.63
2	B	402	NAD	C8A-N7A	-2.52	1.30	1.34
2	A	401	NAD	C8A-N7A	-2.50	1.30	1.34
2	A	401	NAD	PA-O2A	-2.36	1.44	1.55
3	B	404	A1I2L	C10-N05	-2.32	1.45	1.47
3	A	403	A1I2L	C10-N05	-2.26	1.45	1.47
3	A	402	A1I2L	C06-N05	-2.18	1.45	1.47
2	A	401	NAD	C6N-C5N	-2.18	1.33	1.38
2	B	402	NAD	PA-O2A	-2.14	1.45	1.55
3	B	403	A1I2L	C06-N05	-2.14	1.45	1.47

All (38) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	403	A1I2L	O04-S02-O03	-13.89	98.79	118.59
3	A	402	A1I2L	O04-S02-O03	-13.88	98.80	118.59
3	A	403	A1I2L	O04-S02-O03	-12.98	100.09	118.59
3	B	404	A1I2L	O04-S02-O03	-12.97	100.10	118.59
3	A	403	A1I2L	C09-C10-N05	11.35	114.86	108.18
3	B	404	A1I2L	C09-C10-N05	11.33	114.85	108.18
3	B	404	A1I2L	O03-S02-N05	11.12	116.37	107.03
3	A	403	A1I2L	O03-S02-N05	11.12	116.36	107.03
3	A	403	A1I2L	C07-C06-N05	10.86	114.58	108.18
3	B	404	A1I2L	C07-C06-N05	10.85	114.57	108.18
3	B	403	A1I2L	C01-S02-N05	7.26	113.65	107.36
3	A	402	A1I2L	C01-S02-N05	7.23	113.61	107.36
3	A	403	A1I2L	C10-N05-S02	6.82	124.70	116.30
3	B	404	A1I2L	C10-N05-S02	6.80	124.67	116.30
3	A	402	A1I2L	O04-S02-C01	6.30	116.91	108.44
3	B	403	A1I2L	O04-S02-C01	6.29	116.90	108.44
3	A	402	A1I2L	C07-C06-N05	5.66	111.51	108.18
3	B	403	A1I2L	C07-C06-N05	5.64	111.50	108.18
3	B	403	A1I2L	C09-C10-N05	4.95	111.10	108.18
3	A	402	A1I2L	C09-C10-N05	4.95	111.09	108.18
3	A	402	A1I2L	C06-N05-S02	4.36	121.67	116.30
3	B	403	A1I2L	C06-N05-S02	4.34	121.64	116.30
2	B	402	NAD	O2A-PA-O1A	4.30	133.48	112.24

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	401	NAD	O4D-C1D-C2D	-4.19	100.80	106.93
2	A	401	NAD	C6N-N1N-C2N	-4.01	118.32	121.97
3	A	403	A1I2L	O04-S02-C01	3.60	113.28	108.44
3	B	404	A1I2L	O04-S02-C01	3.57	113.24	108.44
2	B	402	NAD	C6N-N1N-C2N	-3.17	119.08	121.97
3	B	404	A1I2L	C01-S02-N05	2.74	109.72	107.36
3	A	403	A1I2L	C01-S02-N05	2.70	109.70	107.36
2	A	401	NAD	O2A-PA-O1A	2.64	125.28	112.24
2	A	401	NAD	C5A-C6A-N6A	2.57	124.26	120.35
2	B	402	NAD	C5A-C6A-N6A	2.41	124.01	120.35
2	A	401	NAD	O7N-C7N-C3N	-2.25	116.94	119.63
3	B	403	A1I2L	O03-S02-C01	2.12	111.29	108.44
3	A	402	A1I2L	O03-S02-C01	2.10	111.27	108.44
3	A	403	A1I2L	O08-C09-C10	2.09	116.40	111.80
3	B	404	A1I2L	O08-C09-C10	2.09	116.39	111.80

There are no chirality outliers.

All (26) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	401	NAD	C5D-O5D-PN-O1N
2	B	402	NAD	C5D-O5D-PN-O1N
3	A	402	A1I2L	C10-N05-S02-C01
3	A	402	A1I2L	C10-N05-S02-O03
3	A	402	A1I2L	C10-N05-S02-O04
3	A	403	A1I2L	C10-N05-S02-C01
3	A	403	A1I2L	C06-N05-S02-C01
3	A	403	A1I2L	C10-N05-S02-O03
3	A	403	A1I2L	C06-N05-S02-O03
3	A	403	A1I2L	C10-N05-S02-O04
3	B	403	A1I2L	C10-N05-S02-C01
3	B	403	A1I2L	C10-N05-S02-O03
3	B	403	A1I2L	C10-N05-S02-O04
3	B	404	A1I2L	C10-N05-S02-C01
3	B	404	A1I2L	C06-N05-S02-C01
3	B	404	A1I2L	C10-N05-S02-O03
3	B	404	A1I2L	C06-N05-S02-O03
3	B	404	A1I2L	C10-N05-S02-O04
3	A	403	A1I2L	C06-N05-S02-O04
3	B	404	A1I2L	C06-N05-S02-O04
2	A	401	NAD	PA-O3-PN-O5D
2	A	401	NAD	C5D-O5D-PN-O3

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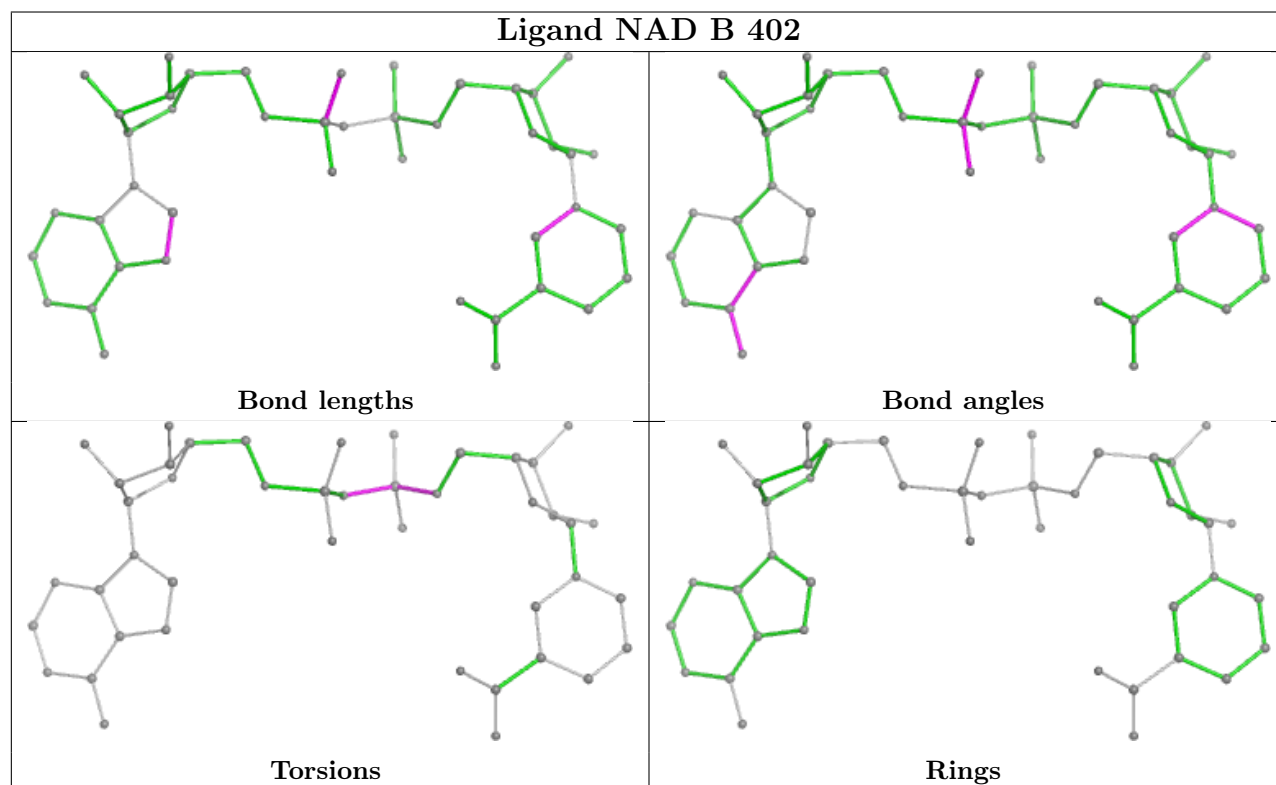
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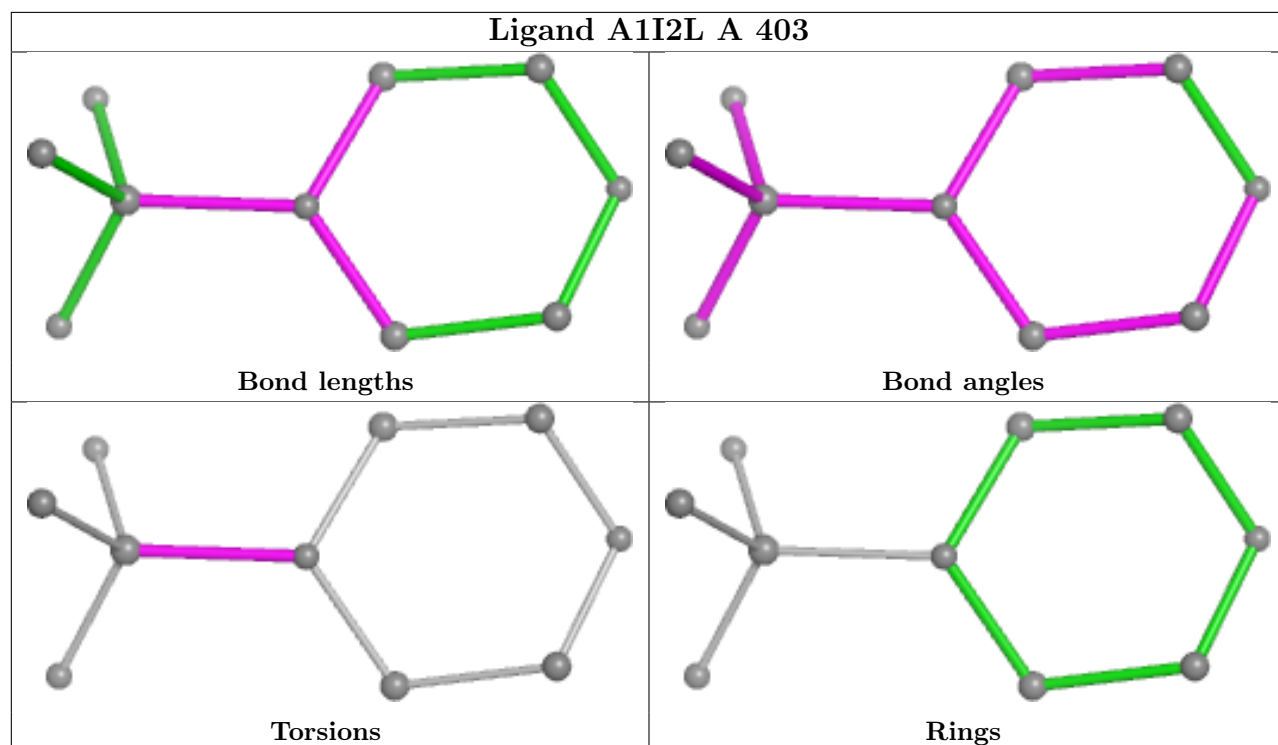
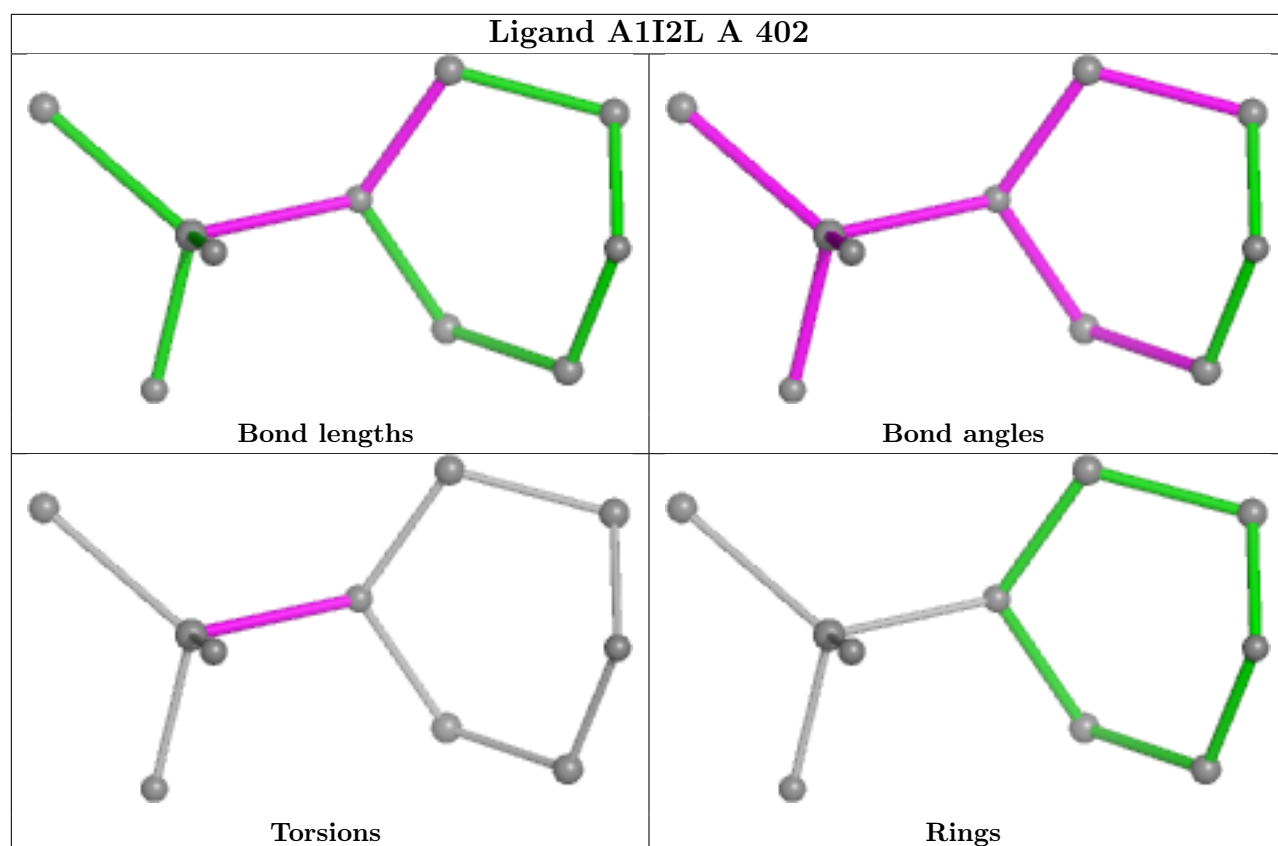
Mol	Chain	Res	Type	Atoms
2	B	402	NAD	C5D-O5D-PN-O3
2	A	401	NAD	C5D-O5D-PN-O2N
2	B	402	NAD	C5D-O5D-PN-O2N
2	B	402	NAD	PA-O3-PN-O5D

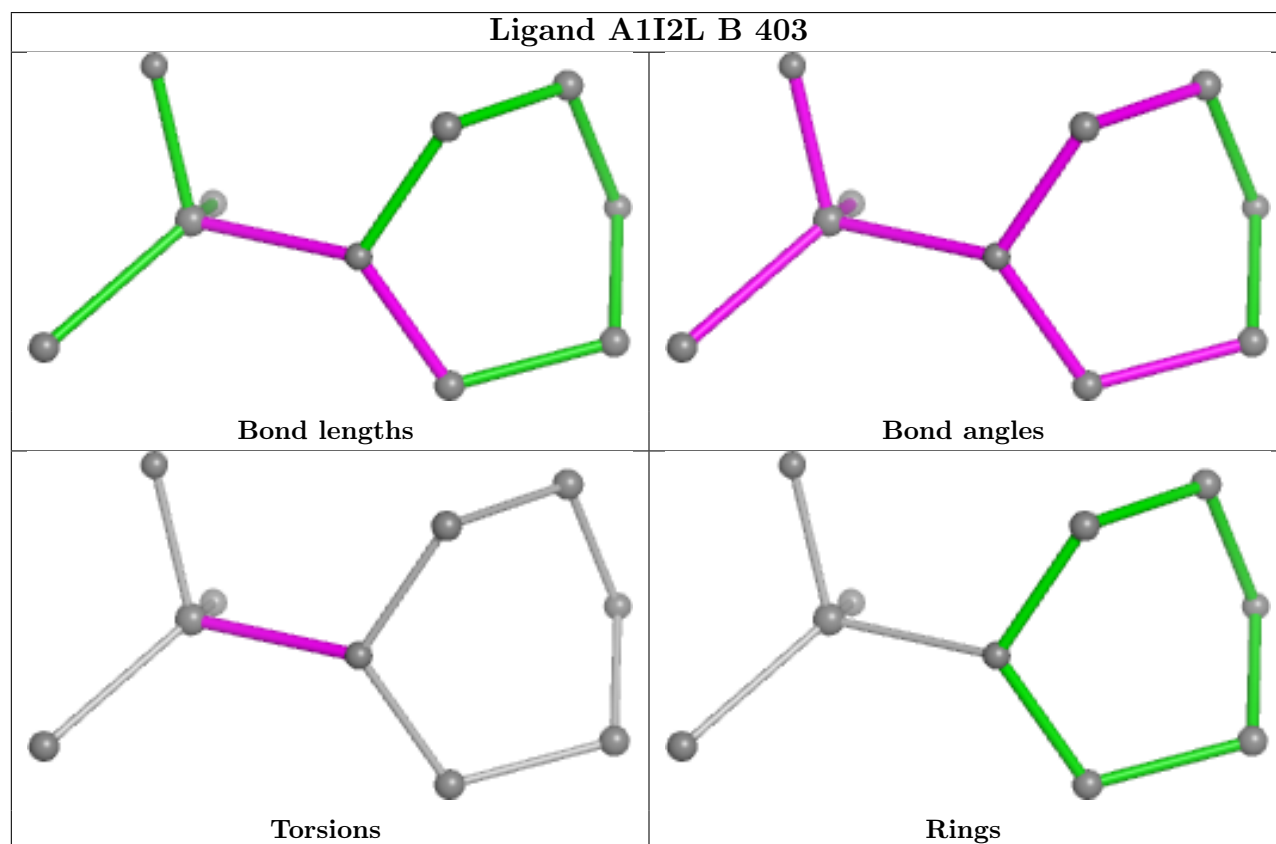
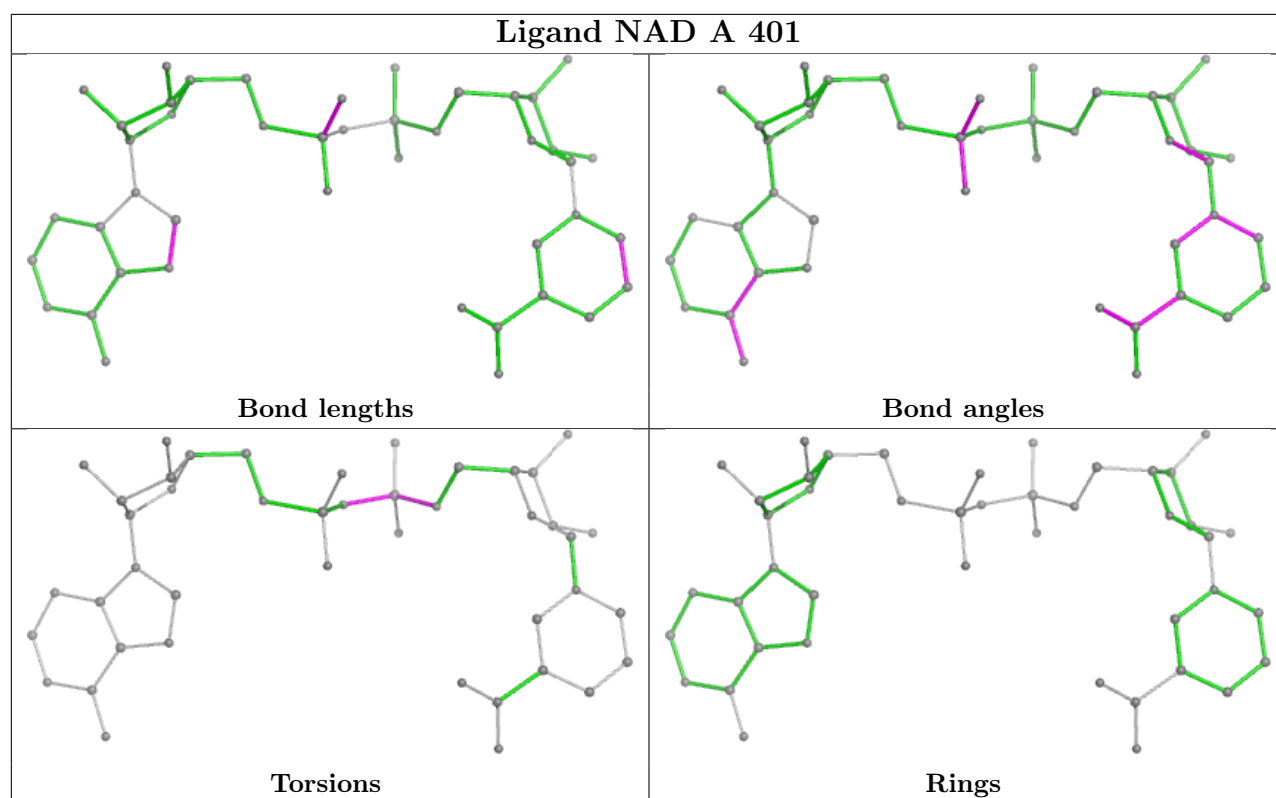
There are no ring outliers.

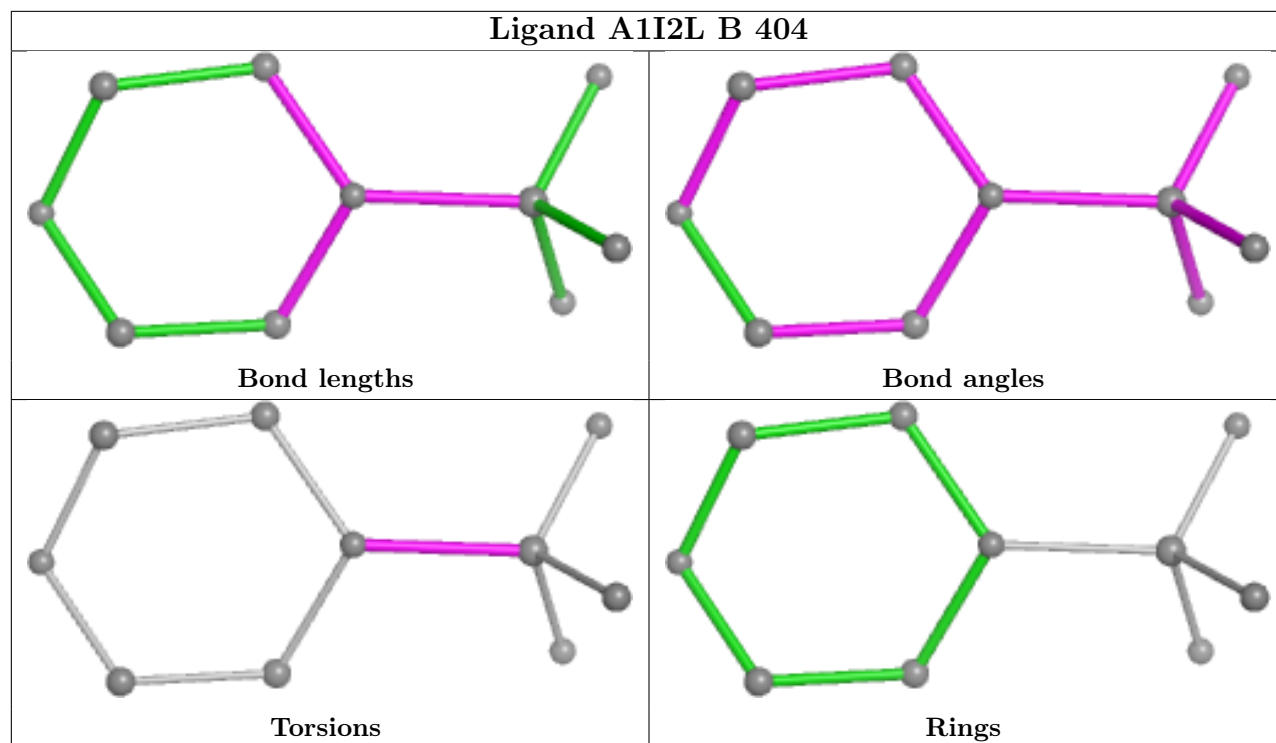
No monomer is involved in short contacts.

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	349/369 (94%)	1.04	46 (13%) 8 7	11, 27, 63, 108	8 (2%)
1	B	335/369 (90%)	0.69	25 (7%) 22 21	13, 27, 47, 82	7 (2%)
All	All	684/738 (92%)	0.87	71 (10%) 13 12	11, 27, 55, 108	15 (2%)

All (71) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	14	LEU	10.0
1	A	18	LEU	9.5
1	A	78	SER	8.2
1	A	9	ALA	7.7
1	A	87	LEU	7.6
1	A	10	PRO	7.5
1	A	15	ALA	6.4
1	A	11	ALA	6.4
1	B	89	GLN	6.0
1	A	17	VAL	5.9
1	A	275	CYS	5.8
1	A	84	HIS	5.7
1	A	91	ARG	5.4
1	A	16	ALA	5.4
1	A	26	PRO	5.4
1	A	363	MET	4.9
1	B	85	ALA	4.8
1	A	77	LEU	4.6
1	B	250	TYR	4.6
1	B	94	LEU	4.5
1	A	361	ALA	4.5
1	A	19	LYS	4.4
1	A	362	PHE	4.3
1	A	12	GLY	4.2

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Mol	Chain	Res	Type	RSRZ
1	B	28	SER	4.2
1	A	20	HIS	4.0
1	A	25	PRO	4.0
1	A	274	LYS	3.9
1	A	24	LEU	3.9
1	A	85	ALA	3.8
1	A	305	TYR	3.8
1	A	22	SER	3.7
1	B	192	MET	3.4
1	B	363	MET	3.3
1	B	93	PRO	3.2
1	A	13	ALA	3.2
1	B	90	SER	3.1
1	A	23	THR	3.1
1	B	251	LYS	3.0
1	B	87	LEU	3.0
1	A	76	PRO	2.9
1	A	272	PHE	2.9
1	B	196	THR	2.8
1	A	21	SER	2.8
1	B	88	THR	2.7
1	B	157	GLU	2.7
1	A	261[A]	GLU	2.6
1	B	91	ARG	2.6
1	A	332	VAL	2.5
1	A	360	ASP	2.5
1	A	195	ASN	2.5
1	B	84	HIS	2.5
1	B	77	LEU	2.5
1	A	74	LEU	2.4
1	B	345	LEU	2.4
1	B	200	LYS	2.3
1	B	173	ASN	2.3
1	B	305	TYR	2.3
1	A	49[A]	PHE	2.2
1	A	27	GLU	2.2
1	B	143	LEU	2.2
1	B	298	ASN	2.2
1	A	32	ARG	2.1
1	A	200	LYS	2.1
1	A	70	ILE	2.1
1	A	196	THR	2.1

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Mol	Chain	Res	Type	RSRZ
1	B	360	ASP	2.1
1	A	271	ILE	2.1
1	A	93	PRO	2.0
1	A	86[A]	ASP	2.0
1	B	74	LEU	2.0

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

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
1	CSS	B	177	7/8	0.92	0.12	35,36,49,88	0
1	CSS	A	177	7/8	0.93	0.10	26,29,41,53	0

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

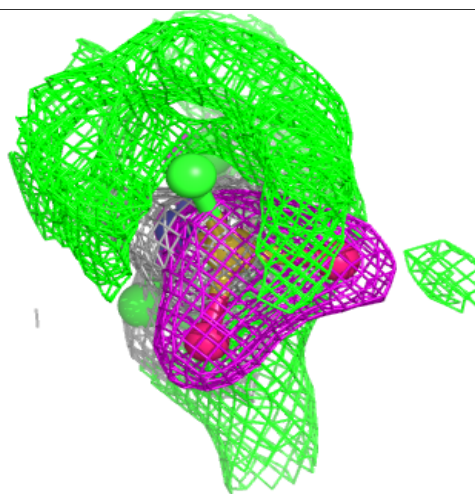
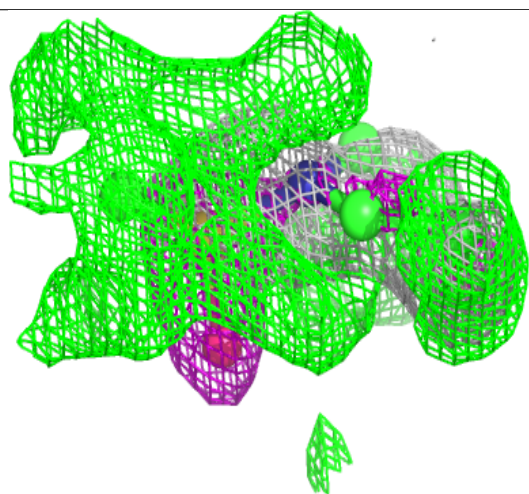
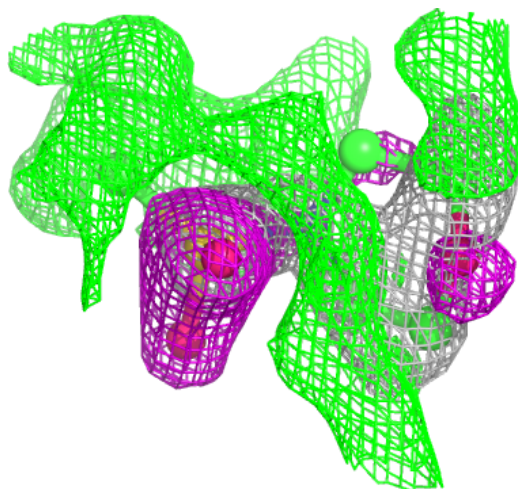
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	A1I2L	A	402	10/10	0.41	0.34	20,20,20,20	10
3	A1I2L	B	403	10/10	0.48	0.33	20,20,20,20	10
3	A1I2L	A	403	10/10	0.62	0.24	20,20,20,20	0
3	A1I2L	B	404	10/10	0.66	0.25	20,20,20,20	0
4	MRD	B	401	8/8	0.91	0.18	39,42,47,53	8
2	NAD	B	402	44/44	0.97	0.07	18,23,30,34	44
2	NAD	A	401	44/44	0.98	0.06	18,21,30,35	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.

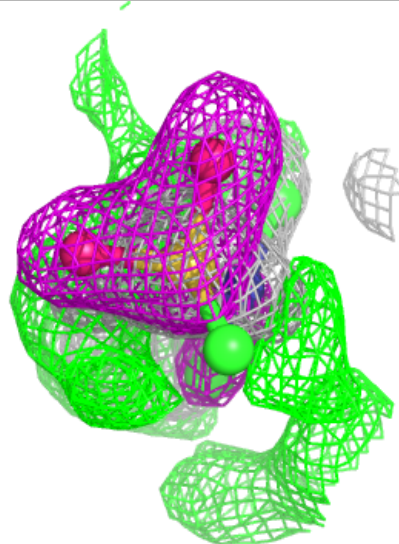
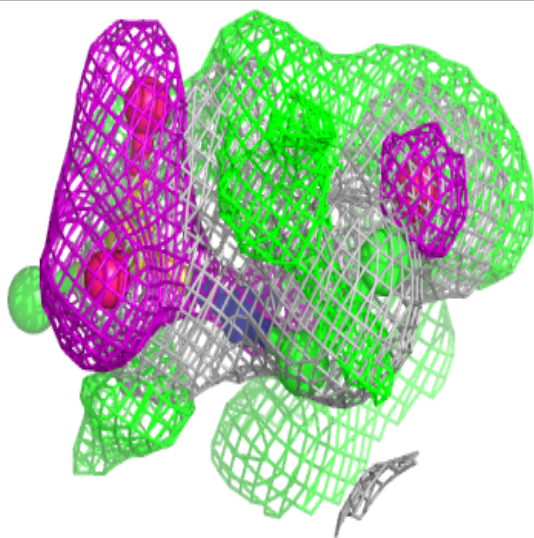
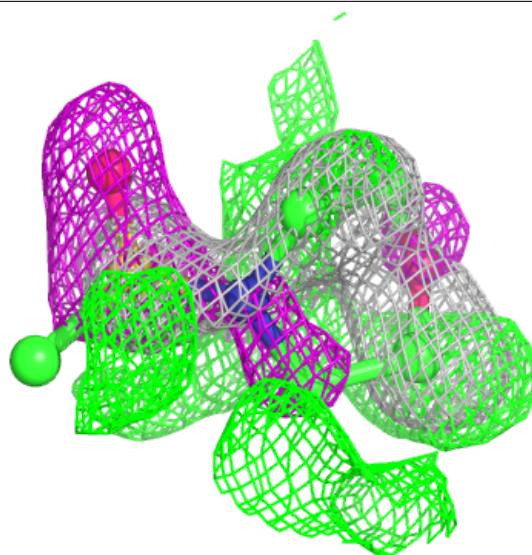
Electron density around A1I2L A 402:

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



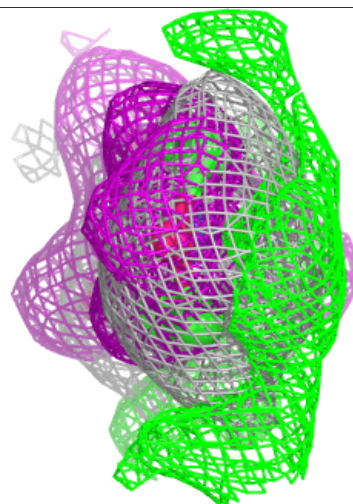
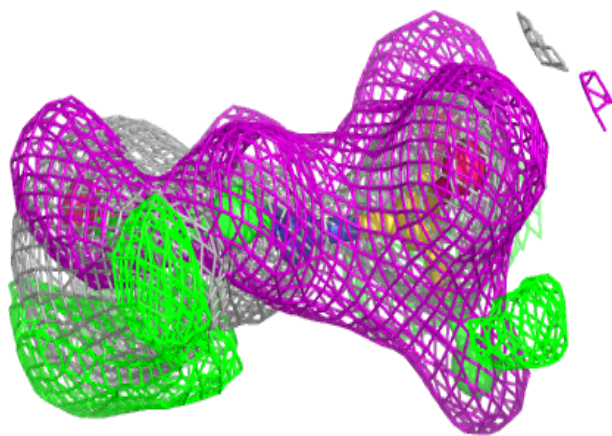
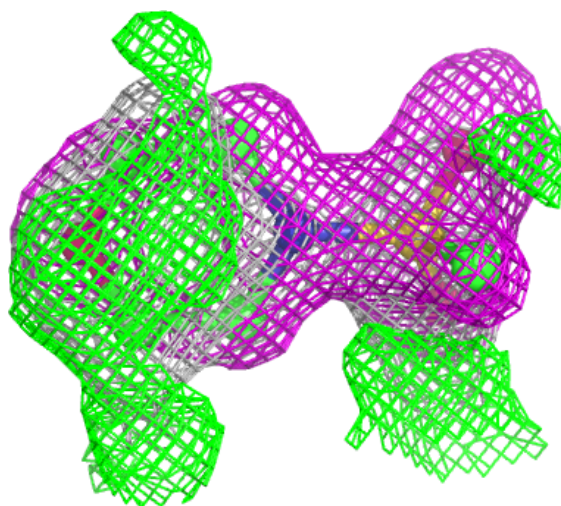
Electron density around A1I2L B 403:

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



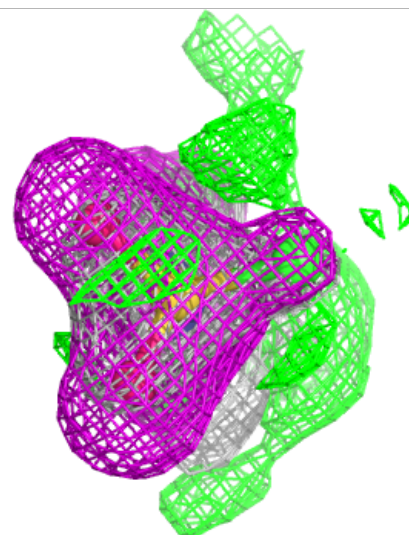
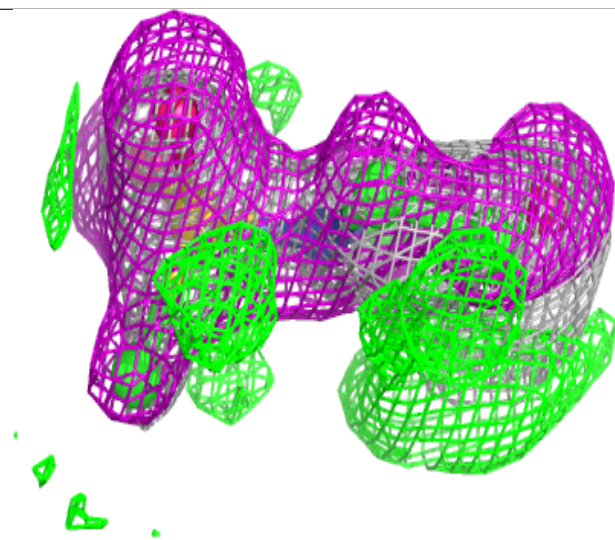
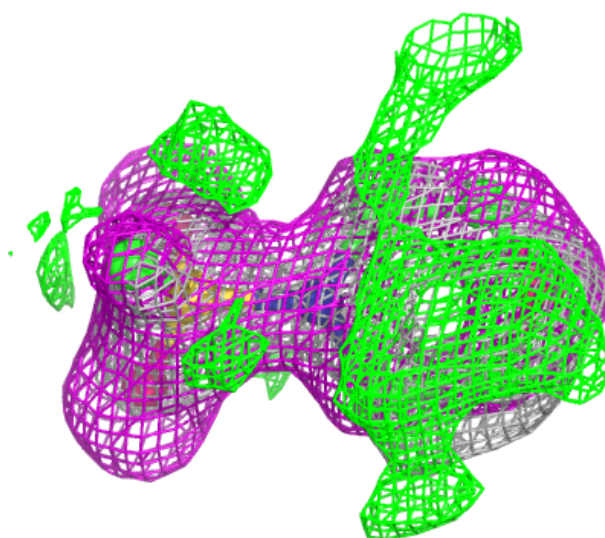
Electron density around A1I2L A 403:

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



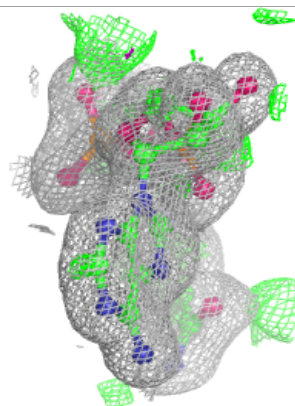
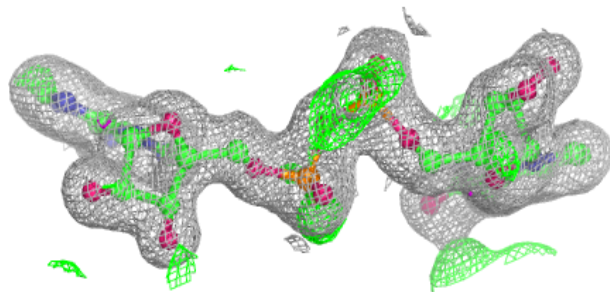
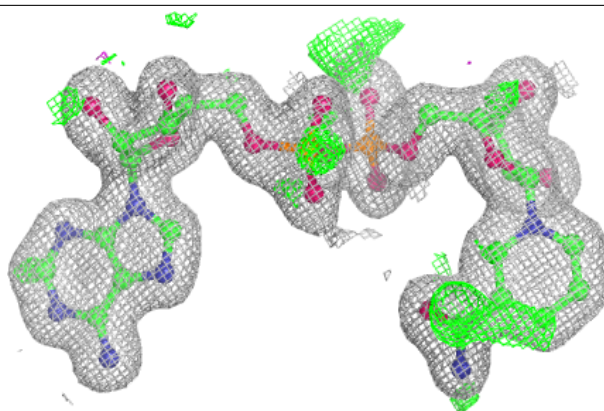
Electron density around A1I2L B 404:

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 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

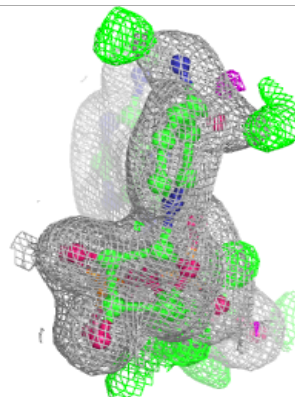
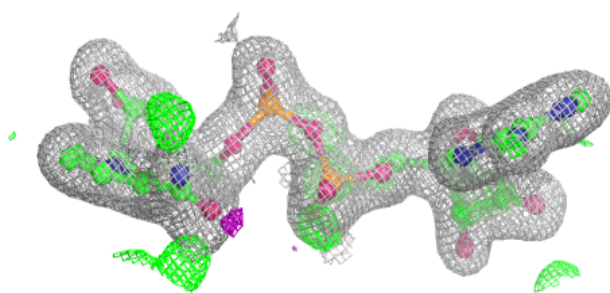
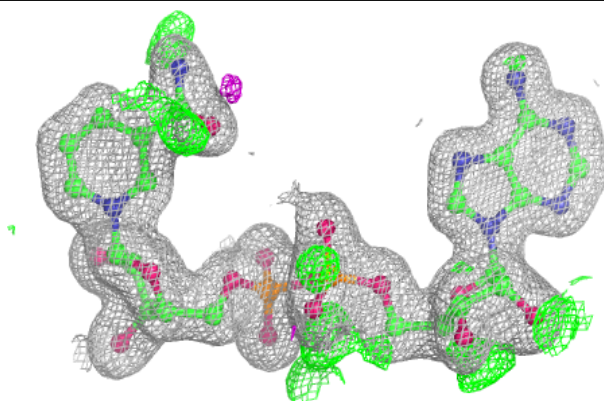


Electron density around NAD B 402:

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

**Electron density around NAD A 401:**

$2mF_o-DF_c$ (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.