



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 03:08 PM UTC

PDB ID : 4YB4 / pdb_00004yb4
Title : Crystal structure of homoisocitrate dehydrogenase from *Thermus thermophilus* in complex with homoisocitrate, magnesium ion (II) and NADH
Authors : Takahashi, K.; Tomita, T.; Kuzuyama, T.; Nishiyama, M.
Deposited on : 2015-02-18
Resolution : 2.50 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
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)	:	2.49

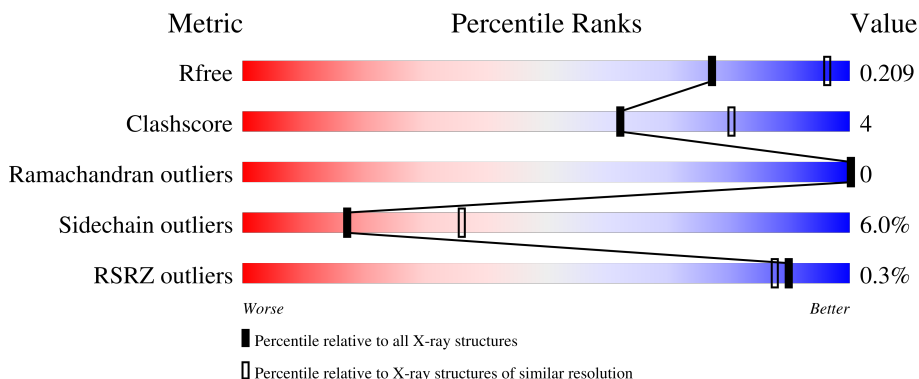
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.50 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}	180053	5829 (2.50-2.50)
Clashscore	190562	6492 (2.50-2.50)
Ramachandran outliers	187476	6378 (2.50-2.50)
Sidechain outliers	187428	6380 (2.50-2.50)
RSRZ outliers	180081	5833 (2.50-2.50)

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	334	% 88% 9% .
1	B	334	90% 9% .
1	C	334	88% 10% .
1	D	334	87% 10% .

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 11169 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.

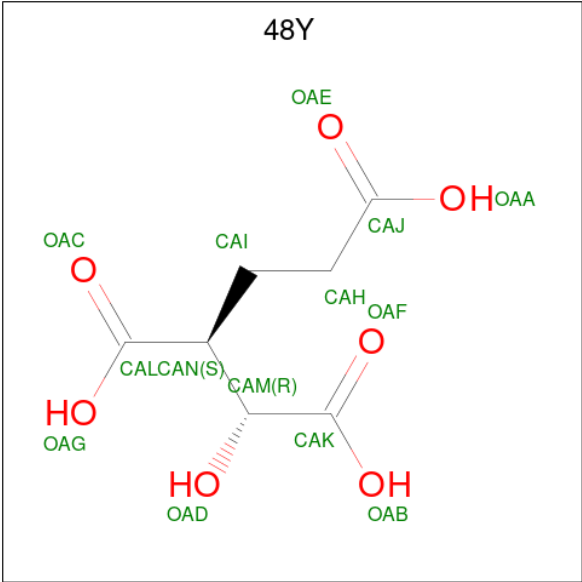
- Molecule 1 is a protein called Homoisocitrate dehydrogenase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	333	Total	C	N	O	S	0	0	0
			2519	1590	448	474	7			
1	B	333	Total	C	N	O	S	0	0	0
			2519	1590	448	474	7			
1	C	333	Total	C	N	O	S	0	0	0
			2519	1590	448	474	7			
1	D	333	Total	C	N	O	S	0	0	0
			2519	1590	448	474	7			

- Molecule 2 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

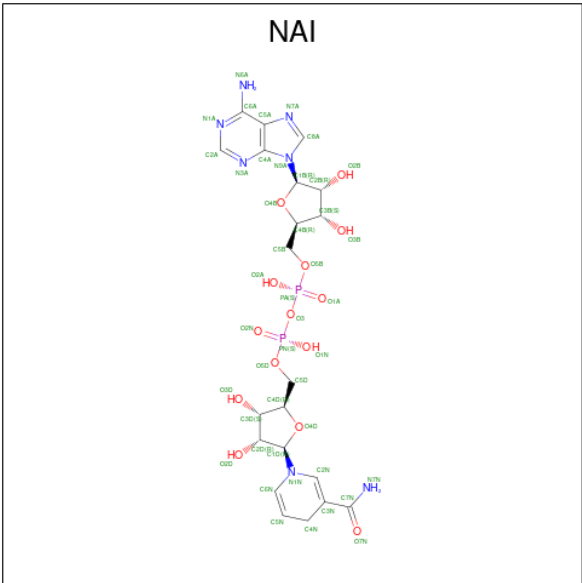
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	2	Total	Mg	0	0
			2	2		
2	C	2	Total	Mg	0	0
			2	2		

- Molecule 3 is (1R,2S)-1-hydroxybutane-1,2,4-tricarboxylic acid (CCD ID: 48Y) (formula: C₇H₁₀O₇).



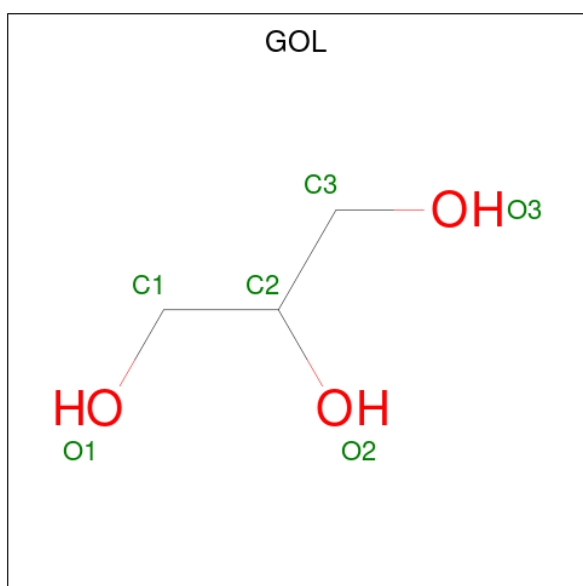
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			14	7	7		
3	B	1	Total	C	O	0	0
			14	7	7		
3	C	1	Total	C	O	0	0
			14	7	7		
3	D	1	Total	C	O	0	0
			14	7	7		

- Molecule 4 is 1,4-DIHYDRONICOTINAMIDE ADENINE DINUCLEOTIDE (CCD ID: NAI) (formula: C₂₁H₂₉N₇O₁₄P₂).



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

- Molecule 5 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).



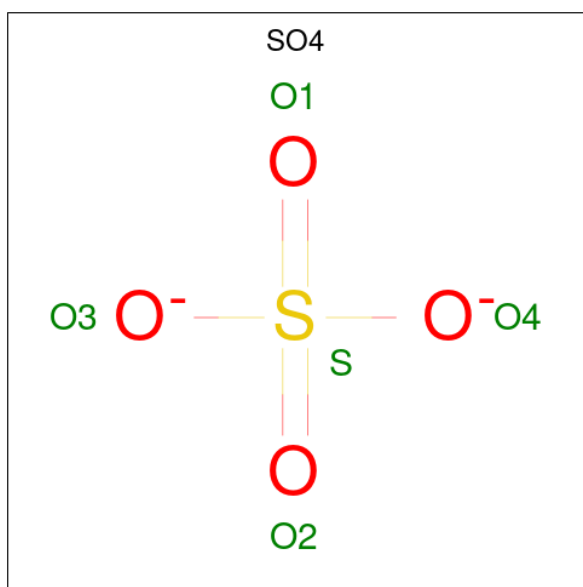
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	O	0	0
			6	3	3		
5	A	1	Total	C	O	0	0
			6	3	3		
5	A	1	Total	C	O	0	0
			6	3	3		
5	A	1	Total	C	O	0	0
			6	3	3		
5	B	1	Total	C	O	0	0
			6	3	3		
5	B	1	Total	C	O	0	0
			6	3	3		
5	B	1	Total	C	O	0	0
			6	3	3		
5	B	1	Total	C	O	0	0
			6	3	3		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	B	1	Total	C	O	0	0
			6	3	3		
5	B	1	Total	C	O	0	0
			6	3	3		
5	C	1	Total	C	O	0	0
			6	3	3		
5	C	1	Total	C	O	0	0
			6	3	3		
5	C	1	Total	C	O	0	0
			6	3	3		
5	C	1	Total	C	O	0	0
			6	3	3		
5	C	1	Total	C	O	0	0
			6	3	3		
5	C	1	Total	C	O	0	0
			6	3	3		
5	C	1	Total	C	O	0	0
			6	3	3		
5	D	1	Total	C	O	0	0
			6	3	3		
5	D	1	Total	C	O	0	0
			6	3	3		
5	D	1	Total	C	O	0	0
			6	3	3		
5	D	1	Total	C	O	0	0
			6	3	3		
5	D	1	Total	C	O	0	0
			6	3	3		

- Molecule 6 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	1	Total	O	S	0	0
			5	4	1		
6	A	1	Total	O	S	0	0
			5	4	1		
6	A	1	Total	O	S	0	0
			5	4	1		
6	A	1	Total	O	S	0	0
			5	4	1		
6	A	1	Total	O	S	0	0
			5	4	1		
6	A	1	Total	O	S	0	0
			5	4	1		
6	B	1	Total	O	S	0	0
			5	4	1		
6	B	1	Total	O	S	0	0
			5	4	1		
6	B	1	Total	O	S	0	0
			5	4	1		
6	B	1	Total	O	S	0	0
			5	4	1		
6	B	1	Total	O	S	0	0
			5	4	1		

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	B	1	Total O S 5 4 1	0	0
6	C	1	Total O S 5 4 1	0	0
6	C	1	Total O S 5 4 1	0	0
6	C	1	Total O S 5 4 1	0	0
6	C	1	Total O S 5 4 1	0	0
6	C	1	Total O S 5 4 1	0	0
6	C	1	Total O S 5 4 1	0	0
6	C	1	Total O S 5 4 1	0	0
6	C	1	Total O S 5 4 1	0	0
6	C	1	Total O S 5 4 1	0	0
6	C	1	Total O S 5 4 1	0	0
6	D	1	Total O S 5 4 1	0	0
6	D	1	Total O S 5 4 1	0	0
6	D	1	Total O S 5 4 1	0	0
6	D	1	Total O S 5 4 1	0	0
6	D	1	Total O S 5 4 1	0	0

- Molecule 7 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	121	Total O 121 121	0	0
7	B	149	Total O 149 149	0	0
7	C	149	Total O 149 149	0	0

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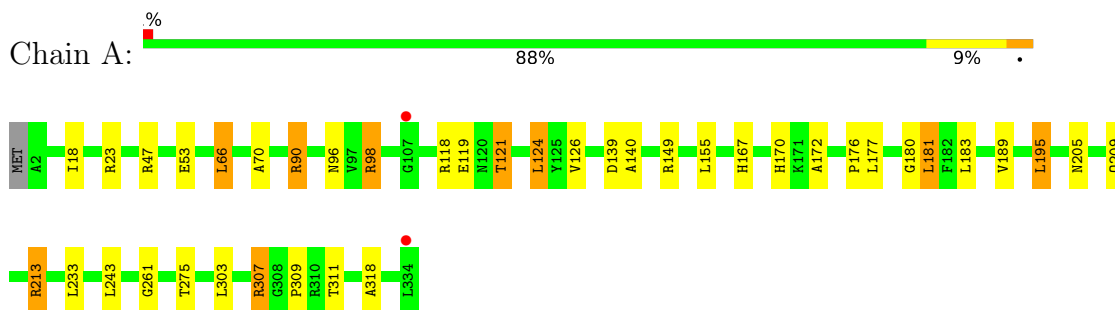
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	D	144	Total 144	O 144	0	0

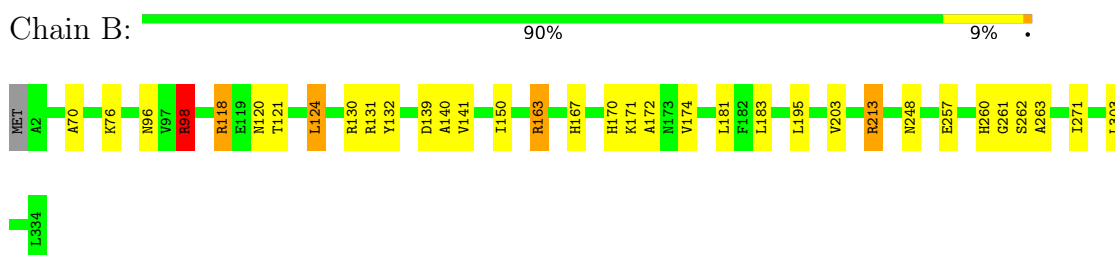
3 Residue-property plots [i](#)

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.

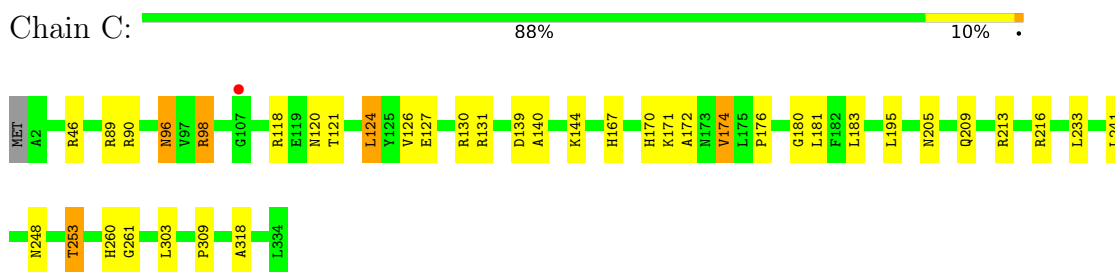
- Molecule 1: Homoisocitrate dehydrogenase



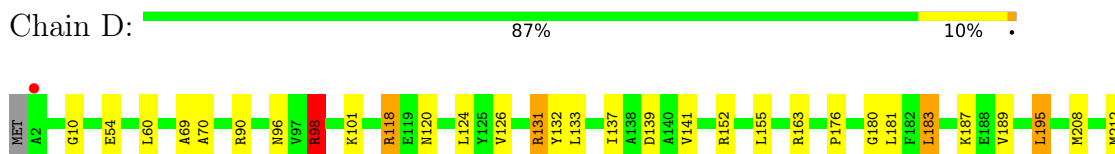
- Molecule 1: Homoisocitrate dehydrogenase



- Molecule 1: Homoisocitrate dehydrogenase



- Molecule 1: Homoisocitrate dehydrogenase





4 Data and refinement statistics

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, α , β , γ	159.66Å 159.66Å 148.52Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	50.00 – 2.50 50.00 – 2.50	Depositor EDS
% Data completeness (in resolution range)	95.1 (50.00-2.50) 95.1 (50.00-2.50)	Depositor EDS
R_{merge}	0.11	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	4.12 (at 2.51Å)	Xtriage
Refinement program	REFMAC 5.8.0049, Coot 0.8-pre	Depositor
R, R_{free}	0.150 , 0.205 0.160 , 0.209	Depositor DCC
R_{free} test set	2997 reflections (4.48%)	wwPDB-VP
Wilson B-factor (Å ²)	32.2	Xtriage
Anisotropy	0.031	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.38 , 37.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	11169	wwPDB-VP
Average B, all atoms (Å ²)	33.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.37% 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 [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: NAI, SO4, GOL, 48Y, MG

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	0.72	0/2560	0.87	1/3474 (0.0%)
1	B	0.67	0/2560	0.85	3/3474 (0.1%)
1	C	0.71	0/2560	0.85	0/3474
1	D	0.69	0/2560	0.88	2/3474 (0.1%)
All	All	0.70	0/10240	0.86	6/13896 (0.0%)

There are no bond length outliers.

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	98	ARG	NE-CZ-NH2	5.57	124.21	119.20
1	B	98	ARG	NE-CZ-NH2	5.26	123.94	119.20
1	A	98	ARG	NE-CZ-NH2	5.12	123.81	119.20
1	B	271	ILE	CB-CA-C	-5.11	105.10	110.62
1	D	137	ILE	CB-CA-C	-5.07	102.69	110.50
1	B	203	VAL	N-CA-C	5.02	115.74	110.62

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2519	0	2582	21	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	B	2519	0	2582	22	0
1	C	2519	0	2582	25	0
1	D	2519	0	2582	23	0
2	A	2	0	0	0	0
2	C	2	0	0	0	0
3	A	14	0	0	1	0
3	B	14	0	0	0	0
3	C	14	0	0	0	0
3	D	14	0	0	0	0
4	A	44	0	27	2	0
4	B	44	0	27	3	0
4	C	44	0	27	0	0
4	D	44	0	27	2	0
5	A	24	0	32	2	0
5	B	36	0	48	1	0
5	C	48	0	64	2	0
5	D	36	0	48	2	0
6	A	35	0	0	0	0
6	B	40	0	0	0	0
6	C	50	0	0	0	0
6	D	25	0	0	0	0
7	A	121	0	0	2	0
7	B	149	0	0	2	0
7	C	149	0	0	5	0
7	D	144	0	0	3	0
All	All	11169	0	10628	87	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 4.

All (87) 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:D:208:MET:SD	1:D:212:MET:HE3	2.04	0.98
1:B:120:ASN:HD21	1:B:248:ASN:HD22	1.19	0.86
1:C:120:ASN:HD21	1:C:248:ASN:HD22	1.28	0.82
1:A:170:HIS:HD2	1:A:172:ALA:H	1.29	0.79
1:C:96:ASN:ND2	1:C:98:ARG:HD3	1.99	0.78
1:B:213:ARG:NH2	5:B:403:GOL:O2	2.18	0.77
1:C:170:HIS:HD2	1:C:172:ALA:H	1.32	0.74
1:D:208:MET:SD	1:D:212:MET:CE	2.76	0.73

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:253:THR:HG23	7:C:526:HOH:O	1.91	0.70
1:D:212:MET:HE1	5:D:403:GOL:O3	1.92	0.70
1:D:253:THR:HG23	7:D:528:HOH:O	1.94	0.68
1:A:124:LEU:HD13	1:A:140:ALA:HB2	1.77	0.66
1:B:170:HIS:HD2	1:B:172:ALA:H	1.41	0.66
1:D:120:ASN:HD21	1:D:248:ASN:HD22	1.42	0.65
1:B:124:LEU:HD13	1:B:140:ALA:HB2	1.80	0.63
1:A:209:GLN:HE22	1:A:213:ARG:HE	1.46	0.62
1:C:209:GLN:HE22	1:C:213:ARG:HH21	1.46	0.61
1:C:96:ASN:HD21	1:C:98:ARG:HD3	1.64	0.61
1:A:167:HIS:HD2	7:A:540:HOH:O	1.84	0.60
1:D:152:ARG:NH1	7:D:619:HOH:O	2.35	0.60
1:B:130:ARG:NH2	1:B:139:ASP:OD1	2.37	0.58
1:A:176:PRO:O	1:A:180:GLY:HA3	2.03	0.57
1:C:167:HIS:HD2	7:C:554:HOH:O	1.86	0.57
1:C:209:GLN:NE2	1:C:213:ARG:HH21	2.03	0.57
1:D:70:ALA:O	4:D:402:NAI:H2N	2.05	0.57
1:D:260:HIS:HD2	1:D:261:GLY:O	1.88	0.57
1:D:261:GLY:HA3	4:D:402:NAI:C6N	2.35	0.56
1:D:96:ASN:ND2	1:D:98:ARG:HD2	2.22	0.54
1:A:155:LEU:CD1	1:A:189:VAL:HG23	2.38	0.54
1:B:260:HIS:HD2	1:B:261:GLY:O	1.91	0.53
1:A:53:GLU:OE2	1:A:90:ARG:NH1	2.41	0.52
1:D:183:LEU:HD22	1:D:187:LYS:HD2	1.92	0.51
5:C:405:GOL:H31	1:D:313:ASP:HB2	1.93	0.50
1:B:120:ASN:ND2	1:B:248:ASN:HD22	2.00	0.50
1:B:163:ARG:HG3	7:B:575:HOH:O	2.11	0.50
1:A:213:ARG:NH2	5:A:405:GOL:O2	2.45	0.49
1:D:176:PRO:O	1:D:180:GLY:HA3	2.12	0.49
1:C:260:HIS:HD2	1:C:261:GLY:O	1.95	0.49
1:C:233:LEU:C	1:C:233:LEU:HD23	2.38	0.48
1:D:195:LEU:HB2	7:D:595:HOH:O	2.13	0.48
1:B:96:ASN:ND2	1:B:98:ARG:HD2	2.28	0.48
1:C:96:ASN:HB3	1:C:118:ARG:HB3	1.94	0.48
1:D:10:GLY:HA3	1:D:69:ALA:O	2.13	0.48
1:A:309:PRO:HB2	1:A:318:ALA:HB2	1.95	0.47
1:B:70:ALA:O	4:B:402:NAI:H2N	2.14	0.47
1:C:170:HIS:CD2	1:C:172:ALA:H	2.22	0.47
1:B:170:HIS:CD2	1:B:172:ALA:H	2.28	0.46
1:C:205:ASN:O	1:C:209:GLN:HG2	2.16	0.46
3:A:402:48Y:OAC	1:B:171:LYS:NZ	2.49	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:195:LEU:HB2	7:A:552:HOH:O	2.16	0.46
1:B:141:VAL:HG21	1:D:132:TYR:CZ	2.50	0.46
1:A:70:ALA:O	4:A:403:NAI:H2N	2.16	0.46
1:A:18:ILE:HD12	1:A:66:LEU:HD13	1.98	0.46
1:B:261:GLY:HA3	4:B:402:NAI:C6N	2.46	0.46
1:B:130:ARG:HD2	1:D:139:ASP:OD2	2.16	0.45
1:C:171:LYS:HG3	1:C:174:VAL:HG13	1.98	0.45
1:C:241:LEU:H	5:D:403:GOL:HO3	1.65	0.45
1:C:90:ARG:NH2	7:C:528:HOH:O	2.50	0.45
1:D:155:LEU:CD1	1:D:189:VAL:HG23	2.47	0.44
1:A:119:GLU:OE2	1:A:121:THR:HB	2.18	0.44
1:A:233:LEU:C	1:A:233:LEU:HD23	2.43	0.44
1:A:243:LEU:HD22	1:A:275:THR:HG21	2.00	0.44
1:B:120:ASN:HD21	1:B:248:ASN:ND2	2.01	0.44
1:D:131:ARG:HD3	1:D:133:LEU:O	2.17	0.44
1:A:205:ASN:O	1:A:209:GLN:HG2	2.18	0.43
1:D:241:LEU:HB3	1:D:260:HIS:HB3	2.00	0.43
1:C:176:PRO:O	1:C:180:GLY:HA3	2.19	0.43
1:B:167:HIS:HD2	7:B:562:HOH:O	2.01	0.43
1:A:139:ASP:OD2	1:C:130:ARG:HD2	2.18	0.43
1:B:96:ASN:HB3	1:B:118:ARG:HG2	2.01	0.43
1:A:177:LEU:O	1:A:181:LEU:HB2	2.20	0.42
1:C:89:ARG:NH2	7:C:638:HOH:O	2.53	0.42
1:B:132:TYR:CZ	1:D:141:VAL:HG21	2.54	0.42
1:C:260:HIS:HE1	7:C:529:HOH:O	2.02	0.42
1:A:261:GLY:HA3	4:A:403:NAI:C6N	2.51	0.41
1:A:307:ARG:O	1:A:307:ARG:HG2	2.19	0.41
1:D:60:LEU:HD23	1:D:60:LEU:HA	1.94	0.41
1:B:262:SER:O	1:B:263:ALA:C	2.62	0.41
1:C:124:LEU:HD22	5:C:407:GOL:H31	2.02	0.41
1:A:213:ARG:HH22	5:A:405:GOL:C2	2.33	0.41
1:B:257:GLU:OE1	4:B:402:NAI:N7N	2.54	0.41
1:C:309:PRO:HB2	1:C:318:ALA:HB2	2.02	0.41
1:D:118:ARG:NH2	1:D:224:ASN:OD1	2.54	0.41
1:B:150:ILE:HD12	1:B:150:ILE:HA	1.98	0.41
1:C:120:ASN:HD21	1:C:248:ASN:ND2	2.08	0.40
1:C:124:LEU:HD13	1:C:140:ALA:HB2	2.04	0.40
1:C:130:ARG:NH2	1:C:139:ASP:OD1	2.55	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	331/334 (99%)	317 (96%)	14 (4%)	0	100	100
1	B	331/334 (99%)	321 (97%)	10 (3%)	0	100	100
1	C	331/334 (99%)	318 (96%)	13 (4%)	0	100	100
1	D	331/334 (99%)	319 (96%)	12 (4%)	0	100	100
All	All	1324/1336 (99%)	1275 (96%)	49 (4%)	0	100	100

There are no Ramachandran outliers to report.

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	263/264 (100%)	245 (93%)	18 (7%)	14	31
1	B	263/264 (100%)	250 (95%)	13 (5%)	22	45
1	C	263/264 (100%)	247 (94%)	16 (6%)	17	35
1	D	263/264 (100%)	247 (94%)	16 (6%)	17	35
All	All	1052/1056 (100%)	989 (94%)	63 (6%)	17	36

All (63) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	23	ARG
1	A	47	ARG

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Mol	Chain	Res	Type
1	A	66	LEU
1	A	90	ARG
1	A	96	ASN
1	A	98	ARG
1	A	118	ARG
1	A	121	THR
1	A	124	LEU
1	A	126	VAL
1	A	149	ARG
1	A	181	LEU
1	A	183	LEU
1	A	195	LEU
1	A	213	ARG
1	A	303	LEU
1	A	307	ARG
1	A	311	THR
1	B	76	LYS
1	B	98	ARG
1	B	118	ARG
1	B	121	THR
1	B	124	LEU
1	B	131	ARG
1	B	163	ARG
1	B	174	VAL
1	B	181	LEU
1	B	183	LEU
1	B	195	LEU
1	B	213	ARG
1	B	303	LEU
1	C	46	ARG
1	C	96	ASN
1	C	98	ARG
1	C	121	THR
1	C	124	LEU
1	C	126	VAL
1	C	127	GLU
1	C	131	ARG
1	C	144	LYS
1	C	174	VAL
1	C	181	LEU
1	C	183	LEU
1	C	195	LEU

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Mol	Chain	Res	Type
1	C	216	ARG
1	C	253	THR
1	C	303	LEU
1	D	54	GLU
1	D	90	ARG
1	D	98	ARG
1	D	101	LYS
1	D	118	ARG
1	D	124	LEU
1	D	126	VAL
1	D	131	ARG
1	D	163	ARG
1	D	181	LEU
1	D	183	LEU
1	D	195	LEU
1	D	253	THR
1	D	286	ASP
1	D	299	LYS
1	D	303	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (22) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	96	ASN
1	A	167	HIS
1	A	170	HIS
1	A	209	GLN
1	A	260	HIS
1	B	96	ASN
1	B	167	HIS
1	B	170	HIS
1	B	248	ASN
1	B	260	HIS
1	C	96	ASN
1	C	167	HIS
1	C	170	HIS
1	C	197	ASN
1	C	199	GLN
1	C	209	GLN
1	C	248	ASN
1	C	260	HIS
1	D	96	ASN

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Mol	Chain	Res	Type
1	D	167	HIS
1	D	248	ASN
1	D	260	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](#)

Of 66 ligands modelled in this entry, 4 are monoatomic - leaving 62 for Mogul analysis.

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	$\# Z > 2$
6	SO4	A	410	-	4,4,4	0.51	0	6,6,6	0.22	0
6	SO4	A	412	-	4,4,4	0.50	0	6,6,6	0.22	0
6	SO4	B	414	-	4,4,4	0.44	0	6,6,6	0.28	0
4	NAI	D	402	-	47,48,48	1.57	11 (23%)	64,73,73	1.59	10 (15%)
5	GOL	D	404	-	5,5,5	0.95	0	5,5,5	0.88	0
5	GOL	B	405	-	5,5,5	0.44	0	5,5,5	0.34	0
5	GOL	C	408	-	5,5,5	0.34	0	5,5,5	0.40	0
6	SO4	B	413	-	4,4,4	0.49	0	6,6,6	0.12	0
6	SO4	D	410	-	4,4,4	0.50	0	6,6,6	0.15	0
6	SO4	C	416	-	4,4,4	0.49	0	6,6,6	0.29	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
5	GOL	A	406	-	5,5,5	0.95	0	5,5,5	1.42	1 (20%)
6	SO4	D	412	-	4,4,4	0.51	0	6,6,6	0.24	0
4	NAI	C	403	-	47,48,48	1.68	12 (25%)	64,73,73	1.81	11 (17%)
3	48Y	A	402	2	13,13,13	1.49	3 (23%)	14,17,17	1.52	3 (21%)
5	GOL	B	407	-	5,5,5	0.51	0	5,5,5	0.25	0
6	SO4	A	409	-	4,4,4	0.48	0	6,6,6	0.34	0
6	SO4	B	411	-	4,4,4	0.47	0	6,6,6	0.23	0
5	GOL	B	406	-	5,5,5	0.43	0	5,5,5	0.31	0
6	SO4	B	410	-	4,4,4	0.44	0	6,6,6	0.28	0
5	GOL	B	408	-	5,5,5	0.35	0	5,5,5	0.33	0
6	SO4	C	417	-	4,4,4	0.46	0	6,6,6	0.17	0
6	SO4	C	419	-	4,4,4	0.48	0	6,6,6	0.17	0
4	NAI	B	402	-	47,48,48	1.66	11 (23%)	64,73,73	1.63	13 (20%)
5	GOL	D	403	-	5,5,5	0.21	0	5,5,5	0.98	0
5	GOL	C	411	-	5,5,5	0.29	0	5,5,5	0.20	0
5	GOL	C	407	-	5,5,5	0.60	0	5,5,5	0.74	0
6	SO4	C	422	-	4,4,4	0.46	0	6,6,6	0.18	0
5	GOL	D	405	-	5,5,5	0.32	0	5,5,5	0.39	0
6	SO4	B	409	-	4,4,4	0.43	0	6,6,6	0.33	0
5	GOL	A	405	-	5,5,5	0.37	0	5,5,5	0.58	0
5	GOL	C	405	-	5,5,5	0.33	0	5,5,5	0.68	0
6	SO4	A	415	-	4,4,4	0.45	0	6,6,6	0.15	0
5	GOL	B	404	-	5,5,5	0.89	0	5,5,5	0.98	0
3	48Y	B	401	2	13,13,13	1.31	0	14,17,17	2.02	5 (35%)
5	GOL	D	406	-	5,5,5	0.33	0	5,5,5	0.22	0
6	SO4	C	414	-	4,4,4	0.45	0	6,6,6	0.18	0
6	SO4	C	418	-	4,4,4	0.41	0	6,6,6	0.21	0
5	GOL	C	409	-	5,5,5	0.40	0	5,5,5	0.28	0
5	GOL	C	410	-	5,5,5	0.16	0	5,5,5	0.39	0
5	GOL	B	403	-	5,5,5	0.38	0	5,5,5	0.37	0
6	SO4	B	415	-	4,4,4	0.52	0	6,6,6	0.15	0
6	SO4	D	413	-	4,4,4	0.47	0	6,6,6	0.22	0
4	NAI	A	403	-	47,48,48	1.60	11 (23%)	64,73,73	1.66	12 (18%)
5	GOL	C	406	-	5,5,5	0.32	0	5,5,5	0.47	0
6	SO4	A	413	-	4,4,4	0.49	0	6,6,6	0.13	0
5	GOL	D	407	-	5,5,5	0.43	0	5,5,5	0.47	0
6	SO4	C	420	-	4,4,4	0.49	0	6,6,6	0.22	0
3	48Y	D	401	2	13,13,13	1.35	2 (15%)	14,17,17	1.78	3 (21%)
5	GOL	A	407	-	5,5,5	0.50	0	5,5,5	0.53	0
6	SO4	C	421	-	4,4,4	0.49	0	6,6,6	0.18	0
6	SO4	C	413	-	4,4,4	0.48	0	6,6,6	0.24	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
6	SO4	B	416	-	4,4,4	0.47	0	6,6,6	0.16	0
3	48Y	C	402	2	13,13,13	1.38	1 (7%)	14,17,17	1.98	4 (28%)
5	GOL	D	408	-	5,5,5	0.47	0	5,5,5	0.84	0
6	SO4	C	415	-	4,4,4	0.49	0	6,6,6	0.27	0
6	SO4	B	412	-	4,4,4	0.44	0	6,6,6	0.22	0
6	SO4	D	411	-	4,4,4	0.51	0	6,6,6	0.17	0
6	SO4	A	414	-	4,4,4	0.43	0	6,6,6	0.36	0
6	SO4	A	411	-	4,4,4	0.46	0	6,6,6	0.11	0
5	GOL	C	412	-	5,5,5	0.61	0	5,5,5	0.68	0
6	SO4	D	409	-	4,4,4	0.52	0	6,6,6	0.19	0
5	GOL	A	408	-	5,5,5	0.51	0	5,5,5	0.26	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
4	NAI	D	402	-	-	6/29/72/72	0/5/5/5
5	GOL	D	404	-	-	4/4/4/4	-
5	GOL	B	405	-	-	0/4/4/4	-
5	GOL	C	408	-	-	2/4/4/4	-
5	GOL	A	406	-	-	4/4/4/4	-
4	NAI	C	403	-	-	7/29/72/72	0/5/5/5
3	48Y	A	402	2	-	1/17/17/17	-
5	GOL	B	407	-	-	4/4/4/4	-
5	GOL	B	406	-	-	2/4/4/4	-
5	GOL	B	408	-	-	4/4/4/4	-
4	NAI	B	402	-	-	6/29/72/72	0/5/5/5
5	GOL	D	403	-	-	2/4/4/4	-
5	GOL	C	411	-	-	2/4/4/4	-
5	GOL	C	407	-	-	4/4/4/4	-
5	GOL	D	405	-	-	2/4/4/4	-
5	GOL	A	405	-	-	2/4/4/4	-
5	GOL	C	405	-	-	2/4/4/4	-
5	GOL	B	404	-	-	3/4/4/4	-
3	48Y	B	401	2	-	2/17/17/17	-
5	GOL	D	406	-	-	2/4/4/4	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	GOL	C	409	-	-	2/4/4/4	-
5	GOL	C	410	-	-	2/4/4/4	-
5	GOL	B	403	-	-	0/4/4/4	-
4	NAI	A	403	-	-	6/29/72/72	0/5/5/5
5	GOL	C	406	-	-	4/4/4/4	-
5	GOL	D	407	-	-	2/4/4/4	-
3	48Y	D	401	2	-	0/17/17/17	-
5	GOL	A	407	-	-	2/4/4/4	-
3	48Y	C	402	2	-	6/17/17/17	-
5	GOL	D	408	-	-	1/4/4/4	-
5	GOL	C	412	-	-	2/4/4/4	-
5	GOL	A	408	-	-	4/4/4/4	-

All (51) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	C	403	NAI	C4N-C3N	-4.84	1.40	1.50
4	A	403	NAI	C4N-C3N	-4.23	1.42	1.50
4	C	403	NAI	C7N-C3N	-4.11	1.39	1.48
4	B	402	NAI	PA-O3	4.10	1.63	1.59
4	A	403	NAI	PN-O3	-4.00	1.55	1.59
4	B	402	NAI	C4N-C3N	-3.86	1.42	1.50
4	D	402	NAI	C4N-C3N	-3.73	1.42	1.50
4	B	402	NAI	C2A-N1A	3.64	1.40	1.33
4	D	402	NAI	C7N-C3N	-3.52	1.41	1.48
4	B	402	NAI	C2A-N3A	3.26	1.39	1.33
4	B	402	NAI	C7N-C3N	-3.12	1.42	1.48
4	C	403	NAI	C2A-N3A	3.08	1.39	1.33
4	B	402	NAI	C5A-N7A	-3.07	1.33	1.39
4	A	403	NAI	C5A-N7A	-2.95	1.33	1.39
4	A	403	NAI	C2A-N1A	2.93	1.39	1.33
4	D	402	NAI	C5A-N7A	-2.92	1.33	1.39
4	A	403	NAI	C7N-C3N	-2.91	1.42	1.48
4	A	403	NAI	C4A-N9A	-2.88	1.31	1.37
4	C	403	NAI	C5A-N7A	-2.87	1.33	1.39
4	D	402	NAI	PA-O3	2.86	1.62	1.59
4	A	403	NAI	C2A-N3A	2.86	1.39	1.33
4	A	403	NAI	C4N-C5N	-2.77	1.41	1.49
4	C	403	NAI	C8A-N9A	-2.77	1.32	1.37
4	C	403	NAI	C5A-C4A	-2.65	1.34	1.39

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	C	403	NAI	C2A-N1A	2.59	1.38	1.33
4	D	402	NAI	C6N-C5N	2.56	1.40	1.33
4	D	402	NAI	C2A-N3A	2.49	1.38	1.33
4	A	403	NAI	C8A-N9A	-2.47	1.33	1.37
4	B	402	NAI	C4N-C5N	-2.45	1.42	1.49
4	D	402	NAI	C4N-C5N	-2.45	1.42	1.49
4	D	402	NAI	C2A-N1A	2.41	1.38	1.33
3	A	402	48Y	CAM-CAK	2.39	1.56	1.52
4	A	403	NAI	C5A-C4A	-2.39	1.34	1.39
4	C	403	NAI	C4N-C5N	-2.38	1.42	1.49
4	B	402	NAI	C6N-C5N	2.34	1.40	1.33
3	A	402	48Y	OAB-CAK	-2.31	1.23	1.30
3	A	402	48Y	CAH-CAJ	2.29	1.55	1.50
4	D	402	NAI	C5A-C4A	-2.29	1.35	1.39
4	C	403	NAI	C5A-C6A	-2.21	1.34	1.41
4	B	402	NAI	C5A-C6A	-2.18	1.34	1.41
4	B	402	NAI	C5A-C4A	-2.18	1.35	1.39
3	C	402	48Y	CAH-CAJ	2.17	1.55	1.50
4	C	403	NAI	PA-O3	2.15	1.61	1.59
3	D	401	48Y	OAA-CAJ	-2.14	1.23	1.30
4	D	402	NAI	C4A-N9A	-2.12	1.33	1.37
4	A	403	NAI	C6N-C5N	2.12	1.39	1.33
4	C	403	NAI	O2B-C2B	2.08	1.48	1.43
4	D	402	NAI	C5A-C6A	-2.07	1.35	1.41
3	D	401	48Y	OAG-CAL	-2.06	1.24	1.30
4	C	403	NAI	C2N-C3N	2.06	1.40	1.35
4	B	402	NAI	C2N-C3N	2.02	1.40	1.35

All (62) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	C	403	NAI	N3A-C2A-N1A	-6.98	118.02	128.58
4	B	402	NAI	N3A-C2A-N1A	-6.00	119.50	128.58
4	D	402	NAI	N3A-C2A-N1A	-5.87	119.69	128.58
4	A	403	NAI	N3A-C2A-N1A	-5.69	119.96	128.58
4	C	403	NAI	C5A-C4A-N3A	-5.16	119.62	126.72
4	B	402	NAI	C5A-C4A-N3A	-4.75	120.17	126.72
4	D	402	NAI	C5A-C4A-N3A	-4.59	120.40	126.72
3	B	401	48Y	CAI-CAN-CAL	4.46	114.54	108.81
4	C	403	NAI	N9A-C8A-N7A	-4.38	107.72	113.94
4	A	403	NAI	C5A-C4A-N3A	-4.33	120.76	126.72
3	C	402	48Y	CAI-CAN-CAL	4.25	114.26	108.81

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	403	NAI	O4D-C1D-N1N	-3.87	100.70	108.08
4	C	403	NAI	C2A-N3A-C4A	3.79	121.08	111.83
4	C	403	NAI	C4A-C5A-N7A	-3.77	106.27	110.58
3	D	401	48Y	CAH-CAI-CAN	-3.77	102.57	113.79
4	C	403	NAI	C5A-N7A-C8A	3.57	109.06	103.45
4	D	402	NAI	C5A-C4A-N9A	3.55	109.68	105.81
4	D	402	NAI	N9A-C8A-N7A	-3.24	109.34	113.94
3	B	401	48Y	OAC-CAL-CAN	-3.21	115.44	123.01
3	D	401	48Y	CAI-CAN-CAL	3.19	112.91	108.81
4	D	402	NAI	C2A-N3A-C4A	3.19	119.62	111.83
4	B	402	NAI	N9A-C8A-N7A	-3.18	109.42	113.94
4	A	403	NAI	C5A-C4A-N9A	3.18	109.27	105.81
4	A	403	NAI	N9A-C8A-N7A	-3.16	109.45	113.94
4	B	402	NAI	C2A-N3A-C4A	3.12	119.46	111.83
4	A	403	NAI	C2A-N3A-C4A	3.11	119.42	111.83
4	C	403	NAI	C5A-C4A-N9A	3.08	109.16	105.81
3	A	402	48Y	CAH-CAI-CAN	-3.04	104.74	113.79
3	C	402	48Y	OAC-CAL-CAN	-3.00	115.94	123.01
4	A	403	NAI	C4A-C5A-N7A	-2.99	107.16	110.58
4	D	402	NAI	C4A-C5A-N7A	-2.95	107.21	110.58
3	B	401	48Y	CAH-CAI-CAN	-2.90	105.16	113.79
4	D	402	NAI	O1N-PN-O3	2.89	115.09	107.27
4	A	403	NAI	O3-PA-O1A	-2.84	102.17	110.70
4	C	403	NAI	O4D-C1D-N1N	-2.82	102.71	108.08
3	A	402	48Y	CAI-CAN-CAL	2.72	112.30	108.81
4	B	402	NAI	C5A-C4A-N9A	2.69	108.75	105.81
4	B	402	NAI	C5A-C6A-N6A	-2.54	117.00	123.29
4	B	402	NAI	C6A-C5A-C4A	2.54	120.64	117.18
4	D	402	NAI	C5A-N7A-C8A	2.53	107.42	103.45
4	B	402	NAI	C5A-N7A-C8A	2.51	107.40	103.45
3	C	402	48Y	CAH-CAI-CAN	-2.51	106.33	113.79
3	C	402	48Y	OAE-CAJ-CAH	-2.47	115.25	123.09
3	D	401	48Y	OAE-CAJ-CAH	-2.44	115.34	123.09
4	B	402	NAI	C4A-C5A-N7A	-2.41	107.83	110.58
4	A	403	NAI	C5A-N7A-C8A	2.39	107.20	103.45
3	A	402	48Y	OAC-CAL-CAN	-2.38	117.38	123.01
4	C	403	NAI	N3A-C4A-N9A	2.38	131.22	127.17
5	A	406	GOL	O2-C2-C3	-2.36	99.40	109.18
4	A	403	NAI	C2D-C1D-N1N	2.34	119.07	113.31
4	A	403	NAI	C6A-C5A-C4A	2.30	120.32	117.18
4	B	402	NAI	N3A-C4A-N9A	2.30	131.08	127.17
4	D	402	NAI	C6A-C5A-C4A	2.27	120.28	117.18

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	402	NAI	O2A-PA-O3	2.26	113.39	107.27
4	A	403	NAI	O2A-PA-O3	2.18	113.16	107.27
4	C	403	NAI	C6A-C5A-C4A	2.17	120.14	117.18
3	B	401	48Y	OAG-CAL-CAN	2.16	119.53	113.93
4	D	402	NAI	C2B-C1B-N9A	-2.15	107.97	113.30
4	B	402	NAI	O1N-PN-O3	2.14	113.05	107.27
4	B	402	NAI	C4D-O4D-C1D	-2.12	104.78	109.47
3	B	401	48Y	OAF-CAK-CAM	-2.08	116.07	121.62
4	C	403	NAI	C5A-C6A-N6A	-2.03	118.27	123.29

There are no chirality outliers.

All (92) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	402	48Y	CAH-CAI-CAN-CAL
3	C	402	48Y	OAC-CAL-CAN-CAI
3	C	402	48Y	CAH-CAI-CAN-CAL
4	A	403	NAI	C5B-O5B-PA-O1A
4	A	403	NAI	C5B-O5B-PA-O3
4	B	402	NAI	C5D-O5D-PN-O3
4	B	402	NAI	C5D-O5D-PN-O1N
4	B	402	NAI	C5D-O5D-PN-O2N
4	C	403	NAI	C5B-O5B-PA-O1A
4	C	403	NAI	C5B-O5B-PA-O3
4	C	403	NAI	C5D-O5D-PN-O1N
4	D	402	NAI	C5B-O5B-PA-O1A
4	D	402	NAI	C5D-O5D-PN-O3
4	D	402	NAI	C5D-O5D-PN-O1N
4	D	402	NAI	C5D-O5D-PN-O2N
5	A	405	GOL	C1-C2-C3-O3
5	A	406	GOL	C1-C2-C3-O3
5	A	407	GOL	O1-C1-C2-C3
5	A	408	GOL	O1-C1-C2-C3
5	A	408	GOL	C1-C2-C3-O3
5	B	404	GOL	C1-C2-C3-O3
5	B	406	GOL	C1-C2-C3-O3
5	C	405	GOL	C1-C2-C3-O3
5	C	406	GOL	C1-C2-C3-O3
5	C	407	GOL	O1-C1-C2-C3
5	C	407	GOL	C1-C2-C3-O3
5	C	410	GOL	C1-C2-C3-O3
5	C	411	GOL	C1-C2-C3-O3

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Mol	Chain	Res	Type	Atoms
5	C	412	GOL	O1-C1-C2-C3
5	D	403	GOL	C1-C2-C3-O3
5	D	405	GOL	O1-C1-C2-C3
5	D	406	GOL	C1-C2-C3-O3
5	A	405	GOL	O2-C2-C3-O3
5	A	406	GOL	O1-C1-C2-O2
5	A	407	GOL	O1-C1-C2-O2
5	A	408	GOL	O1-C1-C2-O2
5	D	405	GOL	O1-C1-C2-O2
5	A	406	GOL	O1-C1-C2-C3
5	B	407	GOL	O1-C1-C2-C3
5	B	407	GOL	C1-C2-C3-O3
5	B	408	GOL	C1-C2-C3-O3
5	C	406	GOL	O1-C1-C2-C3
5	C	408	GOL	C1-C2-C3-O3
5	C	409	GOL	O1-C1-C2-C3
5	D	404	GOL	O1-C1-C2-C3
5	D	404	GOL	C1-C2-C3-O3
5	D	408	GOL	C1-C2-C3-O3
5	B	404	GOL	O2-C2-C3-O3
5	B	407	GOL	O1-C1-C2-O2
5	C	406	GOL	O2-C2-C3-O3
5	C	407	GOL	O2-C2-C3-O3
5	C	409	GOL	O1-C1-C2-O2
5	C	410	GOL	O2-C2-C3-O3
5	C	412	GOL	O1-C1-C2-O2
5	D	403	GOL	O2-C2-C3-O3
5	D	406	GOL	O2-C2-C3-O3
5	A	406	GOL	O2-C2-C3-O3
5	A	408	GOL	O2-C2-C3-O3
5	B	406	GOL	O2-C2-C3-O3
5	C	405	GOL	O2-C2-C3-O3
5	C	407	GOL	O1-C1-C2-O2
5	D	404	GOL	O1-C1-C2-O2
5	C	406	GOL	O1-C1-C2-O2
5	C	411	GOL	O2-C2-C3-O3
5	D	404	GOL	O2-C2-C3-O3
3	B	401	48Y	OAG-CAL-CAN-CAI
3	B	401	48Y	OAC-CAL-CAN-CAI
3	C	402	48Y	OAG-CAL-CAN-CAI
5	D	407	GOL	O1-C1-C2-C3
4	A	403	NAI	O4D-C4D-C5D-O5D

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Mol	Chain	Res	Type	Atoms
4	A	403	NAI	C2D-C1D-N1N-C2N
4	B	402	NAI	C5B-O5B-PA-O1A
4	C	403	NAI	C5D-O5D-PN-O3
4	C	403	NAI	C5D-O5D-PN-O2N
5	B	408	GOL	O1-C1-C2-C3
4	C	403	NAI	C2D-C1D-N1N-C2N
4	A	403	NAI	C3D-C4D-C5D-O5D
4	B	402	NAI	O4D-C1D-N1N-C2N
4	A	403	NAI	O4D-C1D-N1N-C2N
4	C	403	NAI	O4D-C1D-N1N-C2N
5	C	408	GOL	O2-C2-C3-O3
4	D	402	NAI	O4D-C1D-N1N-C2N
5	B	407	GOL	O2-C2-C3-O3
5	B	408	GOL	O2-C2-C3-O3
5	D	407	GOL	O1-C1-C2-O2
4	D	402	NAI	C2D-C1D-N1N-C2N
3	C	402	48Y	OAF-CAK-CAM-CAN
4	B	402	NAI	C2D-C1D-N1N-C2N
5	B	404	GOL	O1-C1-C2-O2
3	C	402	48Y	OAB-CAK-CAM-CAN
5	B	408	GOL	O1-C1-C2-O2
3	C	402	48Y	CAI-CAH-CAJ-OAA

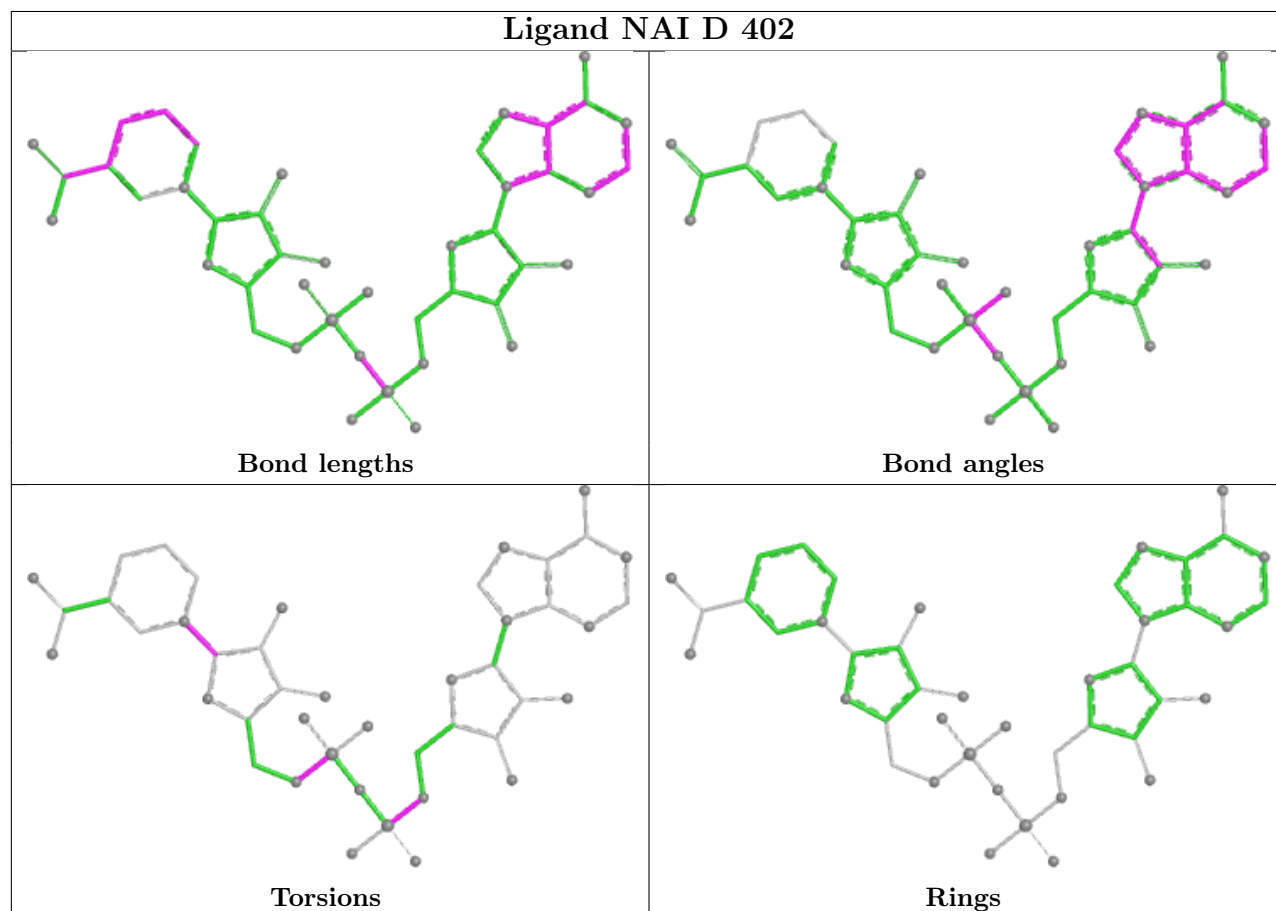
There are no ring outliers.

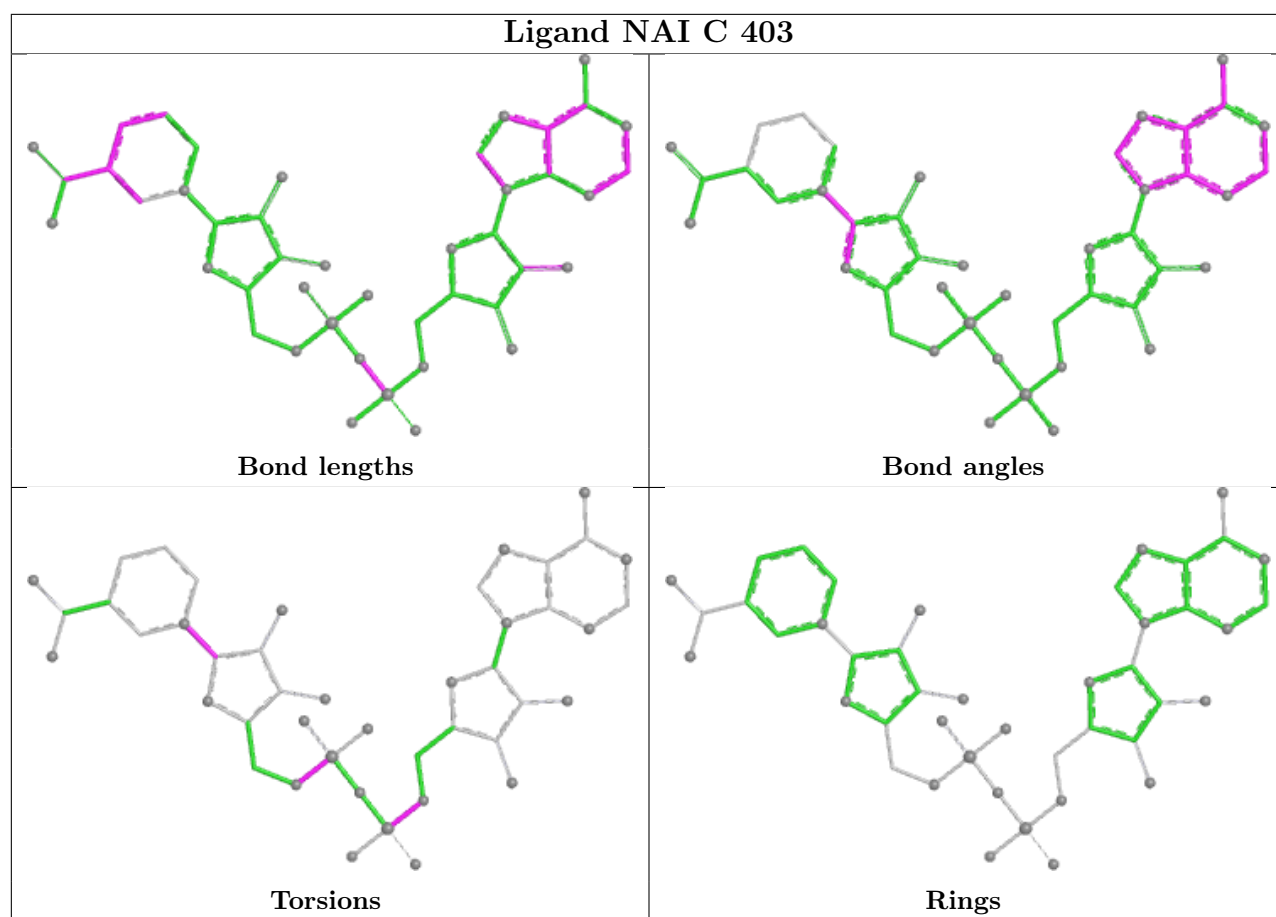
9 monomers are involved in 15 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	D	402	NAI	2	0
3	A	402	48Y	1	0
4	B	402	NAI	3	0
5	D	403	GOL	2	0
5	C	407	GOL	1	0
5	A	405	GOL	2	0
5	C	405	GOL	1	0
5	B	403	GOL	1	0
4	A	403	NAI	2	0

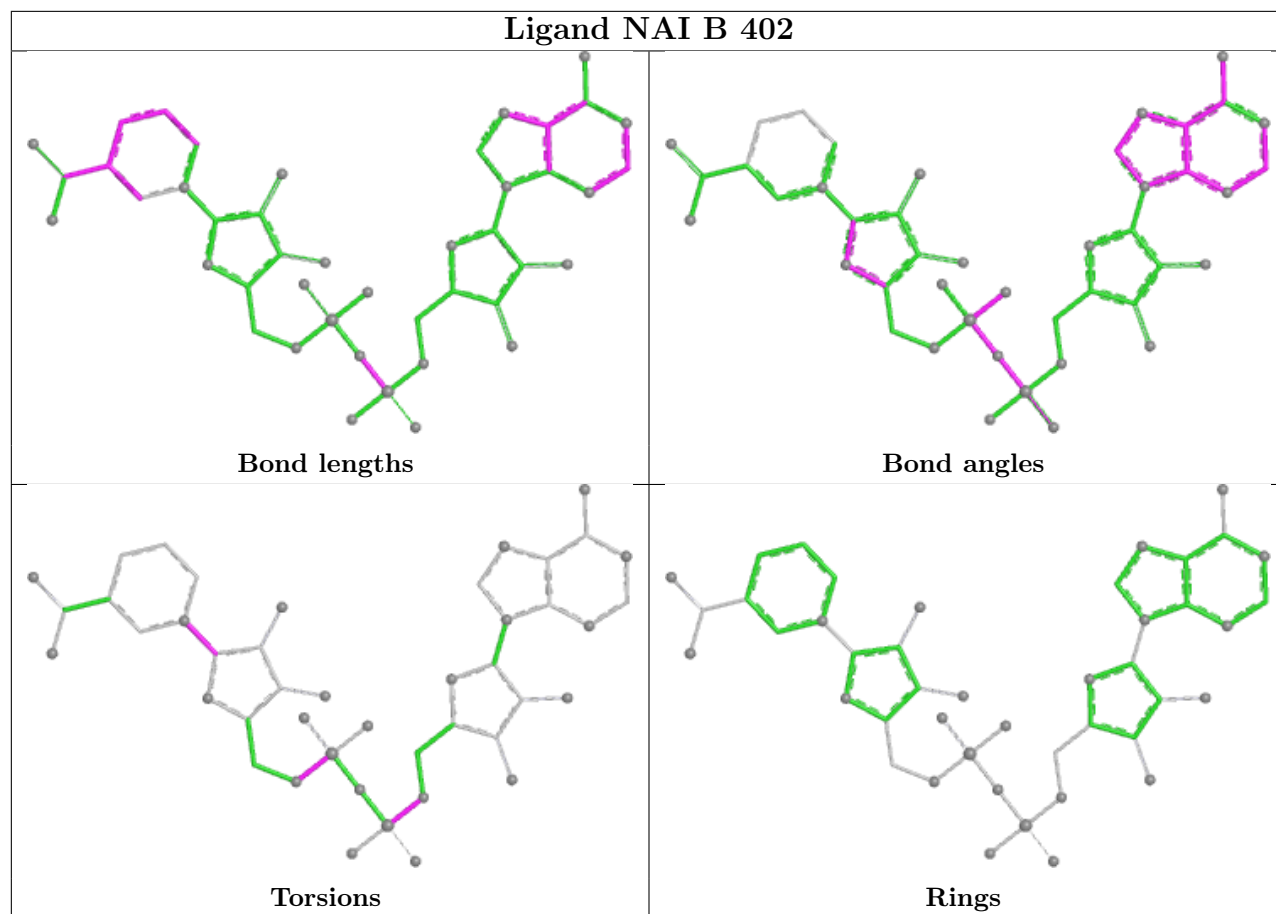
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

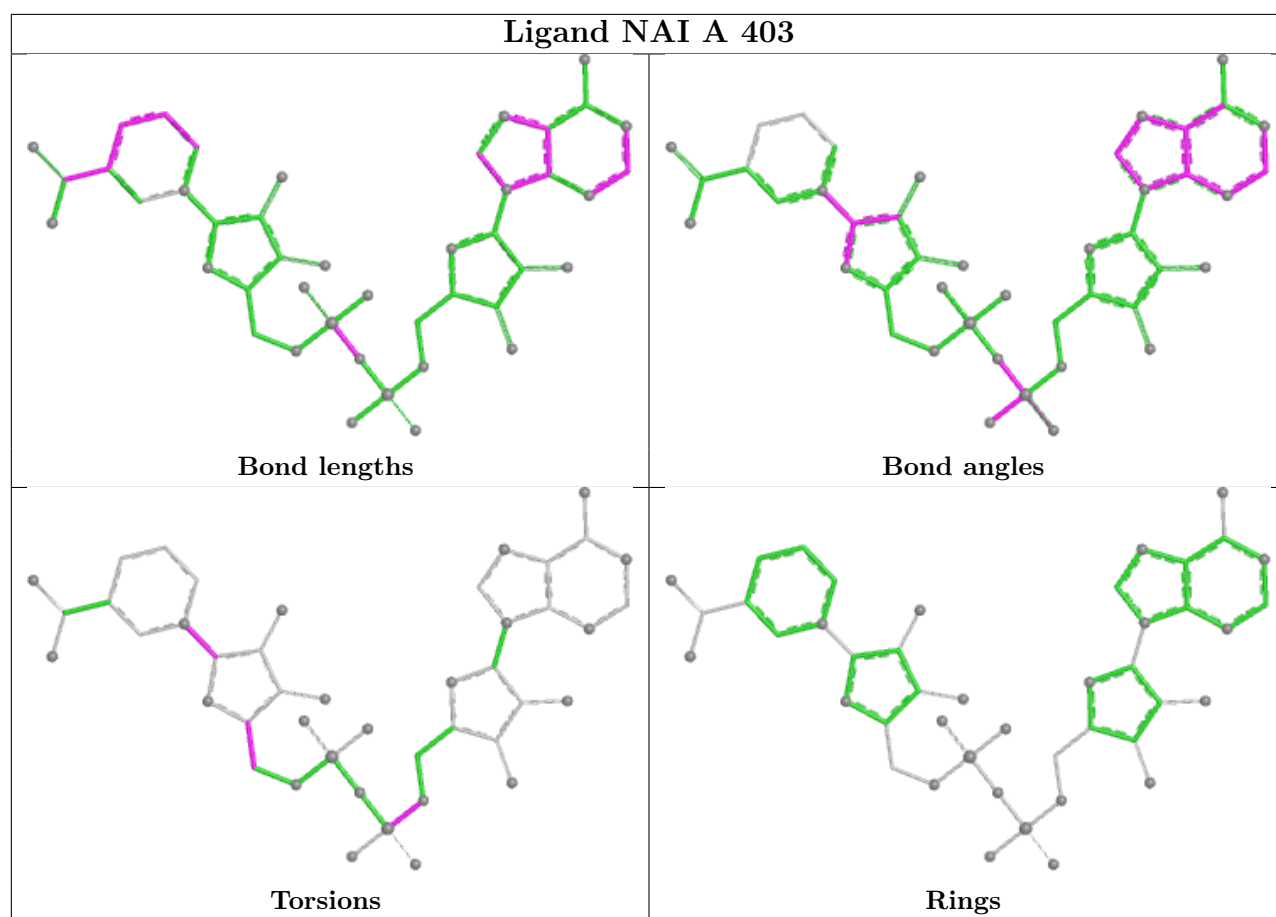
Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD 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.





Ligand NAI B 402





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 [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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	333/334 (99%)	-0.29	2 (0%) 85 83	21, 33, 56, 74	0
1	B	333/334 (99%)	-0.48	0 100 100	20, 29, 45, 61	0
1	C	333/334 (99%)	-0.50	1 (0%) 90 87	18, 27, 45, 65	0
1	D	333/334 (99%)	-0.43	1 (0%) 90 87	21, 28, 46, 67	0
All	All	1332/1336 (99%)	-0.42	4 (0%) 90 87	18, 29, 49, 74	0

All (4) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	107	GLY	2.9
1	A	107	GLY	2.9
1	D	2	ALA	2.2
1	A	334	LEU	2.1

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 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($\text{\AA}^2$)	Q<0.9
6	SO4	B	412	5/5	0.52	0.17	95,98,103,104	0
6	SO4	B	416	5/5	0.74	0.12	93,97,101,103	0
5	GOL	D	404	6/6	0.77	0.15	29,34,35,38	0
6	SO4	C	419	5/5	0.78	0.16	86,93,96,99	0
6	SO4	A	414	5/5	0.80	0.16	87,88,95,98	0
6	SO4	A	411	5/5	0.80	0.14	93,94,100,102	0
6	SO4	C	418	5/5	0.81	0.11	87,89,90,93	0
6	SO4	C	421	5/5	0.81	0.15	96,102,108,108	0
5	GOL	A	406	6/6	0.82	0.13	25,27,32,33	0
6	SO4	B	415	5/5	0.82	0.15	91,92,97,98	0
6	SO4	B	413	5/5	0.83	0.17	89,91,101,102	0
6	SO4	B	409	5/5	0.83	0.16	67,72,75,82	0
6	SO4	C	420	5/5	0.84	0.17	74,78,84,87	0
6	SO4	A	410	5/5	0.85	0.18	95,97,101,107	0
5	GOL	B	407	6/6	0.85	0.20	55,61,61,62	0
6	SO4	A	413	5/5	0.85	0.17	79,84,84,85	0
6	SO4	C	413	5/5	0.85	0.21	87,88,89,91	0
5	GOL	B	405	6/6	0.85	0.19	64,65,67,68	0
6	SO4	A	415	5/5	0.85	0.15	96,101,106,107	0
5	GOL	D	405	6/6	0.85	0.16	62,64,67,67	0
5	GOL	D	406	6/6	0.85	0.21	59,62,63,67	0
6	SO4	B	410	5/5	0.86	0.15	80,88,90,91	0
5	GOL	B	406	6/6	0.86	0.21	61,63,65,65	0
6	SO4	A	412	5/5	0.86	0.17	94,97,105,106	0
6	SO4	C	417	5/5	0.86	0.15	94,97,107,108	0
6	SO4	D	413	5/5	0.86	0.17	96,99,101,101	0
5	GOL	A	408	6/6	0.87	0.23	63,67,67,67	0
5	GOL	B	408	6/6	0.87	0.18	62,67,70,72	0
5	GOL	C	408	6/6	0.87	0.20	55,61,64,65	0
6	SO4	C	415	5/5	0.87	0.17	70,72,76,76	0
6	SO4	D	409	5/5	0.87	0.14	72,72,77,81	0
6	SO4	D	412	5/5	0.87	0.16	82,85,90,90	0
5	GOL	B	404	6/6	0.87	0.15	28,31,32,33	0
6	SO4	A	409	5/5	0.88	0.14	73,74,80,82	0
6	SO4	B	414	5/5	0.89	0.15	97,105,112,114	0
5	GOL	D	408	6/6	0.89	0.13	60,61,62,64	0
5	GOL	C	410	6/6	0.89	0.13	62,65,66,69	0
6	SO4	B	411	5/5	0.89	0.12	68,69,74,75	0
6	SO4	C	422	5/5	0.89	0.14	95,98,103,107	0
5	GOL	A	407	6/6	0.89	0.12	50,57,58,58	0
6	SO4	D	410	5/5	0.89	0.22	78,86,90,90	0
6	SO4	C	416	5/5	0.89	0.20	77,81,83,92	0
5	GOL	D	407	6/6	0.89	0.14	55,58,59,59	0

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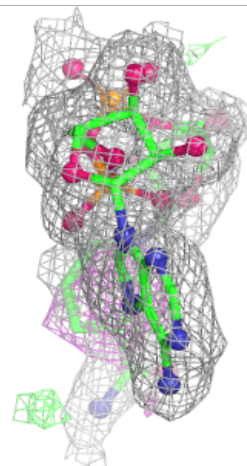
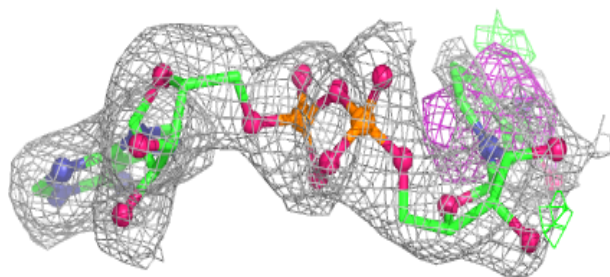
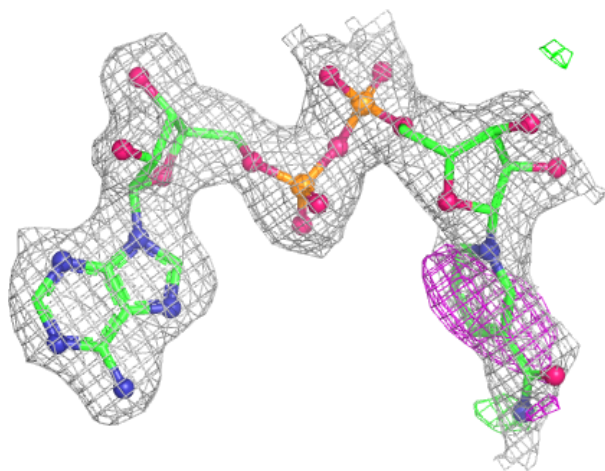
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
6	SO4	D	411	5/5	0.90	0.11	74,76,78,82	0
5	GOL	C	409	6/6	0.91	0.12	61,66,68,72	0
6	SO4	C	414	5/5	0.91	0.16	86,87,90,96	0
5	GOL	C	407	6/6	0.91	0.12	32,36,37,37	0
5	GOL	C	411	6/6	0.92	0.17	53,61,65,66	0
5	GOL	C	406	6/6	0.92	0.10	44,49,50,52	0
5	GOL	D	403	6/6	0.93	0.09	29,34,36,36	0
5	GOL	C	412	6/6	0.94	0.15	47,51,53,54	0
5	GOL	A	405	6/6	0.95	0.09	35,35,38,38	0
3	48Y	D	401	14/14	0.96	0.07	22,23,25,27	0
5	GOL	B	403	6/6	0.96	0.07	33,34,35,35	0
5	GOL	C	405	6/6	0.97	0.06	35,35,36,37	0
3	48Y	B	401	14/14	0.97	0.06	21,23,25,26	0
4	NAI	B	402	44/44	0.97	0.07	21,23,55,59	0
3	48Y	C	402	14/14	0.97	0.07	25,28,33,35	0
4	NAI	C	403	44/44	0.98	0.05	20,24,27,27	0
4	NAI	D	402	44/44	0.98	0.07	20,22,51,54	0
4	NAI	A	403	44/44	0.98	0.05	26,29,30,32	0
3	48Y	A	402	14/14	0.98	0.05	24,27,37,37	0
2	MG	A	401	1/1	0.99	0.01	25,25,25,25	0
2	MG	C	404	1/1	1.00	0.01	27,27,27,27	0
2	MG	A	404	1/1	1.00	0.02	24,24,24,24	0
2	MG	C	401	1/1	1.00	0.01	25,25,25,25	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.

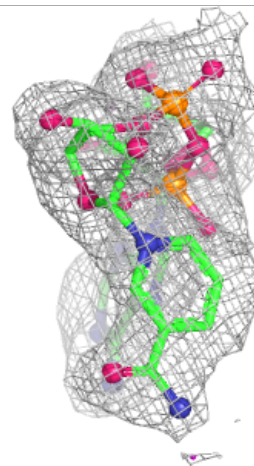
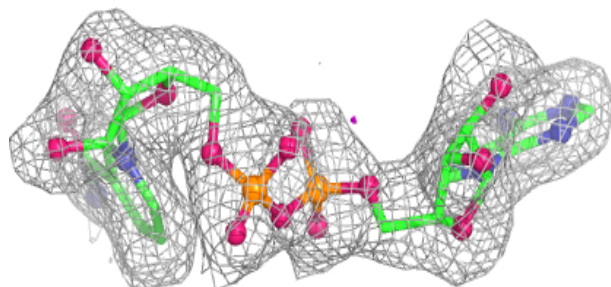
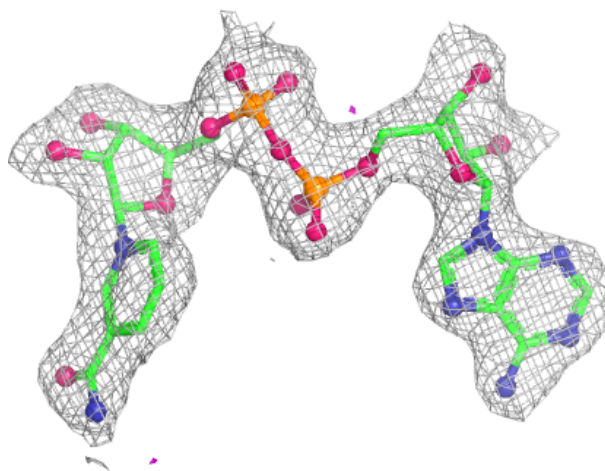
Electron density around NAI B 402:

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



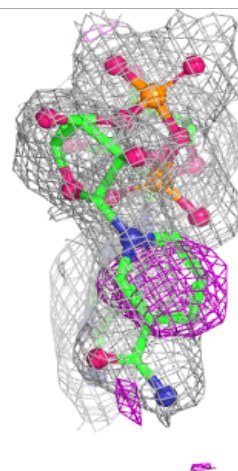
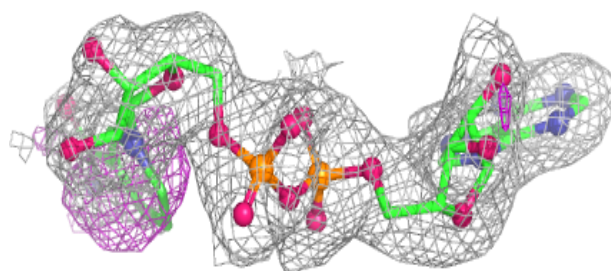
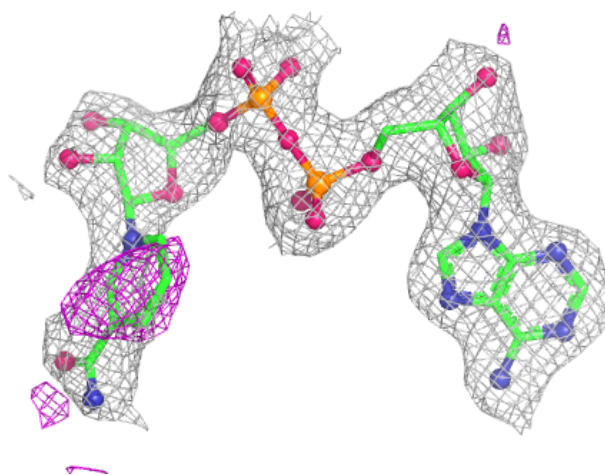
Electron density around NAI C 403:

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



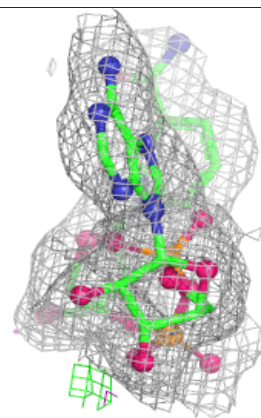
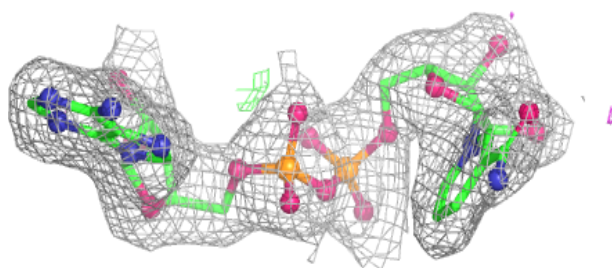
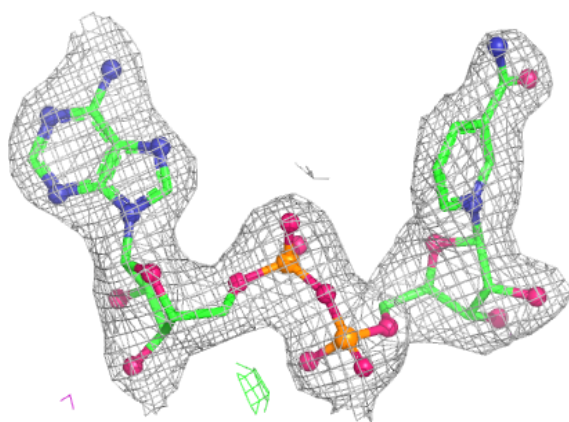
Electron density around NAI D 402:

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



Electron density around NAI 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)



6.5 Other polymers [i](#)

There are no such residues in this entry.