



## Full wwPDB EM Validation Report ⓘ

Mar 5, 2026 – 07:19 PM UTC

PDB ID : 9Q8I / pdb\_00009q8i  
EMDB ID : EMD-52895  
Title : Cryo-EM structure of E. coli complex I variant V96P/N142M (NuoE)  
Authors : Seifermann, T.; Wohlwend, D.; Friedrich, T.  
Deposited on : 2025-02-24  
Resolution : 2.35 Å(reported)

This is a Full wwPDB EM Validation Report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

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

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>.

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

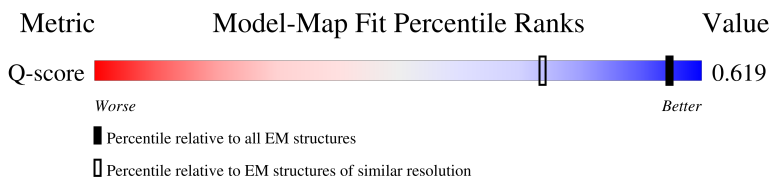
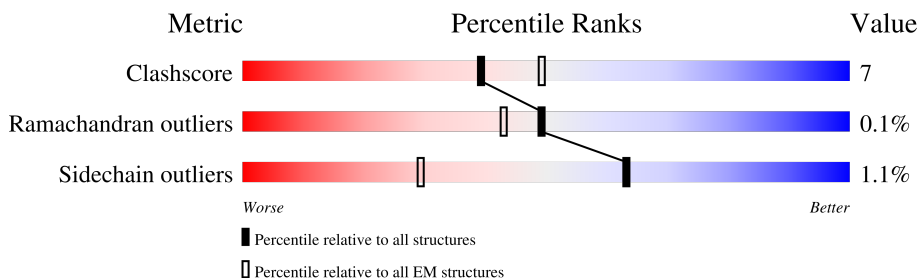
EMDB validation analysis : 0.0.1.dev132  
Mogul : 2022.3.0, CSD as543be (2022)  
MolProbity : 4-5-2 with Phenix2.0  
Buster-report : wwPDB partial adaption of 1.1.7 (2018)  
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)  
EM percentile statistics : 202505.v01 (Using data in the EMDB archive up until May 2025)  
MapQ : 1.9.13  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.49

# 1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:  
*ELECTRON MICROSCOPY*

The reported resolution of this entry is 2.35 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.











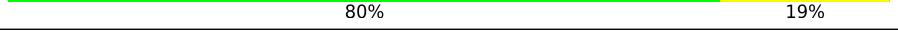
Metric	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
Q-score	-	25397	4607 ( 1.85 - 2.85 )

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 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 EM map (all-atom inclusion  $< 40\%$ ). The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	147	60% 11% 28%
2	B	220	65% 26% 9%
3	C	596	78% 20% .
4	E	166	76% 17% . 6%

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Mol	Chain	Length	Quality of chain
5	F	461	 80% 16% .
6	G	908	 86% 13% .
7	H	325	 77% 21% ..
8	I	180	 69% 12% .. 17%
9	J	184	 74% 22% .
10	K	100	 88% 12%
11	L	613	 83% 17%
12	M	509	 79% 19% ..
13	N	485	 80% 19%

## 2 Entry composition [i](#)

There are 20 unique types of molecules in this entry. The entry contains 37648 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, 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 NADH-quinone oxidoreductase subunit A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	106	840	573	134	129	4	0	0

- Molecule 2 is a protein called NADH-quinone oxidoreductase subunit B.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	B	200	1601	1015	275	294	17	0	0

- Molecule 3 is a protein called NADH-quinone oxidoreductase subunit C/D.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	C	587	4746	3038	827	858	23	0	0

- Molecule 4 is a protein called NADH-quinone oxidoreductase subunit E.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	E	156	1220	769	214	228	9	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
E	96	PRO	VAL	engineered mutation	UNP P0AFD1
E	142	MET	ASN	engineered mutation	UNP P0AFD1

- Molecule 5 is a protein called NADH-quinone oxidoreductase subunit F.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	F	442	3429	2175	601	633	20	0	0

There are 17 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
F	-15	MET	-	initiating methionine	UNP P31979
F	-14	ARG	-	expression tag	UNP P31979
F	-13	GLY	-	expression tag	UNP P31979
F	-12	SER	-	expression tag	UNP P31979
F	-11	HIS	-	expression tag	UNP P31979
F	-10	HIS	-	expression tag	UNP P31979
F	-9	HIS	-	expression tag	UNP P31979
F	-8	HIS	-	expression tag	UNP P31979
F	-7	HIS	-	expression tag	UNP P31979
F	-6	HIS	-	expression tag	UNP P31979
F	-5	THR	-	expression tag	UNP P31979
F	-4	ASP	-	expression tag	UNP P31979
F	-3	PRO	-	expression tag	UNP P31979
F	-2	ALA	-	expression tag	UNP P31979
F	-1	LEU	-	expression tag	UNP P31979
F	0	ARG	-	expression tag	UNP P31979
F	1	ALA	-	expression tag	UNP P31979

- Molecule 6 is a protein called NADH-quinone oxidoreductase subunit G.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	G	907	7044	4402	1272	1332	38	0	0

- Molecule 7 is a protein called NADH-quinone oxidoreductase subunit H.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
7	H	320	2517	1690	395	413	19	0	0

- Molecule 8 is a protein called NADH-quinone oxidoreductase subunit I.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
8	I	149	1186	752	196	225	13	0	0

- Molecule 9 is a protein called NADH-quinone oxidoreductase subunit J.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
9	J	176	1331	884	210	230	7	0	0

- Molecule 10 is a protein called NADH-quinone oxidoreductase subunit K.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
10	K	100	761	494	132	130	5	0	0

- Molecule 11 is a protein called NADH-quinone oxidoreductase subunit L.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
11	L	613	4685	3113	753	787	32	0	0

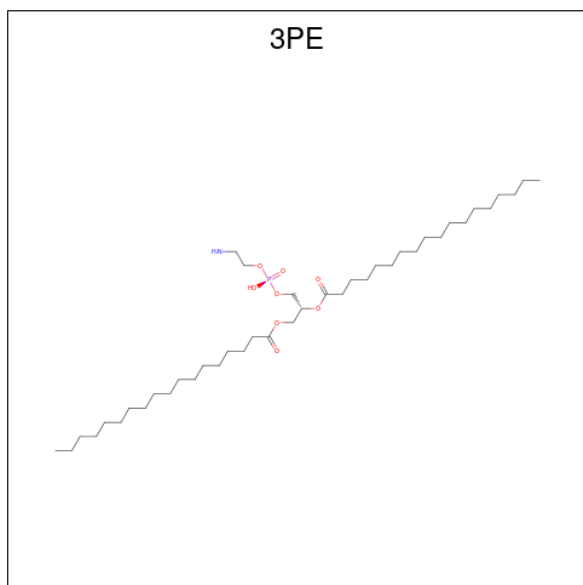
- Molecule 12 is a protein called NADH-quinone oxidoreductase subunit M.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
12	M	505	3960	2665	618	648	29	0	0

- Molecule 13 is a protein called NADH-quinone oxidoreductase subunit N.

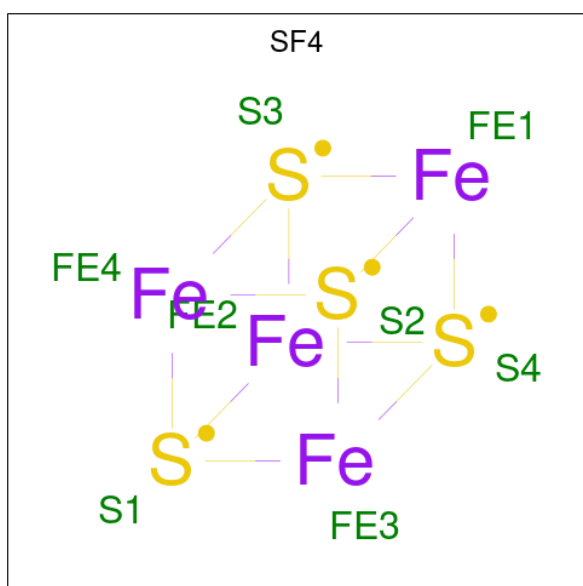
Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
13	N	485	3673	2448	582	623	20	0	0

- Molecule 14 is 1,2-Distearoyl-sn-glycerophosphoethanolamine (CCD ID: 3PE) (formula:  $C_{41}H_{82}NO_8P$ ).



Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	P	
14	A	1	Total 36	C 26	N 1	O 8	P 1	0
14	J	1	Total 42	C 32	N 1	O 8	P 1	0
14	L	1	Total 40	C 30	N 1	O 8	P 1	0
14	L	1	Total 51	C 41	N 1	O 8	P 1	0
14	L	1	Total 47	C 37	N 1	O 8	P 1	0
14	L	1	Total 51	C 41	N 1	O 8	P 1	0
14	M	1	Total 39	C 29	N 1	O 8	P 1	0
14	M	1	Total 37	C 27	N 1	O 8	P 1	0
14	N	1	Total 47	C 37	N 1	O 8	P 1	0
14	N	1	Total 51	C 41	N 1	O 8	P 1	0

- Molecule 15 is IRON/SULFUR CLUSTER (CCD ID: SF4) (formula: Fe<sub>4</sub>S<sub>4</sub>) (labeled as "Ligand of Interest" by depositor).



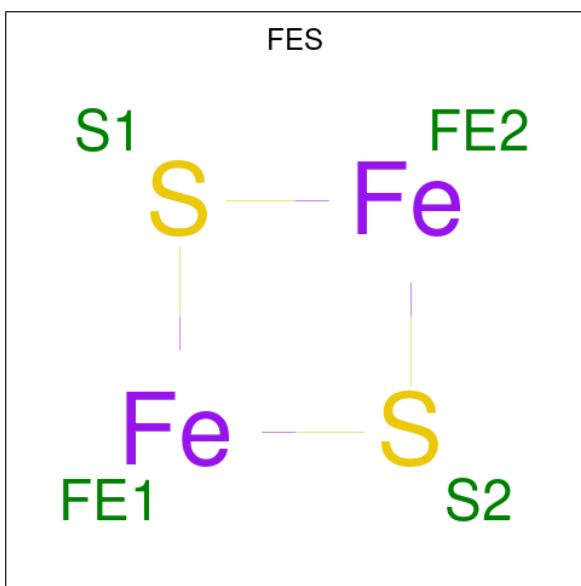
Mol	Chain	Residues	Atoms			AltConf
			Total	Fe	S	
15	B	1	Total 8	Fe 4	S 4	0

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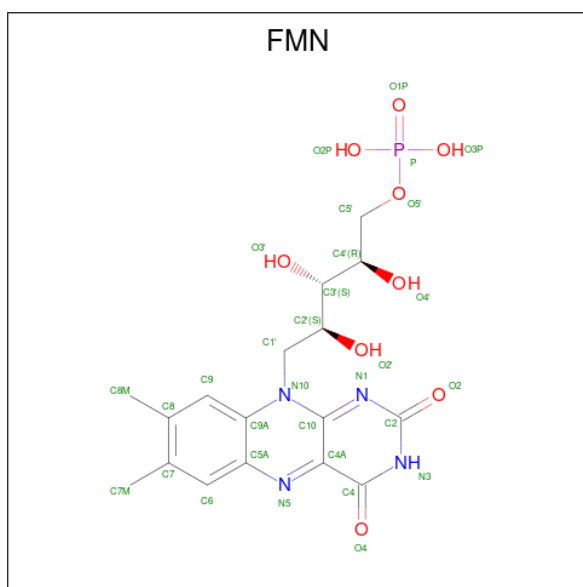
Mol	Chain	Residues	Atoms			AltConf
			Total	Fe	S	
15	F	1	8	4	4	0
15	G	1	8	4	4	0
15	G	1	8	4	4	0
15	G	1	8	4	4	0
15	I	1	8	4	4	0
15	I	1	8	4	4	0

- Molecule 16 is FE2/S2 (INORGANIC) CLUSTER (CCD ID: FES) (formula:  $\text{Fe}_2\text{S}_2$ ) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms			AltConf
			Total	Fe	S	
16	E	1	4	2	2	0
16	G	1	4	2	2	0

- Molecule 17 is FLAVIN MONONUCLEOTIDE (CCD ID: FMN) (formula:  $\text{C}_{17}\text{H}_{21}\text{N}_4\text{O}_9\text{P}$ ) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					AltConf
17	F	1	Total	C	N	O	P	0
			31	17	4	9	1	

- Molecule 18 is CALCIUM ION (CCD ID: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		AltConf
18	G	1	Total	Ca	0
			1	1	

- Molecule 19 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		AltConf
19	G	1	Total	Cl	0
			1	1	
19	N	1	Total	Cl	0
			1	1	

- Molecule 20 is water.

Mol	Chain	Residues	Atoms		AltConf
20	A	2	Total	O	0
			2	2	
20	B	8	Total	O	0
			8	8	
20	C	34	Total	O	0
			34	34	

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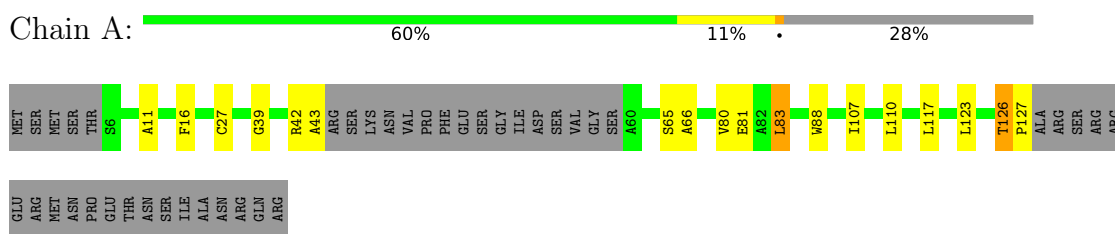
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Mol	Chain	Residues	Atoms		AltConf
20	E	1	Total 1	O 1	0
20	F	7	Total 7	O 7	0
20	G	33	Total 33	O 33	0
20	H	2	Total 2	O 2	0
20	I	10	Total 10	O 10	0
20	J	2	Total 2	O 2	0
20	K	1	Total 1	O 1	0
20	L	2	Total 2	O 2	0
20	M	10	Total 10	O 10	0
20	N	4	Total 4	O 4	0

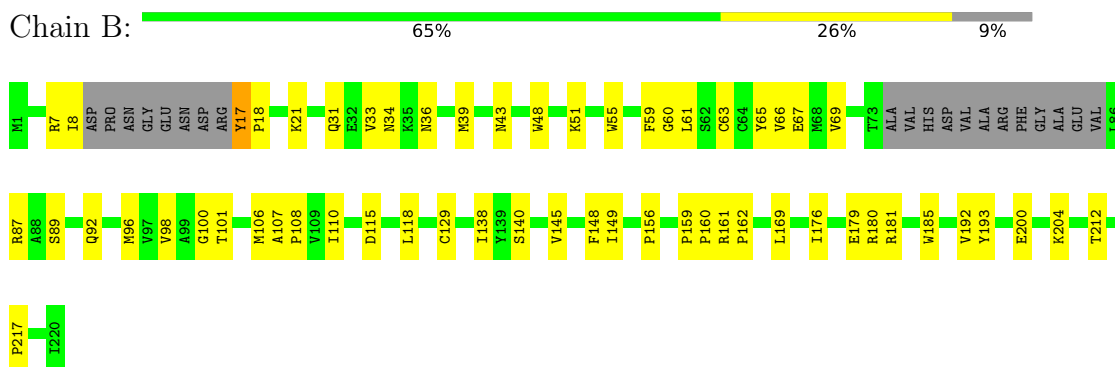
### 3 Residue-property plots

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 atom inclusion in map 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 diamond above a residue indicates a poor fit to the EM map for this residue (all-atom inclusion < 40%). 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.

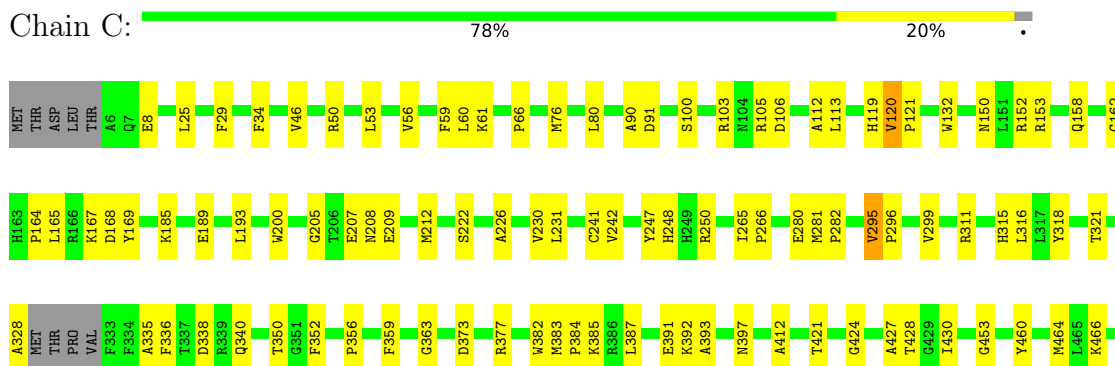
- Molecule 1: NADH-quinone oxidoreductase subunit A



- Molecule 2: NADH-quinone oxidoreductase subunit B

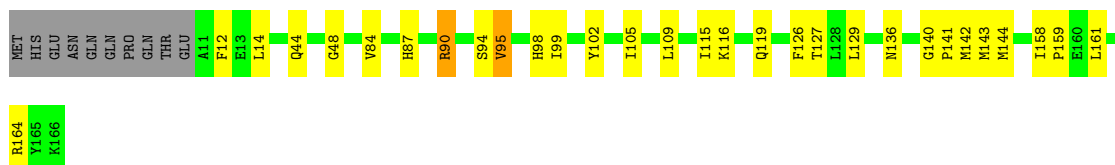
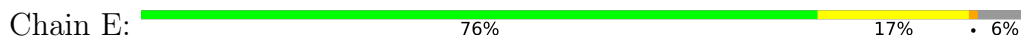


- Molecule 3: NADH-quinone oxidoreductase subunit C/D

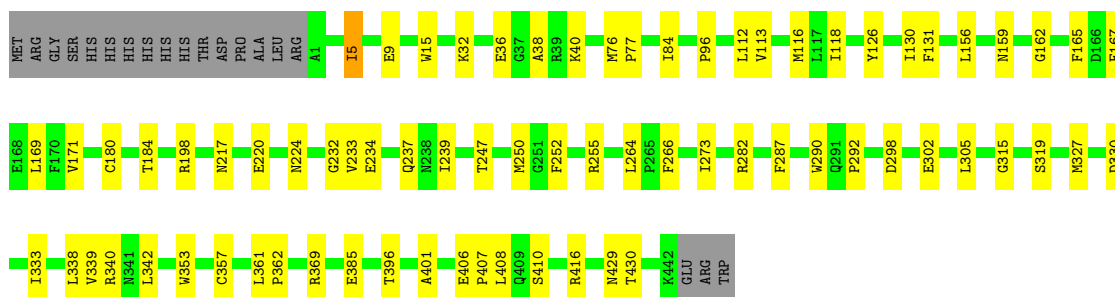
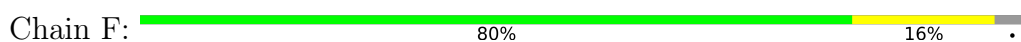




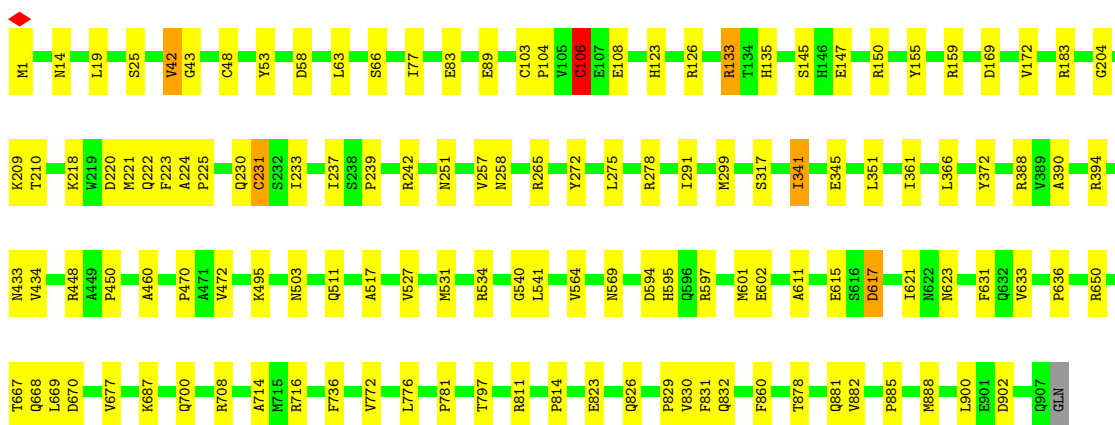
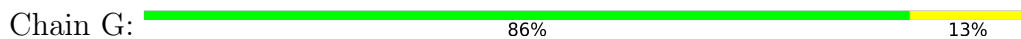
• Molecule 4: NADH-quinone oxidoreductase subunit E



• Molecule 5: NADH-quinone oxidoreductase subunit F

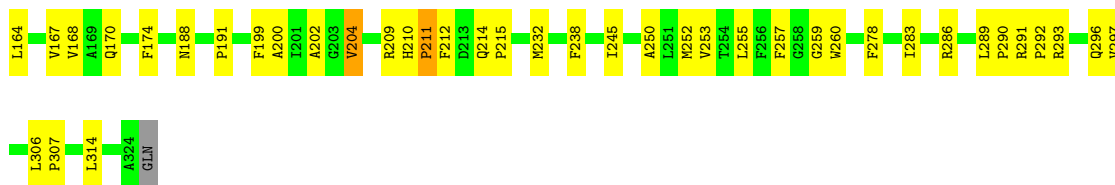


• Molecule 6: NADH-quinone oxidoreductase subunit G

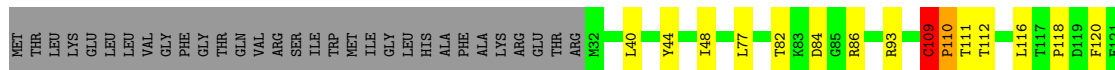


• Molecule 7: NADH-quinone oxidoreductase subunit H





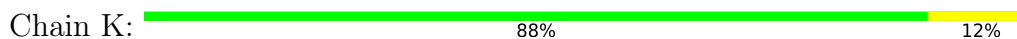
• Molecule 8: NADH-quinone oxidoreductase subunit I



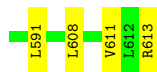
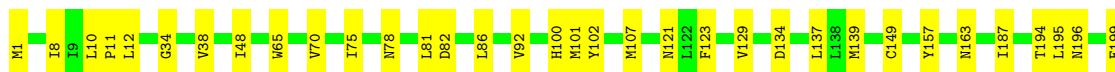
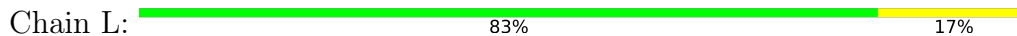
• Molecule 9: NADH-quinone oxidoreductase subunit J




• Molecule 10: NADH-quinone oxidoreductase subunit K



• Molecule 11: NADH-quinone oxidoreductase subunit L




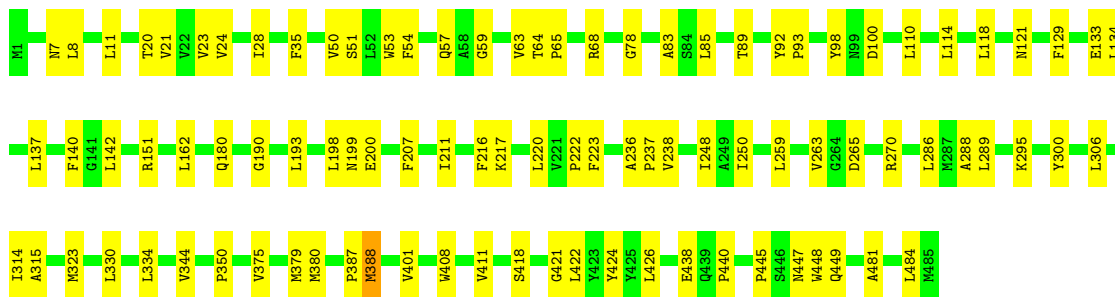
- Molecule 12: NADH-quinone oxidoreductase subunit M

Chain M:  79% 19% ..



- Molecule 13: NADH-quinone oxidoreductase subunit N

Chain N:  80% 19%



## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, POINT, POINT, POINT	Depositor
Number of particles used	95103, 95103, 95103, 95103	Depositor
Resolution determination method	FSC 0.143 CUT-OFF, FSC 0.143 CUT-OFF, FSC 0.143 CUT-OFF, FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION, PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ( $e^-/\text{\AA}^2$ )	40.00	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	2200	Depositor
Magnification	Not provided	
Image detector	TFS FALCON 4i (4k x 4k)	Depositor
Maximum map value	1.317	Depositor
Minimum map value	-0.171	Depositor
Average map value	0.011	Depositor
Map value standard deviation	0.026	Depositor
Recommended contour level	0.07	Depositor
Map size ( $\text{\AA}$ )	457.60004, 457.60004, 457.60004	wwPDB
Map dimensions	400, 400, 400	wwPDB
Map angles ( $^\circ$ )	90.0, 90.0, 90.0	wwPDB
Pixel spacing ( $\text{\AA}$ )	1.144, 1.144, 1.144	Depositor

## 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: FMN, CA, FES, 3PE, CL, SF4

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	0.93	0/865	1.17	0/1176
2	B	0.95	0/1634	1.14	0/2209
3	C	0.94	0/4875	1.13	3/6611 (0.0%)
4	E	0.97	0/1249	1.13	0/1692
5	F	0.96	0/3508	1.15	1/4742 (0.0%)
6	G	0.97	0/7195	1.14	1/9755 (0.0%)
7	H	0.96	0/2590	1.15	0/3522
8	I	0.95	0/1215	1.21	3/1642 (0.2%)
9	J	0.98	0/1357	1.18	0/1848
10	K	0.96	0/770	1.15	0/1040
11	L	0.95	0/4806	1.17	1/6549 (0.0%)
12	M	0.93	0/4081	1.14	2/5556 (0.0%)
13	N	0.96	0/3764	1.17	2/5138 (0.0%)
All	All	0.96	0/37909	1.15	13/51480 (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
4	E	0	1

There are no bond length outliers.

All (13) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
8	I	109	CYS	CB-CA-C	-12.97	89.06	109.42
8	I	110	PRO	N-CA-C	-6.69	106.12	114.68
12	M	134	ILE	N-CA-C	-6.15	107.13	113.10

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
8	I	145	TYR	CB-CA-C	5.99	116.97	110.08
13	N	59	GLY	CA-C-O	-5.77	118.30	122.45
5	F	232	GLY	CA-C-O	-5.64	118.34	122.23
3	C	162	GLY	CA-C-O	-5.59	118.37	122.23
3	C	66	PRO	N-CA-C	5.42	119.21	111.13
13	N	440	PRO	N-CA-C	-5.38	108.52	114.92
6	G	106	CYS	CB-CA-C	5.38	119.22	109.37
11	L	234	PRO	N-CA-CB	-5.16	96.92	102.60
3	C	91	ASP	N-CA-C	-5.13	106.18	112.90
12	M	239	PRO	N-CA-CB	-5.04	97.06	102.60

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
4	E	90	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	A	840	0	857	16	0
2	B	1601	0	1596	41	0
3	C	4746	0	4657	81	0
4	E	1220	0	1188	21	0
5	F	3429	0	3401	49	0
6	G	7044	0	6849	77	0
7	H	2517	0	2574	43	0
8	I	1186	0	1145	16	0
9	J	1331	0	1399	33	0
10	K	761	0	817	11	0
11	L	4685	0	4831	65	0
12	M	3960	0	4060	61	0
13	N	3673	0	3836	67	0
14	A	36	0	46	4	0
14	J	42	0	58	2	0
14	L	189	0	289	12	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
14	M	76	0	100	4	0
14	N	98	0	153	8	0
15	B	8	0	0	0	0
15	F	8	0	0	0	0
15	G	24	0	0	0	0
15	I	16	0	0	0	0
16	E	4	0	0	1	0
16	G	4	0	0	1	0
17	F	31	0	19	2	0
18	G	1	0	0	0	0
19	G	1	0	0	0	0
19	N	1	0	0	0	0
20	A	2	0	0	0	0
20	B	8	0	0	0	0
20	C	34	0	0	0	0
20	E	1	0	0	0	0
20	F	7	0	0	0	0
20	G	33	0	0	0	0
20	H	2	0	0	0	0
20	I	10	0	0	0	0
20	J	2	0	0	0	0
20	K	1	0	0	0	0
20	L	2	0	0	0	0
20	M	10	0	0	0	0
20	N	4	0	0	0	0
All	All	37648	0	37875	539	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 7.

All (539) 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)
3:C:387:LEU:HD21	3:C:471:ARG:HG2	1.59	0.82
2:B:217:PRO:HD3	8:I:144:LYS:HB3	1.62	0.81
6:G:885:PRO:HB2	6:G:888:MET:HG3	1.66	0.77
11:L:157:TYR:HB2	11:L:163:ASN:HD22	1.54	0.73
13:N:78:GLY:HA3	14:N:502:3PE:H2B1	1.69	0.73
12:M:387:LEU:HD13	12:M:468:ILE:HG21	1.70	0.73
13:N:50:VAL:HA	14:N:502:3PE:H3A2	1.70	0.72
6:G:106:CYS:HB2	6:G:150:ARG:CZ	2.20	0.71

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
14:L:702:3PE:H3A2	12:M:177:TYR:HA	1.73	0.69
3:C:76:MET:HE1	3:C:545:THR:HG21	1.73	0.69
3:C:350:THR:HG21	3:C:356:PRO:HB3	1.75	0.69
6:G:341:ILE:HD11	6:G:541:LEU:HD23	1.75	0.69
14:L:702:3PE:H242	13:N:289:LEU:HD21	1.75	0.68
4:E:95:VAL:HG21	5:F:342:LEU:HG	1.75	0.68
14:A:201:3PE:H32	14:J:201:3PE:H232	1.75	0.67
5:F:112:LEU:HG	5:F:116:MET:HE2	1.77	0.67
2:B:59:PHE:HE2	2:B:110:ILE:HG12	1.61	0.66
3:C:152:ARG:HH12	3:C:242:VAL:HG11	1.62	0.65
12:M:244:LEU:HB3	12:M:245:PRO:HD3	1.78	0.65
8:I:48:ILE:HG12	8:I:116:LEU:HG	1.79	0.64
5:F:264:LEU:HD13	5:F:273:ILE:HD12	1.78	0.64
13:N:180:GLN:HG3	13:N:200:GLU:HG2	1.78	0.64
3:C:315:HIS:HB2	3:C:470:LEU:HD21	1.80	0.63
7:H:199:PHE:HE2	7:H:252:MET:HG2	1.63	0.63
13:N:408:TRP:HA	13:N:411:VAL:HG22	1.79	0.63
11:L:101:MET:HE3	11:L:456:PRO:HG3	1.79	0.63
6:G:460:ALA:HB2	6:G:472:VAL:HG11	1.80	0.63
12:M:322:HIS:HE1	12:M:395:THR:HG23	1.64	0.63
6:G:133:ARG:HD2	6:G:135:HIS:CE1	2.33	0.62
11:L:10:LEU:HB2	11:L:11:PRO:HD3	1.81	0.62
13:N:98:TYR:CE2	13:N:100:ASP:HB3	2.34	0.62
10:K:75:ILE:HD12	13:N:137:LEU:HD22	1.81	0.62
12:M:142:PHE:HA	12:M:145:MET:HG2	1.82	0.62
1:A:42:ARG:O	1:A:43:ALA:C	2.42	0.61
11:L:425:THR:HA	11:L:428:TYR:CE2	2.35	0.61
7:H:121:MET:HE3	9:J:56:ILE:HD12	1.83	0.61
9:J:147:LEU:HD11	13:N:137:LEU:HD12	1.83	0.61
13:N:259:LEU:HD22	13:N:323:MET:HE3	1.81	0.61
3:C:207:GLU:C	3:C:209:GLU:H	2.09	0.61
3:C:295:VAL:HG13	3:C:299:VAL:HB	1.81	0.61
6:G:615:GLU:HB3	6:G:636:PRO:HG3	1.84	0.60
9:J:74:LEU:HD11	10:K:81:LEU:HD23	1.83	0.60
13:N:217:LYS:HB3	13:N:250:ILE:HD13	1.84	0.60
14:N:501:3PE:H281	14:N:501:3PE:H3B2	1.82	0.60
11:L:455:LEU:HB3	11:L:456:PRO:HD3	1.83	0.60
11:L:123:PHE:HZ	11:L:258:MET:HB2	1.68	0.59
13:N:295:LYS:HD3	13:N:344:VAL:HG11	1.84	0.59
6:G:108:GLU:HG3	6:G:204:GLY:HA2	1.84	0.59
9:J:23:THR:HG22	9:J:87:TRP:HZ2	1.68	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
11:L:187:ILE:HD11	14:M:601:3PE:H231	1.83	0.59
11:L:355:ALA:HB1	11:L:445:ALA:HB1	1.83	0.59
12:M:160:LYS:HE2	12:M:253:THR:HG21	1.85	0.59
2:B:159:PRO:HD2	3:C:352:PHE:HE2	1.68	0.58
3:C:100:SER:HB3	3:C:103:ARG:HG2	1.84	0.58
6:G:147:GLU:HG2	6:G:150:ARG:CZ	2.33	0.58
11:L:233:LEU:HD13	11:L:290:THR:HG22	1.85	0.58
2:B:7:ARG:HB3	2:B:21:LYS:HD2	1.86	0.58
10:K:98:MET:HE3	13:N:151:ARG:HD3	1.85	0.58
11:L:223:LEU:HD13	11:L:283:VAL:HG22	1.86	0.58
11:L:291:LEU:HA	11:L:314:SER:HA	1.86	0.58
13:N:190:GLY:HA2	13:N:193:LEU:HD23	1.86	0.58
6:G:540:GLY:HA2	6:G:621:ILE:HD12	1.84	0.58
11:L:451:VAL:O	11:L:452:THR:HB	2.04	0.58
13:N:129:PHE:O	13:N:133:GLU:HG2	2.04	0.58
3:C:509:GLU:HG2	6:G:123:HIS:CE1	2.39	0.57
5:F:396:THR:HG21	5:F:401:ALA:HB3	1.85	0.57
6:G:231:CYS:SG	6:G:233:ILE:HG12	2.45	0.57
7:H:156:TYR:HA	7:H:159:PHE:CE1	2.39	0.57
6:G:1:MET:HB3	6:G:14:ASN:HA	1.85	0.57
9:J:143:LEU:HD13	13:N:118:LEU:HD22	1.86	0.57
7:H:306:LEU:HB3	7:H:307:PRO:HD3	1.87	0.57
3:C:316:LEU:HD13	3:C:338:ASP:OD1	2.05	0.56
7:H:200:ALA:O	7:H:204:VAL:HG12	2.05	0.56
2:B:59:PHE:CE2	2:B:110:ILE:HG12	2.41	0.56
3:C:29:PHE:CZ	3:C:56:VAL:HA	2.40	0.56
4:E:161:LEU:HA	4:E:164:ARG:HD3	1.87	0.56
6:G:503:ASN:HA	6:G:534:ARG:HH21	1.70	0.56
12:M:52:TYR:CE2	12:M:64:GLN:HG3	2.40	0.56
12:M:432:ALA:HA	12:M:435:TYR:CE2	2.40	0.56
9:J:2:GLU:HA	10:K:2:ILE:HD11	1.87	0.56
3:C:296:PRO:HG2	3:C:299:VAL:HG23	1.87	0.56
11:L:8:ILE:HD13	11:L:129:VAL:HG22	1.88	0.56
12:M:10:PRO:HG3	12:M:39:THR:HG21	1.87	0.56
12:M:80:HIS:CD2	12:M:134:ILE:HD11	2.40	0.56
6:G:611:ALA:HB1	6:G:615:GLU:HB2	1.86	0.56
13:N:421:GLY:HA2	13:N:424:TYR:CE2	2.41	0.56
12:M:329:ALA:HB2	12:M:410:ILE:HG23	1.87	0.56
7:H:86:ALA:HB3	7:H:87:PRO:HD3	1.87	0.56
2:B:181:ARG:HG2	2:B:192:VAL:HG13	1.88	0.55
13:N:64:THR:HB	13:N:65:PRO:CD	2.36	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
9:J:58:VAL:HG21	10:K:66:ILE:HD12	1.88	0.55
3:C:103:ARG:HG3	3:C:105:ARG:HB2	1.88	0.55
7:H:82:ILE:HG22	7:H:136:SER:HB3	1.88	0.55
3:C:328:ALA:H	3:C:397:ASN:HD21	1.55	0.55
2:B:101:THR:HA	2:B:129:CYS:HB3	1.89	0.55
11:L:123:PHE:HD2	11:L:149:CYS:HB2	1.72	0.55
13:N:270:ARG:HG3	13:N:314:ILE:HG23	1.88	0.55
7:H:152:GLN:HE21	7:H:297:VAL:HG21	1.72	0.54
14:L:701:3PE:H342	12:M:481:TYR:HB2	1.88	0.54
1:A:11:ALA:HA	7:H:11:ILE:HG23	1.89	0.54
7:H:36:GLU:HG3	7:H:283:ILE:HG12	1.90	0.54
9:J:86:GLN:HG3	9:J:92:VAL:HG21	1.89	0.54
9:J:158:VAL:HG11	10:K:79:LEU:HD23	1.88	0.54
13:N:68:ARG:HD3	13:N:484:LEU:HB3	1.88	0.54
3:C:150:ASN:HD22	3:C:152:ARG:HE	1.55	0.54
6:G:53:TYR:HB3	6:G:58:ASP:HB3	1.88	0.54
11:L:260:THR:HB	11:L:335:LEU:HD11	1.88	0.54
2:B:200:GLU:O	2:B:204:LYS:HG2	2.07	0.54
5:F:217:ASN:HA	17:F:502:FMN:O3P	2.07	0.54
5:F:255:ARG:HD2	5:F:282:ARG:HH12	1.73	0.54
6:G:450:PRO:HD3	6:G:878:THR:HG21	1.89	0.54
9:J:90:PRO:HA	9:J:93:TRP:NE1	2.22	0.54
1:A:107:ILE:HD12	7:H:314:LEU:HD13	1.89	0.54
4:E:95:VAL:HG13	5:F:338:LEU:HD11	1.89	0.54
11:L:434:PHE:HB3	11:L:513:LEU:HD13	1.89	0.53
6:G:299:MET:HA	6:G:299:MET:HE2	1.91	0.53
3:C:25:LEU:HD11	3:C:60:LEU:HD21	1.90	0.53
13:N:83:ALA:HB2	13:N:334:LEU:HD11	1.88	0.53
3:C:90:ALA:HB2	3:C:112:ALA:HB1	1.91	0.53
3:C:222:SER:HB2	3:C:321:THR:HG21	1.91	0.53
5:F:184:THR:HB	5:F:198:ARG:HB2	1.90	0.53
4:E:115:ILE:HB	4:E:119:GLN:HG3	1.91	0.53
4:E:99:ILE:HG22	5:F:255:ARG:HG3	1.91	0.53
6:G:531:MET:O	6:G:623:ASN:HB2	2.09	0.53
12:M:314:LEU:O	12:M:318:THR:HG23	2.09	0.53
13:N:248:ILE:HG12	13:N:330:LEU:HD22	1.90	0.53
4:E:116:LYS:O	4:E:119:GLN:HG2	2.10	0.52
11:L:265:LEU:O	11:L:269:THR:HG22	2.09	0.52
11:L:392:VAL:HG23	11:L:393:THR:HG23	1.91	0.52
5:F:250:MET:HE1	5:F:266:PHE:HA	1.91	0.52
13:N:222:PRO:HD2	13:N:223:PHE:CE2	2.44	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:E:94:SER:HB2	16:E:201:FES:S2	2.48	0.52
12:M:357:ILE:HD13	12:M:467:MET:HE2	1.91	0.52
2:B:156:PRO:HG2	8:I:122:MET:HB2	1.91	0.52
3:C:383:MET:O	3:C:384:PRO:C	2.53	0.52
9:J:82:GLU:HA	9:J:87:TRP:HH2	1.74	0.52
14:L:702:3PE:H321	12:M:173:LYS:HA	1.92	0.52
11:L:526:ALA:HB3	11:L:527:PRO:HD3	1.91	0.52
13:N:248:ILE:HG23	13:N:330:LEU:HD13	1.92	0.52
11:L:34:GLY:HA2	11:L:121:ASN:HD21	1.75	0.52
5:F:165:PHE:CE2	5:F:167:PHE:HB2	2.45	0.52
1:A:81:GLU:HB3	1:A:110:LEU:HD21	1.92	0.51
11:L:429:THR:HG23	11:L:430:PHE:CD2	2.45	0.51
2:B:61:LEU:HB2	2:B:100:GLY:HA3	1.93	0.51
3:C:336:PHE:O	3:C:340:GLN:HG2	2.11	0.51
5:F:84:ILE:HG23	5:F:126:TYR:CE1	2.45	0.51
11:L:230:SER:HB3	11:L:316:ILE:HG21	1.93	0.51
2:B:180:ARG:HB2	2:B:193:TYR:HB2	1.92	0.51
3:C:299:VAL:HG11	3:C:363:GLY:HA2	1.93	0.51
5:F:340:ARG:HD2	5:F:369:ARG:HG2	1.93	0.51
7:H:75:PRO:HB2	7:H:78:SER:HB3	1.92	0.51
1:A:83:LEU:C	1:A:83:LEU:HD23	2.36	0.51
5:F:233:VAL:HG12	5:F:237:GLN:HE21	1.75	0.51
12:M:71:TRP:HB2	12:M:79:ILE:HG13	1.92	0.51
13:N:24:VAL:O	13:N:28:ILE:HG13	2.10	0.51
12:M:255:GLY:O	12:M:259:LEU:HG	2.10	0.51
3:C:511:LEU:HD21	6:G:104:PRO:HD3	1.92	0.50
11:L:284:GLY:HA2	11:L:321:LEU:HA	1.93	0.50
12:M:483:GLN:N	12:M:484:PRO:HD2	2.25	0.50
9:J:1:MET:HE2	10:K:2:ILE:HG12	1.93	0.50
11:L:92:VAL:HG22	11:L:257:THR:HG22	1.93	0.50
7:H:164:LEU:HD22	7:H:255:LEU:HD13	1.92	0.50
3:C:393:ALA:O	3:C:397:ASN:N	2.45	0.50
9:J:32:LEU:HD22	10:K:33:ILE:HG23	1.93	0.50
13:N:137:LEU:HD23	13:N:140:PHE:CD2	2.47	0.50
3:C:241:CYS:SG	3:C:569:PRO:HA	2.52	0.50
6:G:341:ILE:HG22	6:G:345:GLU:HB2	1.91	0.50
11:L:65:TRP:CD2	14:L:701:3PE:H322	2.47	0.50
13:N:162:LEU:HB3	13:N:216:PHE:CE1	2.47	0.50
13:N:438:GLU:CD	13:N:438:GLU:H	2.20	0.50
3:C:153:ARG:H	3:C:158:GLN:HE22	1.59	0.50
6:G:366:LEU:HD21	6:G:388:ARG:HB3	1.93	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:F:239:ILE:HG21	5:F:247:THR:HG23	1.92	0.50
6:G:594:ASP:HB3	6:G:601:MET:HE3	1.94	0.50
11:L:216:MET:HA	11:L:276:THR:HG21	1.93	0.50
11:L:389:LEU:HD12	11:L:390:PRO:HD2	1.93	0.50
3:C:318:TYR:CE2	3:C:466:LYS:HG3	2.47	0.50
8:I:44:TYR:HD2	8:I:118:PRO:HA	1.77	0.50
5:F:15:TRP:CH2	5:F:32:LYS:HB3	2.47	0.50
11:L:587:GLU:HG2	13:N:300:TYR:OH	2.12	0.50
3:C:280:GLU:HG3	3:C:359:PHE:CD2	2.46	0.49
3:C:543:TYR:HB3	3:C:556:ARG:HB3	1.94	0.49
3:C:568:ILE:HB	3:C:569:PRO:HD3	1.94	0.49
7:H:53:GLY:HA3	7:H:58:LEU:HB2	1.94	0.49
11:L:338:HIS:NE2	11:L:342:LYS:HG3	2.27	0.49
14:N:501:3PE:H232	14:N:501:3PE:H31	1.93	0.49
6:G:19:LEU:HD13	6:G:77:ILE:HG21	1.94	0.49
7:H:36:GLU:O	7:H:37:ARG:C	2.55	0.49
2:B:31:GLN:HG2	2:B:33:VAL:HG12	1.95	0.49
4:E:90:ARG:HA	4:E:129:LEU:O	2.12	0.49
9:J:159:GLY:O	10:K:85:ARG:NH2	2.46	0.49
11:L:254:HIS:O	11:L:255:ALA:C	2.56	0.49
12:M:175:PHE:CE2	12:M:179:GLN:HG3	2.48	0.49
3:C:164:PRO:HA	3:C:169:TYR:CD1	2.48	0.49
6:G:63:LEU:HD11	6:G:83:GLU:HG2	1.94	0.49
6:G:210:THR:HG22	6:G:830:VAL:HG21	1.94	0.49
6:G:220:ASP:O	6:G:242:ARG:HD3	2.12	0.49
11:L:243:MET:HE2	11:L:243:MET:HA	1.93	0.49
5:F:298:ASP:CG	5:F:410:SER:HB2	2.38	0.49
5:F:361:LEU:N	5:F:362:PRO:HD2	2.27	0.49
3:C:226:ALA:H	3:C:248:HIS:CE1	2.31	0.49
1:A:81:GLU:HG3	9:J:148:LEU:HD13	1.94	0.49
5:F:287:PHE:HZ	5:F:290:TRP:CD1	2.31	0.49
9:J:143:LEU:HB3	13:N:134:LEU:HD11	1.95	0.49
14:L:703:3PE:H2	14:L:703:3PE:H221	1.57	0.49
12:M:3:LEU:N	12:M:4:PRO:HD2	2.27	0.49
7:H:170:GLN:HE22	7:H:191:PRO:HB2	1.77	0.49
11:L:196:ASN:HD22	11:L:199:GLU:HG3	1.78	0.49
4:E:105:ILE:HG23	4:E:158:ILE:HD11	1.94	0.48
6:G:823:GLU:O	6:G:826:GLN:HG2	2.13	0.48
11:L:591:LEU:HD11	13:N:162:LEU:HG	1.95	0.48
7:H:257:PHE:CD1	7:H:278:PHE:HZ	2.31	0.48
9:J:4:ALA:HA	14:J:201:3PE:H381	1.95	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
12:M:145:MET:HG3	12:M:146:MET:N	2.27	0.48
6:G:221:MET:HB2	6:G:223:PHE:CE2	2.48	0.48
2:B:43:ASN:HD21	2:B:180:ARG:HA	1.77	0.48
3:C:506:GLN:HA	8:I:153:MET:HE2	1.95	0.48
6:G:811:ARG:HG2	6:G:881:GLN:HE21	1.77	0.48
7:H:32:MET:HE1	7:H:245:ILE:HG21	1.94	0.48
7:H:210:HIS:CE1	7:H:291:ARG:HG3	2.49	0.48
9:J:15:ALA:O	9:J:19:VAL:HG23	2.12	0.48
2:B:106:MET:O	2:B:110:ILE:HG13	2.14	0.48
4:E:158:ILE:N	4:E:159:PRO:HD2	2.29	0.48
11:L:1:MET:HG2	11:L:48:ILE:HG23	1.95	0.48
1:A:27:CYS:SG	7:H:88:MET:HA	2.54	0.48
3:C:193:LEU:HD12	3:C:193:LEU:H	1.78	0.48
11:L:107:MET:HE2	11:L:107:MET:HA	1.96	0.48
12:M:175:PHE:CD2	13:N:426:LEU:HD11	2.48	0.48
13:N:408:TRP:CG	14:N:501:3PE:H381	2.49	0.48
2:B:138:ILE:HG23	2:B:140:SER:H	1.79	0.47
3:C:205:GLY:C	3:C:207:GLU:H	2.22	0.47
11:L:78:ASN:HB2	11:L:134:ASP:OD2	2.14	0.47
12:M:287:ALA:HB3	12:M:288:PRO:HD3	1.96	0.47
13:N:11:LEU:HD11	13:N:63:VAL:HG11	1.95	0.47
5:F:38:ALA:HA	5:F:118:ILE:HG12	1.96	0.47
6:G:272:TYR:HA	6:G:275:LEU:HG	1.96	0.47
3:C:208:ASN:HB2	9:J:171:ARG:HE	1.80	0.47
7:H:167:VAL:HG13	7:H:188:ASN:HD22	1.78	0.47
9:J:138:VAL:O	9:J:141:VAL:HG22	2.14	0.47
2:B:67:GLU:HG3	2:B:159:PRO:HB2	1.96	0.47
5:F:234:GLU:CD	5:F:234:GLU:H	2.22	0.47
13:N:64:THR:HB	13:N:65:PRO:HD2	1.96	0.47
12:M:251:ALA:O	12:M:252:PRO:C	2.58	0.47
3:C:377:ARG:HD2	3:C:377:ARG:HA	1.63	0.47
3:C:568:ILE:HA	3:C:583:TYR:HE2	1.79	0.47
6:G:25:SER:OG	6:G:772:VAL:HG22	2.14	0.47
6:G:265:ARG:HA	6:G:831:PHE:HZ	1.80	0.47
5:F:315:GLY:HA2	5:F:319:SER:O	2.15	0.47
7:H:199:PHE:CE2	7:H:252:MET:HG2	2.48	0.47
11:L:255:ALA:HB1	11:L:339:ALA:HA	1.95	0.47
12:M:283:SER:HB2	12:M:500:PHE:HE1	1.80	0.47
2:B:36:ASN:HB3	2:B:39:MET:HB2	1.97	0.47
4:E:140:GLY:HA2	4:E:141:PRO:C	2.39	0.47
13:N:7:ASN:HB3	13:N:63:VAL:HG13	1.97	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
13:N:387:PRO:O	13:N:388:MET:HB2	2.14	0.47
3:C:231:LEU:HD23	3:C:241:CYS:HB3	1.97	0.47
4:E:12:PHE:HE2	4:E:14:LEU:HG	1.80	0.47
5:F:339:VAL:HG11	5:F:408:LEU:HD13	1.96	0.47
7:H:34:PHE:CE1	7:H:38:ARG:HG3	2.49	0.47
11:L:38:VAL:HG21	11:L:100:HIS:CE1	2.49	0.47
7:H:68:PHE:CD2	7:H:232:MET:HE3	2.50	0.46
7:H:289:LEU:HD12	7:H:290:PRO:HD2	1.97	0.46
9:J:132:THR:HA	9:J:136:PRO:HD2	1.97	0.46
12:M:2:LEU:HD13	12:M:42:LEU:HD11	1.97	0.46
12:M:47:TRP:HE1	12:M:488:THR:HG21	1.81	0.46
13:N:92:TYR:HB3	13:N:93:PRO:HD3	1.96	0.46
6:G:224:ALA:HB3	6:G:633:VAL:HG22	1.96	0.46
7:H:159:PHE:CE2	7:H:202:ALA:HB2	2.50	0.46
7:H:214:GLN:N	7:H:215:PRO:HD3	2.30	0.46
12:M:9:ILE:HB	12:M:10:PRO:HD3	1.97	0.46
1:A:80:VAL:O	1:A:83:LEU:HB3	2.16	0.46
3:C:335:ALA:O	3:C:336:PHE:C	2.57	0.46
6:G:351:LEU:HD21	6:G:511:GLN:HG3	1.98	0.46
7:H:105:PRO:HD3	7:H:260:TRP:CD2	2.50	0.46
12:M:1:MET:HE3	12:M:2:LEU:H	1.79	0.46
3:C:80:LEU:HD12	3:C:167:LYS:HB3	1.98	0.46
6:G:677:VAL:HG11	6:G:687:LYS:HB2	1.98	0.46
3:C:212:MET:HE3	3:C:212:MET:HB3	1.88	0.46
7:H:21:ILE:O	7:H:25:VAL:HG23	2.16	0.46
8:I:161:LYS:HD2	8:I:166:ALA:HB2	1.98	0.46
12:M:360:GLY:O	12:M:364:GLU:HG2	2.15	0.46
13:N:198:LEU:HD11	13:N:263:VAL:HA	1.97	0.46
14:L:702:3PE:H2G2	12:M:180:ALA:HB1	1.96	0.46
12:M:358:LEU:HD22	12:M:384:LEU:HG	1.98	0.46
1:A:126:THR:O	1:A:127:PRO:C	2.59	0.46
6:G:103:CYS:HB2	6:G:104:PRO:HD3	1.98	0.46
6:G:885:PRO:HB2	6:G:888:MET:CG	2.39	0.46
12:M:60:ILE:HD11	12:M:496:ILE:HA	1.98	0.46
6:G:155:TYR:O	6:G:159:ARG:HG3	2.16	0.46
6:G:470:PRO:HG2	6:G:797:THR:HA	1.98	0.46
7:H:148:ARG:HD3	9:J:166:GLU:OE1	2.16	0.46
13:N:35:PHE:HE1	13:N:448:TRP:HZ2	1.63	0.46
3:C:207:GLU:C	3:C:209:GLU:N	2.74	0.46
3:C:520:TRP:HA	6:G:708:ARG:HG3	1.98	0.46
9:J:79:SER:O	9:J:83:GLN:HG2	2.15	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
11:L:301:GLN:HB2	11:L:307:VAL:HG22	1.97	0.46
12:M:221:TYR:HE1	12:M:285:GLU:HG3	1.80	0.46
2:B:55:TRP:HB3	2:B:87:ARG:HG3	1.97	0.45
3:C:391:GLU:O	3:C:392:LYS:C	2.58	0.45
6:G:169:ASP:O	6:G:183:ARG:HA	2.16	0.45
9:J:85:ARG:HB3	9:J:88:LEU:HD12	1.98	0.45
12:M:322:HIS:CE1	12:M:395:THR:HG23	2.47	0.45
6:G:225:PRO:HG2	6:G:631:PHE:CD1	2.52	0.45
13:N:207:PHE:O	13:N:211:ILE:HG13	2.16	0.45
2:B:31:GLN:HB3	2:B:34:ASN:OD1	2.15	0.45
3:C:511:LEU:HD21	6:G:103:CYS:HB2	1.98	0.45
7:H:209:ARG:HG3	7:H:245:ILE:HD11	1.99	0.45
13:N:481:ALA:HB2	14:N:502:3PE:H251	1.98	0.45
6:G:434:VAL:HG11	6:G:814:PRO:HD2	1.97	0.45
2:B:145:VAL:HG22	2:B:149:ILE:HB	1.98	0.45
13:N:137:LEU:HD23	13:N:140:PHE:CE2	2.51	0.45
2:B:118:LEU:HB2	7:H:70:LYS:HE3	1.99	0.45
14:A:201:3PE:H241	9:J:44:PHE:CE2	2.51	0.45
13:N:288:ALA:HB2	13:N:300:TYR:HB2	1.98	0.45
4:E:98:HIS:HA	4:E:102:TYR:HD2	1.80	0.45
6:G:251:ASN:OD1	6:G:258:ASN:ND2	2.47	0.45
2:B:7:ARG:O	2:B:8:ILE:C	2.60	0.45
4:E:142:MET:HE3	4:E:142:MET:HB3	1.86	0.45
5:F:116:MET:CE	5:F:169:LEU:HD21	2.47	0.45
11:L:70:VAL:O	11:L:70:VAL:HG12	2.17	0.45
13:N:51:SER:HA	13:N:54:PHE:HD2	1.82	0.45
11:L:75:ILE:HG13	11:L:137:LEU:HD23	1.98	0.45
11:L:608:LEU:HA	11:L:611:VAL:HG22	1.99	0.45
2:B:66:VAL:O	2:B:69:VAL:HG22	2.16	0.44
3:C:373:ASP:OD1	3:C:373:ASP:N	2.49	0.44
6:G:133:ARG:HD2	6:G:135:HIS:HE1	1.79	0.44
6:G:361:ILE:HG23	6:G:527:VAL:HG13	1.99	0.44
7:H:210:HIS:CD2	7:H:286:ARG:HA	2.52	0.44
9:J:82:GLU:HA	9:J:87:TRP:CH2	2.52	0.44
11:L:551:LYS:HB2	11:L:552:PRO:HD3	1.98	0.44
13:N:57:GLN:NE2	14:N:502:3PE:O32	2.50	0.44
2:B:212:THR:HA	8:I:141:GLY:HA3	1.98	0.44
5:F:302:GLU:HG3	5:F:305:LEU:HD12	1.99	0.44
5:F:406:GLU:N	5:F:407:PRO:HD2	2.33	0.44
7:H:101:VAL:HG11	7:H:250:ALA:HB1	1.99	0.44
12:M:281:ASN:ND2	12:M:504:VAL:HA	2.32	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
7:H:7:GLU:O	7:H:11:ILE:HG13	2.16	0.44
3:C:311:ARG:HA	3:C:536:THR:HG22	1.99	0.44
4:E:109:LEU:HD21	4:E:143:MET:HE1	2.00	0.44
6:G:230:GLN:HE22	6:G:272:TYR:HE1	1.66	0.44
6:G:317:SER:HB3	6:G:569:ASN:HB2	1.98	0.44
6:G:668:GLN:NE2	6:G:670:ASP:OD2	2.51	0.44
12:M:328:ILE:O	12:M:332:THR:HG23	2.17	0.44
13:N:315:ALA:HB3	13:N:401:VAL:HG12	2.00	0.44
3:C:497:THR:HG23	3:C:517:GLN:HB3	1.99	0.44
3:C:562:PHE:HA	3:C:594:VAL:HG13	1.99	0.44
6:G:388:ARG:HD2	6:G:388:ARG:HA	1.85	0.44
7:H:253:VAL:HG12	7:H:259:GLY:HA2	1.99	0.44
11:L:292:LEU:HD21	11:L:420:VAL:HG23	1.99	0.44
3:C:205:GLY:C	3:C:207:GLU:N	2.76	0.44
3:C:572:ILE:HD12	3:C:572:ILE:HA	1.90	0.44
11:L:297:ALA:O	11:L:301:GLN:HG2	2.17	0.44
12:M:294:GLY:O	12:M:298:ILE:HG13	2.18	0.44
12:M:396:LEU:HD11	12:M:398:MET:HE2	2.00	0.44
2:B:17:TYR:O	2:B:18:PRO:C	2.60	0.44
5:F:116:MET:HE1	5:F:130:ILE:HD11	1.99	0.44
6:G:776:LEU:HD12	6:G:781:PRO:HD3	2.00	0.44
11:L:613:ARG:HG3	13:N:199:ASN:HB3	2.00	0.44
12:M:158:GLY:HA3	12:M:167:ARG:HD2	2.00	0.44
3:C:50:ARG:HD2	3:C:119:HIS:O	2.17	0.44
3:C:152:ARG:CZ	3:C:200:TRP:HA	2.48	0.44
6:G:237:ILE:HG13	6:G:239:PRO:HD3	1.99	0.44
3:C:100:SER:CB	3:C:103:ARG:HG2	2.46	0.43
7:H:33:SER:HB2	7:H:238:PHE:CZ	2.53	0.43
11:L:390:PRO:HA	11:L:396:PHE:CD1	2.53	0.43
14:L:703:3PE:H3I1	14:M:601:3PE:H2A1	2.00	0.43
2:B:87:ARG:HD2	2:B:92:GLN:HB3	2.00	0.43
3:C:475:ARG:O	3:C:479:GLN:HG3	2.19	0.43
5:F:159:ASN:ND2	5:F:162:GLY:HA2	2.33	0.43
13:N:142:LEU:O	13:N:238:VAL:HG21	2.18	0.43
13:N:220:LEU:HD21	13:N:306:LEU:HB3	2.00	0.43
7:H:293:ARG:HB2	7:H:296:GLN:HG3	2.00	0.43
14:L:701:3PE:H352	12:M:480:PHE:HB2	1.99	0.43
12:M:47:TRP:NE1	12:M:488:THR:HG21	2.33	0.43
12:M:51:GLY:O	12:M:55:THR:HG23	2.18	0.43
12:M:393:VAL:O	12:M:396:LEU:HG	2.18	0.43
13:N:350:PRO:HD3	13:N:445:PRO:HG3	1.99	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:117:LEU:HD11	9:J:152:LEU:HD21	2.00	0.43
3:C:412:ALA:HB1	3:C:430:ILE:HD11	1.99	0.43
13:N:53:TRP:O	13:N:57:GLN:HG2	2.17	0.43
4:E:94:SER:HB3	5:F:96:PRO:HB3	2.01	0.43
5:F:327:MET:HE2	5:F:327:MET:HB3	1.85	0.43
11:L:195:LEU:HD23	11:L:195:LEU:HA	1.86	0.43
12:M:200:THR:OG1	12:M:201:GLY:N	2.52	0.43
13:N:375:VAL:O	13:N:379:MET:HG2	2.18	0.43
3:C:165:LEU:HD23	3:C:165:LEU:HA	1.86	0.43
8:I:86:ARG:HG3	8:I:151:TYR:CE2	2.54	0.43
12:M:1:MET:SD	12:M:65:SER:HB3	2.59	0.43
8:I:93:ARG:HE	8:I:93:ARG:HB2	1.61	0.43
8:I:161:LYS:HE2	8:I:161:LYS:HB3	1.87	0.43
11:L:102:TYR:HA	11:L:452:THR:O	2.18	0.43
11:L:363:PHE:C	11:L:365:MET:H	2.27	0.43
2:B:48:TRP:HA	2:B:51:LYS:HE3	2.01	0.43
2:B:87:ARG:C	2:B:89:SER:N	2.77	0.43
3:C:185:LYS:O	3:C:189:GLU:HG2	2.18	0.43
5:F:287:PHE:CZ	5:F:290:TRP:HB3	2.52	0.43
6:G:43:GLY:HA2	16:G:1004:FES:S2	2.59	0.43
6:G:48:CYS:HB2	6:G:66:SER:OG	2.19	0.43
8:I:82:THR:HB	8:I:84:ASP:OD1	2.19	0.43
14:L:702:3PE:H2H2	14:L:702:3PE:H3C1	2.00	0.43
13:N:418:SER:O	13:N:422:LEU:HG	2.19	0.43
13:N:447:ASN:ND2	13:N:449:GLN:HB2	2.34	0.43
14:A:201:3PE:H112	9:J:49:TYR:HE2	1.84	0.42
3:C:520:TRP:CZ2	6:G:218:LYS:HD3	2.54	0.42
1:A:123:LEU:HD23	1:A:123:LEU:HA	1.91	0.42
6:G:89:GLU:HG3	6:G:123:HIS:HB2	2.01	0.42
12:M:144:GLU:OE1	12:M:182:GLY:HA3	2.20	0.42
12:M:215:MET:HB2	12:M:219:VAL:HG13	2.01	0.42
2:B:169:LEU:HD23	2:B:169:LEU:HA	1.89	0.42
3:C:103:ARG:O	3:C:105:ARG:HG2	2.19	0.42
5:F:131:PHE:CE2	5:F:180:CYS:HB3	2.54	0.42
5:F:429:ASN:ND2	6:G:126:ARG:O	2.51	0.42
13:N:236:ALA:HB3	13:N:237:PRO:HD3	2.00	0.42
3:C:132:TRP:HB3	3:C:562:PHE:CZ	2.54	0.42
5:F:130:ILE:HD12	5:F:171:VAL:HG22	2.01	0.42
2:B:96:MET:HE1	2:B:149:ILE:HD13	2.02	0.42
4:E:87:HIS:HB2	4:E:126:PHE:CD1	2.54	0.42
6:G:145:SER:HB2	6:G:209:LYS:HG2	2.01	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
7:H:168:VAL:HG11	7:H:174:PHE:CE1	2.54	0.42
9:J:10:LEU:O	9:J:11:ILE:C	2.61	0.42
9:J:54:LEU:O	9:J:58:VAL:HG22	2.19	0.42
12:M:143:TRP:CZ2	12:M:234:LYS:HD2	2.54	0.42
13:N:380:MET:HA	13:N:380:MET:HE2	2.00	0.42
6:G:433:ASN:O	6:G:448:ARG:HA	2.19	0.42
3:C:113:LEU:HD21	3:C:120:VAL:HG22	2.01	0.42
2:B:176:ILE:O	2:B:179:GLU:HG2	2.20	0.42
6:G:278:ARG:HH21	6:G:595:HIS:HB2	1.83	0.42
6:G:617:ASP:HB2	6:G:669:LEU:HD22	2.02	0.42
7:H:67:MET:HB2	7:H:232:MET:HE2	2.02	0.42
11:L:102:TYR:CD1	11:L:347:LEU:HD22	2.55	0.42
13:N:85:LEU:O	13:N:89:THR:HG23	2.18	0.42
3:C:385:LYS:HE2	3:C:385:LYS:HB3	1.87	0.42
4:E:144:MET:HE2	4:E:144:MET:HB3	1.98	0.42
5:F:385:GLU:OE2	5:F:416:ARG:NH2	2.53	0.42
17:F:502:FMN:H9	17:F:502:FMN:H1'1	1.82	0.42
11:L:342:LYS:HA	11:L:342:LYS:HD3	1.80	0.42
3:C:61:LYS:HE2	3:C:61:LYS:HB3	1.80	0.42
5:F:233:VAL:HG12	5:F:237:GLN:NE2	2.35	0.42
7:H:211:PRO:HD2	7:H:212:PHE:CD2	2.54	0.42
11:L:403:LEU:HB3	11:L:493:LEU:HD11	2.02	0.42
4:E:44:GLN:O	4:E:48:GLY:N	2.46	0.41
11:L:432:MET:HE2	11:L:432:MET:HB3	1.94	0.41
14:M:602:3PE:H122	14:M:602:3PE:H31	2.02	0.41
13:N:20:THR:HA	13:N:23:VAL:HG12	2.02	0.41
3:C:265:ILE:HB	3:C:266:PRO:HD3	2.02	0.41
3:C:460:TYR:O	3:C:464:MET:HG2	2.19	0.41
5:F:5:ILE:H	5:F:5:ILE:HG13	1.65	0.41
5:F:9:GLU:CD	5:F:9:GLU:H	2.28	0.41
5:F:290:TRP:CZ3	5:F:292:PRO:HA	2.55	0.41
6:G:372:TYR:CD2	6:G:495:LYS:HG2	2.54	0.41
12:M:484:PRO:O	12:M:488:THR:HG23	2.21	0.41
13:N:63:VAL:HG12	13:N:64:THR:HG23	2.01	0.41
1:A:66:ALA:H	9:J:161:GLU:HG3	1.85	0.41
2:B:106:MET:HE2	3:C:247:TYR:HB3	2.02	0.41
3:C:281:MET:N	3:C:282:PRO:HD2	2.35	0.41
6:G:860:PHE:HA	6:G:902:ASP:O	2.19	0.41
10:K:82:GLN:NE2	10:K:86:ARG:HE	2.17	0.41
12:M:61:PRO:HB2	12:M:63:TRP:NE1	2.35	0.41
12:M:221:TYR:HE2	14:M:602:3PE:H322	1.84	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
13:N:11:LEU:HD21	13:N:63:VAL:HG21	2.02	0.41
5:F:298:ASP:OD2	5:F:410:SER:HB2	2.20	0.41
6:G:361:ILE:HD13	6:G:517:ALA:HB1	2.02	0.41
10:K:72:GLU:HG3	13:N:137:LEU:HD21	2.02	0.41
11:L:513:LEU:HA	11:L:513:LEU:HD12	1.75	0.41
14:L:702:3PE:H3F2	12:M:240:LEU:HD11	2.02	0.41
13:N:265:ASP:HA	13:N:270:ARG:HH12	1.85	0.41
1:A:88:TRP:HB2	9:J:134:PHE:CE1	2.56	0.41
2:B:148:PHE:CD2	2:B:149:ILE:HG13	2.56	0.41
2:B:159:PRO:HA	2:B:160:PRO:HD3	1.94	0.41
5:F:220:GLU:O	5:F:224:ASN:ND2	2.52	0.41
5:F:353:TRP:HZ2	6:G:42:VAL:HB	1.85	0.41
2:B:98:VAL:HG21	2:B:145:VAL:HG21	2.03	0.41
5:F:250:MET:HB2	5:F:264:LEU:HD12	2.03	0.41
7:H:292:PRO:HG2	7:H:297:VAL:CG1	2.50	0.41
13:N:114:LEU:HD12	13:N:114:LEU:HA	1.87	0.41
3:C:507:HIS:NE2	5:F:430:THR:HG22	2.36	0.41
4:E:98:HIS:HA	4:E:102:TYR:CD2	2.56	0.41
8:I:109:CYS:HB3	8:I:111:THR:H	1.85	0.41
11:L:12:LEU:HD12	11:L:12:LEU:HA	1.94	0.41
11:L:139:MET:HE2	11:L:139:MET:HB3	1.93	0.41
13:N:8:LEU:HD12	13:N:8:LEU:HA	1.94	0.41
1:A:65:SER:HB2	9:J:165:GLY:O	2.21	0.41
2:B:161:ARG:HG3	2:B:162:PRO:HD2	2.02	0.41
3:C:25:LEU:HD12	3:C:59:PHE:HE2	1.86	0.41
3:C:34:PHE:HB2	3:C:46:VAL:HG13	2.02	0.41
3:C:424:GLY:O	3:C:428:THR:HG23	2.20	0.41
3:C:427:ALA:HA	3:C:453:GLY:HA3	2.02	0.41
11:L:385:ALA:HA	11:L:393:THR:HB	2.03	0.41
11:L:423:PHE:HB2	11:L:500:VAL:HG13	2.02	0.41
2:B:34:ASN:OD1	2:B:34:ASN:N	2.49	0.41
2:B:107:ALA:HB3	2:B:108:PRO:HD3	2.02	0.41
5:F:36:GLU:HG3	5:F:40:LYS:HE3	2.01	0.41
5:F:76:MET:HG3	5:F:77:PRO:HD2	2.03	0.41
5:F:357:CYS:HB2	5:F:401:ALA:HB2	2.02	0.41
8:I:110:PRO:HG2	8:I:111:THR:HG23	2.03	0.41
12:M:35:THR:O	12:M:39:THR:HG23	2.20	0.41
12:M:148:VAL:N	12:M:149:PRO:HD2	2.36	0.41
12:M:264:LEU:HD13	12:M:264:LEU:HA	1.85	0.41
12:M:311:ILE:O	12:M:315:ILE:HG13	2.21	0.41
12:M:365:ARG:NH1	12:M:464:GLU:OE1	2.54	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:C:520:TRP:HZ2	6:G:218:LYS:HD3	1.86	0.41
6:G:390:ALA:O	6:G:394:ARG:HG3	2.21	0.41
6:G:650:ARG:NH1	6:G:667:THR:O	2.54	0.41
6:G:714:ALA:O	8:I:93:ARG:HD2	2.21	0.41
6:G:829:PRO:O	6:G:832:GLN:HG2	2.21	0.41
11:L:81:LEU:HD11	11:L:86:LEU:HB2	2.03	0.41
11:L:82:ASP:OD2	11:L:268:ARG:NH1	2.37	0.41
11:L:376:TYR:CZ	11:L:380:LEU:HD11	2.55	0.41
1:A:39:GLY:HA2	2:B:185:TRP:HB3	2.04	0.40
3:C:53:LEU:HD23	3:C:121:PRO:HG2	2.04	0.40
3:C:421:THR:HB	3:C:539:ILE:HG13	2.03	0.40
6:G:291:ILE:N	6:G:291:ILE:HD12	2.36	0.40
11:L:204:ALA:HB3	11:L:205:PRO:HD3	2.02	0.40
12:M:235:MET:HE3	12:M:235:MET:HB2	1.92	0.40
14:N:501:3PE:H31	14:N:501:3PE:H321	1.70	0.40
1:A:16:PHE:HD2	14:A:201:3PE:H322	1.86	0.40
3:C:559:THR:HB	3:C:593:ASP:CG	2.46	0.40
8:I:40:LEU:HD11	8:I:120:PHE:HD2	1.86	0.40
11:L:194:THR:HG21	11:L:203:LEU:HD12	2.03	0.40
2:B:115:ASP:OD2	3:C:185:LYS:NZ	2.54	0.40
3:C:168:ASP:HA	6:G:700:GLN:HG2	2.02	0.40
3:C:328:ALA:N	3:C:397:ASN:HD21	2.18	0.40
5:F:330:ASP:OD1	5:F:333:ILE:HG12	2.21	0.40
7:H:51:ARG:HD3	7:H:51:ARG:HA	1.80	0.40
8:I:109:CYS:HB3	8:I:112:THR:H	1.86	0.40
11:L:399:LYS:HE3	11:L:399:LYS:HB2	1.97	0.40
14:L:704:3PE:H252	14:L:704:3PE:H221	1.90	0.40
13:N:21:VAL:HG22	13:N:110:LEU:HB3	2.03	0.40
13:N:289:LEU:HD12	13:N:289:LEU:HA	1.85	0.40
5:F:113:VAL:HG13	5:F:156:LEU:HD11	2.04	0.40
6:G:222:GLN:HE22	6:G:736:PHE:HD1	1.69	0.40
6:G:882:VAL:HG21	6:G:900:LEU:HD12	2.03	0.40
13:N:286:LEU:HD23	13:N:286:LEU:HA	1.94	0.40
2:B:60:GLY:HA2	2:B:65:TYR:HB2	2.02	0.40
4:E:84:VAL:HG23	4:E:127:THR:HG21	2.04	0.40
6:G:48:CYS:HB2	6:G:66:SER:HG	1.87	0.40
6:G:224:ALA:HB2	6:G:633:VAL:HA	2.03	0.40
12:M:36:MET:SD	12:M:124:LEU:HD13	2.61	0.40
12:M:315:ILE:HD13	12:M:355:LEU:HB3	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 PDB entries followed by that with respect to all EM entries.

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	102/147 (69%)	101 (99%)	1 (1%)	0	100	100
2	B	194/220 (88%)	178 (92%)	16 (8%)	0	100	100
3	C	583/596 (98%)	563 (97%)	20 (3%)	0	100	100
4	E	154/166 (93%)	148 (96%)	6 (4%)	0	100	100
5	F	440/461 (95%)	424 (96%)	16 (4%)	0	100	100
6	G	905/908 (100%)	866 (96%)	38 (4%)	1 (0%)	48	59
7	H	316/325 (97%)	302 (96%)	14 (4%)	0	100	100
8	I	147/180 (82%)	141 (96%)	5 (3%)	1 (1%)	18	20
9	J	174/184 (95%)	172 (99%)	2 (1%)	0	100	100
10	K	98/100 (98%)	95 (97%)	3 (3%)	0	100	100
11	L	611/613 (100%)	579 (95%)	31 (5%)	1 (0%)	43	52
12	M	503/509 (99%)	488 (97%)	15 (3%)	0	100	100
13	N	483/485 (100%)	474 (98%)	8 (2%)	1 (0%)	43	52
All	All	4710/4894 (96%)	4531 (96%)	175 (4%)	4 (0%)	49	59

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
13	N	388	MET
11	L	373	PRO
6	G	257	VAL
8	I	139	ILE

### 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 PDB entries followed by that with respect to all EM entries.

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	82/119 (69%)	80 (98%)	2 (2%)	43	57
2	B	177/192 (92%)	175 (99%)	2 (1%)	65	79
3	C	506/515 (98%)	497 (98%)	9 (2%)	51	66
4	E	129/139 (93%)	127 (98%)	2 (2%)	55	70
5	F	355/372 (95%)	353 (99%)	2 (1%)	78	87
6	G	735/736 (100%)	724 (98%)	11 (2%)	57	72
7	H	265/269 (98%)	263 (99%)	2 (1%)	73	84
8	I	128/154 (83%)	126 (98%)	2 (2%)	55	70
9	J	139/146 (95%)	139 (100%)	0	100	100
10	K	79/79 (100%)	78 (99%)	1 (1%)	61	76
11	L	485/485 (100%)	484 (100%)	1 (0%)	87	94
12	M	414/418 (99%)	408 (99%)	6 (1%)	59	73
13	N	385/385 (100%)	384 (100%)	1 (0%)	86	92
All	All	3879/4009 (97%)	3838 (99%)	41 (1%)	63	79

All (41) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	83	LEU
1	A	126	THR
2	B	17	TYR
2	B	63	CYS
3	C	8	GLU
3	C	106	ASP
3	C	120	VAL
3	C	230	VAL
3	C	250	ARG
3	C	295	VAL
3	C	382	TRP
3	C	527	ASN
3	C	579	ASP
4	E	95	VAL
4	E	136	ASN
5	F	5	ILE
5	F	252	PHE
6	G	42	VAL

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Mol	Chain	Res	Type
6	G	106	CYS
6	G	133	ARG
6	G	172	VAL
6	G	231	CYS
6	G	341	ILE
6	G	564	VAL
6	G	597	ARG
6	G	602	GLU
6	G	617	ASP
6	G	716	ARG
7	H	204	VAL
7	H	211	PRO
8	I	77	LEU
8	I	109	CYS
10	K	95	VAL
11	L	234	PRO
12	M	174	PHE
12	M	262	ILE
12	M	264	LEU
12	M	303	TRP
12	M	418	VAL
12	M	468	ILE
13	N	121	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (64) such sidechains are listed below:

Mol	Chain	Res	Type
2	B	31	GLN
2	B	52	ASN
2	B	111	GLN
2	B	190	GLN
2	B	198	GLN
3	C	12	GLN
3	C	16	HIS
3	C	52	GLN
3	C	158	GLN
3	C	215	ASN
3	C	248	HIS
3	C	397	ASN
3	C	482	ASN
3	C	531	GLN
3	C	540	ASN

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
4	E	24	HIS
4	E	46	GLN
4	E	78	GLN
4	E	100	ASN
4	E	136	ASN
4	E	150	HIS
5	F	237	GLN
5	F	238	ASN
5	F	291	GLN
6	G	5	HIS
6	G	135	HIS
6	G	176	HIS
6	G	336	ASN
6	G	395	GLN
6	G	420	ASN
6	G	671	HIS
6	G	700	GLN
6	G	804	GLN
6	G	826	GLN
6	G	832	GLN
6	G	881	GLN
7	H	152	GLN
7	H	170	GLN
7	H	208	HIS
7	H	226	HIS
7	H	312	ASN
10	K	40	ASN
10	K	82	GLN
10	K	89	ASN
11	L	58	GLN
11	L	74	ASN
11	L	78	ASN
11	L	121	ASN
11	L	163	ASN
11	L	196	ASN
11	L	232	GLN
11	L	357	HIS
11	L	409	ASN
11	L	411	HIS
11	L	442	GLN
12	M	45	GLN
12	M	250	GLN

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Mol	Chain	Res	Type
12	M	281	ASN
12	M	308	GLN
12	M	322	HIS
12	M	455	GLN
12	M	498	GLN
13	N	123	ASN
13	N	305	HIS

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

### 5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

### 5.6 Ligand geometry [i](#)

Of 23 ligands modelled in this entry, 3 are monoatomic - leaving 20 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z  > 2$	Counts	RMSZ	$\# Z  > 2$
17	FMN	F	502	-	33,33,33	0.35	0	48,50,50	0.43	0
14	3PE	L	703	-	46,46,50	0.31	0	49,51,55	0.44	0
15	SF4	G	1003	6	0,12,12	-	-	-	-	-
14	3PE	N	502	-	50,50,50	0.28	0	53,55,55	0.33	0
15	SF4	G	1001	6	0,12,12	-	-	-	-	-
14	3PE	M	601	-	38,38,50	0.31	0	41,43,55	0.37	0
14	3PE	J	201	-	41,41,50	0.31	0	44,46,55	0.33	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
14	3PE	L	701	-	39,39,50	0.31	0	42,44,55	0.33	0
15	SF4	B	301	2	0,12,12	-	-	-	-	-
14	3PE	M	602	-	36,36,50	0.32	0	39,41,55	0.37	0
15	SF4	G	1002	6	0,12,12	-	-	-	-	-
15	SF4	F	501	5	0,12,12	-	-	-	-	-
14	3PE	N	501	-	46,46,50	0.29	0	49,51,55	0.41	0
14	3PE	A	201	-	35,35,50	0.33	0	38,40,55	0.36	0
15	SF4	I	201	8	0,12,12	-	-	-	-	-
14	3PE	L	704	-	50,50,50	0.30	0	53,55,55	0.32	0
15	SF4	I	202	8	0,12,12	-	-	-	-	-
16	FES	G	1004	6	0,4,4	-	-	-	-	-
14	3PE	L	702	-	50,50,50	0.30	0	53,55,55	0.32	0
16	FES	E	201	4	0,4,4	-	-	-	-	-

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
17	FMN	F	502	-	-	9/18/18/18	0/3/3/3
14	3PE	L	703	-	-	9/50/50/54	-
15	SF4	G	1003	6	-	-	0/6/5/5
14	3PE	N	502	-	-	7/54/54/54	-
15	SF4	G	1001	6	-	-	0/6/5/5
14	3PE	M	601	-	-	8/42/42/54	-
14	3PE	J	201	-	-	9/45/45/54	-
14	3PE	L	701	-	-	6/43/43/54	-
15	SF4	B	301	2	-	-	0/6/5/5
14	3PE	M	602	-	-	13/40/40/54	-
15	SF4	G	1002	6	-	-	0/6/5/5
15	SF4	F	501	5	-	-	0/6/5/5
14	3PE	N	501	-	-	15/50/50/54	-
14	3PE	A	201	-	-	9/39/39/54	-
15	SF4	I	201	8	-	-	0/6/5/5
14	3PE	L	704	-	-	32/54/54/54	-
15	SF4	I	202	8	-	-	0/6/5/5
16	FES	G	1004	6	-	-	0/1/1/1
14	3PE	L	702	-	-	15/54/54/54	-
16	FES	E	201	4	-	-	0/1/1/1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (132) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
14	L	701	3PE	C2-C1-O11-P
14	L	702	3PE	C1-O11-P-O14
14	L	702	3PE	C12-C11-O13-P
14	L	702	3PE	O32-C31-O31-C3
14	L	702	3PE	C32-C31-O31-C3
14	L	702	3PE	C22-C21-O21-C2
14	L	703	3PE	O22-C21-O21-C2
14	L	703	3PE	C22-C21-O21-C2
14	M	601	3PE	C22-C21-O21-C2
14	M	602	3PE	C1-O11-P-O13
14	M	602	3PE	C1-O11-P-O14
14	N	501	3PE	C1-O11-P-O12
14	N	501	3PE	C1-O11-P-O13
14	N	501	3PE	C1-O11-P-O14
14	N	501	3PE	O32-C31-O31-C3
14	N	501	3PE	C32-C31-O31-C3
14	N	501	3PE	O22-C21-O21-C2
14	N	501	3PE	C22-C21-O21-C2
17	F	502	FMN	N10-C1'-C2'-O2'
17	F	502	FMN	C3'-C4'-C5'-O5'
17	F	502	FMN	O4'-C4'-C5'-O5'
17	F	502	FMN	C5'-O5'-P-O1P
17	F	502	FMN	C5'-O5'-P-O2P
17	F	502	FMN	C5'-O5'-P-O3P
14	J	201	3PE	O32-C31-O31-C3
14	M	601	3PE	O32-C31-O31-C3
14	L	702	3PE	O22-C21-O21-C2
14	M	601	3PE	O22-C21-O21-C2
14	M	601	3PE	C32-C31-O31-C3
14	J	201	3PE	C32-C31-O31-C3
14	L	704	3PE	C32-C33-C34-C35
14	A	201	3PE	C32-C31-O31-C3
14	L	704	3PE	C21-C22-C23-C24
14	M	602	3PE	C21-C22-C23-C24
14	J	201	3PE	C22-C21-O21-C2
14	M	602	3PE	C22-C21-O21-C2
14	A	201	3PE	O32-C31-O31-C3

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Mol	Chain	Res	Type	Atoms
14	L	704	3PE	C24-C25-C26-C27
14	A	201	3PE	C22-C21-O21-C2
14	J	201	3PE	O22-C21-O21-C2
14	M	602	3PE	O22-C21-O21-C2
14	L	702	3PE	C26-C27-C28-C29
14	L	704	3PE	C28-C29-C2A-C2B
14	A	201	3PE	O22-C21-O21-C2
14	L	704	3PE	C3B-C3C-C3D-C3E
14	L	704	3PE	C25-C26-C27-C28
14	L	704	3PE	C39-C3A-C3B-C3C
14	L	704	3PE	C3A-C3B-C3C-C3D
14	N	502	3PE	C22-C21-O21-C2
14	N	502	3PE	O22-C21-O21-C2
14	L	704	3PE	C31-C32-C33-C34
14	M	602	3PE	C2-C1-O11-P
14	L	704	3PE	C35-C36-C37-C38
14	L	704	3PE	C1-C2-C3-O31
14	M	601	3PE	C1-C2-C3-O31
14	L	704	3PE	C38-C39-C3A-C3B
14	L	704	3PE	C37-C38-C39-C3A
14	M	602	3PE	C23-C24-C25-C26
14	L	704	3PE	C29-C2A-C2B-C2C
14	N	501	3PE	C33-C34-C35-C36
14	J	201	3PE	C1-C2-C3-O31
14	L	704	3PE	C22-C23-C24-C25
14	L	702	3PE	O11-C1-C2-O21
14	L	704	3PE	O11-C1-C2-O21
14	N	501	3PE	C32-C33-C34-C35
14	L	703	3PE	C38-C39-C3A-C3B
14	L	704	3PE	C2B-C2C-C2D-C2E
14	L	701	3PE	C12-C11-O13-P
14	M	601	3PE	C12-C11-O13-P
14	M	602	3PE	C12-C11-O13-P
14	N	501	3PE	C12-C11-O13-P
14	J	201	3PE	O21-C2-C3-O31
14	L	704	3PE	C2D-C2E-C2F-C2G
14	L	704	3PE	O11-C1-C2-C3
14	L	703	3PE	C32-C33-C34-C35
17	F	502	FMN	N10-C1'-C2'-C3'
14	N	501	3PE	C2-C1-O11-P
14	A	201	3PE	C22-C23-C24-C25
14	L	702	3PE	C21-C22-C23-C24

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Mol	Chain	Res	Type	Atoms
14	A	201	3PE	C21-C22-C23-C24
14	L	704	3PE	C2A-C2B-C2C-C2D
14	L	703	3PE	C11-O13-P-O14
14	M	602	3PE	C1-O11-P-O12
14	M	602	3PE	C34-C35-C36-C37
14	L	703	3PE	C3C-C3D-C3E-C3F
14	M	602	3PE	C3-C2-O21-C21
14	L	704	3PE	C26-C27-C28-C29
14	L	702	3PE	C36-C37-C38-C39
14	N	501	3PE	C27-C28-C29-C2A
14	L	704	3PE	C3E-C3F-C3G-C3H
14	L	702	3PE	C2-C1-O11-P
14	L	704	3PE	O21-C2-C3-O31
14	M	601	3PE	O21-C2-C3-O31
14	L	702	3PE	C3B-C3C-C3D-C3E
14	N	501	3PE	C3C-C3D-C3E-C3F
14	L	704	3PE	C32-C31-O31-C3
14	J	201	3PE	C24-C25-C26-C27
14	L	702	3PE	C27-C28-C29-C2A
14	L	704	3PE	O22-C21-O21-C2
14	L	701	3PE	C23-C24-C25-C26
17	F	502	FMN	O2'-C2'-C3'-C4'
14	J	201	3PE	C2-C3-O31-C31
14	L	704	3PE	O32-C31-O31-C3
14	J	201	3PE	C26-C27-C28-C29
14	A	201	3PE	C26-C27-C28-C29
14	L	702	3PE	O11-C1-C2-C3
14	L	701	3PE	C22-C23-C24-C25
14	N	502	3PE	C37-C38-C39-C3A
14	N	501	3PE	C25-C26-C27-C28
14	N	502	3PE	C3B-C3C-C3D-C3E
14	N	502	3PE	C32-C31-O31-C3
14	N	501	3PE	C3-C2-O21-C21
14	L	702	3PE	C31-C32-C33-C34
14	N	502	3PE	O32-C31-O31-C3
14	L	703	3PE	C3F-C3G-C3H-C3I
14	L	704	3PE	C3C-C3D-C3E-C3F
14	N	502	3PE	C35-C36-C37-C38
14	L	701	3PE	C36-C37-C38-C39
14	L	704	3PE	C22-C21-O21-C2
17	F	502	FMN	O2'-C2'-C3'-O3'
14	L	704	3PE	O31-C31-C32-C33

*Continued on next page...*

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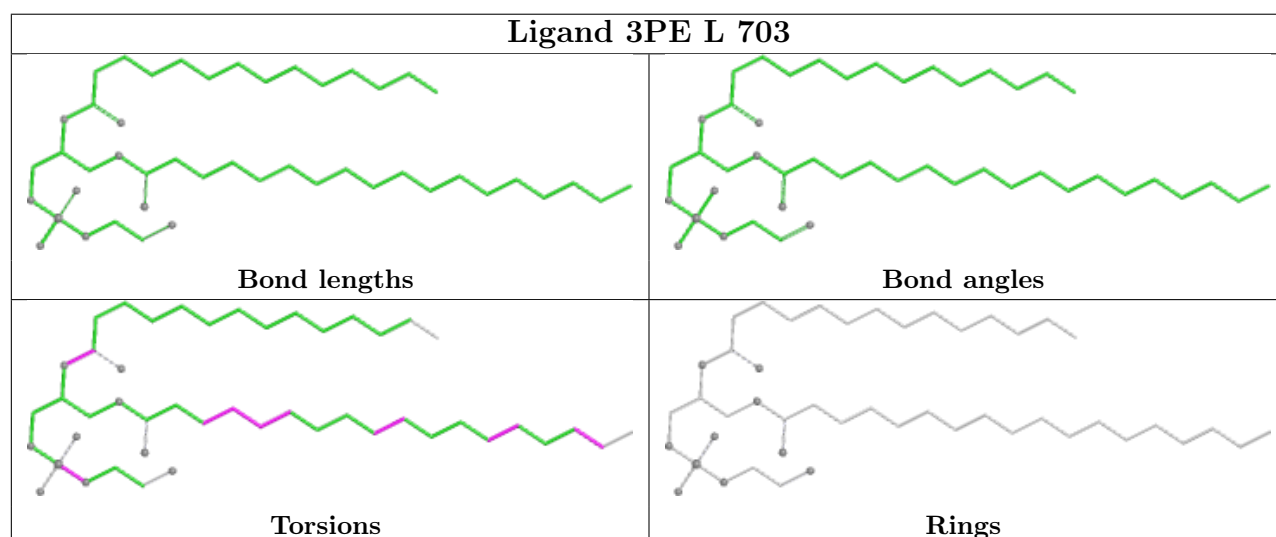
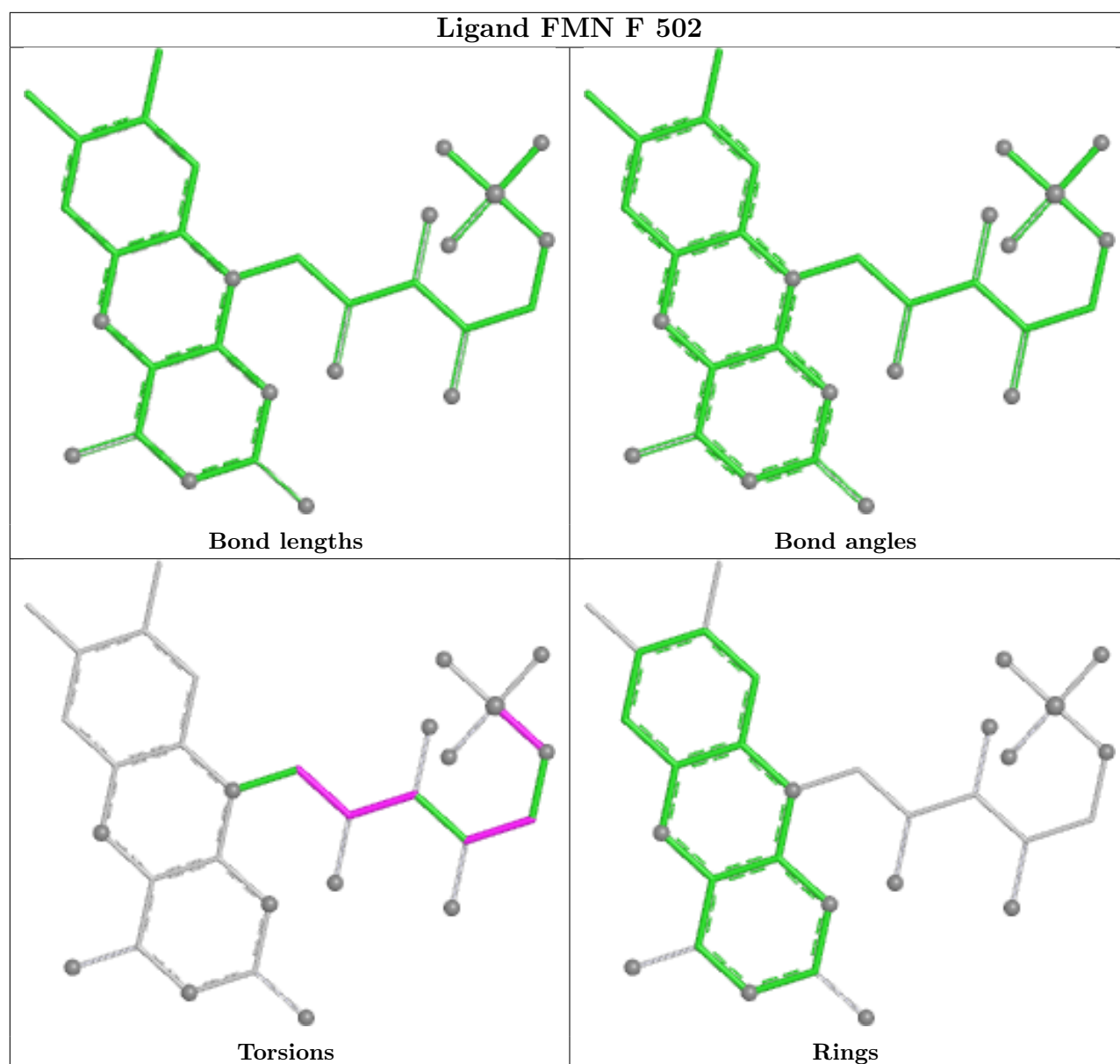
Mol	Chain	Res	Type	Atoms
14	L	704	3PE	C3F-C3G-C3H-C3I
14	L	703	3PE	C34-C35-C36-C37
14	M	602	3PE	C1-C2-O21-C21
14	M	602	3PE	C33-C34-C35-C36
14	A	201	3PE	O21-C21-C22-C23
14	M	601	3PE	C2-C3-O31-C31
14	L	703	3PE	C33-C34-C35-C36
14	L	701	3PE	C32-C31-O31-C3
14	A	201	3PE	O22-C21-C22-C23
14	L	704	3PE	O32-C31-C32-C33
14	L	704	3PE	C2E-C2F-C2G-C2H

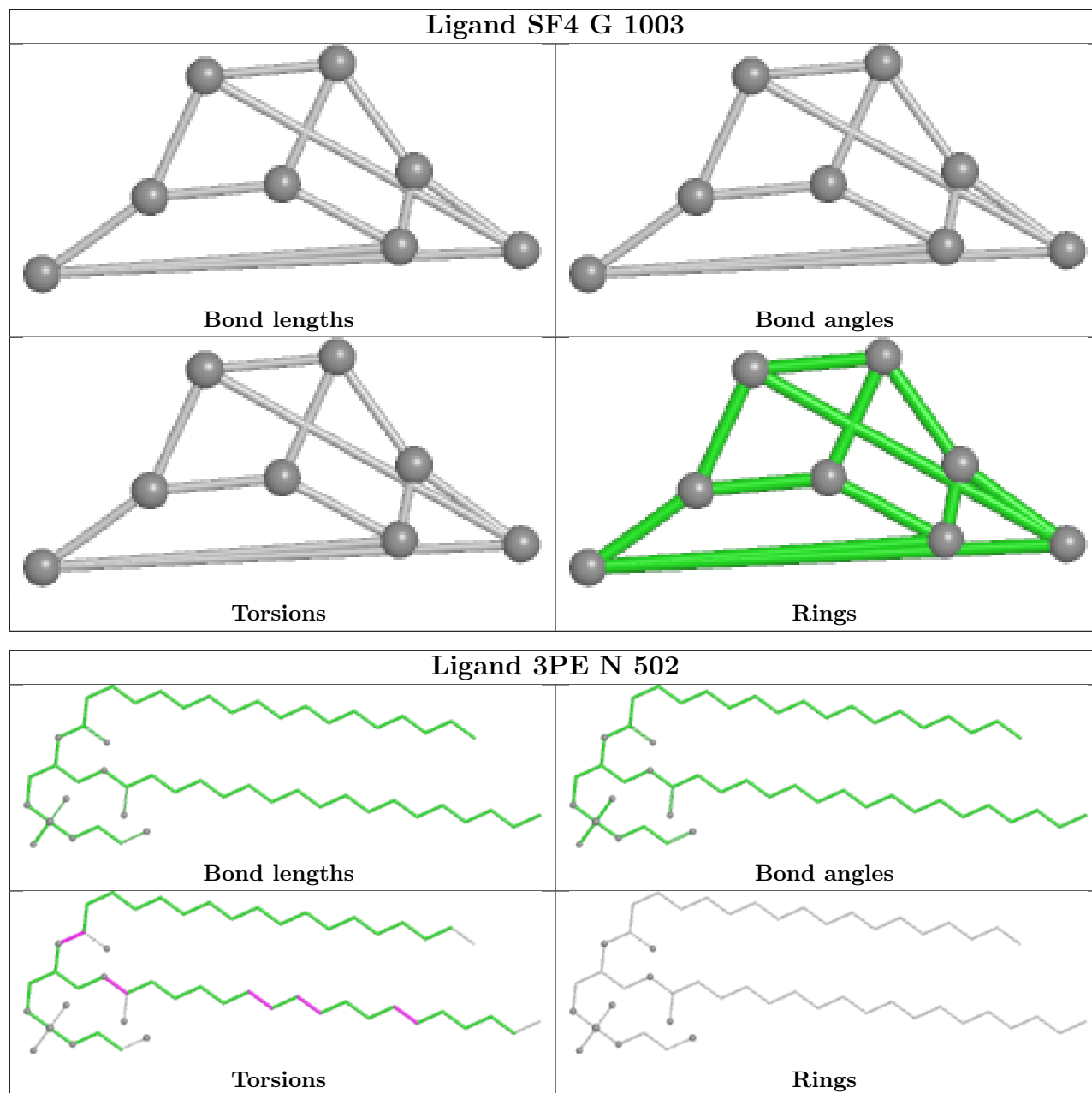
There are no ring outliers.

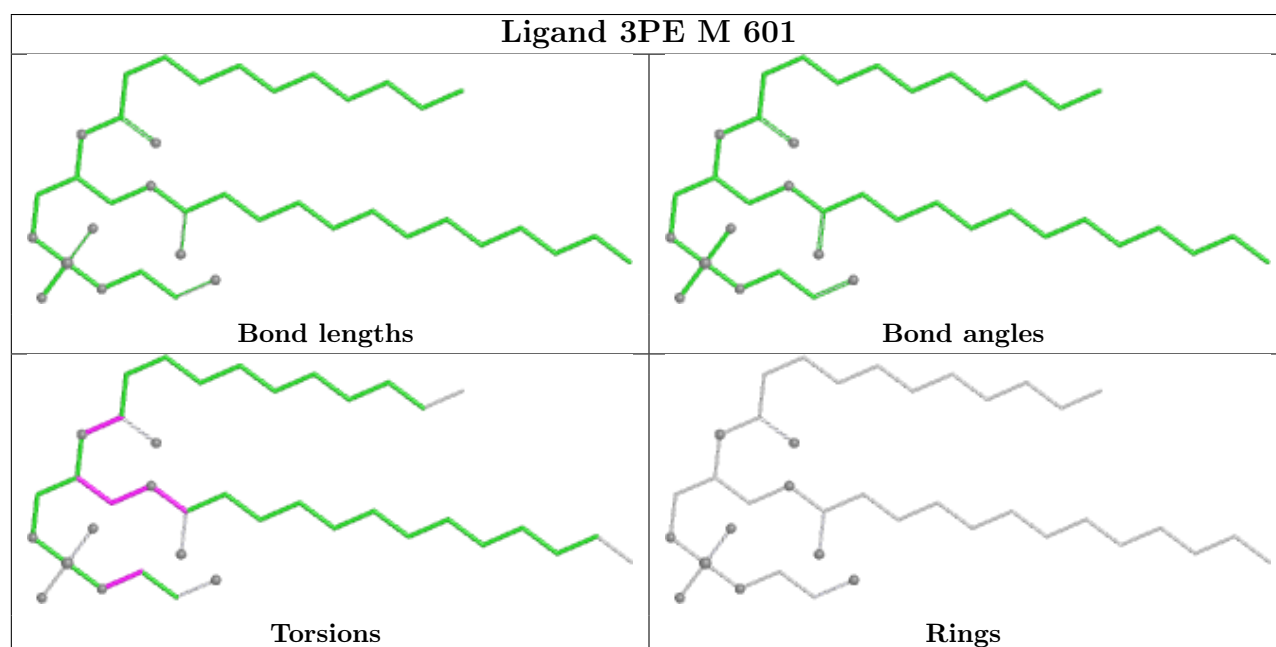
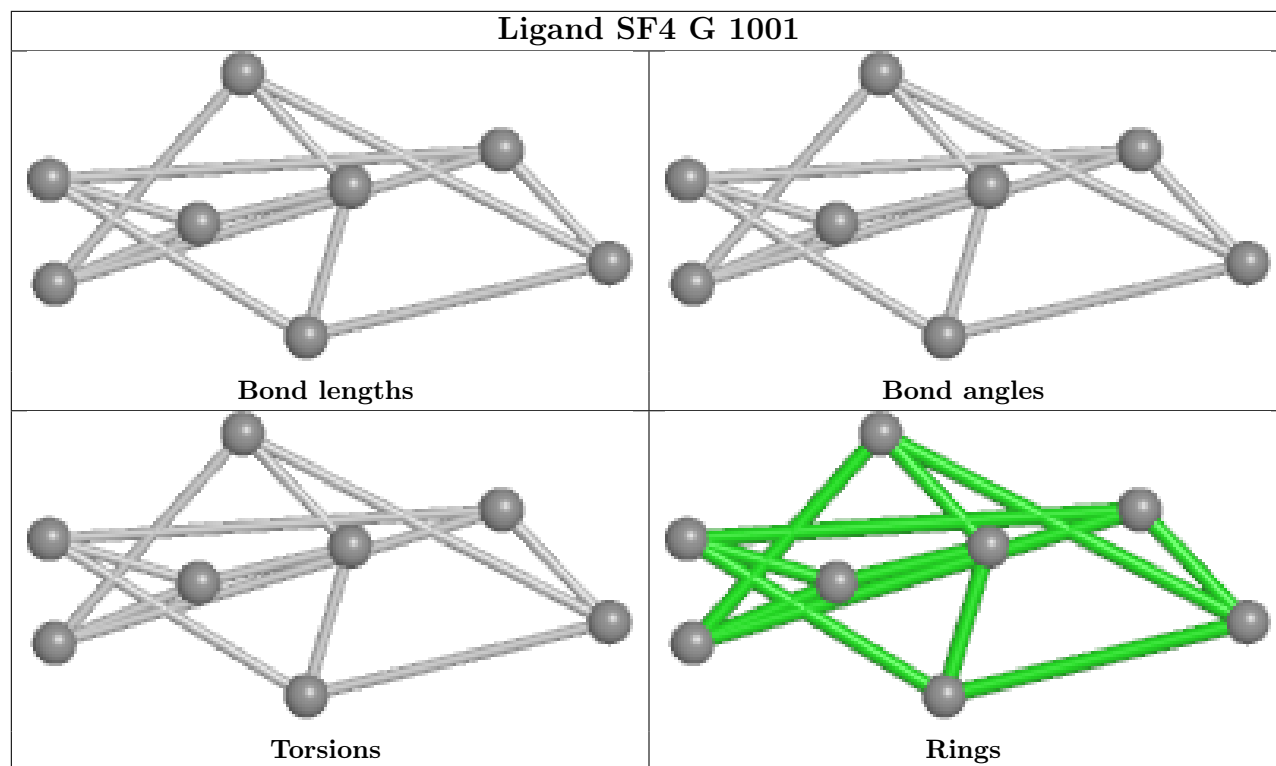
13 monomers are involved in 32 short contacts:

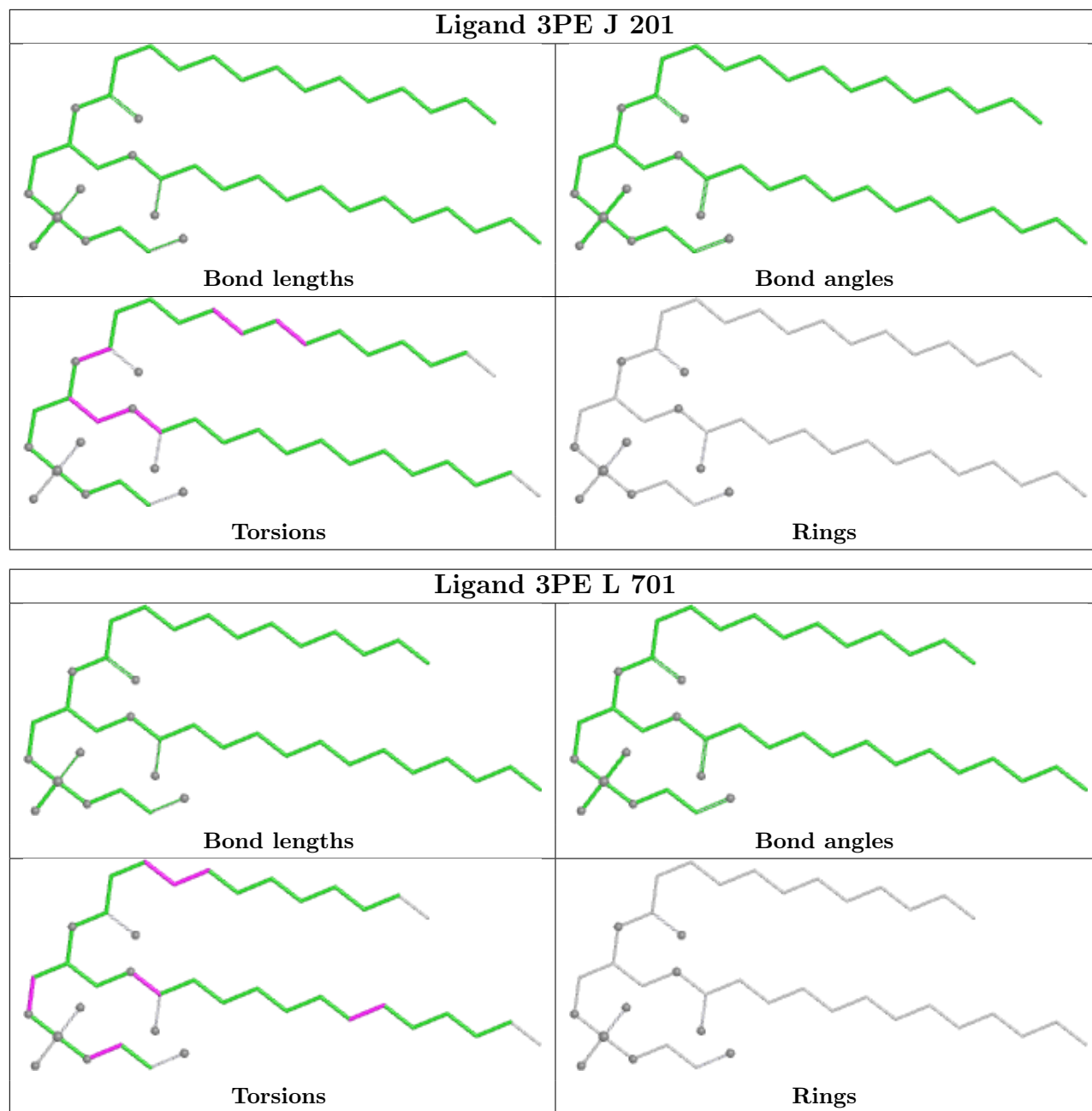
Mol	Chain	Res	Type	Clashes	Symm-Clashes
17	F	502	FMN	2	0
14	L	703	3PE	2	0
14	N	502	3PE	4	0
14	M	601	3PE	2	0
14	J	201	3PE	2	0
14	L	701	3PE	3	0
14	M	602	3PE	2	0
14	N	501	3PE	4	0
14	A	201	3PE	4	0
14	L	704	3PE	1	0
16	G	1004	FES	1	0
14	L	702	3PE	6	0
16	E	201	FES	1	0

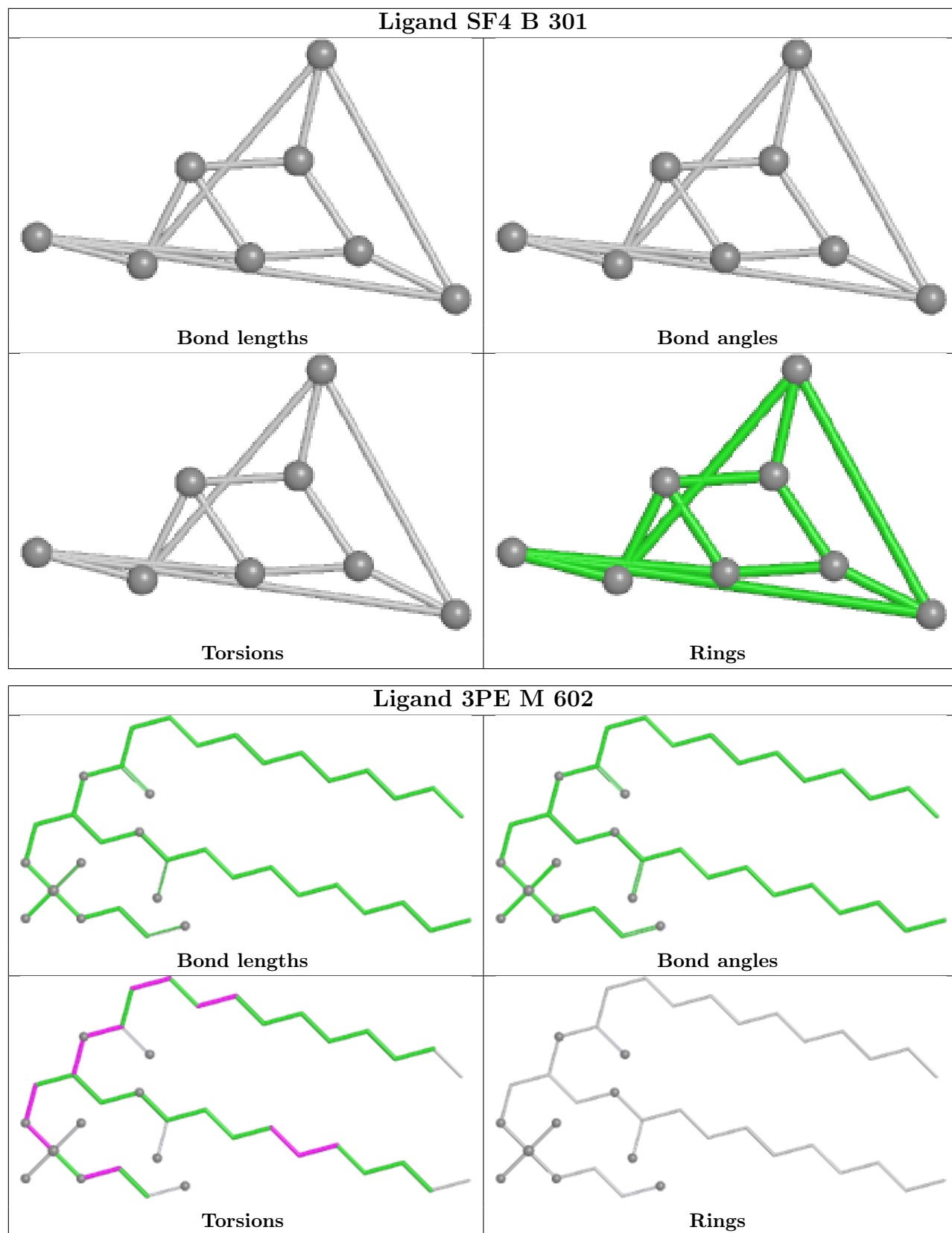
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

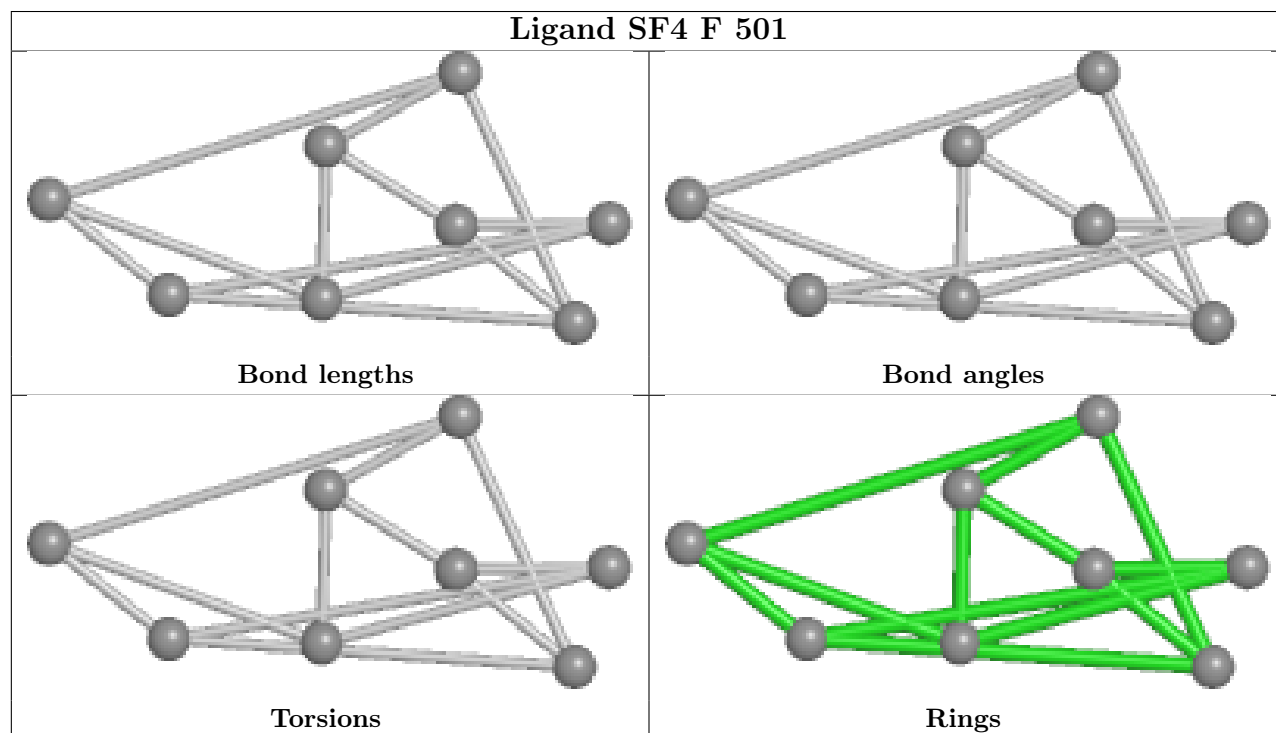
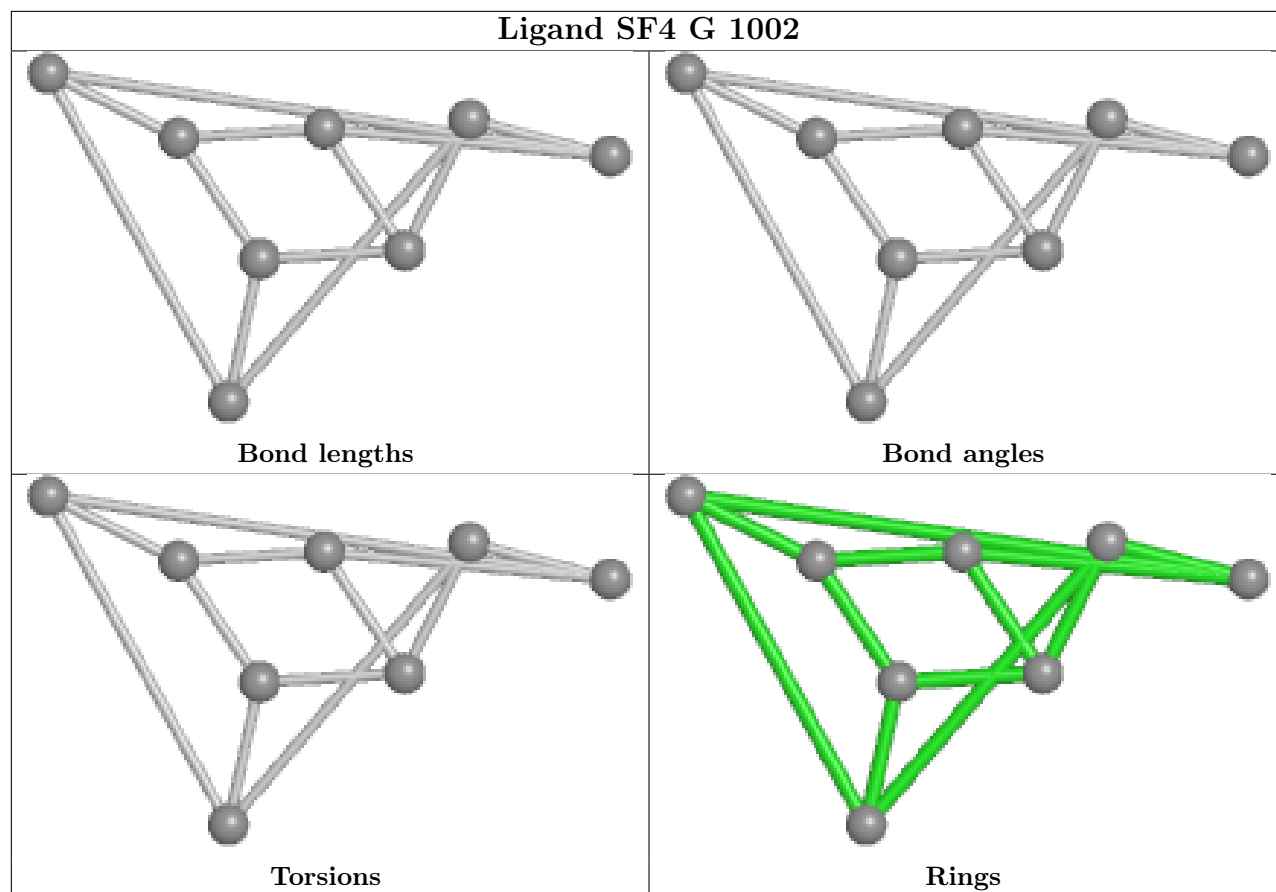


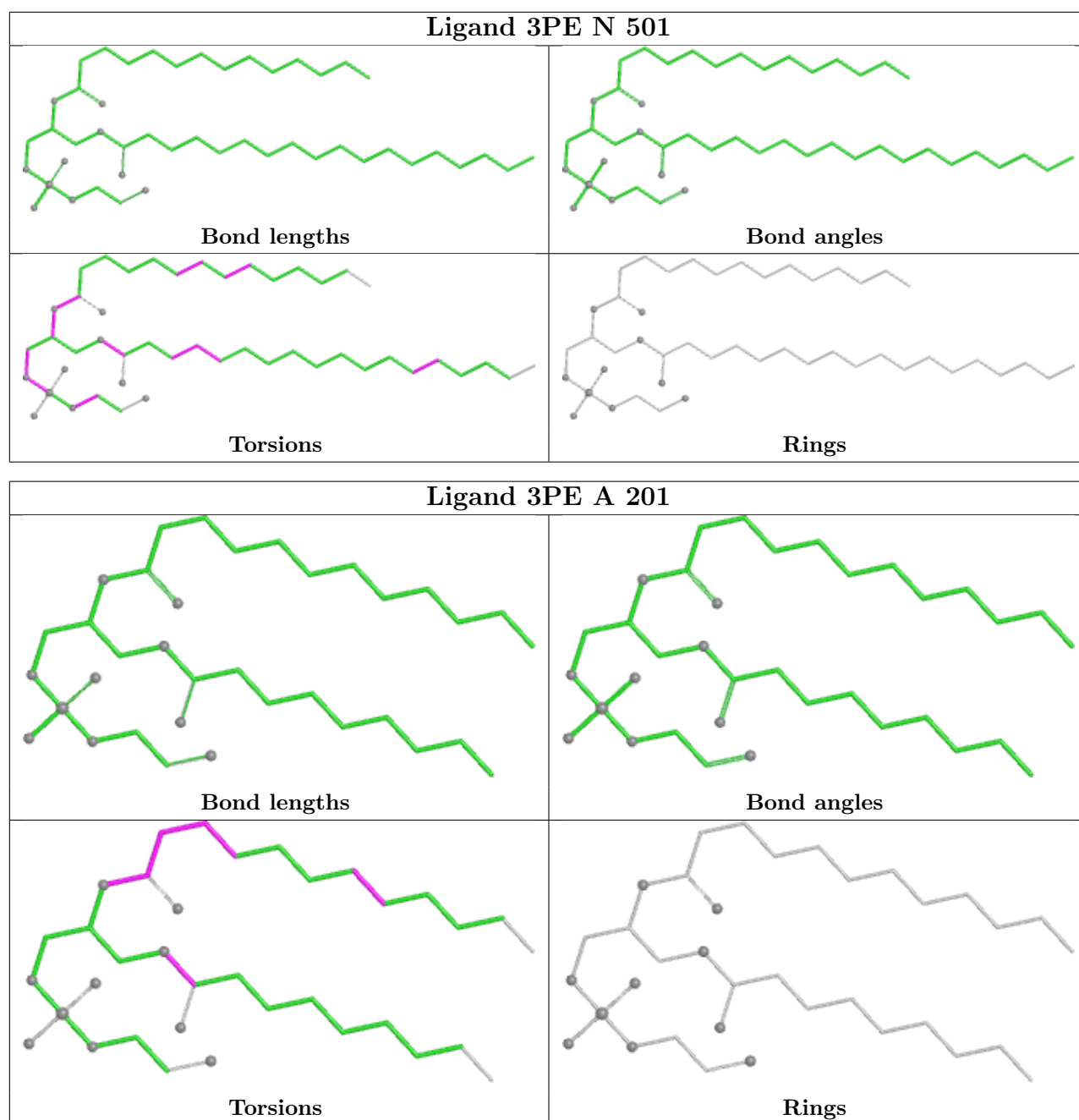


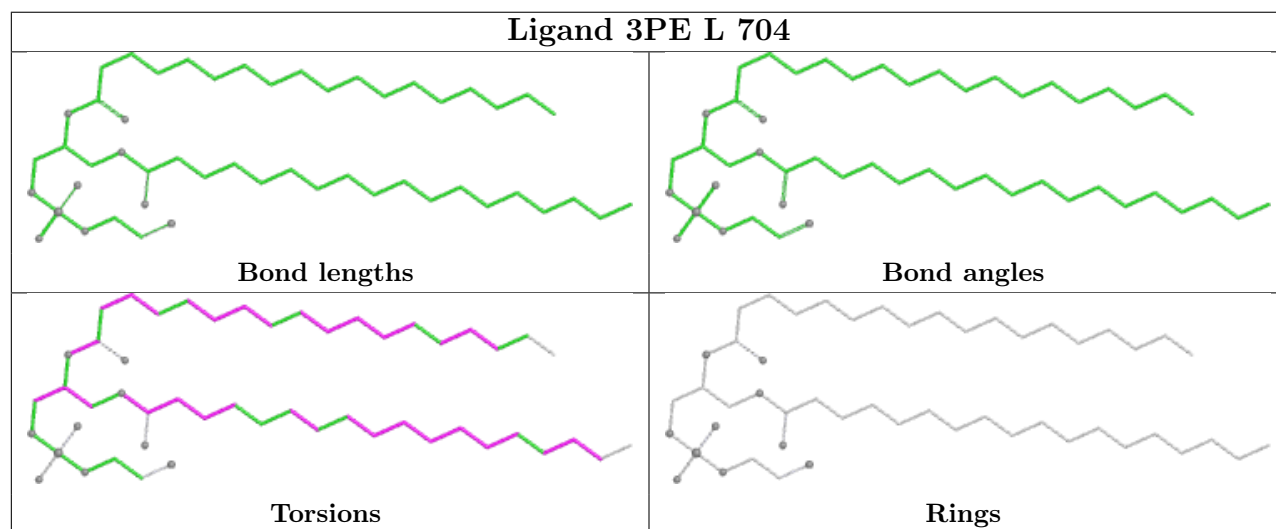
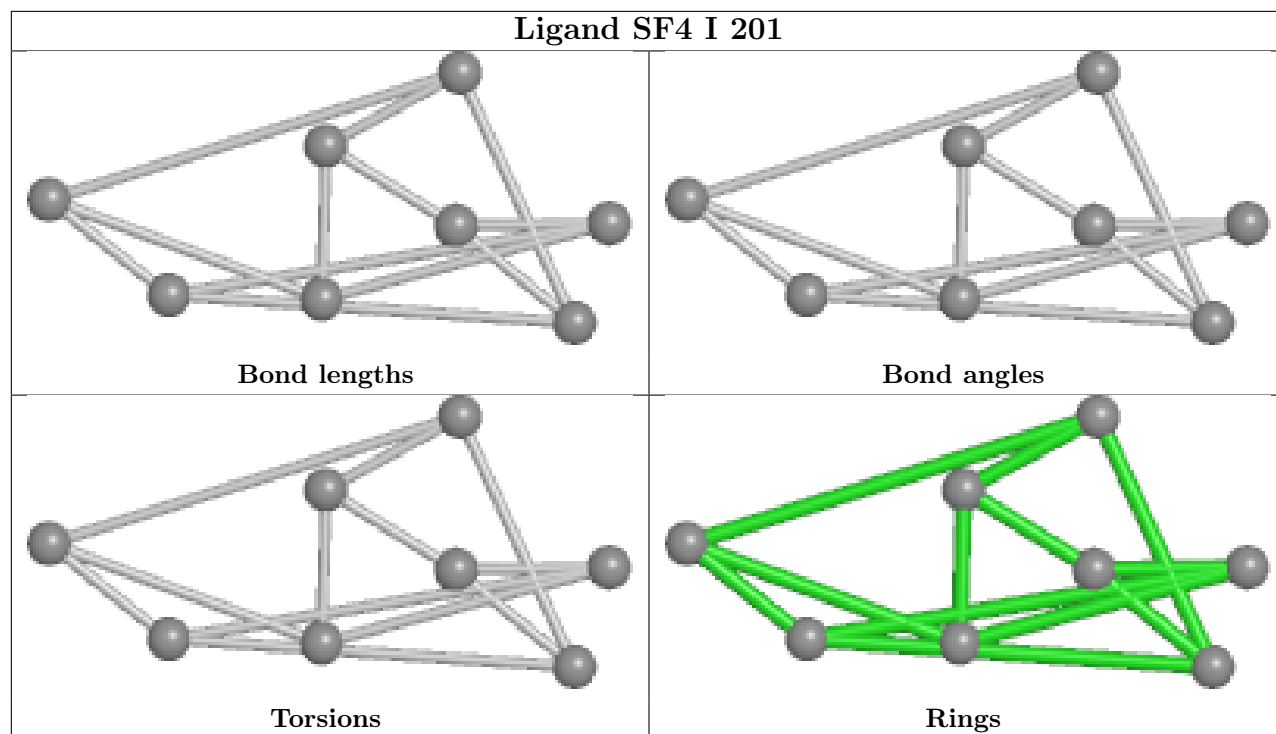


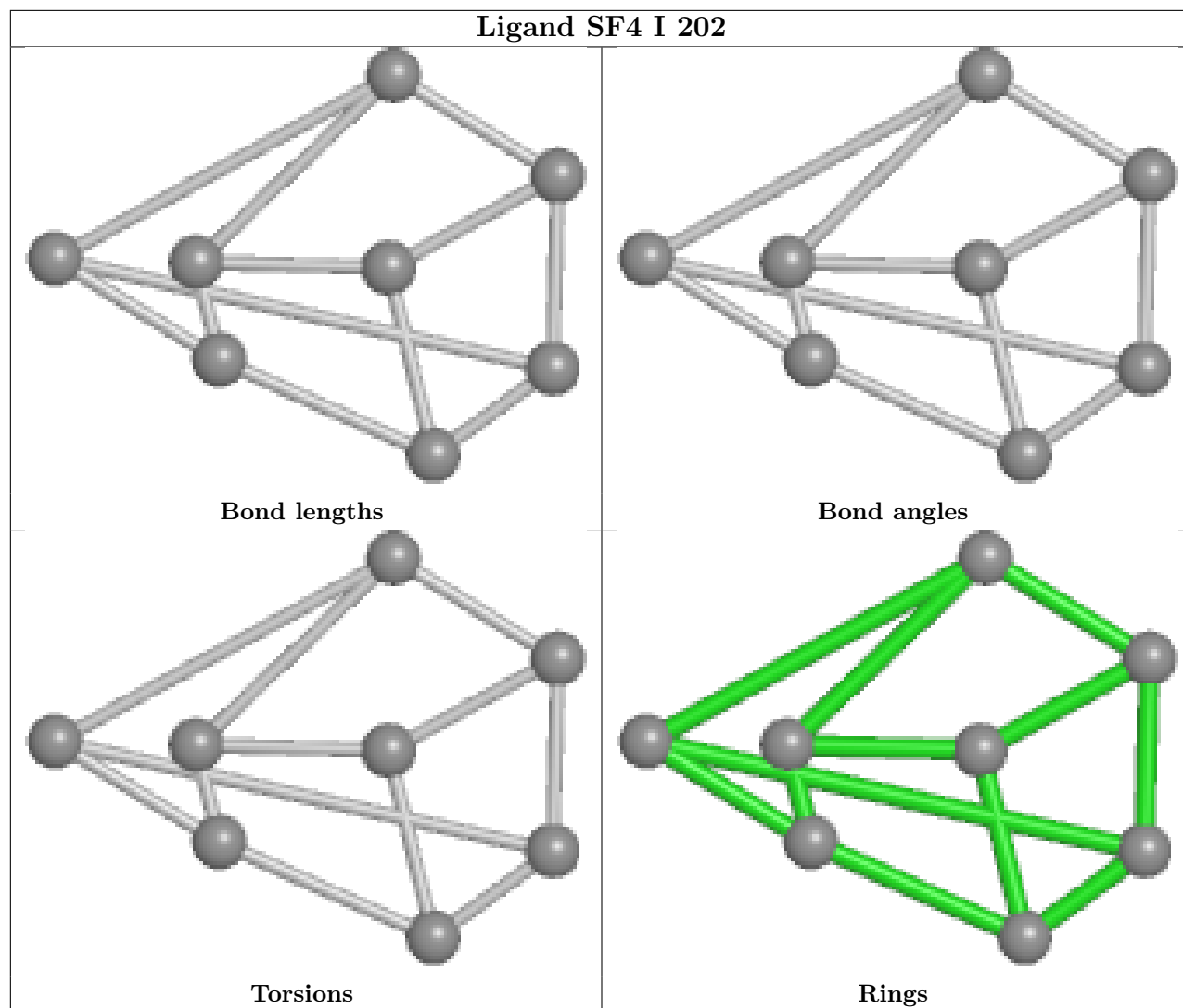


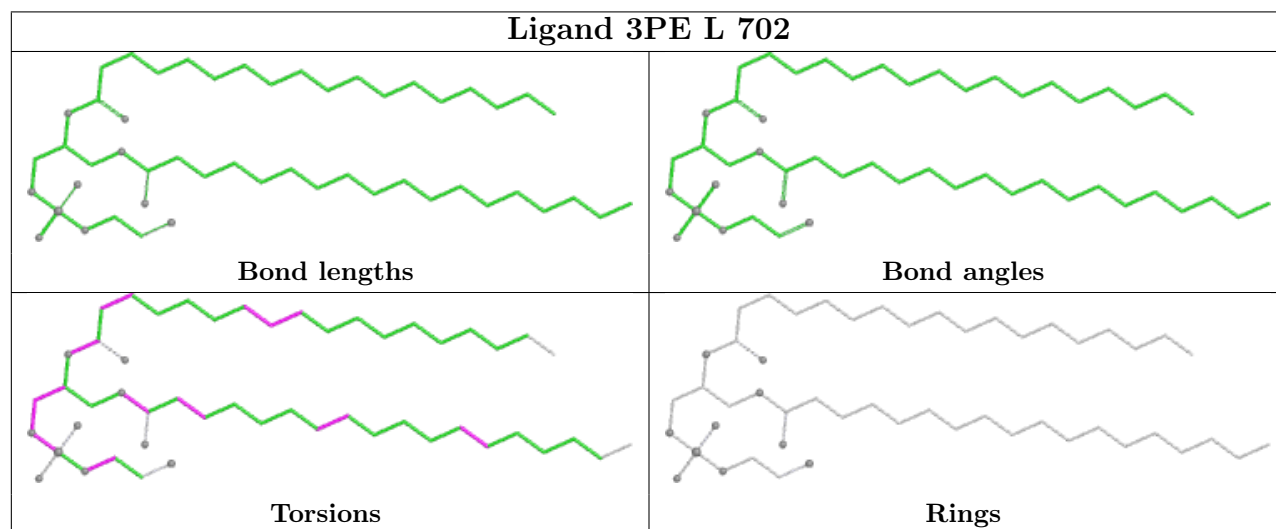
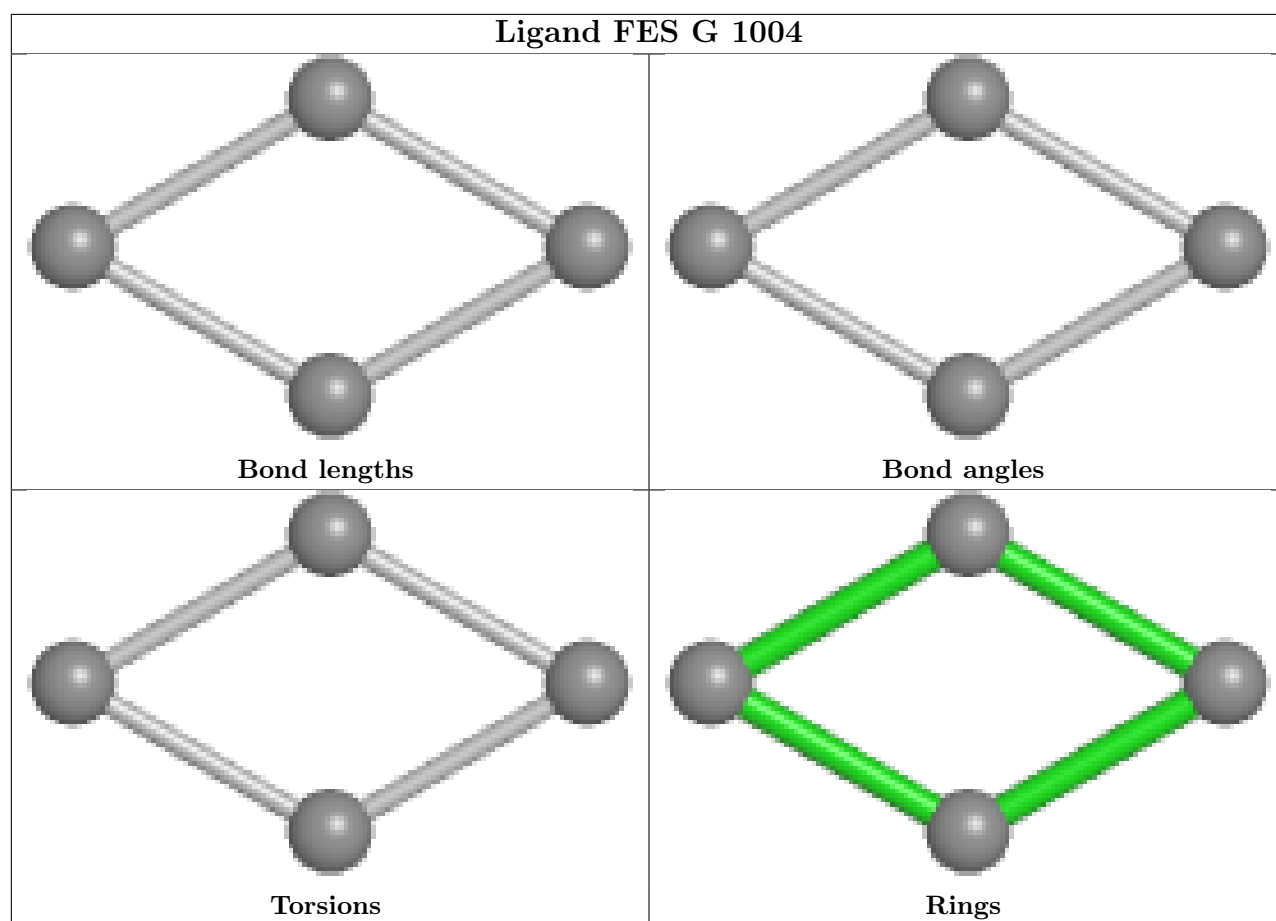


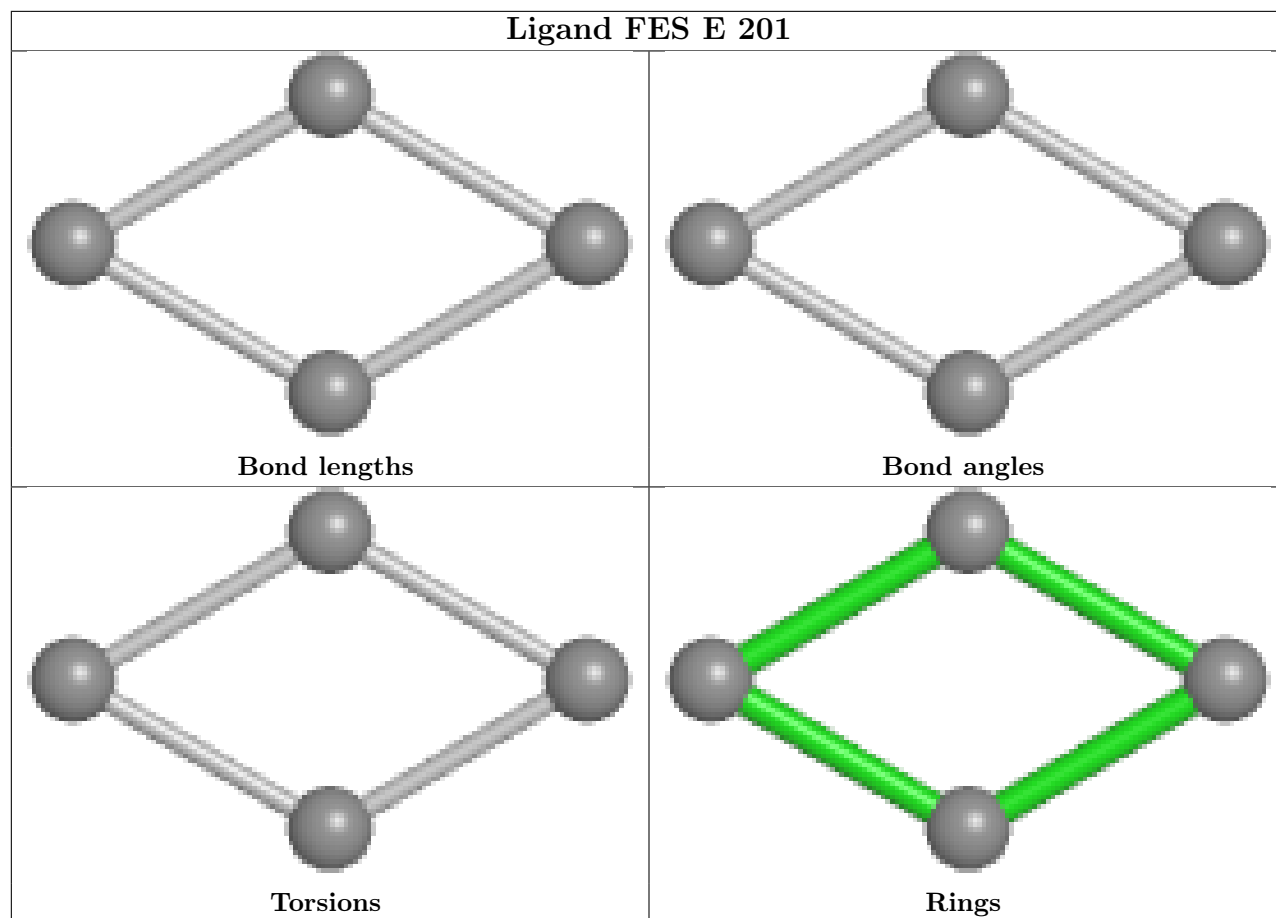












## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

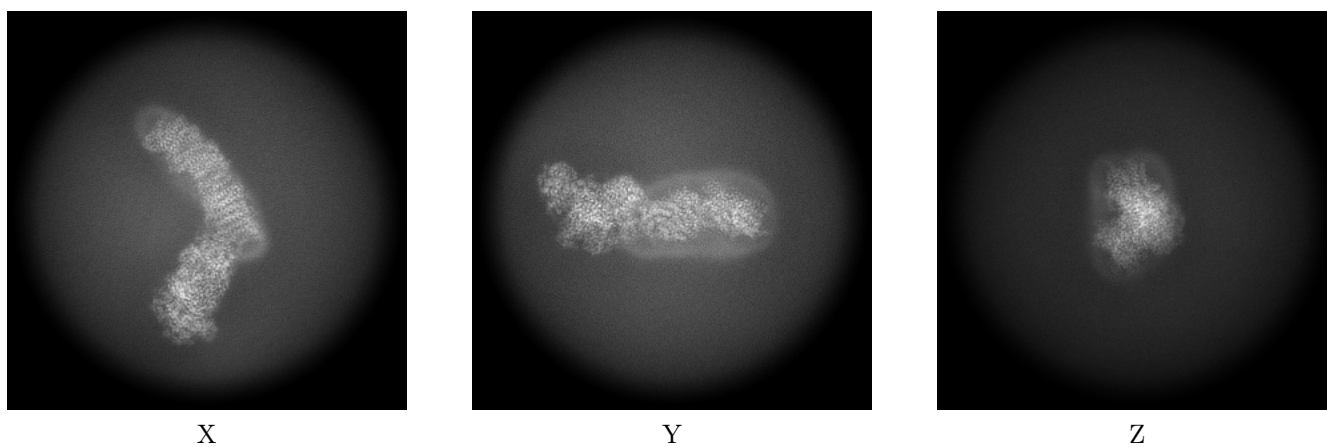
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-52895. These allow visual inspection of the internal detail of the map and identification of artifacts.

No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

### 6.1 Orthogonal projections [i](#)

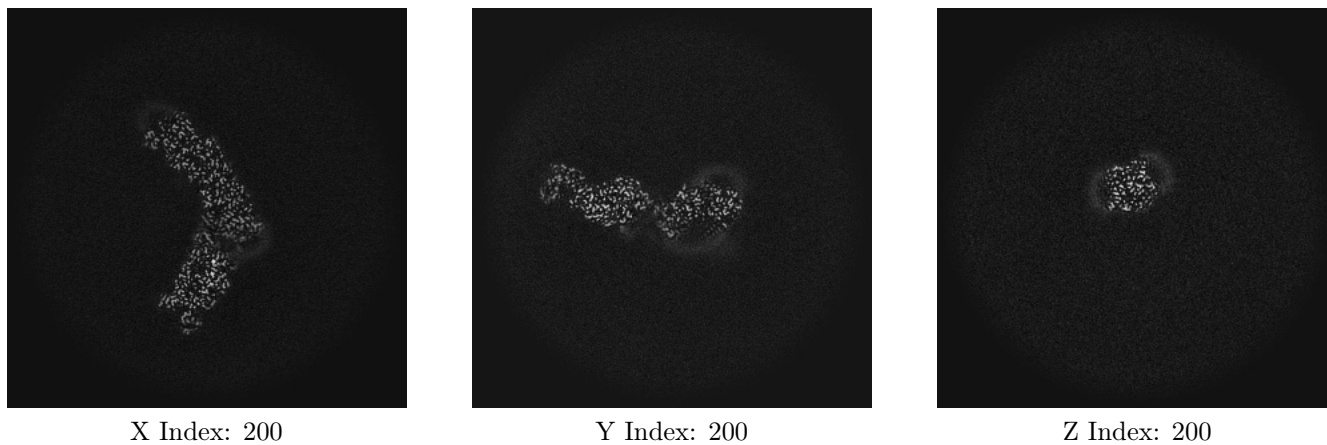
#### 6.1.1 Primary map



The images above show the map projected in three orthogonal directions.

### 6.2 Central slices [i](#)

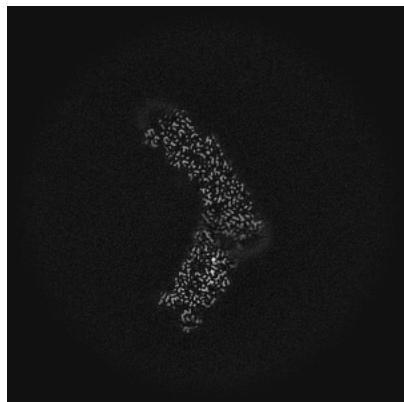
#### 6.2.1 Primary map



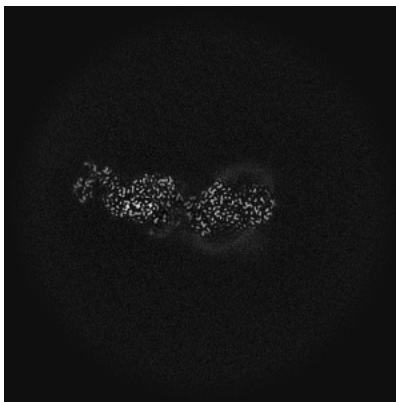
The images above show central slices of the map in three orthogonal directions.

## 6.3 Largest variance slices [i](#)

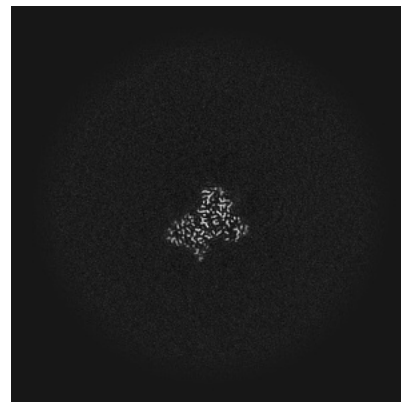
### 6.3.1 Primary map



X Index: 200



Y Index: 205

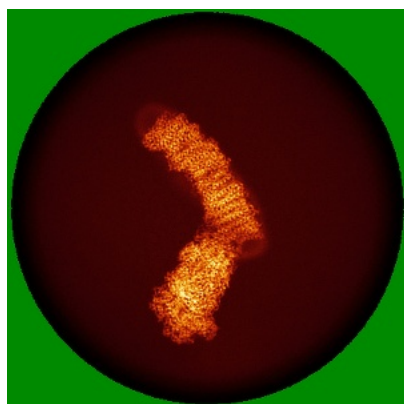


Z Index: 119

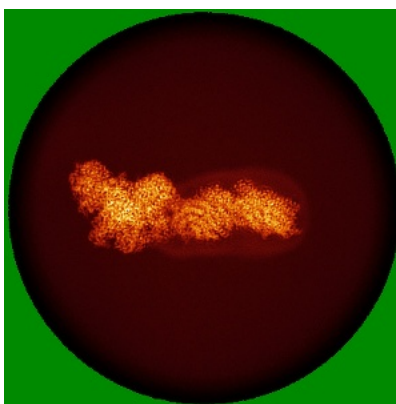
The images above show the largest variance slices of the map in three orthogonal directions.

## 6.4 Orthogonal standard-deviation projections (False-color) [i](#)

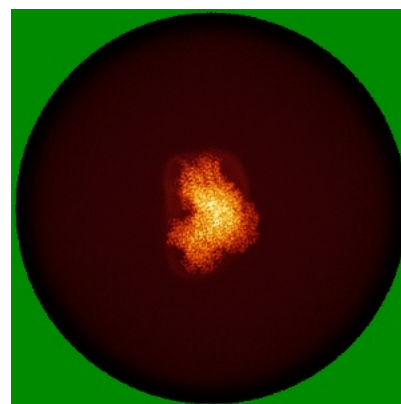
### 6.4.1 Primary map



X



Y



Z

The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

## 6.5 Orthogonal surface views

This section was not generated.

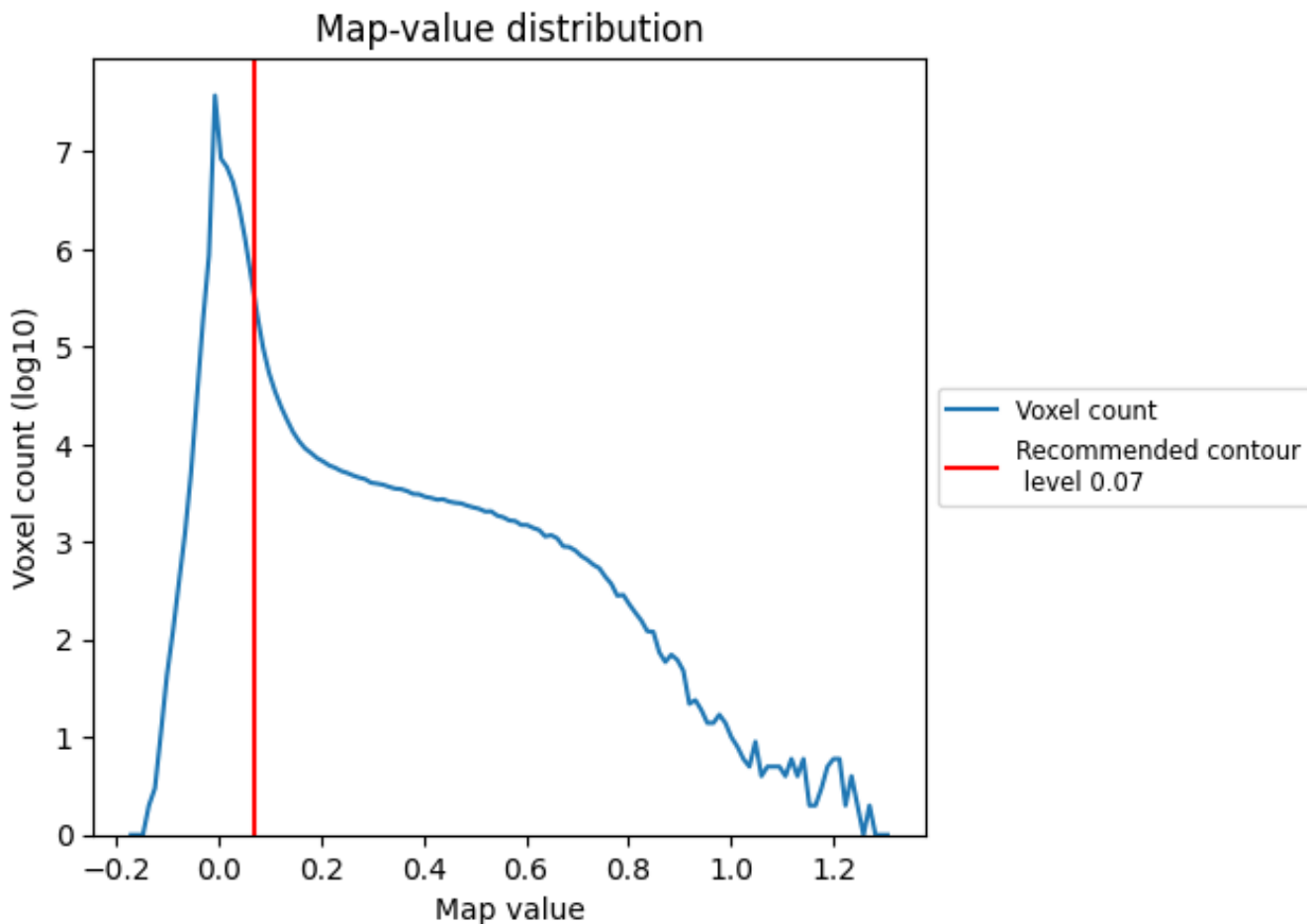
## 6.6 Mask visualisation

This section was not generated. No masks/segmentation were deposited.

## 7 Map analysis [i](#)

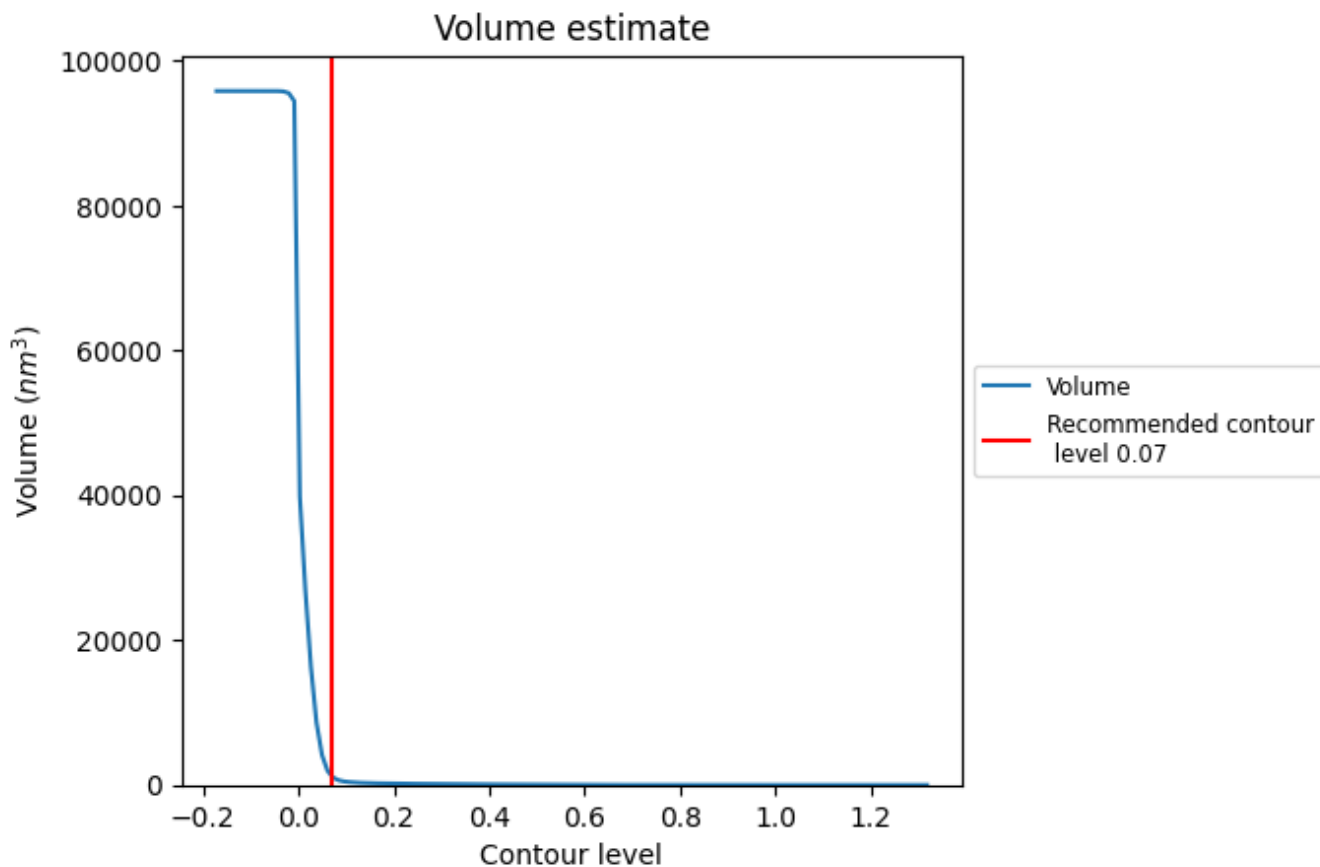
This section contains the results of statistical analysis of the map.

### 7.1 Map-value distribution [i](#)



The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

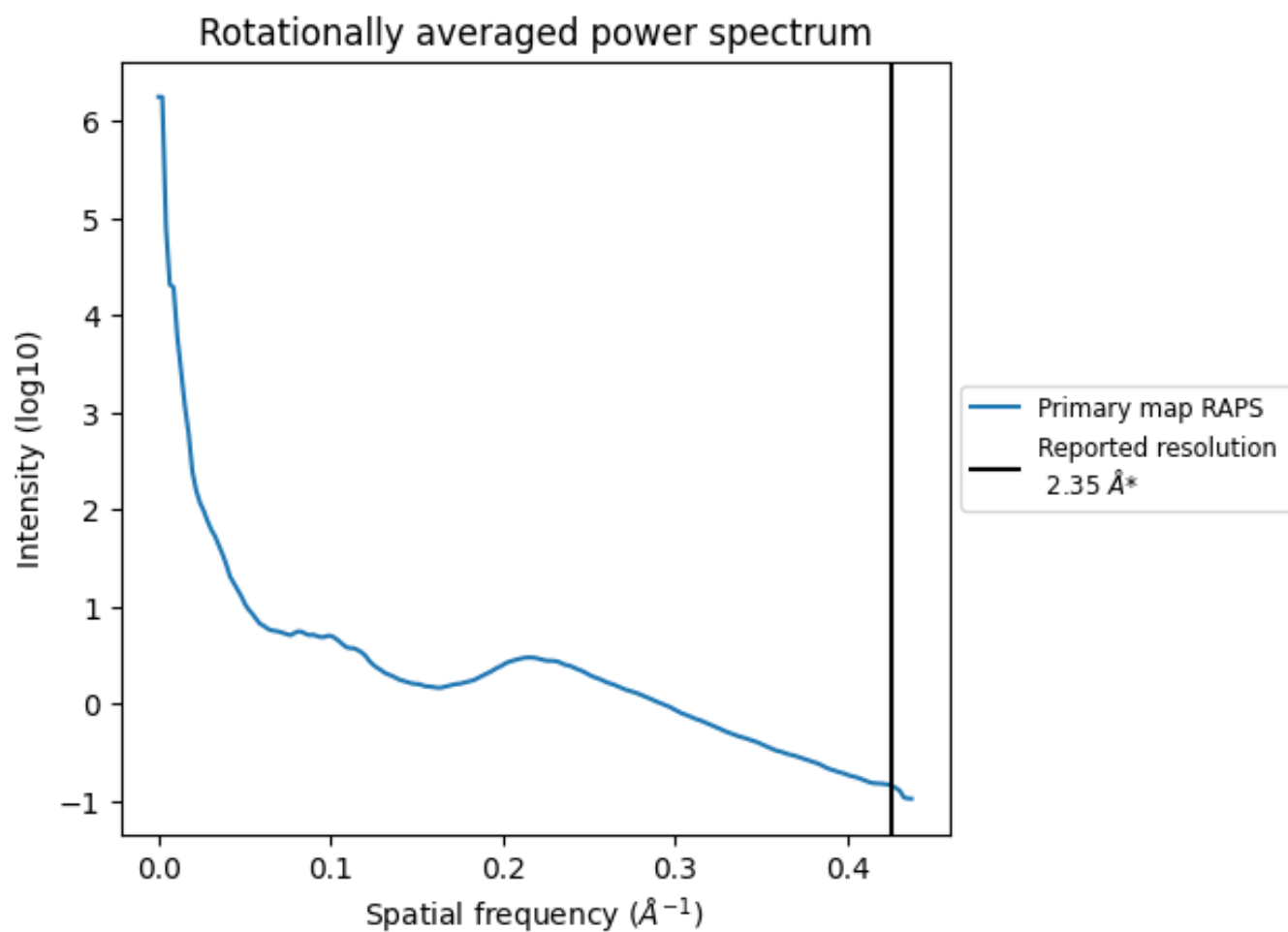
## 7.2 Volume estimate [i](#)



The volume at the recommended contour level is 1253  $\text{nm}^3$ ; this corresponds to an approximate mass of 1132 kDa.

The volume estimate graph shows how the enclosed volume varies with the contour level. The recommended contour level is shown as a vertical line and the intersection between the line and the curve gives the volume of the enclosed surface at the given level.

### 7.3 Rotationally averaged power spectrum i



\*Reported resolution corresponds to spatial frequency of 0.426 Å<sup>-1</sup>

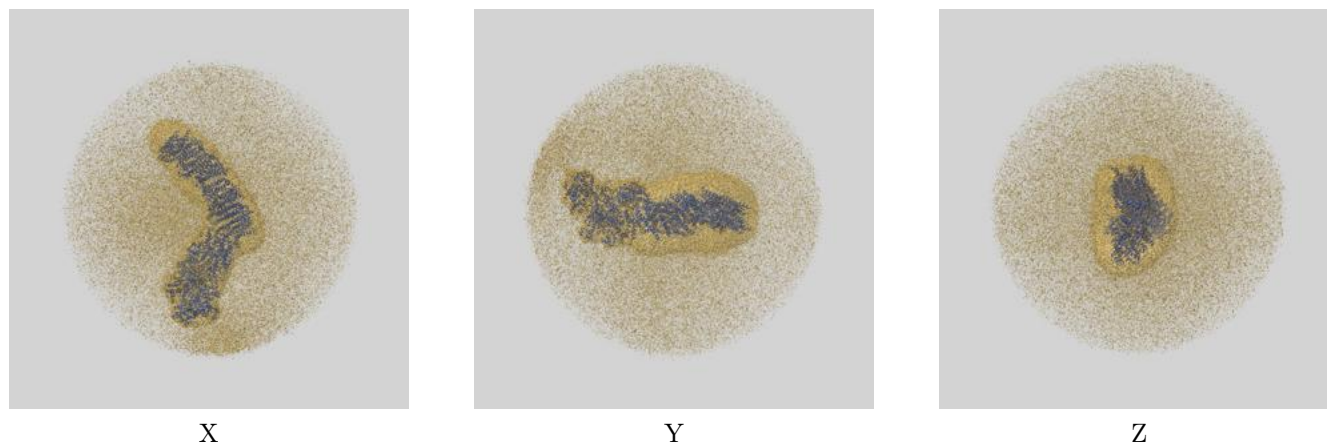
## 8 Fourier-Shell correlation

This section was not generated. No FSC curve or half-maps provided.

## 9 Map-model fit [i](#)

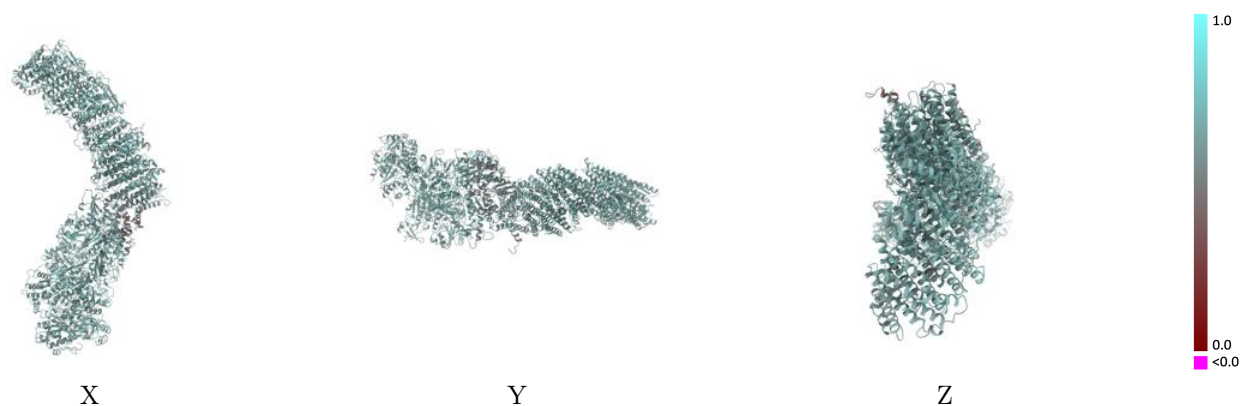
This section contains information regarding the fit between EMDB map EMD-52895 and PDB model 9Q8I. Per-residue inclusion information can be found in section 3 on page 11.

### 9.1 Map-model overlay [i](#)



The images above show the 3D surface view of the map at the recommended contour level 0.07 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

## 9.2 Q-score mapped to coordinate model [i](#)

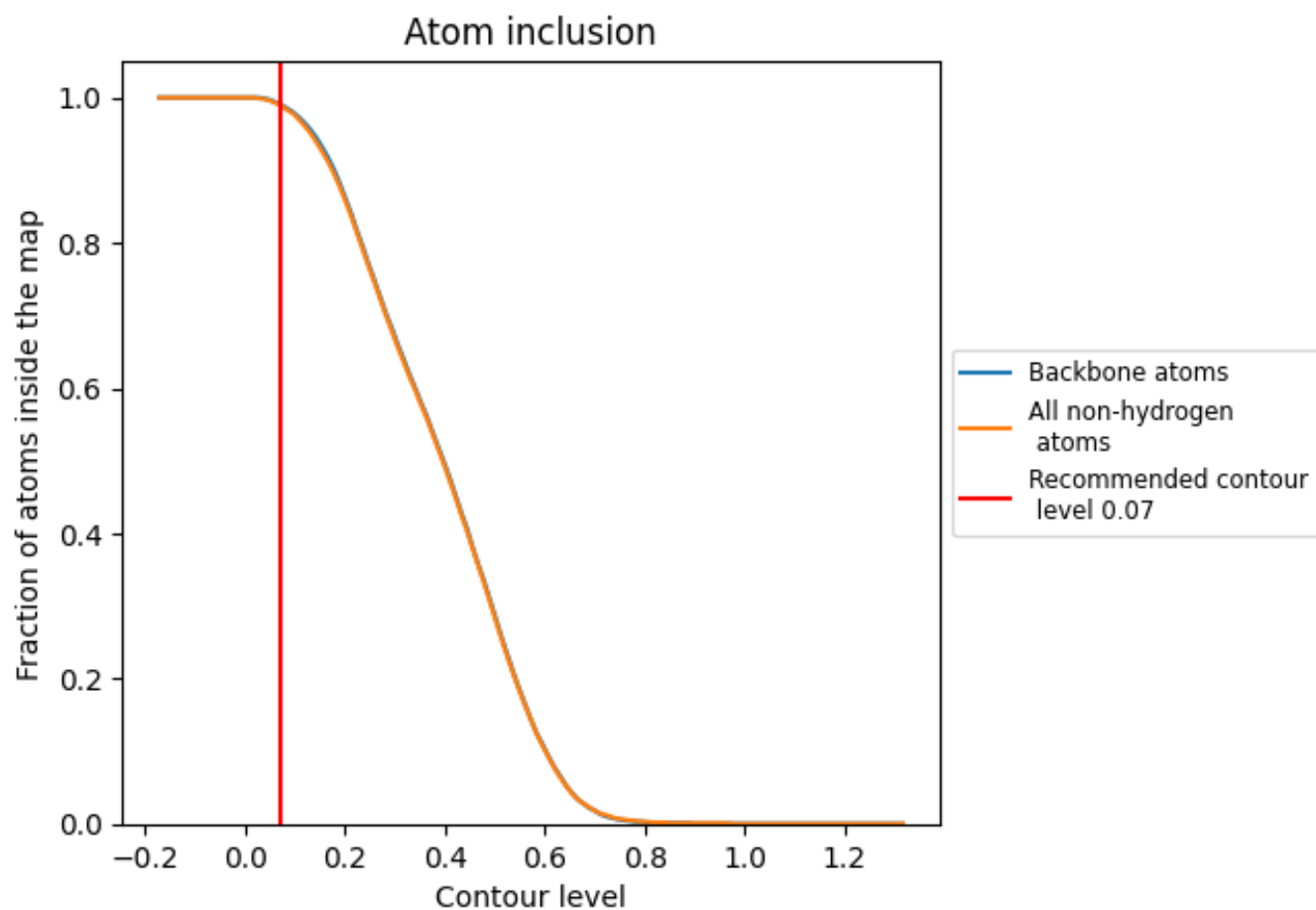


The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions at which atoms can be resolved. Low Q-score values may therefore be expected for many entries.

## 9.3 Atom inclusion mapped to coordinate model [i](#)

This section was not generated.





























## 9.4 Atom inclusion [i](#)



At the recommended contour level, 99% of all backbone atoms, 99% of all non-hydrogen atoms, are inside the map.

## 9.5 Map-model fit summary

The table lists the average atom inclusion at the recommended contour level (0.07) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.9900	 0.6190
A	 0.9910	 0.6010
B	 0.9780	 0.5890
C	 0.9890	 0.6130
E	 0.9870	 0.5950
F	 0.9880	 0.6100
G	 0.9910	 0.6340
H	 0.9890	 0.5760
I	 0.9920	 0.6410
J	 0.9920	 0.6170
K	 0.9950	 0.6460
L	 0.9890	 0.6160
M	 0.9940	 0.6360
N	 0.9950	 0.6310

