wwPDB X-ray Structure Validation Summary Report ⓘ

Aug 21, 2020 – 06:57 PM BST

PDB ID	:	6KE3
Title	:	Crystal structure of the alpha bata heterodimer of human IDH3 in complex with NADH
Authors	:	Sun, P.; Ding, J.
Deposited on	:	2019-07-03
Resolution	:	3.31 Å(reported)

The following versions of software and data (see references ⓘ) 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	:	2.13.1
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)	:	2.13.1

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 3.31 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		0.297
Clashscore		19
Ramachandran outliers		0
Sidechain outliers		3.7%
RSRZ outliers		0.9%

Worse — *Better*

▌ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution
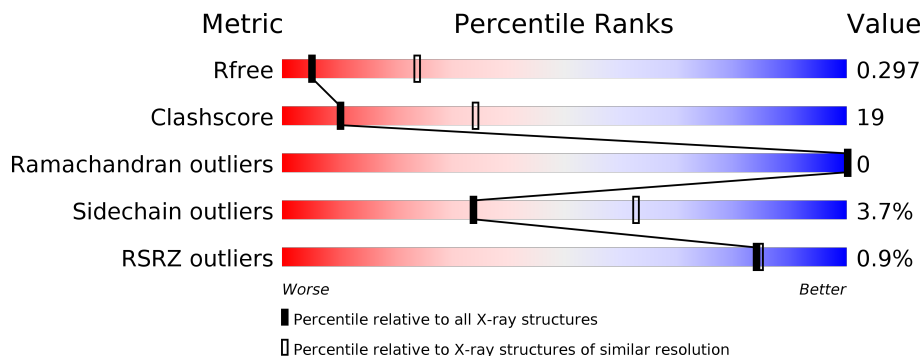
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R$_{free}$	130704	1149 (3.34-3.26)
Clashscore	141614	1205 (3.34-3.26)
Ramachandran outliers	138981	1183 (3.34-3.26)
Sidechain outliers	138945	1182 (3.34-3.26)
RSRZ outliers	127900	1115 (3.34-3.26)

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 on 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	A	341	58% / 38% / · ·
1	C	341	61% / 34% / · 5%
1	E	341	65% / 26% / · 7%
1	G	341	71% / 23% / 6%
2	B	356	56% / 38% / · 5%
2	D	356	58% / 36% / · 5%

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Mol	Chain	Length	Quality of chain
2	F	356	62% 32% • 5%
2	H	356	64% 30% • 5%

2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 19231 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 Isocitrate dehydrogenase [NAD] subunit alpha, mitochondrial.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	335	Total	C	N	O	S	0	0	0
			2422	1521	418	462	21			
1	C	325	Total	C	N	O	S	0	0	0
			2299	1438	400	442	19			
1	E	318	Total	C	N	O	S	0	0	0
			2136	1327	375	419	15			
1	G	320	Total	C	N	O	S	0	0	0
			2161	1353	375	417	16			

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-1	GLY	-	expression tag	UNP P50213
A	0	SER	-	expression tag	UNP P50213
C	-1	GLY	-	expression tag	UNP P50213
C	0	SER	-	expression tag	UNP P50213
E	-1	GLY	-	expression tag	UNP P50213
E	0	SER	-	expression tag	UNP P50213
G	-1	GLY	-	expression tag	UNP P50213
G	0	SER	-	expression tag	UNP P50213

- Molecule 2 is a protein called Isocitrate dehydrogenase [NAD] subunit beta, mitochondrial.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	338	Total	C	N	O	S	0	0	0
			2525	1594	434	476	21			
2	D	338	Total	C	N	O	S	0	0	0
			2519	1590	438	471	20			
2	F	338	Total	C	N	O	S	0	0	0
			2502	1585	430	466	21			
2	H	338	Total	C	N	O	S	0	0	0
			2491	1573	435	464	19			

There are 64 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	341	GLU	-	expression tag	UNP O43837
B	342	ILE	-	expression tag	UNP O43837
B	343	CYS	-	expression tag	UNP O43837
B	344	ARG	-	expression tag	UNP O43837
B	345	ARG	-	expression tag	UNP O43837
B	346	VAL	-	expression tag	UNP O43837
B	347	LYS	-	expression tag	UNP O43837
B	348	ASP	-	expression tag	UNP O43837
B	349	LEU	-	expression tag	UNP O43837
B	350	ASP	-	expression tag	UNP O43837
B	351	GLU	-	expression tag	UNP O43837
B	352	ASN	-	expression tag	UNP O43837
B	353	LEU	-	expression tag	UNP O43837
B	354	TYR	-	expression tag	UNP O43837
B	355	PHE	-	expression tag	UNP O43837
B	356	GLN	-	expression tag	UNP O43837
D	341	GLU	-	expression tag	UNP O43837
D	342	ILE	-	expression tag	UNP O43837
D	343	CYS	-	expression tag	UNP O43837
D	344	ARG	-	expression tag	UNP O43837
D	345	ARG	-	expression tag	UNP O43837
D	346	VAL	-	expression tag	UNP O43837
D	347	LYS	-	expression tag	UNP O43837
D	348	ASP	-	expression tag	UNP O43837
D	349	LEU	-	expression tag	UNP O43837
D	350	ASP	-	expression tag	UNP O43837
D	351	GLU	-	expression tag	UNP O43837
D	352	ASN	-	expression tag	UNP O43837
D	353	LEU	-	expression tag	UNP O43837
D	354	TYR	-	expression tag	UNP O43837
D	355	PHE	-	expression tag	UNP O43837
D	356	GLN	-	expression tag	UNP O43837
F	341	GLU	-	expression tag	UNP O43837
F	342	ILE	-	expression tag	UNP O43837
F	343	CYS	-	expression tag	UNP O43837
F	344	ARG	-	expression tag	UNP O43837
F	345	ARG	-	expression tag	UNP O43837
F	346	VAL	-	expression tag	UNP O43837
F	347	LYS	-	expression tag	UNP O43837
F	348	ASP	-	expression tag	UNP O43837
F	349	LEU	-	expression tag	UNP O43837
F	350	ASP	-	expression tag	UNP O43837

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Chain	Residue	Modelled	Actual	Comment	Reference
F	351	GLU	-	expression tag	UNP O43837
F	352	ASN	-	expression tag	UNP O43837
F	353	LEU	-	expression tag	UNP O43837
F	354	TYR	-	expression tag	UNP O43837
F	355	PHE	-	expression tag	UNP O43837
F	356	GLN	-	expression tag	UNP O43837
H	341	GLU	-	expression tag	UNP O43837
H	342	ILE	-	expression tag	UNP O43837
H	343	CYS	-	expression tag	UNP O43837
H	344	ARG	-	expression tag	UNP O43837
H	345	ARG	-	expression tag	UNP O43837
H	346	VAL	-	expression tag	UNP O43837
H	347	LYS	-	expression tag	UNP O43837
H	348	ASP	-	expression tag	UNP O43837
H	349	LEU	-	expression tag	UNP O43837
H	350	ASP	-	expression tag	UNP O43837
H	351	GLU	-	expression tag	UNP O43837
H	352	ASN	-	expression tag	UNP O43837
H	353	LEU	-	expression tag	UNP O43837
H	354	TYR	-	expression tag	UNP O43837
H	355	PHE	-	expression tag	UNP O43837
H	356	GLN	-	expression tag	UNP O43837

- 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 author).
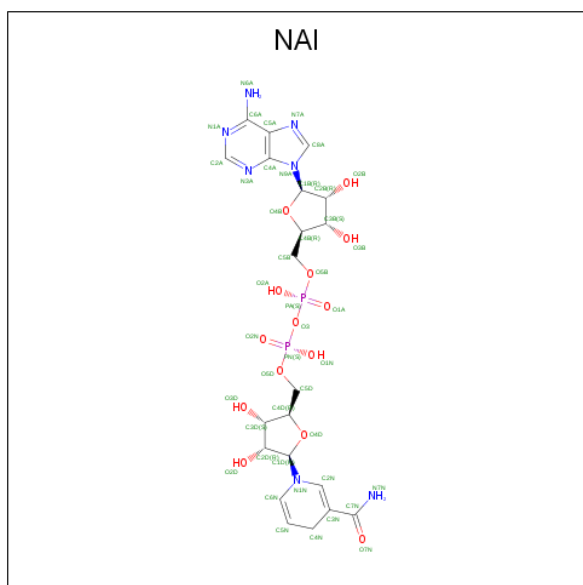
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	P	0	0
			44	21	7	14	2		
3	C	1	Total	C	N	O	P	0	0
			44	21	7	14	2		
3	E	1	Total	C	N	O	P	0	0
			44	21	7	14	2		
3	G	1	Total	C	N	O	P	0	0
			44	21	7	14	2		

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: Isocitrate dehydrogenase [NAD] subunit alpha, mitochondrial

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• Molecule 1: Isocitrate dehydrogenase [NAD] subunit alpha, mitochondrial

Chain G:

• Molecule 2: Isocitrate dehydrogenase [NAD] subunit beta, mitochondrial

Chain B:

• Molecule 2: Isocitrate dehydrogenase [NAD] subunit beta, mitochondrial

Chain D:

F105 A106 N107 V108 V109 H110 V111 K112 S113 L114 P115 G116 Y117 L124 V127 I128 I129 R130 E131 Q132 T133 E134 G135 E136 Y137 L140 E141 G147 V148 I149 E150 C151 L152 K153 T156 R157 S160 Q161 R162 I163 A164 D169 T172 K173 R176 G177 K178 A185 K189

L190 G191 D192 G193 L194 F195 L196 Q197 C198 V202 I209 K210 C219 C220 M221 Q222 L223 V224 V232 L233 P236 N237 L238 Y239 G240 N241 I242 I243 D244 A248 V251 G252 G253 V257 P258 E260 S261 A264 V268 F269 E270 R274 H275 P276 F277 A278 I285

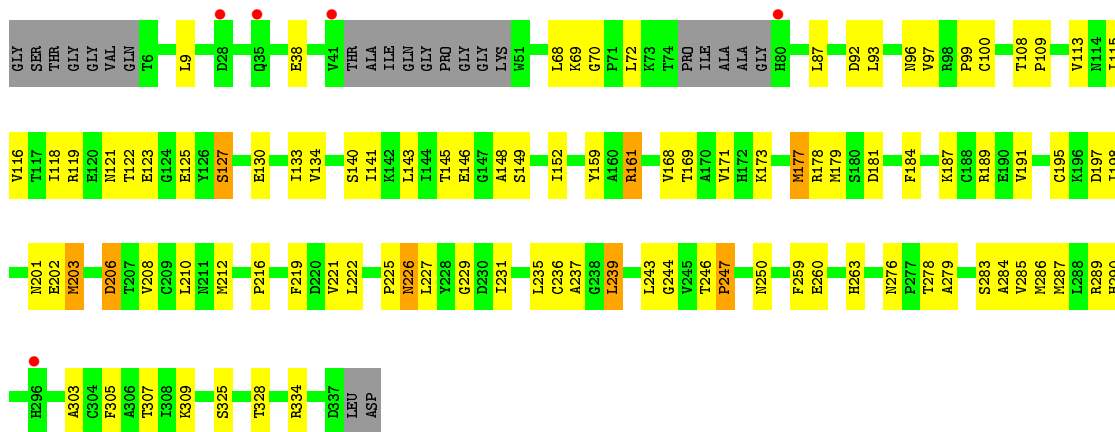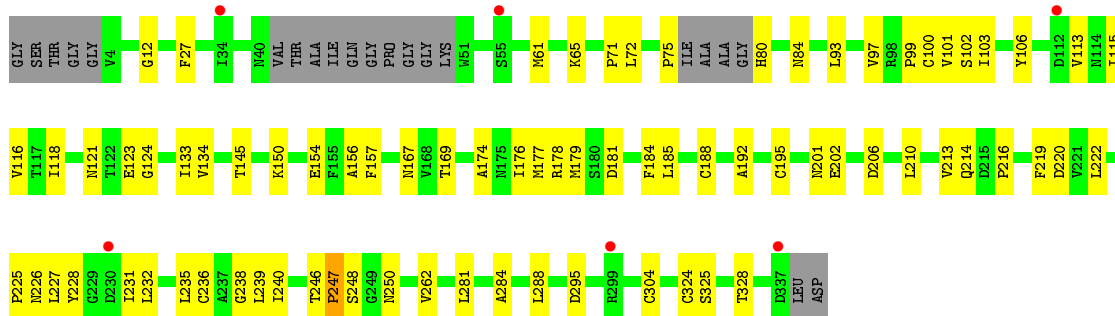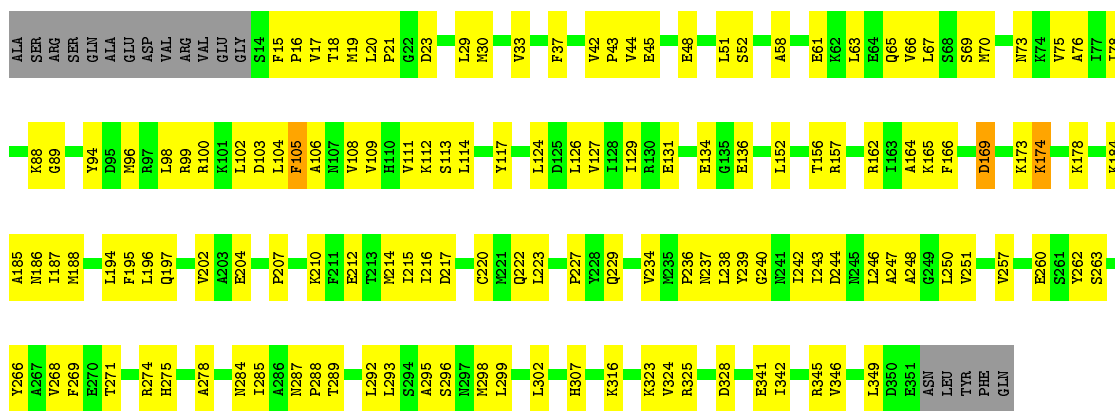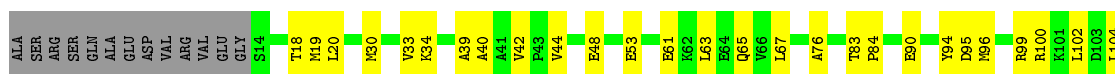A286 N287 P288 L292 S296 N297 M298 L299 E305 S308 S309 M310 I311 A312 D313 A314 V315 K316 K317 V318 I319 R325 T326 M329 C335 T339 I342 R345 V346 K347 D348 L349 D350 E351 ASN LEU TYR PHE GLN

• Molecule 2: Isocitrate dehydrogenase [NAD] subunit beta, mitochondrial

Chain F:

62% 32% • 5%

ALA SER ARG SER GLN ALA GLU ASP VAL ARG VAL GLU GLY S14 F15 P16 V17 T18 M19 L20 P21 G22 M30 K34 E35 V36 F37 A40 A41 E45 A58 V75 A76 I81 H82 T83 Y87 E90 S93 Y94 R99 D103 V108 V109 H110 S113

L114 Y117 M118 T119 R120 H121 N122 N123 L124 I129 R130 E131 Q132 T133 E134 G135 E136 Y137 L140 E141 H142 E143 G147 V148 I149 E150 C151 L152 R157 A158 K159 R162 I163 A164 K165 F168 D169 T172 K173 K174 G175 R176 G177 K178 V179 T180 K184 A185 N186 I187 M188

K189 L190 L194 C198 E201 V202 I209 K210 F211 M214 I215 L223 N226 P227 Y228 V232 L233 N237 L238 Y239 G240 N241 I242 I243 D244 N245 A248 V251 G252 G253 A254 V257 P258 S263 A264 E270 A273 R274 H275 P276 N287 P288 L293

S294 A295 S296 L302 S309 M310 I311 A314 V315 V318 I319 G322 R325 D328 M329 F338 T339 C343 R344 R345 V346 L349 D350 E351 ASN LEU TYR PHE GLN

• Molecule 2: Isocitrate dehydrogenase [NAD] subunit beta, mitochondrial

Chain H:

64% 30% • 5%

ALA SER ARG SER GLN ALA GLU ASP VAL ARG VAL GLU GLY S14 M19 D23 E28 I29 M30 H31 K34 E35 V36 F37 K38 A39 V42 P43 V44 E48 S52 L63 V75 A76 I77 I81 H82 E90 L91 Y94 D95 M96 R97 L98 R99 R100 K101

S113 L114 Y117 V127 R130 E131 Q132 T133 E134 G135 L140 E141 H142 E143 R146 G147 V148 I149 E150 K153 I154 K159 A164 A171 R176 G177 K178 N186 I187 M188 K189 L190 F195 V202 L205 Y206 P207 K210 I215 C220 V224

Q229 F230 D231 V232 L233 V234 M235 P236 N237 G240 N241 I242 I243 A247 L250 V251 G252 G253 V257 E260 S261 Y262 S263 A264 F269 E270 T271 G272 H275 P276 G282 R283 A286 N287 P288 L293 S296 N297 M298 L299 L302 Y306 M310 V315

I319 R325 M329 C335 T339 E340 E341 I342 C343 R344 D348 E351 ASN LEU TYR PHE GLN

4   Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	99.36Å 162.67Å 114.78Å 90.00° 100.38° 90.00°	Depositor
Resolution (Å)	42.16 – 3.31	Depositor
	42.16 – 3.31	EDS
% Data completeness (in resolution range)	89.1 (42.16-3.31)	Depositor
	89.9 (42.16-3.31)	EDS
R_{merge}	0.11	Depositor
R_{sym}	(Not available)	Depositor
$<I/\sigma(I)>$ [1]	2.20 (at 3.32Å)	Xtriage
Refinement program	PHENIX 1.14_3260	Depositor
R, R_{free}	0.250 , 0.299	Depositor
	0.248 , 0.297	DCC
R_{free} test set	2331 reflections (4.81%)	wwPDB-VP
Wilson B-factor (Å^2)	60.4	Xtriage
Anisotropy	0.416	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.26 , 36.3	EDS
L-test for twinning[2]	$<|L|>=0.50$, $<L^2>=0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.81	EDS
Total number of atoms	19231	wwPDB-VP
Average B, all atoms (Å^2)	60.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 9.62% 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: 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	A	0.52	0/2464	0.69	1/3352 (0.0%)
1	C	0.45	0/2335	0.65	1/3179 (0.0%)
1	E	0.55	1/2170 (0.0%)	0.63	0/2971
1	G	0.49	1/2199 (0.0%)	0.59	0/3011
2	B	0.54	0/2570	0.71	0/3484
2	D	0.55	1/2564 (0.0%)	0.71	0/3474
2	F	0.52	0/2547	0.70	0/3454
2	H	0.52	0/2536	0.71	2/3445 (0.1%)
All	All	0.52	3/19385 (0.0%)	0.68	4/26370 (0.0%)

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	E	247	PRO	N-CD	-13.38	1.29	1.47
2	D	258	PRO	N-CD	-13.18	1.29	1.47
1	G	247	PRO	N-CD	-12.28	1.30	1.47

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	H	283	ARG	CB-CA-C	6.63	123.67	110.40
1	C	33	PRO	N-CA-C	-6.14	96.14	112.10
2	H	140	LEU	CB-CG-CD1	-5.50	101.66	111.00
1	A	314	LEU	CA-CB-CG	5.08	126.98	115.30

There are no chirality outliers.

There are no planarity outliers.

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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	2422	0	2312	116	0
1	C	2299	0	2109	96	0
1	E	2136	0	1822	83	0
1	G	2161	0	1826	58	0
2	B	2525	0	2443	104	0
2	D	2519	0	2439	96	0
2	F	2502	0	2425	94	0
2	H	2491	0	2386	89	0
3	A	44	0	27	9	0
3	C	44	0	25	6	0
3	E	44	0	27	7	0
3	G	44	0	27	3	0
All	All	19231	0	17868	695	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 19.

The worst 5 of 695 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:268:ASP:OD2	3:A:401:NAI:O3B	1.72	1.07
2:H:135:GLY:HA3	2:H:237:ASN:HB3	1.31	1.06
1:C:30:ALA:O	1:C:299:ARG:NH1	1.99	0.96
1:C:236:CYS:HA	1:C:239:LEU:HD13	1.48	0.95
1:A:6:THR:HG22	1:A:35:GLN:HB3	1.55	0.90

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	333/341 (98%)	291 (87%)	42 (13%)	0	100	100
1	C	319/341 (94%)	272 (85%)	47 (15%)	0	100	100
1	E	312/341 (92%)	271 (87%)	41 (13%)	0	100	100
1	G	314/341 (92%)	272 (87%)	42 (13%)	0	100	100
2	B	336/356 (94%)	296 (88%)	40 (12%)	0	100	100
2	D	336/356 (94%)	289 (86%)	47 (14%)	0	100	100
2	F	336/356 (94%)	284 (84%)	52 (16%)	0	100	100
2	H	336/356 (94%)	281 (84%)	55 (16%)	0	100	100
All	All	2622/2788 (94%)	2256 (86%)	366 (14%)	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	243/278 (87%)	232 (96%)	11 (4%)	27	58
1	C	219/278 (79%)	214 (98%)	5 (2%)	50	73
1	E	182/278 (66%)	174 (96%)	8 (4%)	28	59
1	G	180/278 (65%)	175 (97%)	5 (3%)	43	70
2	B	260/300 (87%)	249 (96%)	11 (4%)	30	60
2	D	257/300 (86%)	244 (95%)	13 (5%)	24	54
2	F	255/300 (85%)	245 (96%)	10 (4%)	32	62
2	H	250/300 (83%)	244 (98%)	6 (2%)	49	73
All	All	1846/2312 (80%)	1777 (96%)	69 (4%)	34	63

5 of 69 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	D	192	ASP
2	D	309	SER
2	H	52	SER
2	D	219	CYS
2	D	244	ASP

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 11 such sidechains are listed below:

Mol	Chain	Res	Type
2	D	287	ASN
2	F	218	ASN
1	G	121	ASN
2	D	222	GLN
1	G	96	ASN

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)

4 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
3	NAI	G	401	-	42,48,48	1.12	3 (7%)	47,73,73	1.27	4 (8%)
3	NAI	A	401	-	42,48,48	1.39	7 (16%)	47,73,73	1.31	3 (6%)
3	NAI	C	401	-	42,48,48	1.25	1 (2%)	47,73,73	1.85	10 (21%)
3	NAI	E	401	-	42,48,48	1.17	4 (9%)	47,73,73	1.59	14 (29%)

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
3	NAI	G	401	-	-	9/25/72/72	0/5/5/5
3	NAI	A	401	-	-	9/25/72/72	0/5/5/5
3	NAI	C	401	-	-	14/25/72/72	0/5/5/5
3	NAI	E	401	-	-	8/25/72/72	0/5/5/5

The worst 5 of 15 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	G	401	NAI	C6N-C5N	3.51	1.39	1.33
3	A	401	NAI	C2B-C1B	-3.37	1.48	1.53
3	E	401	NAI	C2B-C1B	-3.20	1.48	1.53
3	A	401	NAI	O4B-C4B	-2.61	1.39	1.45
3	G	401	NAI	C2B-C1B	-2.56	1.49	1.53

The worst 5 of 31 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	C	401	NAI	PN-O3-PA	-5.81	112.88	132.83
3	C	401	NAI	C4A-C5A-N7A	-5.00	104.19	109.40
3	C	401	NAI	O4B-C1B-C2B	-4.01	101.06	106.93
3	G	401	NAI	PN-O3-PA	-3.98	119.16	132.83
3	A	401	NAI	N3A-C2A-N1A	-3.85	122.66	128.68

There are no chirality outliers.

5 of 40 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	G	401	NAI	C5D-O5D-PN-O1N
3	G	401	NAI	C5D-O5D-PN-O2N

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Mol	Chain	Res	Type	Atoms
3	A	401	NAI	C5D-O5D-PN-O3
3	A	401	NAI	C5D-O5D-PN-O1N
3	C	401	NAI	C2N-C3N-C7N-N7N

There are no ring outliers.

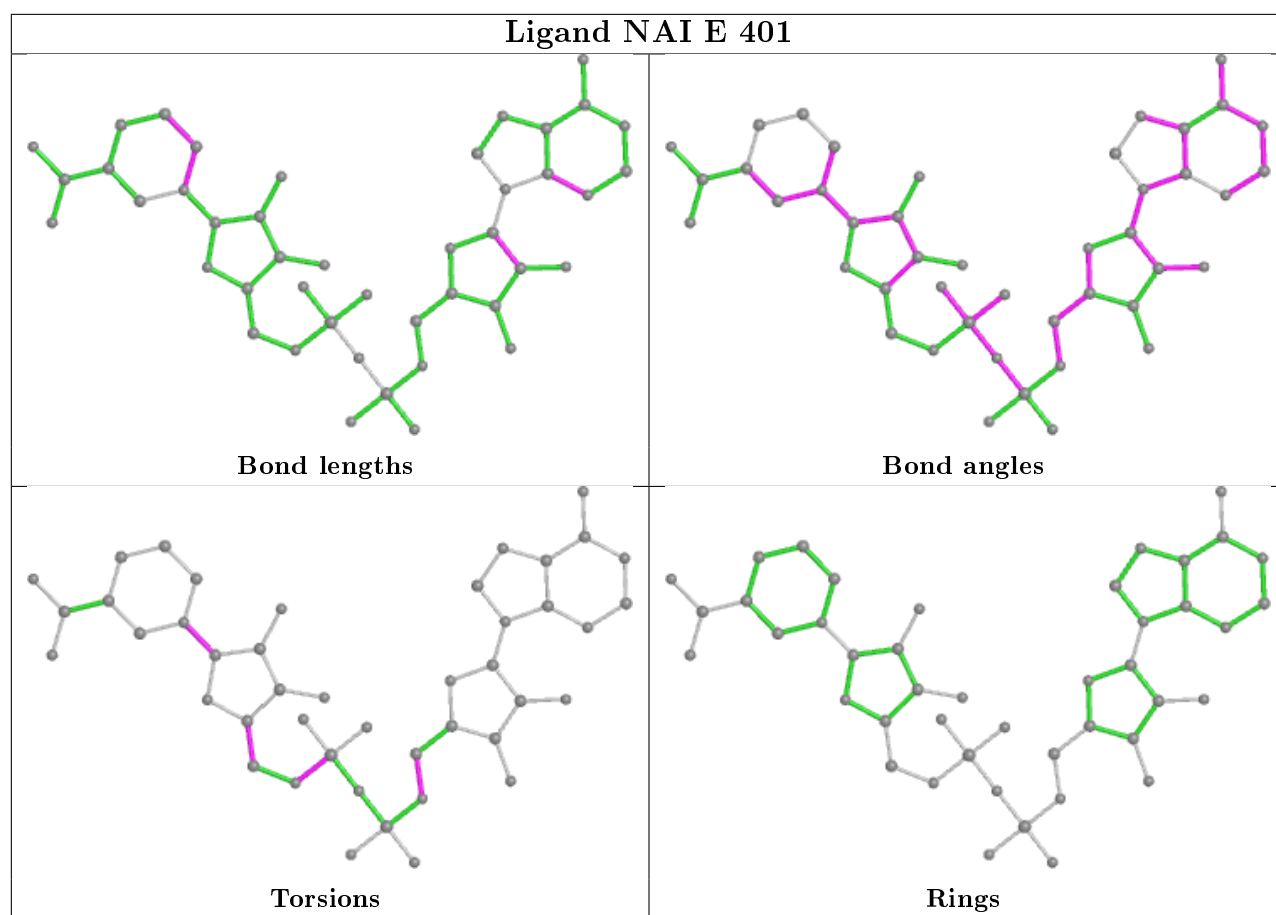4 monomers are involved in 25 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	G	401	NAI	3	0
3	A	401	NAI	9	0
3	C	401	NAI	6	0
3	E	401	NAI	7	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 G 401

Bond lengths

Bond angles

Torsions

Rings

Ligand NAI A 401

Bond lengths

Bond angles

Torsions

Rings

Ligand NAI C 401

Bond lengths

Bond angles

Torsions

Rings

Ligand NAI E 401

Bond lengths

Bond angles

Torsions

Rings
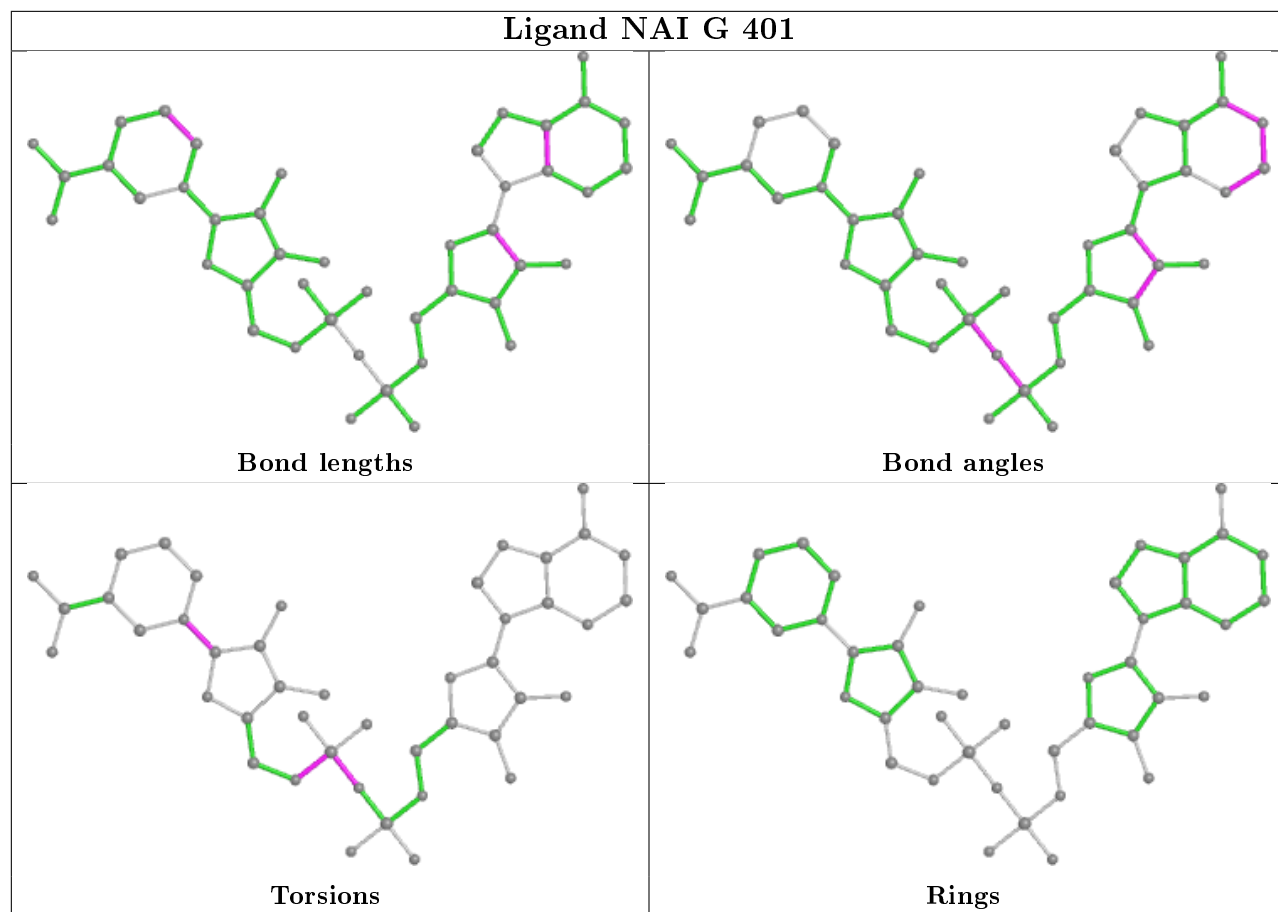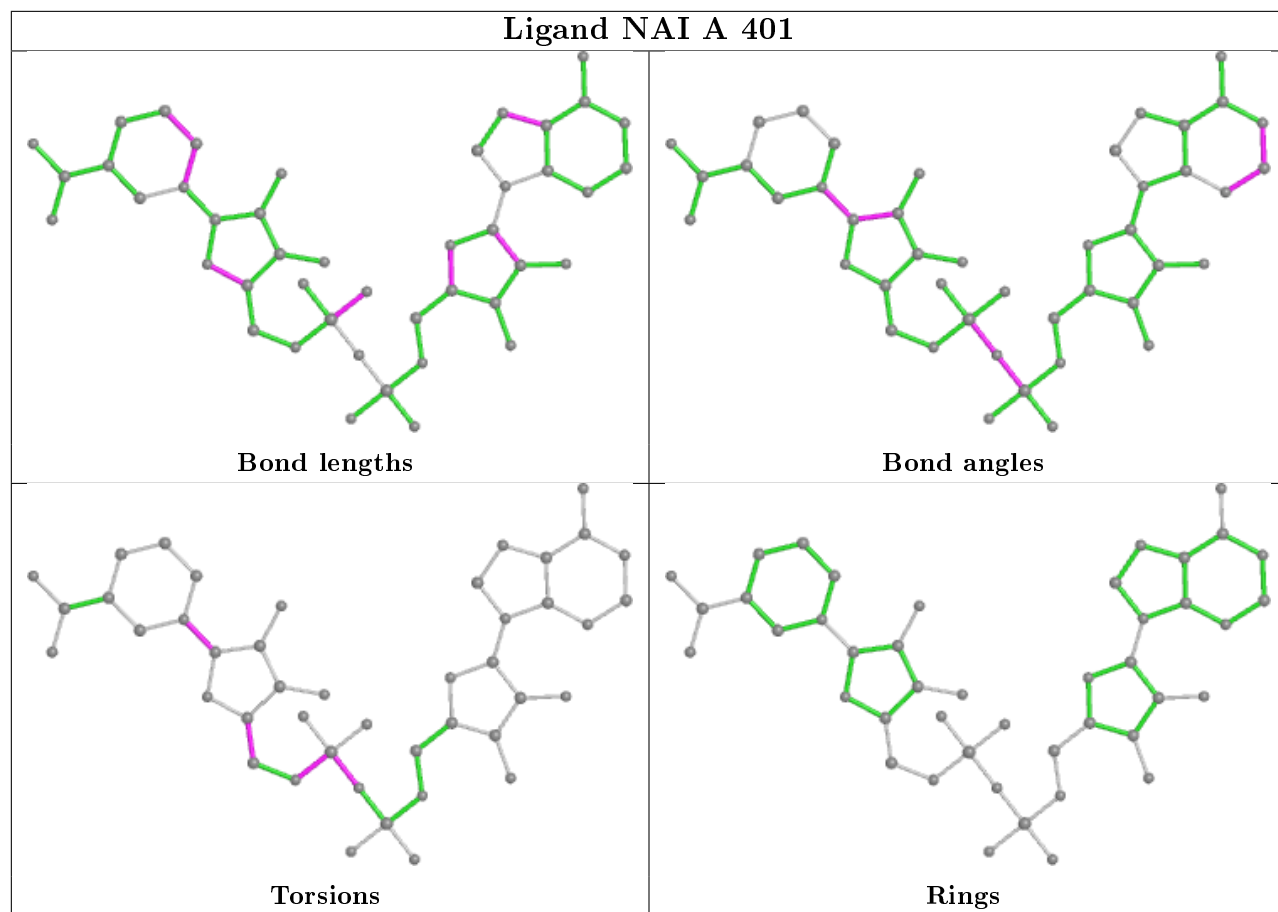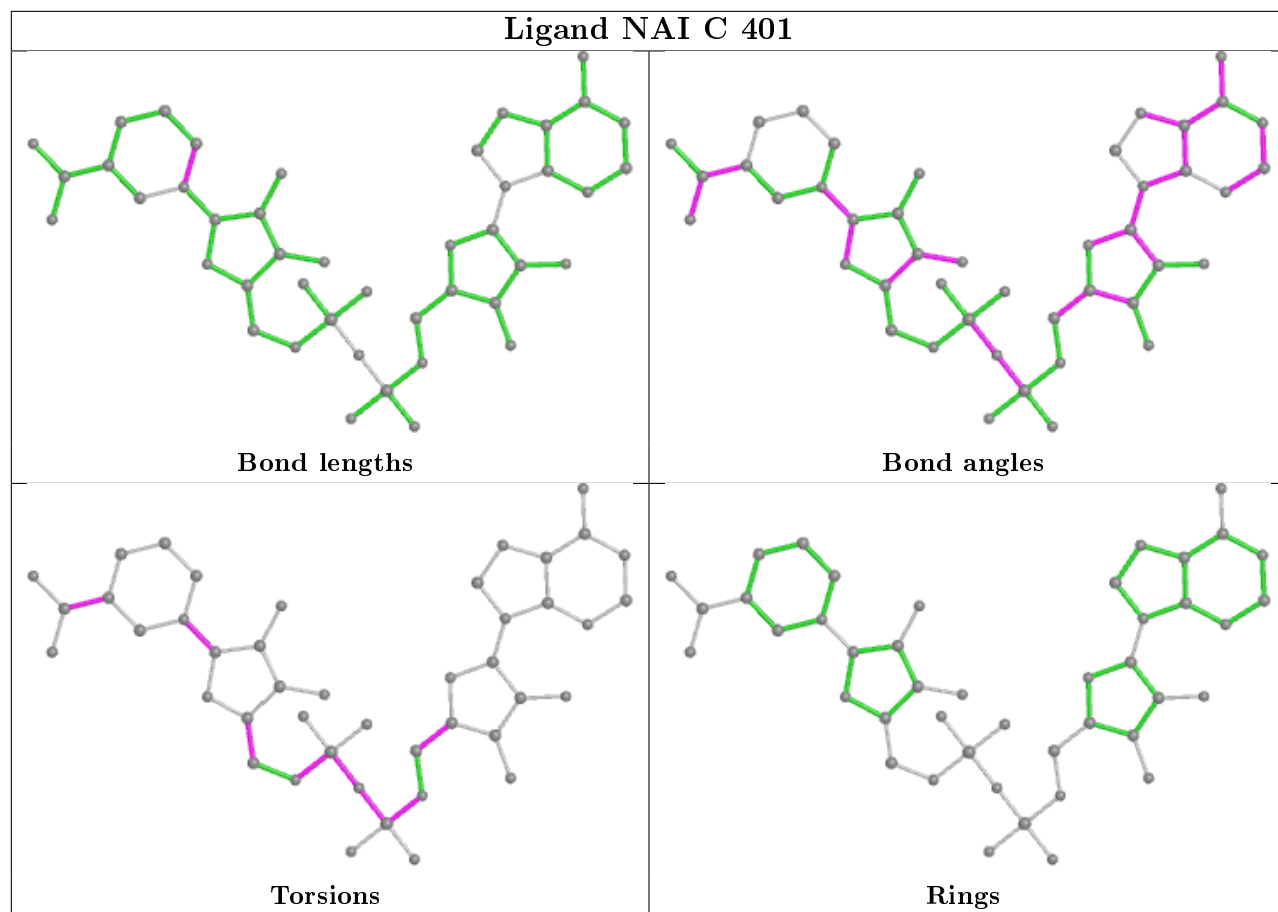
5.7 Other polymers (i)

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(Å²)	Q<0.9
1	A	335/341 (98%)	-0.25	4 (1%)	79	78	30, 48, 77, 121	0
1	C	325/341 (95%)	-0.23	7 (2%)	62	60	30, 63, 105, 133	0
1	E	318/341 (93%)	-0.13	5 (1%)	72	70	28, 79, 121, 132	0
1	G	320/341 (93%)	-0.07	6 (1%)	66	65	33, 81, 116, 139	0
2	B	338/356 (94%)	-0.25	0	100	100	28, 47, 67, 87	0
2	D	338/356 (94%)	-0.22	0	100	100	27, 51, 81, 111	0
2	F	338/356 (94%)	-0.30	0	100	100	29, 53, 83, 94	0
2	H	338/356 (94%)	-0.34	1 (0%)	94	94	27, 50, 77, 89	0
All	All	2650/2788 (95%)	-0.22	23 (0%)	84	84	27, 56, 107, 139	0

The worst 5 of 23 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	G	230	ASP	4.0
1	A	47	PRO	3.9
1	E	296	HIS	3.8
1	C	48	GLY	3.8
1	G	55	SER	3.6

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

There are no non-standard protein/DNA/RNA residues in this entry.
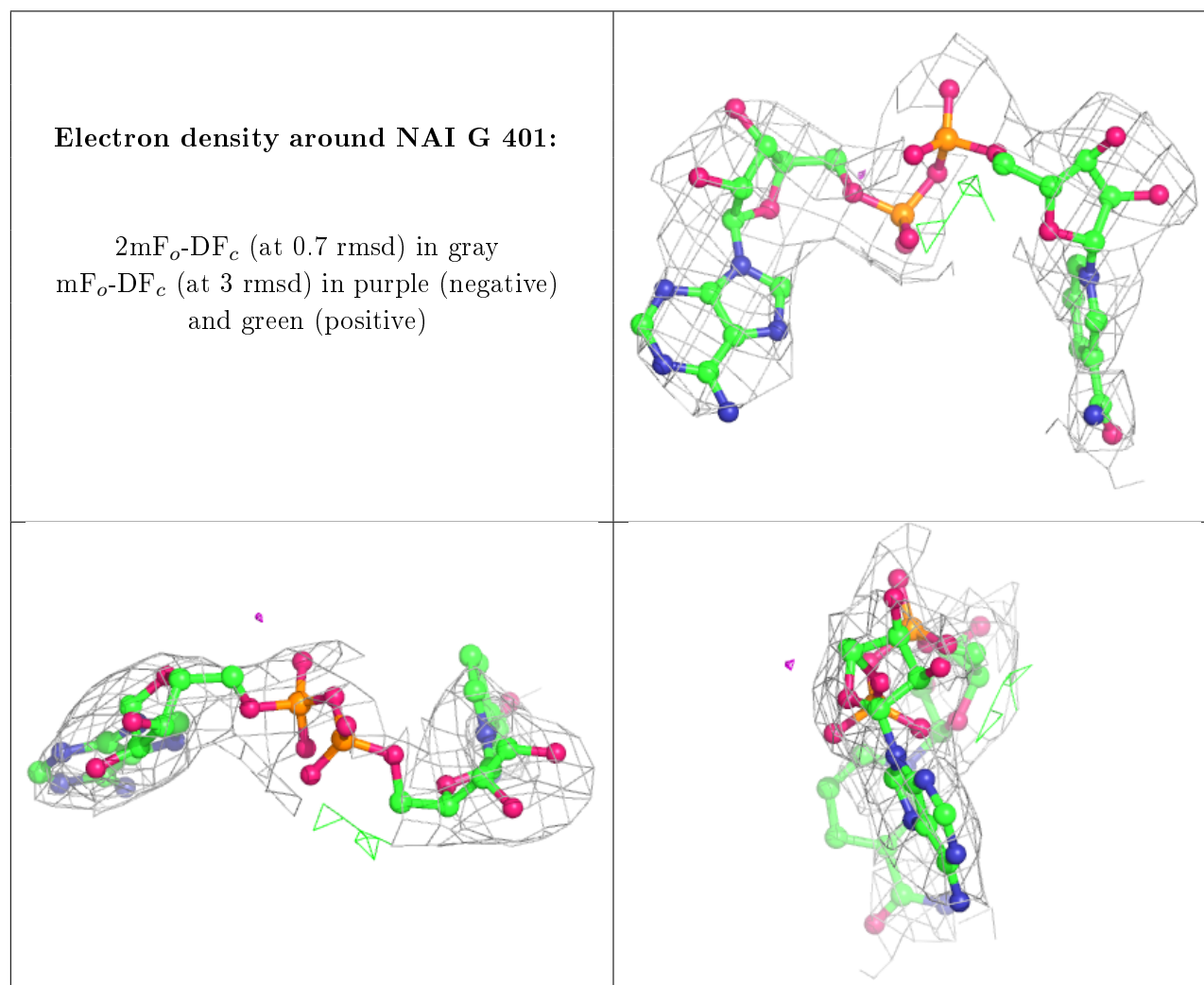
6.3 Carbohydrates (i)

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
3	NAI	G	401	44/44	0.88	0.20	98,98,98,98	0
3	NAI	C	401	44/44	0.89	0.20	70,70,70,70	0
3	NAI	E	401	44/44	0.90	0.15	91,91,91,91	0
3	NAI	A	401	44/44	0.93	0.18	56,56,56,56	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.
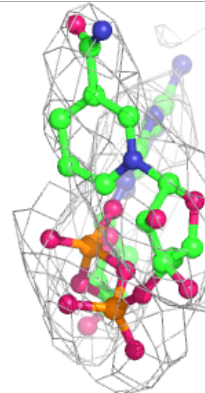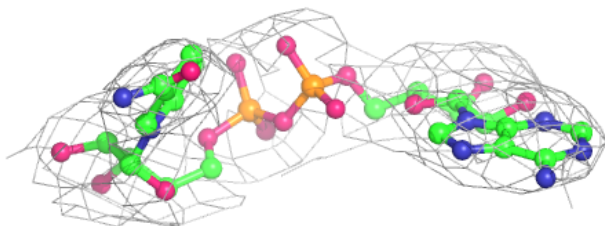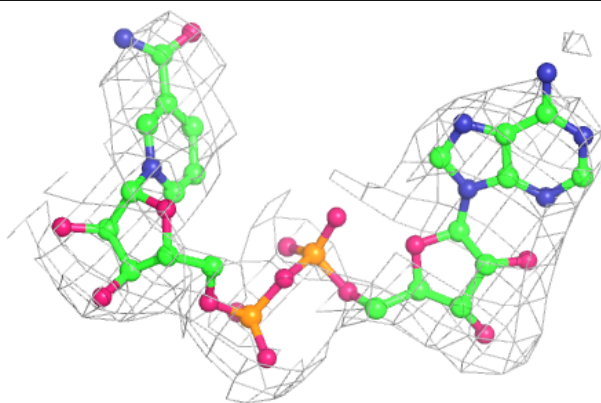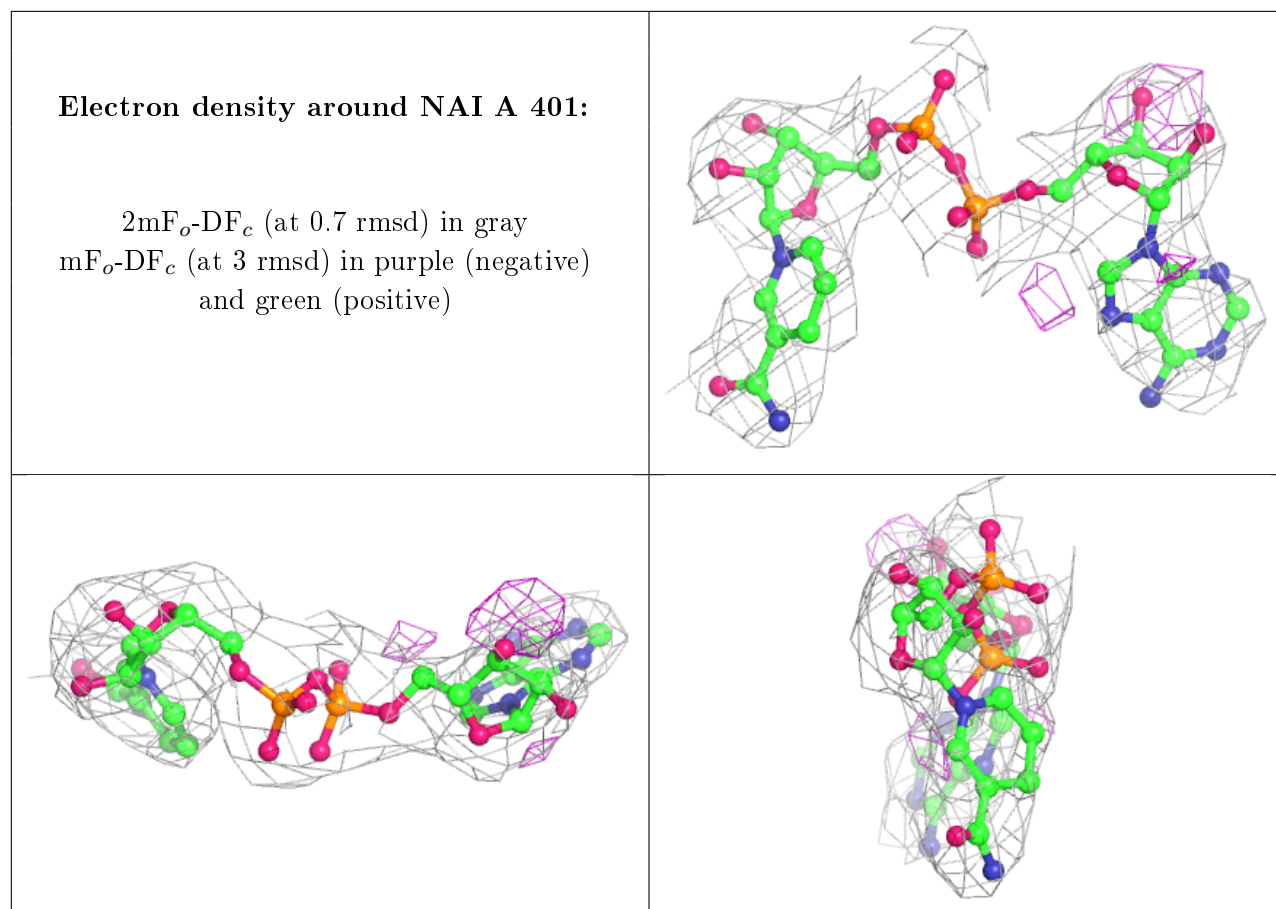
Electron density around NAI G 401:

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

Electron density around NAI C 401:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
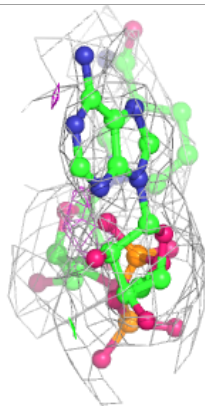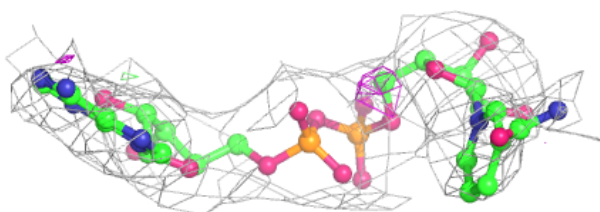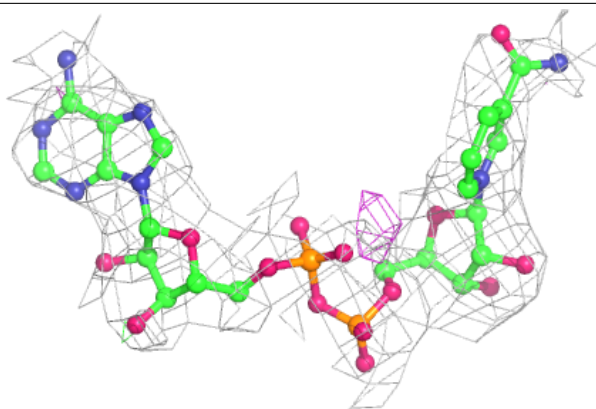
Electron density around NAI E 401:

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

Electron density around NAI 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.