



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 06:57 AM UTC

PDB ID : 8S4P / pdb_00008s4p
Title : Crystal structure of an Ene-reductase from *Penicillium steckii*
Authors : Rozeboom, H.J.; Fraaije, M.W.
Deposited on : 2024-02-22
Resolution : 2.29 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

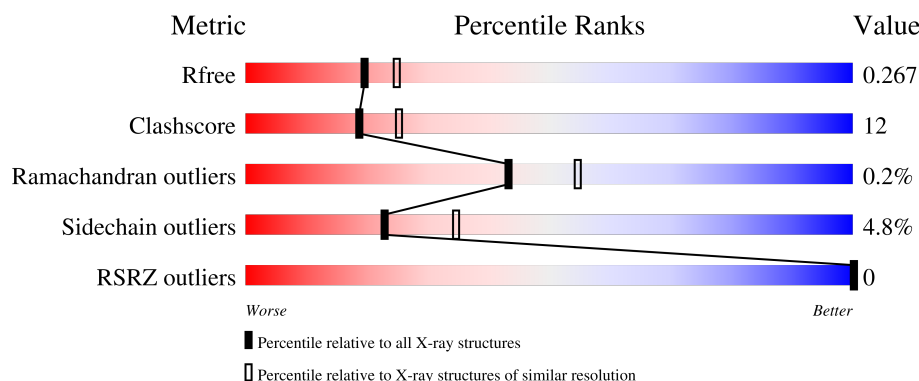
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.29 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	6319 (2.30-2.30)
Clashscore	190562	6919 (2.30-2.30)
Ramachandran outliers	187476	6854 (2.30-2.30)
Sidechain outliers	187428	6854 (2.30-2.30)
RSRZ outliers	180081	6325 (2.30-2.30)

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	422	
1	B	422	
1	C	422	
1	D	422	
1	E	422	

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Mol	Chain	Length	Quality of chain
1	F	422	
1	G	422	
1	H	422	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
4	CL	D	503	-	-	X	-

2 Entry composition

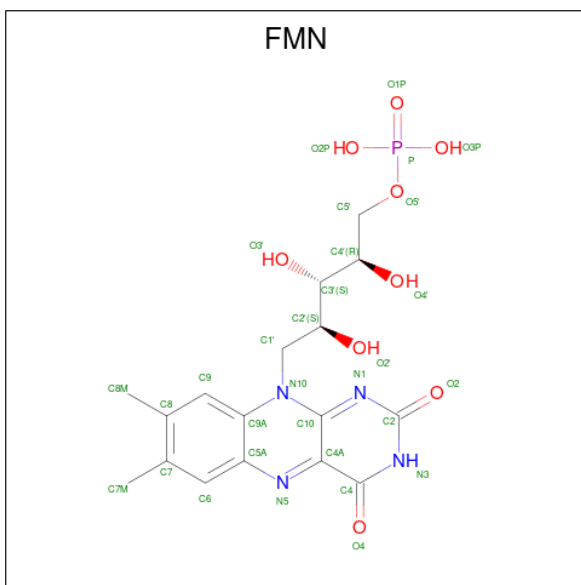
There are 6 unique types of molecules in this entry. The entry contains 26030 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 NADH:flavin oxidoreductase/NADH oxidase N-terminal domain-containing protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	409	Total	C	N	O	S	0	0	0
			3085	1958	536	581	10			
1	B	410	Total	C	N	O	S	0	0	0
			3099	1969	539	581	10			
1	C	409	Total	C	N	O	S	0	0	0
			3085	1958	536	581	10			
1	D	409	Total	C	N	O	S	0	0	0
			3084	1957	536	581	10			
1	E	408	Total	C	N	O	S	0	0	0
			3078	1954	535	579	10			
1	F	412	Total	C	N	O	S	0	0	0
			3112	1976	542	584	10			
1	G	410	Total	C	N	O	S	0	0	0
			3093	1963	537	582	11			
1	H	409	Total	C	N	O	S	0	0	0
			3083	1957	536	580	10			

- Molecule 2 is FLAVIN MONONUCLEOTIDE (CCD ID: FMN) (formula: C₁₇H₂₁N₄O₉P).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total 31	C 17	N 4	O 9	P 1	0	0
2	B	1	Total 31	C 17	N 4	O 9	P 1	0	0
2	C	1	Total 31	C 17	N 4	O 9	P 1	0	0
2	D	1	Total 31	C 17	N 4	O 9	P 1	0	0
2	E	1	Total 31	C 17	N 4	O 9	P 1	0	0
2	F	1	Total 31	C 17	N 4	O 9	P 1	0	0
2	G	1	Total 31	C 17	N 4	O 9	P 1	0	0
2	H	1	Total 31	C 17	N 4	O 9	P 1	0	0

- Molecule 3 is GLYCEROL (CCD ID: GOL) (formula: $\text{C}_3\text{H}_8\text{O}_3$).



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

- Molecule 4 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	Cl	0	0
			1	1		
4	B	1	Total	Cl	0	0
			1	1		
4	D	1	Total	Cl	0	0
			1	1		
4	E	1	Total	Cl	0	0
			1	1		
4	F	1	Total	Cl	0	0
			1	1		
4	G	1	Total	Cl	0	0
			1	1		
4	H	1	Total	Cl	0	0
			1	1		

- Molecule 5 is CALCIUM ION (CCD ID: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	C	1	Total	Ca	0	0
			1	1		

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	D	1	Total 1	Ca 1	0	0
5	F	2	Total 2	Ca 2	0	0
5	G	1	Total 1	Ca 1	0	0
5	H	1	Total 1	Ca 1	0	0

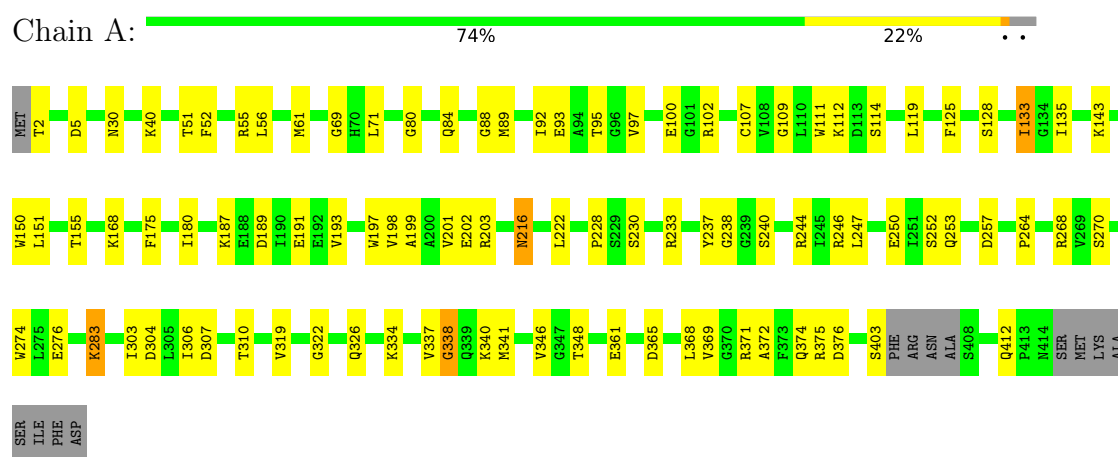
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	121	Total 121	O 121	0	0
6	B	154	Total 154	O 154	0	0
6	C	127	Total 127	O 127	0	0
6	D	133	Total 133	O 133	0	0
6	E	121	Total 121	O 121	0	0
6	F	122	Total 122	O 122	0	0
6	G	143	Total 143	O 143	0	0
6	H	123	Total 123	O 123	0	0

3 Residue-property plots

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

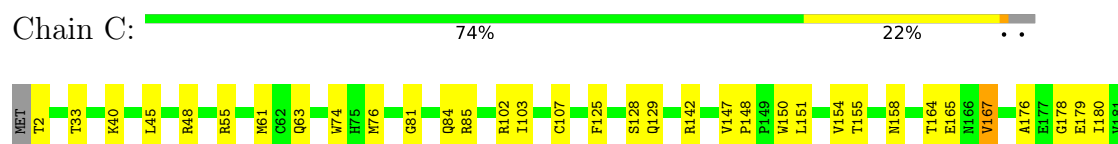
- Molecule 1: NADH:flavin oxidoreductase/NADH oxidase N-terminal domain-containing protein

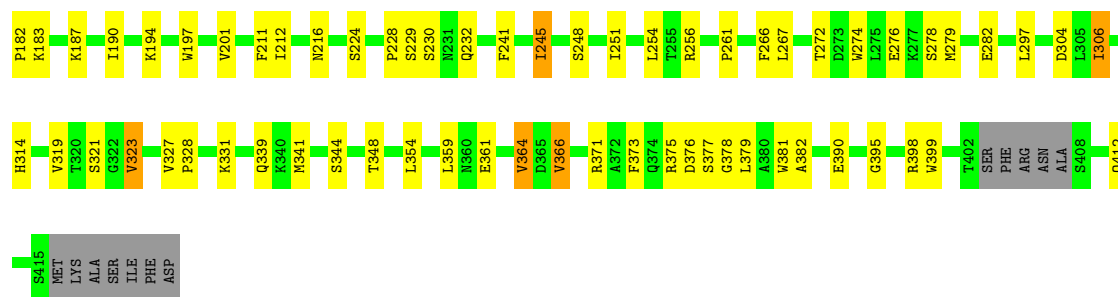


- Molecule 1: NADH:flavin oxidoreductase/NADH oxidase N-terminal domain-containing protein



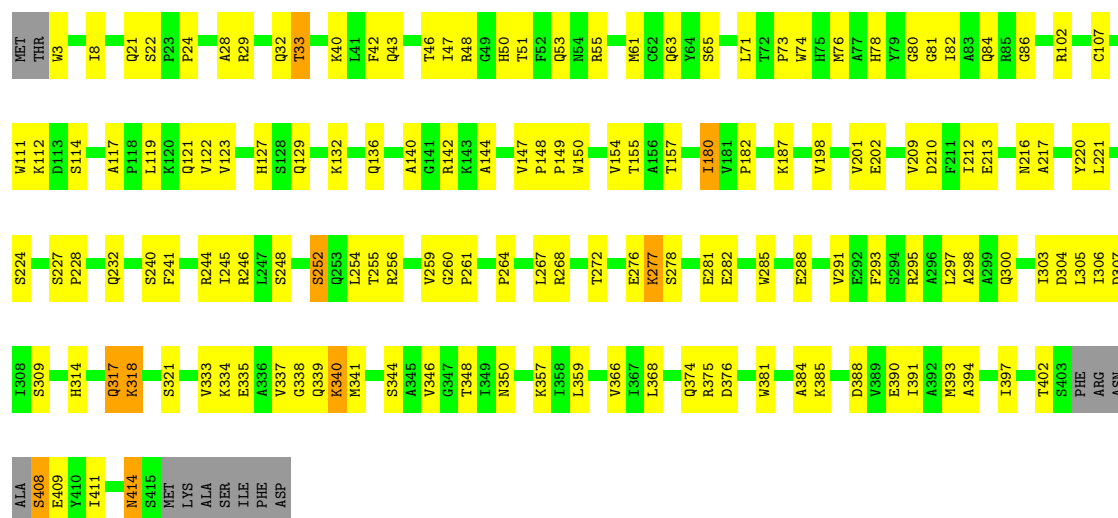
- Molecule 1: NADH:flavin oxidoreductase/NADH oxidase N-terminal domain-containing protein





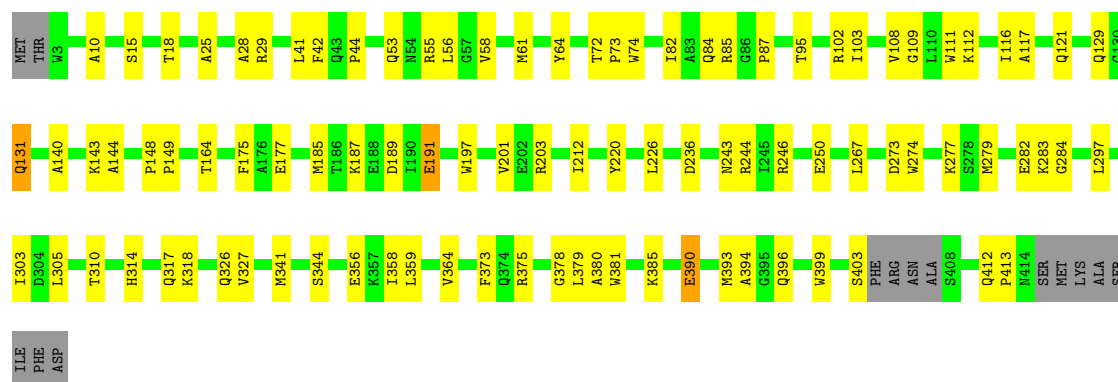
- Molecule 1: NADH:flavin oxidoreductase/NADH oxidase N-terminal domain-containing protein

Chain D: 62% 33%



- Molecule 1: NADH:flavin oxidoreductase/NADH oxidase N-terminal domain-containing protein

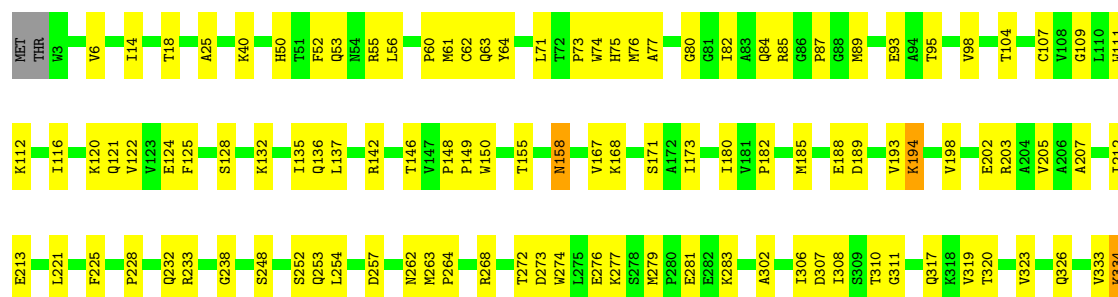
Chain E: 74% 22%

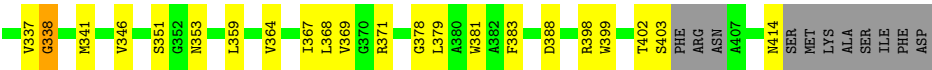


- Molecule 1: NADH:flavin oxidoreductase/NADH oxidase N-terminal domain-containing protein

- Molecule 1: NADH:flavin oxidoreductase/NADH oxidase N-terminal domain-containing protein

- Molecule 1: NADH:flavin oxidoreductase/NADH oxidase N-terminal domain-containing protein





4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	107.48Å 175.29Å 107.53Å 90.00° 111.53° 90.00°	Depositor
Resolution (Å)	86.88 – 2.29 86.88 – 2.29	Depositor EDS
% Data completeness (in resolution range)	99.1 (86.88-2.29) 99.0 (86.88-2.29)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.38 (at 2.29Å)	Xtriage
Refinement program	PHENIX (1.20_4459: ???)	Depositor
R, R_{free}	0.201 , 0.275 0.199 , 0.267	Depositor DCC
R_{free} test set	8122 reflections (4.89%)	wwPDB-VP
Wilson B-factor (Å ²)	25.1	Xtriage
Anisotropy	0.468	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 17.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.30$	Xtriage
Estimated twinning fraction	0.439 for l,-k,h	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	26030	wwPDB-VP
Average B, all atoms (Å ²)	24.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 22.91 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 5.1800e-03. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: GOL, CA, FMN, CL

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	0.35	0/3159	0.58	0/4300
1	B	0.35	0/3174	0.56	0/4319
1	C	0.35	0/3159	0.57	0/4300
1	D	0.36	0/3158	0.60	1/4298 (0.0%)
1	E	0.38	0/3152	0.60	0/4290
1	F	0.36	0/3188	0.60	1/4340 (0.0%)
1	G	0.37	0/3167	0.58	0/4310
1	H	0.38	0/3157	0.61	1/4297 (0.0%)
All	All	0.36	0/25314	0.59	3/34454 (0.0%)

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	H	281	GLU	CA-CB-CG	6.06	126.22	114.10
1	F	52	PHE	N-CA-CB	-5.32	101.76	110.43
1	D	86	GLY	N-CA-C	5.18	122.90	112.34

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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	3085	0	3051	60	0
1	B	3099	0	3067	55	0
1	C	3085	0	3051	64	0
1	D	3084	0	3049	102	0
1	E	3078	0	3044	74	0
1	F	3112	0	3079	76	0
1	G	3093	0	3063	85	0
1	H	3083	0	3049	106	0
2	A	31	0	19	4	0
2	B	31	0	19	4	0
2	C	31	0	19	4	0
2	D	31	0	19	3	0
2	E	31	0	19	2	0
2	F	31	0	19	3	0
2	G	31	0	19	4	0
2	H	31	0	19	4	0
3	A	6	0	8	2	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
4	D	1	0	0	2	0
4	E	1	0	0	1	0
4	F	1	0	0	0	0
4	G	1	0	0	0	0
4	H	1	0	0	0	0
5	C	1	0	0	0	0
5	D	1	0	0	0	0
5	F	2	0	0	0	0
5	G	1	0	0	0	0
5	H	1	0	0	0	0
6	A	121	0	0	5	0
6	B	154	0	0	5	0
6	C	127	0	0	5	0
6	D	133	0	0	12	0
6	E	121	0	0	10	0
6	F	122	0	0	5	0
6	G	143	0	0	8	0
6	H	123	0	0	6	0
All	All	26030	0	24613	590	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 12.

All (590) 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:H:274:TRP:NE1	1:H:310:THR:HG21	1.58	1.17
1:H:274:TRP:NE1	1:H:310:THR:CG2	2.21	1.04
1:E:385:LYS:HD2	1:E:413:PRO:HB2	1.46	0.97
1:H:274:TRP:HE1	1:H:310:THR:HG21	1.33	0.93
1:H:274:TRP:HE1	1:H:310:THR:CG2	1.84	0.89
1:E:393:MET:HE3	1:E:394:ALA:H	1.38	0.88
1:H:50:HIS:CD2	1:H:264:PRO:HD3	2.13	0.84
1:D:40:LYS:HD3	1:D:359:LEU:HB3	1.63	0.80
1:D:252:SER:HB3	1:D:303:ILE:HD11	1.71	0.73
1:H:50:HIS:HD2	1:H:264:PRO:HD3	1.54	0.72
1:D:50:HIS:HD2	1:D:264:PRO:HD3	1.54	0.71
1:E:277:LYS:HB2	1:E:318:LYS:HE2	1.72	0.71
1:A:376:ASP:CG	1:B:375:ARG:HH12	2.00	0.70
1:G:295:ARG:NH1	6:G:607:HOH:O	2.25	0.70
1:G:61:MET:HA	2:G:501:FMN:N5	2.07	0.69
1:G:331:LYS:HB2	1:G:362:ASP:HB3	1.74	0.69
1:D:220:TYR:HE2	4:D:503:CL:CL	2.12	0.69
1:H:274:TRP:CE2	1:H:310:THR:HG21	2.28	0.69
1:C:178:GLY:O	1:D:3:TRP:NE1	2.21	0.68
1:H:274:TRP:CD1	1:H:310:THR:CG2	2.76	0.68
1:H:274:TRP:CD1	1:H:310:THR:HG22	2.28	0.68
1:F:253:GLN:NE2	1:F:257:ASP:OD1	2.26	0.68
1:A:306:ILE:HG13	1:A:341:MET:HG2	1.76	0.68
1:G:275:LEU:HD22	1:G:279:MET:HB2	1.75	0.68
1:H:272:THR:HG23	1:H:310:THR:HG23	1.75	0.68
1:H:274:TRP:NE1	1:H:310:THR:HG22	2.09	0.67
1:H:272:THR:CG2	1:H:310:THR:HG23	2.25	0.67
1:H:310:THR:HG22	1:H:311:GLY:N	2.10	0.67
1:H:40:LYS:HD2	1:H:359:LEU:HB3	1.77	0.66
1:D:29:ARG:O	1:D:32:GLN:NE2	2.29	0.66
1:G:256:ARG:NH2	1:G:304:ASP:OD2	2.28	0.66
1:H:121:GLN:NE2	1:H:124:GLU:OE1	2.23	0.66
1:D:298:ALA:HB1	1:D:340:LYS:HG3	1.79	0.65
1:H:334:LYS:NZ	1:H:338:GLY:O	2.23	0.65
1:H:40:LYS:NZ	1:H:364:VAL:O	2.29	0.65
1:D:127:HIS:NE2	1:D:210:ASP:OD2	2.27	0.65
1:B:243:ASN:OD1	1:B:246:ARG:NH2	2.26	0.64
1:F:189:ASP:O	1:F:193:VAL:HG23	1.97	0.64
1:G:274:TRP:CD1	1:G:319:VAL:HG22	2.32	0.64
1:F:243:ASN:OD1	1:F:246:ARG:NH2	2.28	0.64
1:G:228:PRO:O	1:G:232:GLN:NE2	2.26	0.64
1:G:394:ALA:HB2	6:G:629:HOH:O	1.98	0.64

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:276:GLU:N	1:A:276:GLU:OE1	2.29	0.63
1:A:375:ARG:NH1	1:B:376:ASP:OD1	2.22	0.63
1:D:216:ASN:HD21	1:D:248:SER:HB3	1.63	0.63
1:D:277:LYS:HE3	1:D:318:LYS:HZ1	1.63	0.63
1:E:15:SER:N	6:E:604:HOH:O	2.29	0.63
1:E:87:PRO:O	1:E:131:GLN:NE2	2.31	0.63
1:C:267:LEU:N	6:C:614:HOH:O	2.31	0.63
1:G:61:MET:HA	2:G:501:FMN:C5A	2.29	0.62
1:B:29:ARG:NH1	1:B:390:GLU:OE2	2.31	0.62
1:G:188:GLU:O	1:G:192:GLU:HG3	2.00	0.62
1:H:262:ASN:ND2	6:H:611:HOH:O	2.28	0.62
1:H:52:PHE:CE2	1:H:89:MET:HE2	2.34	0.62
1:C:228:PRO:O	1:C:232:GLN:NE2	2.32	0.62
1:D:136:GLN:NE2	1:D:213:GLU:OE2	2.28	0.62
1:D:337:VAL:HG21	1:D:341:MET:HB3	1.81	0.62
1:F:326:GLN:NE2	1:F:346:VAL:O	2.25	0.62
1:D:123:VAL:HG21	6:D:630:HOH:O	1.99	0.62
1:E:375:ARG:NH1	1:F:378:GLY:O	2.31	0.62
1:H:142:ARG:HB2	1:H:182:PRO:HG3	1.80	0.62
1:D:256:ARG:NH1	1:D:260:GLY:O	2.33	0.61
1:B:25:ALA:O	1:B:53:GLN:NE2	2.31	0.61
1:F:398:ARG:HB2	1:F:411:ILE:HD11	1.82	0.61
1:H:167:VAL:HG12	1:H:182:PRO:HB3	1.83	0.61
1:G:306:ILE:HD11	1:G:341:MET:HE3	1.82	0.61
1:B:337:VAL:HG21	1:B:341:MET:HB3	1.83	0.61
1:H:398:ARG:NH2	6:H:618:HOH:O	2.32	0.61
1:C:61:MET:HA	2:C:501:FMN:C5A	2.31	0.60
1:G:36:LYS:NZ	6:G:617:HOH:O	2.34	0.60
1:H:155:THR:HG23	1:H:180:ILE:HD11	1.82	0.60
1:C:241:PHE:O	1:C:245:ILE:HG23	2.01	0.60
1:D:264:PRO:HA	1:D:304:ASP:OD2	2.02	0.60
1:G:275:LEU:HD11	1:G:314:HIS:CD2	2.37	0.60
1:H:185:MET:HE1	1:H:193:VAL:HG21	1.83	0.60
1:C:167:VAL:O	1:C:183:LYS:HD2	2.02	0.60
1:C:272:THR:OG1	1:C:276:GLU:OE2	2.20	0.59
1:D:414:ASN:OD1	1:D:414:ASN:N	2.35	0.59
1:A:102:ARG:HB3	1:A:107:CYS:HB2	1.83	0.59
1:D:340:LYS:O	1:D:340:LYS:NZ	2.21	0.59
1:C:48:ARG:NH1	1:C:261:PRO:O	2.30	0.59
1:E:85:ARG:NH2	1:F:374:GLN:O	2.35	0.59
1:B:253:GLN:NE2	6:B:602:HOH:O	2.22	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:306:ILE:HG13	1:C:341:MET:HG2	1.84	0.59
1:H:40:LYS:CD	1:H:359:LEU:HB3	2.33	0.59
1:G:80:GLY:O	1:G:84:GLN:HG3	2.02	0.59
1:G:185:MET:HE3	1:G:221:LEU:HD11	1.83	0.59
1:C:176:ALA:H	1:C:179:GLU:HG3	1.66	0.59
1:E:61:MET:HA	2:E:501:FMN:N5	2.17	0.58
1:E:129:GLN:NE2	6:E:603:HOH:O	2.27	0.58
1:F:256:ARG:NH2	1:F:304:ASP:OD2	2.37	0.58
1:B:109:GLY:HA3	1:B:111:TRP:CZ3	2.38	0.58
1:B:116:ILE:HD11	1:B:203:ARG:HG2	1.85	0.58
1:C:279:MET:HG2	1:C:282:GLU:HB2	1.86	0.58
1:G:109:GLY:HA3	1:G:111:TRP:CZ3	2.38	0.58
1:D:277:LYS:HE3	1:D:318:LYS:NZ	2.18	0.58
1:A:306:ILE:HD11	1:A:341:MET:HE3	1.86	0.57
1:B:61:MET:HA	2:B:501:FMN:C5A	2.34	0.57
1:G:46:THR:OG1	1:G:51:THR:OG1	2.21	0.57
1:E:267:LEU:HB2	1:E:303:ILE:HD12	1.86	0.57
1:D:298:ALA:O	1:D:340:LYS:HE3	2.04	0.57
1:F:228:PRO:O	1:F:232:GLN:NE2	2.37	0.57
1:H:25:ALA:O	1:H:53:GLN:NE2	2.37	0.57
1:C:399:TRP:CD2	1:D:149:PRO:HB2	2.39	0.57
1:C:167:VAL:HG12	1:C:182:PRO:HA	1.86	0.57
1:C:306:ILE:HD11	1:C:341:MET:HE3	1.87	0.57
1:D:248:SER:O	1:D:252:SER:OG	2.22	0.57
1:F:187:LYS:O	1:F:191:GLU:HG2	2.05	0.57
1:C:229:SER:OG	1:C:282:GLU:OE2	2.20	0.56
1:D:61:MET:HA	2:D:501:FMN:C5A	2.36	0.56
1:C:102:ARG:NH1	6:C:606:HOH:O	2.26	0.56
1:A:334:LYS:NZ	1:A:365:ASP:OD2	2.28	0.56
1:H:198:VAL:O	1:H:202:GLU:HG3	2.06	0.56
1:H:136:GLN:NE2	1:H:213:GLU:OE2	2.39	0.56
1:D:216:ASN:HD22	1:D:267:LEU:HD11	1.71	0.56
1:G:201:VAL:O	1:G:205:VAL:HG23	2.05	0.56
1:H:120:LYS:HG3	1:H:207:ALA:HA	1.88	0.56
1:D:50:HIS:CD2	1:D:264:PRO:HD3	2.39	0.56
1:B:346:VAL:HG22	2:B:501:FMN:H5'1	1.88	0.55
1:G:396:GLN:HG2	1:H:63:GLN:O	2.06	0.55
1:A:80:GLY:O	1:A:84:GLN:HG3	2.06	0.55
1:C:375:ARG:NH1	1:D:376:ASP:OD1	2.32	0.55
1:D:314:HIS:O	1:D:317:GLN:HG2	2.06	0.55
1:A:322:GLY:HA3	6:A:691:HOH:O	2.05	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:G:40:LYS:HA	1:G:43:GLN:OE1	2.06	0.55
1:A:112:LYS:HE3	1:A:114:SER:OG	2.07	0.55
1:E:41:LEU:HD13	1:E:359:LEU:HD11	1.87	0.55
1:D:48:ARG:HD3	1:D:261:PRO:O	2.06	0.55
1:F:370:GLY:O	1:F:373:PHE:N	2.36	0.55
1:H:253:GLN:OE1	1:H:302:ALA:HB2	2.06	0.55
1:H:334:LYS:HB3	6:H:612:HOH:O	2.07	0.55
1:B:61:MET:HA	2:B:501:FMN:N5	2.21	0.54
1:C:266:PHE:HB3	6:C:614:HOH:O	2.07	0.54
1:D:117:ALA:O	1:D:121:GLN:HG3	2.07	0.54
1:E:385:LYS:CD	1:E:413:PRO:HB2	2.28	0.54
2:A:501:FMN:H1'2	3:A:502:GOL:H12	1.89	0.54
1:C:256:ARG:NH2	1:C:304:ASP:OD2	2.41	0.54
1:G:326:GLN:NE2	1:G:346:VAL:O	2.40	0.54
1:H:60:PRO:HD2	1:H:268:ARG:NH2	2.23	0.54
1:E:279:MET:HE2	1:E:282:GLU:HB2	1.89	0.54
1:E:327:VAL:HG21	1:E:358:ILE:HD13	1.90	0.54
1:D:276:GLU:HB2	1:D:277:LYS:HE2	1.90	0.53
1:A:109:GLY:HA3	1:A:111:TRP:CZ3	2.43	0.53
1:C:63:GLN:NE2	1:C:74:TRP:HE1	2.05	0.53
1:D:80:GLY:N	6:D:618:HOH:O	2.41	0.53
1:E:282:GLU:HG2	6:E:612:HOH:O	2.08	0.53
1:G:226:LEU:O	1:G:244:ARG:HD2	2.09	0.53
1:D:293:PHE:CZ	1:D:297:LEU:HD11	2.44	0.53
1:G:187:LYS:O	1:G:191:GLU:HG2	2.08	0.53
1:D:228:PRO:O	1:D:232:GLN:NE2	2.38	0.53
1:E:109:GLY:HA3	1:E:111:TRP:CZ3	2.43	0.53
1:F:398:ARG:HB2	1:F:411:ILE:CD1	2.39	0.53
1:H:194:LYS:HD2	1:H:254:LEU:HD11	1.89	0.53
1:H:228:PRO:O	1:H:232:GLN:NE2	2.40	0.53
1:H:310:THR:CG2	1:H:311:GLY:N	2.71	0.53
1:D:408:SER:O	1:D:408:SER:OG	2.24	0.53
1:D:220:TYR:CE2	4:D:503:CL:CL	2.98	0.53
1:D:268:ARG:HA	1:D:307:ASP:O	2.09	0.53
1:C:76:MET:HE3	1:D:73:PRO:HB3	1.90	0.53
1:E:393:MET:HE3	1:E:394:ALA:N	2.15	0.53
1:F:40:LYS:NZ	6:F:601:HOH:O	2.21	0.53
1:G:151:LEU:HD13	1:H:6:VAL:HG12	1.90	0.53
1:H:334:LYS:NZ	1:H:341:MET:O	2.35	0.53
1:A:61:MET:HA	2:A:501:FMN:N5	2.24	0.52
1:D:217:ALA:HB2	1:D:268:ARG:HG2	1.91	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:216:ASN:ND2	1:F:248:SER:OG	2.38	0.52
1:C:155:THR:HG23	1:C:180:ILE:HD11	1.90	0.52
1:D:40:LYS:CD	1:D:359:LEU:HB3	2.38	0.52
1:G:63:GLN:O	1:G:65:SER:OG	2.24	0.52
1:D:71:LEU:HD23	1:D:122:VAL:HG21	1.90	0.52
1:E:246:ARG:O	1:E:250:GLU:HG3	2.09	0.52
1:H:188:GLU:OE1	1:H:188:GLU:N	2.33	0.52
1:H:268:ARG:HA	1:H:307:ASP:O	2.08	0.52
1:A:100:GLU:OE2	1:A:168:LYS:NZ	2.41	0.52
1:C:158:ASN:ND2	1:C:165:GLU:OE1	2.35	0.52
1:F:43:GLN:HG2	6:F:711:HOH:O	2.08	0.52
1:B:40:LYS:NZ	6:B:614:HOH:O	2.35	0.52
1:C:216:ASN:HD21	1:C:248:SER:HB3	1.72	0.52
1:E:283:LYS:NZ	6:E:617:HOH:O	2.42	0.52
1:G:82:ILE:HG22	1:G:87:PRO:HG3	1.92	0.52
1:C:359:LEU:HD23	1:C:364:VAL:O	2.09	0.52
1:E:149:PRO:O	1:F:406:ASN:ND2	2.36	0.52
1:E:356:GLU:HA	1:E:359:LEU:HD12	1.91	0.52
1:F:265:VAL:HG12	1:F:303:ILE:HD13	1.92	0.52
1:G:127:HIS:HD2	1:G:131:GLN:O	1.93	0.52
1:C:390:GLU:HB2	1:C:412:GLN:OE1	2.10	0.52
1:D:277:LYS:HG2	1:D:318:LYS:HE2	1.90	0.52
1:E:29:ARG:HD2	1:E:390:GLU:CD	2.35	0.52
1:F:221:LEU:HD11	1:F:225:PHE:HE2	1.74	0.52
1:E:61:MET:HA	2:E:501:FMN:C5A	2.40	0.52
1:B:48:ARG:NH1	1:B:261:PRO:O	2.36	0.51
1:C:399:TRP:CZ2	1:D:149:PRO:HG2	2.45	0.51
1:H:272:THR:HG23	1:H:310:THR:CG2	2.40	0.51
1:H:326:GLN:HB2	1:H:346:VAL:O	2.10	0.51
1:H:388:ASP:OD1	1:H:414:ASN:ND2	2.43	0.51
1:A:61:MET:HA	2:A:501:FMN:C5A	2.41	0.51
1:E:226:LEU:O	1:E:244:ARG:HD2	2.10	0.51
1:H:80:GLY:O	1:H:84:GLN:HG3	2.11	0.51
1:H:168:LYS:NZ	1:H:189:ASP:OD1	2.38	0.51
1:A:376:ASP:OD1	1:B:375:ARG:NH1	2.37	0.51
1:D:155:THR:HG23	1:D:180:ILE:HD11	1.92	0.51
1:F:40:LYS:O	1:F:55:ARG:HD2	2.10	0.51
1:F:371:ARG:NH1	2:F:501:FMN:O3P	2.33	0.51
1:H:50:HIS:HB3	1:H:132:LYS:CE	2.40	0.51
1:H:52:PHE:CD2	1:H:89:MET:HB3	2.45	0.51
1:H:111:TRP:NE1	1:H:112:LYS:HD3	2.25	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:112:LYS:HD2	1:D:114:SER:OG	2.11	0.51
1:D:21:GLN:NE2	1:D:129:GLN:OE1	2.44	0.51
1:E:84:GLN:O	1:E:393:MET:HE1	2.11	0.51
1:G:99:PRO:HG3	1:G:111:TRP:CE2	2.46	0.50
1:B:393:MET:HG3	1:B:411:ILE:HD12	1.93	0.50
1:E:310:THR:OG1	1:E:326:GLN:OE1	2.28	0.50
1:H:109:GLY:HA3	1:H:111:TRP:CZ3	2.46	0.50
1:E:143:LYS:HE3	1:E:175:PHE:CE1	2.46	0.50
1:C:40:LYS:O	1:C:55:ARG:HD2	2.11	0.50
1:C:279:MET:HE1	1:C:314:HIS:CE1	2.47	0.50
1:F:61:MET:HA	2:F:501:FMN:N5	2.26	0.50
1:F:268:ARG:HE	1:F:307:ASP:CG	2.19	0.50
1:F:275:LEU:HD11	1:F:314:HIS:CG	2.47	0.50
1:G:334:LYS:O	1:G:338:GLY:N	2.45	0.50
1:A:187:LYS:O	1:A:191:GLU:HG2	2.11	0.50
1:E:375:ARG:NH2	1:F:382:ALA:HB2	2.27	0.50
1:B:198:VAL:O	1:B:202:GLU:HG3	2.11	0.50
1:E:95:THR:HG23	1:E:108:VAL:HG12	1.93	0.50
1:D:391:ILE:O	1:D:411:ILE:N	2.41	0.49
1:E:375:ARG:NH2	1:F:376:ASP:OD2	2.45	0.49
1:G:199:ALA:O	1:G:203:ARG:HG3	2.11	0.49
1:H:116:ILE:HD11	1:H:203:ARG:HG2	1.93	0.49
1:C:375:ARG:HH12	1:D:376:ASP:CG	2.20	0.49
1:G:275:LEU:HD11	1:G:314:HIS:CG	2.47	0.49
1:A:40:LYS:O	1:A:55:ARG:HD2	2.12	0.49
1:D:48:ARG:O	6:D:601:HOH:O	2.20	0.49
1:E:61:MET:N	6:E:615:HOH:O	2.42	0.49
1:F:167:VAL:HG12	1:F:182:PRO:HB3	1.94	0.49
1:B:357:LYS:HE2	1:B:361:GLU:OE2	2.12	0.49
1:E:197:TRP:O	1:E:201:VAL:HG23	2.13	0.49
1:F:56:LEU:O	1:F:88:GLY:N	2.43	0.49
1:H:205:VAL:HG22	1:H:263:MET:HE1	1.95	0.49
1:B:102:ARG:NH2	6:B:615:HOH:O	2.36	0.49
1:C:197:TRP:O	1:C:201:VAL:HG23	2.12	0.49
1:G:16:TYR:CE2	1:H:73:PRO:HD2	2.48	0.49
1:G:71:LEU:HG	1:G:75:HIS:CG	2.48	0.49
1:B:45:LEU:HB2	1:B:55:ARG:CZ	2.43	0.49
1:B:157:THR:OG1	1:B:160:VAL:HG22	2.12	0.49
1:A:125:PHE:O	1:A:128:SER:OG	2.21	0.49
1:E:28:ALA:HB2	1:E:42:PHE:HB3	1.95	0.49
1:F:267:LEU:HB2	1:F:303:ILE:HD12	1.95	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:G:61:MET:HB2	6:G:642:HOH:O	2.12	0.49
1:A:155:THR:HG23	1:A:180:ILE:HD11	1.95	0.48
1:D:76:MET:HA	6:D:618:HOH:O	2.13	0.48
1:F:297:LEU:HD22	1:F:303:ILE:HG13	1.95	0.48
1:G:41:LEU:O	1:G:54:ASN:HB2	2.13	0.48
1:F:411:ILE:O	1:F:413:PRO:HD3	2.13	0.48
1:G:245:ILE:O	1:G:249:LEU:HD23	2.13	0.48
1:H:381:TRP:HD1	1:H:381:TRP:O	1.96	0.48
1:F:61:MET:HA	2:F:501:FMN:C5A	2.43	0.48
1:F:156:ALA:O	1:F:162:GLY:HA3	2.12	0.48
1:D:61:MET:HA	2:D:501:FMN:N5	2.29	0.48
1:F:99:PRO:HG3	1:F:111:TRP:CE2	2.48	0.48
1:F:275:LEU:HD11	1:F:314:HIS:CD2	2.49	0.48
1:B:34:SER:OG	1:B:36:LYS:HG3	2.13	0.48
1:C:142:ARG:HB2	1:C:182:PRO:HG3	1.96	0.48
1:D:102:ARG:HG2	1:D:107:CYS:HB2	1.95	0.48
1:D:140:ALA:HB3	1:D:144:ALA:HB2	1.95	0.48
1:D:240:SER:O	1:D:244:ARG:HG3	2.13	0.48
1:D:384:ALA:O	1:D:388:ASP:N	2.47	0.48
1:F:85:ARG:HB3	1:F:378:GLY:HA2	1.94	0.48
1:B:21:GLN:HG3	6:B:683:HOH:O	2.13	0.48
1:E:116:ILE:HG12	1:E:203:ARG:HB3	1.95	0.48
1:F:127:HIS:HD2	1:F:131:GLN:O	1.96	0.48
1:F:241:PHE:O	1:F:245:ILE:HG23	2.13	0.48
1:H:233:ARG:HB2	1:H:238:GLY:HA3	1.95	0.48
1:H:276:GLU:OE1	1:H:276:GLU:N	2.41	0.48
1:A:69:GLY:N	6:A:617:HOH:O	2.40	0.48
1:C:339:GLN:N	6:C:632:HOH:O	2.45	0.48
1:G:164:THR:HG22	1:G:180:ILE:HD11	1.94	0.48
1:H:346:VAL:HB	1:H:368:LEU:HB2	1.96	0.48
1:B:279:MET:HE1	1:B:314:HIS:NE2	2.29	0.48
1:C:147:VAL:HG22	1:C:154:VAL:O	2.14	0.48
1:E:375:ARG:HH22	1:F:382:ALA:HB2	1.79	0.48
1:A:199:ALA:O	1:A:203:ARG:HG3	2.14	0.48
1:B:127:HIS:NE2	1:B:210:ASP:OD2	2.34	0.47
1:C:395:GLY:HA2	1:C:398:ARG:HG2	1.95	0.47
1:E:148:PRO:CD	1:F:8:ILE:HD11	2.44	0.47
1:F:385:LYS:HG3	1:F:413:PRO:HB2	1.95	0.47
1:G:297:LEU:HD22	1:G:303:ILE:HG13	1.96	0.47
1:H:61:MET:HA	2:H:501:FMN:C5A	2.44	0.47
1:F:310:THR:OG1	1:F:326:GLN:OE1	2.25	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:369:VAL:HG11	1:F:379:LEU:CD2	2.43	0.47
1:G:119:LEU:HG	1:G:207:ALA:HB1	1.97	0.47
1:H:76:MET:HE1	1:H:122:VAL:HA	1.96	0.47
1:C:45:LEU:HD22	1:C:55:ARG:NH1	2.29	0.47
1:D:111:TRP:HA	6:D:678:HOH:O	2.13	0.47
1:E:274:TRP:HB2	1:E:317:GLN:HB2	1.95	0.47
1:H:107:CYS:HB3	6:H:628:HOH:O	2.15	0.47
1:H:306:ILE:HD12	1:H:341:MET:HG2	1.96	0.47
1:B:255:THR:O	1:B:259:VAL:HG22	2.14	0.47
1:H:137:LEU:HD23	1:H:212:ILE:HG23	1.97	0.47
1:A:233:ARG:HB2	1:A:238:GLY:HA3	1.97	0.47
1:A:369:VAL:CG1	1:A:372:ALA:HB3	2.45	0.47
1:C:297:LEU:HD12	1:C:306:ILE:HD13	1.97	0.47
1:D:24:PRO:HG2	1:D:53:GLN:HG3	1.96	0.47
1:E:314:HIS:CD2	6:E:612:HOH:O	2.67	0.47
1:F:155:THR:HG23	1:F:180:ILE:HD11	1.95	0.47
1:A:246:ARG:O	1:A:250:GLU:HG3	2.14	0.47
1:A:268:ARG:HA	1:A:307:ASP:HB3	1.97	0.47
1:D:393:MET:HG3	1:D:394:ALA:N	2.29	0.47
2:G:501:FMN:O2P	2:G:501:FMN:O4'	2.32	0.47
1:B:264:PRO:HA	1:B:304:ASP:OD2	2.14	0.47
1:F:85:ARG:NH2	6:F:605:HOH:O	2.27	0.47
1:F:253:GLN:HE21	1:F:257:ASP:CG	2.20	0.47
2:C:501:FMN:O2P	2:C:501:FMN:O4'	2.31	0.46
1:B:239:GLY:O	1:B:244:ARG:HD3	2.15	0.46
1:D:209:VAL:N	6:D:630:HOH:O	2.47	0.46
1:G:48:ARG:HD3	1:G:261:PRO:O	2.15	0.46
1:G:56:LEU:HD23	1:G:380:ALA:HA	1.96	0.46
1:D:71:LEU:HD22	1:D:119:LEU:HA	1.97	0.46
1:F:3:TRP:N	6:F:628:HOH:O	2.48	0.46
1:F:102:ARG:HB3	1:F:107:CYS:HB2	1.98	0.46
1:F:268:ARG:HA	1:F:307:ASP:HB3	1.97	0.46
1:A:95:THR:OG1	1:A:135:ILE:HD11	2.16	0.46
1:A:189:ASP:O	1:A:193:VAL:HG23	2.15	0.46
1:C:142:ARG:CZ	1:C:230:SER:HB3	2.45	0.46
1:E:44:PRO:O	1:E:55:ARG:NH2	2.43	0.46
1:E:73:PRO:HB3	1:F:76:MET:HE3	1.97	0.46
1:H:148:PRO:HB3	1:H:150:TRP:CZ3	2.51	0.46
2:A:501:FMN:C1'	3:A:502:GOL:H12	2.45	0.46
1:C:323:VAL:HG13	1:C:354:LEU:HD21	1.97	0.46
1:H:111:TRP:HE1	1:H:112:LYS:HD3	1.81	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:H:310:THR:HB	1:H:326:GLN:HE21	1.80	0.46
1:C:81:GLY:HA2	1:C:84:GLN:OE1	2.16	0.46
1:D:346:VAL:HG23	1:D:368:LEU:O	2.16	0.46
1:E:58:VAL:HG21	1:E:82:ILE:HG21	1.97	0.46
1:D:252:SER:HB3	1:D:303:ILE:CD1	2.44	0.46
1:E:394:ALA:HB2	6:E:603:HOH:O	2.16	0.46
1:G:146:THR:HA	1:G:156:ALA:H	1.81	0.46
1:G:189:ASP:O	1:G:193:VAL:HG23	2.16	0.46
1:A:112:LYS:HB3	1:A:112:LYS:HE2	1.57	0.45
1:C:211:PHE:O	1:C:212:ILE:HD13	2.16	0.45
1:E:185:MET:HG2	1:E:189:ASP:HB3	1.98	0.45
1:A:374:GLN:O	1:B:85:ARG:NH2	2.50	0.45
1:C:61:MET:HG2	2:C:501:FMN:C7	2.46	0.45
1:C:327:VAL:N	1:C:328:PRO:HD2	2.31	0.45
1:G:287:LEU:HD22	1:G:329:PHE:CD2	2.51	0.45
1:G:307:ASP:HA	1:G:344:SER:OG	2.16	0.45
1:G:397:ILE:O	6:G:601:HOH:O	2.21	0.45
1:A:240:SER:O	1:A:244:ARG:HG3	2.16	0.45
1:A:374:GLN:NE2	6:A:608:HOH:O	2.29	0.45
1:C:85:ARG:HB3	1:C:378:GLY:HA2	1.97	0.45
1:E:220:TYR:HE2	4:E:502:CL:CL	2.37	0.45
1:E:297:LEU:HD22	1:E:303:ILE:HG13	1.98	0.45
1:H:402:THR:OG1	1:H:403:SER:N	2.49	0.45
1:A:310:THR:OG1	1:A:326:GLN:OE1	2.29	0.45
1:B:381:TRP:HD1	1:B:381:TRP:O	2.00	0.45
1:H:125:PHE:O	1:H:128:SER:OG	2.30	0.45
1:A:92:ILE:HD11	1:A:133:ILE:HD11	1.99	0.45
1:D:147:VAL:HG22	1:D:154:VAL:O	2.16	0.45
1:D:246:ARG:HG3	1:D:246:ARG:HH11	1.80	0.45
1:G:60:PRO:O	2:G:501:FMN:C4A	2.64	0.45
1:H:71:LEU:HD22	1:H:75:HIS:CD2	2.52	0.45
1:A:264:PRO:HA	1:A:304:ASP:OD2	2.17	0.45
1:E:10:ALA:HB1	6:E:679:HOH:O	2.15	0.45
1:E:314:HIS:NE2	6:E:612:HOH:O	2.36	0.45
1:E:375:ARG:HH12	1:F:378:GLY:C	2.20	0.45
1:F:320:THR:O	1:F:320:THR:OG1	2.29	0.45
1:G:25:ALA:O	1:G:53:GLN:NE2	2.45	0.45
1:G:32:GLN:HE21	1:G:38:ILE:HG12	1.80	0.45
1:G:334:LYS:HA	1:G:337:VAL:HG22	1.99	0.45
1:G:385:LYS:HG3	1:G:413:PRO:HB2	1.99	0.45
1:H:95:THR:OG1	1:H:135:ILE:HD11	2.16	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:252:SER:HB3	1:A:303:ILE:HD11	1.97	0.45
1:B:272:THR:OG1	1:B:276:GLU:OE2	2.27	0.45
1:G:61:MET:HE1	1:G:374:GLN:HG3	1.98	0.45
1:D:201:VAL:HG13	1:D:212:ILE:CD1	2.47	0.45
1:D:381:TRP:CZ2	1:D:411:ILE:HD13	2.51	0.45
1:E:243:ASN:ND2	6:E:630:HOH:O	2.49	0.45
1:D:198:VAL:O	1:D:202:GLU:HG3	2.17	0.45
1:G:58:VAL:HG21	1:G:82:ILE:HG21	1.98	0.45
1:G:271:ALA:HB2	1:G:308:ILE:HG23	1.99	0.45
1:B:273:ASP:CG	1:B:286:LYS:HZ2	2.25	0.45
1:D:81:GLY:HA2	1:D:84:GLN:OE1	2.17	0.45
1:E:140:ALA:HB3	1:E:144:ALA:HB2	1.98	0.45
1:H:272:THR:CG2	1:H:310:THR:CG2	2.95	0.45
1:H:369:VAL:HG11	1:H:379:LEU:CD2	2.47	0.45
1:B:100:GLU:OE2	1:B:168:LYS:NZ	2.50	0.44
1:B:256:ARG:HB2	1:B:302:ALA:HB1	2.00	0.44
1:F:109:GLY:HA3	1:F:111:TRP:CZ3	2.52	0.44
1:H:82:ILE:HG22	1:H:87:PRO:HG3	1.98	0.44
1:D:142:ARG:HB2	1:D:182:PRO:HG3	1.99	0.44
1:E:73:PRO:HD2	1:F:16:TYR:CE2	2.52	0.44
1:H:158:ASN:OD1	1:H:158:ASN:N	2.46	0.44
1:A:143:LYS:HE3	1:A:175:PHE:CE1	2.52	0.44
1:F:28:ALA:HB2	1:F:42:PHE:HB3	1.99	0.44
1:A:369:VAL:HG11	1:A:372:ALA:HB3	1.99	0.44
1:B:82:ILE:HG22	1:B:87:PRO:HG3	1.98	0.44
1:D:217:ALA:CB	1:D:268:ARG:HG2	2.47	0.44
1:D:344:SER:HB2	1:D:366:VAL:HB	2.00	0.44
1:E:148:PRO:HD3	1:F:8:ILE:HD11	2.00	0.44
1:E:373:PHE:CE1	1:E:379:LEU:HB3	2.53	0.44
1:G:100:GLU:OE1	1:G:100:GLU:N	2.48	0.44
1:G:236:ASP:O	1:G:246:ARG:NE	2.45	0.44
1:C:381:TRP:CD2	1:D:375:ARG:HD3	2.53	0.44
1:D:201:VAL:HG13	1:D:212:ILE:HD13	1.99	0.44
1:F:236:ASP:O	1:F:246:ARG:NE	2.41	0.44
1:G:259:VAL:O	6:G:602:HOH:O	2.21	0.44
1:H:104:THR:HG22	1:H:146:THR:O	2.18	0.44
1:E:177:GLU:OE1	1:E:177:GLU:HA	2.18	0.44
1:F:270:SER:OG	1:F:311:GLY:O	2.33	0.44
1:F:370:GLY:O	1:F:371:ARG:C	2.60	0.44
1:H:333:VAL:O	1:H:337:VAL:HG22	2.18	0.44
1:B:102:ARG:HB3	1:B:107:CYS:HB2	1.98	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:64:TYR:CZ	1:E:149:PRO:HD3	2.53	0.44
1:F:398:ARG:CZ	1:F:409:GLU:HA	2.48	0.44
6:F:704:HOH:O	1:H:120:LYS:HE3	2.18	0.44
1:G:194:LYS:HE2	1:G:250:GLU:OE1	2.18	0.44
1:G:233:ARG:HB2	1:G:238:GLY:HA3	2.00	0.44
1:C:40:LYS:NZ	1:C:359:LEU:O	2.51	0.44
1:D:51:THR:O	1:D:132:LYS:HE3	2.18	0.44
1:D:221:LEU:O	1:D:224:SER:OG	2.34	0.44
1:E:25:ALA:HB1	1:E:393:MET:SD	2.58	0.44
1:F:59:ALA:HB2	1:F:368:LEU:HB3	2.00	0.44
1:G:110:LEU:HD13	1:G:203:ARG:HB2	1.99	0.44
1:D:318:LYS:NZ	1:D:318:LYS:O	2.42	0.43
1:A:30:ASN:ND2	6:A:631:HOH:O	2.51	0.43
1:A:228:PRO:HG2	1:A:283:LYS:HE2	2.00	0.43
1:C:129:GLN:OE1	1:D:74:TRP:HZ3	2.01	0.43
1:C:344:SER:HB2	1:C:366:VAL:HG12	1.98	0.43
1:E:74:TRP:CZ3	1:F:84:GLN:HG2	2.53	0.43
1:H:279:MET:HE2	1:H:279:MET:HB3	1.86	0.43
1:B:306:ILE:CG2	1:B:343:VAL:HG22	2.47	0.43
1:D:78:HIS:O	1:D:82:ILE:HG13	2.19	0.43
1:D:334:LYS:O	1:D:338:GLY:N	2.50	0.43
1:E:201:VAL:HG13	1:E:212:ILE:HD13	1.99	0.43
1:B:327:VAL:N	1:B:328:PRO:HD2	2.33	0.43
1:B:397:ILE:O	6:B:601:HOH:O	2.21	0.43
1:D:241:PHE:O	1:D:245:ILE:HG12	2.18	0.43
1:H:189:ASP:O	1:H:193:VAL:HG23	2.17	0.43
1:H:253:GLN:NE2	1:H:257:ASP:OD1	2.51	0.43
1:H:371:ARG:HG3	2:H:501:FMN:O2P	2.19	0.43
1:B:216:ASN:HA	1:B:222:LEU:HB2	2.01	0.43
1:D:295:ARG:NH2	6:D:627:HOH:O	2.43	0.43
1:E:102:ARG:HE	1:E:102:ARG:HB2	1.69	0.43
1:E:187:LYS:NZ	1:E:191:GLU:OE1	2.39	0.43
1:H:272:THR:HG22	1:H:310:THR:HG23	1.98	0.43
1:C:190:ILE:O	1:C:194:LYS:HG3	2.18	0.43
1:C:373:PHE:CE1	1:C:379:LEU:HB3	2.53	0.43
1:D:300:GLN:O	6:D:602:HOH:O	2.20	0.43
1:G:117:ALA:O	1:G:121:GLN:HG3	2.18	0.43
1:G:411:ILE:HD13	1:G:411:ILE:HA	1.83	0.43
1:A:150:TRP:CD1	1:A:151:LEU:HG	2.53	0.43
1:A:375:ARG:HH12	1:B:376:ASP:CG	2.20	0.43
1:B:268:ARG:HA	1:B:307:ASP:O	2.18	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:G:277:LYS:O	1:G:280:PRO:HD3	2.18	0.43
1:H:50:HIS:HB3	1:H:132:LYS:NZ	2.34	0.43
1:H:61:MET:O	6:H:602:HOH:O	2.21	0.43
1:H:85:ARG:HD3	1:H:378:GLY:CA	2.48	0.43
1:A:198:VAL:O	1:A:202:GLU:HG3	2.18	0.43
1:C:371:ARG:NH2	6:C:638:HOH:O	2.50	0.43
1:C:382:ALA:HB2	1:D:375:ARG:NH2	2.33	0.43
1:D:394:ALA:HB3	1:D:397:ILE:HD12	2.00	0.43
1:H:76:MET:HE2	1:H:122:VAL:HG22	2.01	0.43
1:A:274:TRP:CD1	1:A:319:VAL:HG22	2.53	0.43
1:C:167:VAL:H	1:C:183:LYS:NZ	2.17	0.43
1:E:273:ASP:OD2	1:E:284:GLY:HA3	2.19	0.43
1:H:62:CYS:HA	1:H:93:GLU:HB2	2.00	0.43
1:C:148:PRO:HD3	1:D:8:ILE:HD11	2.00	0.42
1:C:376:ASP:CG	1:D:375:ARG:HH12	2.25	0.42
1:D:305:LEU:HD21	1:D:344:SER:HB3	2.00	0.42
1:E:305:LEU:HD21	1:E:344:SER:HB3	2.00	0.42
1:G:158:ASN:OD1	1:G:164:THR:OG1	2.29	0.42
1:B:60:PRO:HD2	1:B:268:ARG:NH2	2.34	0.42
1:D:374:GLN:OE1	6:D:603:HOH:O	2.21	0.42
1:G:26:GLY:HA2	1:G:391:ILE:HD12	2.01	0.42
1:G:278:SER:OG	1:G:316:ALA:O	2.32	0.42
1:H:61:MET:HG2	2:H:501:FMN:C7	2.49	0.42
1:C:125:PHE:O	1:C:128:SER:HB2	2.19	0.42
1:C:167:VAL:H	1:C:183:LYS:HZ2	1.67	0.42
1:E:385:LYS:HE3	1:E:413:PRO:O	2.18	0.42
1:G:39:PRO:HB2	1:G:356:GLU:OE1	2.20	0.42
1:A:111:TRP:CD1	1:A:112:LYS:HB2	2.55	0.42
1:C:150:TRP:CD1	1:C:151:LEU:HG	2.54	0.42
1:E:117:ALA:O	1:E:121:GLN:HG3	2.19	0.42
1:E:396:GLN:HG2	1:F:63:GLN:O	2.19	0.42
1:H:248:SER:O	1:H:252:SER:OG	2.27	0.42
1:D:374:GLN:HE22	2:D:501:FMN:HM72	1.85	0.42
1:E:25:ALA:O	1:E:53:GLN:NE2	2.52	0.42
1:G:268:ARG:HA	1:G:307:ASP:O	2.20	0.42
1:H:171:SER:HB2	1:H:173:ILE:HD12	2.02	0.42
1:H:320:THR:O	1:H:320:THR:OG1	2.35	0.42
1:B:58:VAL:HG21	1:B:82:ILE:HG21	2.00	0.42
1:D:111:TRP:NE1	1:D:112:LYS:HE2	2.34	0.42
1:H:85:ARG:HD3	1:H:378:GLY:N	2.35	0.42
1:B:56:LEU:HA	1:B:367:ILE:O	2.20	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:148:PRO:HB3	1:D:150:TRP:CZ3	2.55	0.42
1:D:306:ILE:CD1	1:D:341:MET:HG2	2.49	0.42
1:E:56:LEU:HD23	1:E:380:ALA:HA	2.02	0.42
1:F:254:LEU:HA	1:F:254:LEU:HD23	1.79	0.42
1:H:273:ASP:OD1	1:H:273:ASP:N	2.49	0.42
1:A:5:ASP:HB3	1:D:254:LEU:HD21	2.01	0.42
1:F:359:LEU:HD23	1:F:364:VAL:HG23	2.02	0.42
1:D:409:GLU:OE1	1:D:409:GLU:N	2.48	0.42
1:F:48:ARG:HD3	1:F:261:PRO:O	2.19	0.42
1:F:195:THR:OG1	1:G:159:ALA:HA	2.20	0.42
1:B:61:MET:HG2	2:B:501:FMN:C7	2.50	0.42
1:B:293:PHE:CE2	1:B:297:LEU:HD11	2.55	0.42
1:B:331:LYS:NZ	1:B:362:ASP:OD1	2.43	0.42
1:C:379:LEU:O	1:C:379:LEU:HG	2.19	0.42
1:H:167:VAL:HG21	1:H:180:ILE:HG21	2.01	0.42
1:H:346:VAL:HG22	2:H:501:FMN:H5'2	2.01	0.42
1:H:399:TRP:O	6:H:601:HOH:O	2.21	0.42
1:A:56:LEU:O	1:A:88:GLY:N	2.51	0.41
1:A:202:GLU:OE2	6:A:601:HOH:O	2.22	0.41
1:A:268:ARG:HA	1:A:307:ASP:O	2.20	0.41
1:A:337:VAL:C	1:A:340:LYS:HE3	2.44	0.41
1:D:272:THR:HA	1:D:285:TRP:O	2.20	0.41
1:A:71:LEU:HD22	1:A:119:LEU:HA	2.01	0.41
1:A:216:ASN:HA	1:A:222:LEU:HB2	2.01	0.41
1:F:268:ARG:HA	1:F:307:ASP:O	2.20	0.41
1:F:285:TRP:CZ3	1:F:289:ASP:HB3	2.55	0.41
1:G:76:MET:HE1	1:G:121:GLN:O	2.19	0.41
1:G:90:ILE:HG13	1:G:131:GLN:NE2	2.35	0.41
1:F:314:HIS:O	1:F:317:GLN:HG2	2.19	0.41
1:G:29:ARG:HB2	1:G:410:TYR:CD2	2.55	0.41
1:H:50:HIS:HB3	1:H:132:LYS:HZ1	1.86	0.41
1:C:102:ARG:HB3	1:C:107:CYS:HB2	2.03	0.41
1:E:236:ASP:O	1:E:246:ARG:NE	2.45	0.41
1:E:378:GLY:O	1:E:381:TRP:HB3	2.20	0.41
1:F:183:LYS:N	1:F:183:LYS:HD3	2.35	0.41
1:G:345:ALA:HA	6:G:684:HOH:O	2.19	0.41
1:H:40:LYS:O	1:H:55:ARG:HD2	2.21	0.41
1:B:187:LYS:HD2	1:B:187:LYS:HA	1.90	0.41
1:B:201:VAL:O	1:B:205:VAL:HG23	2.21	0.41
1:C:331:LYS:NZ	1:C:361:GLU:O	2.53	0.41
1:D:63:GLN:O	1:D:65:SER:OG	2.32	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:283:LYS:HZ2	1:E:283:LYS:HG2	1.74	0.41
1:G:228:PRO:HG3	1:G:244:ARG:NE	2.35	0.41
1:G:381:TRP:O	1:G:381:TRP:HD1	2.03	0.41
1:A:253:GLN:NE2	1:A:257:ASP:OD1	2.42	0.41
1:D:43:GLN:O	1:D:55:ARG:NE	2.42	0.41
1:D:341:MET:HE2	1:D:341:MET:HB2	1.89	0.41
1:E:399:TRP:CD2	1:F:149:PRO:HB2	2.56	0.41
1:F:354:LEU:O	1:F:358:ILE:HG13	2.21	0.41
1:A:237:TYR:CD2	1:A:247:LEU:HB2	2.56	0.41
1:B:57:GLY:HA2	1:B:89:MET:HG3	2.03	0.41
1:G:95:THR:HG23	1:G:108:VAL:HG12	2.03	0.41
1:G:176:ALA:H	1:G:179:GLU:HG3	1.85	0.41
1:G:275:LEU:HD13	1:G:282:GLU:HG2	2.02	0.41
1:A:102:ARG:HD3	1:A:111:TRP:CH2	2.56	0.41
1:A:337:VAL:O	1:A:338:GLY:C	2.63	0.41
1:A:346:VAL:HG23	1:A:368:LEU:O	2.21	0.41
1:B:378:GLY:O	1:B:381:TRP:HB3	2.20	0.41
1:F:50:HIS:CD2	1:F:264:PRO:HD3	2.56	0.41
1:G:87:PRO:HG2	1:G:131:GLN:NE2	2.35	0.41
1:G:247:LEU:O	1:G:247:LEU:HD12	2.21	0.41
1:G:410:TYR:CD1	1:G:410:TYR:N	2.88	0.41
1:H:63:GLN:HB3	1:H:74:TRP:HE1	1.86	0.41
1:H:308:ILE:HD13	1:H:308:ILE:HA	1.79	0.41
1:A:52:PHE:CE2	1:A:89:MET:HE2	2.55	0.41
1:A:97:VAL:O	1:A:111:TRP:HB3	2.21	0.41
1:E:341:MET:HE2	1:E:341:MET:HB2	1.88	0.41
1:G:252:SER:HB3	1:G:303:ILE:HD11	2.03	0.41
1:G:129:GLN:NE2	6:G:615:HOH:O	2.34	0.40
1:H:274:TRP:CD1	1:H:319:VAL:HG22	2.56	0.40
1:A:197:TRP:O	1:A:201:VAL:HG23	2.21	0.40
1:D:28:ALA:HB2	1:D:42:PHE:HB3	2.04	0.40
1:D:350:ASN:HB2	6:D:673:HOH:O	2.20	0.40
1:D:390:GLU:HA	1:D:411:ILE:O	2.21	0.40
1:E:103:ILE:HG12	1:E:140:ALA:HB2	2.02	0.40
1:F:283:LYS:HD2	1:F:283:LYS:HA	1.76	0.40
1:G:110:LEU:O	1:G:203:ARG:HD2	2.21	0.40
1:H:188:GLU:H	1:H:188:GLU:CD	2.27	0.40
1:H:221:LEU:O	1:H:225:PHE:HD1	2.04	0.40
1:C:61:MET:HA	2:C:501:FMN:N5	2.35	0.40
1:C:274:TRP:CD1	1:C:319:VAL:HG22	2.57	0.40
1:D:33:THR:O	6:D:604:HOH:O	2.21	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:111:TRP:HE1	1:D:112:LYS:HE2	1.86	0.40
1:D:255:THR:O	1:D:259:VAL:HG22	2.21	0.40
1:F:198:VAL:O	1:F:202:GLU:HG3	2.21	0.40
1:H:56:LEU:HD13	1:H:383:PHE:CD2	2.57	0.40
1:H:263:MET:HA	1:H:264:PRO:HD3	1.99	0.40
1:A:361:GLU:OE1	1:A:361:GLU:HA	2.22	0.40
1:F:50:HIS:HD2	1:F:264:PRO:HD3	1.87	0.40
1:H:274:TRP:HB2	1:H:317:GLN:HB2	2.03	0.40
1:B:40:LYS:N	1:B:356:GLU:OE2	2.50	0.40
1:B:216:ASN:HD21	1:B:248:SER:CB	2.34	0.40
1:B:411:ILE:HG21	1:B:411:ILE:HD13	1.84	0.40
1:C:377:SER:HB3	6:D:622:HOH:O	2.21	0.40
1:E:267:LEU:HD22	1:E:297:LEU:HD11	2.04	0.40
1:G:77:ALA:HA	1:H:77:ALA:HA	2.03	0.40
1:H:64:TYR:CZ	1:H:149:PRO:HD3	2.56	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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	405/422 (96%)	391 (96%)	12 (3%)	2 (0%)	24	31
1	B	406/422 (96%)	391 (96%)	15 (4%)	0	100	100
1	C	405/422 (96%)	389 (96%)	16 (4%)	0	100	100
1	D	405/422 (96%)	391 (96%)	14 (4%)	0	100	100
1	E	404/422 (96%)	389 (96%)	15 (4%)	0	100	100
1	F	410/422 (97%)	394 (96%)	16 (4%)	0	100	100
1	G	406/422 (96%)	388 (96%)	16 (4%)	2 (0%)	24	31
1	H	405/422 (96%)	390 (96%)	14 (4%)	1 (0%)	43	55

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
All	All	3246/3376 (96%)	3123 (96%)	118 (4%)	5 (0%)	43	55

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	338	GLY
1	G	338	GLY
1	H	338	GLY
1	G	93	GLU
1	A	93	GLU

5.3.2 Protein sidechains ⓘ

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	321/332 (97%)	310 (97%)	11 (3%)	32	49
1	B	322/332 (97%)	312 (97%)	10 (3%)	35	52
1	C	321/332 (97%)	304 (95%)	17 (5%)	20	30
1	D	321/332 (97%)	292 (91%)	29 (9%)	9	12
1	E	320/332 (96%)	310 (97%)	10 (3%)	35	52
1	F	323/332 (97%)	307 (95%)	16 (5%)	22	33
1	G	322/332 (97%)	304 (94%)	18 (6%)	19	28
1	H	320/332 (96%)	308 (96%)	12 (4%)	29	44
All	All	2570/2656 (97%)	2447 (95%)	123 (5%)	23	35

All (123) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	2	THR
1	A	51	THR
1	A	133	ILE
1	A	216	ASN
1	A	230	SER

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Mol	Chain	Res	Type
1	A	270	SER
1	A	283	LYS
1	A	348	THR
1	A	371	ARG
1	A	403	SER
1	A	412	GLN
1	B	18	THR
1	B	21	GLN
1	B	40	LYS
1	B	112	LYS
1	B	230	SER
1	B	262	ASN
1	B	306	ILE
1	B	364	VAL
1	B	404	PHE
1	B	408	SER
1	C	2	THR
1	C	33	THR
1	C	103	ILE
1	C	164	THR
1	C	167	VAL
1	C	187	LYS
1	C	224	SER
1	C	245	ILE
1	C	251	ILE
1	C	254	LEU
1	C	278	SER
1	C	306	ILE
1	C	321	SER
1	C	323	VAL
1	C	348	THR
1	C	364	VAL
1	C	366	VAL
1	D	22	SER
1	D	33	THR
1	D	46	THR
1	D	47	ILE
1	D	157	THR
1	D	180	ILE
1	D	187	LYS
1	D	227	SER
1	D	252	SER

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Mol	Chain	Res	Type
1	D	277	LYS
1	D	278	SER
1	D	281	GLU
1	D	282	GLU
1	D	288	GLU
1	D	291	VAL
1	D	309	SER
1	D	317	GLN
1	D	318	LYS
1	D	321	SER
1	D	333	VAL
1	D	335	GLU
1	D	339	GLN
1	D	340	LYS
1	D	348	THR
1	D	357	LYS
1	D	385	LYS
1	D	402	THR
1	D	408	SER
1	D	414	ASN
1	E	18	THR
1	E	72	THR
1	E	112	LYS
1	E	131	GLN
1	E	164	THR
1	E	191	GLU
1	E	364	VAL
1	E	390	GLU
1	E	403	SER
1	E	412	GLN
1	F	29	ARG
1	F	51	THR
1	F	71	LEU
1	F	177	GLU
1	F	186	THR
1	F	230	SER
1	F	234	THR
1	F	236	ASP
1	F	270	SER
1	F	277	LYS
1	F	281	GLU
1	F	283	LYS

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Mol	Chain	Res	Type
1	F	321	SER
1	F	348	THR
1	F	397	ILE
1	F	405	ARG
1	G	2	THR
1	G	18	THR
1	G	33	THR
1	G	36	LYS
1	G	51	THR
1	G	103	ILE
1	G	112	LYS
1	G	131	GLN
1	G	160	VAL
1	G	212	ILE
1	G	223	SER
1	G	230	SER
1	G	247	LEU
1	G	331	LYS
1	G	333	VAL
1	G	364	VAL
1	G	366	VAL
1	G	403	SER
1	H	14	ILE
1	H	18	THR
1	H	98	VAL
1	H	158	ASN
1	H	194	LYS
1	H	277	LYS
1	H	283	LYS
1	H	323	VAL
1	H	334	LYS
1	H	351	SER
1	H	353	ASN
1	H	367	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (26) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	131	GLN
1	A	353	ASN
1	B	21	GLN
1	B	216	ASN

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Mol	Chain	Res	Type
1	C	21	GLN
1	C	54	ASN
1	C	216	ASN
1	C	232	GLN
1	C	326	GLN
1	C	360	ASN
1	C	374	GLN
1	D	166	ASN
1	D	216	ASN
1	D	374	GLN
1	E	63	GLN
1	E	216	ASN
1	F	43	GLN
1	F	216	ASN
1	F	360	ASN
1	G	215	HIS
1	G	216	ASN
1	G	253	GLN
1	G	353	ASN
1	H	63	GLN
1	H	216	ASN
1	H	326	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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 22 ligands modelled in this entry, 13 are monoatomic - leaving 9 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
2	FMN	H	501	-	33,33,33	1.19	3 (9%)	48,50,50	1.60	10 (20%)
2	FMN	D	501	-	33,33,33	1.04	2 (6%)	48,50,50	1.44	11 (22%)
2	FMN	C	501	-	33,33,33	1.05	2 (6%)	48,50,50	1.34	9 (18%)
2	FMN	F	501	-	33,33,33	1.12	3 (9%)	48,50,50	1.42	8 (16%)
2	FMN	A	501	-	33,33,33	1.03	2 (6%)	48,50,50	1.26	6 (12%)
2	FMN	G	501	-	33,33,33	0.99	2 (6%)	48,50,50	1.59	12 (25%)
3	GOL	A	502	-	5,5,5	1.17	1 (20%)	5,5,5	0.94	0
2	FMN	E	501	-	33,33,33	1.14	3 (9%)	48,50,50	1.42	11 (22%)
2	FMN	B	501	-	33,33,33	1.08	2 (6%)	48,50,50	1.45	10 (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
2	FMN	H	501	-	-	4/18/18/18	0/3/3/3
2	FMN	D	501	-	-	8/18/18/18	0/3/3/3
2	FMN	C	501	-	-	1/18/18/18	0/3/3/3
2	FMN	F	501	-	-	1/18/18/18	0/3/3/3
2	FMN	A	501	-	-	7/18/18/18	0/3/3/3
2	FMN	G	501	-	-	5/18/18/18	0/3/3/3
3	GOL	A	502	-	-	2/4/4/4	-
2	FMN	E	501	-	-	1/18/18/18	0/3/3/3
2	FMN	B	501	-	-	4/18/18/18	0/3/3/3

All (20) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	501	FMN	C4A-N5	3.79	1.38	1.30
2	C	501	FMN	C4A-N5	3.68	1.38	1.30
2	E	501	FMN	C4A-N5	3.65	1.38	1.30
2	H	501	FMN	C4A-N5	3.61	1.38	1.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	501	FMN	C4A-N5	3.36	1.38	1.30
2	D	501	FMN	C4A-N5	3.28	1.37	1.30
2	F	501	FMN	C4A-N5	3.15	1.37	1.30
2	E	501	FMN	C1'-C2'	3.12	1.57	1.52
2	H	501	FMN	C1'-C2'	3.02	1.56	1.52
2	F	501	FMN	C10-N1	2.76	1.38	1.33
2	H	501	FMN	C10-N1	2.71	1.38	1.33
2	B	501	FMN	C10-N1	2.68	1.38	1.33
2	G	501	FMN	C4A-N5	2.68	1.36	1.30
2	D	501	FMN	C10-N1	2.67	1.38	1.33
2	C	501	FMN	C10-N1	2.43	1.38	1.33
2	G	501	FMN	C10-N1	2.41	1.38	1.33
2	A	501	FMN	C10-N1	2.37	1.38	1.33
2	E	501	FMN	C10-N1	2.21	1.37	1.33
3	A	502	GOL	O2-C2	-2.21	1.36	1.43
2	F	501	FMN	C1'-C2'	2.18	1.55	1.52

All (77) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	H	501	FMN	C5'-C4'-C3'	-4.94	102.91	112.22
2	G	501	FMN	C4'-C3'-C2'	-4.02	106.88	113.57
2	G	501	FMN	C4-N3-C2	-3.78	118.93	125.64
2	F	501	FMN	C4-N3-C2	-3.77	118.95	125.64
2	B	501	FMN	O3P-P-O5'	3.67	116.24	106.67
2	D	501	FMN	C1'-C2'-C3'	3.43	118.97	109.66
2	A	501	FMN	C4-N3-C2	-3.34	119.71	125.64
2	E	501	FMN	C10-C4A-N5	-3.20	118.28	124.81
2	D	501	FMN	C4-N3-C2	-3.17	120.02	125.64
2	G	501	FMN	C4-C4A-C10	3.15	122.33	116.93
2	E	501	FMN	C1'-C2'-C3'	3.03	117.86	109.66
2	E	501	FMN	C4A-C10-N10	3.02	120.81	116.48
2	C	501	FMN	C4A-C10-N10	2.99	120.77	116.48
2	H	501	FMN	C4A-C10-N10	2.97	120.74	116.48
2	H	501	FMN	C1'-C2'-C3'	2.95	117.65	109.66
2	B	501	FMN	C4-N3-C2	-2.94	120.42	125.64
2	A	501	FMN	C4A-C10-N10	2.94	120.69	116.48
2	H	501	FMN	C4-N3-C2	-2.91	120.48	125.64
2	F	501	FMN	C4'-C3'-C2'	-2.89	108.76	113.57
2	C	501	FMN	C4-N3-C2	-2.87	120.54	125.64
2	E	501	FMN	C4'-C3'-C2'	-2.86	108.81	113.57
2	E	501	FMN	C4-N3-C2	-2.85	120.58	125.64

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	501	FMN	O3P-P-O5'	2.79	113.95	106.67
2	B	501	FMN	C4A-C10-N10	2.79	120.47	116.48
2	F	501	FMN	C4A-C4-N3	2.77	120.30	113.25
2	H	501	FMN	O4-C4-C4A	-2.76	119.24	126.53
2	C	501	FMN	C4A-C4-N3	2.69	120.09	113.25
2	G	501	FMN	C10-C4A-N5	-2.68	119.33	124.81
2	H	501	FMN	C4A-C4-N3	2.68	120.07	113.25
2	F	501	FMN	C10-C4A-N5	-2.66	119.38	124.81
2	F	501	FMN	C4A-C10-N10	2.66	120.28	116.48
2	B	501	FMN	C5'-C4'-C3'	-2.65	107.23	112.22
2	B	501	FMN	C1'-C2'-C3'	2.64	116.81	109.66
2	F	501	FMN	O4-C4-C4A	-2.62	119.62	126.53
2	G	501	FMN	O4-C4-C4A	-2.59	119.70	126.53
2	A	501	FMN	C10-C4A-N5	-2.58	119.54	124.81
2	B	501	FMN	C4A-C4-N3	2.57	119.79	113.25
2	G	501	FMN	C4A-C10-N10	2.57	120.16	116.48
2	G	501	FMN	C4A-C10-N1	-2.56	118.31	124.59
2	D	501	FMN	O4-C4-C4A	-2.56	119.77	126.53
2	F	501	FMN	C4A-C10-N1	-2.54	118.36	124.59
2	A	501	FMN	C4A-C4-N3	2.51	119.65	113.25
2	H	501	FMN	C2'-C1'-N10	-2.50	98.38	110.20
2	C	501	FMN	C10-C4A-N5	-2.47	119.76	124.81
2	H	501	FMN	C10-C4A-N5	-2.46	119.78	124.81
2	A	501	FMN	O4-C4-C4A	-2.45	120.06	126.53
2	B	501	FMN	C10-C4A-N5	-2.45	119.81	124.81
2	D	501	FMN	C10-C4A-N5	-2.43	119.85	124.81
2	B	501	FMN	C9A-C5A-N5	-2.41	119.90	122.45
2	H	501	FMN	O3P-P-O5'	2.38	112.88	106.67
2	F	501	FMN	C4-C4A-C10	2.37	121.00	116.93
2	E	501	FMN	C2'-C1'-N10	-2.35	99.07	110.20
2	D	501	FMN	C4A-C4-N3	2.35	119.24	113.25
2	D	501	FMN	O4'-C4'-C5'	-2.34	104.83	109.99
2	E	501	FMN	C4-C4A-C10	2.33	120.92	116.93
2	C	501	FMN	O4-C4-C4A	-2.32	120.42	126.53
2	G	501	FMN	C1'-C2'-C3'	2.31	115.93	109.66
2	H	501	FMN	O2'-C2'-C3'	-2.31	103.84	109.25
2	G	501	FMN	O3'-C3'-C2'	2.31	114.17	108.93
2	G	501	FMN	O3P-P-O5'	2.28	112.60	106.67
2	D	501	FMN	C4A-C10-N10	2.24	119.69	116.48
2	D	501	FMN	C4-C4A-C10	2.23	120.76	116.93
2	D	501	FMN	C4A-C10-N1	-2.21	119.18	124.59
2	D	501	FMN	C9A-C5A-N5	-2.17	120.15	122.45

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	501	FMN	C2'-C1'-N10	-2.17	99.95	110.20
2	E	501	FMN	C4A-C10-N1	-2.16	119.30	124.59
2	B	501	FMN	O4-C4-C4A	-2.11	120.96	126.53
2	B	501	FMN	C5A-C9A-N10	2.10	119.87	117.97
2	G	501	FMN	C4A-C4-N3	2.09	118.58	113.25
2	E	501	FMN	C4A-C4-N3	2.08	118.55	113.25
2	A	501	FMN	C9A-C5A-N5	-2.07	120.26	122.45
2	C	501	FMN	C4-C4A-N5	2.07	121.06	118.21
2	E	501	FMN	C9A-C5A-N5	-2.06	120.27	122.45
2	C	501	FMN	C4'-C3'-C2'	-2.04	110.18	113.57
2	G	501	FMN	C5A-N5-C4A	2.01	121.34	118.09
2	C	501	FMN	C5'-C4'-C3'	-2.01	108.43	112.22
2	E	501	FMN	C5A-N5-C4A	2.00	121.32	118.09

There are no chirality outliers.

All (33) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	501	FMN	O3'-C3'-C4'-C5'
2	A	501	FMN	C5'-O5'-P-O2P
2	A	501	FMN	C5'-O5'-P-O3P
2	D	501	FMN	C1'-C2'-C3'-O3'
2	D	501	FMN	C1'-C2'-C3'-C4'
2	D	501	FMN	O2'-C2'-C3'-O3'
2	D	501	FMN	C5'-O5'-P-O2P
2	D	501	FMN	C5'-O5'-P-O3P
3	A	502	GOL	O1-C1-C2-C3
2	A	501	FMN	C2'-C3'-C4'-C5'
2	H	501	FMN	C2'-C3'-C4'-C5'
2	A	501	FMN	O3'-C3'-C4'-O4'
2	A	501	FMN	C2'-C3'-C4'-O4'
3	A	502	GOL	O1-C1-C2-O2
2	B	501	FMN	O4'-C4'-C5'-O5'
2	D	501	FMN	O2'-C2'-C3'-C4'
2	A	501	FMN	C5'-O5'-P-O1P
2	D	501	FMN	C5'-O5'-P-O1P
2	H	501	FMN	C2'-C3'-C4'-O4'
2	G	501	FMN	C2'-C3'-C4'-C5'
2	G	501	FMN	C2'-C3'-C4'-O4'
2	C	501	FMN	C4'-C5'-O5'-P
2	B	501	FMN	C4'-C5'-O5'-P
2	H	501	FMN	C4'-C5'-O5'-P

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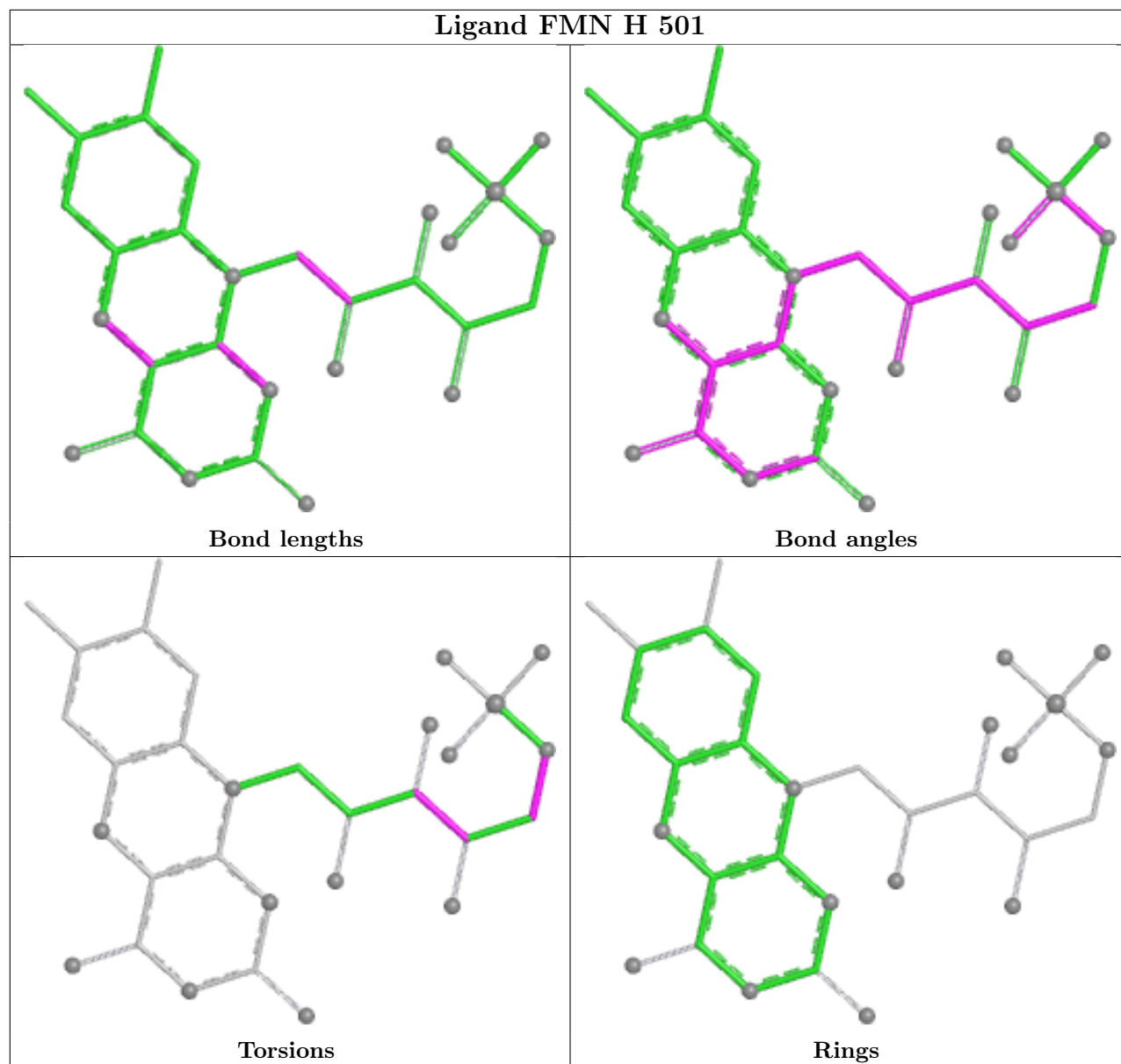
Mol	Chain	Res	Type	Atoms
2	E	501	FMN	C4'-C5'-O5'-P
2	G	501	FMN	C4'-C5'-O5'-P
2	F	501	FMN	C4'-C5'-O5'-P
2	D	501	FMN	C4'-C5'-O5'-P
2	H	501	FMN	O3'-C3'-C4'-C5'
2	G	501	FMN	O3'-C3'-C4'-C5'
2	G	501	FMN	C5'-O5'-P-O3P
2	B	501	FMN	C3'-C4'-C5'-O5'
2	B	501	FMN	C2'-C3'-C4'-C5'

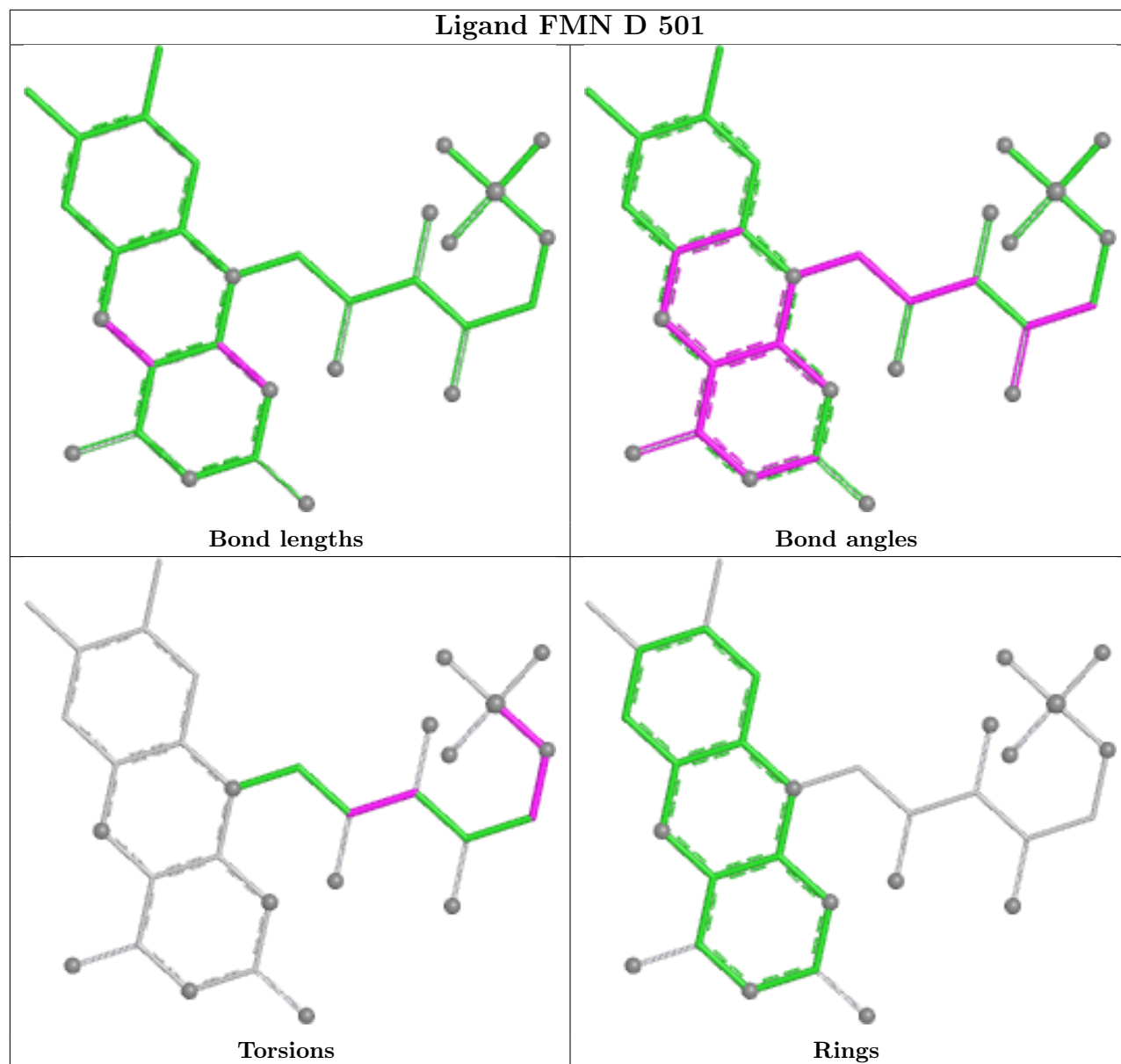
There are no ring outliers.

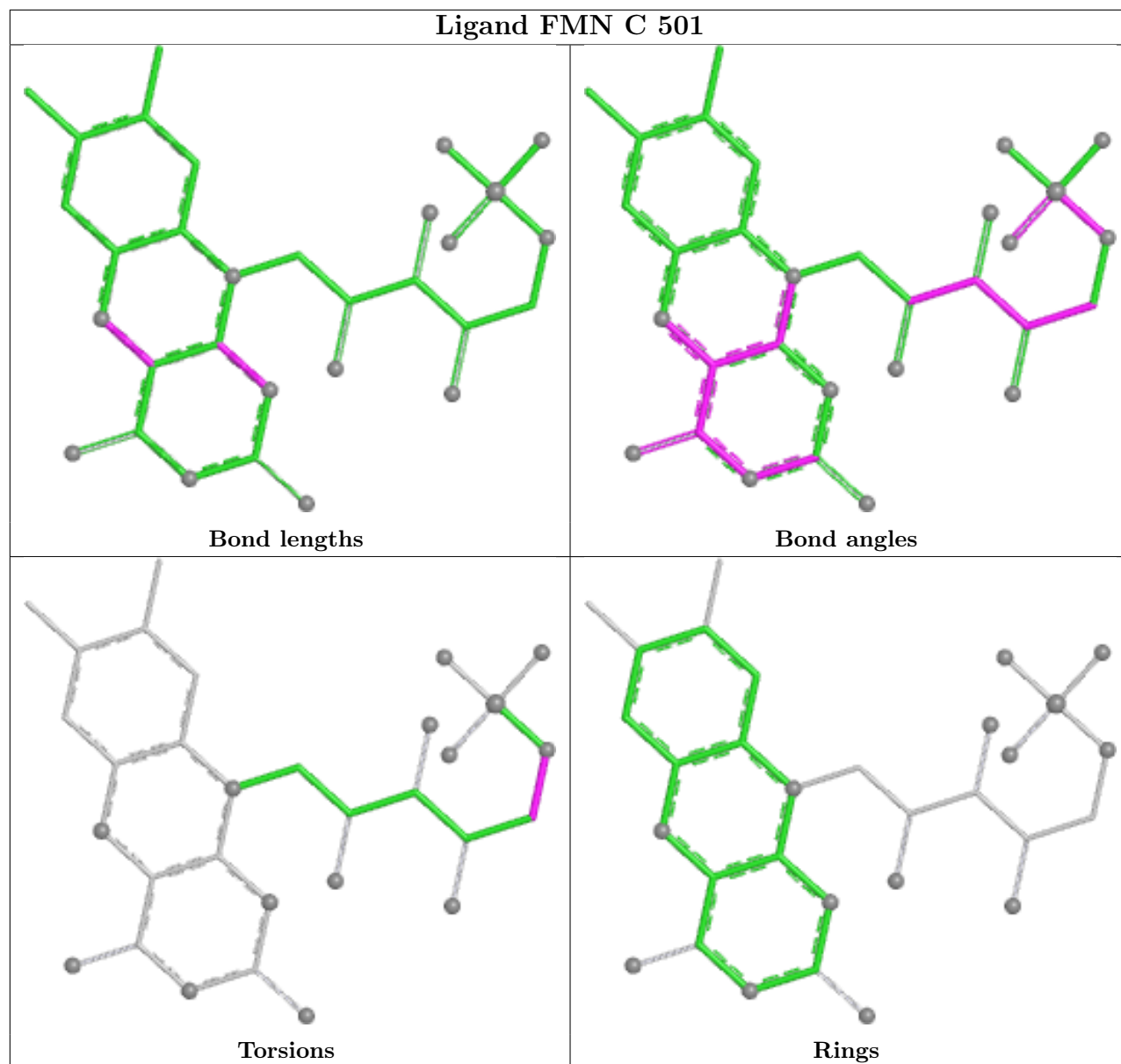
9 monomers are involved in 28 short contacts:

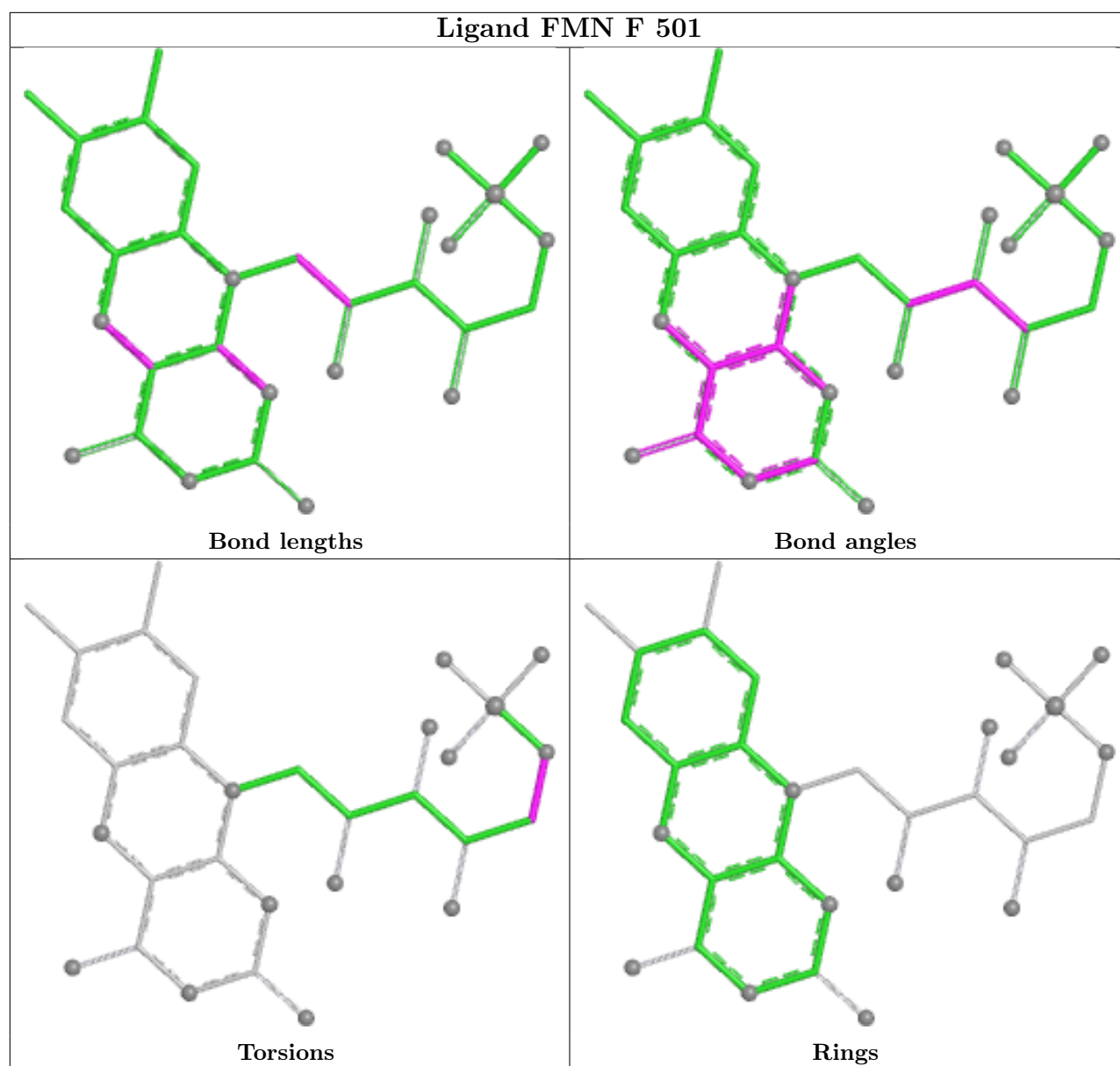
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	H	501	FMN	4	0
2	D	501	FMN	3	0
2	C	501	FMN	4	0
2	F	501	FMN	3	0
2	A	501	FMN	4	0
2	G	501	FMN	4	0
3	A	502	GOL	2	0
2	E	501	FMN	2	0
2	B	501	FMN	4	0

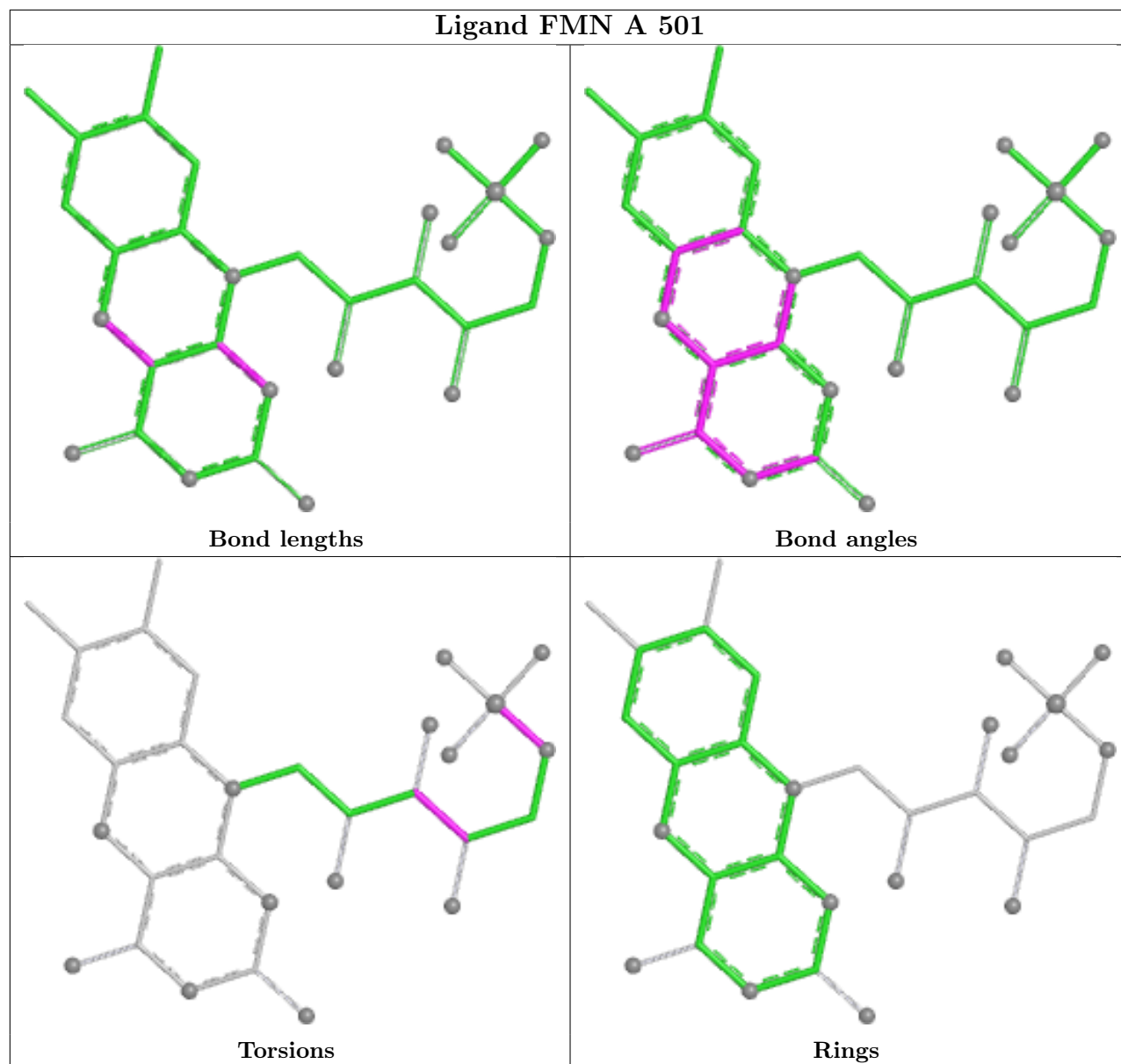
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

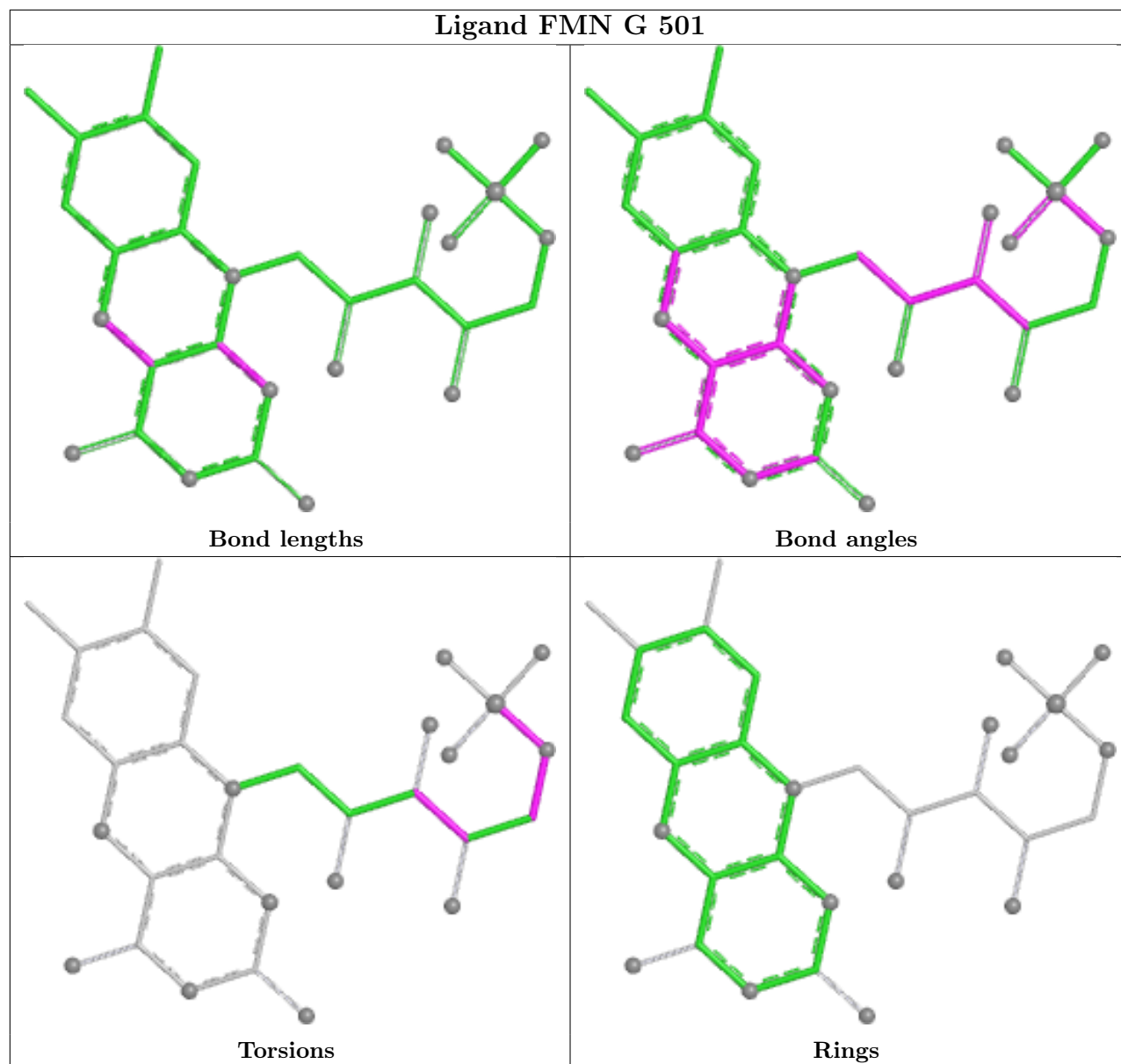


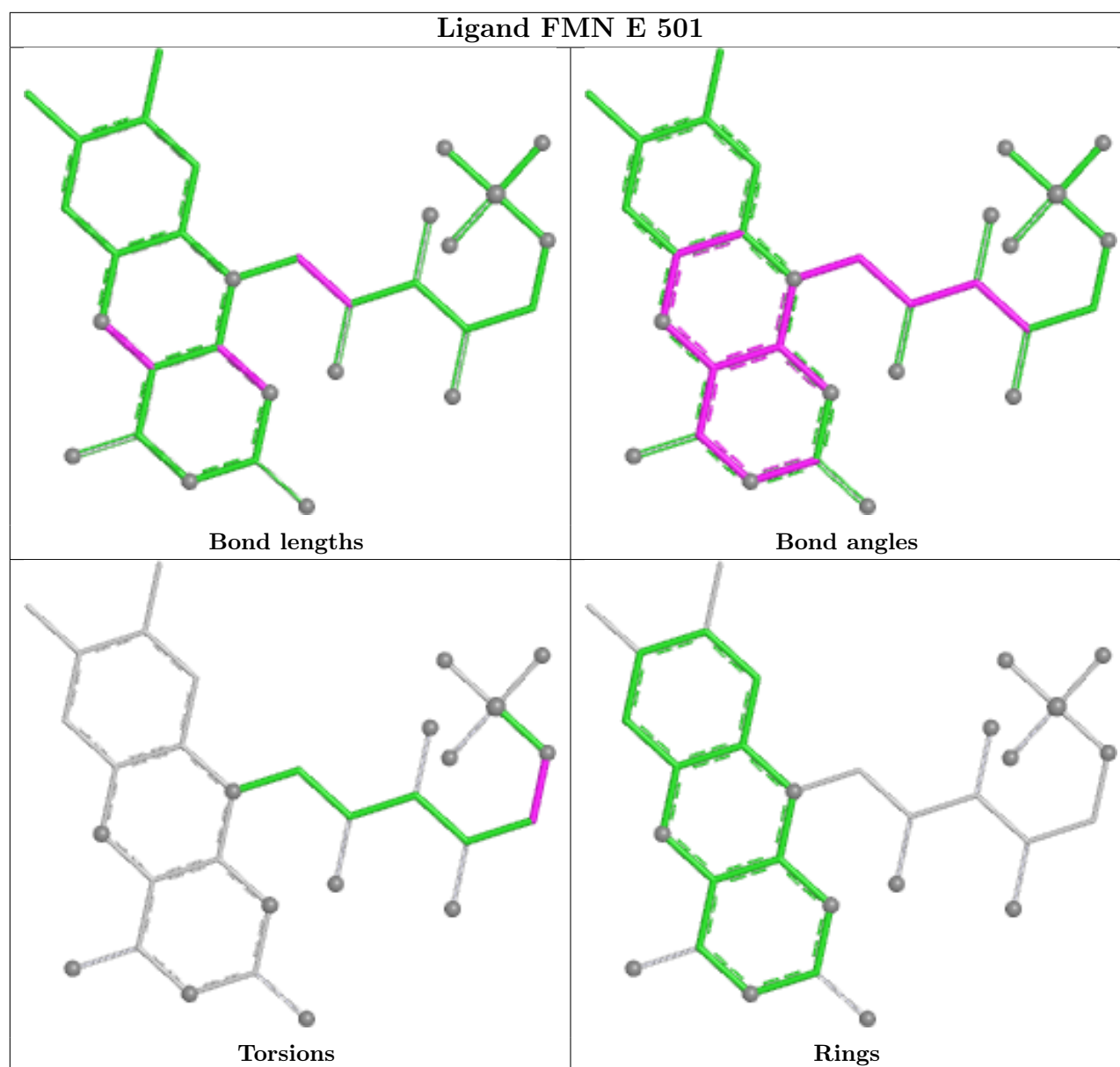


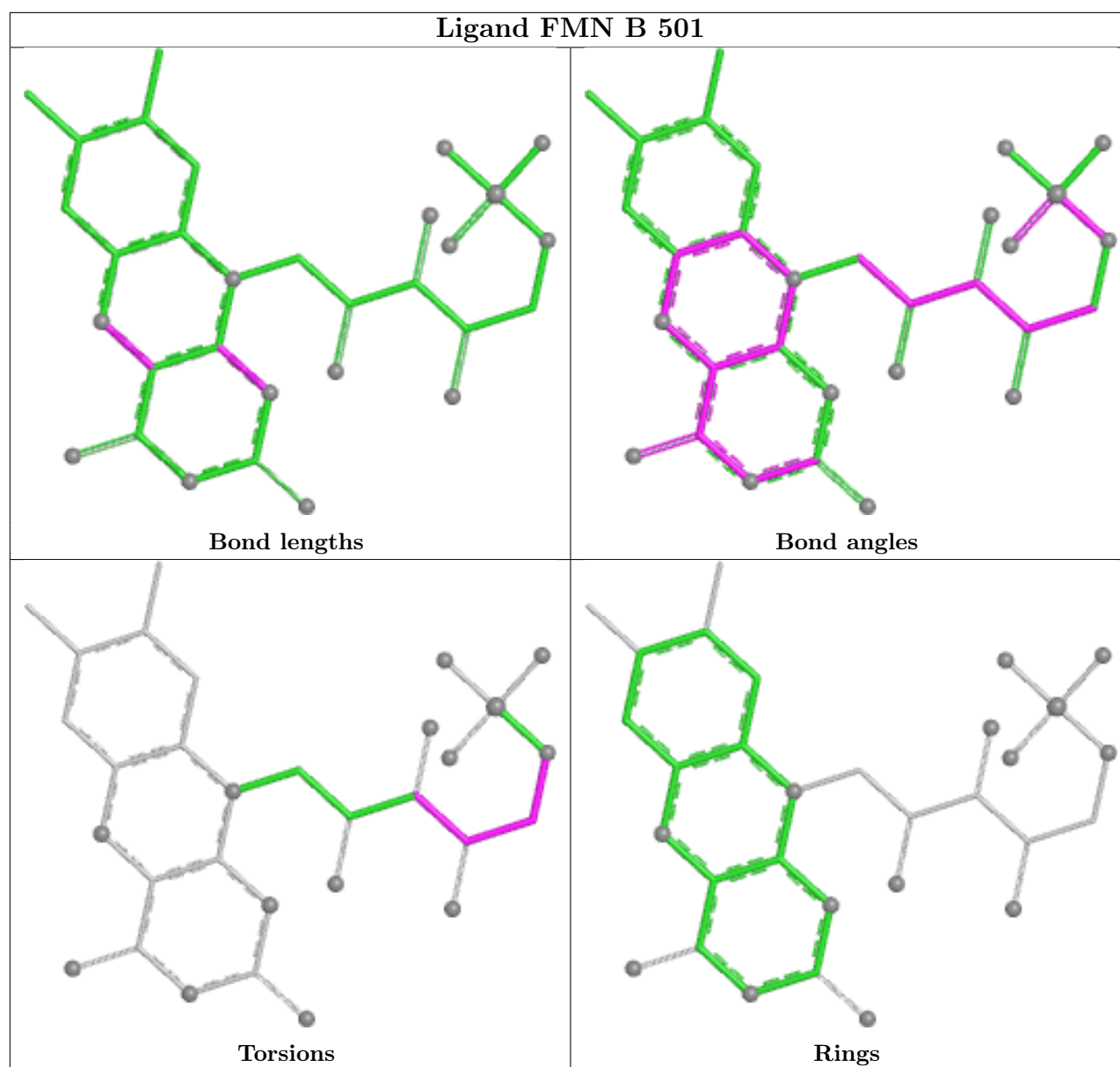












5.7 Other polymers [i](#)

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	409/422 (96%)	-1.13	0 100 100	15, 22, 31, 43	0
1	B	410/422 (97%)	-1.13	0 100 100	16, 22, 32, 41	0
1	C	409/422 (96%)	-1.03	0 100 100	16, 25, 34, 43	0
1	D	409/422 (96%)	-0.98	0 100 100	16, 26, 34, 46	0
1	E	408/422 (96%)	-1.12	0 100 100	15, 22, 30, 39	0
1	F	412/422 (97%)	-1.07	0 100 100	14, 23, 30, 46	0
1	G	410/422 (97%)	-0.98	0 100 100	15, 25, 34, 43	0
1	H	409/422 (96%)	-1.02	0 100 100	15, 25, 34, 43	0
All	All	3276/3376 (97%)	-1.06	0 100 100	14, 24, 33, 46	0

There are no RSRZ outliers to report.

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

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

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

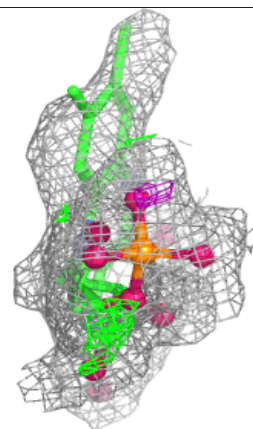
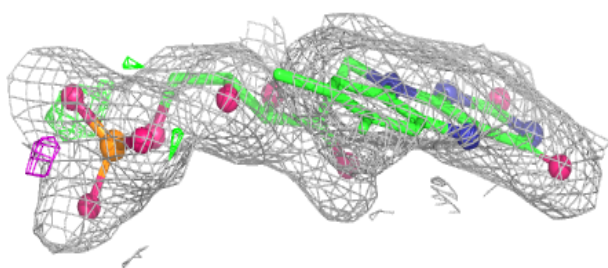
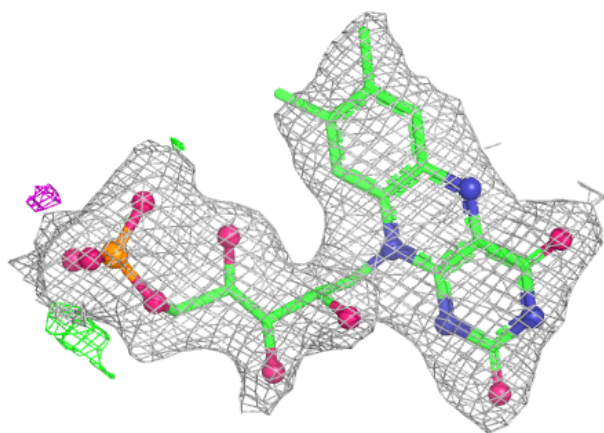
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q< 0.9’ lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
4	CL	G	503	1/1	0.97	0.04	31,31,31,31	0
4	CL	F	504	1/1	0.98	0.04	31,31,31,31	0
4	CL	A	503	1/1	0.98	0.05	39,39,39,39	0
5	CA	F	502	1/1	0.98	0.06	46,46,46,46	0
2	FMN	E	501	31/31	0.99	0.04	17,24,28,31	0
2	FMN	F	501	31/31	0.99	0.04	15,25,28,30	0
2	FMN	G	501	31/31	0.99	0.04	24,30,33,34	0
2	FMN	H	501	31/31	0.99	0.04	18,29,35,39	0
3	GOL	A	502	6/6	0.99	0.04	23,24,25,26	0
2	FMN	A	501	31/31	0.99	0.04	17,24,26,27	0
4	CL	B	502	1/1	0.99	0.04	36,36,36,36	0
4	CL	D	503	1/1	0.99	0.06	39,39,39,39	0
4	CL	E	502	1/1	0.99	0.06	40,40,40,40	0
2	FMN	B	501	31/31	0.99	0.04	20,24,27,27	0
2	FMN	C	501	31/31	0.99	0.04	20,29,33,35	0
4	CL	H	503	1/1	0.99	0.03	30,30,30,30	0
5	CA	D	502	1/1	0.99	0.02	25,25,25,25	0
2	FMN	D	501	31/31	0.99	0.04	23,29,34,36	0
5	CA	F	503	1/1	0.99	0.07	41,41,41,41	0
5	CA	G	502	1/1	0.99	0.07	48,48,48,48	0
5	CA	H	502	1/1	0.99	0.03	32,32,32,32	0
5	CA	C	502	1/1	1.00	0.05	33,33,33,33	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.

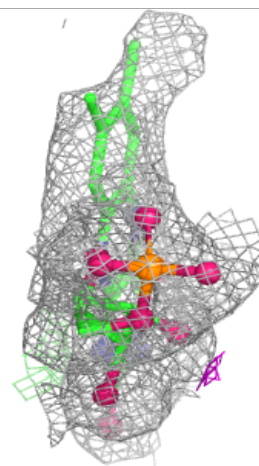
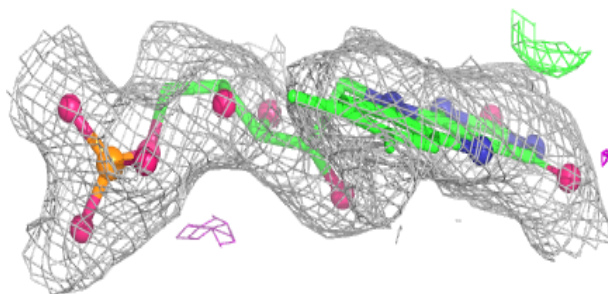
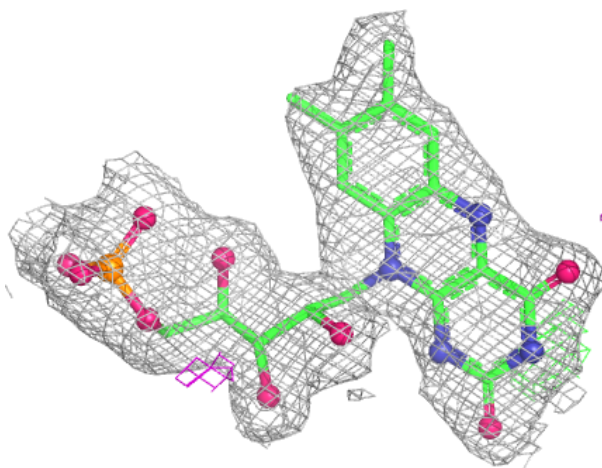
Electron density around FMN E 501:

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



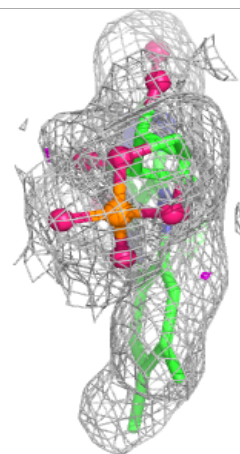
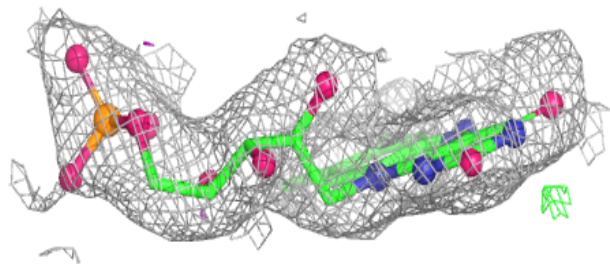
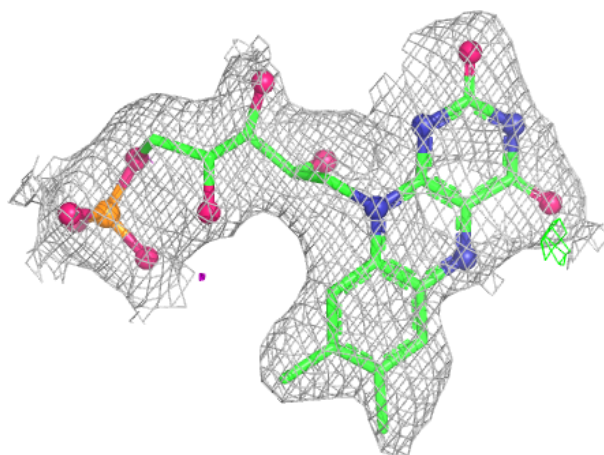
Electron density around FMN F 501:

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



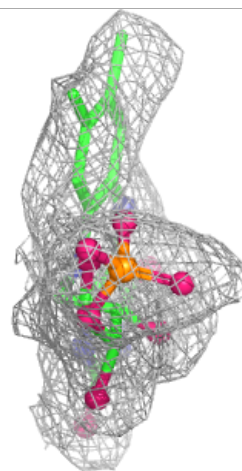
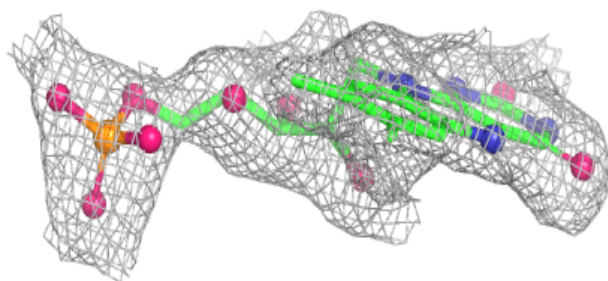
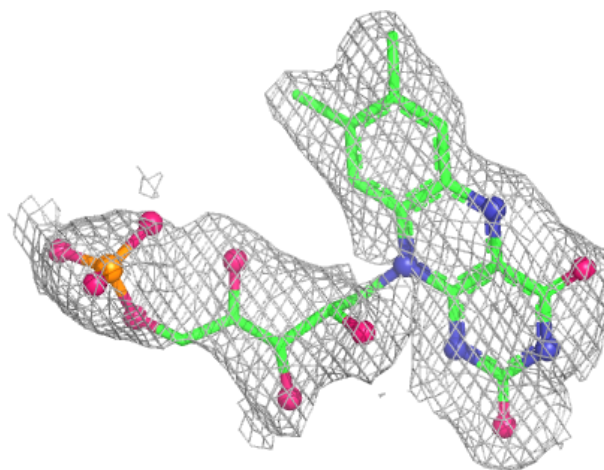
Electron density around FMN G 501:

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



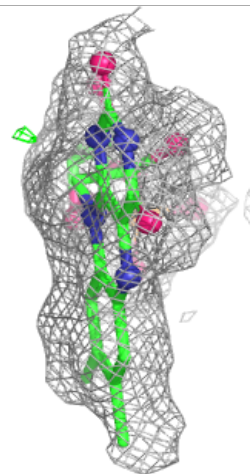
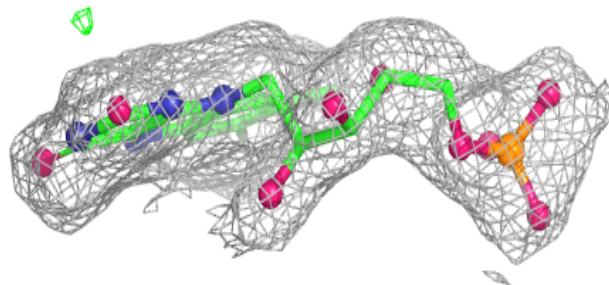
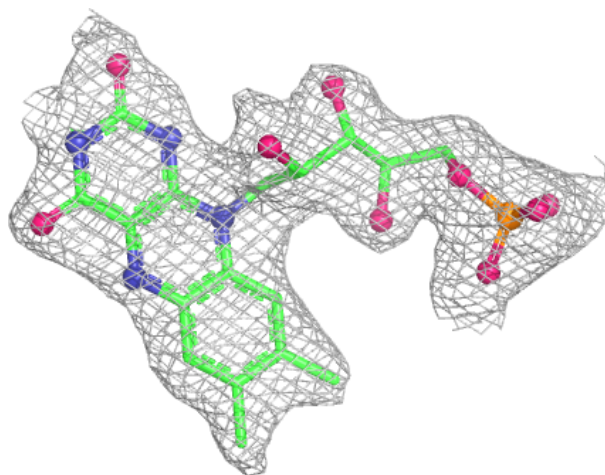
Electron density around FMN H 501:

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



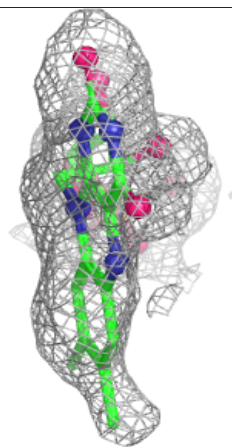
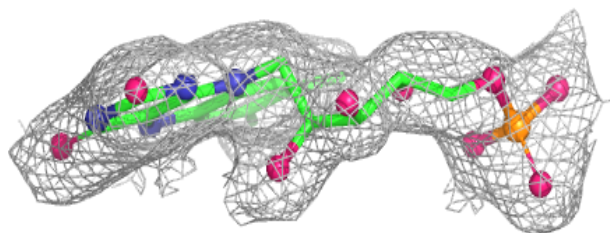
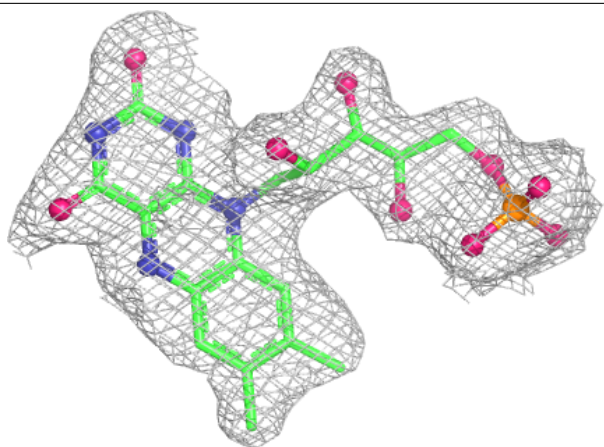
Electron density around FMN A 501:

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



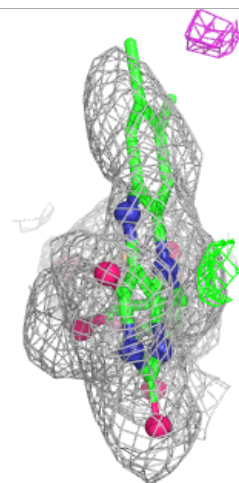
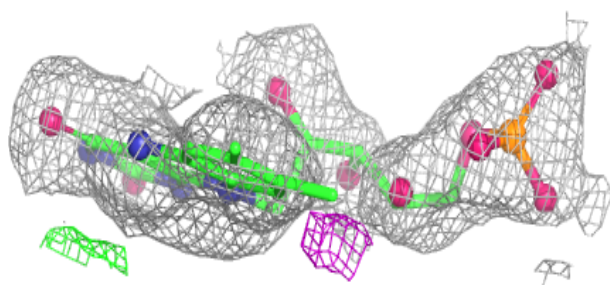
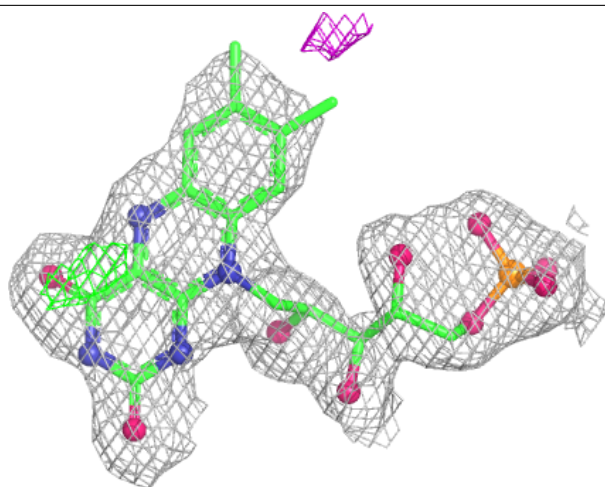
Electron density around FMN B 501:

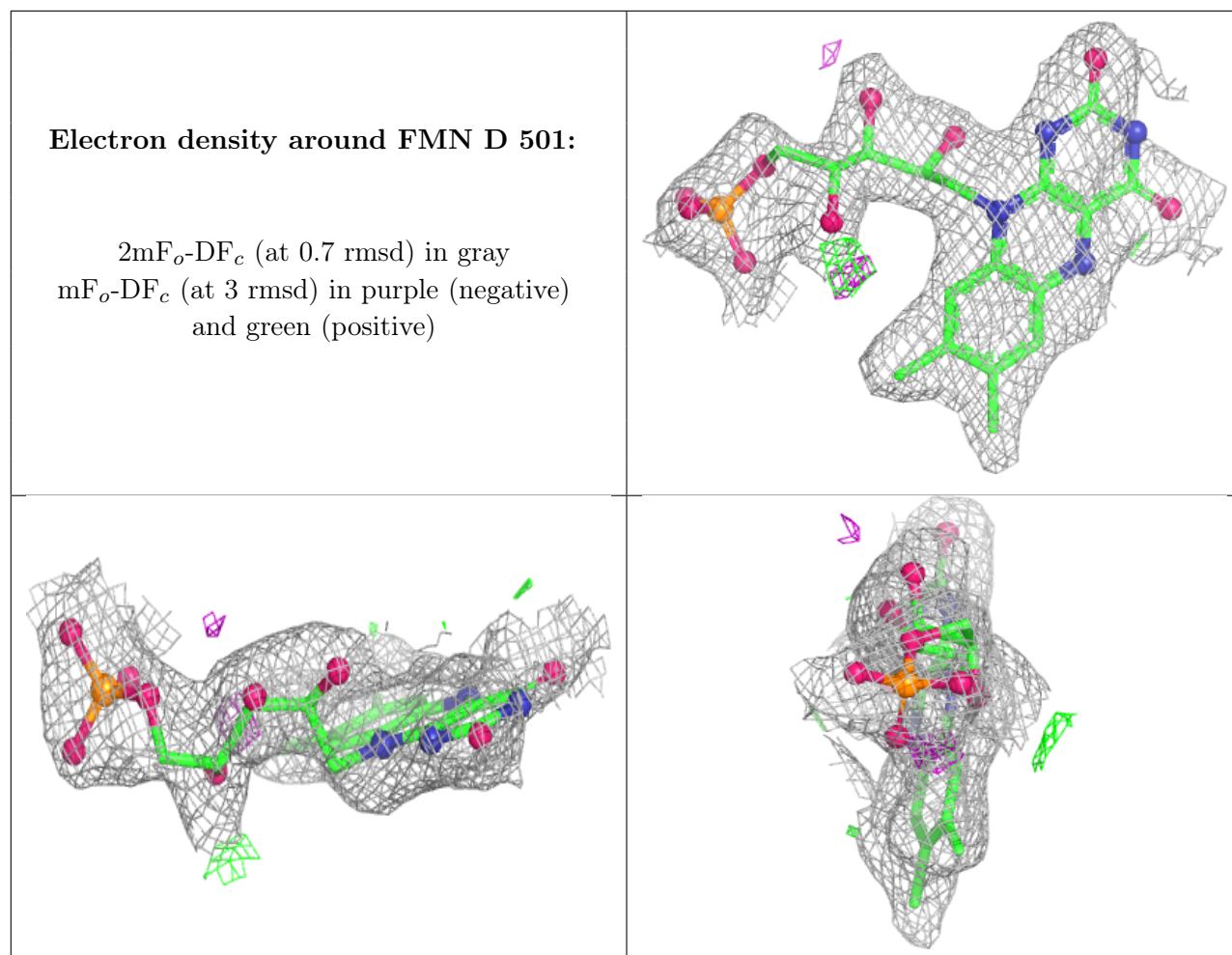
$2mF_o - DF_c$ (at 0.7 rmsd) in gray
 $mF_o - DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around FMN C 501:

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





6.5 Other polymers ⓘ

There are no such residues in this entry.