



Full wwPDB X-ray Structure Validation Report ⓘ

Jun 27, 2024 – 06:21 PM EDT

PDB ID : 8VRE
Title : Structure of PYCR1 complexed with NADH and N-formyl-L-proline
Authors : Tanner, J.J.; Meeks, K.R.
Deposited on : 2024-01-21
Resolution : 1.83 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 : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.37.1
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) : 2.37.1

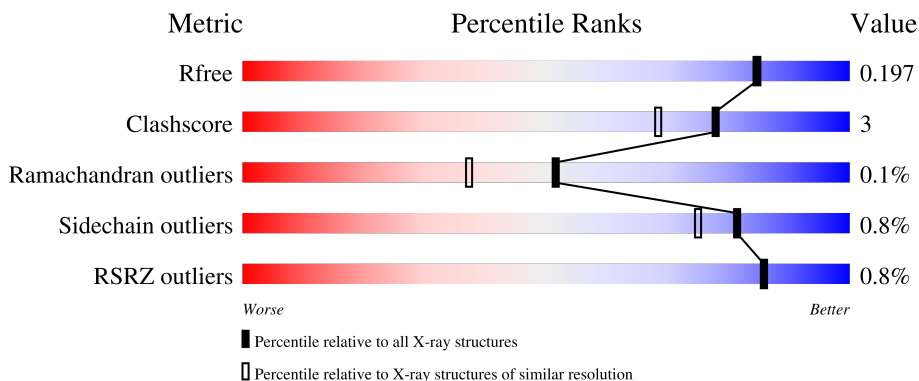
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.83 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}	130704	4003 (1.86-1.82)
Clashscore	141614	4233 (1.86-1.82)
Ramachandran outliers	138981	4185 (1.86-1.82)
Sidechain outliers	138945	4186 (1.86-1.82)
RSRZ outliers	127900	3957 (1.86-1.82)

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	316	 82% 6% 12%
1	B	316	 83% 5% 12%
1	C	316	 77% 9% 13%
1	D	316	 81% 7% 13%
1	E	316	 81% 6% 13%

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 10695 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 Pyrroline-5-carboxylate reductase 1, mitochondrial.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	278	2006	1269	351	372	14	0	4	0
1	B	278	1995	1258	352	373	12	0	1	0
1	C	276	1950	1227	346	365	12	0	1	0
1	D	276	1952	1232	343	365	12	0	3	0
1	E	276	1958	1233	346	365	14	0	2	0

There are 110 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-21	MET	-	initiating methionine	UNP P32322
A	-20	HIS	-	expression tag	UNP P32322
A	-19	HIS	-	expression tag	UNP P32322
A	-18	HIS	-	expression tag	UNP P32322
A	-17	HIS	-	expression tag	UNP P32322
A	-16	HIS	-	expression tag	UNP P32322
A	-15	HIS	-	expression tag	UNP P32322
A	-14	SER	-	expression tag	UNP P32322
A	-13	SER	-	expression tag	UNP P32322
A	-12	GLY	-	expression tag	UNP P32322
A	-11	VAL	-	expression tag	UNP P32322
A	-10	ASP	-	expression tag	UNP P32322
A	-9	LEU	-	expression tag	UNP P32322
A	-8	GLY	-	expression tag	UNP P32322
A	-7	THR	-	expression tag	UNP P32322
A	-6	GLU	-	expression tag	UNP P32322
A	-5	ASN	-	expression tag	UNP P32322
A	-4	LEU	-	expression tag	UNP P32322
A	-3	TYR	-	expression tag	UNP P32322

Continued on next page...

Continued from previous page...

Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	PHE	-	expression tag	UNP P32322
A	-1	GLN	-	expression tag	UNP P32322
A	0	SER	-	expression tag	UNP P32322
B	-21	MET	-	initiating methionine	UNP P32322
B	-20	HIS	-	expression tag	UNP P32322
B	-19	HIS	-	expression tag	UNP P32322
B	-18	HIS	-	expression tag	UNP P32322
B	-17	HIS	-	expression tag	UNP P32322
B	-16	HIS	-	expression tag	UNP P32322
B	-15	HIS	-	expression tag	UNP P32322
B	-14	SER	-	expression tag	UNP P32322
B	-13	SER	-	expression tag	UNP P32322
B	-12	GLY	-	expression tag	UNP P32322
B	-11	VAL	-	expression tag	UNP P32322
B	-10	ASP	-	expression tag	UNP P32322
B	-9	LEU	-	expression tag	UNP P32322
B	-8	GLY	-	expression tag	UNP P32322
B	-7	THR	-	expression tag	UNP P32322
B	-6	GLU	-	expression tag	UNP P32322
B	-5	ASN	-	expression tag	UNP P32322
B	-4	LEU	-	expression tag	UNP P32322
B	-3	TYR	-	expression tag	UNP P32322
B	-2	PHE	-	expression tag	UNP P32322
B	-1	GLN	-	expression tag	UNP P32322
B	0	SER	-	expression tag	UNP P32322
C	-21	MET	-	initiating methionine	UNP P32322
C	-20	HIS	-	expression tag	UNP P32322
C	-19	HIS	-	expression tag	UNP P32322
C	-18	HIS	-	expression tag	UNP P32322
C	-17	HIS	-	expression tag	UNP P32322
C	-16	HIS	-	expression tag	UNP P32322
C	-15	HIS	-	expression tag	UNP P32322
C	-14	SER	-	expression tag	UNP P32322
C	-13	SER	-	expression tag	UNP P32322
C	-12	GLY	-	expression tag	UNP P32322
C	-11	VAL	-	expression tag	UNP P32322
C	-10	ASP	-	expression tag	UNP P32322
C	-9	LEU	-	expression tag	UNP P32322
C	-8	GLY	-	expression tag	UNP P32322
C	-7	THR	-	expression tag	UNP P32322
C	-6	GLU	-	expression tag	UNP P32322
C	-5	ASN	-	expression tag	UNP P32322

Continued on next page...

Continued from previous page...

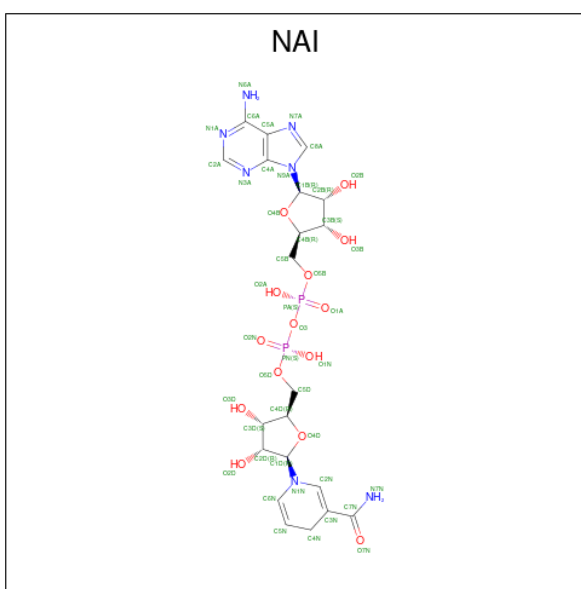
Chain	Residue	Modelled	Actual	Comment	Reference
C	-4	LEU	-	expression tag	UNP P32322
C	-3	TYR	-	expression tag	UNP P32322
C	-2	PHE	-	expression tag	UNP P32322
C	-1	GLN	-	expression tag	UNP P32322
C	0	SER	-	expression tag	UNP P32322
D	-21	MET	-	initiating methionine	UNP P32322
D	-20	HIS	-	expression tag	UNP P32322
D	-19	HIS	-	expression tag	UNP P32322
D	-18	HIS	-	expression tag	UNP P32322
D	-17	HIS	-	expression tag	UNP P32322
D	-16	HIS	-	expression tag	UNP P32322
D	-15	HIS	-	expression tag	UNP P32322
D	-14	SER	-	expression tag	UNP P32322
D	-13	SER	-	expression tag	UNP P32322
D	-12	GLY	-	expression tag	UNP P32322
D	-11	VAL	-	expression tag	UNP P32322
D	-10	ASP	-	expression tag	UNP P32322
D	-9	LEU	-	expression tag	UNP P32322
D	-8	GLY	-	expression tag	UNP P32322
D	-7	THR	-	expression tag	UNP P32322
D	-6	GLU	-	expression tag	UNP P32322
D	-5	ASN	-	expression tag	UNP P32322
D	-4	LEU	-	expression tag	UNP P32322
D	-3	TYR	-	expression tag	UNP P32322
D	-2	PHE	-	expression tag	UNP P32322
D	-1	GLN	-	expression tag	UNP P32322
D	0	SER	-	expression tag	UNP P32322
E	-21	MET	-	initiating methionine	UNP P32322
E	-20	HIS	-	expression tag	UNP P32322
E	-19	HIS	-	expression tag	UNP P32322
E	-18	HIS	-	expression tag	UNP P32322
E	-17	HIS	-	expression tag	UNP P32322
E	-16	HIS	-	expression tag	UNP P32322
E	-15	HIS	-	expression tag	UNP P32322
E	-14	SER	-	expression tag	UNP P32322
E	-13	SER	-	expression tag	UNP P32322
E	-12	GLY	-	expression tag	UNP P32322
E	-11	VAL	-	expression tag	UNP P32322
E	-10	ASP	-	expression tag	UNP P32322
E	-9	LEU	-	expression tag	UNP P32322
E	-8	GLY	-	expression tag	UNP P32322
E	-7	THR	-	expression tag	UNP P32322

Continued on next page...

Continued from previous page...

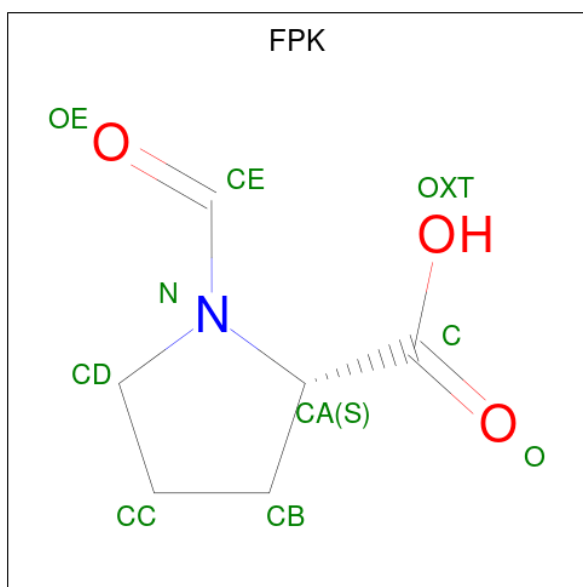
Chain	Residue	Modelled	Actual	Comment	Reference
E	-6	GLU	-	expression tag	UNP P32322
E	-5	ASN	-	expression tag	UNP P32322
E	-4	LEU	-	expression tag	UNP P32322
E	-3	TYR	-	expression tag	UNP P32322
E	-2	PHE	-	expression tag	UNP P32322
E	-1	GLN	-	expression tag	UNP P32322
E	0	SER	-	expression tag	UNP P32322

- Molecule 2 is 1,4-DIHYDRONICOTINAMIDE ADENINE DINUCLEOTIDE (three-letter code: NAI) (formula: C₂₁H₂₉N₇O₁₄P₂) (labeled as "Ligand of Interest" by depositor).



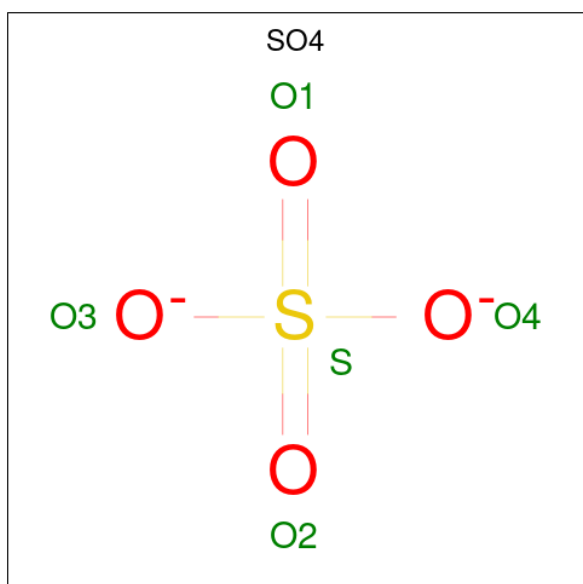
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
			Total	C	N	O			P
2	A	1	Total	C	N	O	P	0	0
			44	21	7	14	2		
2	B	1	Total	C	N	O	P	0	0
			44	21	7	14	2		
2	C	1	Total	C	N	O	P	0	0
			44	21	7	14	2		
2	D	1	Total	C	N	O	P	0	0
			44	21	7	14	2		
2	E	1	Total	C	N	O	P	0	0
			44	21	7	14	2		

- Molecule 3 is 1-formyl-L-proline (three-letter code: FPK) (formula: C₆H₉NO₃) (labeled as "Ligand of Interest" by depositor).



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

- Molecule 4 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



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

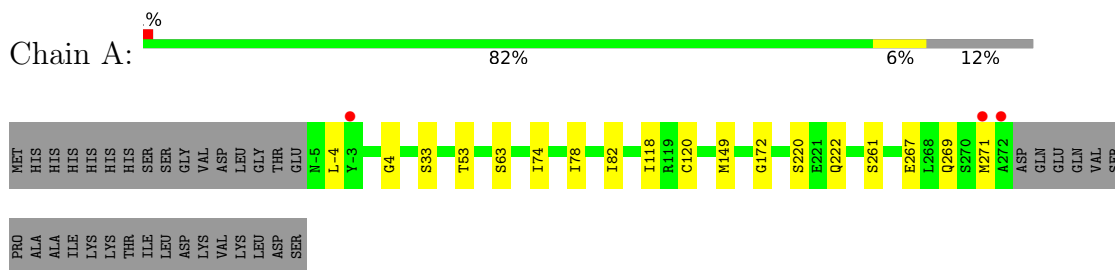
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	139	Total	O	0	0
			139	139		
5	B	115	Total	O	0	0
			115	115		
5	C	101	Total	O	0	0
			101	101		
5	D	92	Total	O	0	0
			92	92		
5	E	107	Total	O	0	0
			107	107		

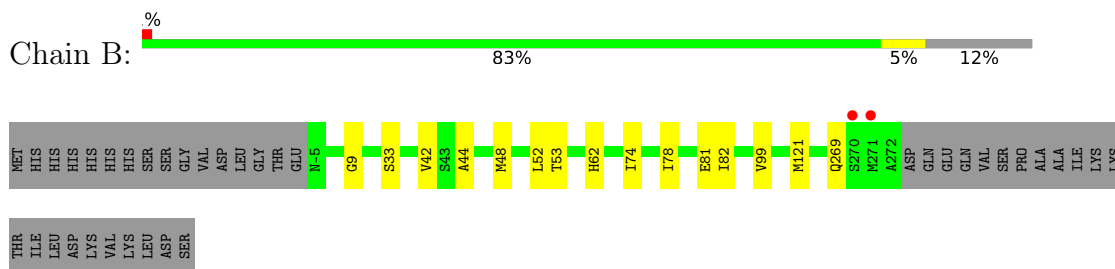
3 Residue-property plots [i](#)

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.

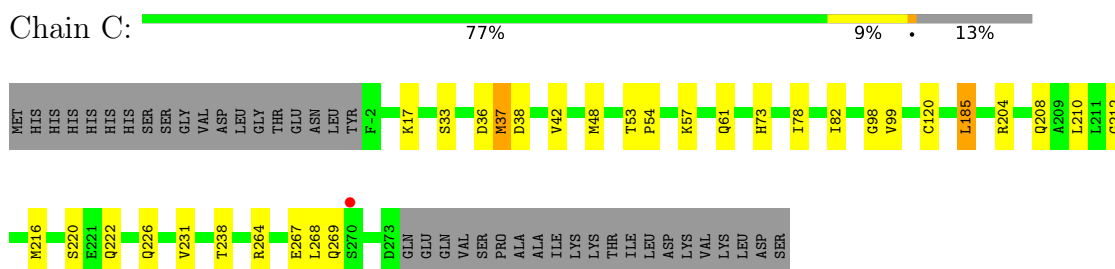
- Molecule 1: Pyrroline-5-carboxylate reductase 1, mitochondrial



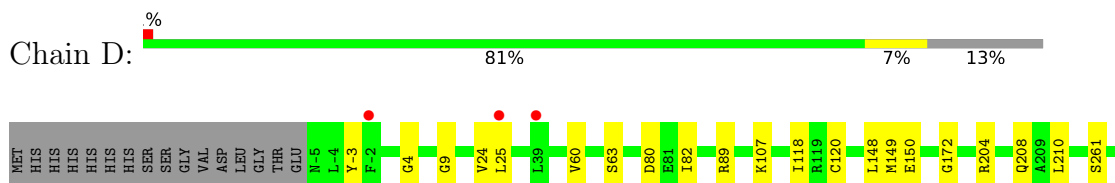
- Molecule 1: Pyrroline-5-carboxylate reductase 1, mitochondrial



- Molecule 1: Pyrroline-5-carboxylate reductase 1, mitochondrial

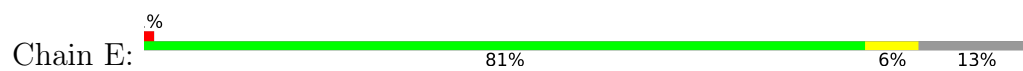


- Molecule 1: Pyrroline-5-carboxylate reductase 1, mitochondrial



S270
 MET
 ALA
 ASP
 GLN
 GLU
 GLN
 VAL
 SER
 SER
 PRO
 ALA
 ALA
 ILE
 LYS
 THR
 THR
 ILE
 LEU
 LEU
 ASP
 LYS
 VAL
 VAL
 LYS
 LEU
 ASP
 SER

- Molecule 1: Pyrroline-5-carboxylate reductase 1, mitochondrial



MET
 HIS
 HIS
 HIS
 HIS
 HIS
 HIS
 SER
 SER
 SER
 GLY
 VAL
 VAL
 ASP
 LEU
 LEU
 GLY
 THR
 GLU
 ASN
 LEU
 LEU
 TYR
 F-2
 Y3
 C4
 F13
 L25
 M31
 A32
 S33
 V42
 L45
 R46
 L52
 T53
 H62
 S63
 I118
 T133
 M149
 L153
 G172
 S261
 W271
 A272
 D273
 GLN
 GLU

GLN
 VAL
 SER
 PRO
 ALA
 ALA
 ILE
 LYS
 LYS
 THR
 ILE
 LEU
 ASP
 LYS
 VAL
 THR
 LYS
 LEU
 ASP
 SER

4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	110.53Å 179.29Å 88.36Å 90.00° 106.80° 90.00°	Depositor
Resolution (Å)	71.50 – 1.83 91.13 – 1.83	Depositor EDS
% Data completeness (in resolution range)	93.5 (71.50-1.83) 98.2 (91.13-1.83)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.73 (at 1.83Å)	Xtrriage
Refinement program	PHENIX (1.20.1_4487: ???)	Depositor
R, R_{free}	0.175 , 0.202 0.171 , 0.197	Depositor DCC
R_{free} test set	6944 reflections (4.90%)	wwPDB-VP
Wilson B-factor (Å ²)	30.7	Xtrriage
Anisotropy	0.227	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 45.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	10695	wwPDB-VP
Average B, all atoms (Å ²)	37.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.50% 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, FPK

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	0.40	0/2049	0.61	0/2782
1	B	0.39	0/2031	0.61	1/2762 (0.0%)
1	C	0.38	0/1983	0.62	1/2699 (0.0%)
1	D	0.38	0/1992	0.58	0/2714
1	E	0.39	0/1994	0.61	0/2713
All	All	0.39	0/10049	0.61	2/13670 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	185	LEU	CB-CG-CD2	-6.61	99.77	111.00
1	B	121	MET	CG-SD-CE	5.76	109.41	100.20

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	2006	0	2028	10	0
1	B	1995	0	1976	8	0
1	C	1950	0	1930	20	0
1	D	1952	0	1913	11	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	E	1958	0	1945	10	0
2	A	44	0	27	0	0
2	B	44	0	27	1	0
2	C	44	0	27	0	0
2	D	44	0	27	1	0
2	E	44	0	27	0	0
3	A	10	0	8	0	0
3	B	10	0	8	0	0
3	C	10	0	8	0	0
3	D	10	0	8	0	0
3	E	10	0	8	0	0
4	A	5	0	0	0	0
4	B	5	0	0	0	0
5	A	139	0	0	0	0
5	B	115	0	0	0	0
5	C	101	0	0	2	0
5	D	92	0	0	0	0
5	E	107	0	0	0	0
All	All	10695	0	9967	58	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 3.

All (58) 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:E:42:VAL:HG13	1:E:52:LEU:HD22	1.69	0.73
1:C:17:LYS:HA	1:C:48:MET:HE3	1.78	0.64
1:C:99:VAL:HA	1:C:269:GLN:HG3	1.81	0.62
1:D:-3:TYR:HB3	1:D:148:LEU:HD13	1.81	0.62
1:D:63:SER:O	1:D:89:ARG:NH2	2.33	0.61
1:C:185:LEU:HD21	1:C:210:LEU:HD12	1.84	0.59
1:C:37:MET:HE1	1:C:54:PRO:HD3	1.85	0.59
1:A:118:ILE:HD12	1:A:149[B]:MET:HG2	1.85	0.58
1:C:220:SER:OG	1:C:222:GLN:HG3	2.06	0.56
1:C:73:HIS:ND1	5:C:502:HOH:O	2.33	0.56
1:B:99:VAL:HA	1:B:269:GLN:NE2	2.21	0.56
1:C:210:LEU:HB3	1:D:210:LEU:HD11	1.89	0.53
1:B:42:VAL:HG13	1:B:52:LEU:HD22	1.90	0.53
1:C:212:GLY:O	1:C:216:MET:HG3	2.09	0.53
1:C:264:ARG:HA	1:C:267:GLU:HG2	1.91	0.53

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:3:VAL:HG21	1:E:25:LEU:HD11	1.92	0.52
1:C:57:LYS:O	1:C:61:GLN:HG3	2.11	0.50
1:A:220:SER:OG	1:A:222:GLN:HG3	2.11	0.50
1:B:78:ILE:O	1:B:82:ILE:HG13	2.11	0.50
1:D:24:VAL:HG23	1:D:25:LEU:HD12	1.93	0.49
1:C:37:MET:HG3	1:C:42:VAL:HG11	1.93	0.49
1:A:78:ILE:O	1:A:82:ILE:HG13	2.13	0.49
1:C:226:GLN:NE2	5:C:501:HOH:O	2.22	0.49
1:B:74:ILE:HG22	1:B:78:ILE:HG12	1.96	0.48
1:D:4:GLY:HA3	1:D:63:SER:OG	2.15	0.47
1:C:33:SER:HA	1:C:53:THR:O	2.14	0.47
1:B:44:ALA:O	1:B:48:MET:HG3	2.13	0.47
1:D:9:GLY:HA3	2:D:401:NAI:O5B	2.15	0.46
1:A:267:GLU:O	1:A:271:MET:HG3	2.15	0.46
1:A:220:SER:HG	1:A:222:GLN:HG3	1.81	0.46
1:C:78:ILE:O	1:C:82:ILE:HG13	2.17	0.45
1:A:4:GLY:HA3	1:A:63[A]:SER:OG	2.16	0.44
1:C:204:ARG:HH12	1:C:208:GLN:HB2	1.82	0.44
1:E:31:MET:HE3	1:E:62:HIS:HB3	1.98	0.44
1:B:9:GLY:HA3	2:B:401:NAI:O5B	2.18	0.44
1:D:118:ILE:HD13	1:D:149[B]:MET:HG2	2.00	0.43
1:D:80:ASP:OD2	1:D:107:LYS:HE3	2.19	0.43
1:B:81:GLU:HG2	1:B:82:ILE:HG23	2.00	0.42
1:D:60:VAL:HG21	1:D:82:ILE:HB	2.01	0.42
1:D:204:ARG:NH1	1:D:208:GLN:HB2	2.33	0.42
1:C:231:VAL:HG12	1:C:238:THR:HG21	2.00	0.42
1:C:185:LEU:HA	1:C:185:LEU:HD23	1.86	0.42
1:A:74:ILE:HG22	1:A:78:ILE:HG12	2.01	0.42
1:B:33:SER:HA	1:B:53:THR:O	2.20	0.41
1:E:31:MET:HE3	1:E:62:HIS:CB	2.50	0.41
1:C:98:GLY:O	1:C:269:GLN:HG3	2.21	0.41
1:D:172:GLY:HA2	1:D:261:SER:OG	2.21	0.41
1:E:133:THR:HG21	1:E:153:LEU:HG	2.02	0.41
1:A:269:GLN:HA	1:A:269:GLN:OE1	2.20	0.41
1:C:264:ARG:O	1:C:268:LEU:HD13	2.21	0.41
1:A:172:GLY:HA2	1:A:261:SER:OG	2.20	0.41
1:E:118:ILE:HD12	1:E:149[B]:MET:HG2	2.02	0.40
1:E:172:GLY:HA2	1:E:261:SER:OG	2.21	0.40
1:E:33:SER:HA	1:E:53:THR:O	2.22	0.40
1:C:36:ASP:C	1:C:38:ASP:H	2.23	0.40
1:E:4:GLY:HA3	1:E:63:SER:OG	2.22	0.40

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:33:SER:HA	1:A:53:THR:O	2.22	0.40
1:E:13:PHE:HA	1:E:45:LEU:HD21	2.03	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	280/316 (89%)	275 (98%)	5 (2%)	0	100	100
1	B	277/316 (88%)	270 (98%)	7 (2%)	0	100	100
1	C	275/316 (87%)	268 (98%)	6 (2%)	1 (0%)	34	20
1	D	277/316 (88%)	271 (98%)	6 (2%)	0	100	100
1	E	276/316 (87%)	271 (98%)	5 (2%)	0	100	100
All	All	1385/1580 (88%)	1355 (98%)	29 (2%)	1 (0%)	51	37

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	37	MET

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	205/251 (82%)	203 (99%)	2 (1%)	76	68
1	B	200/251 (80%)	199 (100%)	1 (0%)	88	85
1	C	193/251 (77%)	192 (100%)	1 (0%)	88	85
1	D	191/251 (76%)	189 (99%)	2 (1%)	76	68
1	E	195/251 (78%)	193 (99%)	2 (1%)	76	68
All	All	984/1255 (78%)	976 (99%)	8 (1%)	81	75

All (8) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	-4	LEU
1	A	120	CYS
1	B	62	HIS
1	C	120	CYS
1	D	120	CYS
1	D	150	GLU
1	E	46	ARG
1	E	62	HIS

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

Mol	Chain	Res	Type
1	B	269	GLN

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

12 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	FPK	B	402	-	10,10,10	1.08	1 (10%)	10,13,13	1.83	1 (10%)
2	NAI	D	401	-	42,48,48	1.35	7 (16%)	47,73,73	1.56	10 (21%)
3	FPK	D	402	-	10,10,10	1.16	1 (10%)	10,13,13	1.66	1 (10%)
3	FPK	A	402	-	10,10,10	1.18	1 (10%)	10,13,13	1.60	1 (10%)
2	NAI	A	401	-	42,48,48	1.21	4 (9%)	47,73,73	1.53	8 (17%)
2	NAI	C	401	-	42,48,48	1.33	6 (14%)	47,73,73	1.58	10 (21%)
4	SO4	A	403	-	4,4,4	0.17	0	6,6,6	0.10	0
2	NAI	E	401	-	42,48,48	1.18	3 (7%)	47,73,73	1.51	8 (17%)
3	FPK	C	402	-	10,10,10	1.21	1 (10%)	10,13,13	1.52	1 (10%)
2	NAI	B	401	-	42,48,48	1.21	5 (11%)	47,73,73	1.52	10 (21%)
4	SO4	B	403	-	4,4,4	0.20	0	6,6,6	0.11	0
3	FPK	E	402	-	10,10,10	1.22	1 (10%)	10,13,13	1.55	2 (20%)

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	FPK	B	402	-	-	0/5/16/16	0/1/1/1
2	NAI	D	401	-	-	5/25/72/72	0/5/5/5
3	FPK	D	402	-	-	0/5/16/16	0/1/1/1
3	FPK	A	402	-	-	0/5/16/16	0/1/1/1
2	NAI	A	401	-	-	3/25/72/72	0/5/5/5
2	NAI	C	401	-	-	4/25/72/72	0/5/5/5
2	NAI	E	401	-	-	4/25/72/72	0/5/5/5
3	FPK	C	402	-	-	0/5/16/16	0/1/1/1
2	NAI	B	401	-	-	4/25/72/72	0/5/5/5

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	FPK	E	402	-	-	0/5/16/16	0/1/1/1

All (30) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	401	NAI	PN-O5D	3.39	1.73	1.59
2	D	401	NAI	PN-O5D	3.37	1.72	1.59
2	E	401	NAI	PA-O5B	3.31	1.72	1.59
2	A	401	NAI	PA-O5B	3.28	1.72	1.59
2	C	401	NAI	PA-O5B	3.20	1.72	1.59
3	E	402	FPK	CA-C	3.12	1.58	1.52
2	E	401	NAI	PN-O5D	3.06	1.71	1.59
2	D	401	NAI	PA-O5B	2.98	1.71	1.59
2	B	401	NAI	PA-O5B	2.95	1.71	1.59
2	B	401	NAI	PN-O5D	2.70	1.70	1.59
3	C	402	FPK	CA-C	2.60	1.57	1.52
3	A	402	FPK	CA-C	2.52	1.57	1.52
3	D	402	FPK	CA-C	2.50	1.57	1.52
2	C	401	NAI	C2A-N3A	2.50	1.36	1.32
2	D	401	NAI	C2A-N3A	2.48	1.36	1.32
3	B	402	FPK	CA-C	2.44	1.57	1.52
2	C	401	NAI	C3D-C4D	2.36	1.59	1.53
2	A	401	NAI	PN-O5D	2.30	1.68	1.59
2	D	401	NAI	C2A-N1A	2.29	1.38	1.33
2	C	401	NAI	C7N-N7N	2.29	1.39	1.33
2	A	401	NAI	C7N-N7N	2.22	1.39	1.33
2	D	401	NAI	C7N-N7N	2.22	1.39	1.33
2	D	401	NAI	C4A-N3A	2.21	1.38	1.35
2	E	401	NAI	C3B-C4B	2.20	1.58	1.53
2	B	401	NAI	C3D-C4D	2.17	1.58	1.53
2	A	401	NAI	C2A-N3A	2.17	1.35	1.32
2	D	401	NAI	O5D-C5D	-2.09	1.36	1.44
2	C	401	NAI	O5D-C5D	-2.07	1.36	1.44
2	B	401	NAI	C7N-N7N	2.04	1.38	1.33
2	B	401	NAI	C2A-N3A	2.02	1.35	1.32

All (52) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	E	401	NAI	PN-O3-PA	-5.07	115.42	132.83
2	D	401	NAI	PN-O3-PA	-5.06	115.47	132.83
2	A	401	NAI	PN-O3-PA	-4.95	115.83	132.83

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	401	NAI	PN-O3-PA	-4.93	115.90	132.83
2	C	401	NAI	PN-O3-PA	-4.88	116.09	132.83
3	D	402	FPK	CB-CA-N	4.56	107.05	101.98
3	B	402	FPK	CB-CA-N	4.51	106.98	101.98
3	C	402	FPK	CB-CA-N	4.45	106.92	101.98
3	A	402	FPK	CB-CA-N	4.15	106.59	101.98
3	E	402	FPK	CB-CA-N	3.56	105.93	101.98
2	C	401	NAI	O4B-C1B-C2B	-3.25	102.17	106.93
2	C	401	NAI	O2A-PA-O1A	3.10	127.58	112.24
2	D	401	NAI	O2A-PA-O1A	3.05	127.33	112.24
2	E	401	NAI	O2A-PA-O1A	2.92	126.66	112.24
2	A	401	NAI	O2A-PA-O1A	2.89	126.50	112.24
2	B	401	NAI	O2A-PA-O1A	2.86	126.40	112.24
2	E	401	NAI	C1B-N9A-C4A	-2.82	121.68	126.64
2	A	401	NAI	C1B-N9A-C4A	-2.77	121.78	126.64
2	D	401	NAI	O4B-C1B-C2B	-2.73	102.93	106.93
2	D	401	NAI	O1N-PN-O2N	2.51	124.63	112.24
2	C	401	NAI	O7N-C7N-N7N	-2.49	117.06	122.88
2	D	401	NAI	O7N-C7N-N7N	-2.47	117.10	122.88
2	B	401	NAI	O4B-C1B-C2B	-2.47	103.32	106.93
2	D	401	NAI	O5B-PA-O1A	-2.40	99.70	109.07
3	E	402	FPK	C-CA-N	2.36	117.25	112.20
2	E	401	NAI	O7N-C7N-N7N	-2.34	117.40	122.88
2	D	401	NAI	PA-O5B-C5B	-2.32	108.07	121.68
2	A	401	NAI	O4B-C1B-C2B	-2.32	103.54	106.93
2	B	401	NAI	O1N-PN-O2N	2.30	123.59	112.24
2	A	401	NAI	O1N-PN-O2N	2.29	123.58	112.24
2	C	401	NAI	PA-O5B-C5B	-2.26	108.44	121.68
2	E	401	NAI	O1N-PN-O2N	2.25	123.34	112.24
2	A	401	NAI	C3B-C2B-C1B	-2.24	97.61	100.98
2	E	401	NAI	C5B-C4B-C3B	-2.22	106.85	115.18
2	D	401	NAI	C5B-C4B-C3B	-2.21	106.88	115.18
2	C	401	NAI	O1N-PN-O2N	2.21	123.17	112.24
2	B	401	NAI	C1B-N9A-C4A	-2.20	122.77	126.64
2	B	401	NAI	PA-O5B-C5B	-2.20	108.78	121.68
2	B	401	NAI	C5B-C4B-C3B	-2.19	106.98	115.18
2	E	401	NAI	PA-O5B-C5B	-2.16	109.01	121.68
2	C	401	NAI	C3B-C2B-C1B	-2.15	97.73	100.98
2	C	401	NAI	C5B-C4B-C3B	-2.14	107.16	115.18
2	B	401	NAI	C3N-C2N-N1N	-2.14	120.05	123.10
2	B	401	NAI	O7N-C7N-N7N	-2.13	117.89	122.88
2	C	401	NAI	O5D-PN-O2N	-2.13	100.75	109.07

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	401	NAI	C2A-N1A-C6A	-2.13	115.12	118.75
2	A	401	NAI	C5B-C4B-C3B	-2.12	107.22	115.18
2	B	401	NAI	C3B-C2B-C1B	-2.11	97.80	100.98
2	D	401	NAI	C1B-N9A-C4A	-2.09	122.96	126.64
2	E	401	NAI	O5D-PN-O2N	-2.05	101.08	109.07
2	D	401	NAI	O5D-PN-O2N	-2.04	101.11	109.07
2	A	401	NAI	O7N-C7N-N7N	-2.04	118.12	122.88

There are no chirality outliers.

All (20) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	401	NAI	O4D-C1D-N1N-C6N
2	C	401	NAI	O4D-C1D-N1N-C6N
2	D	401	NAI	O4D-C1D-N1N-C6N
2	B	401	NAI	O4D-C1D-N1N-C6N
2	E	401	NAI	O4D-C1D-N1N-C6N
2	D	401	NAI	C2D-C1D-N1N-C6N
2	D	401	NAI	O4D-C4D-C5D-O5D
2	B	401	NAI	C2D-C1D-N1N-C6N
2	C	401	NAI	C2D-C1D-N1N-C6N
2	E	401	NAI	C2D-C1D-N1N-C6N
2	C	401	NAI	O4B-C4B-C5B-O5B
2	A	401	NAI	PN-O3-PA-O2A
2	B	401	NAI	PN-O3-PA-O2A
2	C	401	NAI	PN-O3-PA-O2A
2	D	401	NAI	PN-O3-PA-O2A
2	E	401	NAI	PN-O3-PA-O2A
2	A	401	NAI	O4B-C4B-C5B-O5B
2	B	401	NAI	O4B-C4B-C5B-O5B
2	D	401	NAI	O4B-C4B-C5B-O5B
2	E	401	NAI	O4B-C4B-C5B-O5B

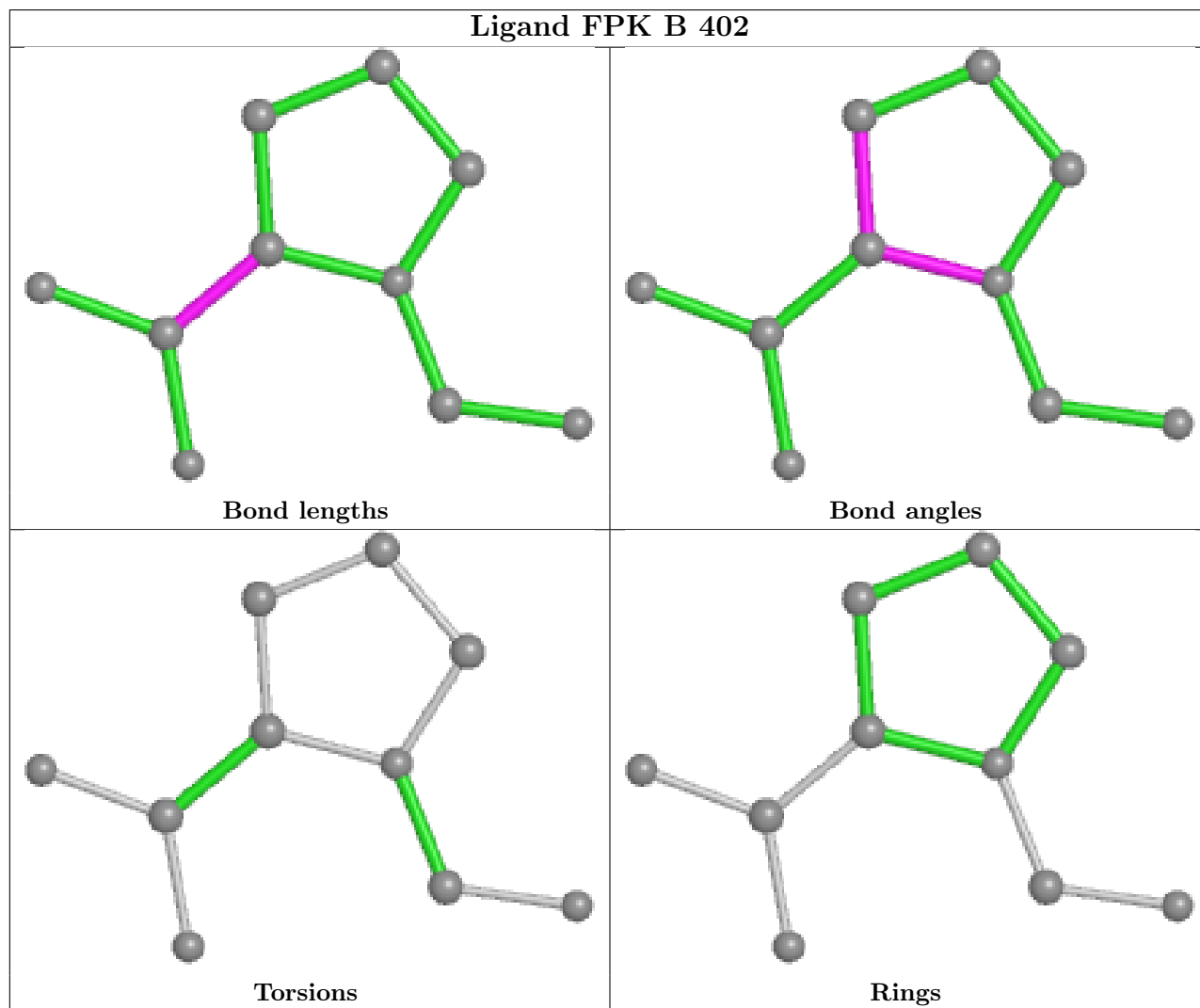
There are no ring outliers.

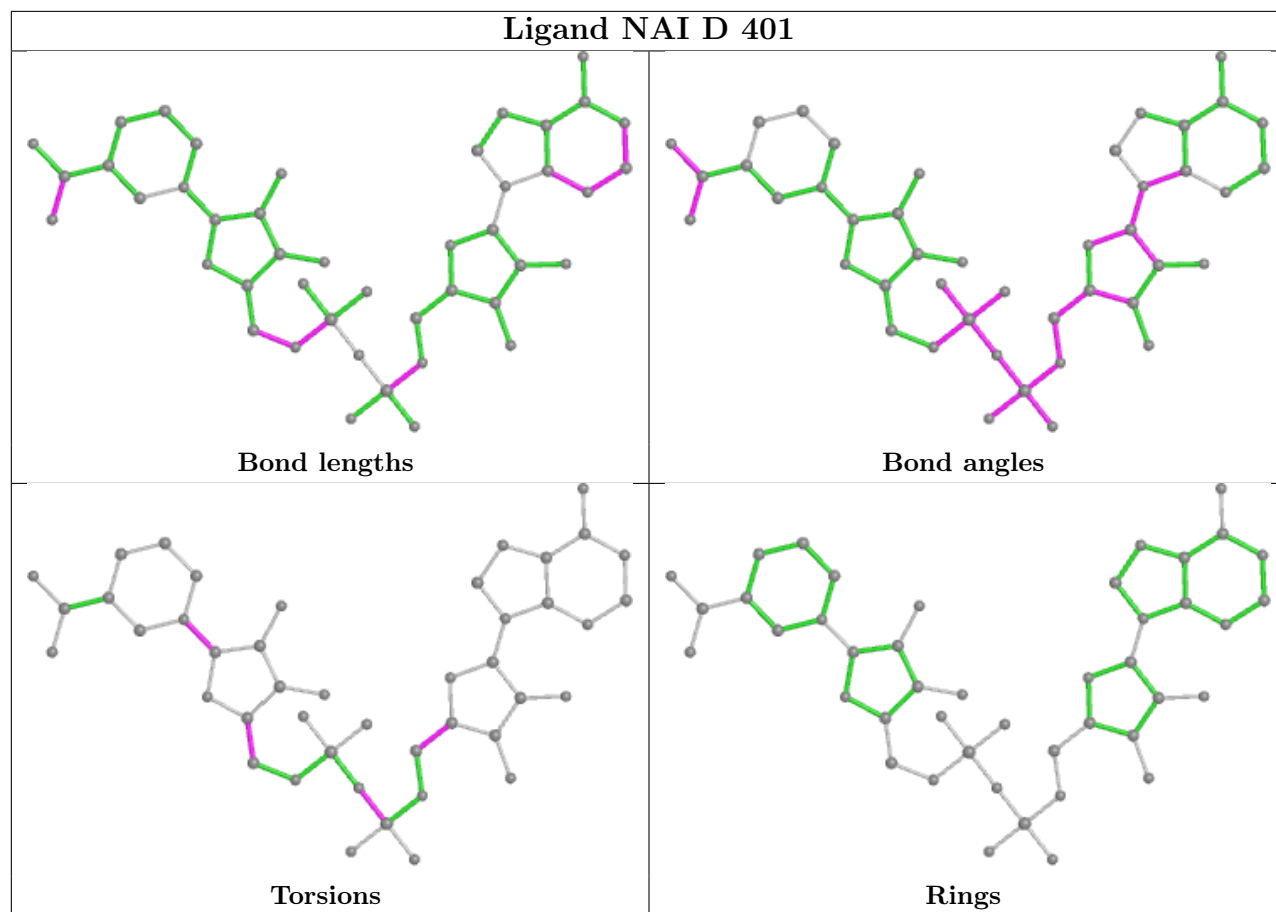
2 monomers are involved in 2 short contacts:

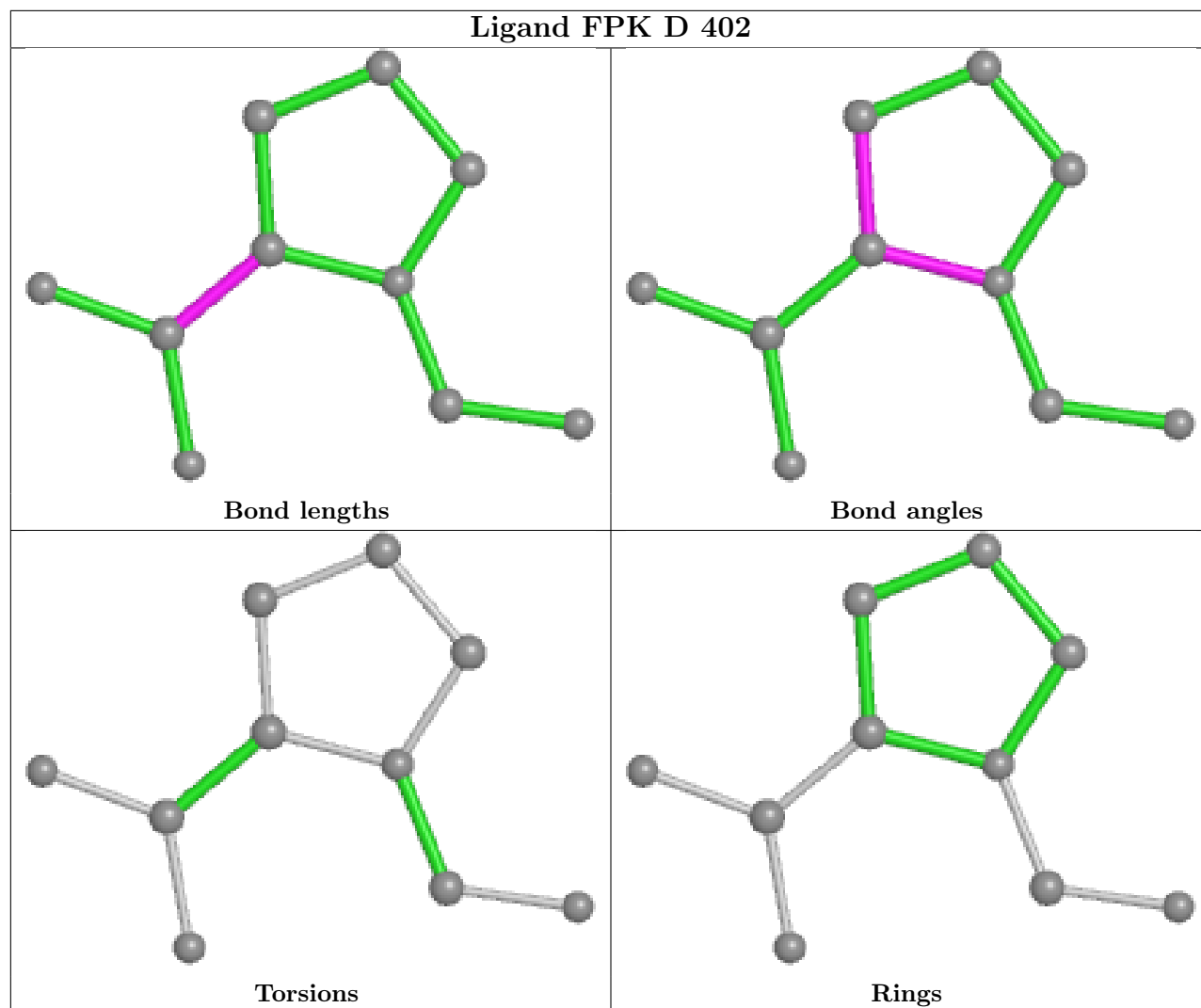
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	D	401	NAI	1	0
2	B	401	NAI	1	0

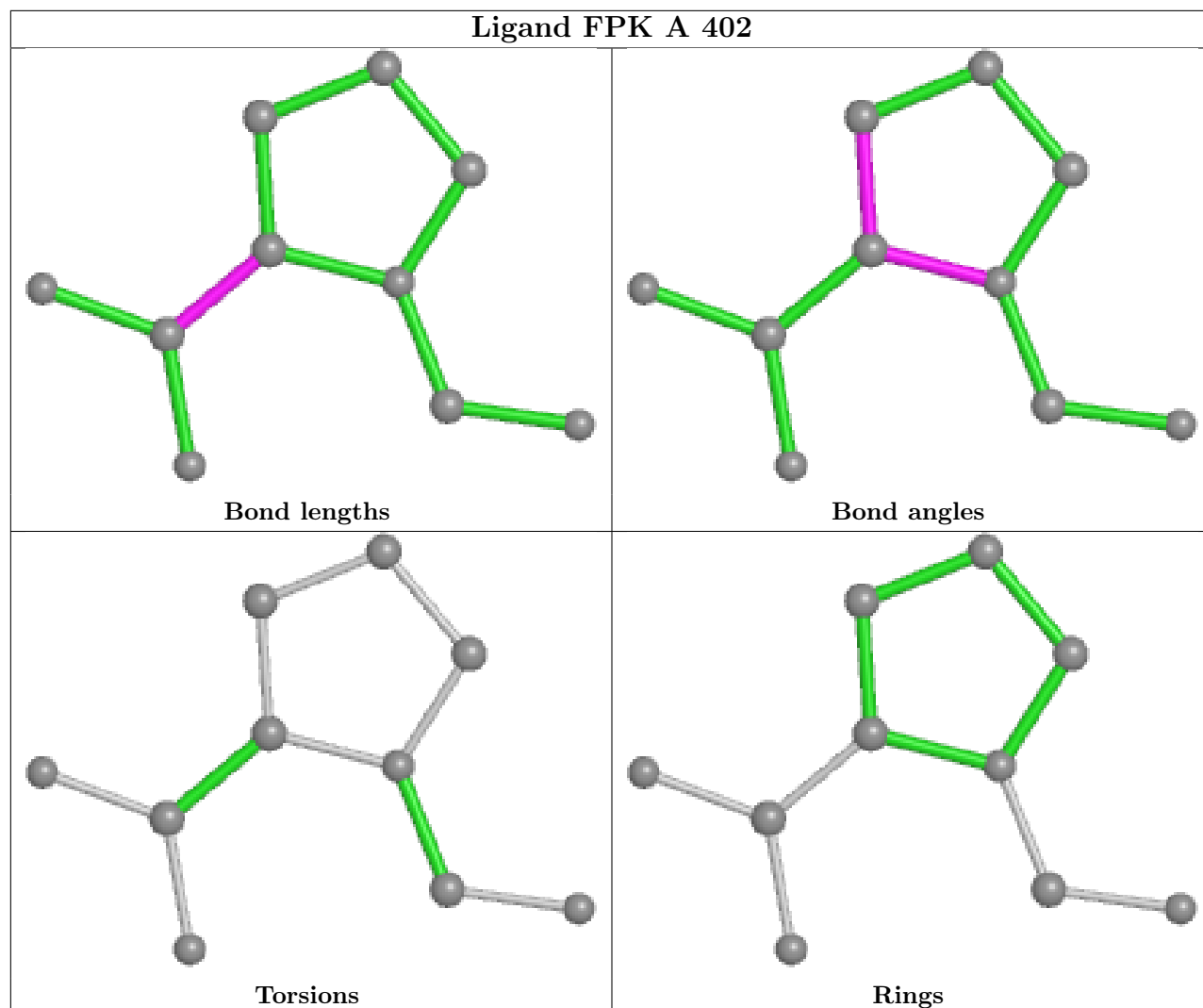
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths,

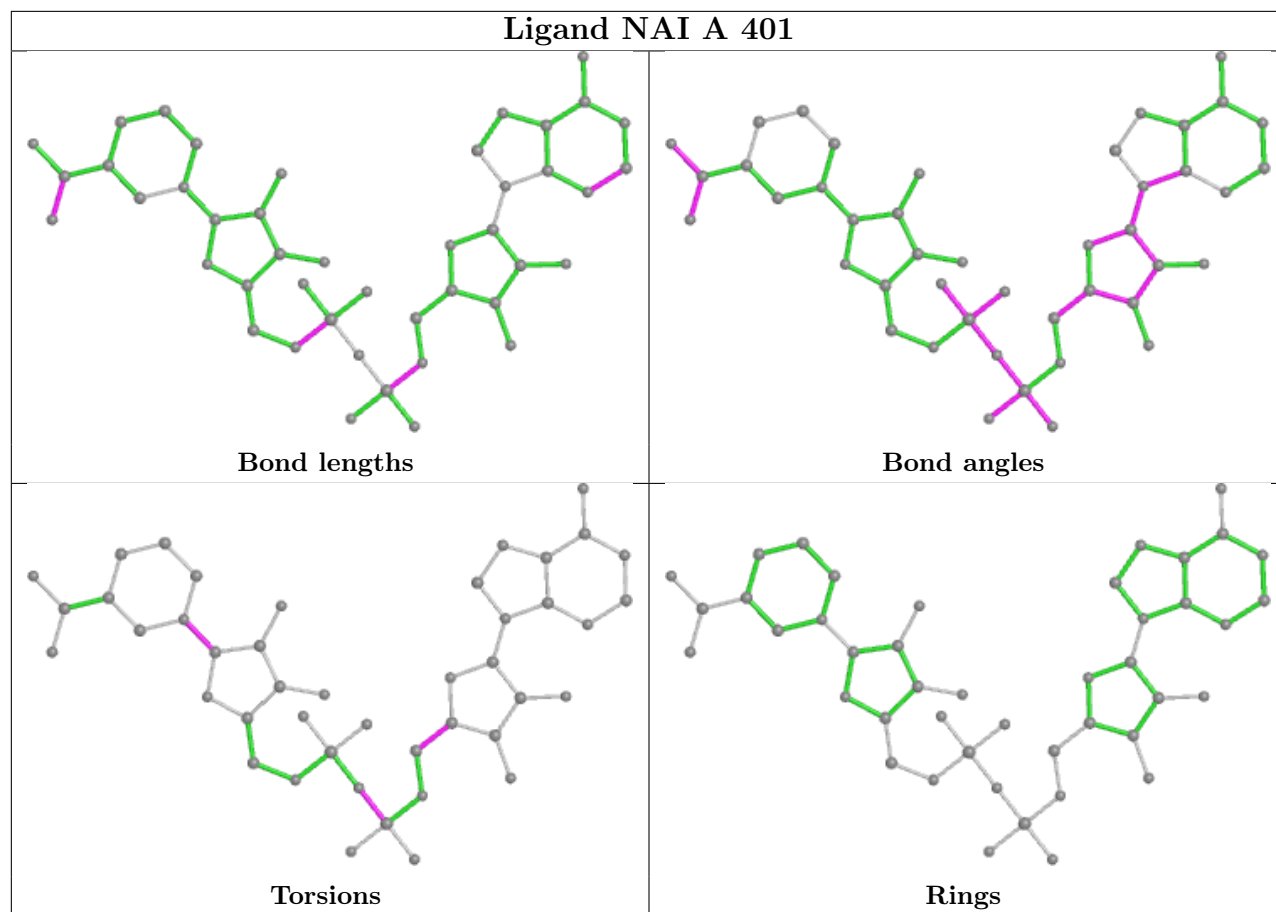
bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

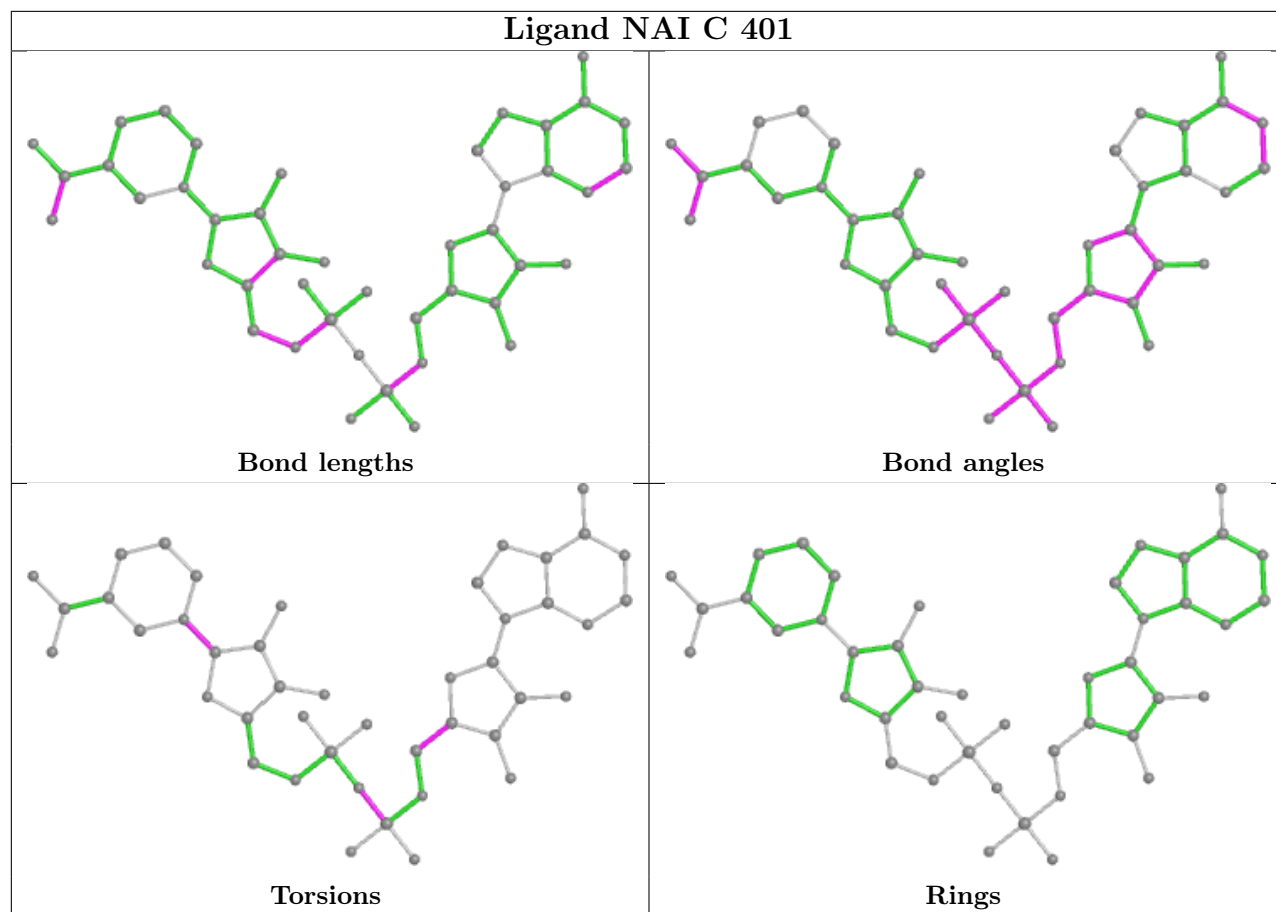


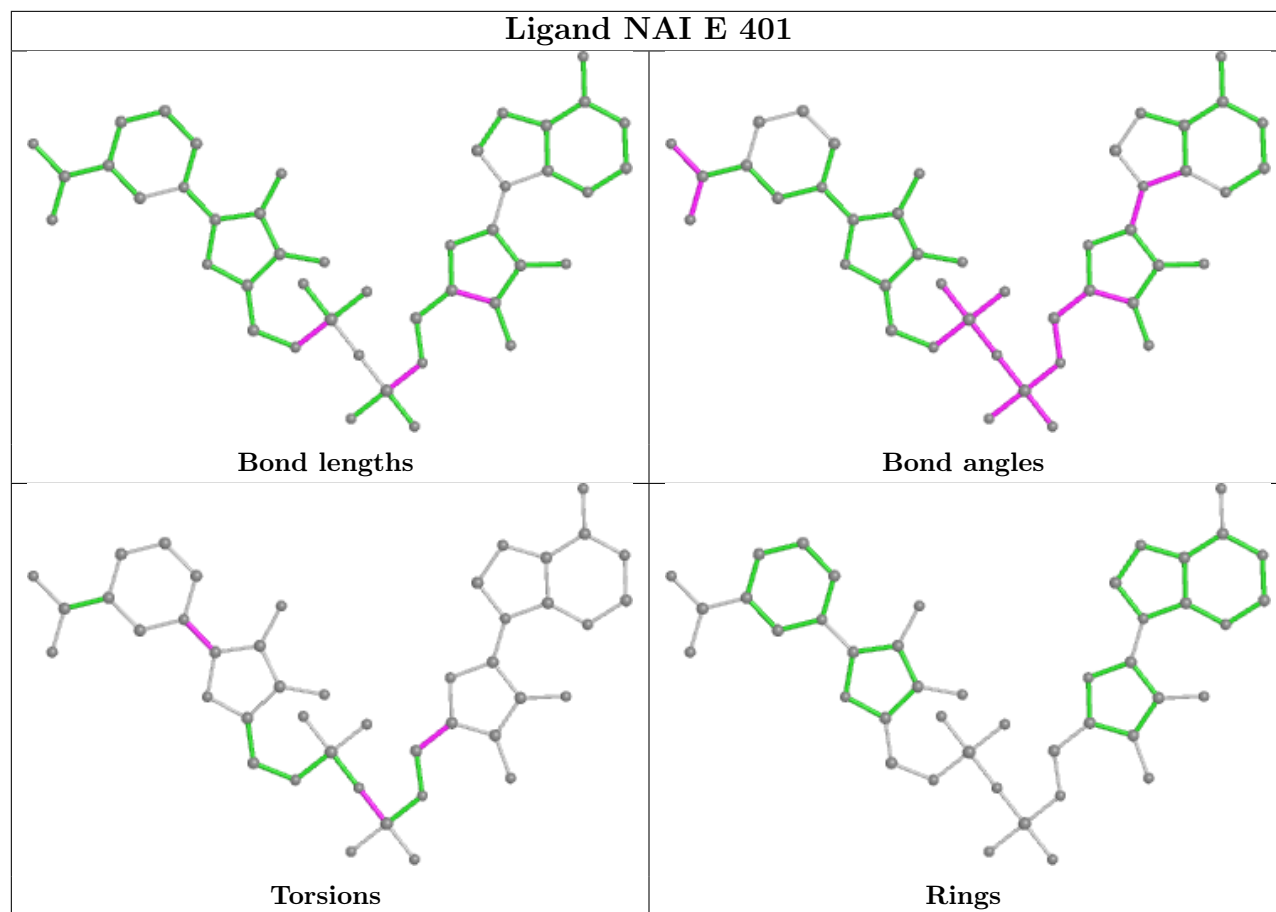


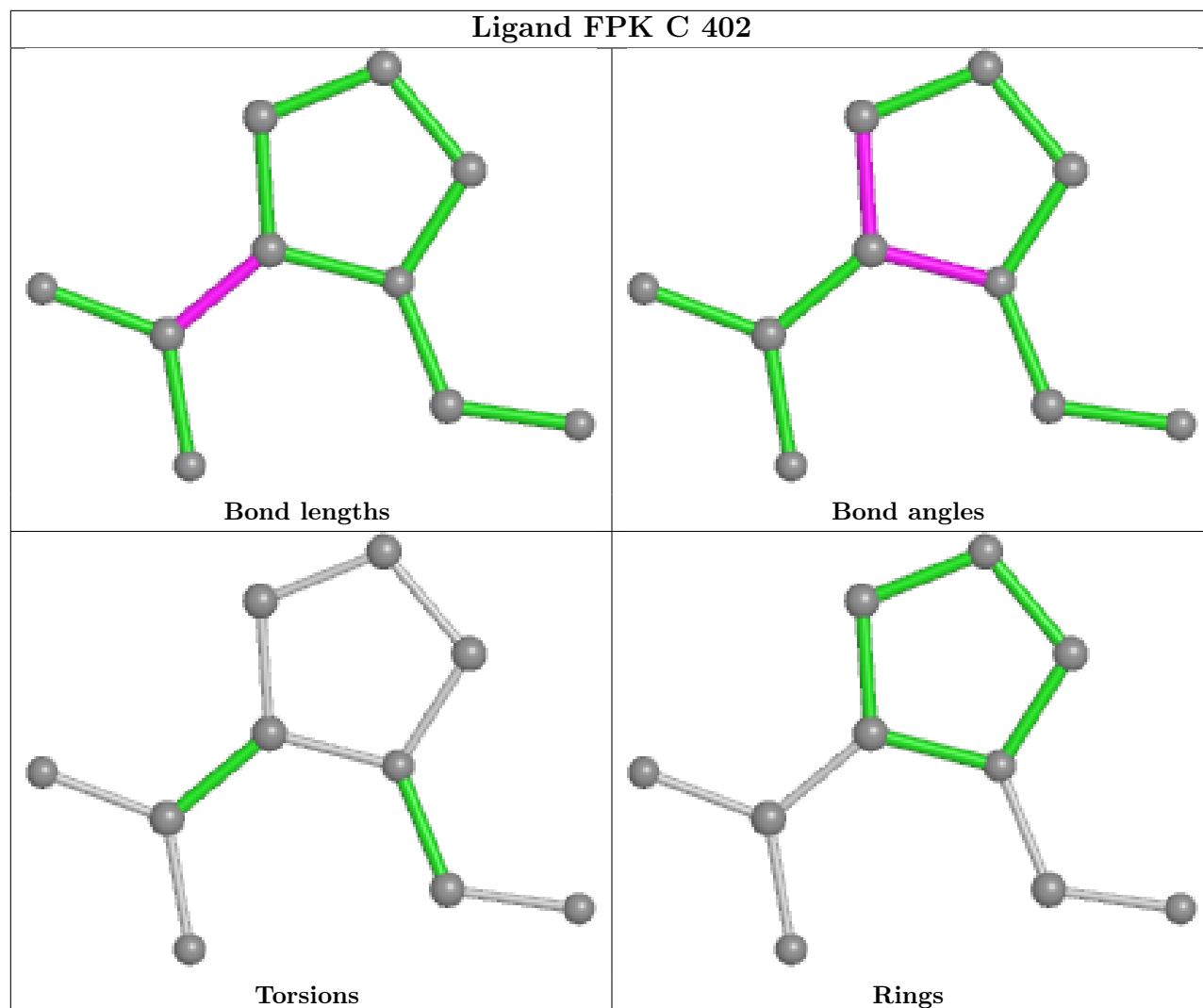


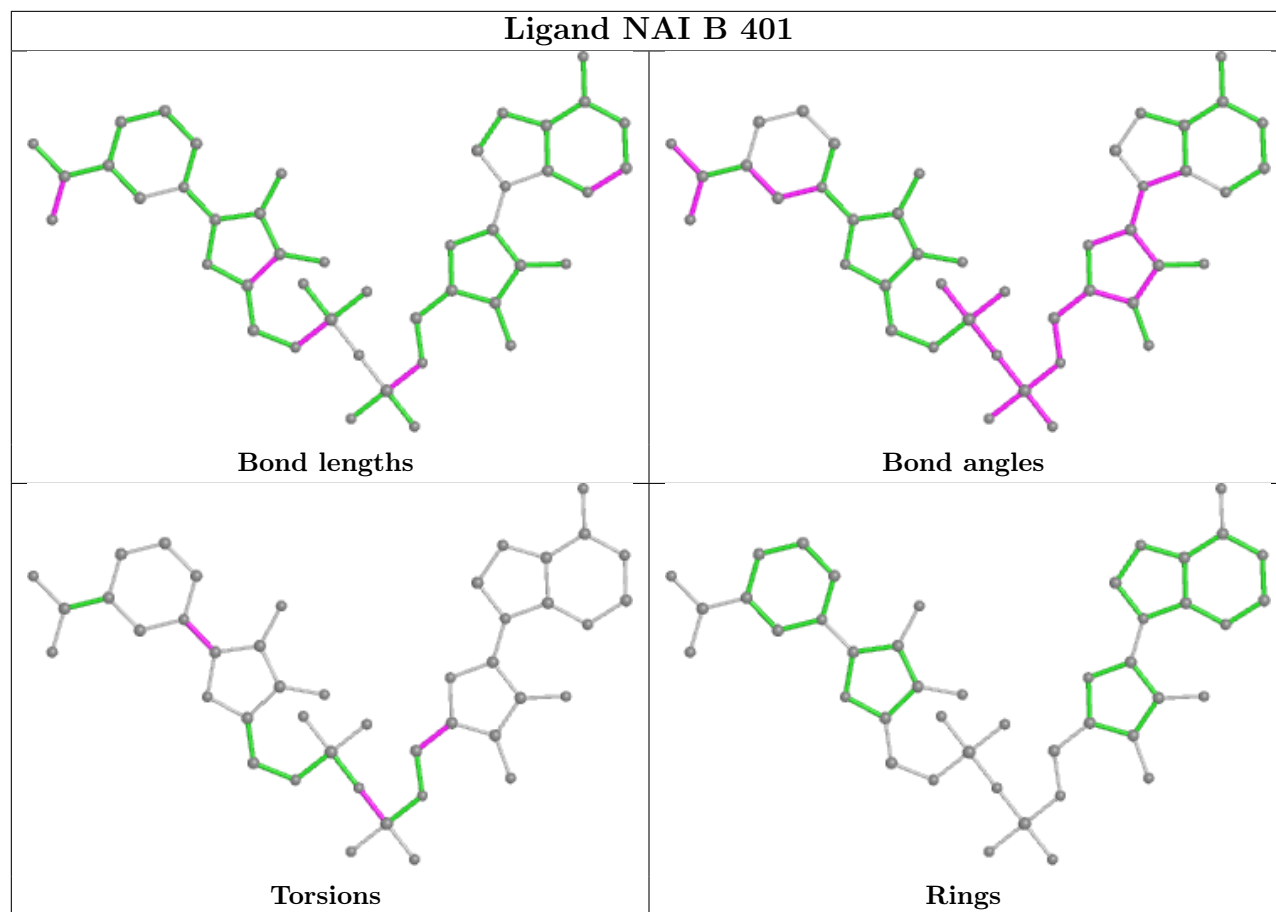


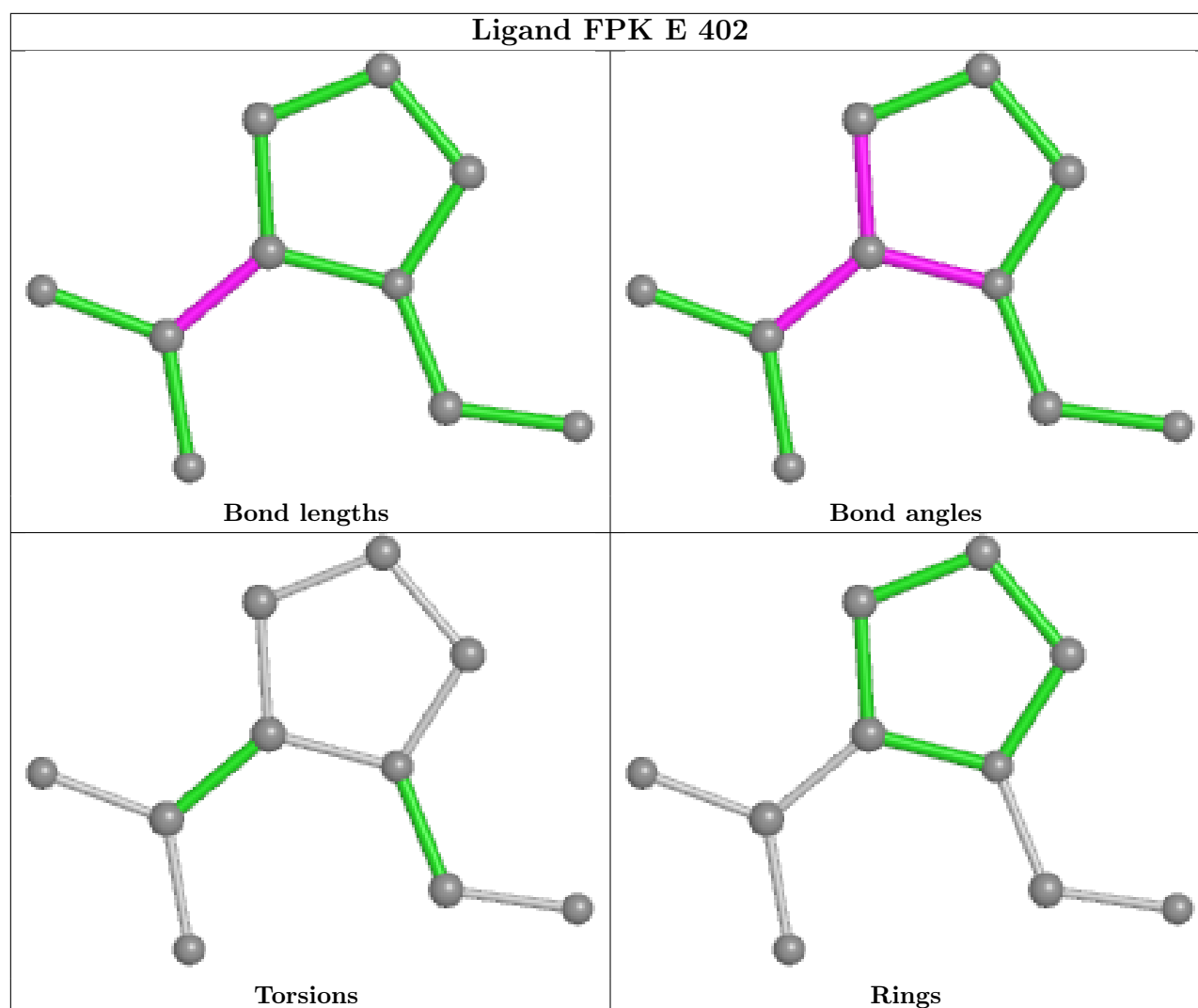












5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data [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	278/316 (87%)	-0.45	3 (1%) 80 80	21, 30, 51, 73	0
1	B	278/316 (87%)	-0.48	2 (0%) 87 87	22, 32, 54, 73	0
1	C	276/316 (87%)	-0.42	1 (0%) 92 92	23, 36, 60, 83	0
1	D	276/316 (87%)	-0.34	3 (1%) 80 80	22, 39, 67, 89	0
1	E	276/316 (87%)	-0.40	2 (0%) 87 87	21, 35, 63, 83	0
All	All	1384/1580 (87%)	-0.42	11 (0%) 86 86	21, 34, 62, 89	0

All (11) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	-3	TYR	4.9
1	A	271	MET	3.5
1	D	25	LEU	3.2
1	E	271	MET	3.0
1	B	271	MET	2.9
1	A	272	ALA	2.7
1	D	-2	PHE	2.5
1	B	270	SER	2.5
1	C	270	SER	2.1
1	E	273	ASP	2.0
1	D	39	LEU	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

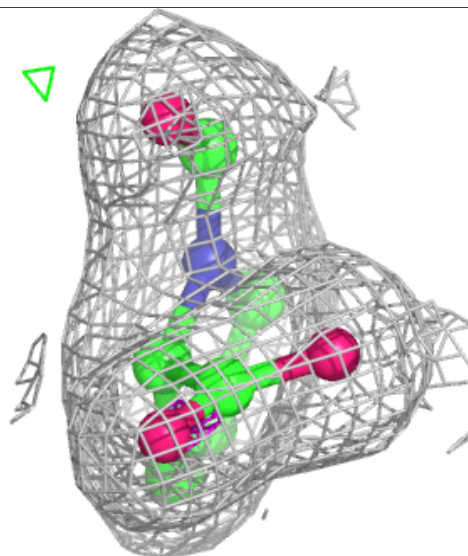
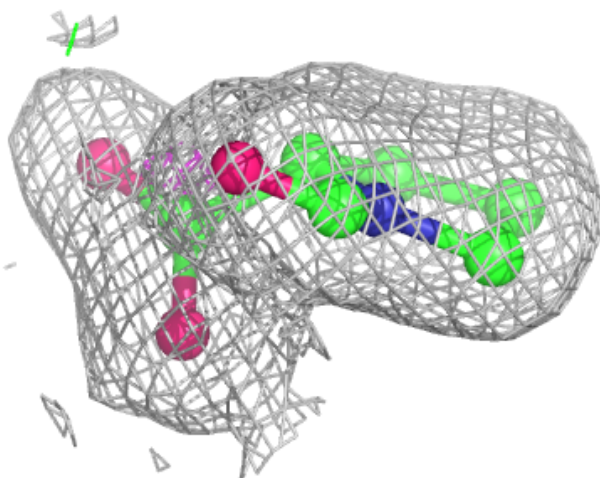
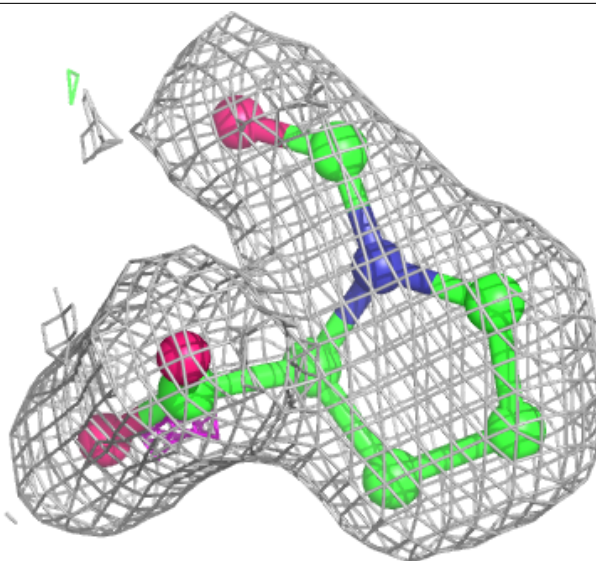
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists 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	SO4	B	403	5/5	0.82	0.16	53,56,60,61	5
4	SO4	A	403	5/5	0.91	0.17	50,51,56,58	5
3	FPK	A	402	10/10	0.94	0.09	25,29,34,37	0
3	FPK	E	402	10/10	0.94	0.09	27,30,34,38	0
3	FPK	C	402	10/10	0.95	0.08	29,31,36,40	0
3	FPK	D	402	10/10	0.96	0.09	32,33,37,39	0
2	NAI	D	401	44/44	0.96	0.08	29,40,50,55	0
3	FPK	B	402	10/10	0.96	0.09	27,32,38,40	0
2	NAI	E	401	44/44	0.96	0.08	25,33,41,44	0
2	NAI	C	401	44/44	0.97	0.08	28,35,42,45	0
2	NAI	A	401	44/44	0.97	0.08	25,31,36,39	0
2	NAI	B	401	44/44	0.98	0.09	24,30,37,39	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.

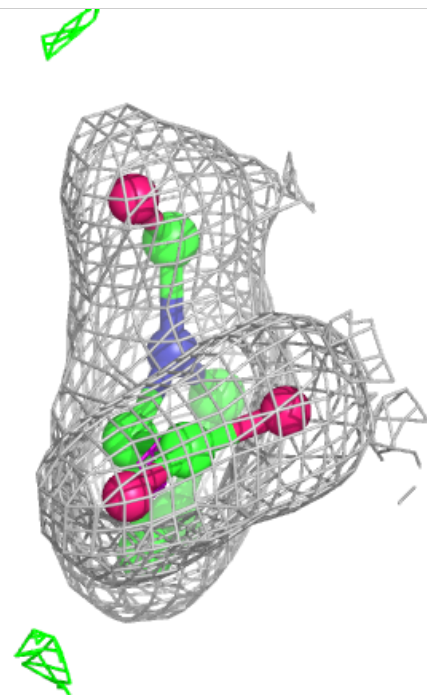
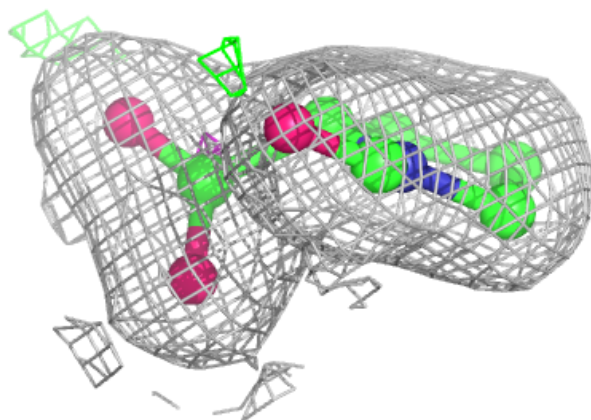
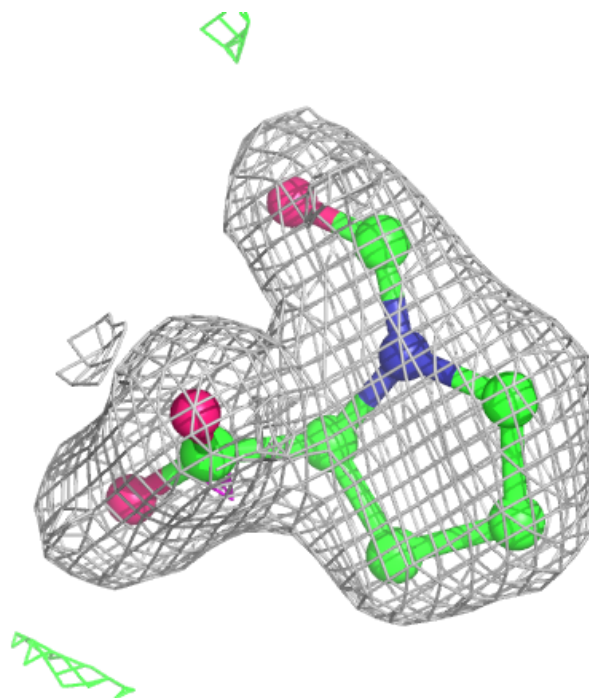
Electron density around FPK A 402:

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



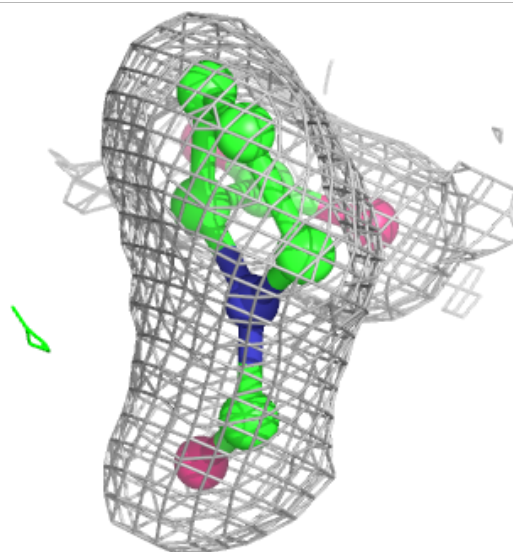
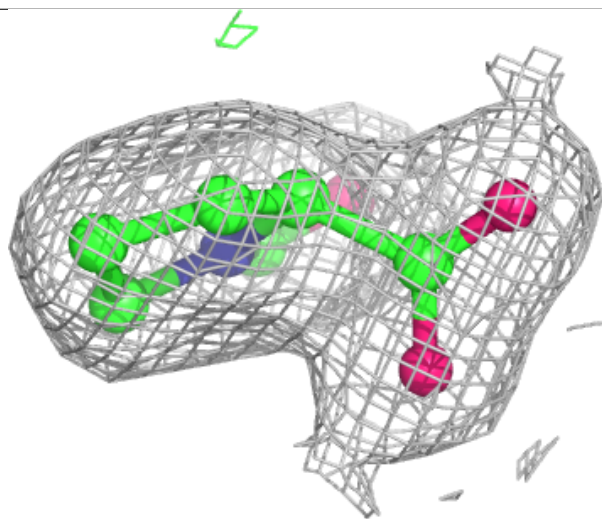
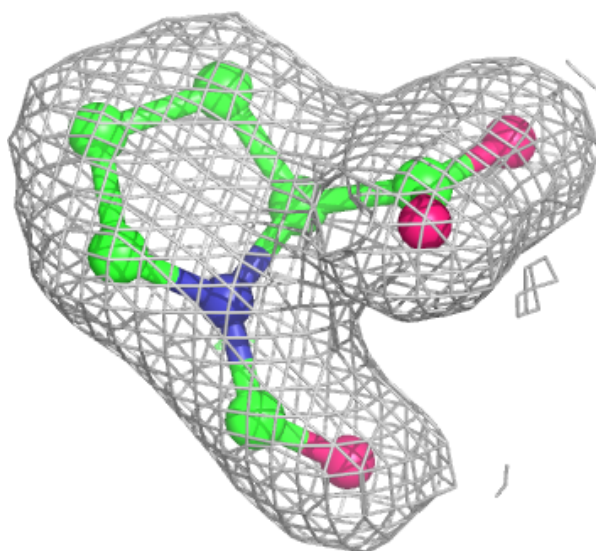
Electron density around FPK E 402:

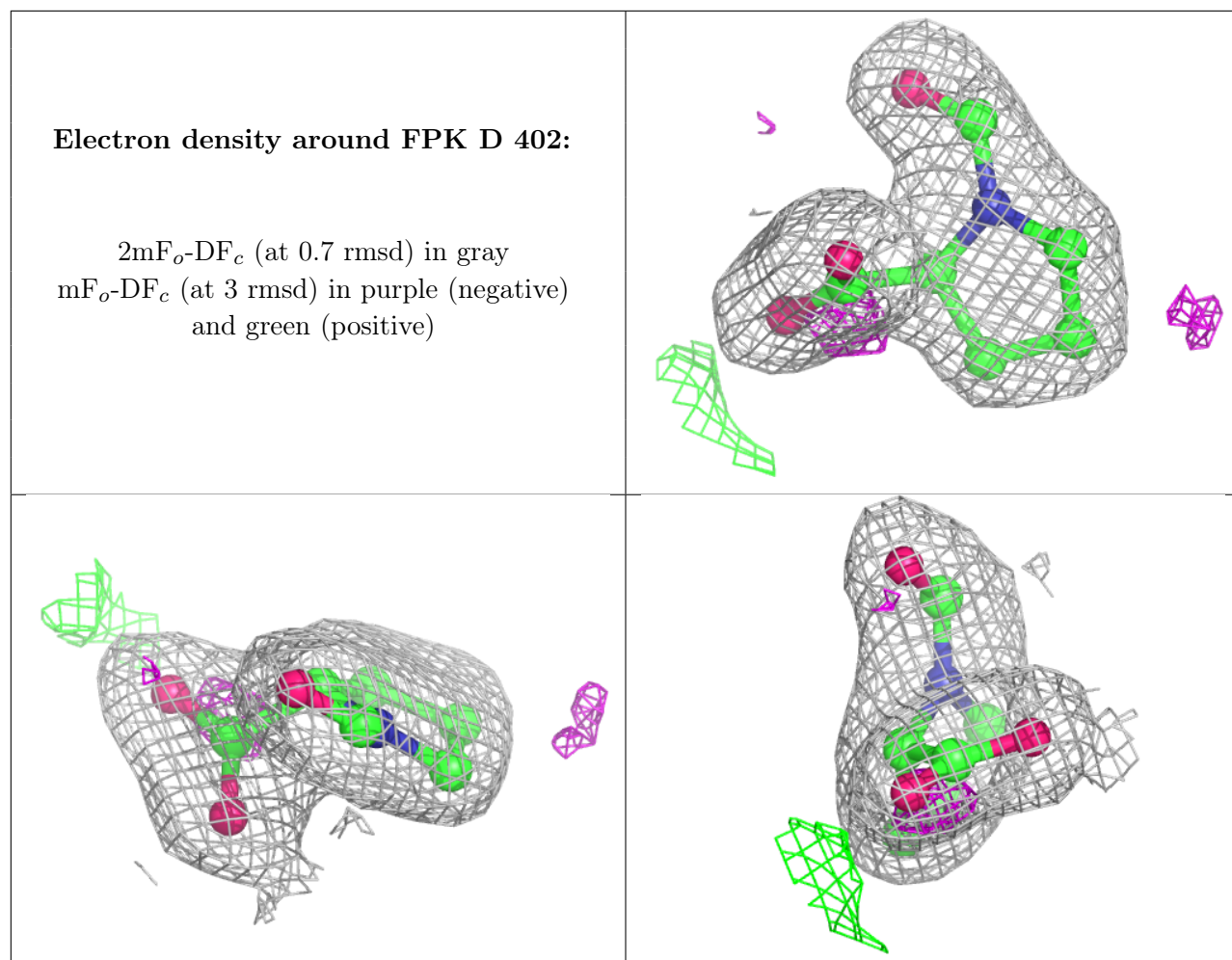
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around FPK C 402:

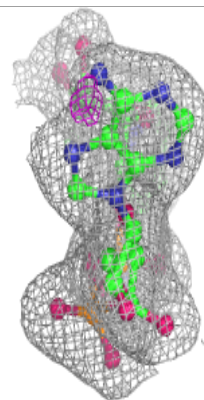
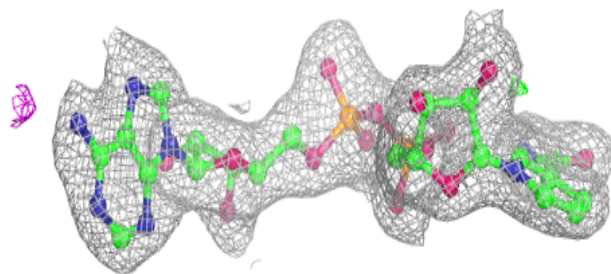
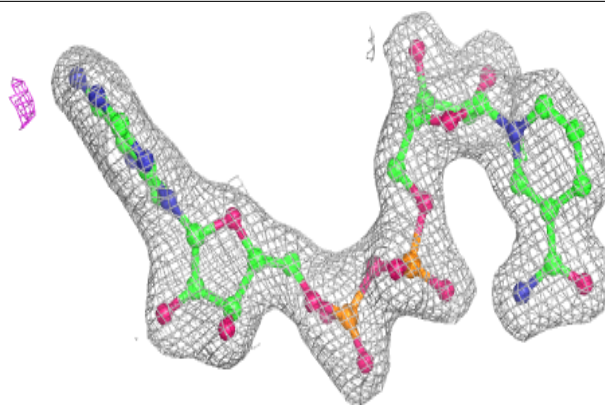
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)





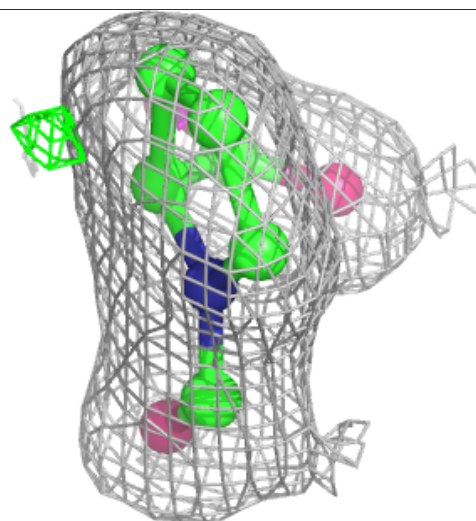
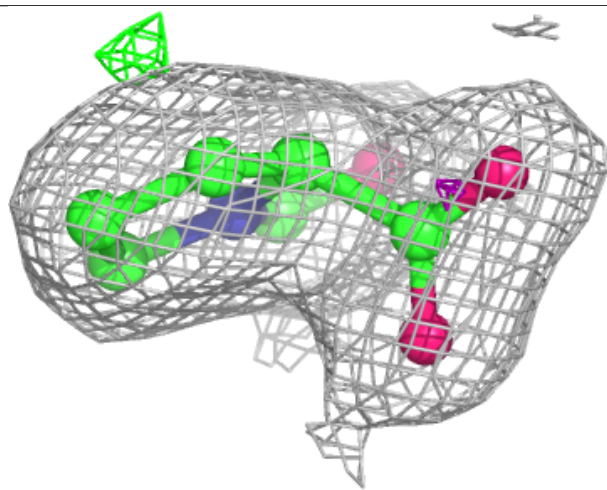
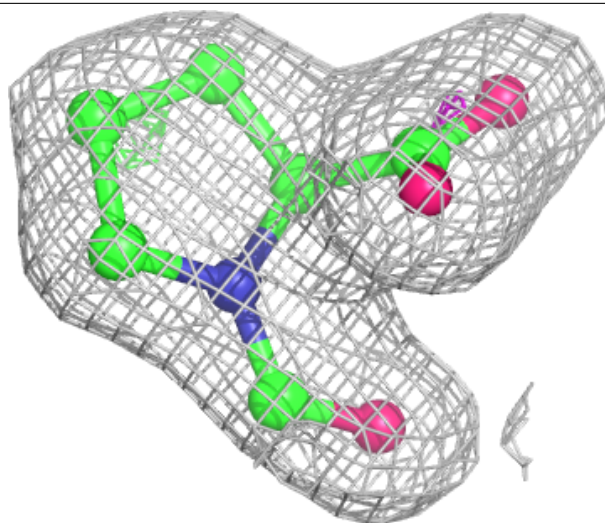
Electron density around NAI D 401:

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



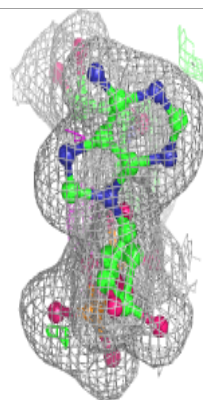
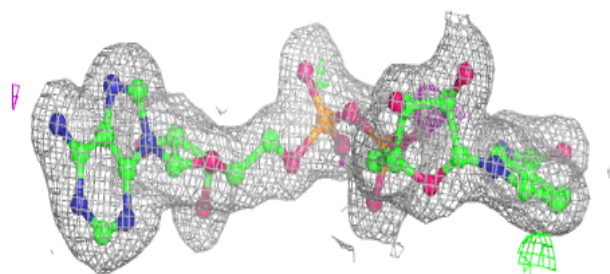
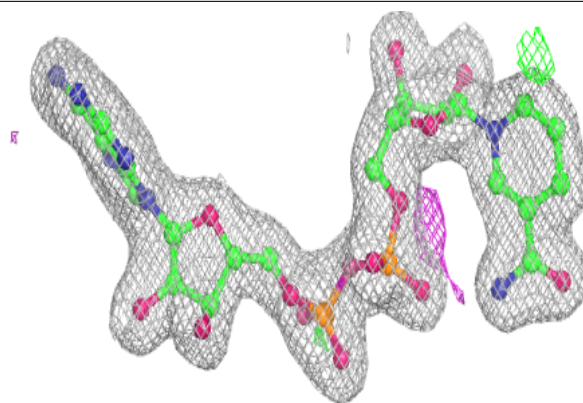
Electron density around FPK B 402:

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

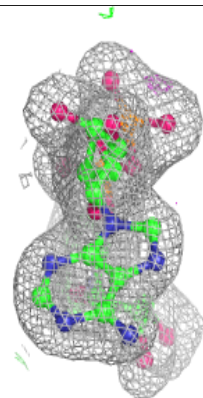
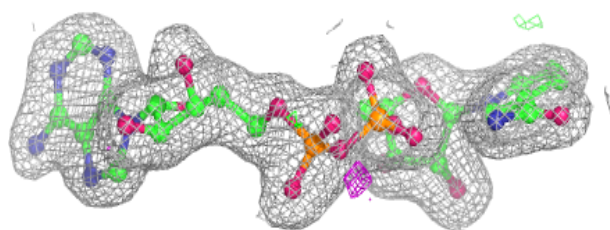
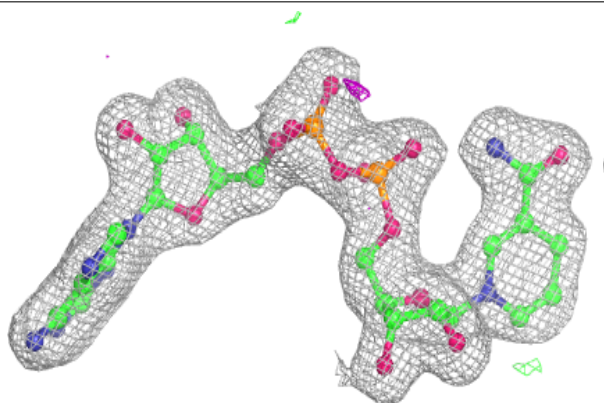


Electron density around NAI E 401:

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

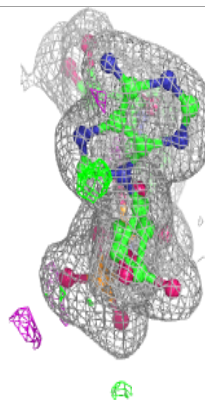
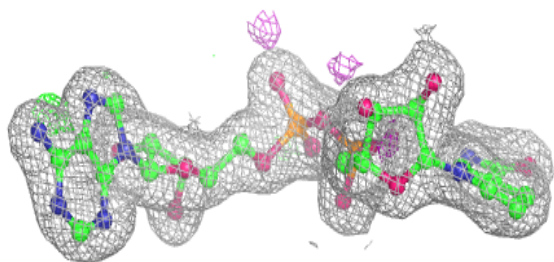
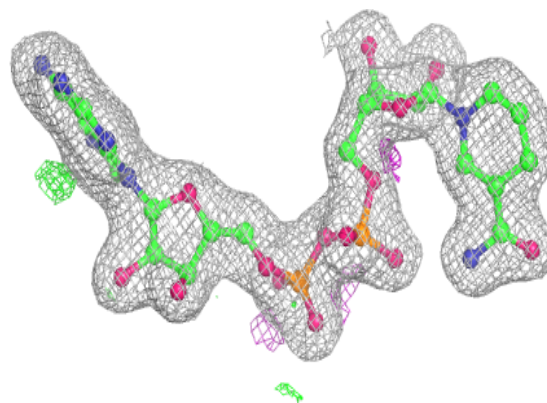
**Electron density around NAI C 401:**

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

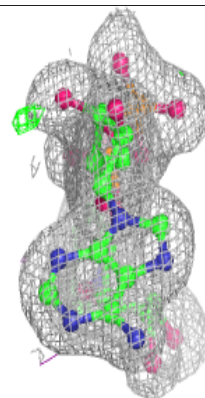
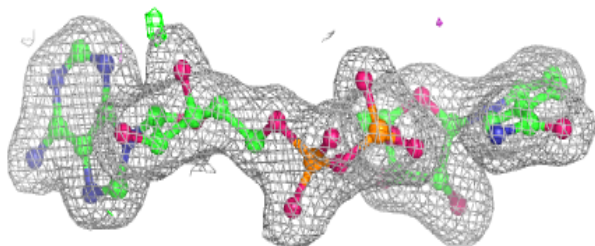
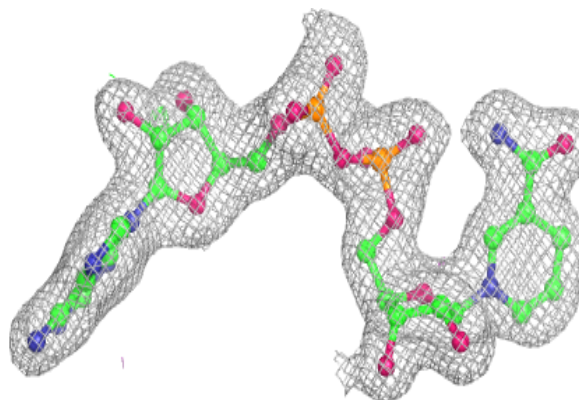


Electron density around NAI A 401:

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

**Electron density around NAI B 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.