WORLDWIDE PDB PROTEIN DATA BANK

Full wwPDB X-ray Structure Validation Report (i)

May 25, 2021 – 12:20 am BST

PDB ID	:	6T94
Title	:	NAD+-dependent fungal formate dehydrogenase from Chaetomium thermophilum: A complex of N120C mutant protein with the reduced form of the cofactor NADH.
Authors	:	Isupov, M.N.; Yelmazer, B.; De Rose, S.A.; Littlechild, J.A.
Deposited on	:	2019-10-25
Resolution	:	1.15 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 (i) symbol.

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

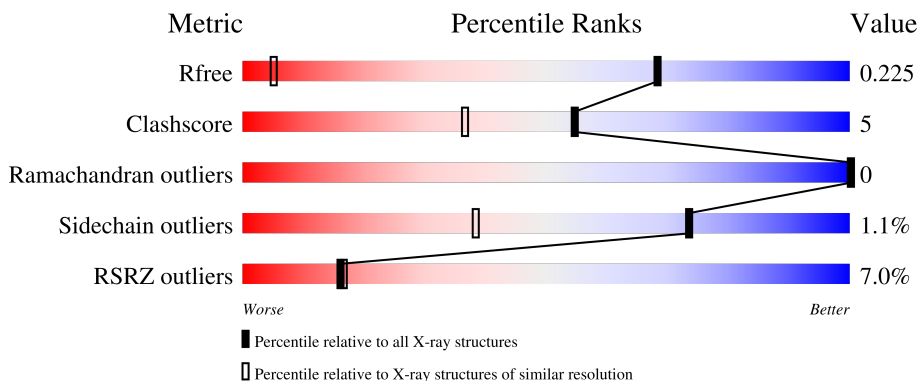|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.18
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.18

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 1.15 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	Percentile Ranks	Value
Rfree		0.225
Clashscore		5
Ramachandran outliers		0
Sidechain outliers		1.1%
RSRZ outliers		7.0%

Worse   *Better*

■ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R$_{free}$	130704	1492 (1.18-1.10)
Clashscore	141614	1537 (1.18-1.10)
Ramachandran outliers	138981	1483 (1.18-1.10)
Sidechain outliers	138945	1480 (1.18-1.10)
RSRZ outliers	127900	1464 (1.18-1.10)

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 <=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	AAA	410	% 82% 7% 10%
1	BBB	410	10% 83% 8% 9%
1	CCC	410	13% 82% 8% 10%
1	DDD	410	% 82% 7% 10%

2 Entry composition (i)

There are 5 unique types of molecules in this entry. The entry contains 27255 atoms, of which 12811 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 Formate dehydrogenase.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	AAA	367	Total 6210	C 1935	H 3148	N 547	O 566	S 14	119	33	0
1	BBB	374	Total 6312	C 1973	H 3195	N 549	O 582	S 13	119	34	0
1	CCC	371	Total 6259	C 1951	H 3177	N 550	O 569	S 12	115	31	0
1	DDD	367	Total 6104	C 1906	H 3085	N 536	O 563	S 14	120	28	0

There are 164 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
AAA	-33	MET	-	initiating methionine	UNP G0SGU4
AAA	-32	ALA	-	expression tag	UNP G0SGU4
AAA	-31	HIS	-	expression tag	UNP G0SGU4
AAA	-30	HIS	-	expression tag	UNP G0SGU4
AAA	-29	HIS	-	expression tag	UNP G0SGU4
AAA	-28	HIS	-	expression tag	UNP G0SGU4
AAA	-27	HIS	-	expression tag	UNP G0SGU4
AAA	-26	HIS	-	expression tag	UNP G0SGU4
AAA	-25	VAL	-	expression tag	UNP G0SGU4
AAA	-24	GLY	-	expression tag	UNP G0SGU4
AAA	-23	THR	-	expression tag	UNP G0SGU4
AAA	-22	GLY	-	expression tag	UNP G0SGU4
AAA	-21	SER	-	expression tag	UNP G0SGU4
AAA	-20	ASN	-	expression tag	UNP G0SGU4
AAA	-19	ASP	-	expression tag	UNP G0SGU4
AAA	-18	ASP	-	expression tag	UNP G0SGU4
AAA	-17	ASP	-	expression tag	UNP G0SGU4
AAA	-16	ASP	-	expression tag	UNP G0SGU4
AAA	-15	LYS	-	expression tag	UNP G0SGU4
AAA	-14	SER	-	expression tag	UNP G0SGU4
AAA	-13	PRO	-	expression tag	UNP G0SGU4

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Chain	Residue	Modelled	Actual	Comment	Reference
AAA	-12	ASP	-	expression tag	UNP G0SGU4
AAA	-11	PRO	-	expression tag	UNP G0SGU4
AAA	-10	ASN	-	expression tag	UNP G0SGU4
AAA	-9	TRP	-	expression tag	UNP G0SGU4
AAA	-8	GLU	-	expression tag	UNP G0SGU4
AAA	-7	LEU	-	expression tag	UNP G0SGU4
AAA	-6	VAL	-	expression tag	UNP G0SGU4
AAA	-5	TYR	-	expression tag	UNP G0SGU4
AAA	-4	THR	-	expression tag	UNP G0SGU4
AAA	-3	ALA	-	expression tag	UNP G0SGU4
AAA	-2	ARG	-	expression tag	UNP G0SGU4
AAA	-1	LEU	-	expression tag	UNP G0SGU4
AAA	0	GLN	-	expression tag	UNP G0SGU4
AAA	120	CYS	ASN	engineered mutation	UNP G0SGU4
AAA	371	HIS	-	expression tag	UNP G0SGU4
AAA	372	HIS	-	expression tag	UNP G0SGU4
AAA	373	HIS	-	expression tag	UNP G0SGU4
AAA	374	HIS	-	expression tag	UNP G0SGU4
AAA	375	HIS	-	expression tag	UNP G0SGU4
AAA	376	HIS	-	expression tag	UNP G0SGU4
BBB	-33	MET	-	initiating methionine	UNP G0SGU4
BBB	-32	ALA	-	expression tag	UNP G0SGU4
BBB	-31	HIS	-	expression tag	UNP G0SGU4
BBB	-30	HIS	-	expression tag	UNP G0SGU4
BBB	-29	HIS	-	expression tag	UNP G0SGU4
BBB	-28	HIS	-	expression tag	UNP G0SGU4
BBB	-27	HIS	-	expression tag	UNP G0SGU4
BBB	-26	HIS	-	expression tag	UNP G0SGU4
BBB	-25	VAL	-	expression tag	UNP G0SGU4
BBB	-24	GLY	-	expression tag	UNP G0SGU4
BBB	-23	THR	-	expression tag	UNP G0SGU4
BBB	-22	GLY	-	expression tag	UNP G0SGU4
BBB	-21	SER	-	expression tag	UNP G0SGU4
BBB	-20	ASN	-	expression tag	UNP G0SGU4
BBB	-19	ASP	-	expression tag	UNP G0SGU4
BBB	-18	ASP	-	expression tag	UNP G0SGU4
BBB	-17	ASP	-	expression tag	UNP G0SGU4
BBB	-16	ASP	-	expression tag	UNP G0SGU4
BBB	-15	LYS	-	expression tag	UNP G0SGU4
BBB	-14	SER	-	expression tag	UNP G0SGU4
BBB	-13	PRO	-	expression tag	UNP G0SGU4
BBB	-12	ASP	-	expression tag	UNP G0SGU4

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Chain	Residue	Modelled	Actual	Comment	Reference
BBB	-11	PRO	-	expression tag	UNP G0SGU4
BBB	-10	ASN	-	expression tag	UNP G0SGU4
BBB	-9	TRP	-	expression tag	UNP G0SGU4
BBB	-8	GLU	-	expression tag	UNP G0SGU4
BBB	-7	LEU	-	expression tag	UNP G0SGU4
BBB	-6	VAL	-	expression tag	UNP G0SGU4
BBB	-5	TYR	-	expression tag	UNP G0SGU4
BBB	-4	THR	-	expression tag	UNP G0SGU4
BBB	-3	ALA	-	expression tag	UNP G0SGU4
BBB	-2	ARG	-	expression tag	UNP G0SGU4
BBB	-1	LEU	-	expression tag	UNP G0SGU4
BBB	0	GLN	-	expression tag	UNP G0SGU4
BBB	120	CYS	ASN	engineered mutation	UNP G0SGU4
BBB	371	HIS	-	expression tag	UNP G0SGU4
BBB	372	HIS	-	expression tag	UNP G0SGU4
BBB	373	HIS	-	expression tag	UNP G0SGU4
BBB	374	HIS	-	expression tag	UNP G0SGU4
BBB	375	HIS	-	expression tag	UNP G0SGU4
BBB	376	HIS	-	expression tag	UNP G0SGU4
CCC	-33	MET	-	initiating methionine	UNP G0SGU4
CCC	-32	ALA	-	expression tag	UNP G0SGU4
CCC	-31	HIS	-	expression tag	UNP G0SGU4
CCC	-30	HIS	-	expression tag	UNP G0SGU4
CCC	-29	HIS	-	expression tag	UNP G0SGU4
CCC	-28	HIS	-	expression tag	UNP G0SGU4
CCC	-27	HIS	-	expression tag	UNP G0SGU4
CCC	-26	HIS	-	expression tag	UNP G0SGU4
CCC	-25	VAL	-	expression tag	UNP G0SGU4
CCC	-24	GLY	-	expression tag	UNP G0SGU4
CCC	-23	THR	-	expression tag	UNP G0SGU4
CCC	-22	GLY	-	expression tag	UNP G0SGU4
CCC	-21	SER	-	expression tag	UNP G0SGU4
CCC	-20	ASN	-	expression tag	UNP G0SGU4
CCC	-19	ASP	-	expression tag	UNP G0SGU4
CCC	-18	ASP	-	expression tag	UNP G0SGU4
CCC	-17	ASP	-	expression tag	UNP G0SGU4
CCC	-16	ASP	-	expression tag	UNP G0SGU4
CCC	-15	LYS	-	expression tag	UNP G0SGU4
CCC	-14	SER	-	expression tag	UNP G0SGU4
CCC	-13	PRO	-	expression tag	UNP G0SGU4
CCC	-12	ASP	-	expression tag	UNP G0SGU4
CCC	-11	PRO	-	expression tag	UNP G0SGU4

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Chain	Residue	Modelled	Actual	Comment	Reference
CCC	-10	ASN	-	expression tag	UNP G0SGU4
CCC	-9	TRP	-	expression tag	UNP G0SGU4
CCC	-8	GLU	-	expression tag	UNP G0SGU4
CCC	-7	LEU	-	expression tag	UNP G0SGU4
CCC	-6	VAL	-	expression tag	UNP G0SGU4
CCC	-5	TYR	-	expression tag	UNP G0SGU4
CCC	-4	THR	-	expression tag	UNP G0SGU4
CCC	-3	ALA	-	expression tag	UNP G0SGU4
CCC	-2	ARG	-	expression tag	UNP G0SGU4
CCC	-1	LEU	-	expression tag	UNP G0SGU4
CCC	0	GLN	-	expression tag	UNP G0SGU4
CCC	120	CYS	ASN	engineered mutation	UNP G0SGU4
CCC	371	HIS	-	expression tag	UNP G0SGU4
CCC	372	HIS	-	expression tag	UNP G0SGU4
CCC	373	HIS	-	expression tag	UNP G0SGU4
CCC	374	HIS	-	expression tag	UNP G0SGU4
CCC	375	HIS	-	expression tag	UNP G0SGU4
CCC	376	HIS	-	expression tag	UNP G0SGU4
DDD	-33	MET	-	initiating methionine	UNP G0SGU4
DDD	-32	ALA	-	expression tag	UNP G0SGU4
DDD	-31	HIS	-	expression tag	UNP G0SGU4
DDD	-30	HIS	-	expression tag	UNP G0SGU4
DDD	-29	HIS	-	expression tag	UNP G0SGU4
DDD	-28	HIS	-	expression tag	UNP G0SGU4
DDD	-27	HIS	-	expression tag	UNP G0SGU4
DDD	-26	HIS	-	expression tag	UNP G0SGU4
DDD	-25	VAL	-	expression tag	UNP G0SGU4
DDD	-24	GLY	-	expression tag	UNP G0SGU4
DDD	-23	THR	-	expression tag	UNP G0SGU4
DDD	-22	GLY	-	expression tag	UNP G0SGU4
DDD	-21	SER	-	expression tag	UNP G0SGU4
DDD	-20	ASN	-	expression tag	UNP G0SGU4
DDD	-19	ASP	-	expression tag	UNP G0SGU4
DDD	-18	ASP	-	expression tag	UNP G0SGU4
DDD	-17	ASP	-	expression tag	UNP G0SGU4
DDD	-16	ASP	-	expression tag	UNP G0SGU4
DDD	-15	LYS	-	expression tag	UNP G0SGU4
DDD	-14	SER	-	expression tag	UNP G0SGU4
DDD	-13	PRO	-	expression tag	UNP G0SGU4
DDD	-12	ASP	-	expression tag	UNP G0SGU4
DDD	-11	PRO	-	expression tag	UNP G0SGU4
DDD	-10	ASN	-	expression tag	UNP G0SGU4

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Chain	Residue	Modelled	Actual	Comment	Reference
DDD	-9	TRP	-	expression tag	UNP G0SGU4
DDD	-8	GLU	-	expression tag	UNP G0SGU4
DDD	-7	LEU	-	expression tag	UNP G0SGU4
DDD	-6	VAL	-	expression tag	UNP G0SGU4
DDD	-5	TYR	-	expression tag	UNP G0SGU4
DDD	-4	THR	-	expression tag	UNP G0SGU4
DDD	-3	ALA	-	expression tag	UNP G0SGU4
DDD	-2	ARG	-	expression tag	UNP G0SGU4
DDD	-1	LEU	-	expression tag	UNP G0SGU4
DDD	0	GLN	-	expression tag	UNP G0SGU4
DDD	120	CYS	ASN	engineered mutation	UNP G0SGU4
DDD	371	HIS	-	expression tag	UNP G0SGU4
DDD	372	HIS	-	expression tag	UNP G0SGU4
DDD	373	HIS	-	expression tag	UNP G0SGU4
DDD	374	HIS	-	expression tag	UNP G0SGU4
DDD	375	HIS	-	expression tag	UNP G0SGU4
DDD	376	HIS	-	expression tag	UNP G0SGU4

- Molecule 2 is DI(HYDROXYETHYL)ETHER (three-letter code: PEG) (formula: $C_4H_{10}O_3$).
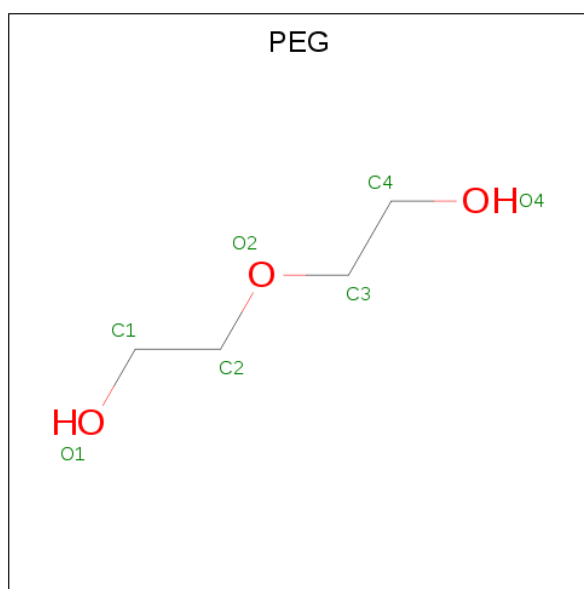
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	AAA	1	Total	C	H	O	1	0
			17	4	10	3		
2	AAA	1	Total	C	H	O	1	0
			17	4	10	3		
2	CCC	1	Total	C	H	O	1	0
			17	4	10	3		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	DDD	1	Total	C	H	O	1	0
			17	4	10	3		
2	DDD	1	Total	C	H	O	1	0
			17	4	10	3		

- Molecule 3 is 1,4-DIHYDRONICOTINAMIDE ADENINE DINUCLEOTIDE (three-letter code: NAI) (formula: $C_{21}H_{29}N_7O_{14}P_2$) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
3	AAA	1	Total	C	H	N	O	P	4	0
			71	21	27	7	14	2		
3	BBB	1	Total	C	H	N	O	P	4	0
			71	21	27	7	14	2		
3	CCC	1	Total	C	H	N	O	P	4	0
			71	21	27	7	14	2		
3	DDD	1	Total	C	H	N	O	P	4	0
			71	21	27	7	14	2		

- Molecule 4 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: $C_2H_6O_2$).

EDO

O2
OH
C1
C2
HO
O1

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	AAA	1	Total 10	C 2	H 6	O 2	1	0
4	AAA	1	Total 10	C 2	H 6	O 2	1	0
4	AAA	1	Total 10	C 2	H 6	O 2	1	0
4	AAA	1	Total 10	C 2	H 6	O 2	1	0
4	BBB	1	Total 10	C 2	H 6	O 2	1	0
4	CCC	1	Total 10	C 2	H 6	O 2	1	0
4	DDD	1	Total 10	C 2	H 6	O 2	1	0
4	DDD	1	Total 10	C 2	H 6	O 2	1	0

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	AAA	515	Total 515	O 515	0	0
5	BBB	454	Total 454	O 454	0	0
5	CCC	448	Total 448	O 448	0	0
5	DDD	504	Total 504	O 504	0	0

3 Residue-property plots ⓘ

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

Chain AAA:

- Molecule 1: Formate dehydrogenase

Chain BBB:

- Molecule 1: Formate dehydrogenase

Chain CCC:

• Molecule 1: Formate dehydrogenase

Chain DDD:

82%	7%	10%

MET ALA HIS HIS HIS HIS HIS HIS VAL GLY THR GLY SER ASN ASP ASP ASP ASP LYS SER PRO ASP PRO ASN TRP GLU LEU VAL TYR T-4 A-3 R-2 L-1 Q0 M1 D10 G11 A15 K16 Q17 S46 K84 C120 R137 D159 E160 Y161 R183 Y195 N215

E218 M219 F240 D243 M248 K249 R250 L254 Q288 P289 F303 M313 T316 S317 L318 D319 A320 E326 A358 R362 GLU ASP VAL LYS ILE PRO GLY GLN HIS HIS HIS HIS HIS

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α, β, γ	50.73Å 94.75Å 94.60Å 85.96° 89.97° 81.58°	Depositor
Resolution (Å)	68.90 – 1.15 68.91 – 1.15	Depositor EDS
% Data completeness (in resolution range)	86.8 (68.90-1.15) 86.8 (68.91-1.15)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.09 (at 1.15Å)	Xtriage
Refinement program	REFMAC 5.8.0257	Depositor
R, R_{free}	0.196 , 0.218 0.205 , 0.225	Depositor DCC
R_{free} test set	26885 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å^2)	13.3	Xtriage
Anisotropy	0.530	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.36 , 47.7	EDS
L-test for twinning[2]	$< |L| > = 0.44, < L^2 > = 0.26$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.97	EDS
Total number of atoms	27255	wwPDB-VP
Average B, all atoms (Å^2)	23.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 8.47% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ 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: EDO, PEG, NAI

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	AAA	0.75	0/3198	0.89	3/4306 (0.1%)
1	BBB	0.74	0/3261	0.88	0/4395
1	CCC	0.78	1/3218 (0.0%)	0.92	1/4333 (0.0%)
1	DDD	0.81	0/3146	0.95	2/4241 (0.0%)
All	All	0.77	1/12823 (0.0%)	0.91	6/17275 (0.0%)

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	AAA	0	1
1	BBB	0	1
1	CCC	0	1
1	DDD	0	1
All	All	0	4

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	CCC	144	GLU	CD-OE2	-5.12	1.20	1.25

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	AAA	250	ARG	NE-CZ-NH1	6.83	123.72	120.30
1	DDD	183	ARG	NE-CZ-NH2	-6.29	117.15	120.30
1	DDD	250	ARG	NE-CZ-NH1	5.86	123.23	120.30
1	AAA	280	TYR	CB-CG-CD2	5.84	124.50	121.00

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	CCC	324	TYR	CB-CG-CD1	5.61	124.37	121.00
1	AAA	259	ARG	NE-CZ-NH1	5.19	122.90	120.30

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	AAA	137	ARG	Sidechain
1	BBB	137	ARG	Sidechain
1	CCC	137	ARG	Sidechain
1	DDD	137	ARG	Sidechain

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	AAA	3062	3148	3163	33	0
1	BBB	3117	3195	3214	26	0
1	CCC	3082	3177	3194	41	0
1	DDD	3019	3085	3099	32	0
2	AAA	14	20	20	1	0
2	CCC	7	10	10	0	0
2	DDD	14	20	20	0	0
3	AAA	44	27	27	1	0
3	BBB	44	27	27	2	0
3	CCC	44	27	27	2	0
3	DDD	44	27	27	1	0
4	AAA	16	24	24	5	0
4	BBB	4	6	6	0	0
4	CCC	4	6	6	1	0
4	DDD	8	12	12	0	0
5	AAA	515	0	0	18	2
5	BBB	454	0	0	7	2
5	CCC	448	0	0	14	0
5	DDD	504	0	0	10	0
All	All	14444	12811	12876	133	2

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 5.

All (133) 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:AAA:150[A]:ARG:NH1	5:AAA:607:HOH:O	1.65	1.28
1:DDD:243[A]:ASP:OD1	5:DDD:502:HOH:O	1.73	1.07
1:BBB:13[B]:GLU:OE2	5:BBB:1006:HOH:O	1.74	1.05
1:CCC:3[A]:LYS:NZ	1:CCC:85[A]:LYS:HZ1	1.53	1.05
1:AAA:195:TYR:HB2	1:AAA:219[B]:MET:HE2	1.44	0.98
1:AAA:243[A]:ASP:OD1	5:AAA:608:HOH:O	1.79	0.97
1:CCC:3[A]:LYS:HZ3	1:CCC:85[A]:LYS:NZ	1.67	0.93
1:BBB:243[A]:ASP:OD1	5:BBB:1007:HOH:O	1.86	0.93
1:DDD:195:TYR:HB2	1:DDD:219[B]:MET:HE2	1.51	0.92
1:CCC:243[A]:ASP:OD1	5:CCC:502:HOH:O	1.89	0.91
1:DDD:243[B]:ASP:OD2	5:DDD:503:HOH:O	1.90	0.89
1:CCC:159[A]:ASP:OD1	1:CCC:303[A]:PHE:CE2	2.25	0.89
1:AAA:10[B]:ASP:OD1	5:AAA:609:HOH:O	1.90	0.89
1:CCC:243[B]:ASP:OD2	5:CCC:503:HOH:O	1.92	0.88
1:AAA:243[A]:ASP:CG	5:AAA:608:HOH:O	2.12	0.87
1:CCC:-2:ARG:HH21	1:CCC:38:GLN:NE2	1.75	0.85
4:CCC:403:EDO:H22	5:CCC:632:HOH:O	1.75	0.85
1:AAA:51[A]:GLU:O	5:AAA:610:HOH:O	1.94	0.84
1:DDD:195:TYR:HB2	1:DDD:219[B]:MET:CE	2.08	0.84
1:BBB:240:PHE:HE2	1:BBB:248[B]:MET:CE	1.93	0.82
1:CCC:51[B]:GLU:O	5:CCC:504:HOH:O	1.98	0.81
1:CCC:3[A]:LYS:NZ	1:CCC:85[A]:LYS:NZ	2.26	0.81
1:DDD:218[A]:GLU:OE1	5:DDD:504:HOH:O	1.98	0.79
1:DDD:195:TYR:CB	1:DDD:219[B]:MET:CE	2.63	0.77
1:CCC:159[A]:ASP:OD1	1:CCC:303[A]:PHE:HE2	1.67	0.77
1:CCC:-2:ARG:NH2	1:CCC:38:GLN:NE2	2.34	0.75
1:BBB:242[A]:LYS:HE2	5:BBB:1007:HOH:O	1.87	0.75
1:CCC:3[A]:LYS:HZ3	1:CCC:85[A]:LYS:HZ1	0.80	0.74
1:DDD:195:TYR:CB	1:DDD:219[B]:MET:HE2	2.18	0.73
1:AAA:218[B]:GLU:OE1	5:AAA:611:HOH:O	2.06	0.73
1:CCC:326[A]:GLU:OE1	5:CCC:505:HOH:O	2.07	0.72
1:AAA:195:TYR:CB	1:AAA:219[B]:MET:HE2	2.18	0.72
1:CCC:237[B]:ARG:NH1	5:CCC:501:HOH:O	1.61	0.70
1:CCC:85[A]:LYS:HD2	5:CCC:844:HOH:O	1.92	0.69
1:DDD:243[A]:ASP:CG	5:DDD:502:HOH:O	2.21	0.69
1:DDD:240:PHE:HE2	1:DDD:248[B]:MET:CE	2.06	0.69
1:AAA:243[A]:ASP:OD2	5:AAA:608:HOH:O	2.10	0.68

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:CCC:159[A]:ASP:OD1	1:CCC:303[A]:PHE:CD2	2.46	0.67
1:AAA:101:LEU:N	4:AAA:507:EDO:H21	2.10	0.67
1:DDD:240:PHE:HE2	1:DDD:248[B]:MET:HE1	1.59	0.67
1:AAA:326[A]:GLU:HG3	5:AAA:630:HOH:O	1.95	0.66
1:CCC:159[A]:ASP:OD2	1:CCC:303[A]:PHE:CD2	2.49	0.66
1:DDD:303[B]:PHE:HD2	5:DDD:736:HOH:O	1.79	0.66
1:DDD:303[B]:PHE:CD2	5:DDD:736:HOH:O	2.47	0.66
1:AAA:206[B]:LYS:HE2	5:AAA:637:HOH:O	1.96	0.65
1:AAA:218[B]:GLU:CD	5:AAA:611:HOH:O	2.33	0.65
1:AAA:195:TYR:CB	1:AAA:219[B]:MET:CE	2.77	0.62
1:AAA:206[B]:LYS:CE	5:AAA:637:HOH:O	2.46	0.62
1:BBB:242[A]:LYS:HG3	5:BBB:1007:HOH:O	1.99	0.62
1:DDD:240:PHE:CE2	1:DDD:248[B]:MET:CE	2.83	0.61
1:AAA:248[B]:MET:HE1	1:AAA:254:LEU:HD13	1.83	0.61
1:CCC:159[A]:ASP:CG	1:CCC:303[A]:PHE:CD2	2.75	0.61
1:CCC:-2:ARG:NH2	1:CCC:38:GLN:HE22	1.99	0.60
1:DDD:288:GLN:HA	1:DDD:289:PRO:C	2.23	0.59
1:BBB:240:PHE:CE2	1:BBB:248[B]:MET:CE	2.80	0.58
1:CCC:288:GLN:HA	1:CCC:289:PRO:C	2.23	0.58
1:DDD:326[A]:GLU:HG3	5:DDD:619:HOH:O	2.03	0.58
1:BBB:288:GLN:HA	1:BBB:289:PRO:C	2.23	0.58
1:AAA:357[B]:ARG:NH2	5:AAA:613:HOH:O	2.36	0.58
1:CCC:159[A]:ASP:OD2	1:CCC:303[A]:PHE:HD2	1.86	0.58
1:DDD:240:PHE:CE2	1:DDD:248[B]:MET:HE1	2.39	0.57
1:AAA:195:TYR:HB2	1:AAA:219[B]:MET:CE	2.26	0.56
1:BBB:234[B]:GLU:HG2	5:BBB:1232:HOH:O	2.05	0.56
1:AAA:101:LEU:H	4:AAA:507:EDO:H21	1.70	0.56
1:AAA:215:ASN:OD1	1:AAA:218[B]:GLU:HG2	2.05	0.56
1:AAA:288:GLN:HA	1:AAA:289:PRO:C	2.25	0.56
1:BBB:240:PHE:HE2	1:BBB:248[B]:MET:HE2	1.71	0.56
1:CCC:159[A]:ASP:CG	1:CCC:303[A]:PHE:HD2	2.09	0.56
1:BBB:347:LEU:HD12	1:BBB:368:PRO:CG	2.37	0.55
1:BBB:362:ARG:HB2	1:BBB:365:VAL:HG13	1.88	0.55
1:AAA:51[A]:GLU:O	1:AAA:51[A]:GLU:OE2	2.26	0.53
1:AAA:233:HIS:CE1	1:AAA:235[A]:SER:OG	2.62	0.53
1:AAA:17[A]:GLN:OE1	1:BBB:303[A]:PHE:CE1	2.62	0.53
1:CCC:326[A]:GLU:HG3	5:CCC:612:HOH:O	2.08	0.53
1:DDD:17[B]:GLN:NE2	5:DDD:509:HOH:O	2.43	0.52
1:DDD:326[A]:GLU:OE1	5:DDD:505:HOH:O	2.19	0.50
3:AAA:503:NAI:H42N	5:AAA:938:HOH:O	2.10	0.50
1:DDD:195:TYR:HB3	1:DDD:219[B]:MET:CE	2.41	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:CCC:-2:ARG:HH21	1:CCC:38:GLN:HE22	1.50	0.49
1:AAA:326[A]:GLU:OE1	5:AAA:612:HOH:O	2.20	0.48
1:CCC:61:ASP:HB2	1:CCC:85[A]:LYS:HE3	1.95	0.48
1:AAA:51[A]:GLU:HG3	1:AAA:52[A]:GLY:N	2.29	0.48
3:CCC:402:NAI:H42N	5:CCC:789:HOH:O	2.13	0.48
3:BBB:901:NAI:H42N	5:BBB:1306:HOH:O	2.13	0.48
1:AAA:195:TYR:HB3	1:AAA:219[B]:MET:CE	2.44	0.48
1:BBB:265[A]:LYS:NZ	5:BBB:1024:HOH:O	2.47	0.48
1:CCC:242[A]:LYS:HG3	5:CCC:502:HOH:O	2.13	0.47
1:DDD:84[A]:LYS:NZ	5:DDD:512:HOH:O	2.46	0.47
1:CCC:326[A]:GLU:CD	5:CCC:505:HOH:O	2.52	0.47
4:AAA:504:EDO:H22	5:AAA:606:HOH:O	2.15	0.47
1:CCC:61:ASP:HB2	1:CCC:85[A]:LYS:CE	2.44	0.47
1:CCC:242[B]:LYS:NZ	5:CCC:510:HOH:O	2.46	0.46
1:BBB:57[A]:ARG:HH11	1:BBB:57[A]:ARG:HB3	1.80	0.46
1:BBB:347:LEU:HD12	1:BBB:368:PRO:HG3	1.98	0.46
1:BBB:347:LEU:HD12	1:BBB:368:PRO:HG2	1.97	0.45
1:AAA:313:MET:HA	1:AAA:316:THR:HG22	1.98	0.45
1:CCC:11:GLY:HA3	1:CCC:15:ALA:HB2	1.98	0.45
1:AAA:206[B]:LYS:HG3	5:AAA:783:HOH:O	2.16	0.45
1:BBB:233:HIS:CE1	1:BBB:235[B]:SER:OG	2.70	0.44
1:CCC:313:MET:HA	1:CCC:316:THR:HG22	1.98	0.44
1:AAA:11:GLY:HA3	1:AAA:15:ALA:HB2	2.00	0.44
1:CCC:303[A]:PHE:CE1	1:DDD:17[A]:GLN:OE1	2.70	0.44
1:DDD:10[A]:ASP:OD2	1:DDD:46:SER:OG	2.35	0.44
1:DDD:215:ASN:O	1:DDD:218[B]:GLU:HB3	2.18	0.43
1:DDD:11:GLY:HA3	1:DDD:15:ALA:HB2	2.00	0.43
1:BBB:313:MET:HA	1:BBB:316:THR:HG22	2.01	0.43
4:AAA:505:EDO:O1	1:BBB:322[B]:LYS:NZ	2.50	0.43
1:CCC:204[B]:LYS:HE3	5:CCC:532:HOH:O	2.17	0.43
1:CCC:-2:ARG:NH2	1:CCC:38:GLN:HE21	2.13	0.43
1:AAA:318:LEU:HD12	1:BBB:161:TYR:CZ	2.53	0.43
1:CCC:161:TYR:CZ	1:DDD:318:LEU:HD12	2.54	0.43
1:BBB:11:GLY:HA3	1:BBB:15:ALA:HB2	2.01	0.42
1:DDD:248[B]:MET:HE1	1:DDD:254:LEU:HD13	2.02	0.42
1:CCC:60:GLU:O	1:CCC:84[B]:LYS:HG3	2.20	0.42
1:BBB:57[B]:ARG:NH2	1:BBB:58:GLU:OE2	2.53	0.42
1:DDD:195:TYR:N	1:DDD:219[B]:MET:CE	2.83	0.42
2:AAA:502:PEG:H32	4:AAA:507:EDO:H22	2.01	0.42
1:AAA:322[B]:LYS:HD2	5:AAA:644:HOH:O	2.20	0.42
1:DDD:120[B]:CYS:HB3	1:DDD:320:ALA:HB1	2.02	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:BBB:358:ALA:O	3:BBB:901:NAI:H8A	2.19	0.41
1:CCC:318:LEU:HD12	1:DDD:161:TYR:CZ	2.54	0.41
1:DDD:313:MET:HA	1:DDD:316:THR:HG22	2.02	0.41
1:BBB:248[B]:MET:CE	1:BBB:254:LEU:HD13	2.50	0.41
1:CCC:303[B]:PHE:CD2	5:CCC:571:HOH:O	2.57	0.41
1:BBB:3[A]:LYS:HE3	1:BBB:3[A]:LYS:HB3	1.85	0.41
1:CCC:3[A]:LYS:HZ1	1:CCC:85[A]:LYS:NZ	2.14	0.41
1:BBB:33[B]:LYS:HD3	1:BBB:33[B]:LYS:HA	1.94	0.41
1:AAA:218[B]:GLU:HG2	5:AAA:611:HOH:O	2.19	0.41
1:CCC:358:ALA:O	3:CCC:402:NAI:H8A	2.21	0.40
1:CCC:283:ASP:O	1:CCC:312:HIS:HA	2.21	0.40
1:DDD:358:ALA:O	3:DDD:403:NAI:H8A	2.22	0.40
1:CCC:61:ASP:HA	1:CCC:85[A]:LYS:HG3	2.03	0.40
1:DDD:195:TYR:N	1:DDD:219[B]:MET:HE2	2.36	0.40

All (2) 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:AAA:647:HOH:O	5:BBB:1387:HOH:O[1_455]	2.19	0.01
5:AAA:894:HOH:O	5:BBB:1074:HOH:O[1_455]	2.19	0.01

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	AAA	398/410 (97%)	388 (98%)	10 (2%)	0	100	100
1	BBB	406/410 (99%)	394 (97%)	12 (3%)	0	100	100
1	CCC	400/410 (98%)	389 (97%)	11 (3%)	0	100	100
1	DDD	393/410 (96%)	382 (97%)	11 (3%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
All	All	1597/1640 (97%)	1553 (97%)	44 (3%)	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	AAA	333/340 (98%)	329 (99%)	4 (1%)	71 35
1	BBB	341/340 (100%)	334 (98%)	7 (2%)	53 13
1	CCC	335/340 (98%)	328 (98%)	7 (2%)	53 13
1	DDD	328/340 (96%)	326 (99%)	2 (1%)	86 59
All	All	1337/1360 (98%)	1317 (98%)	20 (2%)	73 27

All (20) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	AAA	51[A]	GLU
1	AAA	51[B]	GLU
1	AAA	159[A]	ASP
1	AAA	159[B]	ASP
1	BBB	0	GLN
1	BBB	57[A]	ARG
1	BBB	57[B]	ARG
1	BBB	159[A]	ASP
1	BBB	159[B]	ASP
1	BBB	366	LYS
1	BBB	367	ILE
1	CCC	1	MET
1	CCC	57[A]	ARG
1	CCC	57[B]	ARG
1	CCC	234[A]	GLU
1	CCC	234[B]	GLU
1	CCC	366	LYS

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Mol	Chain	Res	Type
1	CCC	367	ILE
1	DDD	159[A]	ASP
1	DDD	159[B]	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

5.3.3 RNA (i)

There are no RNA molecules in this entry.

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

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

17 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	$\#|Z| > 2$
4	EDO	DDD	405	-	3,3,3	0.44	0	2,2,2	0.67	0
3	NAI	DDD	403	-	42,48,48	1.42	6 (14%)	47,73,73	1.71	6 (12%)
2	PEG	DDD	401	-	6,6,6	0.36	0	5,5,5	0.18	0
2	PEG	AAA	501	-	6,6,6	0.21	0	5,5,5	0.12	0
2	PEG	CCC	401	-	6,6,6	0.25	0	5,5,5	0.13	0
2	PEG	AAA	502	-	6,6,6	0.22	0	5,5,5	0.12	0
2	PEG	DDD	402	-	6,6,6	0.15	0	5,5,5	0.12	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#|Z| > 2	Counts	RMSZ	#|Z| > 2
4	EDO	AAA	504	-	3,3,3	0.13	0	2,2,2	0.54	0
4	EDO	AAA	506	-	3,3,3	0.34	0	2,2,2	0.49	0
4	EDO	AAA	505	-	3,3,3	0.15	0	2,2,2	0.47	0
4	EDO	BBB	902	-	3,3,3	0.25	0	2,2,2	0.43	0
4	EDO	DDD	404	-	3,3,3	0.12	0	2,2,2	0.38	0
4	EDO	CCC	403	-	3,3,3	0.14	0	2,2,2	0.78	0
3	NAI	CCC	402	-	42,48,48	1.36	3 (7%)	47,73,73	1.35	5 (10%)
3	NAI	AAA	503	-	42,48,48	1.17	2 (4%)	47,73,73	1.30	6 (12%)
4	EDO	AAA	507	-	3,3,3	0.22	0	2,2,2	0.61	0
3	NAI	BBB	901	-	42,48,48	1.16	4 (9%)	47,73,73	1.50	4 (8%)

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	EDO	DDD	405	-	-	0/1/1/1	-
3	NAI	DDD	403	-	-	2/25/72/72	0/5/5/5
2	PEG	DDD	401	-	-	4/4/4/4	-
2	PEG	AAA	501	-	-	1/4/4/4	-
2	PEG	CCC	401	-	-	1/4/4/4	-
2	PEG	AAA	502	-	-	3/4/4/4	-
2	PEG	DDD	402	-	-	1/4/4/4	-
4	EDO	AAA	504	-	-	1/1/1/1	-
4	EDO	AAA	506	-	-	1/1/1/1	-
4	EDO	AAA	505	-	-	1/1/1/1	-
4	EDO	BBB	902	-	-	1/1/1/1	-
4	EDO	DDD	404	-	-	1/1/1/1	-
4	EDO	CCC	403	-	-	1/1/1/1	-
3	NAI	CCC	402	-	-	2/25/72/72	0/5/5/5
3	NAI	AAA	503	-	-	2/25/72/72	0/5/5/5
4	EDO	AAA	507	-	-	0/1/1/1	-
3	NAI	BBB	901	-	-	3/25/72/72	0/5/5/5

All (15) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	CCC	402	NAI	C6N-C5N	4.67	1.41	1.33
3	DDD	403	NAI	C2A-N1A	3.91	1.41	1.33

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	AAA	503	NAI	C6N-C5N	3.72	1.40	1.33
3	CCC	402	NAI	C4N-C5N	-3.41	1.40	1.48
3	DDD	403	NAI	C6N-C5N	3.23	1.39	1.33
3	DDD	403	NAI	C5A-C4A	3.14	1.49	1.40
3	DDD	403	NAI	O4B-C1B	2.91	1.45	1.41
3	BBB	901	NAI	C6N-C5N	2.79	1.38	1.33
3	BBB	901	NAI	O3D-C3D	2.67	1.49	1.43
3	CCC	402	NAI	C5A-C4A	2.52	1.47	1.40
3	AAA	503	NAI	C2A-N1A	2.42	1.38	1.33
3	BBB	901	NAI	C4A-N3A	-2.30	1.32	1.35
3	DDD	403	NAI	C2A-N3A	2.22	1.35	1.32
3	DDD	403	NAI	C4N-C5N	-2.15	1.43	1.48
3	BBB	901	NAI	C5A-C4A	2.12	1.46	1.40

All (21) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	DDD	403	NAI	N3A-C2A-N1A	-5.67	119.82	128.68
3	BBB	901	NAI	C4A-C5A-N7A	-5.43	103.74	109.40
3	BBB	901	NAI	N3A-C2A-N1A	-5.23	120.50	128.68
3	AAA	503	NAI	N3A-C2A-N1A	-4.85	121.10	128.68
3	DDD	403	NAI	C1B-N9A-C4A	-4.77	118.27	126.64
3	DDD	403	NAI	O4B-C1B-C2B	-4.46	100.41	106.93
3	CCC	402	NAI	N3A-C2A-N1A	-4.01	122.40	128.68
3	CCC	402	NAI	C1B-N9A-C4A	-3.85	119.89	126.64
3	DDD	403	NAI	O1N-PN-O2N	2.74	125.79	112.24
3	CCC	402	NAI	C1D-N1N-C6N	-2.69	115.04	120.83
3	AAA	503	NAI	C3D-C2D-C1D	2.55	106.27	101.43
3	BBB	901	NAI	O1N-PN-O2N	2.49	124.56	112.24
3	AAA	503	NAI	O4B-C1B-C2B	-2.36	103.47	106.93
3	AAA	503	NAI	C1B-N9A-C4A	-2.34	122.53	126.64
3	AAA	503	NAI	C2D-C3D-C4D	-2.32	98.13	102.64
3	BBB	901	NAI	C1B-N9A-C4A	-2.22	122.74	126.64
3	CCC	402	NAI	O4D-C4D-C3D	-2.18	100.79	105.11
3	DDD	403	NAI	O3B-C3B-C4B	2.16	117.30	111.05
3	CCC	402	NAI	PN-O3-PA	-2.16	125.41	132.83
3	DDD	403	NAI	O4D-C4D-C3D	-2.10	100.97	105.11
3	AAA	503	NAI	O1N-PN-O2N	2.02	122.23	112.24

There are no chirality outliers.

All (25) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	DDD	401	PEG	C1-C2-O2-C3
2	CCC	401	PEG	O1-C1-C2-O2
2	DDD	401	PEG	O1-C1-C2-O2
2	DDD	402	PEG	O2-C3-C4-O4
4	AAA	505	EDO	O1-C1-C2-O2
2	AAA	502	PEG	C4-C3-O2-C2
2	AAA	501	PEG	O1-C1-C2-O2
3	AAA	503	NAI	O4D-C1D-N1N-C2N
3	CCC	402	NAI	O4D-C1D-N1N-C2N
3	DDD	403	NAI	O4D-C1D-N1N-C2N
4	AAA	504	EDO	O1-C1-C2-O2
4	BBB	902	EDO	O1-C1-C2-O2
4	DDD	404	EDO	O1-C1-C2-O2
3	BBB	901	NAI	O4D-C1D-N1N-C2N
2	AAA	502	PEG	O2-C3-C4-O4
2	DDD	401	PEG	O2-C3-C4-O4
2	DDD	401	PEG	C4-C3-O2-C2
4	AAA	506	EDO	O1-C1-C2-O2
4	CCC	403	EDO	O1-C1-C2-O2
3	AAA	503	NAI	O4B-C4B-C5B-O5B
3	BBB	901	NAI	O4B-C4B-C5B-O5B
3	DDD	403	NAI	O4B-C4B-C5B-O5B
3	BBB	901	NAI	C2D-C1D-N1N-C2N
3	CCC	402	NAI	O4B-C4B-C5B-O5B
2	AAA	502	PEG	O1-C1-C2-O2

There are no ring outliers.

9 monomers are involved in 12 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	DDD	403	NAI	1	0
2	AAA	502	PEG	1	0
4	AAA	504	EDO	1	0
4	AAA	505	EDO	1	0
4	CCC	403	EDO	1	0
3	CCC	402	NAI	2	0
3	AAA	503	NAI	1	0
4	AAA	507	EDO	3	0
3	BBB	901	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 then 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 DDD 403

Bond lengths

Bond angles

Torsions

Rings

Ligand NAI CCC 402

Bond lengths

Bond angles

Torsions

Rings

Ligand NAI AAA 503

Bond lengths

Bond angles

Torsions

Rings

Ligand NAI BBB 901

Bond lengths

Bond angles

Torsions

Rings
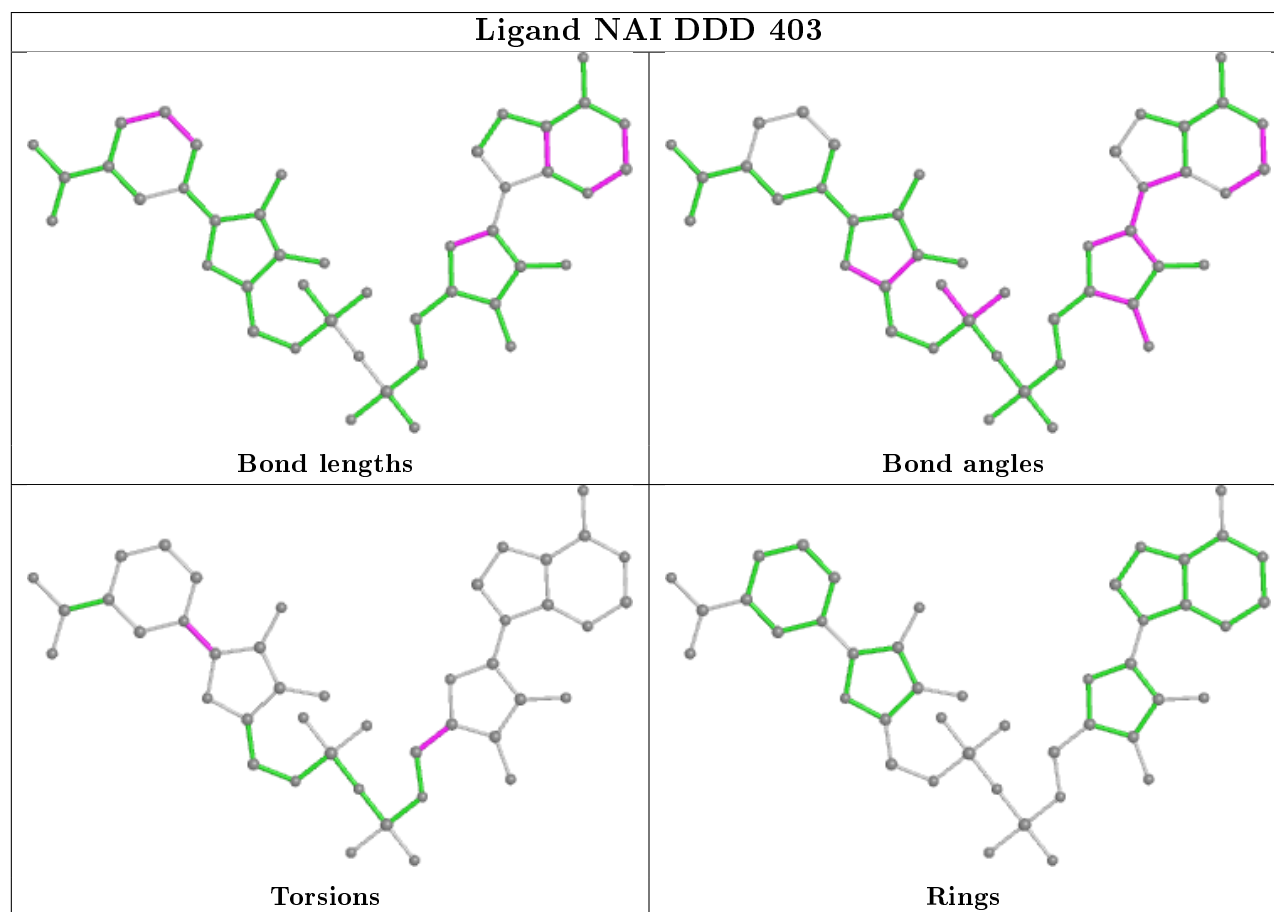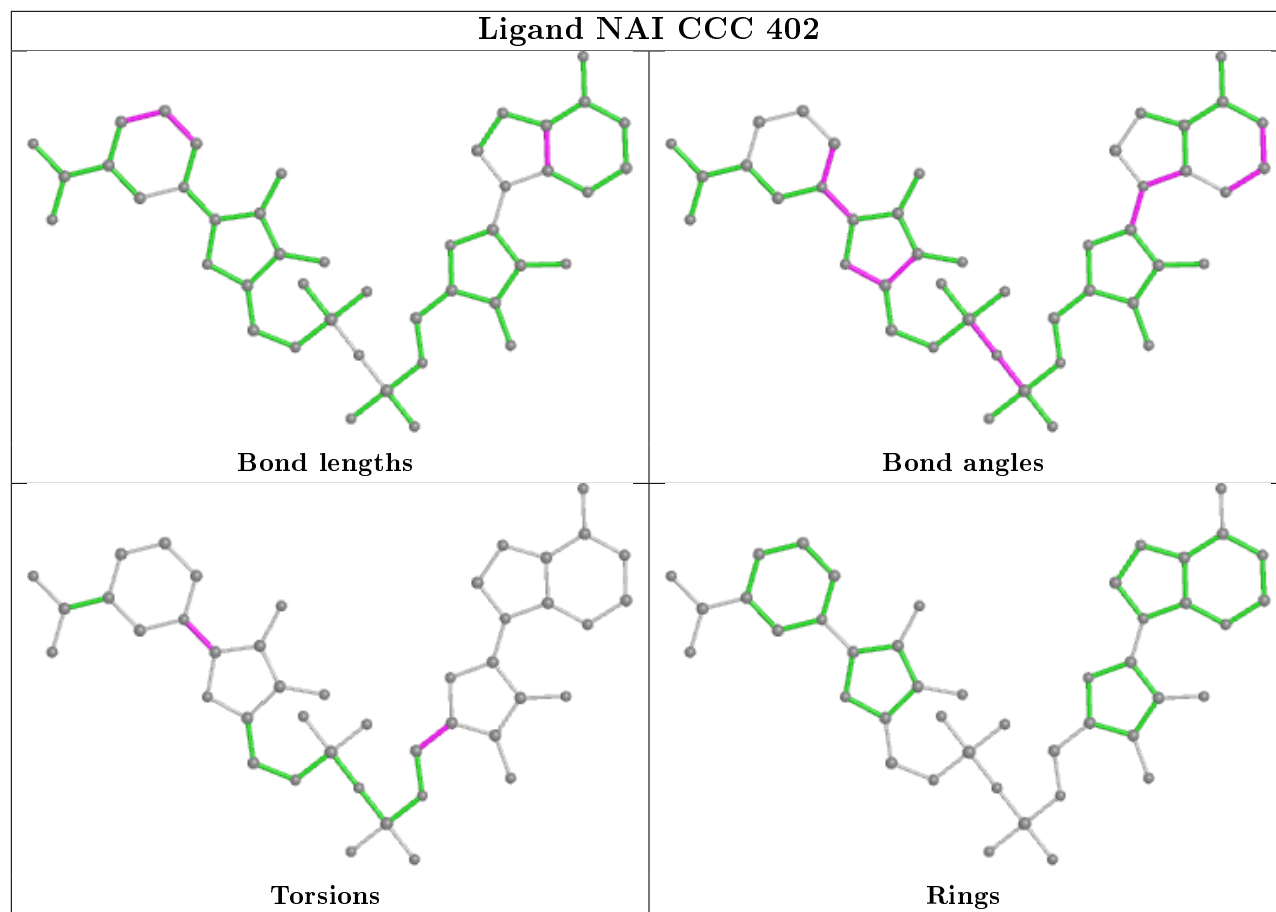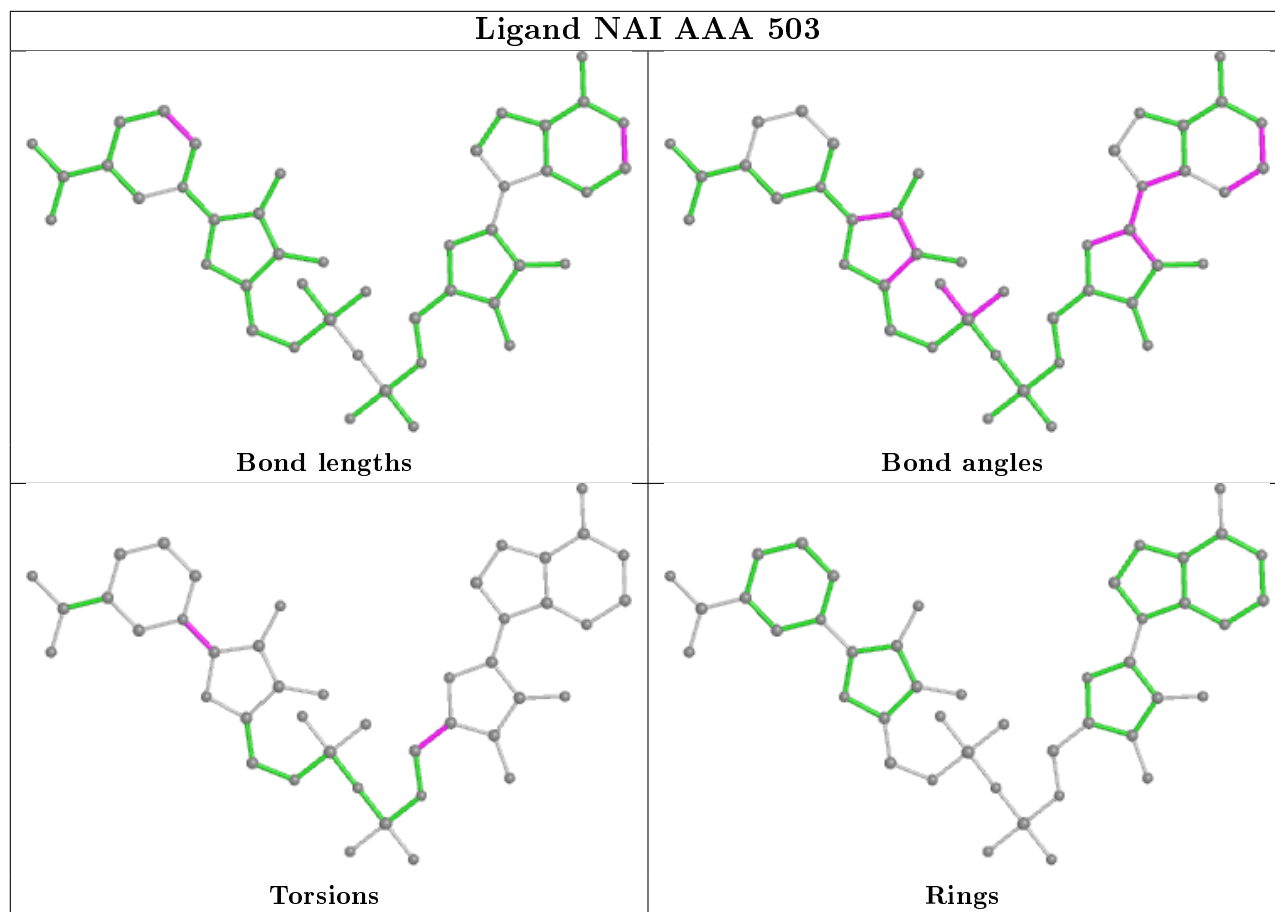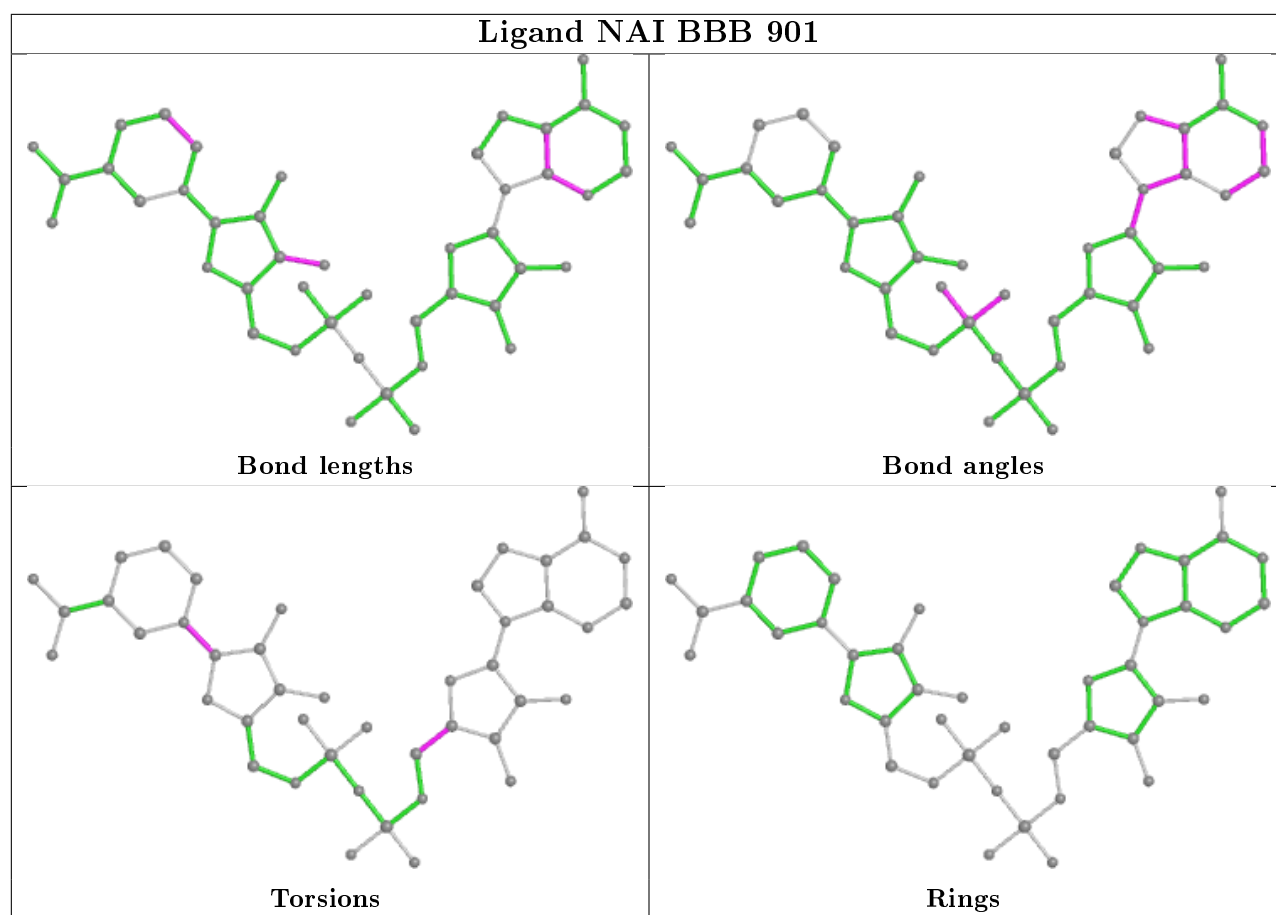
5.7 Other polymers (i)

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	AAA	367/410 (89%)	-0.02	5 (1%)	75	73	10, 17, 33, 89	0
1	BBB	374/410 (91%)	0.45	40 (10%)	6	7	10, 20, 45, 109	0
1	CCC	371/410 (90%)	0.60	53 (14%)	2	4	9, 19, 45, 128	0
1	DDD	367/410 (89%)	0.08	5 (1%)	75	73	9, 16, 36, 77	0
All	All	1479/1640 (90%)	0.28	103 (6%)	16	17	9, 18, 41, 128	0

All (103) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	CCC	365	VAL	11.2
1	CCC	364	ASP	8.9
1	BBB	365	VAL	8.1
1	AAA	-4	THR	7.8
1	CCC	-1	LEU	7.5
1	DDD	-4	THR	7.2
1	BBB	364	ASP	6.2
1	CCC	366	LYS	6.2
1	BBB	368	PRO	5.8
1	CCC	367	ILE	5.7
1	BBB	86	LEU	5.6
1	CCC	83	ALA	5.4
1	CCC	1	MET	5.1
1	BBB	367	ILE	5.1
1	BBB	-5	TYR	4.9
1	CCC	336	LEU	4.8
1	BBB	-1	LEU	4.6
1	CCC	81	ALA	4.6
1	CCC	335	TYR	4.5
1	CCC	-2	ARG	4.3
1	BBB	-4	THR	4.2

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Mol	Chain	Res	Type	RSRZ
1	BBB	35	LEU	4.0
1	BBB	111	ILE	3.9
1	CCC	363	GLU	3.8
1	CCC	57[A]	ARG	3.8
1	CCC	61	ASP	3.6
1	BBB	106[A]	LYS	3.6
1	CCC	86	LEU	3.5
1	CCC	4	VAL	3.4
1	CCC	106[A]	LYS	3.4
1	BBB	51[A]	GLU	3.3
1	DDD	-2	ARG	3.3
1	BBB	89	ALA	3.3
1	CCC	103	ALA	3.3
1	DDD	-1	LEU	3.2
1	DDD	-3	ALA	3.2
1	CCC	340	PHE	3.2
1	BBB	363	GLU	3.1
1	BBB	34	TRP	3.1
1	BBB	366	LYS	3.1
1	CCC	2	VAL	3.1
1	CCC	107	THR	3.1
1	BBB	80	LEU	3.1
1	CCC	35	LEU	3.1
1	CCC	59	LEU	3.0
1	CCC	65	ILE	3.0
1	CCC	85[A]	LYS	2.9
1	CCC	111	ILE	2.9
1	CCC	84[A]	LYS	2.9
1	BBB	331	ILE	2.8
1	CCC	-3	ALA	2.8
1	CCC	64	ILE	2.8
1	BBB	340	PHE	2.8
1	CCC	51[A]	GLU	2.8
1	CCC	89	ALA	2.8
1	BBB	43	VAL	2.7
1	BBB	57[A]	ARG	2.7
1	AAA	41	THR	2.7
1	CCC	352	GLY	2.7
1	BBB	1	MET	2.7
1	BBB	2	VAL	2.6
1	AAA	-2	ARG	2.6
1	CCC	80	LEU	2.6

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Mol	Chain	Res	Type	RSRZ
1	CCC	331	ILE	2.6
1	CCC	342	TYR	2.6
1	BBB	52[A]	GLY	2.5
1	CCC	332	LEU	2.5
1	AAA	-3	ALA	2.5
1	BBB	50	ARG	2.5
1	BBB	81	ALA	2.5
1	BBB	75	LEU	2.5
1	BBB	-3	ALA	2.4
1	CCC	34	TRP	2.4
1	BBB	0	GLN	2.4
1	BBB	113	VAL	2.4
1	BBB	335	TYR	2.4
1	BBB	39	GLY	2.3
1	CCC	328	VAL	2.3
1	BBB	77	ALA	2.3
1	BBB	42	LEU	2.3
1	BBB	102	ASP	2.3
1	CCC	5	LEU	2.3
1	BBB	65	ILE	2.3
1	CCC	88	LEU	2.2
1	BBB	103	ALA	2.2
1	CCC	41	THR	2.2
1	CCC	60	GLU	2.2
1	BBB	38	GLN	2.2
1	CCC	33[A]	LYS	2.2
1	CCC	31	LEU	2.2
1	BBB	332	LEU	2.1
1	CCC	50	ARG	2.1
1	CCC	3[A]	LYS	2.1
1	CCC	101	LEU	2.1
1	AAA	-1	LEU	2.1
1	CCC	104	ALA	2.0
1	CCC	110	GLY	2.0
1	BBB	354	TYR	2.0
1	CCC	87[A]	LYS	2.0
1	CCC	42	LEU	2.0
1	DDD	1	MET	2.0
1	CCC	55	PHE	2.0
1	CCC	52[A]	GLY	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, 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
4	EDO	DDD	404	4/4	0.69	0.21	49,53,66,66	1
4	EDO	AAA	505	4/4	0.70	0.19	49,51,60,60	1
4	EDO	AAA	507	4/4	0.82	0.18	31,39,52,52	1
2	PEG	AAA	502	7/7	0.86	0.14	33,40,70,70	1
4	EDO	AAA	506	4/4	0.86	0.12	38,39,41,41	1
2	PEG	CCC	401	7/7	0.87	0.10	27,31,48,48	1
4	EDO	DDD	405	4/4	0.87	0.11	30,32,37,37	1
4	EDO	CCC	403	4/4	0.88	0.15	25,37,55,55	1
2	PEG	AAA	501	7/7	0.93	0.11	25,27,80,80	1
2	PEG	DDD	401	7/7	0.93	0.09	20,24,47,47	1
2	PEG	DDD	402	7/7	0.93	0.16	40,59,84,84	1
4	EDO	BBB	902	4/4	0.94	0.06	25,26,37,37	1
4	EDO	AAA	504	4/4	0.96	0.18	24,33,57,57	1
3	NAI	CCC	402	44/44	0.97	0.06	12,15,18,19	4
3	NAI	DDD	403	44/44	0.98	0.07	10,12,14,17	4
3	NAI	AAA	503	44/44	0.99	0.06	10,13,15,16	4
3	NAI	BBB	901	44/44	0.99	0.05	13,16,20,20	4

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 CCC 402:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
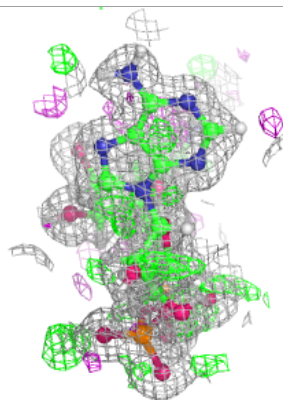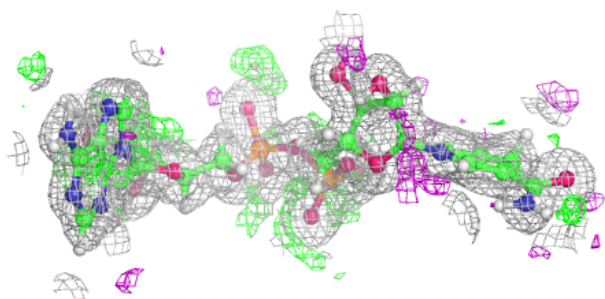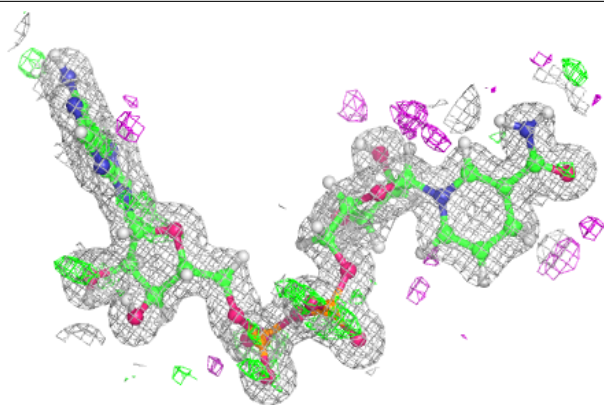mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
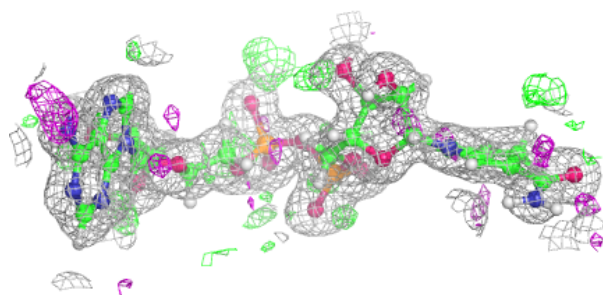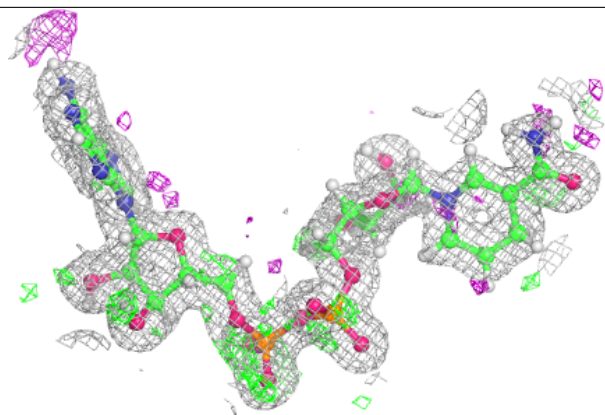
Electron density around NAI DDD 403:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
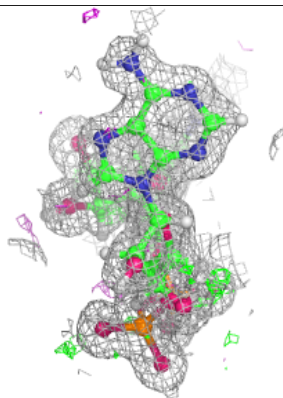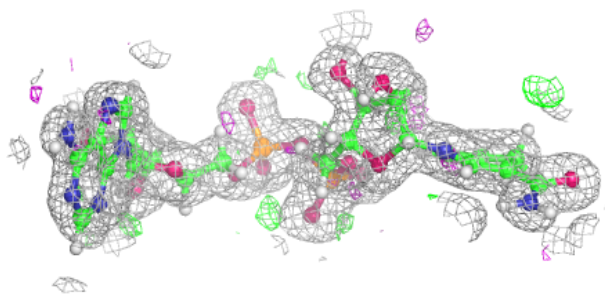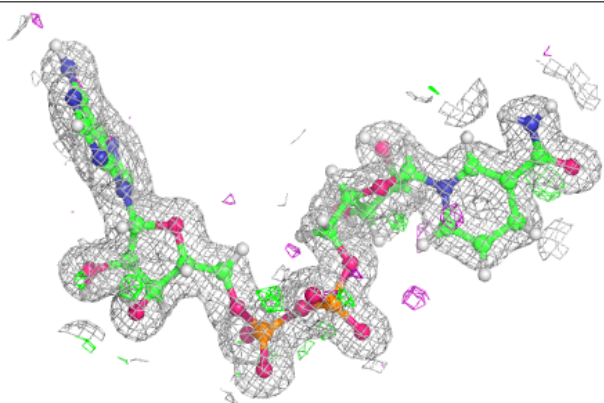mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
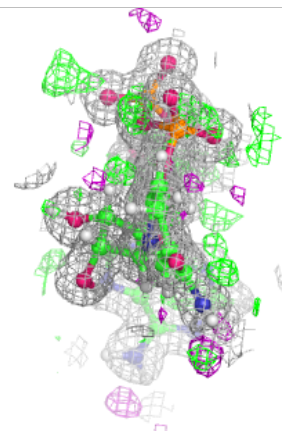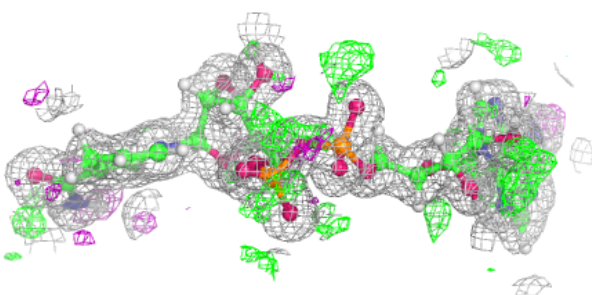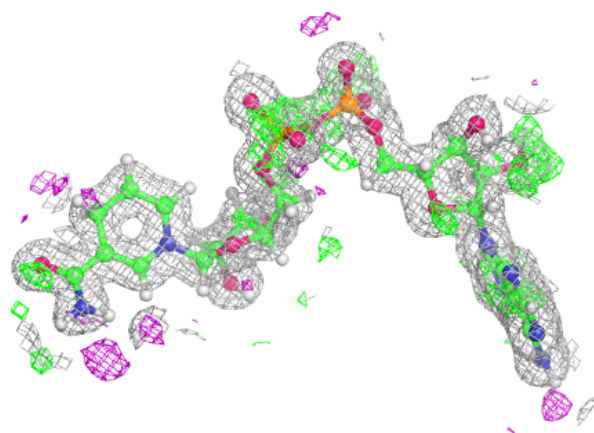
Electron density around NAI AAA 503:

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

Electron density around NAI BBB 901:

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

6.5 Other polymers (i)

There are no such residues in this entry.