



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 4, 2026 – 02:17 PM JST

PDB ID : 21TS / pdb_000021ts
Title : prenylated FMN synthase from Methanosarcina mazei (MmPFS) in complexed with FMN and DMAP(P)
Authors : Unno, H.; Hemmi, H.
Deposited on : 2025-12-24
Resolution : 1.68 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 Phenix2.2
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 2.2
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 : 9.0.015 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.51

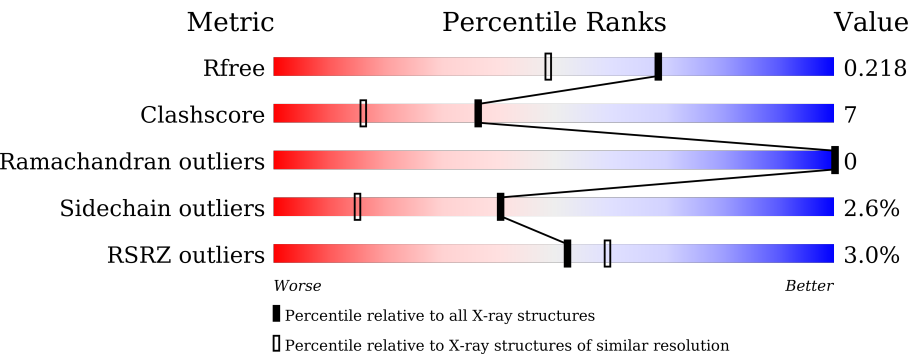
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.68 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	1054 (1.68-1.68)
Clashscore	190562	1078 (1.68-1.68)
Ramachandran outliers	187476	1068 (1.68-1.68)
Sidechain outliers	187428	1067 (1.68-1.68)
RSRZ outliers	180081	1055 (1.68-1.68)

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	D	214	
1	E	214	
1	F	214	
1	I	214	
1	K	214	
1	L	214	

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Mol	Chain	Length	Quality of chain
1	M	214	
1	N	214	
1	O	214	
1	P	214	
1	Q	214	
1	R	214	

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
5	IPA	E	203	-	-	X	-

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 18222 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 Flavin prenyltransferase UbiX.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	D	183	Total	C	N	O	S	0	1	0
			1406	894	239	263	10			
1	E	182	Total	C	N	O	S	0	1	0
			1395	888	235	262	10			
1	F	182	Total	C	N	O	S	0	1	0
			1395	888	235	262	10			
1	I	183	Total	C	N	O	S	0	2	0
			1414	899	242	263	10			
1	K	183	Total	C	N	O	S	0	1	0
			1405	893	239	263	10			
1	L	183	Total	C	N	O	S	0	1	0
			1406	894	239	263	10			
1	M	182	Total	C	N	O	S	0	1	0
			1395	888	235	262	10			
1	N	183	Total	C	N	O	S	0	1	0
			1406	894	239	263	10			
1	O	182	Total	C	N	O	S	0	1	0
			1395	888	235	262	10			
1	P	182	Total	C	N	O	S	0	1	0
			1395	888	235	262	10			
1	Q	183	Total	C	N	O	S	0	1	0
			1406	894	239	263	10			
1	R	183	Total	C	N	O	S	0	2	0
			1414	899	242	263	10			

There are 240 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
D	-19	MET	-	initiating methionine	UNP Q8PVT9
D	-18	GLY	-	expression tag	UNP Q8PVT9
D	-17	SER	-	expression tag	UNP Q8PVT9
D	-16	SER	-	expression tag	UNP Q8PVT9
D	-15	HIS	-	expression tag	UNP Q8PVT9

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Chain	Residue	Modelled	Actual	Comment	Reference
D	-14	HIS	-	expression tag	UNP Q8PVT9
D	-13	HIS	-	expression tag	UNP Q8PVT9
D	-12	HIS	-	expression tag	UNP Q8PVT9
D	-11	HIS	-	expression tag	UNP Q8PVT9
D	-10	HIS	-	expression tag	UNP Q8PVT9
D	-9	SER	-	expression tag	UNP Q8PVT9
D	-8	SER	-	expression tag	UNP Q8PVT9
D	-7	GLY	-	expression tag	UNP Q8PVT9
D	-6	LEU	-	expression tag	UNP Q8PVT9
D	-5	VAL	-	expression tag	UNP Q8PVT9
D	-4	PRO	-	expression tag	UNP Q8PVT9
D	-3	ARG	-	expression tag	UNP Q8PVT9
D	-2	GLY	-	expression tag	UNP Q8PVT9
D	-1	SER	-	expression tag	UNP Q8PVT9
D	0	HIS	-	expression tag	UNP Q8PVT9
E	-19	MET	-	initiating methionine	UNP Q8PVT9
E	-18	GLY	-	expression tag	UNP Q8PVT9
E	-17	SER	-	expression tag	UNP Q8PVT9
E	-16	SER	-	expression tag	UNP Q8PVT9
E	-15	HIS	-	expression tag	UNP Q8PVT9
E	-14	HIS	-	expression tag	UNP Q8PVT9
E	-13	HIS	-	expression tag	UNP Q8PVT9
E	-12	HIS	-	expression tag	UNP Q8PVT9
E	-11	HIS	-	expression tag	UNP Q8PVT9
E	-10	HIS	-	expression tag	UNP Q8PVT9
E	-9	SER	-	expression tag	UNP Q8PVT9
E	-8	SER	-	expression tag	UNP Q8PVT9
E	-7	GLY	-	expression tag	UNP Q8PVT9
E	-6	LEU	-	expression tag	UNP Q8PVT9
E	-5	VAL	-	expression tag	UNP Q8PVT9
E	-4	PRO	-	expression tag	UNP Q8PVT9
E	-3	ARG	-	expression tag	UNP Q8PVT9
E	-2	GLY	-	expression tag	UNP Q8PVT9
E	-1	SER	-	expression tag	UNP Q8PVT9
E	0	HIS	-	expression tag	UNP Q8PVT9
F	-19	MET	-	initiating methionine	UNP Q8PVT9
F	-18	GLY	-	expression tag	UNP Q8PVT9
F	-17	SER	-	expression tag	UNP Q8PVT9
F	-16	SER	-	expression tag	UNP Q8PVT9
F	-15	HIS	-	expression tag	UNP Q8PVT9
F	-14	HIS	-	expression tag	UNP Q8PVT9
F	-13	HIS	-	expression tag	UNP Q8PVT9

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Chain	Residue	Modelled	Actual	Comment	Reference
F	-12	HIS	-	expression tag	UNP Q8PVT9
F	-11	HIS	-	expression tag	UNP Q8PVT9
F	-10	HIS	-	expression tag	UNP Q8PVT9
F	-9	SER	-	expression tag	UNP Q8PVT9
F	-8	SER	-	expression tag	UNP Q8PVT9
F	-7	GLY	-	expression tag	UNP Q8PVT9
F	-6	LEU	-	expression tag	UNP Q8PVT9
F	-5	VAL	-	expression tag	UNP Q8PVT9
F	-4	PRO	-	expression tag	UNP Q8PVT9
F	-3	ARG	-	expression tag	UNP Q8PVT9
F	-2	GLY	-	expression tag	UNP Q8PVT9
F	-1	SER	-	expression tag	UNP Q8PVT9
F	0	HIS	-	expression tag	UNP Q8PVT9
I	-19	MET	-	initiating methionine	UNP Q8PVT9
I	-18	GLY	-	expression tag	UNP Q8PVT9
I	-17	SER	-	expression tag	UNP Q8PVT9
I	-16	SER	-	expression tag	UNP Q8PVT9
I	-15	HIS	-	expression tag	UNP Q8PVT9
I	-14	HIS	-	expression tag	UNP Q8PVT9
I	-13	HIS	-	expression tag	UNP Q8PVT9
I	-12	HIS	-	expression tag	UNP Q8PVT9
I	-11	HIS	-	expression tag	UNP Q8PVT9
I	-10	HIS	-	expression tag	UNP Q8PVT9
I	-9	SER	-	expression tag	UNP Q8PVT9
I	-8	SER	-	expression tag	UNP Q8PVT9
I	-7	GLY	-	expression tag	UNP Q8PVT9
I	-6	LEU	-	expression tag	UNP Q8PVT9
I	-5	VAL	-	expression tag	UNP Q8PVT9
I	-4	PRO	-	expression tag	UNP Q8PVT9
I	-3	ARG	-	expression tag	UNP Q8PVT9
I	-2	GLY	-	expression tag	UNP Q8PVT9
I	-1	SER	-	expression tag	UNP Q8PVT9
I	0	HIS	-	expression tag	UNP Q8PVT9
K	-19	MET	-	initiating methionine	UNP Q8PVT9
K	-18	GLY	-	expression tag	UNP Q8PVT9
K	-17	SER	-	expression tag	UNP Q8PVT9
K	-16	SER	-	expression tag	UNP Q8PVT9
K	-15	HIS	-	expression tag	UNP Q8PVT9
K	-14	HIS	-	expression tag	UNP Q8PVT9
K	-13	HIS	-	expression tag	UNP Q8PVT9
K	-12	HIS	-	expression tag	UNP Q8PVT9
K	-11	HIS	-	expression tag	UNP Q8PVT9

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Chain	Residue	Modelled	Actual	Comment	Reference
K	-10	HIS	-	expression tag	UNP Q8PVT9
K	-9	SER	-	expression tag	UNP Q8PVT9
K	-8	SER	-	expression tag	UNP Q8PVT9
K	-7	GLY	-	expression tag	UNP Q8PVT9
K	-6	LEU	-	expression tag	UNP Q8PVT9
K	-5	VAL	-	expression tag	UNP Q8PVT9
K	-4	PRO	-	expression tag	UNP Q8PVT9
K	-3	ARG	-	expression tag	UNP Q8PVT9
K	-2	GLY	-	expression tag	UNP Q8PVT9
K	-1	SER	-	expression tag	UNP Q8PVT9
K	0	HIS	-	expression tag	UNP Q8PVT9
L	-19	MET	-	initiating methionine	UNP Q8PVT9
L	-18	GLY	-	expression tag	UNP Q8PVT9
L	-17	SER	-	expression tag	UNP Q8PVT9
L	-16	SER	-	expression tag	UNP Q8PVT9
L	-15	HIS	-	expression tag	UNP Q8PVT9
L	-14	HIS	-	expression tag	UNP Q8PVT9
L	-13	HIS	-	expression tag	UNP Q8PVT9
L	-12	HIS	-	expression tag	UNP Q8PVT9
L	-11	HIS	-	expression tag	UNP Q8PVT9
L	-10	HIS	-	expression tag	UNP Q8PVT9
L	-9	SER	-	expression tag	UNP Q8PVT9
L	-8	SER	-	expression tag	UNP Q8PVT9
L	-7	GLY	-	expression tag	UNP Q8PVT9
L	-6	LEU	-	expression tag	UNP Q8PVT9
L	-5	VAL	-	expression tag	UNP Q8PVT9
L	-4	PRO	-	expression tag	UNP Q8PVT9
L	-3	ARG	-	expression tag	UNP Q8PVT9
L	-2	GLY	-	expression tag	UNP Q8PVT9
L	-1	SER	-	expression tag	UNP Q8PVT9
L	0	HIS	-	expression tag	UNP Q8PVT9
M	-19	MET	-	initiating methionine	UNP Q8PVT9
M	-18	GLY	-	expression tag	UNP Q8PVT9
M	-17	SER	-	expression tag	UNP Q8PVT9
M	-16	SER	-	expression tag	UNP Q8PVT9
M	-15	HIS	-	expression tag	UNP Q8PVT9
M	-14	HIS	-	expression tag	UNP Q8PVT9
M	-13	HIS	-	expression tag	UNP Q8PVT9
M	-12	HIS	-	expression tag	UNP Q8PVT9
M	-11	HIS	-	expression tag	UNP Q8PVT9
M	-10	HIS	-	expression tag	UNP Q8PVT9
M	-9	SER	-	expression tag	UNP Q8PVT9

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Chain	Residue	Modelled	Actual	Comment	Reference
M	-8	SER	-	expression tag	UNP Q8PVT9
M	-7	GLY	-	expression tag	UNP Q8PVT9
M	-6	LEU	-	expression tag	UNP Q8PVT9
M	-5	VAL	-	expression tag	UNP Q8PVT9
M	-4	PRO	-	expression tag	UNP Q8PVT9
M	-3	ARG	-	expression tag	UNP Q8PVT9
M	-2	GLY	-	expression tag	UNP Q8PVT9
M	-1	SER	-	expression tag	UNP Q8PVT9
M	0	HIS	-	expression tag	UNP Q8PVT9
N	-19	MET	-	initiating methionine	UNP Q8PVT9
N	-18	GLY	-	expression tag	UNP Q8PVT9
N	-17	SER	-	expression tag	UNP Q8PVT9
N	-16	SER	-	expression tag	UNP Q8PVT9
N	-15	HIS	-	expression tag	UNP Q8PVT9
N	-14	HIS	-	expression tag	UNP Q8PVT9
N	-13	HIS	-	expression tag	UNP Q8PVT9
N	-12	HIS	-	expression tag	UNP Q8PVT9
N	-11	HIS	-	expression tag	UNP Q8PVT9
N	-10	HIS	-	expression tag	UNP Q8PVT9
N	-9	SER	-	expression tag	UNP Q8PVT9
N	-8	SER	-	expression tag	UNP Q8PVT9
N	-7	GLY	-	expression tag	UNP Q8PVT9
N	-6	LEU	-	expression tag	UNP Q8PVT9
N	-5	VAL	-	expression tag	UNP Q8PVT9
N	-4	PRO	-	expression tag	UNP Q8PVT9
N	-3	ARG	-	expression tag	UNP Q8PVT9
N	-2	GLY	-	expression tag	UNP Q8PVT9
N	-1	SER	-	expression tag	UNP Q8PVT9
N	0	HIS	-	expression tag	UNP Q8PVT9
O	-19	MET	-	initiating methionine	UNP Q8PVT9
O	-18	GLY	-	expression tag	UNP Q8PVT9
O	-17	SER	-	expression tag	UNP Q8PVT9
O	-16	SER	-	expression tag	UNP Q8PVT9
O	-15	HIS	-	expression tag	UNP Q8PVT9
O	-14	HIS	-	expression tag	UNP Q8PVT9
O	-13	HIS	-	expression tag	UNP Q8PVT9
O	-12	HIS	-	expression tag	UNP Q8PVT9
O	-11	HIS	-	expression tag	UNP Q8PVT9
O	-10	HIS	-	expression tag	UNP Q8PVT9
O	-9	SER	-	expression tag	UNP Q8PVT9
O	-8	SER	-	expression tag	UNP Q8PVT9
O	-7	GLY	-	expression tag	UNP Q8PVT9

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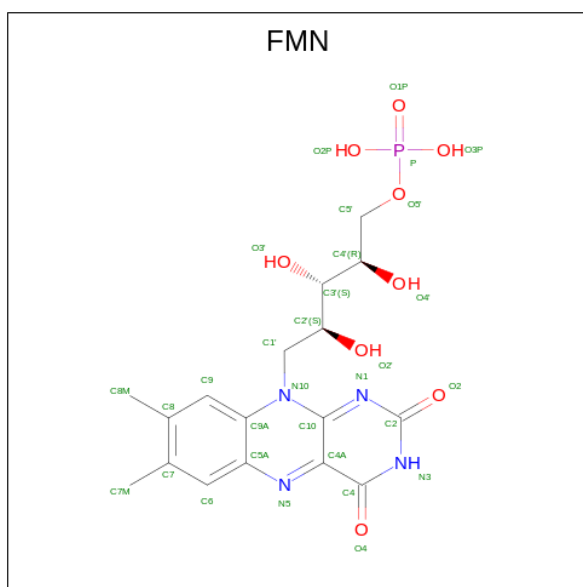
Chain	Residue	Modelled	Actual	Comment	Reference
O	-6	LEU	-	expression tag	UNP Q8PVT9
O	-5	VAL	-	expression tag	UNP Q8PVT9
O	-4	PRO	-	expression tag	UNP Q8PVT9
O	-3	ARG	-	expression tag	UNP Q8PVT9
O	-2	GLY	-	expression tag	UNP Q8PVT9
O	-1	SER	-	expression tag	UNP Q8PVT9
O	0	HIS	-	expression tag	UNP Q8PVT9
P	-19	MET	-	initiating methionine	UNP Q8PVT9
P	-18	GLY	-	expression tag	UNP Q8PVT9
P	-17	SER	-	expression tag	UNP Q8PVT9
P	-16	SER	-	expression tag	UNP Q8PVT9
P	-15	HIS	-	expression tag	UNP Q8PVT9
P	-14	HIS	-	expression tag	UNP Q8PVT9
P	-13	HIS	-	expression tag	UNP Q8PVT9
P	-12	HIS	-	expression tag	UNP Q8PVT9
P	-11	HIS	-	expression tag	UNP Q8PVT9
P	-10	HIS	-	expression tag	UNP Q8PVT9
P	-9	SER	-	expression tag	UNP Q8PVT9
P	-8	SER	-	expression tag	UNP Q8PVT9
P	-7	GLY	-	expression tag	UNP Q8PVT9
P	-6	LEU	-	expression tag	UNP Q8PVT9
P	-5	VAL	-	expression tag	UNP Q8PVT9
P	-4	PRO	-	expression tag	UNP Q8PVT9
P	-3	ARG	-	expression tag	UNP Q8PVT9
P	-2	GLY	-	expression tag	UNP Q8PVT9
P	-1	SER	-	expression tag	UNP Q8PVT9
P	0	HIS	-	expression tag	UNP Q8PVT9
Q	-19	MET	-	initiating methionine	UNP Q8PVT9
Q	-18	GLY	-	expression tag	UNP Q8PVT9
Q	-17	SER	-	expression tag	UNP Q8PVT9
Q	-16	SER	-	expression tag	UNP Q8PVT9
Q	-15	HIS	-	expression tag	UNP Q8PVT9
Q	-14	HIS	-	expression tag	UNP Q8PVT9
Q	-13	HIS	-	expression tag	UNP Q8PVT9
Q	-12	HIS	-	expression tag	UNP Q8PVT9
Q	-11	HIS	-	expression tag	UNP Q8PVT9
Q	-10	HIS	-	expression tag	UNP Q8PVT9
Q	-9	SER	-	expression tag	UNP Q8PVT9
Q	-8	SER	-	expression tag	UNP Q8PVT9
Q	-7	GLY	-	expression tag	UNP Q8PVT9
Q	-6	LEU	-	expression tag	UNP Q8PVT9
Q	-5	VAL	-	expression tag	UNP Q8PVT9

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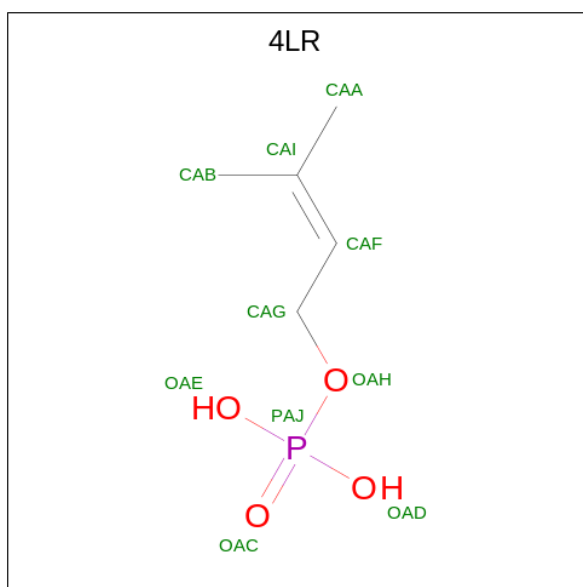
Chain	Residue	Modelled	Actual	Comment	Reference
Q	-4	PRO	-	expression tag	UNP Q8PVT9
Q	-3	ARG	-	expression tag	UNP Q8PVT9
Q	-2	GLY	-	expression tag	UNP Q8PVT9
Q	-1	SER	-	expression tag	UNP Q8PVT9
Q	0	HIS	-	expression tag	UNP Q8PVT9
R	-19	MET	-	initiating methionine	UNP Q8PVT9
R	-18	GLY	-	expression tag	UNP Q8PVT9
R	-17	SER	-	expression tag	UNP Q8PVT9
R	-16	SER	-	expression tag	UNP Q8PVT9
R	-15	HIS	-	expression tag	UNP Q8PVT9
R	-14	HIS	-	expression tag	UNP Q8PVT9
R	-13	HIS	-	expression tag	UNP Q8PVT9
R	-12	HIS	-	expression tag	UNP Q8PVT9
R	-11	HIS	-	expression tag	UNP Q8PVT9
R	-10	HIS	-	expression tag	UNP Q8PVT9
R	-9	SER	-	expression tag	UNP Q8PVT9
R	-8	SER	-	expression tag	UNP Q8PVT9
R	-7	GLY	-	expression tag	UNP Q8PVT9
R	-6	LEU	-	expression tag	UNP Q8PVT9
R	-5	VAL	-	expression tag	UNP Q8PVT9
R	-4	PRO	-	expression tag	UNP Q8PVT9
R	-3	ARG	-	expression tag	UNP Q8PVT9
R	-2	GLY	-	expression tag	UNP Q8PVT9
R	-1	SER	-	expression tag	UNP Q8PVT9
R	0	HIS	-	expression tag	UNP Q8PVT9

- Molecule 2 is FLAVIN MONONUCLEOTIDE (CCD ID: FMN) (formula: $C_{17}H_{21}N_4O_9P$) (labeled as "Ligand of Interest" by depositor).



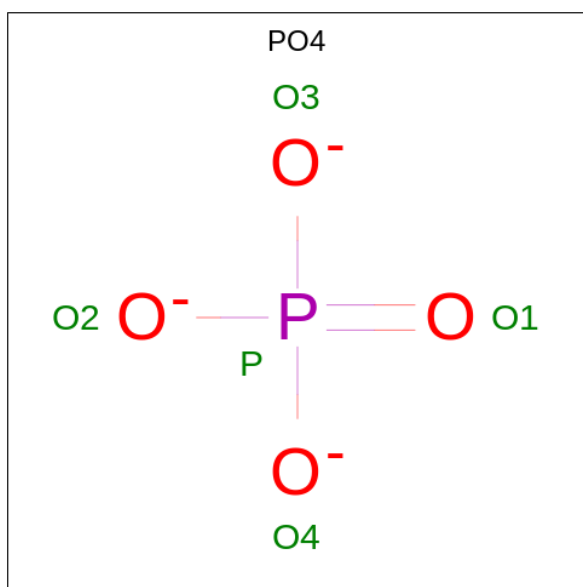
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	D	1	Total	C	N	O	P	0	0
			31	17	4	9	1		
2	E	1	Total	C	N	O	P	0	0
			31	17	4	9	1		
2	F	1	Total	C	N	O	P	0	0
			31	17	4	9	1		
2	I	1	Total	C	N	O	P	0	0
			31	17	4	9	1		
2	K	1	Total	C	N	O	P	0	0
			31	17	4	9	1		
2	L	1	Total	C	N	O	P	0	0
			31	17	4	9	1		
2	M	1	Total	C	N	O	P	0	0
			31	17	4	9	1		
2	N	1	Total	C	N	O	P	0	0
			31	17	4	9	1		
2	O	1	Total	C	N	O	P	0	0
			31	17	4	9	1		
2	P	1	Total	C	N	O	P	0	0
			31	17	4	9	1		
2	Q	1	Total	C	N	O	P	0	0
			31	17	4	9	1		
2	R	1	Total	C	N	O	P	0	0
			31	17	4	9	1		

- Molecule 3 is Dimethylallyl monophosphate (CCD ID: 4LR) (formula: $C_5H_{11}O_4P$) (labeled as "Ligand of Interest" by depositor).



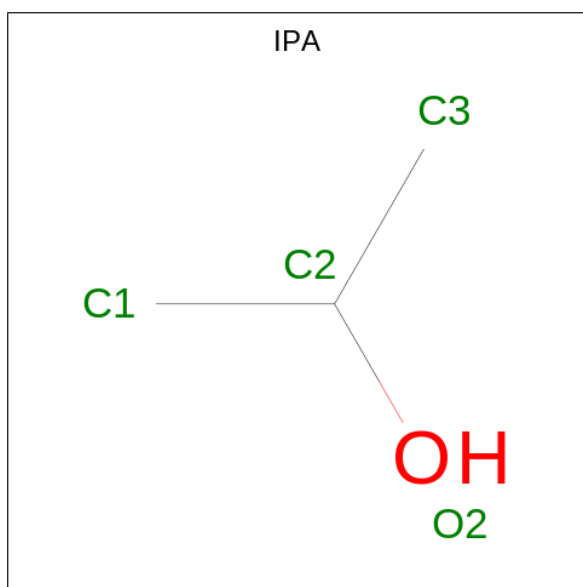
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	D	1	Total	C	O	P	0	0
			10	5	4	1		
3	E	1	Total	C	O	P	0	0
			10	5	4	1		
3	F	1	Total	C	O	P	0	0
			10	5	4	1		
3	I	1	Total	C	O	P	0	0
			10	5	4	1		
3	K	1	Total	C	O	P	0	0
			10	5	4	1		
3	L	1	Total	C	O	P	0	0
			10	5	4	1		
3	M	1	Total	C	O	P	0	0
			10	5	4	1		
3	N	1	Total	C	O	P	0	0
			10	5	4	1		
3	O	1	Total	C	O	P	0	0
			10	5	4	1		
3	P	1	Total	C	O	P	0	0
			10	5	4	1		
3	Q	1	Total	C	O	P	0	0
			10	5	4	1		
3	R	1	Total	C	O	P	0	0
			10	5	4	1		

- Molecule 4 is PHOSPHATE ION (CCD ID: PO4) (formula: O₄P) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	D	1	Total	O	P	0	0
			5	4	1		
4	I	1	Total	O	P	0	0
			5	4	1		
4	M	1	Total	O	P	0	0
			5	4	1		
4	P	1	Total	O	P	0	0
			5	4	1		
4	P	1	Total	O	P	0	0
			5	4	1		

- Molecule 5 is ISOPROPYL ALCOHOL (CCD ID: IPA) (formula: C₃H₈O) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	E	1	Total	C	O	0	0
			4	3	1		

- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	D	71	Total	O	0	0
			71	71		
6	E	80	Total	O	0	0
			80	80		
6	F	94	Total	O	0	0
			94	94		
6	I	68	Total	O	0	0
			68	68		
6	K	73	Total	O	0	0
			73	73		
6	L	69	Total	O	0	0
			69	69		
6	M	74	Total	O	0	0
			74	74		
6	N	59	Total	O	0	0
			59	59		
6	O	80	Total	O	0	0
			80	80		
6	P	75	Total	O	0	0
			75	75		
6	Q	59	Total	O	0	0
			59	59		

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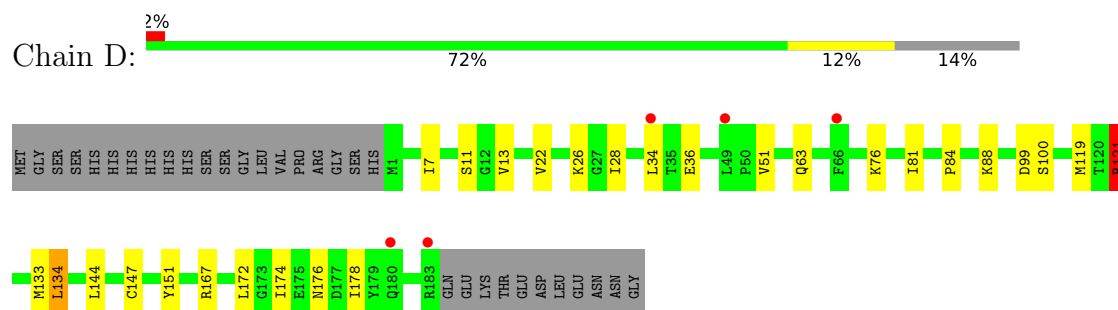
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	R	67	Total	O	0	0
			67	67		

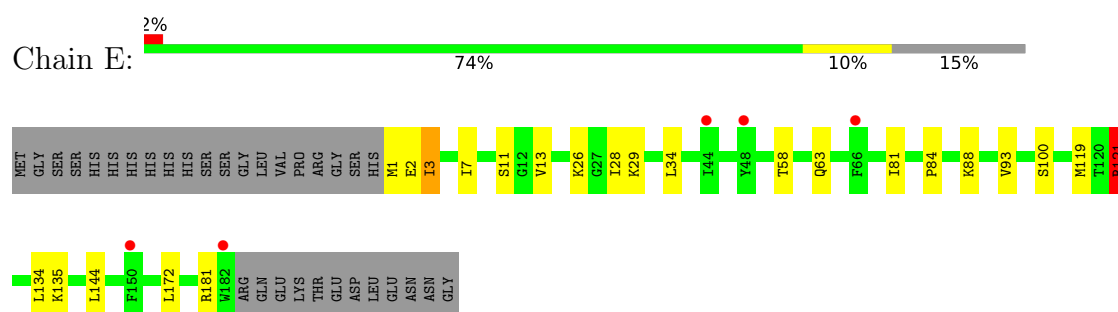
3 Residue-property plots [i](#)

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

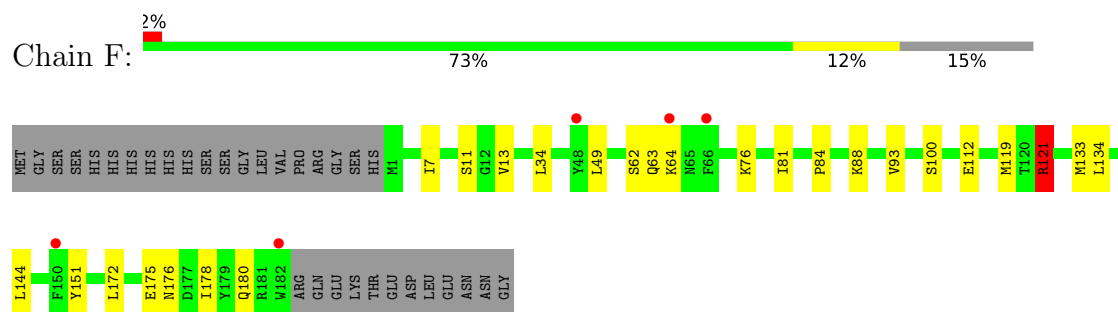
- Molecule 1: Flavin prenyltransferase UbiX



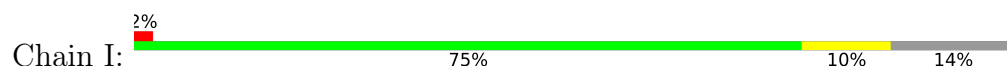
- Molecule 1: Flavin prenyltransferase UbiX

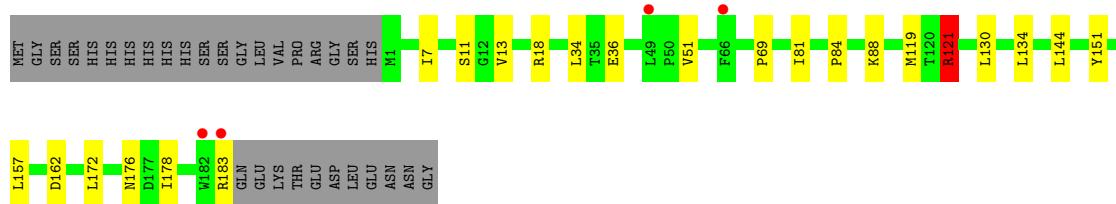


- Molecule 1: Flavin prenyltransferase UbiX

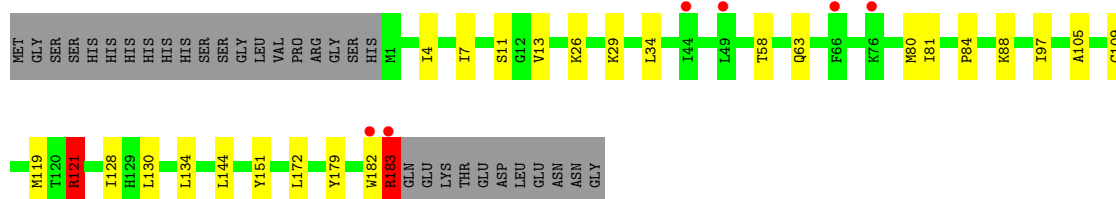
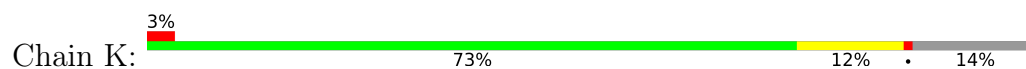


- Molecule 1: Flavin prenyltransferase UbiX

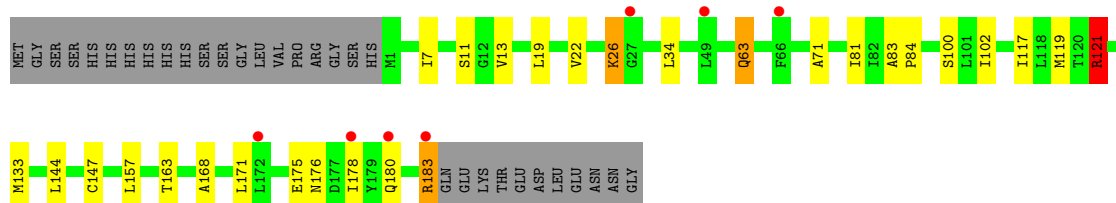
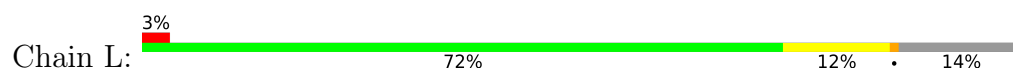




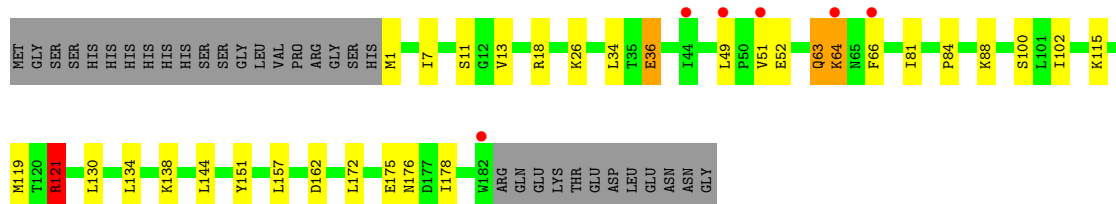
• Molecule 1: Flavin prenyltransferase UbiX



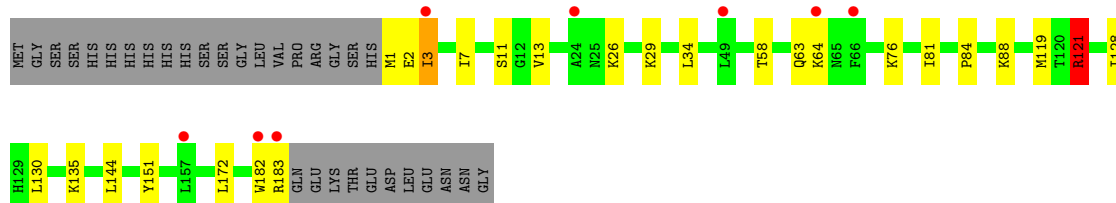
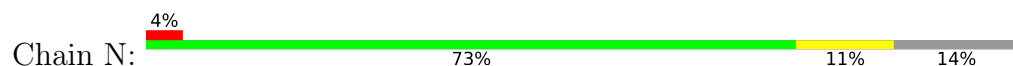
• Molecule 1: Flavin prenyltransferase UbiX



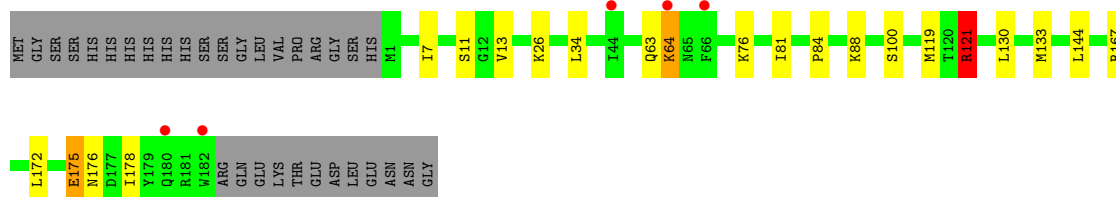
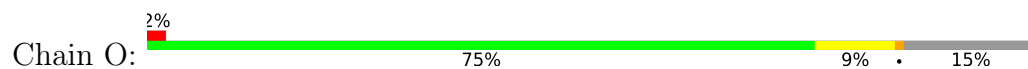
• Molecule 1: Flavin prenyltransferase UbiX



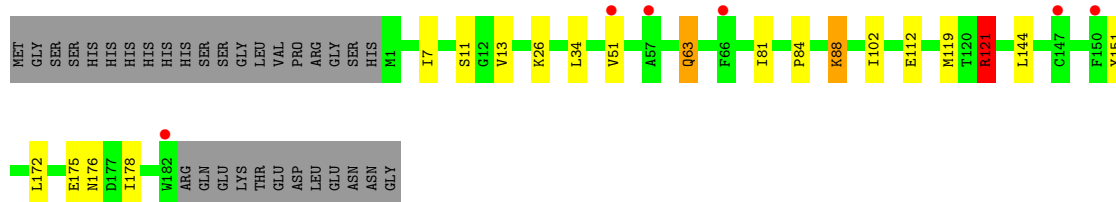
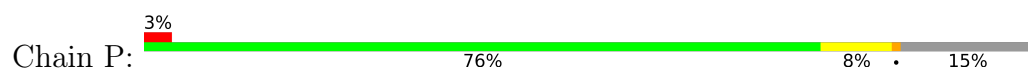
• Molecule 1: Flavin prenyltransferase UbiX



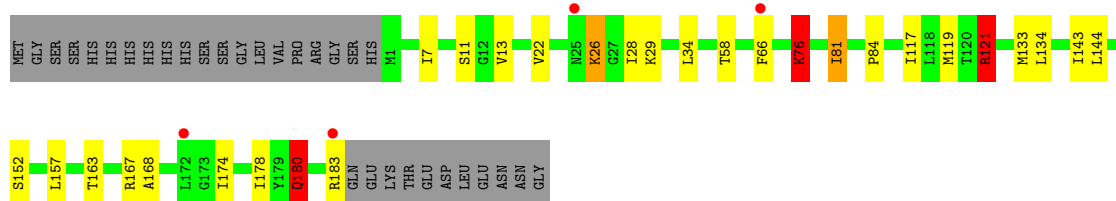
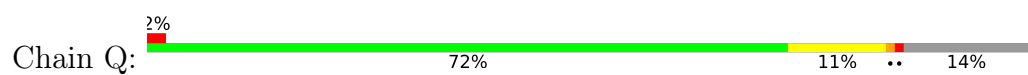
- Molecule 1: Flavin prenyltransferase UbiX



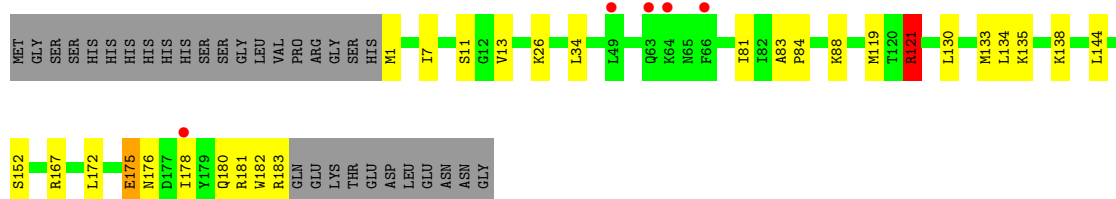
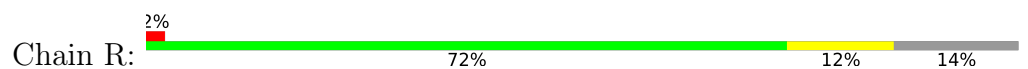
- Molecule 1: Flavin prenyltransferase UbiX



- Molecule 1: Flavin prenyltransferase UbiX



- Molecule 1: Flavin prenyltransferase UbiX



4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	95.66Å 95.73Å 95.94Å 88.76° 77.76° 61.69°	Depositor
Resolution (Å)	48.20 – 1.68 48.20 – 1.68	Depositor EDS
% Data completeness (in resolution range)	96.9 (48.20-1.68) 96.9 (48.20-1.68)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.22 (at 1.68Å)	Xtriage
Refinement program	REFMAC 5.8.0431	Depositor
R, R_{free}	0.195 , 0.212 0.203 , 0.218	Depositor DCC
R_{free} test set	16161 reflections (4.86%)	wwPDB-VP
Wilson B-factor (Å ²)	33.3	Xtriage
Anisotropy	0.028	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 35.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.46$, $\langle L^2 \rangle = 0.29$	Xtriage
Estimated twinning fraction	0.028 for -h+k,k,-l	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	18222	wwPDB-VP
Average B, all atoms (Å ²)	42.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.86% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: IPA, 4LR, PO4, FMN

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	D	0.68	0/1429	1.00	1/1933 (0.1%)
1	E	0.64	0/1418	1.06	4/1919 (0.2%)
1	F	0.64	0/1418	1.04	3/1919 (0.2%)
1	I	0.61	0/1440	1.02	3/1947 (0.2%)
1	K	0.63	0/1427	1.02	4/1929 (0.2%)
1	L	0.65	0/1429	1.05	5/1933 (0.3%)
1	M	0.63	0/1418	0.96	1/1919 (0.1%)
1	N	0.61	0/1429	0.99	3/1933 (0.2%)
1	O	0.65	0/1418	0.97	1/1919 (0.1%)
1	P	0.60	0/1418	1.00	4/1919 (0.2%)
1	Q	0.67	0/1429	1.04	5/1933 (0.3%)
1	R	0.61	0/1440	1.03	3/1947 (0.2%)
All	All	0.63	0/17113	1.01	37/23150 (0.2%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	E	0	1

There are no bond length outliers.

All (37) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	I	121	ARG	NE-CZ-NH2	9.62	127.85	119.20
1	L	121	ARG	CD-NE-CZ	9.56	137.78	124.40
1	F	121	ARG	CD-NE-CZ	9.49	137.68	124.40
1	R	121	ARG	CD-NE-CZ	9.37	137.51	124.40

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	E	121	ARG	CD-NE-CZ	9.07	137.10	124.40
1	E	121	ARG	NE-CZ-NH2	8.85	127.17	119.20
1	P	121	ARG	NE-CZ-NH2	8.45	126.80	119.20
1	F	121	ARG	NE-CZ-NH2	8.43	126.78	119.20
1	E	121	ARG	NE-CZ-NH1	-8.42	113.08	121.50
1	R	121	ARG	NE-CZ-NH2	8.11	126.50	119.20
1	L	121	ARG	NE-CZ-NH1	-8.01	113.49	121.50
1	I	121	ARG	CD-NE-CZ	7.89	135.44	124.40
1	P	121	ARG	CD-NE-CZ	7.82	135.34	124.40
1	L	121	ARG	NE-CZ-NH2	7.75	126.17	119.20
1	F	121	ARG	NE-CZ-NH1	-7.16	114.34	121.50
1	R	121	ARG	NE-CZ-NH1	-7.14	114.36	121.50
1	P	121	ARG	NE-CZ-NH1	-7.05	114.45	121.50
1	E	88	LYS	CB-CG-CD	6.98	127.36	111.30
1	I	121	ARG	NE-CZ-NH1	-6.75	114.75	121.50
1	L	26	LYS	CG-CD-CE	6.55	126.37	111.30
1	Q	26	LYS	CB-CG-CD	6.46	126.15	111.30
1	M	121	ARG	CB-CG-CD	6.17	125.50	111.30
1	N	121	ARG	CB-CG-CD	6.04	125.20	111.30
1	K	121	ARG	CB-CG-CD	5.90	124.87	111.30
1	O	121	ARG	CB-CG-CD	5.87	124.81	111.30
1	Q	121	ARG	CB-CG-CD	5.84	124.72	111.30
1	P	88	LYS	CB-CG-CD	5.74	124.51	111.30
1	K	183	ARG	CG-CD-NE	5.63	124.39	112.00
1	Q	76	LYS	CB-CG-CD	5.63	124.24	111.30
1	D	121	ARG	CB-CG-CD	5.53	124.01	111.30
1	Q	163	THR	CA-CB-OG1	-5.50	101.35	109.60
1	K	88	LYS	CB-CG-CD	5.42	123.76	111.30
1	K	26	LYS	CB-CG-CD	5.36	123.63	111.30
1	Q	180	GLN	CB-CG-CD	5.24	121.51	112.60
1	N	26	LYS	CB-CG-CD	5.09	123.01	111.30
1	L	163	THR	CA-CB-OG1	-5.07	102.00	109.60
1	N	121	ARG	NE-CZ-NH2	-5.02	114.68	119.20

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	E	181	ARG	Sidechain

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	D	1406	0	1471	21	0
1	E	1395	0	1457	22	0
1	F	1395	0	1457	19	0
1	I	1414	0	1484	14	0
1	K	1405	0	1469	23	0
1	L	1406	0	1471	26	0
1	M	1395	0	1458	30	0
1	N	1406	0	1470	24	0
1	O	1395	0	1457	15	0
1	P	1395	0	1457	15	0
1	Q	1406	0	1471	21	0
1	R	1414	0	1483	31	0
2	D	31	0	19	2	0
2	E	31	0	19	2	0
2	F	31	0	19	2	0
2	I	31	0	19	1	0
2	K	31	0	19	0	0
2	L	31	0	19	2	0
2	M	31	0	19	2	0
2	N	31	0	19	1	0
2	O	31	0	19	3	0
2	P	31	0	19	0	0
2	Q	31	0	19	2	0
2	R	31	0	19	1	0
3	D	10	0	11	0	0
3	E	10	0	11	1	0
3	F	10	0	11	1	0
3	I	10	0	11	2	0
3	K	10	0	11	2	0
3	L	10	0	11	4	0
3	M	10	0	11	3	0
3	N	10	0	11	1	0
3	O	10	0	10	2	0
3	P	10	0	11	0	0
3	Q	10	0	10	2	0
3	R	10	0	11	2	0
4	D	5	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	I	5	0	0	0	0
4	M	5	0	0	0	0
4	P	10	0	0	0	0
5	E	4	0	8	7	0
6	D	71	0	0	4	0
6	E	80	0	0	0	0
6	F	94	0	0	4	0
6	I	68	0	0	1	0
6	K	73	0	0	1	0
6	L	69	0	0	2	0
6	M	74	0	0	9	0
6	N	59	0	0	2	0
6	O	80	0	0	2	0
6	P	75	0	0	1	0
6	Q	59	0	0	1	0
6	R	67	0	0	5	0
All	All	18222	0	17971	251	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 (251) 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:K:179:TYR:CD2	1:K:179:TYR:CZ	2.39	1.04
1:K:80:MET:HE3	1:K:109:CYS:SG	2.09	0.92
1:R:1:MET:HE2	6:R:356:HOH:O	1.72	0.89
1:M:88:LYS:HD2	6:M:315:HOH:O	1.74	0.88
1:E:135:LYS:CE	5:E:203:IPA:H11	2.07	0.84
1:E:135:LYS:HE2	5:E:203:IPA:H11	1.60	0.83
5:E:203:IPA:H13	1:N:135:LYS:CE	2.08	0.83
1:L:117:ILE:HG13	6:L:305:HOH:O	1.78	0.83
1:L:176:ASN:HB2	1:L:178:ILE:HD13	1.63	0.80
5:E:203:IPA:H13	1:N:135:LYS:HE2	1.62	0.80
3:L:202:4LR:H8	2:Q:201:FMN:C9	2.15	0.77
1:P:51:VAL:HG23	6:P:362:HOH:O	1.84	0.76
1:M:134:LEU:HG	1:M:138:LYS:HE3	1.68	0.74
1:M:36:GLU:HG3	6:M:354:HOH:O	1.89	0.72
1:D:51:VAL:HG23	6:D:361:HOH:O	1.91	0.71
1:N:88:LYS:HE3	6:N:310:HOH:O	1.91	0.70
1:F:180:GLN:HG2	6:F:359:HOH:O	1.91	0.70

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:L:147[B]:CYS:SG	1:M:121:ARG:HD2	2.31	0.70
1:D:76:LYS:NZ	6:D:301:HOH:O	2.25	0.69
1:E:1:MET:HG2	1:E:3:ILE:CD1	2.23	0.69
1:M:88:LYS:CD	6:M:315:HOH:O	2.38	0.69
1:M:115:LYS:CE	6:M:313:HOH:O	2.40	0.68
1:E:7:ILE:HB	1:E:34:LEU:HD12	1.76	0.68
1:K:4:ILE:CD1	1:K:80:MET:HE2	2.23	0.67
1:N:1:MET:HG2	1:N:3:ILE:CD1	2.25	0.67
1:O:7:ILE:HB	1:O:34:LEU:HD12	1.76	0.67
1:P:63:GLN:HE22	1:P:102:ILE:H	1.41	0.67
1:F:7:ILE:HB	1:F:34:LEU:HD12	1.76	0.67
5:E:203:IPA:H12	1:R:135:LYS:NZ	2.11	0.66
1:I:7:ILE:HB	1:I:34:LEU:HD12	1.78	0.66
1:D:7:ILE:HB	1:D:34:LEU:HD12	1.77	0.66
1:K:7:ILE:HB	1:K:34:LEU:HD12	1.77	0.66
1:Q:7:ILE:HB	1:Q:34:LEU:HD12	1.78	0.66
2:L:201:FMN:C8	3:O:202:4LR:H11	2.25	0.66
1:Q:28:ILE:HD13	1:Q:174:ILE:HD13	1.77	0.66
1:R:7:ILE:HB	1:R:34:LEU:HD12	1.78	0.65
5:E:203:IPA:H12	1:R:135:LYS:HE2	1.78	0.65
1:N:2:GLU:C	1:N:3:ILE:HD12	2.21	0.65
1:M:7:ILE:HB	1:M:34:LEU:HD12	1.77	0.65
1:P:7:ILE:HB	1:P:34:LEU:HD12	1.78	0.65
1:E:2:GLU:C	1:E:3:ILE:HD12	2.22	0.64
1:K:4:ILE:HD12	1:K:80:MET:HE2	1.78	0.64
1:N:7:ILE:HB	1:N:34:LEU:HD12	1.78	0.64
1:R:134:LEU:HG	1:R:138:LYS:HE3	1.80	0.64
1:L:7:ILE:HB	1:L:34:LEU:HD12	1.78	0.64
1:N:63:GLN:NE2	6:N:301:HOH:O	2.31	0.64
3:L:202:4LR:H8	2:Q:201:FMN:C9A	2.28	0.63
1:M:115:LYS:HE2	6:M:313:HOH:O	1.98	0.63
1:F:88:LYS:HE3	6:F:308:HOH:O	1.98	0.63
1:M:115:LYS:HE3	6:M:313:HOH:O	1.99	0.63
1:L:11:SER:O	1:L:121:ARG:HD2	1.99	0.62
1:F:121:ARG:NH2	2:F:201:FMN:O4	2.28	0.61
1:I:51:VAL:HG23	6:I:357:HOH:O	1.99	0.61
1:D:28:ILE:HD13	1:D:174:ILE:HD13	1.82	0.61
1:M:151:TYR:CD2	3:O:202:4LR:H7	2.36	0.61
1:M:51:VAL:HG23	6:M:363:HOH:O	2.01	0.60
1:I:130:LEU:CD2	1:Q:133:MET:HE2	2.32	0.60
1:E:63:GLN:HG3	1:E:100:SER:HB2	1.83	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:K:80:MET:HE1	1:K:105:ALA:C	2.26	0.60
1:O:63:GLN:HG3	1:O:100:SER:HB2	1.84	0.59
5:E:203:IPA:H12	1:R:135:LYS:CE	2.31	0.59
1:Q:76:LYS:HE2	1:R:181:ARG:HH12	1.65	0.59
1:L:176:ASN:HB2	1:L:178:ILE:CD1	2.30	0.59
1:E:11:SER:O	1:E:121:ARG:HD2	2.01	0.59
1:F:11:SER:O	1:F:121:ARG:HD2	2.02	0.59
1:I:151:TYR:CE2	3:L:202:4LR:H4	2.38	0.59
1:N:1:MET:SD	1:N:3:ILE:HD11	2.42	0.59
1:F:63:GLN:HG3	1:F:100:SER:HB2	1.84	0.59
3:N:202:4LR:OAC	1:O:167:ARG:NH2	2.36	0.59
1:L:171:LEU:HB2	6:L:305:HOH:O	2.04	0.58
1:N:121:ARG:NH2	2:N:201:FMN:O4	2.31	0.58
1:I:11:SER:O	1:I:121:ARG:HD2	2.03	0.58
2:E:201:FMN:C8	3:R:202:4LR:H11	2.35	0.57
1:R:182:TRP:O	1:R:183:ARG:C	2.48	0.57
1:E:1:MET:SD	1:E:3:ILE:HD11	2.45	0.56
1:L:19:LEU:HA	1:L:22:VAL:HG22	1.86	0.56
1:M:49:LEU:HD13	1:M:52:GLU:OE2	2.06	0.56
1:M:63:GLN:HG3	1:M:100:SER:HB2	1.88	0.56
1:P:11:SER:O	1:P:121:ARG:HD2	2.05	0.56
1:D:63:GLN:HG3	1:D:100:SER:HB2	1.88	0.55
1:R:11:SER:O	1:R:121:ARG:HD2	2.05	0.55
3:Q:202:4LR:OAD	1:R:167:ARG:NH2	2.39	0.55
1:L:63:GLN:HG3	1:L:100:SER:HB2	1.89	0.55
1:K:29:LYS:HE2	1:K:58:THR:HG21	1.88	0.55
1:Q:134:LEU:HD13	6:Q:329:HOH:O	2.07	0.54
1:F:88:LYS:HD3	1:F:88:LYS:C	2.33	0.54
1:D:133:MET:HE2	1:K:130:LEU:CD2	2.38	0.53
1:O:133:MET:HE2	1:R:130:LEU:CD2	2.38	0.53
1:I:69:PRO:HB3	1:K:183:ARG:NH2	2.22	0.53
1:L:71:ALA:O	3:L:202:4LR:H7	2.09	0.53
1:L:133:MET:HE2	1:M:130:LEU:CD2	2.38	0.53
1:L:178:ILE:HG22	1:L:178:ILE:O	2.08	0.53
1:L:178:ILE:O	1:L:178:ILE:CG2	2.56	0.53
1:K:80:MET:CE	1:K:109:CYS:SG	2.93	0.52
1:Q:81:ILE:HD13	1:Q:168:ALA:HB1	1.90	0.52
1:F:13:VAL:HA	1:F:84:PRO:HD3	1.91	0.52
1:D:121:ARG:NH2	2:D:201:FMN:O4	2.31	0.52
1:M:64:LYS:HE3	1:M:64:LYS:HA	1.92	0.52
1:D:22:VAL:HG11	1:D:178:ILE:HD13	1.91	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:147[B]:CYS:SG	1:K:121:ARG:HD2	2.50	0.52
2:F:201:FMN:C8	3:M:202:4LR:H11	2.40	0.52
1:Q:152:SER:HB2	1:Q:180:GLN:HG3	1.92	0.51
1:K:182:TRP:O	1:K:183:ARG:C	2.53	0.51
1:R:26:LYS:NZ	6:R:303:HOH:O	2.39	0.51
1:R:121:ARG:NH2	2:R:201:FMN:O4	2.34	0.51
1:E:13:VAL:HA	1:E:84:PRO:HD3	1.94	0.50
1:R:178:ILE:CG2	1:R:178:ILE:O	2.59	0.50
1:D:119:MET:HA	1:D:144:LEU:O	2.11	0.50
1:K:80:MET:HE1	1:K:105:ALA:O	2.11	0.50
1:O:64:LYS:HE3	1:O:64:LYS:HA	1.93	0.50
1:E:119:MET:HA	1:E:144:LEU:O	2.12	0.49
1:O:76:LYS:NZ	6:O:304:HOH:O	2.45	0.49
1:N:1:MET:CG	1:N:3:ILE:CD1	2.90	0.49
1:P:119:MET:HA	1:P:144:LEU:O	2.13	0.49
1:N:1:MET:HG2	1:N:3:ILE:HD13	1.95	0.49
3:K:202:4LR:H8	2:M:201:FMN:C8	2.42	0.49
1:F:119:MET:HA	1:F:144:LEU:O	2.13	0.49
1:K:97:ILE:HG23	6:M:315:HOH:O	2.11	0.49
1:N:119:MET:HA	1:N:144:LEU:O	2.13	0.49
1:R:1:MET:CE	6:R:356:HOH:O	2.45	0.49
1:R:81:ILE:HD11	1:R:172:LEU:CD1	2.43	0.49
1:O:119:MET:HA	1:O:144:LEU:O	2.13	0.49
1:R:119:MET:HA	1:R:144:LEU:O	2.13	0.49
2:D:201:FMN:C8	3:I:202:4LR:H8	2.43	0.49
1:E:1:MET:HG2	1:E:3:ILE:HD13	1.94	0.48
1:L:119:MET:HA	1:L:144:LEU:O	2.12	0.48
1:F:81:ILE:HD11	1:F:172:LEU:CD1	2.44	0.48
1:K:119:MET:HA	1:K:144:LEU:O	2.14	0.48
1:O:13:VAL:HA	1:O:84:PRO:HD3	1.95	0.48
1:E:121:ARG:NH2	2:E:201:FMN:O4	2.36	0.48
1:K:13:VAL:HA	1:K:84:PRO:HD3	1.95	0.48
1:M:119:MET:HA	1:M:144:LEU:O	2.12	0.48
1:E:1:MET:CG	1:E:3:ILE:CD1	2.90	0.48
1:N:13:VAL:HA	1:N:84:PRO:HD3	1.96	0.48
1:P:13:VAL:HA	1:P:84:PRO:HD3	1.95	0.48
1:Q:119:MET:HA	1:Q:144:LEU:O	2.13	0.48
1:I:119:MET:HA	1:I:144:LEU:O	2.13	0.48
1:N:1:MET:CG	1:N:3:ILE:HD11	2.43	0.48
1:Q:76:LYS:HE2	1:R:181:ARG:NH1	2.29	0.48
1:R:88:LYS:HD3	1:R:88:LYS:C	2.38	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:81:ILE:HD11	1:D:172:LEU:HD11	1.95	0.48
1:E:2:GLU:O	1:E:3:ILE:HD12	2.13	0.48
1:E:81:ILE:HD11	1:E:172:LEU:CD1	2.44	0.48
1:M:13:VAL:HA	1:M:84:PRO:HD3	1.95	0.48
1:P:63:GLN:HE21	1:P:63:GLN:HA	1.78	0.48
1:D:28:ILE:CD1	1:D:174:ILE:HD13	2.43	0.47
1:I:13:VAL:HA	1:I:84:PRO:HD3	1.96	0.47
3:K:202:4LR:H8	2:M:201:FMN:C9	2.44	0.47
3:M:202:4LR:H7	1:N:151:TYR:CD2	2.48	0.47
1:R:13:VAL:HA	1:R:84:PRO:HD3	1.95	0.47
1:R:176:ASN:HB2	1:R:178:ILE:HD13	1.95	0.47
1:N:81:ILE:HD11	1:N:172:LEU:CD1	2.44	0.47
1:E:1:MET:CG	1:E:3:ILE:HD11	2.44	0.47
1:E:29:LYS:HE2	1:E:58:THR:HG21	1.96	0.47
1:D:176:ASN:HD22	1:D:178:ILE:H	1.62	0.47
1:L:11:SER:O	1:L:121:ARG:CD	2.62	0.47
1:L:63:GLN:HE21	1:L:63:GLN:HA	1.79	0.47
1:N:2:GLU:O	1:N:3:ILE:HD12	2.14	0.47
1:Q:28:ILE:CD1	1:Q:174:ILE:HD13	2.43	0.47
1:L:121:ARG:NH2	2:L:201:FMN:O4	2.36	0.47
1:M:63:GLN:HE21	1:M:63:GLN:HA	1.79	0.47
1:M:18:ARG:NH1	1:M:162:ASP:OD1	2.44	0.47
1:I:81:ILE:HD11	1:I:172:LEU:CD1	2.45	0.46
1:K:4:ILE:HD13	1:K:80:MET:HE2	1.96	0.46
3:M:202:4LR:H6	1:N:182:TRP:CD2	2.51	0.46
1:M:81:ILE:HD11	1:M:172:LEU:CD1	2.45	0.46
1:Q:22:VAL:HG11	1:Q:178:ILE:HD13	1.97	0.46
1:L:176:ASN:HD22	1:L:178:ILE:H	1.64	0.46
1:P:63:GLN:NE2	1:P:102:ILE:H	2.12	0.46
1:D:13:VAL:HA	1:D:84:PRO:HD3	1.98	0.46
1:D:167:ARG:NH2	1:F:112:GLU:OE2	2.49	0.46
1:E:26:LYS:HB3	1:E:26:LYS:HE3	1.67	0.46
1:I:18[A]:ARG:NH1	1:I:162:ASP:OD1	2.44	0.46
1:L:63:GLN:NE2	1:L:102:ILE:H	2.14	0.45
1:Q:29:LYS:HE2	1:Q:58:THR:HG21	1.99	0.45
3:E:202:4LR:H4	1:F:151:TYR:CE2	2.52	0.45
1:K:11:SER:O	1:K:121:ARG:HG3	2.16	0.45
1:L:180:GLN:HE22	1:L:183:ARG:HH11	1.64	0.45
1:D:81:ILE:HD11	1:D:172:LEU:CD1	2.46	0.45
6:F:325:HOH:O	1:M:66:PHE:HB3	2.17	0.45
1:K:81:ILE:HD11	1:K:172:LEU:CD1	2.46	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:L:157:LEU:HD23	1:M:157:LEU:HD23	1.99	0.45
1:D:99:ASP:HB3	1:P:88:LYS:CE	2.47	0.45
1:E:63:GLN:CG	1:E:100:SER:HB2	2.46	0.45
1:F:63:GLN:CG	1:F:100:SER:HB2	2.47	0.44
6:D:309:HOH:O	1:F:76:LYS:HE3	2.16	0.44
1:M:63:GLN:NE2	1:M:102:ILE:H	2.16	0.44
1:N:11:SER:O	1:N:121:ARG:HG3	2.18	0.44
1:R:152:SER:HB2	1:R:180:GLN:HB3	2.00	0.44
1:O:81:ILE:HD11	1:O:172:LEU:CD1	2.48	0.44
1:P:112:GLU:OE2	1:Q:167:ARG:NH2	2.50	0.44
1:L:63:GLN:HE22	1:L:102:ILE:H	1.65	0.44
1:P:81:ILE:HD11	1:P:172:LEU:CD1	2.47	0.44
1:I:121:ARG:NH2	2:I:201:FMN:O4	2.38	0.44
1:M:176:ASN:HD22	1:M:178:ILE:H	1.66	0.44
1:O:176:ASN:HD22	1:O:178:ILE:H	1.66	0.44
1:Q:81:ILE:HD12	1:Q:117:ILE:CG2	2.47	0.43
6:F:325:HOH:O	1:M:66:PHE:CB	2.66	0.43
1:O:11:SER:O	1:O:121:ARG:HG3	2.18	0.43
1:P:151:TYR:CD2	3:R:202:4LR:H7	2.53	0.43
1:Q:13:VAL:HA	1:Q:84:PRO:HD3	1.99	0.43
1:L:13:VAL:HA	1:L:84:PRO:HD3	2.00	0.43
1:Q:133:MET:HE3	1:Q:143:ILE:HG21	1.99	0.43
1:R:178:ILE:O	1:R:178:ILE:HG22	2.18	0.43
1:D:151:TYR:CE2	3:F:202:4LR:H4	2.54	0.43
1:I:176:ASN:HD22	1:I:178:ILE:H	1.66	0.43
1:M:11:SER:O	1:M:121:ARG:HG3	2.17	0.43
1:R:26:LYS:HD2	6:R:307:HOH:O	2.19	0.43
1:I:157:LEU:HD23	1:Q:157:LEU:HD23	2.00	0.43
1:M:1:MET:N	6:M:304:HOH:O	2.51	0.42
1:N:29:LYS:HE2	1:N:58:THR:HG21	2.01	0.42
1:P:176:ASN:HD22	1:P:178:ILE:H	1.67	0.42
1:D:134:LEU:CD1	1:K:134:LEU:CD1	2.97	0.42
1:L:81:ILE:HD12	1:L:168:ALA:HB1	2.01	0.42
6:D:309:HOH:O	1:F:76:LYS:CE	2.66	0.42
1:F:11:SER:O	1:F:121:ARG:CD	2.68	0.42
1:N:76:LYS:HE2	6:O:365:HOH:O	2.20	0.42
1:O:26:LYS:HE3	1:O:175:GLU:O	2.20	0.42
1:O:63:GLN:CG	1:O:100:SER:HB2	2.47	0.42
1:I:130:LEU:HD21	1:Q:133:MET:HE2	2.01	0.42
1:F:133:MET:HE2	1:N:130:LEU:CD2	2.49	0.42
1:R:81:ILE:HD11	1:R:172:LEU:HD11	2.01	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:28:ILE:HD13	1:D:174:ILE:CD1	2.49	0.41
3:I:202:4LR:H4	1:K:151:TYR:CE2	2.54	0.41
1:K:63:GLN:HB2	6:K:363:HOH:O	2.19	0.41
1:E:11:SER:O	1:E:121:ARG:CD	2.66	0.41
1:L:178:ILE:HD12	1:L:178:ILE:N	2.35	0.41
1:M:63:GLN:CG	1:M:100:SER:HB2	2.50	0.41
1:D:11:SER:O	1:D:121:ARG:HG3	2.21	0.41
1:M:26:LYS:HE3	1:M:175:GLU:O	2.21	0.41
1:P:11:SER:O	1:P:121:ARG:CD	2.68	0.41
1:R:26:LYS:HE3	1:R:175:GLU:O	2.21	0.41
1:F:93:VAL:O	1:K:128:ILE:HD13	2.20	0.41
1:R:1:MET:N	6:R:306:HOH:O	2.53	0.41
1:R:11:SER:O	1:R:121:ARG:CD	2.69	0.41
1:F:176:ASN:HD22	1:F:178:ILE:H	1.67	0.41
1:M:134:LEU:CG	1:M:138:LYS:HE3	2.44	0.41
1:O:88:LYS:HD3	1:O:88:LYS:C	2.46	0.41
1:P:26:LYS:HE3	1:P:175:GLU:O	2.20	0.41
1:R:83:ALA:HA	1:R:84:PRO:HA	1.93	0.41
1:E:3:ILE:HD13	1:E:28:ILE:CG2	2.52	0.41
1:E:93:VAL:O	1:N:128:ILE:HD13	2.20	0.41
1:O:130:LEU:CD2	1:R:133:MET:HE2	2.51	0.41
2:O:201:FMN:HM73	2:O:201:FMN:HM81	1.89	0.41
2:O:201:FMN:C8	3:Q:202:4LR:H8	2.51	0.40
1:Q:28:ILE:HD13	1:Q:174:ILE:CD1	2.49	0.40
1:R:134:LEU:CG	1:R:138:LYS:HE3	2.50	0.40
1:N:81:ILE:HD11	1:N:172:LEU:HD11	2.04	0.40
2:O:201:FMN:HM82	1:Q:66:PHE:O	2.22	0.40
1:L:83:ALA:HA	1:L:84:PRO:HA	1.92	0.40
1:Q:11:SER:O	1:Q:121:ARG:HG3	2.22	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	D	182/214 (85%)	181 (100%)	1 (0%)	0	100	100
1	E	181/214 (85%)	180 (99%)	1 (1%)	0	100	100
1	F	181/214 (85%)	180 (99%)	1 (1%)	0	100	100
1	I	183/214 (86%)	182 (100%)	1 (0%)	0	100	100
1	K	182/214 (85%)	181 (100%)	1 (0%)	0	100	100
1	L	182/214 (85%)	181 (100%)	1 (0%)	0	100	100
1	M	181/214 (85%)	180 (99%)	1 (1%)	0	100	100
1	N	182/214 (85%)	180 (99%)	2 (1%)	0	100	100
1	O	181/214 (85%)	180 (99%)	1 (1%)	0	100	100
1	P	181/214 (85%)	180 (99%)	1 (1%)	0	100	100
1	Q	182/214 (85%)	181 (100%)	1 (0%)	0	100	100
1	R	183/214 (86%)	182 (100%)	1 (0%)	0	100	100
All	All	2181/2568 (85%)	2168 (99%)	13 (1%)	0	100	100

There are no Ramachandran outliers to report.

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	D	153/179 (86%)	148 (97%)	5 (3%)	33	8
1	E	152/179 (85%)	149 (98%)	3 (2%)	48	23
1	F	152/179 (85%)	146 (96%)	6 (4%)	28	6
1	I	154/179 (86%)	149 (97%)	5 (3%)	34	9
1	K	153/179 (86%)	151 (99%)	2 (1%)	61	39
1	L	153/179 (86%)	148 (97%)	5 (3%)	33	8
1	M	152/179 (85%)	148 (97%)	4 (3%)	40	15
1	N	153/179 (86%)	149 (97%)	4 (3%)	40	15
1	O	152/179 (85%)	149 (98%)	3 (2%)	48	23

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	P	152/179 (85%)	150 (99%)	2 (1%)	61	39
1	Q	153/179 (86%)	147 (96%)	6 (4%)	28	6
1	R	154/179 (86%)	152 (99%)	2 (1%)	61	39
All	All	1833/2148 (85%)	1786 (97%)	47 (3%)	40	15

All (47) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	26	LYS
1	D	36	GLU
1	D	88	LYS
1	D	121	ARG
1	D	134	LEU
1	E	3	ILE
1	E	121	ARG
1	E	134	LEU
1	F	49	LEU
1	F	62	SER
1	F	64	LYS
1	F	121	ARG
1	F	134	LEU
1	F	175	GLU
1	I	36	GLU
1	I	88	LYS
1	I	121	ARG
1	I	134	LEU
1	I	183	ARG
1	K	121	ARG
1	K	183	ARG
1	L	26	LYS
1	L	63	GLN
1	L	121	ARG
1	L	175	GLU
1	L	183	ARG
1	M	36	GLU
1	M	63	GLN
1	M	64	LYS
1	M	121	ARG
1	N	3	ILE
1	N	64	LYS
1	N	121	ARG

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Mol	Chain	Res	Type
1	N	183	ARG
1	O	64	LYS
1	O	121	ARG
1	O	175	GLU
1	P	63	GLN
1	P	121	ARG
1	Q	26	LYS
1	Q	76	LYS
1	Q	81	ILE
1	Q	121	ARG
1	Q	180	GLN
1	Q	183	ARG
1	R	121	ARG
1	R	175	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (28) such sidechains are listed below:

Mol	Chain	Res	Type
1	D	60	ASN
1	D	176	ASN
1	E	25	ASN
1	F	60	ASN
1	F	176	ASN
1	I	60	ASN
1	I	176	ASN
1	I	180	GLN
1	K	25	ASN
1	L	60	ASN
1	L	63	GLN
1	L	176	ASN
1	L	180	GLN
1	M	60	ASN
1	M	63	GLN
1	M	176	ASN
1	M	180	GLN
1	N	25	ASN
1	O	60	ASN
1	O	176	ASN
1	O	180	GLN
1	P	60	ASN
1	P	63	GLN
1	P	176	ASN

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Mol	Chain	Res	Type
1	P	180	GLN
1	Q	25	ASN
1	R	60	ASN
1	R	176	ASN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

30 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# $ Z > 2$	Counts	RMSZ	# $ Z > 2$
3	4LR	O	202	-	9,9,9	1.13	1 (11%)	11,12,12	1.16	1 (9%)
2	FMN	R	201	-	33,33,33	0.80	0	48,50,50	0.84	2 (4%)
2	FMN	L	201	-	33,33,33	0.82	1 (3%)	48,50,50	0.97	3 (6%)
3	4LR	M	202	-	9,9,9	0.92	0	11,12,12	1.07	1 (9%)
3	4LR	R	202	-	9,9,9	1.01	1 (11%)	11,12,12	1.38	1 (9%)
3	4LR	D	202	-	9,9,9	0.89	0	11,12,12	1.07	0
3	4LR	K	202	-	9,9,9	0.76	0	11,12,12	1.07	1 (9%)
2	FMN	Q	201	-	33,33,33	0.77	1 (3%)	48,50,50	0.90	2 (4%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	4LR	L	202	-	9,9,9	0.53	0	11,12,12	1.13	2 (18%)
4	PO4	M	203	-	4,4,4	1.06	0	6,6,6	0.54	0
2	FMN	F	201	-	33,33,33	0.84	0	48,50,50	0.76	3 (6%)
2	FMN	E	201	-	33,33,33	0.81	2 (6%)	48,50,50	0.96	3 (6%)
4	PO4	D	203	-	4,4,4	1.80	1 (25%)	6,6,6	0.47	0
2	FMN	I	201	-	33,33,33	0.67	0	48,50,50	0.98	3 (6%)
2	FMN	O	201	-	33,33,33	0.69	0	48,50,50	0.92	2 (4%)
2	FMN	D	201	-	33,33,33	0.78	1 (3%)	48,50,50	0.96	3 (6%)
2	FMN	K	201	-	33,33,33	0.78	1 (3%)	48,50,50	0.87	2 (4%)
4	PO4	I	203	-	4,4,4	0.97	0	6,6,6	0.35	0
3	4LR	Q	202	-	9,9,9	1.15	1 (11%)	11,12,12	0.99	0
4	PO4	P	203	-	4,4,4	1.48	1 (25%)	6,6,6	0.43	0
3	4LR	P	202	-	9,9,9	0.31	0	11,12,12	0.77	0
2	FMN	M	201	-	33,33,33	0.70	0	48,50,50	0.90	3 (6%)
3	4LR	I	202	-	9,9,9	0.99	1 (11%)	11,12,12	0.85	0
2	FMN	N	201	-	33,33,33	0.70	0	48,50,50	0.96	3 (6%)
5	IPA	E	203	-	3,3,3	0.32	0	3,3,3	0.38	0
4	PO4	P	204	-	4,4,4	0.91	0	6,6,6	0.51	0
2	FMN	P	201	-	33,33,33	0.86	1 (3%)	48,50,50	0.99	3 (6%)
3	4LR	F	202	-	9,9,9	0.84	0	11,12,12	0.60	0
3	4LR	E	202	-	9,9,9	0.86	0	11,12,12	0.76	0
3	4LR	N	202	-	9,9,9	0.59	0	11,12,12	0.69	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	4LR	O	202	-	-	4/7/7/7	-
2	FMN	R	201	-	-	2/18/18/18	0/3/3/3
2	FMN	L	201	-	-	1/18/18/18	0/3/3/3
3	4LR	M	202	-	-	4/7/7/7	-
3	4LR	R	202	-	-	3/7/7/7	-
3	4LR	D	202	-	-	3/7/7/7	-
3	4LR	K	202	-	-	1/7/7/7	-
2	FMN	Q	201	-	-	2/18/18/18	0/3/3/3
3	4LR	L	202	-	-	3/7/7/7	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	FMN	F	201	-	-	2/18/18/18	0/3/3/3
2	FMN	E	201	-	-	2/18/18/18	0/3/3/3
2	FMN	I	201	-	-	2/18/18/18	0/3/3/3
2	FMN	O	201	-	-	1/18/18/18	0/3/3/3
2	FMN	D	201	-	-	1/18/18/18	0/3/3/3
2	FMN	K	201	-	-	2/18/18/18	0/3/3/3
3	4LR	Q	202	-	-	3/7/7/7	-
3	4LR	P	202	-	-	1/7/7/7	-
2	FMN	M	201	-	-	1/18/18/18	0/3/3/3
3	4LR	I	202	-	-	3/7/7/7	-
2	FMN	N	201	-	-	2/18/18/18	0/3/3/3
2	FMN	P	201	-	-	1/18/18/18	0/3/3/3
3	4LR	F	202	-	-	2/7/7/7	-
3	4LR	E	202	-	-	2/7/7/7	-
3	4LR	N	202	-	-	3/7/7/7	-

All (13) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	D	203	PO4	P-O4	-3.17	1.45	1.54
2	P	201	FMN	O3'-C3'	2.51	1.48	1.43
2	E	201	FMN	P-O2P	-2.36	1.45	1.54
4	P	203	PO4	P-O3	-2.30	1.47	1.54
2	K	201	FMN	O2-C2	-2.26	1.20	1.24
2	Q	201	FMN	C1'-C2'	-2.24	1.49	1.52
3	Q	202	4LR	PAJ-OAD	-2.24	1.46	1.54
3	I	202	4LR	PAJ-OAC	2.19	1.57	1.50
3	O	202	4LR	PAJ-OAE	-2.19	1.46	1.54
2	E	201	FMN	C4A-C4	-2.15	1.36	1.44
2	D	201	FMN	O3'-C3'	2.14	1.48	1.43
3	R	202	4LR	PAJ-OAC	2.03	1.57	1.50
2	L	201	FMN	O3'-C3'	2.00	1.47	1.43

All (38) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	R	202	4LR	OAE-PAJ-OAH	3.48	115.98	106.73
2	D	201	FMN	C4-N3-C2	-3.04	120.02	125.64
2	L	201	FMN	C4-N3-C2	-2.94	120.21	125.64
2	E	201	FMN	O4-C4-C4A	-2.93	118.82	126.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	E	201	FMN	C4-N3-C2	-2.85	120.38	125.64
2	Q	201	FMN	C4-N3-C2	-2.83	120.42	125.64
2	P	201	FMN	C4-N3-C2	-2.79	120.49	125.64
2	I	201	FMN	C4-N3-C2	-2.70	120.66	125.64
2	N	201	FMN	C4-N3-C2	-2.70	120.66	125.64
2	M	201	FMN	C4-N3-C2	-2.68	120.70	125.64
2	O	201	FMN	C4-N3-C2	-2.67	120.72	125.64
2	L	201	FMN	O4-C4-C4A	-2.64	119.59	126.60
2	K	201	FMN	C4-N3-C2	-2.53	120.96	125.64
2	P	201	FMN	O4-C4-C4A	-2.51	119.95	126.60
2	R	201	FMN	O4-C4-C4A	-2.46	120.07	126.60
2	I	201	FMN	O3P-P-O5'	-2.42	100.31	106.73
2	D	201	FMN	O4-C4-C4A	-2.41	120.20	126.60
2	R	201	FMN	C4-N3-C2	-2.41	121.19	125.64
2	I	201	FMN	O5'-P-O1P	2.39	113.17	106.47
2	P	201	FMN	C4A-C4-N3	2.37	119.21	113.19
2	F	201	FMN	O4-C4-C4A	-2.34	120.38	126.60
3	O	202	4LR	OAH-PAJ-OAC	2.34	113.03	106.47
2	N	201	FMN	O4-C4-C4A	-2.27	120.58	126.60
2	O	201	FMN	O4-C4-C4A	-2.24	120.67	126.60
2	L	201	FMN	C4A-C4-N3	2.24	118.87	113.19
3	L	202	4LR	OAD-PAJ-OAH	-2.21	100.86	106.73
3	M	202	4LR	OAH-CAG-CAF	2.17	118.71	109.59
3	K	202	4LR	OAE-PAJ-OAD	2.14	115.82	107.64
2	M	201	FMN	O4-C4-C4A	-2.13	120.94	126.60
3	L	202	4LR	OAH-PAJ-OAC	2.12	112.43	106.47
2	E	201	FMN	C4A-C4-N3	2.12	118.58	113.19
2	F	201	FMN	C4-N3-C2	-2.12	121.73	125.64
2	Q	201	FMN	O4-C4-C4A	-2.08	121.07	126.60
2	D	201	FMN	C4A-C4-N3	2.07	118.46	113.19
2	K	201	FMN	P-O5'-C5'	2.07	123.99	118.30
2	F	201	FMN	C4A-C4-N3	2.06	118.43	113.19
2	M	201	FMN	C4A-C4-N3	2.04	118.37	113.19
2	N	201	FMN	P-O5'-C5'	2.00	123.81	118.30

There are no chirality outliers.

All (51) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	K	201	FMN	C5'-O5'-P-O1P
3	D	202	4LR	CAG-OAH-PAJ-OAD
3	F	202	4LR	CAG-OAH-PAJ-OAC

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Mol	Chain	Res	Type	Atoms
3	I	202	4LR	CAG-OAH-PAJ-OAD
3	I	202	4LR	CAG-OAH-PAJ-OAE
3	M	202	4LR	CAG-OAH-PAJ-OAD
3	M	202	4LR	CAG-OAH-PAJ-OAE
3	N	202	4LR	CAG-OAH-PAJ-OAE
3	N	202	4LR	CAG-OAH-PAJ-OAC
3	O	202	4LR	CAG-OAH-PAJ-OAD
3	O	202	4LR	CAG-OAH-PAJ-OAE
3	Q	202	4LR	CAG-OAH-PAJ-OAD
3	Q	202	4LR	CAG-OAH-PAJ-OAE
3	R	202	4LR	CAG-OAH-PAJ-OAD
3	R	202	4LR	CAG-OAH-PAJ-OAE
3	L	202	4LR	CAG-CAF-CAI-CAB
2	Q	201	FMN	O4'-C4'-C5'-O5'
3	L	202	4LR	CAG-CAF-CAI-CAA
3	K	202	4LR	CAG-OAH-PAJ-OAC
3	M	202	4LR	CAG-OAH-PAJ-OAC
3	O	202	4LR	CAG-OAH-PAJ-OAC
3	Q	202	4LR	CAG-OAH-PAJ-OAC
2	I	201	FMN	C2'-C3'-C4'-C5'
2	K	201	FMN	C5'-O5'-P-O3P
3	F	202	4LR	CAG-OAH-PAJ-OAE
2	D	201	FMN	C2'-C3'-C4'-C5'
2	Q	201	FMN	C2'-C3'-C4'-C5'
2	M	201	FMN	C5'-O5'-P-O1P
3	D	202	4LR	CAG-OAH-PAJ-OAC
2	E	201	FMN	C2'-C3'-C4'-C5'
2	F	201	FMN	C2'-C3'-C4'-C5'
2	N	201	FMN	C2'-C3'-C4'-C5'
2	O	201	FMN	C2'-C3'-C4'-C5'
2	P	201	FMN	C2'-C3'-C4'-C5'
2	R	201	FMN	C2'-C3'-C4'-C5'
3	D	202	4LR	CAG-OAH-PAJ-OAE
3	E	202	4LR	CAG-OAH-PAJ-OAD
3	N	202	4LR	CAG-OAH-PAJ-OAD
2	F	201	FMN	O4'-C4'-C5'-O5'
3	I	202	4LR	CAG-OAH-PAJ-OAC
3	L	202	4LR	CAG-OAH-PAJ-OAC
2	L	201	FMN	C2'-C3'-C4'-C5'
3	E	202	4LR	CAG-CAF-CAI-CAA
3	M	202	4LR	CAI-CAF-CAG-OAH
3	O	202	4LR	CAI-CAF-CAG-OAH

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Mol	Chain	Res	Type	Atoms
3	P	202	4LR	CAI-CAF-CAG-OAH
3	R	202	4LR	CAI-CAF-CAG-OAH
2	E	201	FMN	O4'-C4'-C5'-O5'
2	I	201	FMN	O4'-C4'-C5'-O5'
2	N	201	FMN	O4'-C4'-C5'-O5'
2	R	201	FMN	O4'-C4'-C5'-O5'

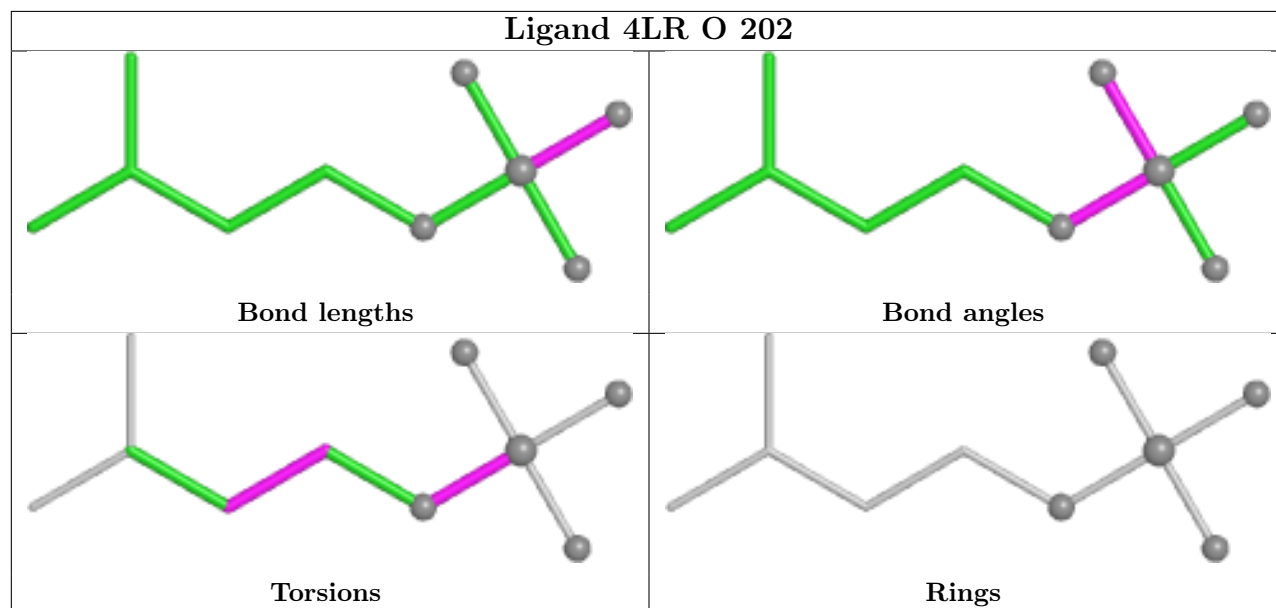
There are no ring outliers.

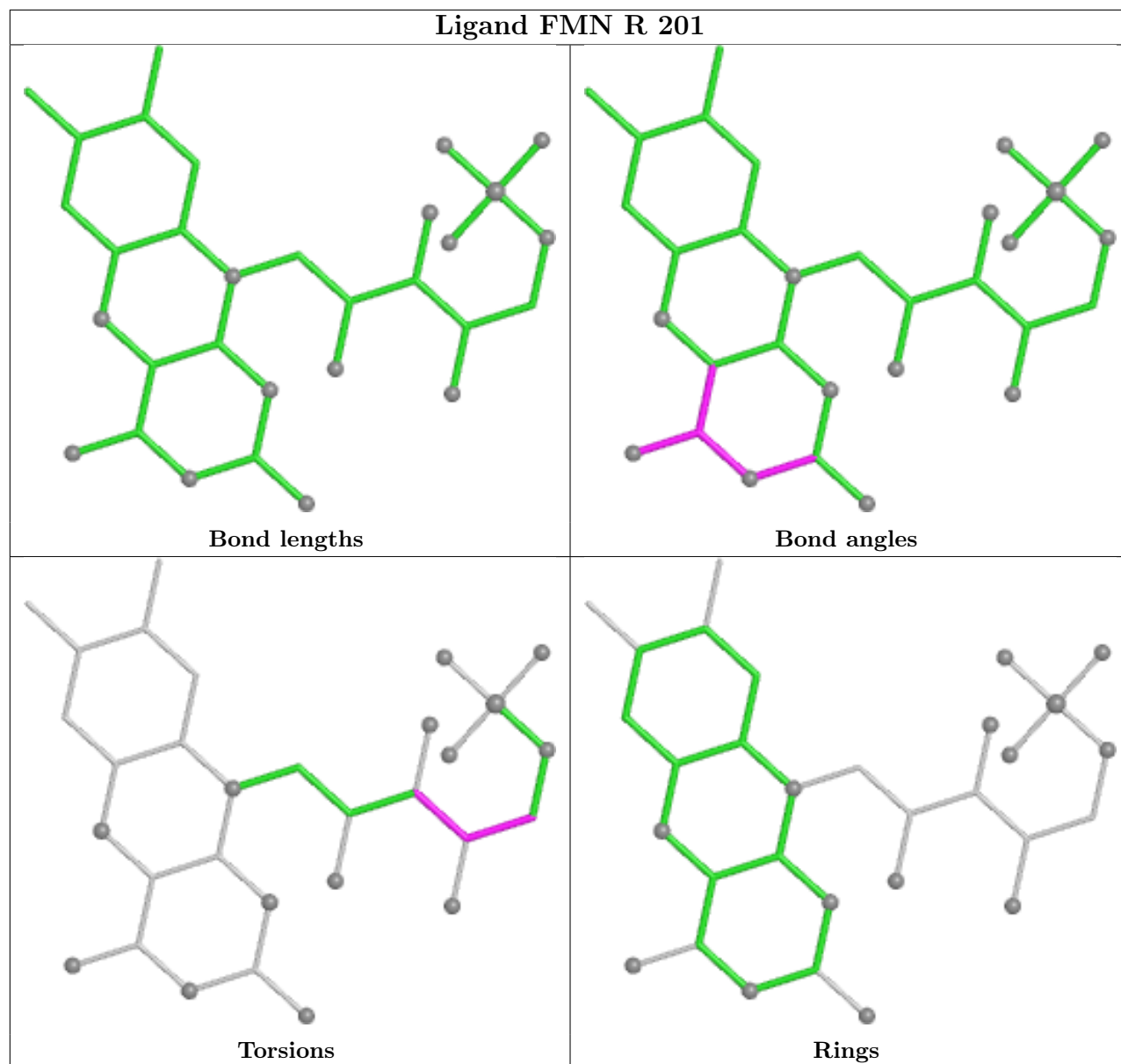
21 monomers are involved in 36 short contacts:

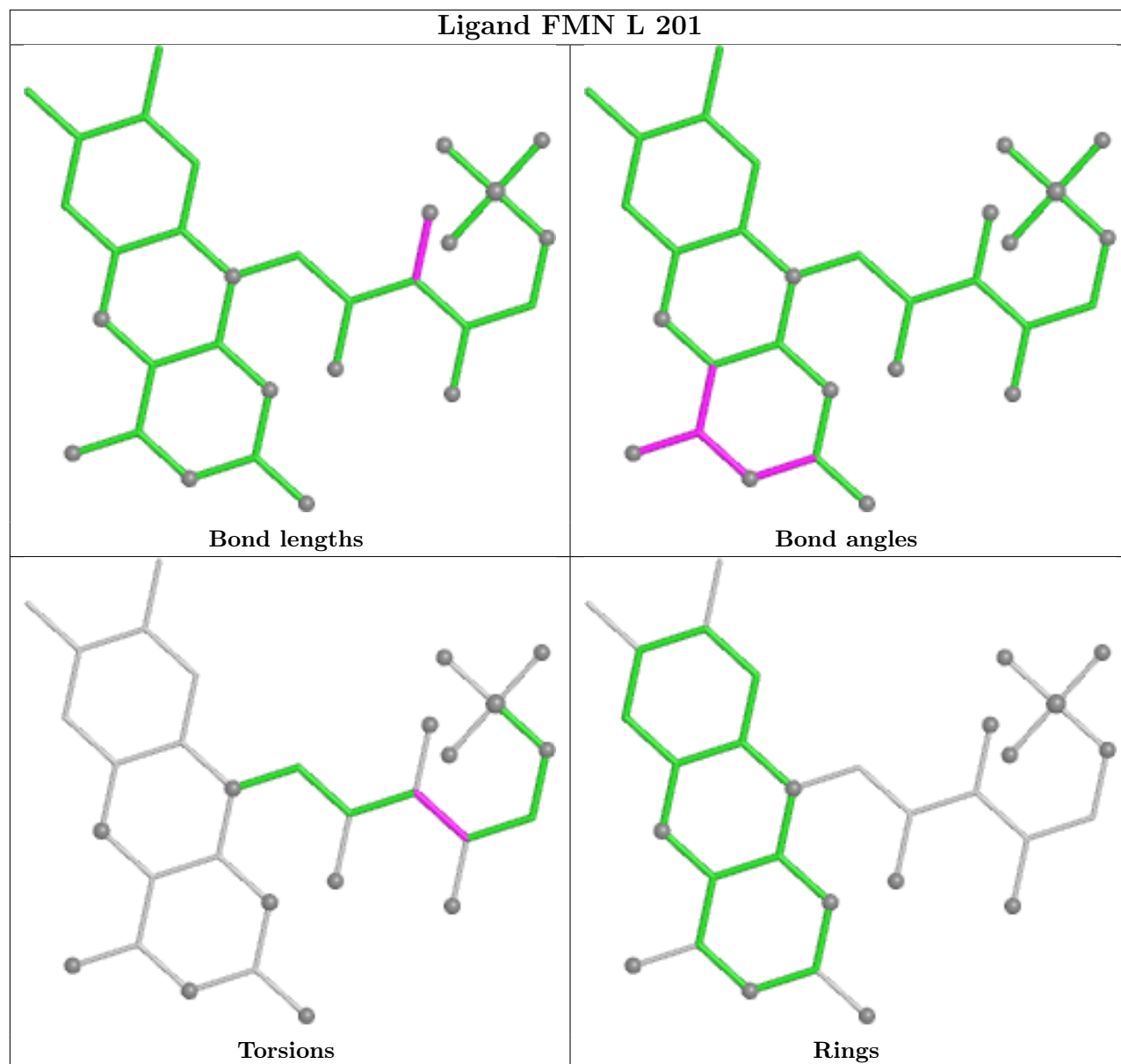
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	O	202	4LR	2	0
2	R	201	FMN	1	0
2	L	201	FMN	2	0
3	M	202	4LR	3	0
3	R	202	4LR	2	0
3	K	202	4LR	2	0
2	Q	201	FMN	2	0
3	L	202	4LR	4	0
2	F	201	FMN	2	0
2	E	201	FMN	2	0
2	I	201	FMN	1	0
2	O	201	FMN	3	0
2	D	201	FMN	2	0
3	Q	202	4LR	2	0
2	M	201	FMN	2	0
3	I	202	4LR	2	0
2	N	201	FMN	1	0
5	E	203	IPA	7	0
3	F	202	4LR	1	0
3	E	202	4LR	1	0
3	N	202	4LR	1	0

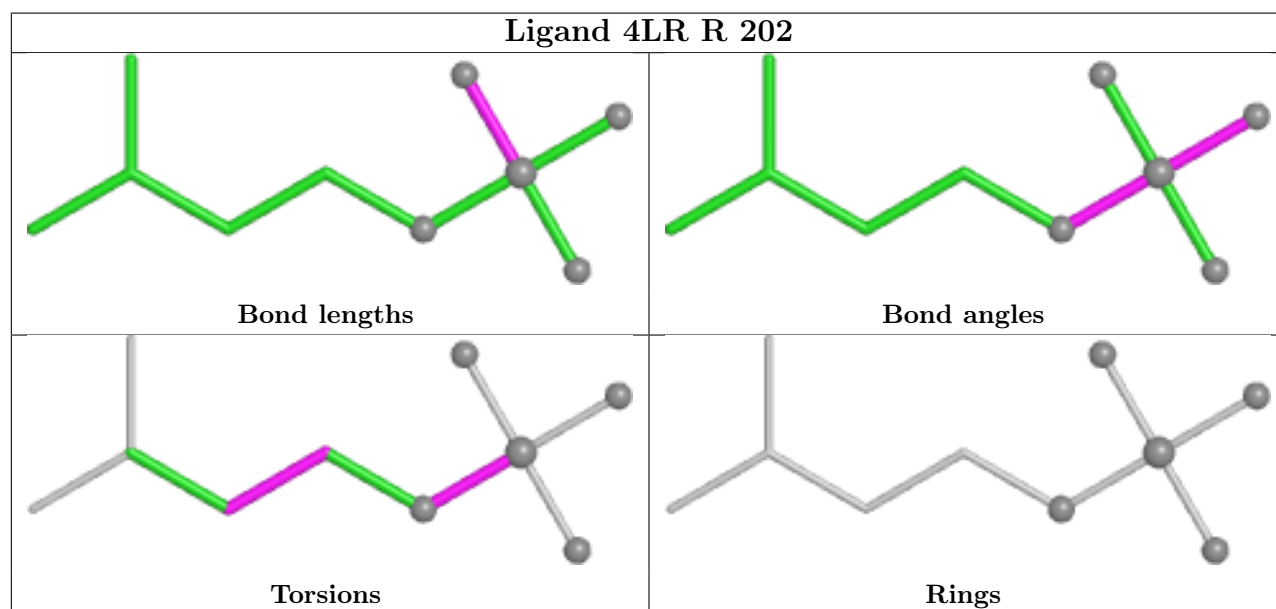
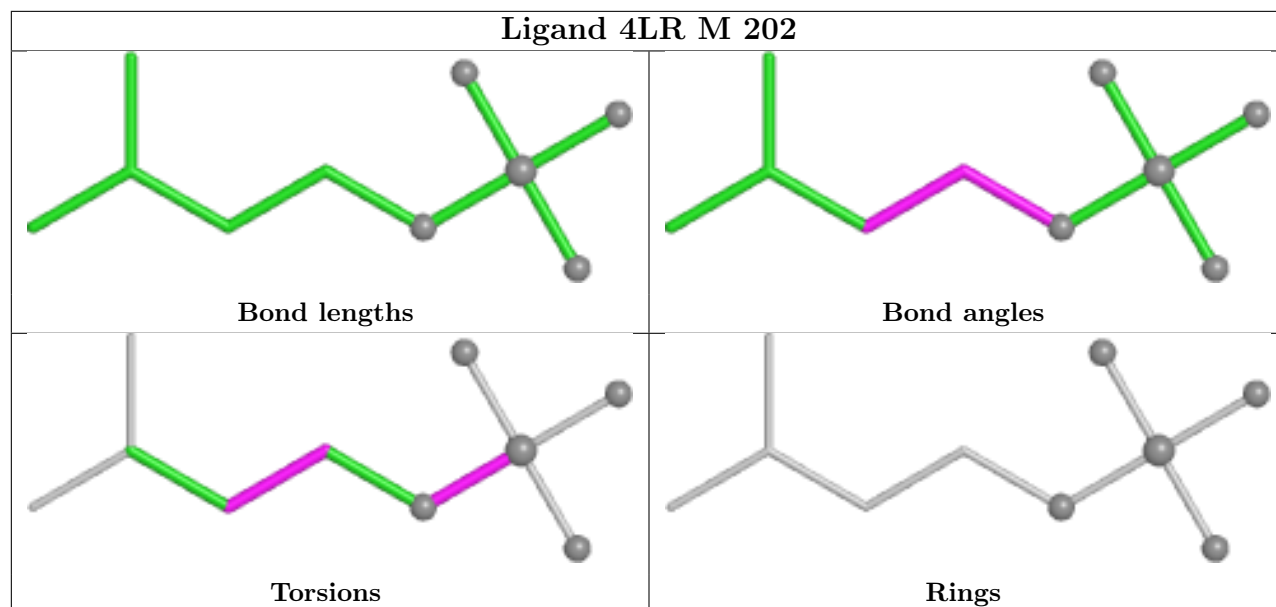
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and

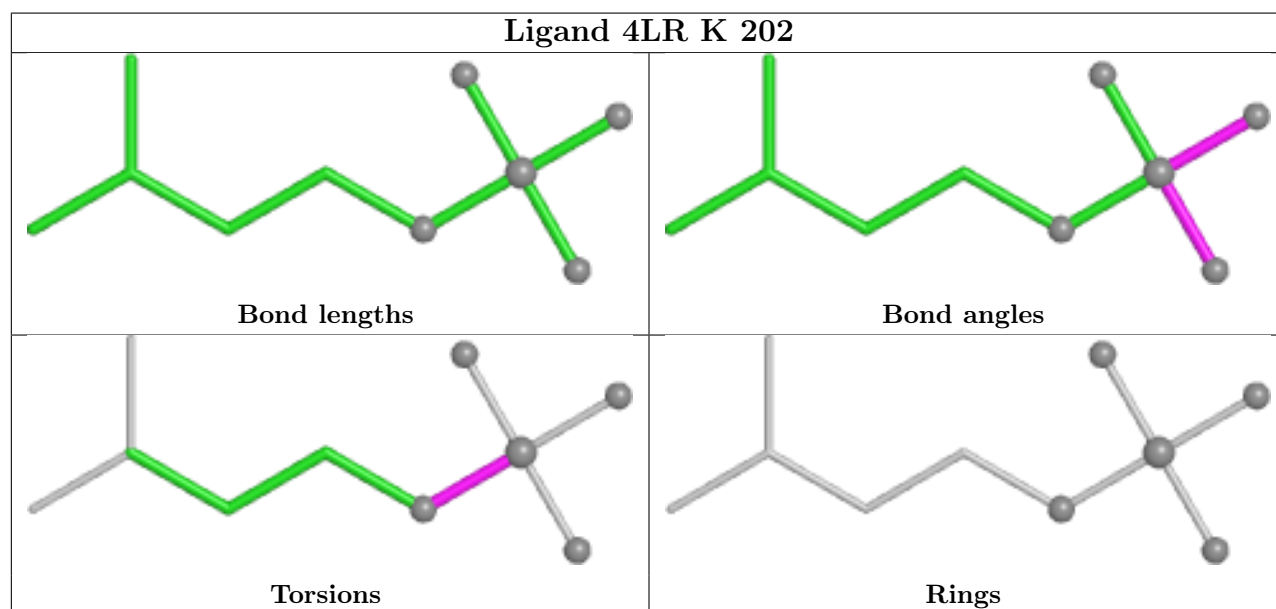
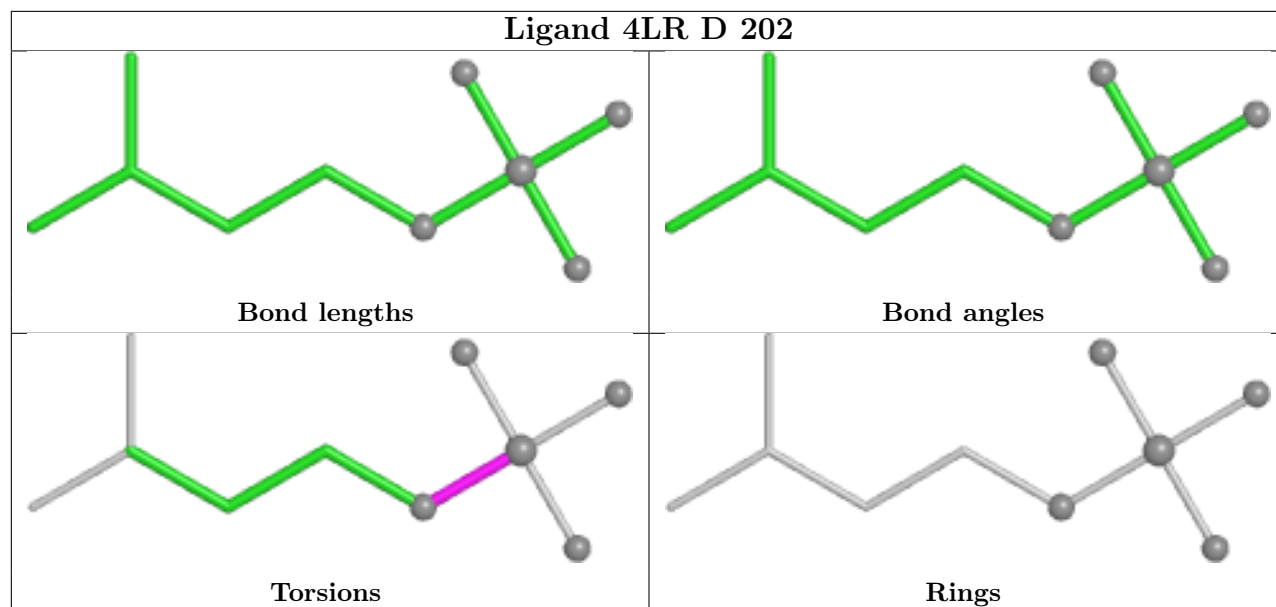
any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

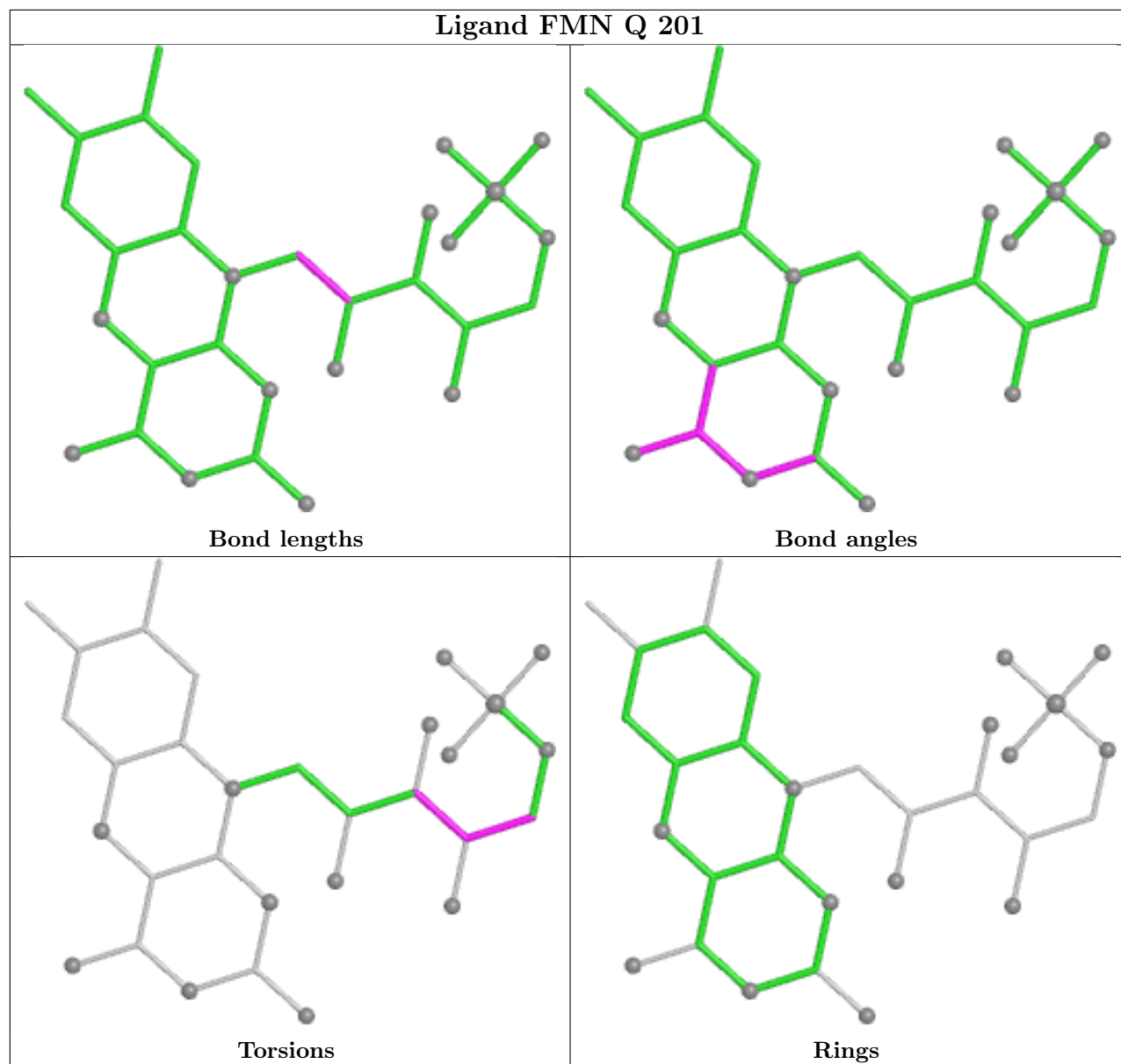


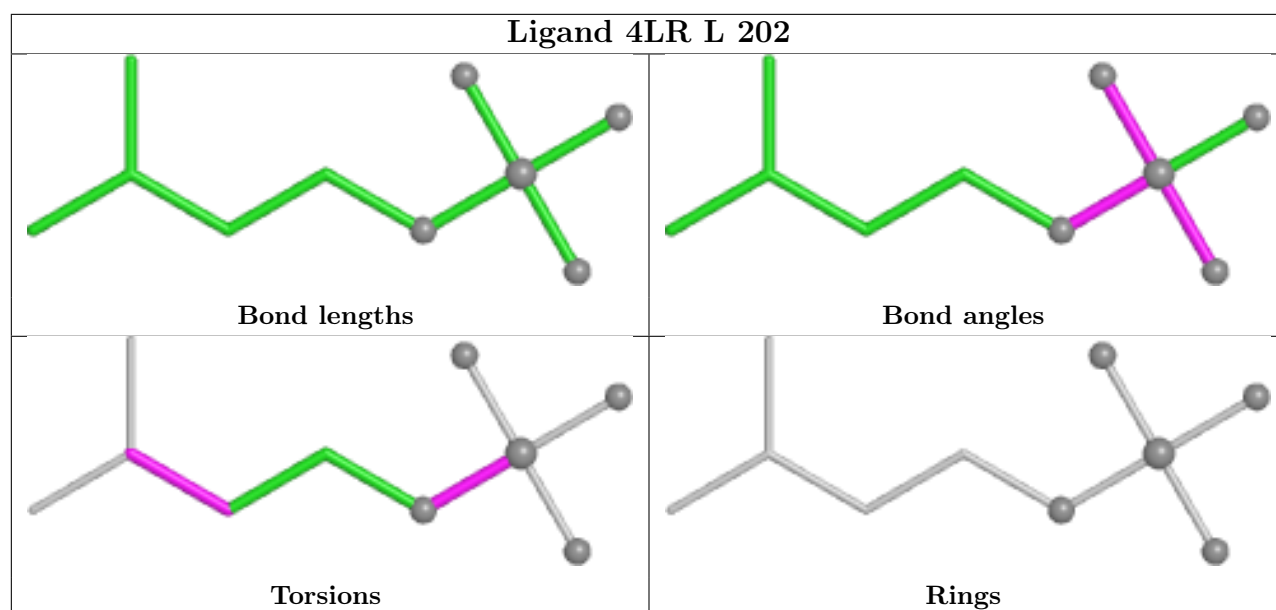


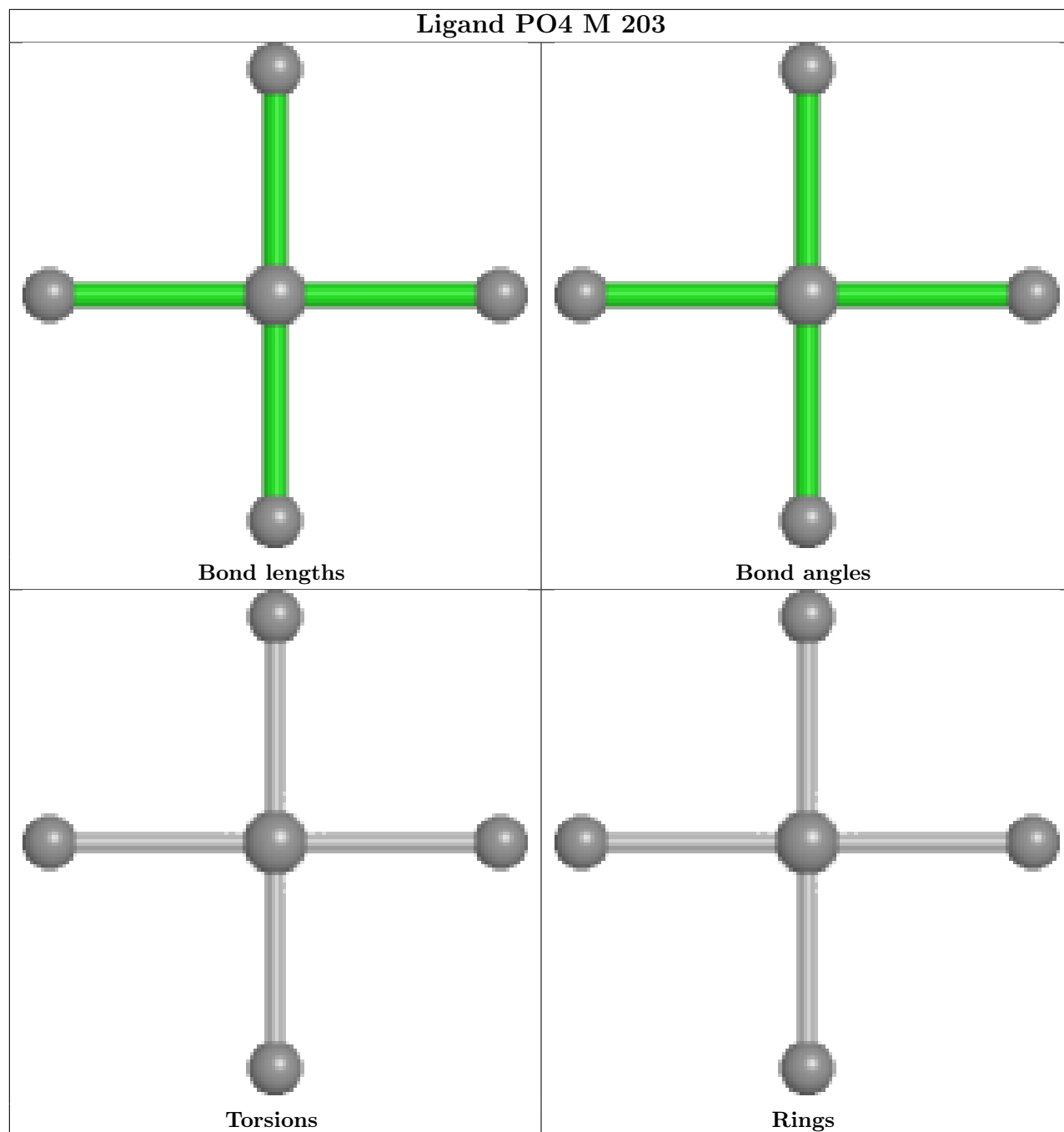


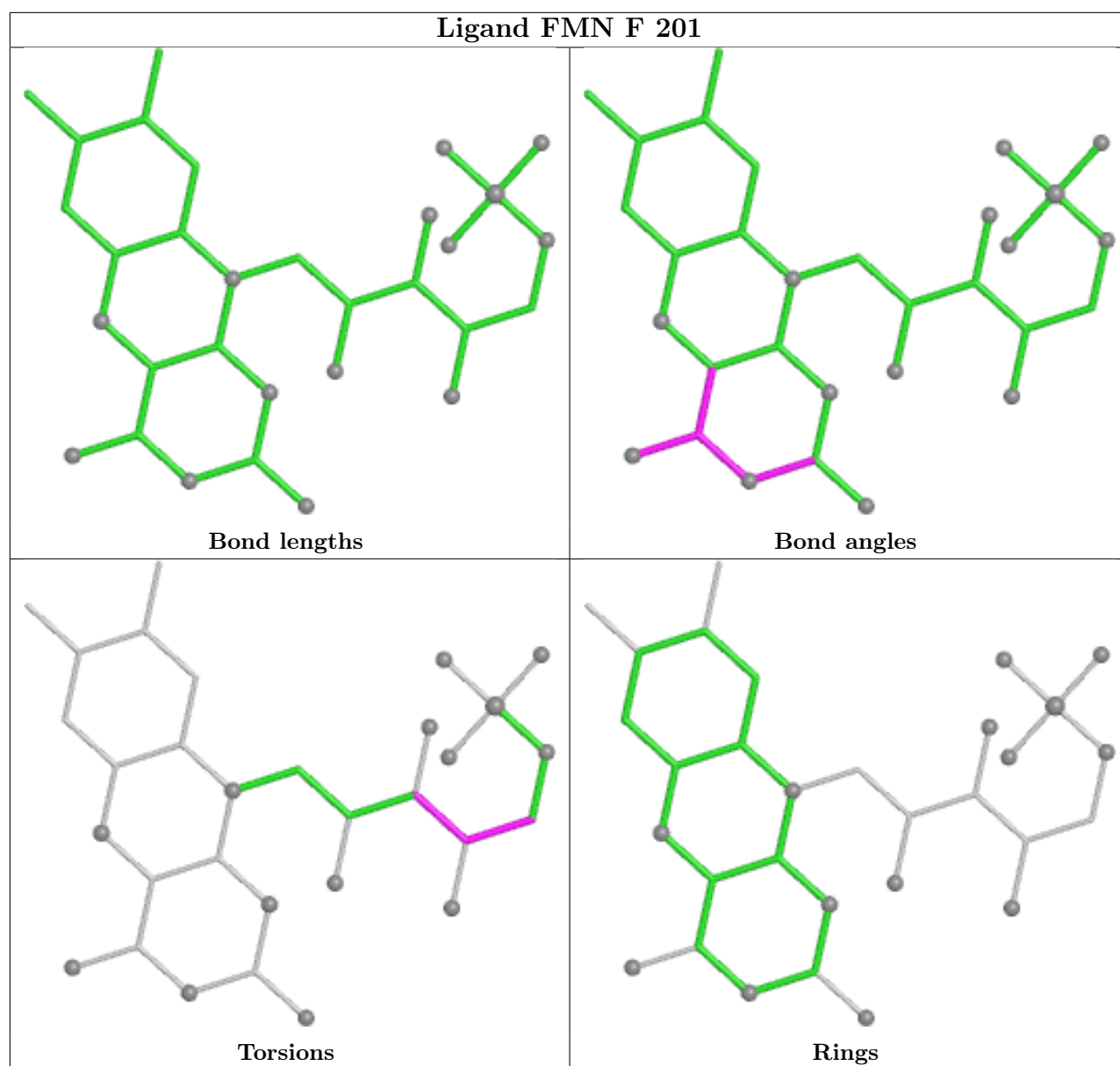


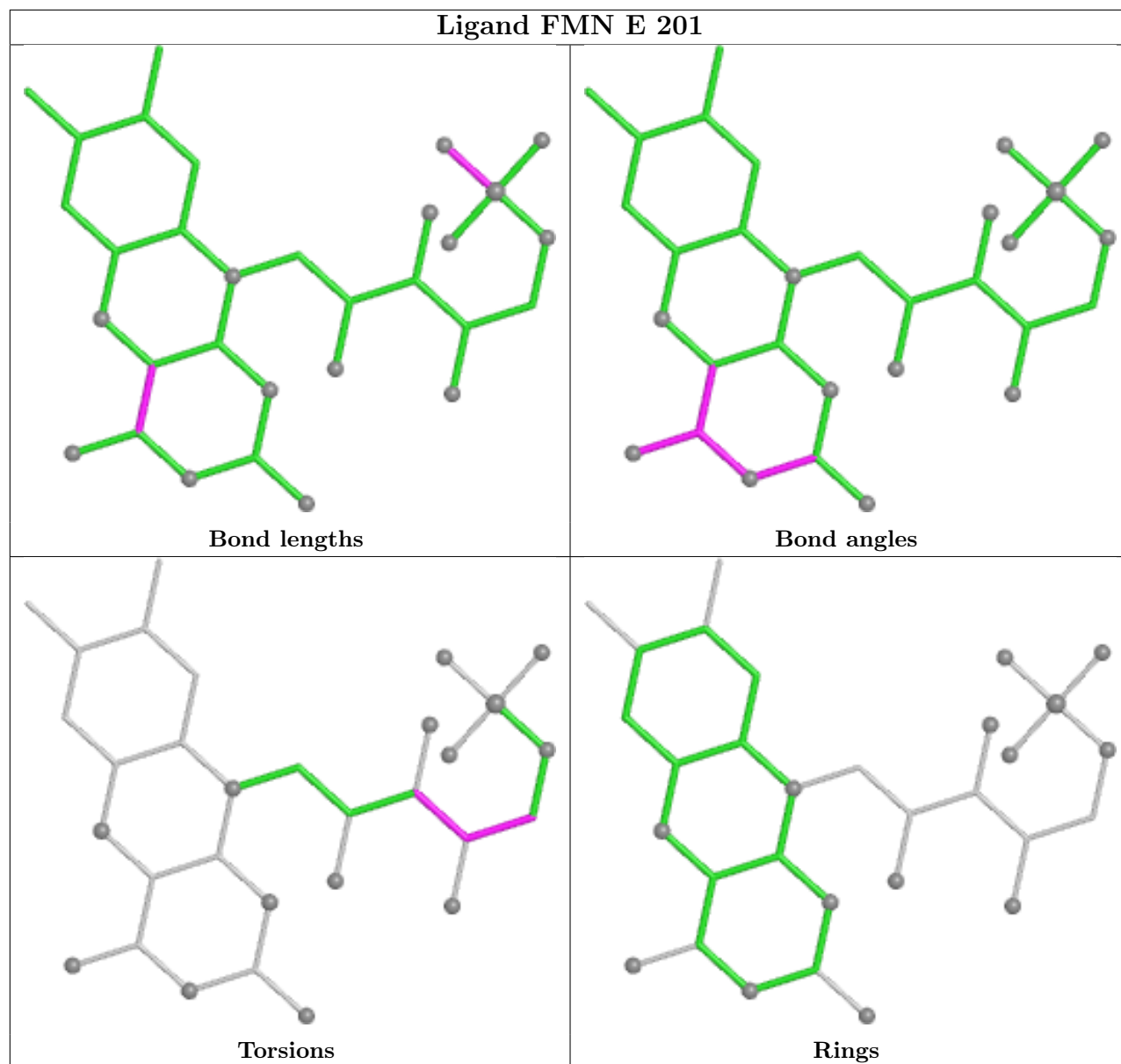


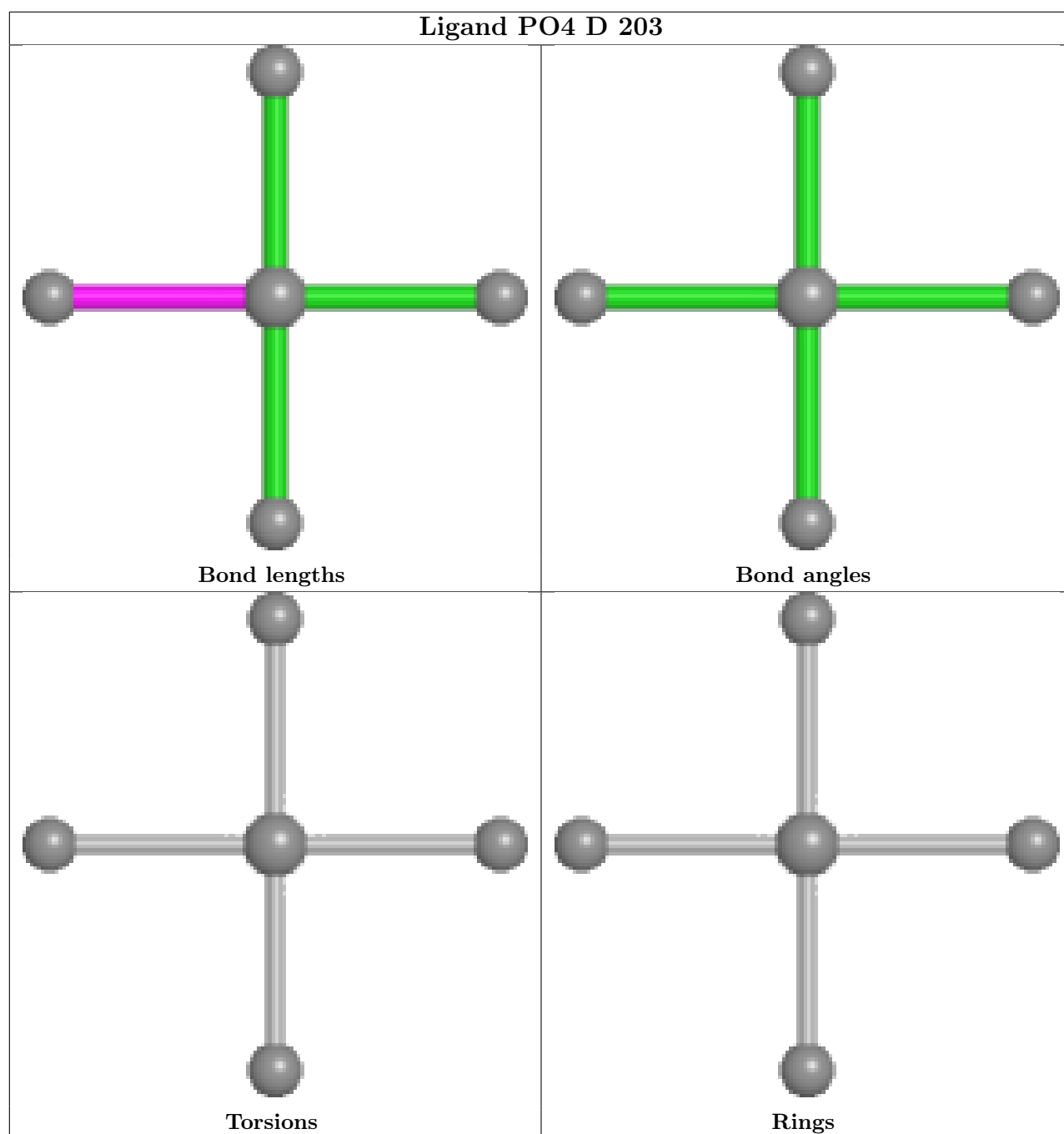


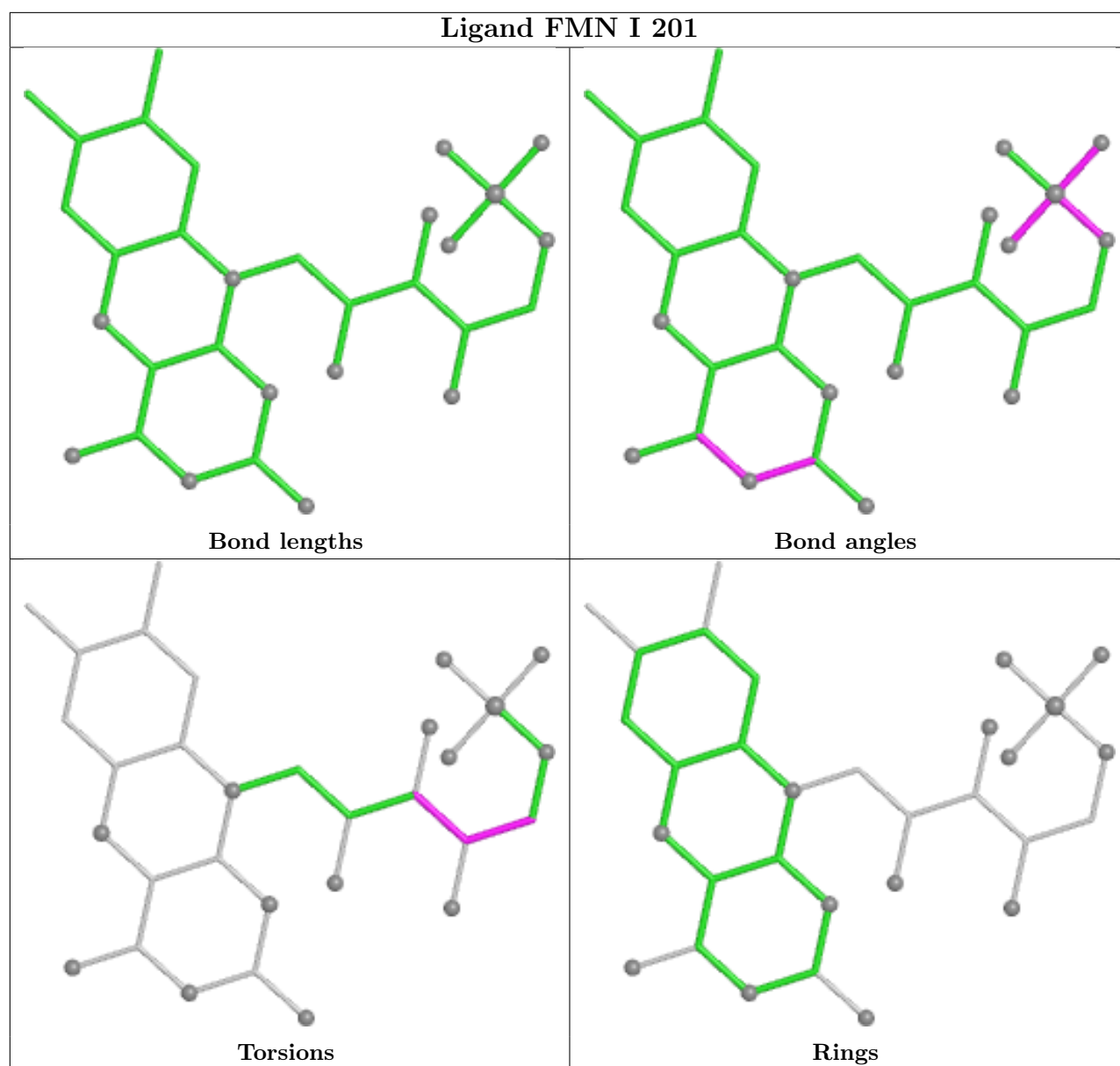


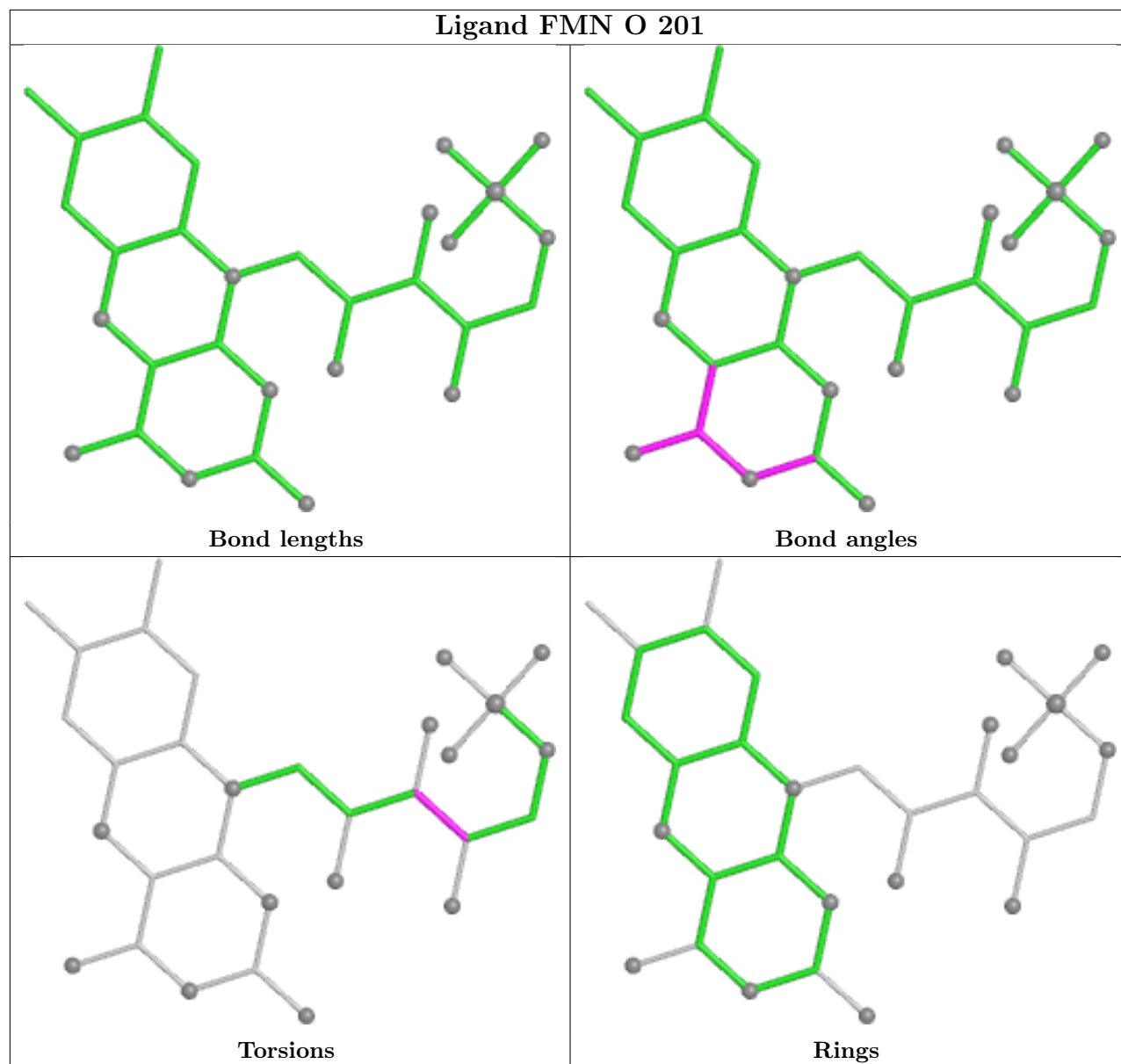


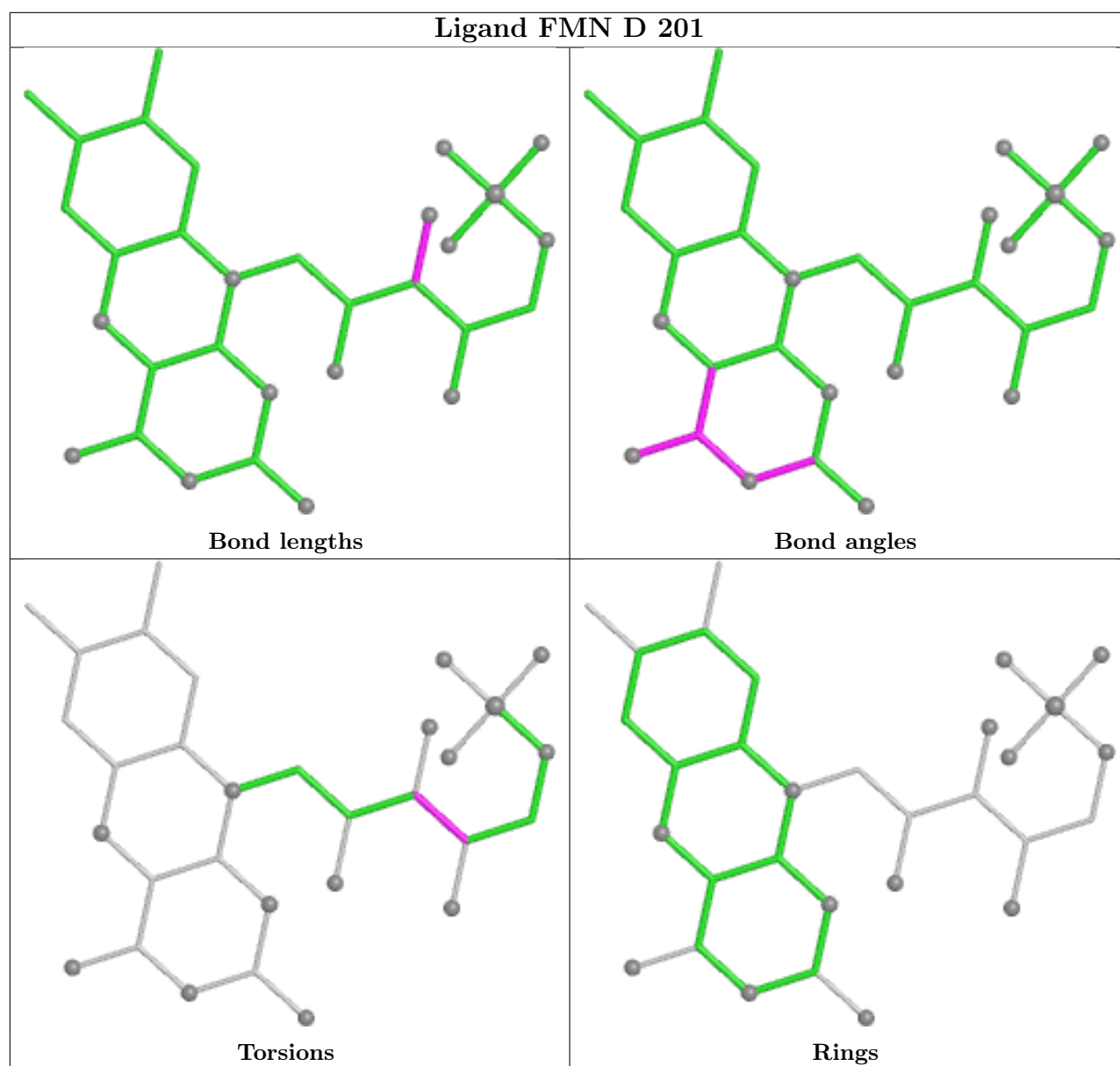


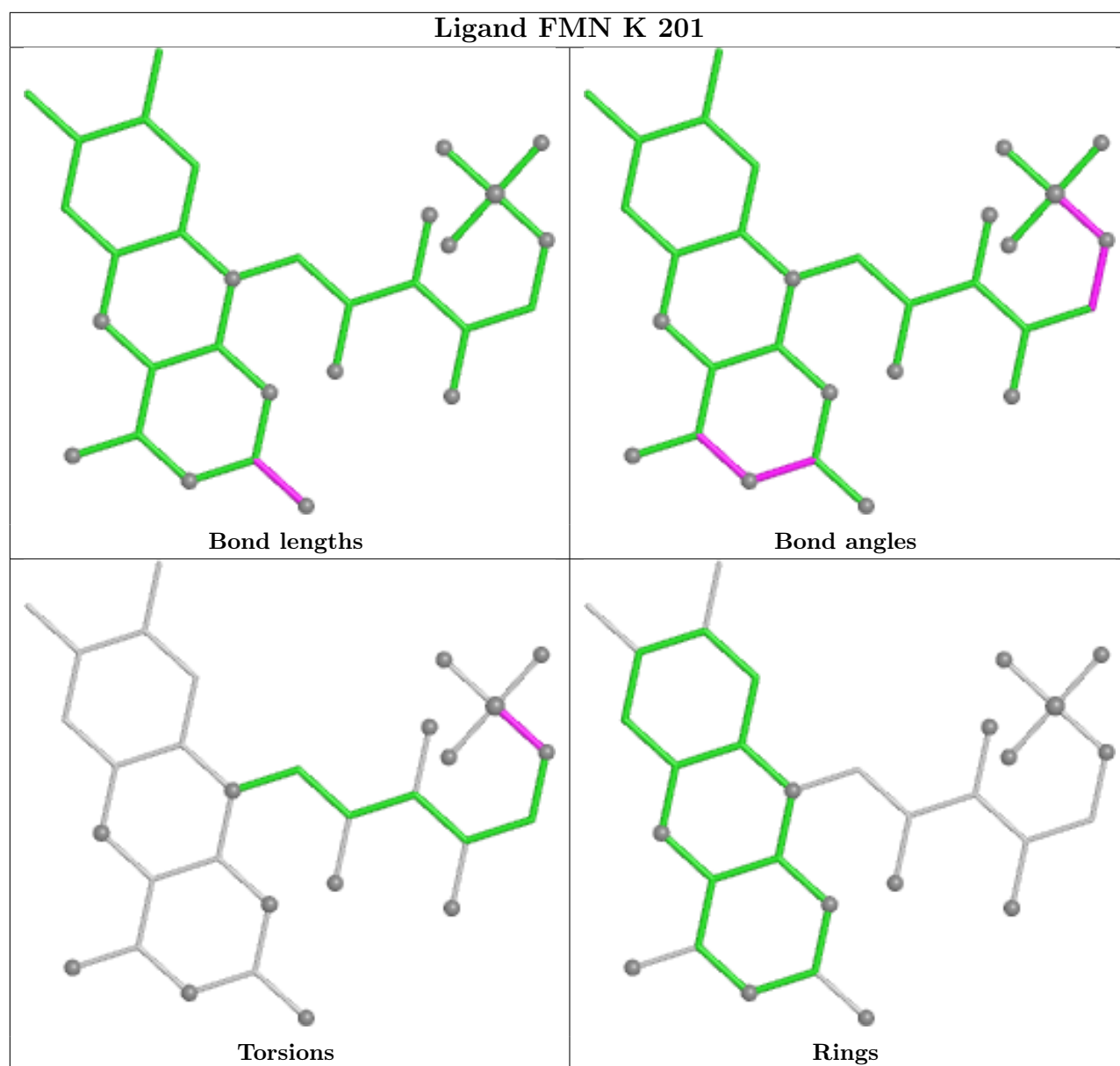


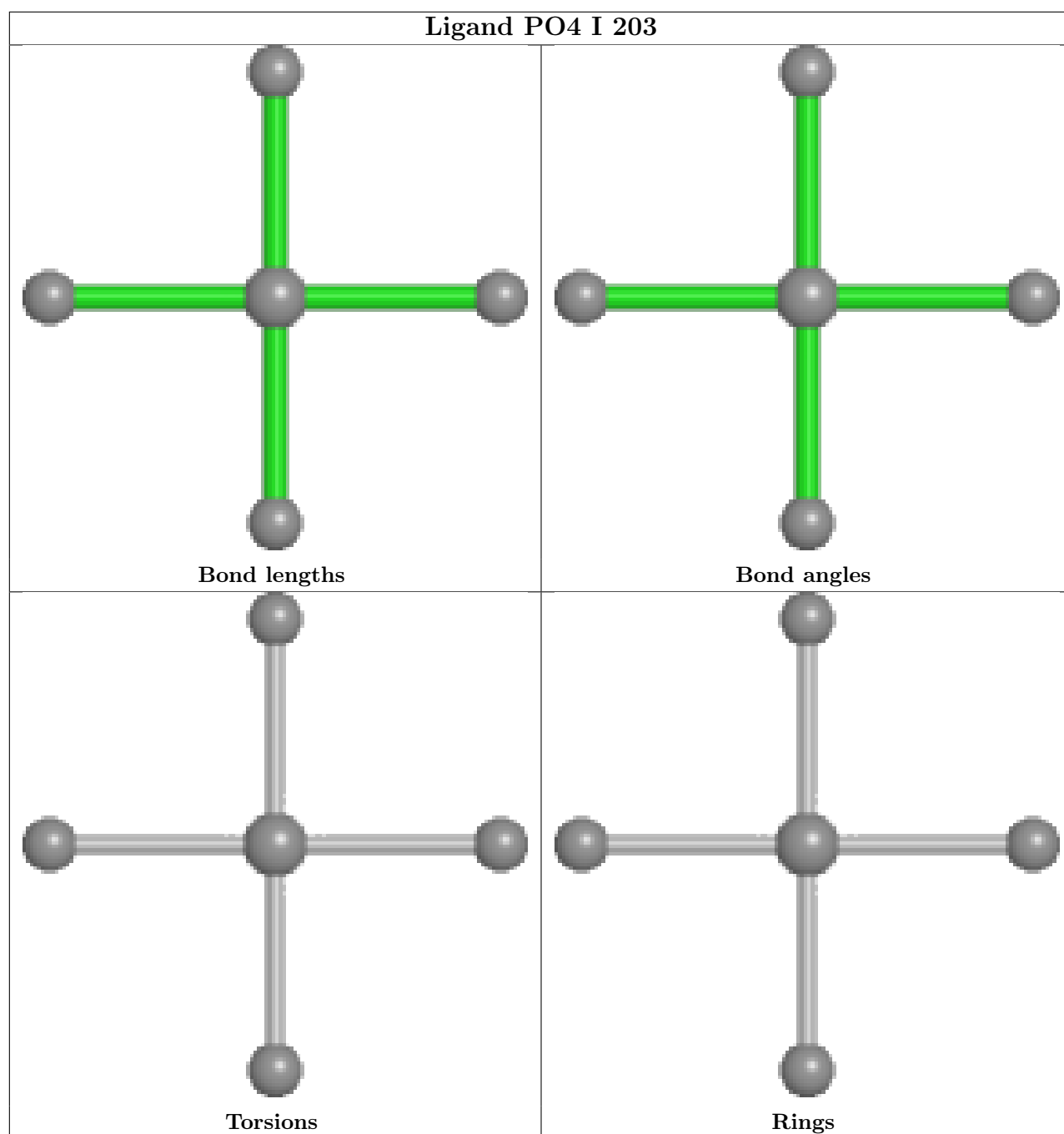


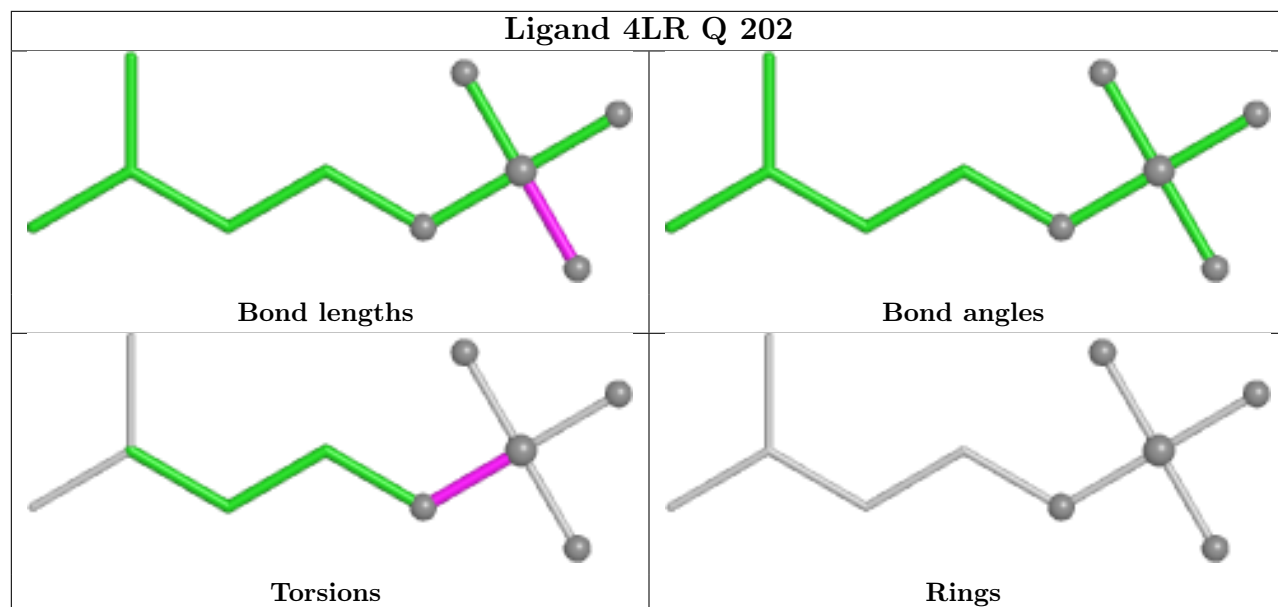


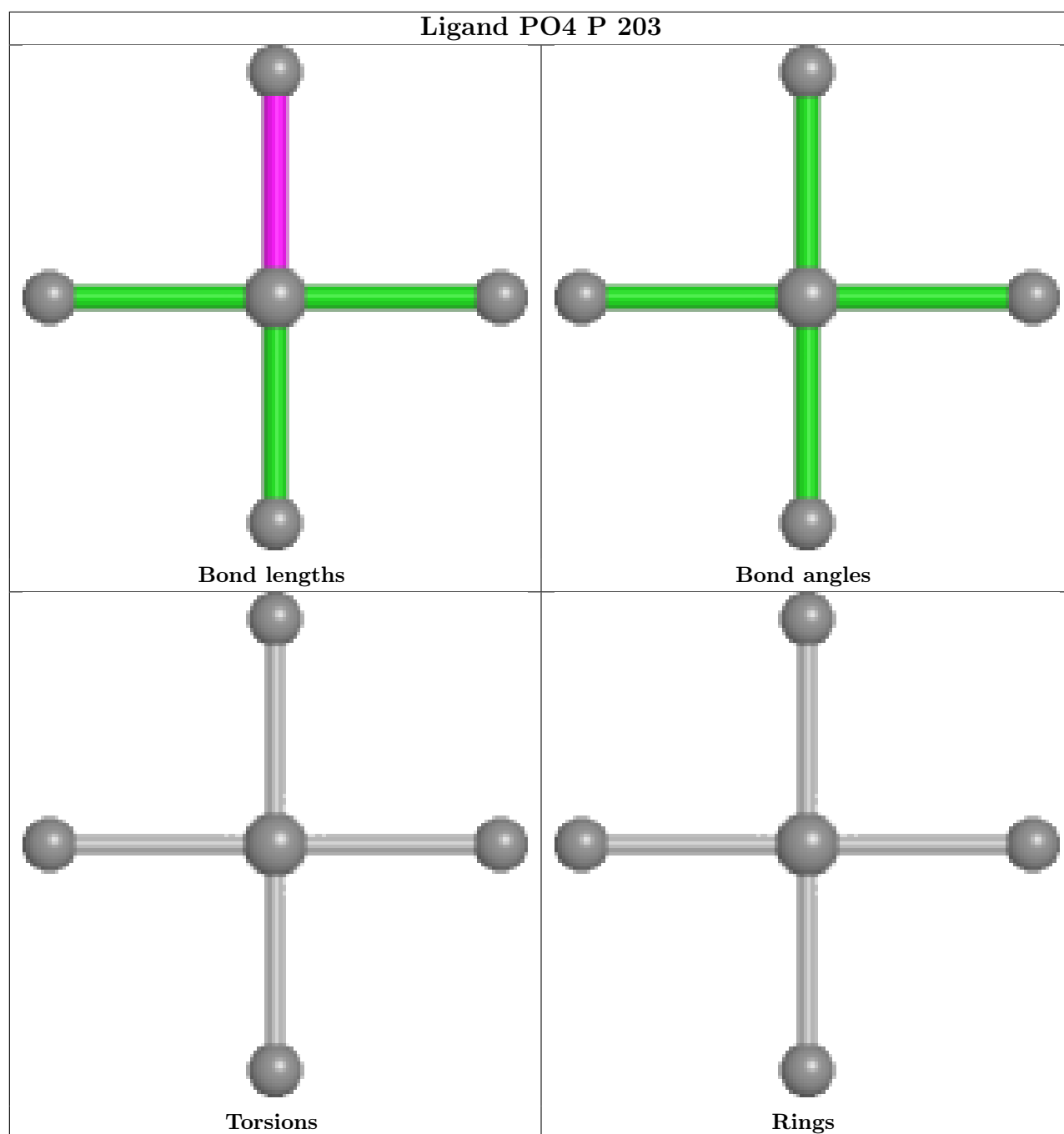


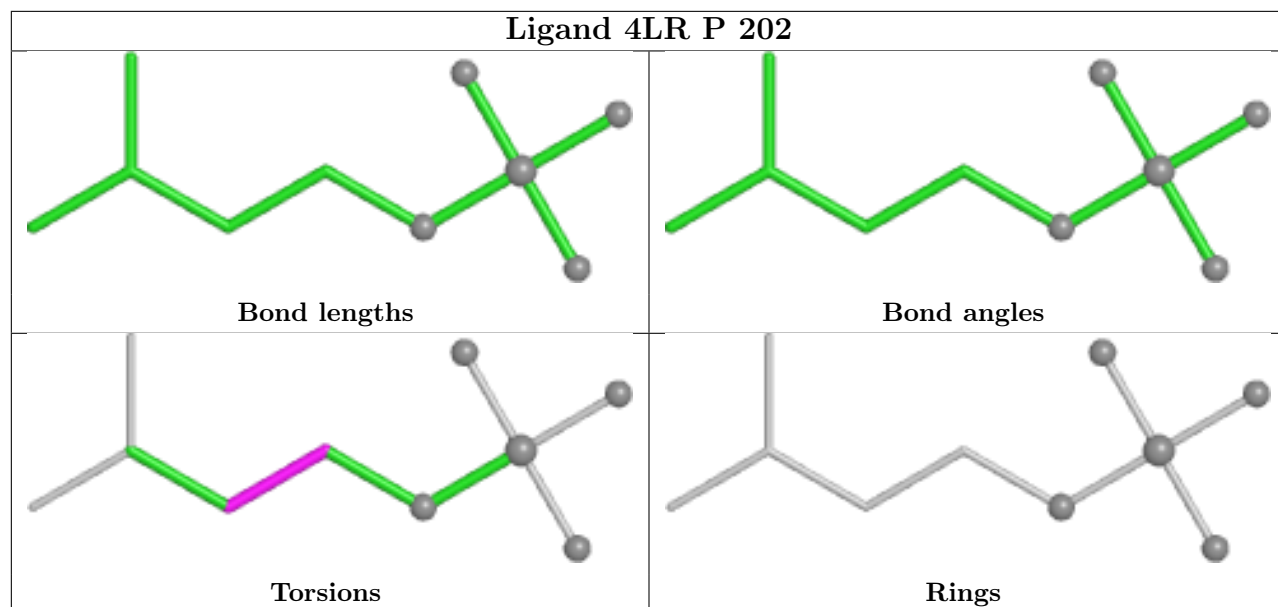


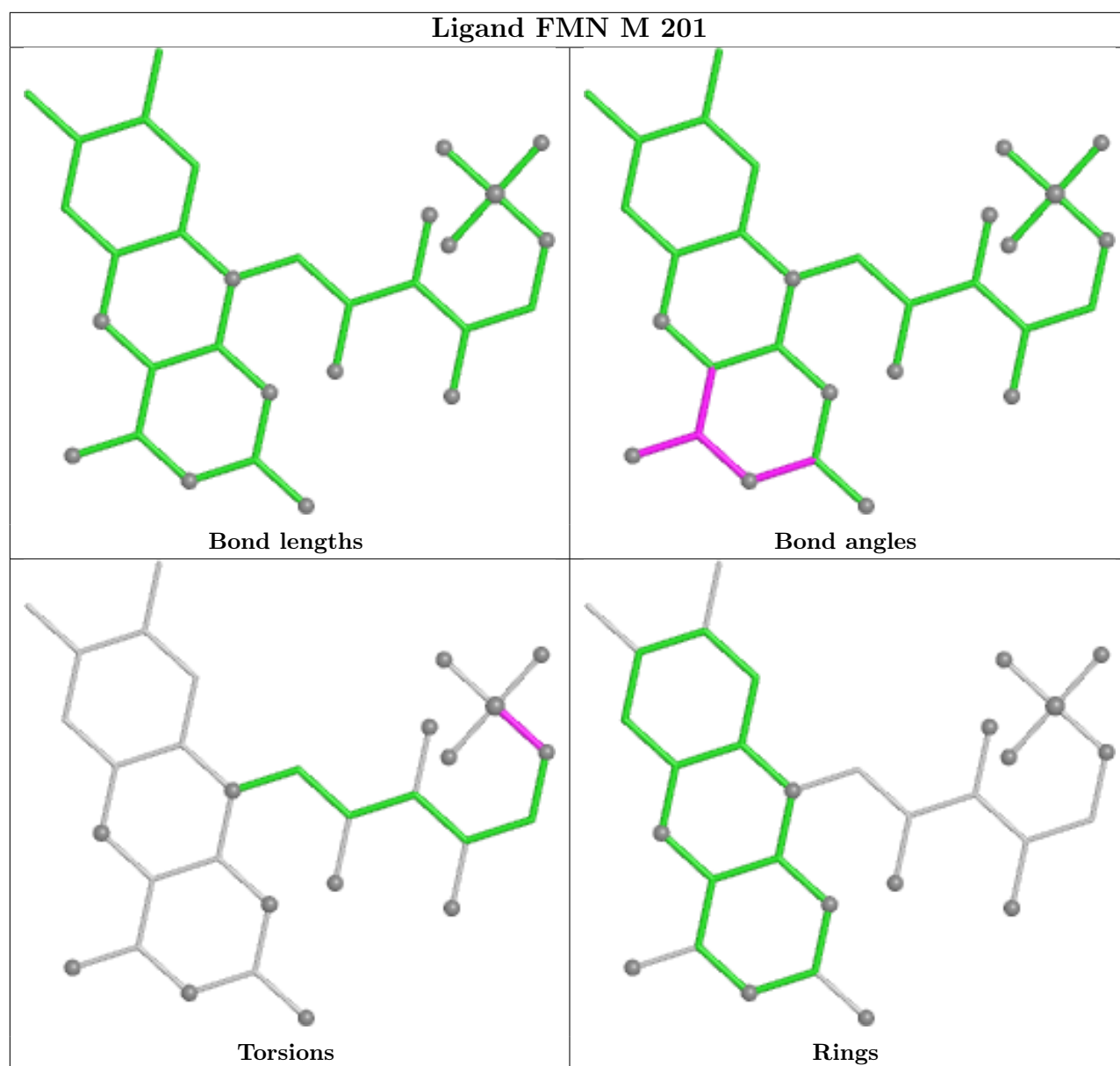


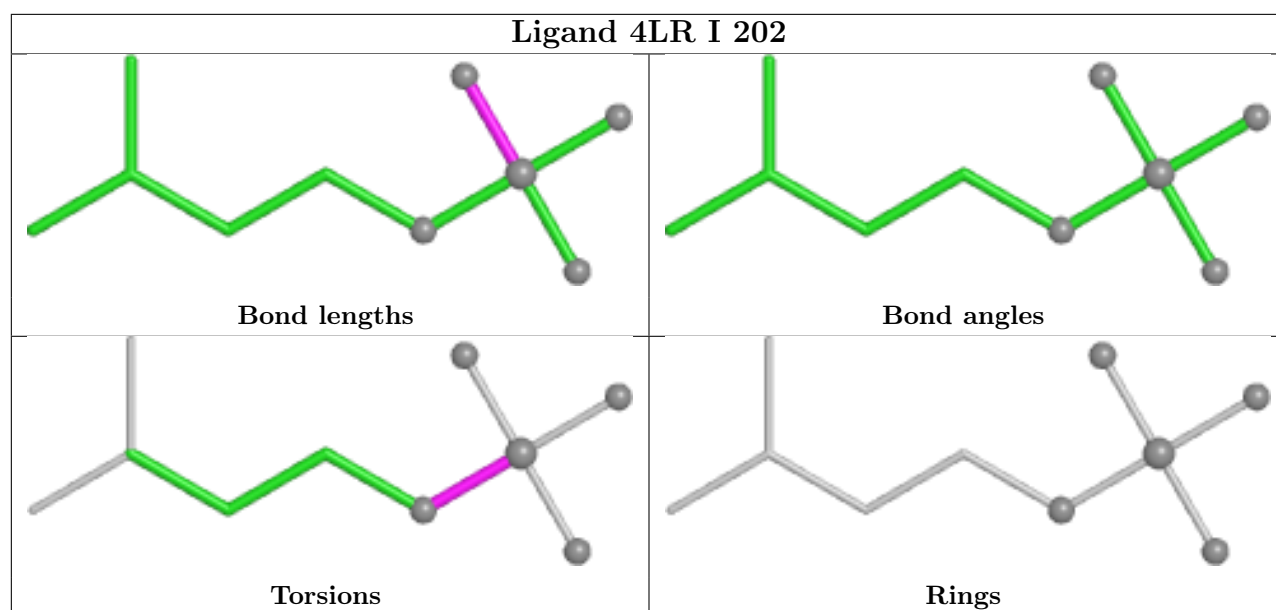


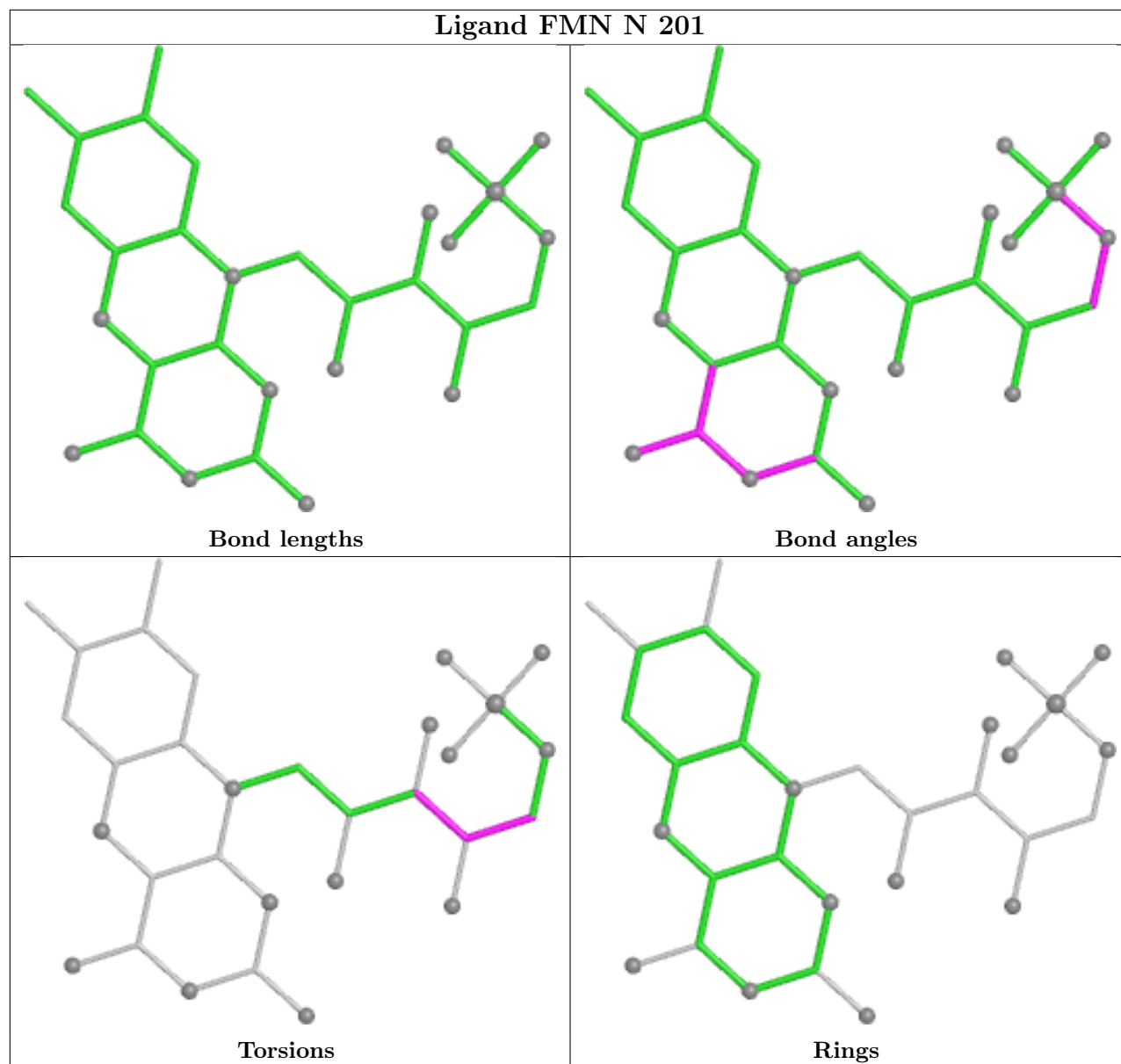


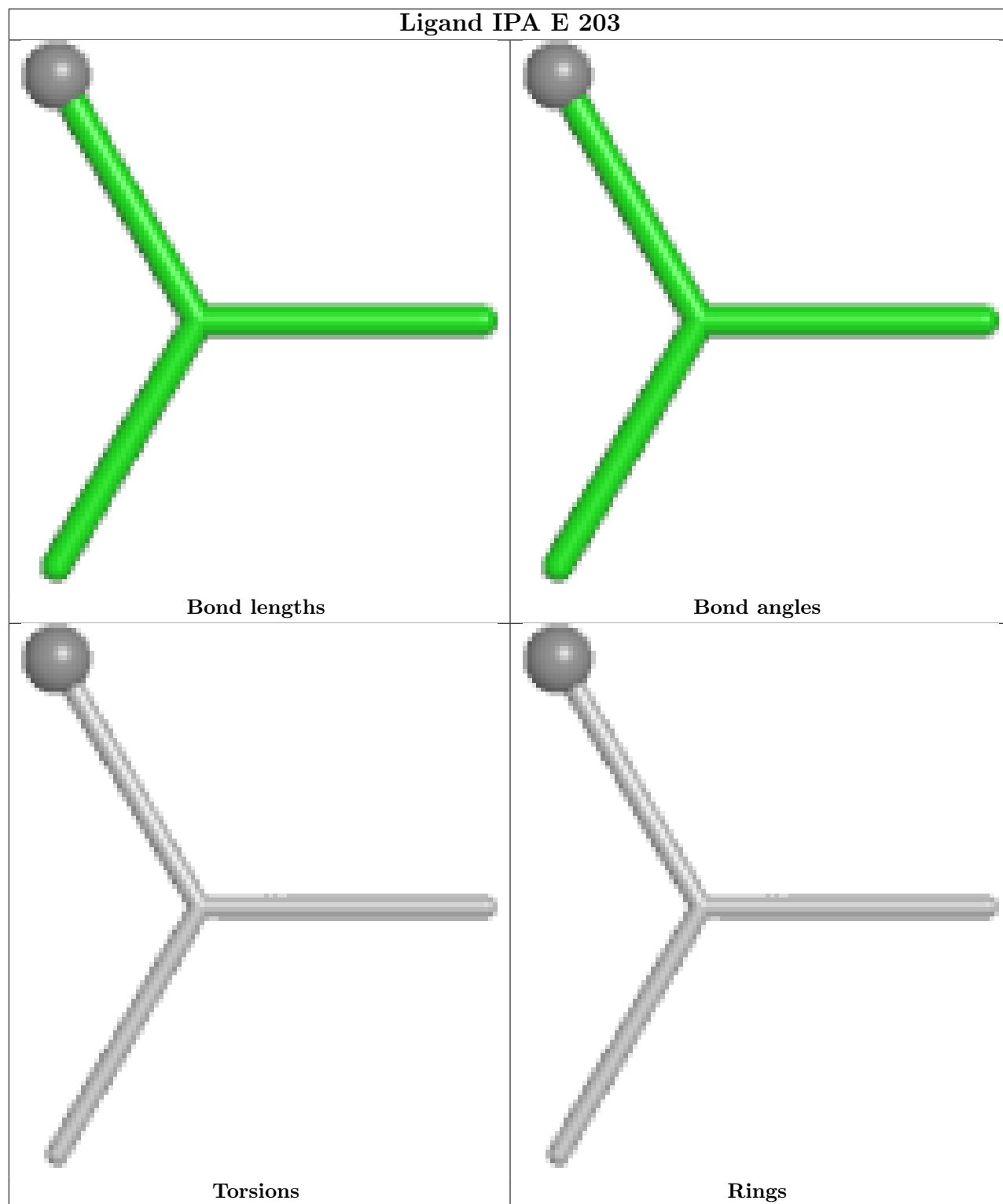


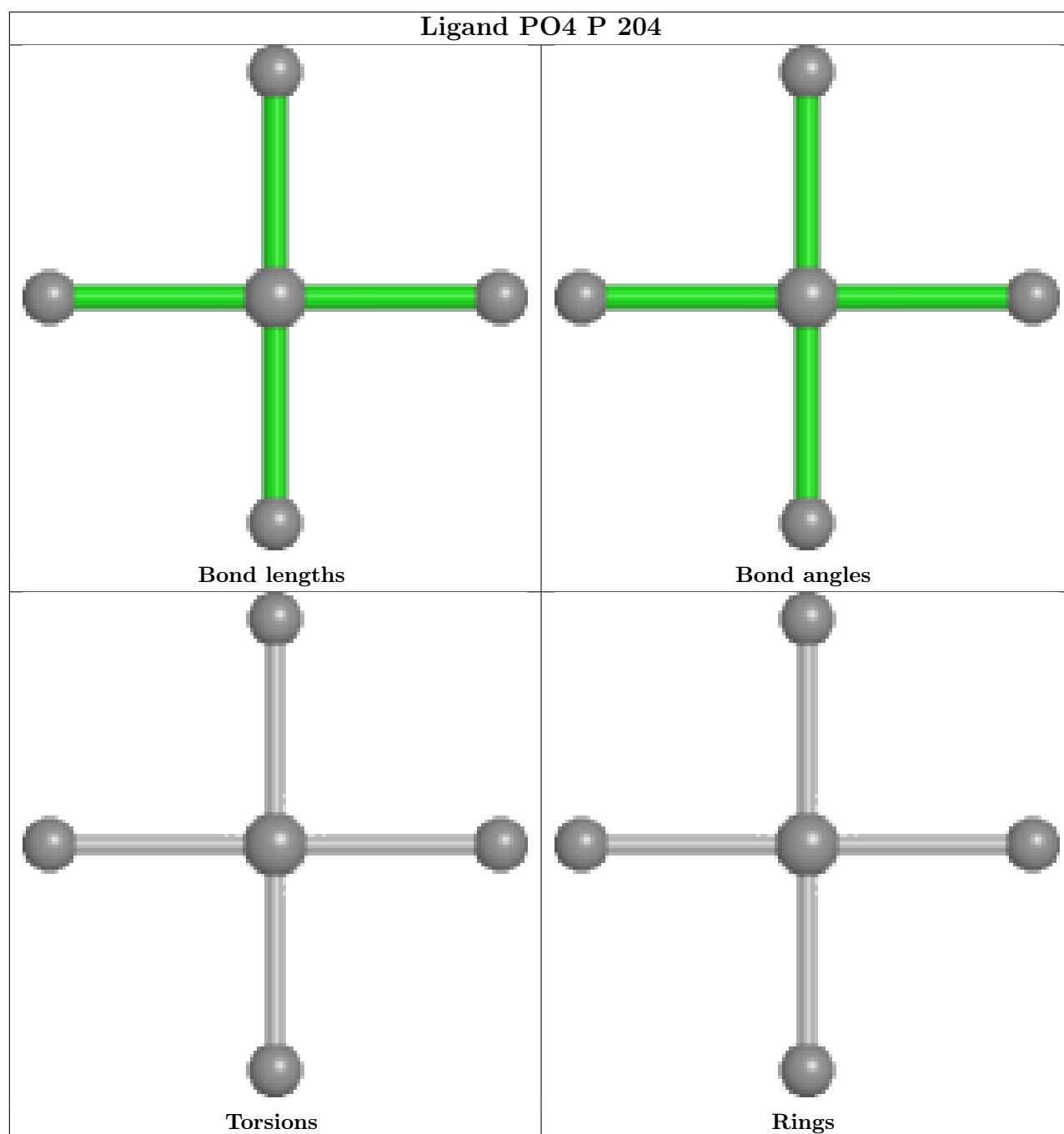


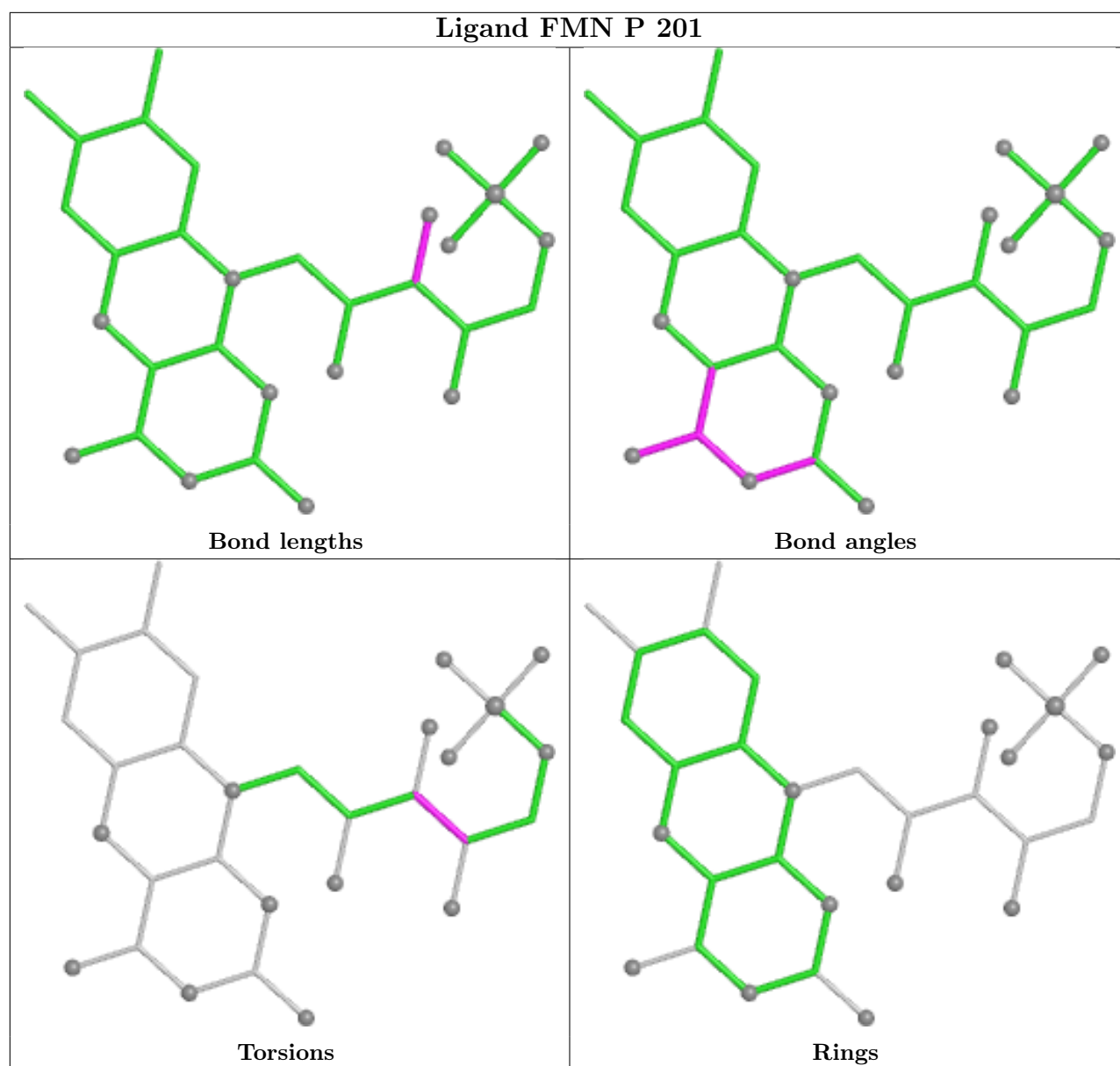


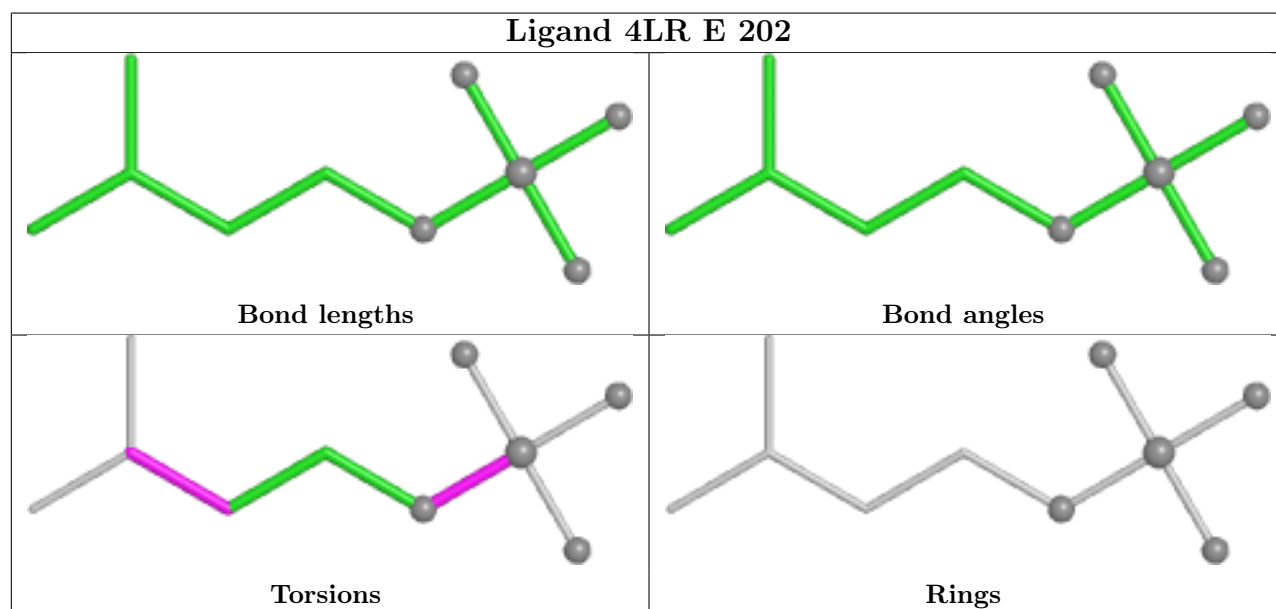
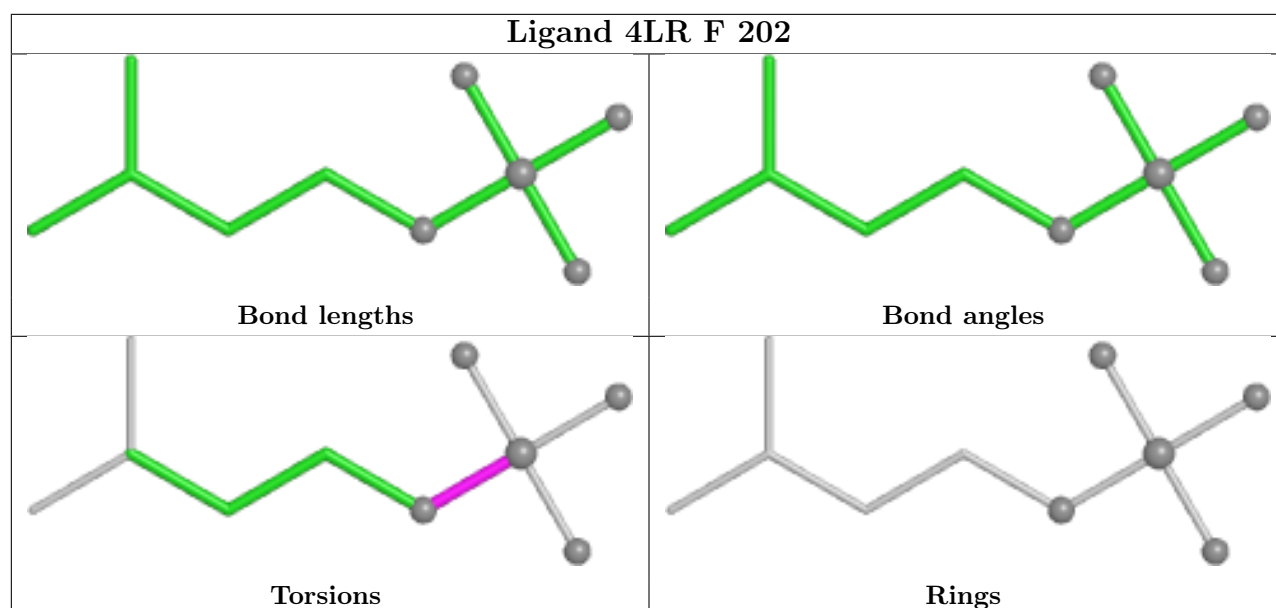


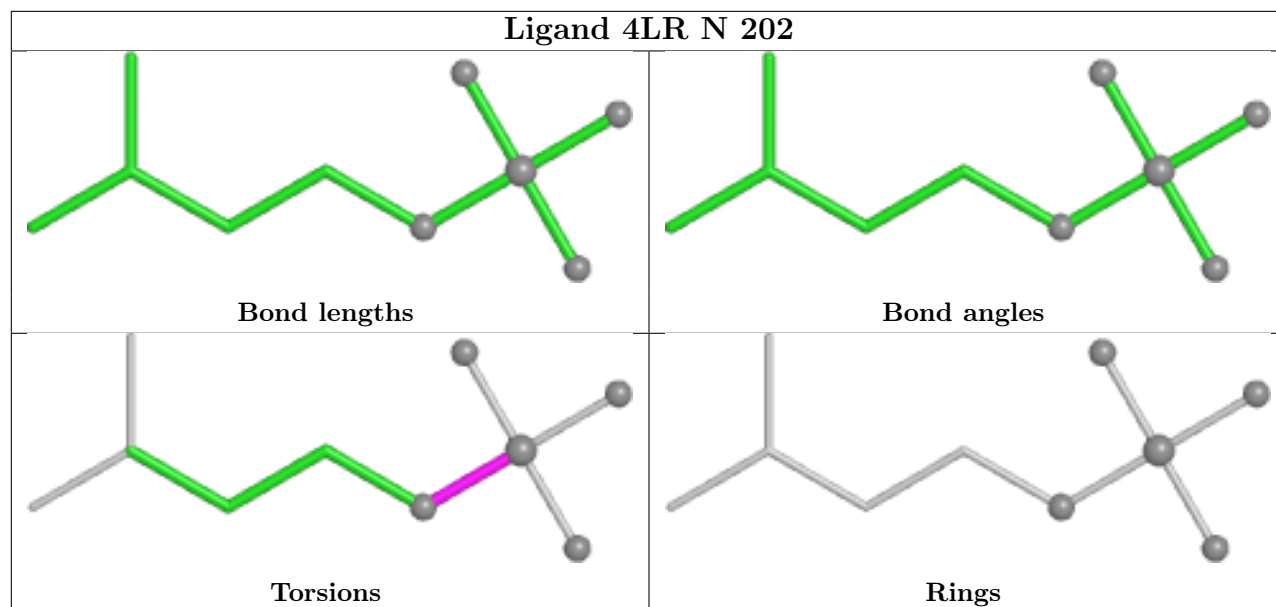












5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

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	D	183/214 (85%)	0.24	5 (2%)	56	63	25, 38, 62, 87	1 (0%)
1	E	182/214 (85%)	0.17	5 (2%)	56	63	24, 36, 58, 74	1 (0%)
1	F	182/214 (85%)	0.12	5 (2%)	56	63	24, 34, 55, 95	1 (0%)
1	I	183/214 (85%)	0.28	4 (2%)	62	68	24, 41, 67, 85	2 (1%)
1	K	183/214 (85%)	0.24	6 (3%)	49	56	23, 39, 69, 89	1 (0%)
1	L	183/214 (85%)	0.32	7 (3%)	44	52	26, 39, 63, 98	1 (0%)
1	M	182/214 (85%)	0.20	6 (3%)	49	56	25, 39, 65, 75	1 (0%)
1	N	183/214 (85%)	0.35	8 (4%)	39	47	25, 42, 68, 101	1 (0%)
1	O	182/214 (85%)	0.18	5 (2%)	56	63	25, 37, 58, 78	1 (0%)
1	P	182/214 (85%)	0.31	6 (3%)	49	56	25, 40, 66, 83	1 (0%)
1	Q	183/214 (85%)	0.24	4 (2%)	62	68	26, 38, 62, 94	1 (0%)
1	R	183/214 (85%)	0.31	5 (2%)	56	63	24, 41, 69, 87	2 (1%)
All	All	2191/2568 (85%)	0.25	66 (3%)	52	59	23, 39, 65, 101	14 (0%)

All (66) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	F	66	PHE	8.2
1	D	66	PHE	5.0
1	P	66	PHE	4.8
1	Q	66	PHE	4.7
1	E	66	PHE	4.0
1	I	66	PHE	3.7
1	E	182	TRP	3.7
1	L	172	LEU	3.7
1	O	182	TRP	3.6
1	L	66	PHE	3.6
1	I	49	LEU	3.4

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Mol	Chain	Res	Type	RSRZ
1	N	49	LEU	3.3
1	M	66	PHE	3.3
1	M	182	TRP	3.2
1	F	182	TRP	3.2
1	M	49	LEU	3.1
1	K	66	PHE	3.1
1	N	66	PHE	3.1
1	I	182	TRP	3.0
1	O	66	PHE	3.0
1	M	64	LYS	3.0
1	P	51	VAL	3.0
1	K	182	TRP	3.0
1	P	182	TRP	3.0
1	D	49	LEU	3.0
1	K	183	ARG	3.0
1	D	183	ARG	2.9
1	Q	183	ARG	2.9
1	R	66	PHE	2.9
1	R	49	LEU	2.8
1	N	182	TRP	2.8
1	K	76	LYS	2.7
1	E	48	TYR	2.6
1	E	150	PHE	2.6
1	L	178	ILE	2.6
1	P	57	ALA	2.6
1	F	48	TYR	2.5
1	M	51	VAL	2.5
1	N	183	ARG	2.5
1	P	150	PHE	2.5
1	O	180	GLN	2.4
1	D	34	LEU	2.4
1	I	183	ARG	2.4
1	F	150	PHE	2.3
1	L	180	GLN	2.3
1	O	44	ILE	2.3
1	Q	172	LEU	2.2
1	N	24	ALA	2.2
1	L	27	GLY	2.2
1	L	49	LEU	2.2
1	R	178	ILE	2.2
1	D	180	GLN	2.1
1	Q	25	ASN	2.1

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Mol	Chain	Res	Type	RSRZ
1	K	49	LEU	2.1
1	K	44	ILE	2.1
1	L	183	ARG	2.1
1	N	64	LYS	2.1
1	O	64	LYS	2.1
1	N	3	ILE	2.1
1	N	157	LEU	2.0
1	F	64	LYS	2.0
1	R	63	GLN	2.0
1	E	44	ILE	2.0
1	M	44	ILE	2.0
1	P	147[A]	CYS	2.0
1	R	64	LYS	2.0

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

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

6.3 Carbohydrates [i](#)

There are no 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(Å ²)	Q<0.9
4	PO4	P	204	5/5	0.80	0.14	54,82,85,89	0
5	IPA	E	203	4/4	0.82	0.16	53,62,62,65	0
4	PO4	M	203	5/5	0.91	0.11	37,53,59,62	0
2	FMN	R	201	31/31	0.94	0.10	39,49,61,65	0
4	PO4	I	203	5/5	0.94	0.08	39,46,56,57	0
2	FMN	D	201	31/31	0.94	0.10	40,51,71,75	0
2	FMN	L	201	31/31	0.94	0.09	40,53,72,84	0
2	FMN	Q	201	31/31	0.94	0.11	42,56,80,83	0
2	FMN	N	201	31/31	0.95	0.08	36,45,57,58	0
4	PO4	P	203	5/5	0.95	0.11	34,47,54,55	0

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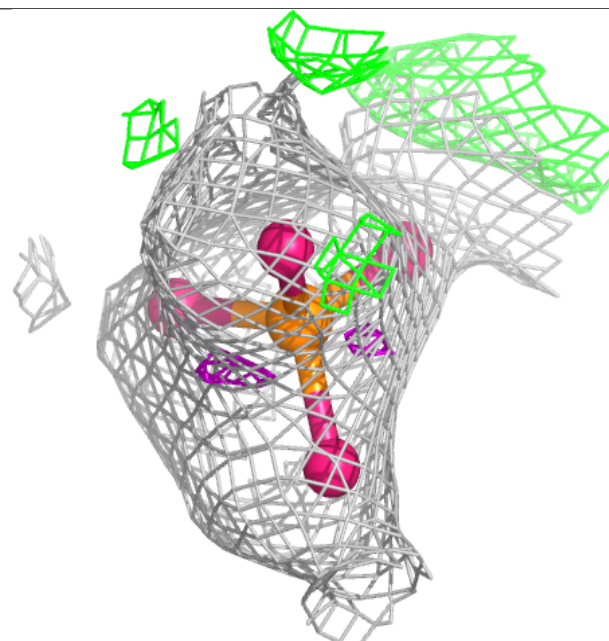
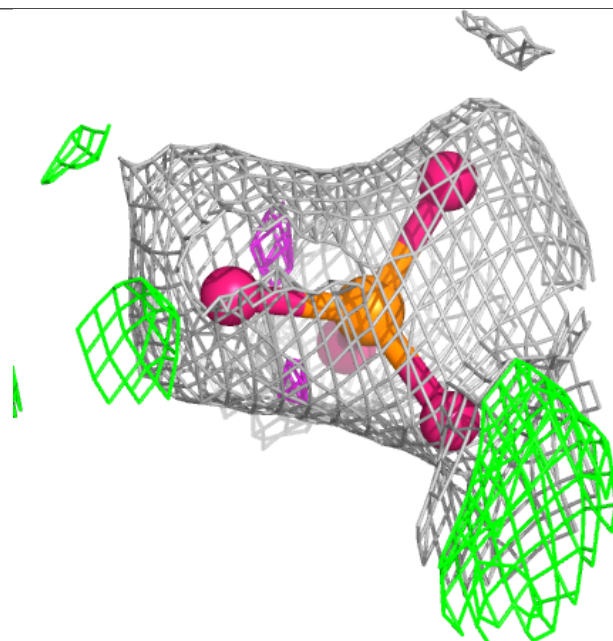
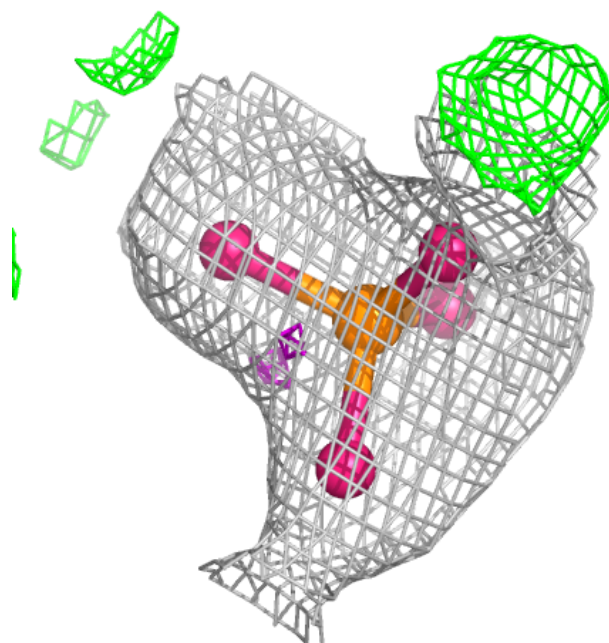
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	FMN	E	201	31/31	0.96	0.08	36,43,57,60	0
3	4LR	M	202	10/10	0.96	0.12	34,40,82,86	0
3	4LR	O	202	10/10	0.96	0.13	30,37,74,80	0
3	4LR	R	202	10/10	0.96	0.12	37,41,81,85	0
4	PO4	D	203	5/5	0.96	0.10	36,43,51,52	0
2	FMN	M	201	31/31	0.96	0.07	34,43,52,60	0
2	FMN	F	201	31/31	0.96	0.07	32,37,49,58	0
2	FMN	O	201	31/31	0.96	0.08	36,41,55,59	0
2	FMN	P	201	31/31	0.96	0.08	39,45,55,61	0
2	FMN	I	201	31/31	0.96	0.07	36,44,52,57	0
3	4LR	Q	202	10/10	0.97	0.11	32,39,69,70	0
3	4LR	I	202	10/10	0.97	0.10	35,41,84,85	0
3	4LR	K	202	10/10	0.97	0.09	34,42,59,63	0
3	4LR	L	202	10/10	0.97	0.12	33,39,86,91	0
3	4LR	D	202	10/10	0.97	0.10	34,38,64,67	0
3	4LR	N	202	10/10	0.97	0.11	36,44,82,82	0
3	4LR	E	202	10/10	0.97	0.11	35,42,59,64	0
3	4LR	P	202	10/10	0.97	0.10	36,39,62,69	0
3	4LR	F	202	10/10	0.98	0.08	30,39,48,55	0
2	FMN	K	201	31/31	0.98	0.06	32,37,47,47	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.

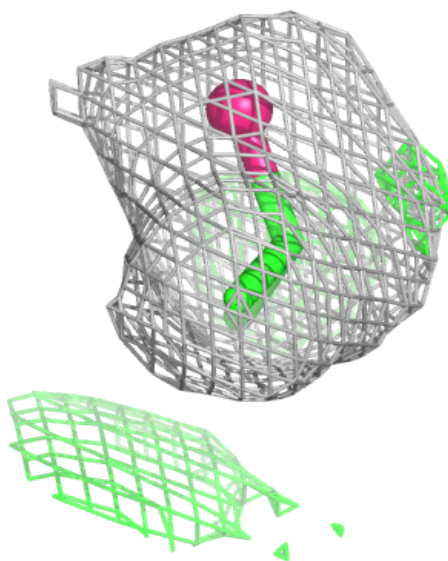
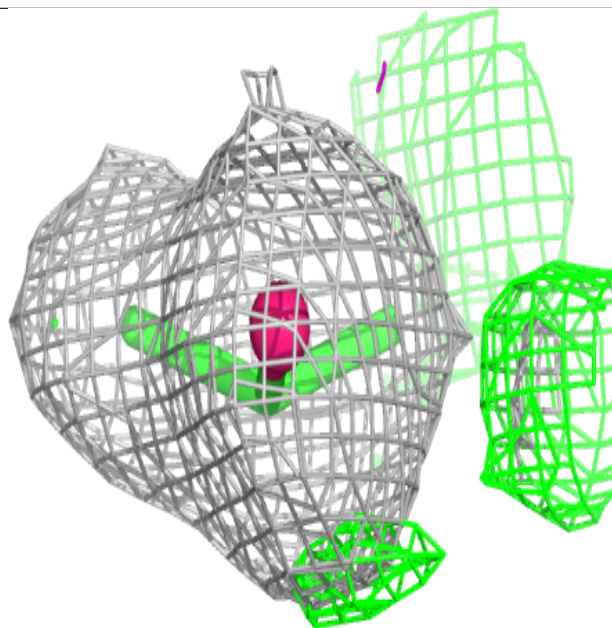
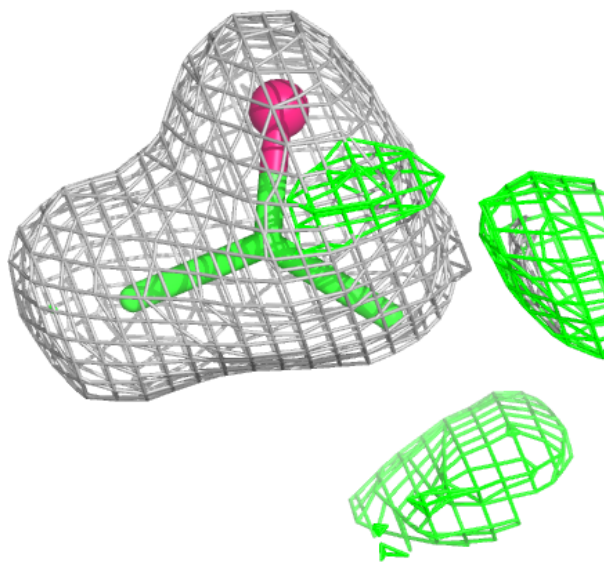
Electron density around PO4 P 204:

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



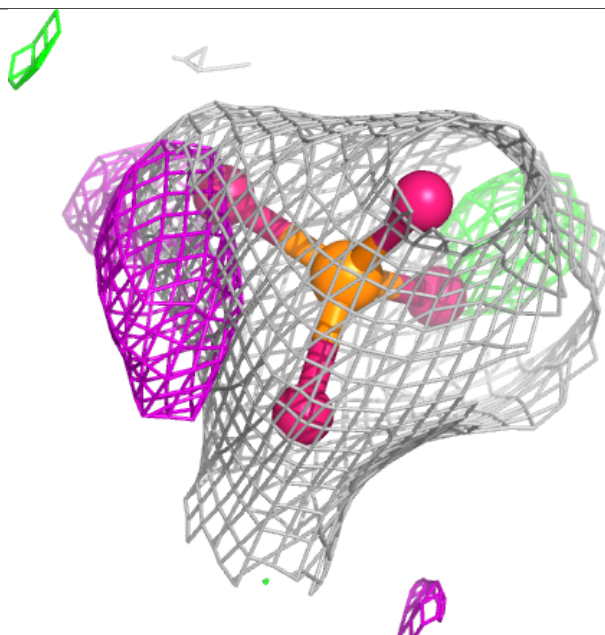
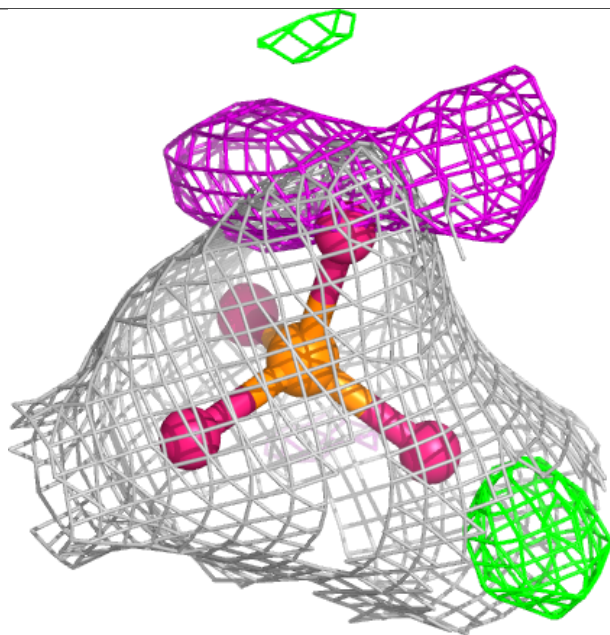
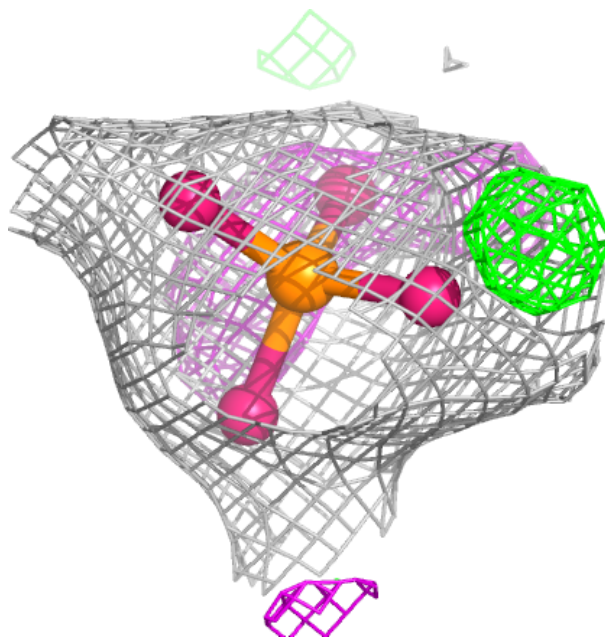
Electron density around IPA E 203:

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 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



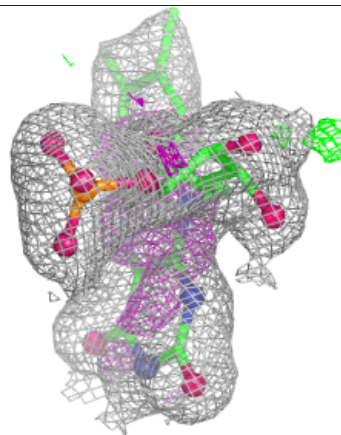
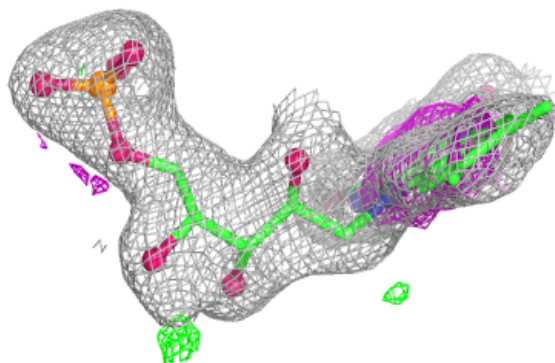
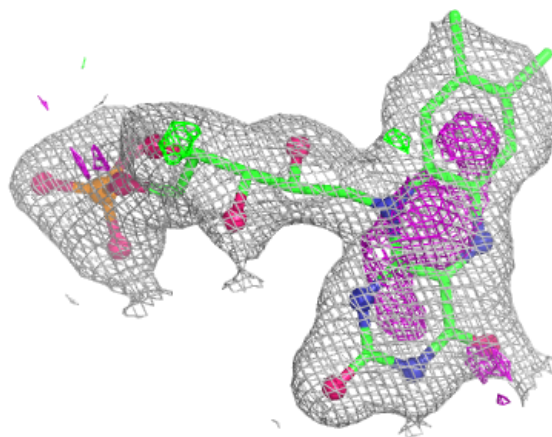
Electron density around PO4 M 203:

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 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



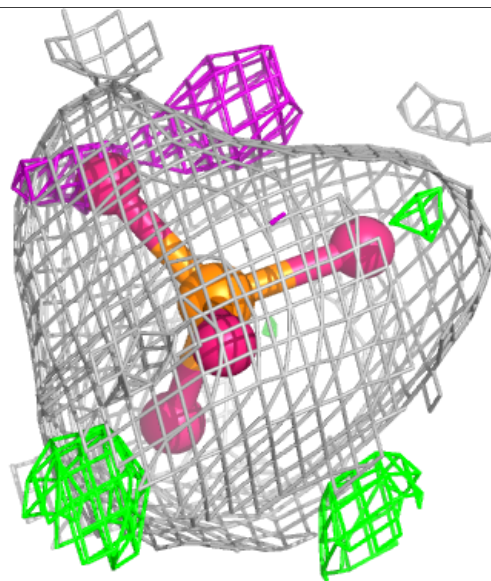
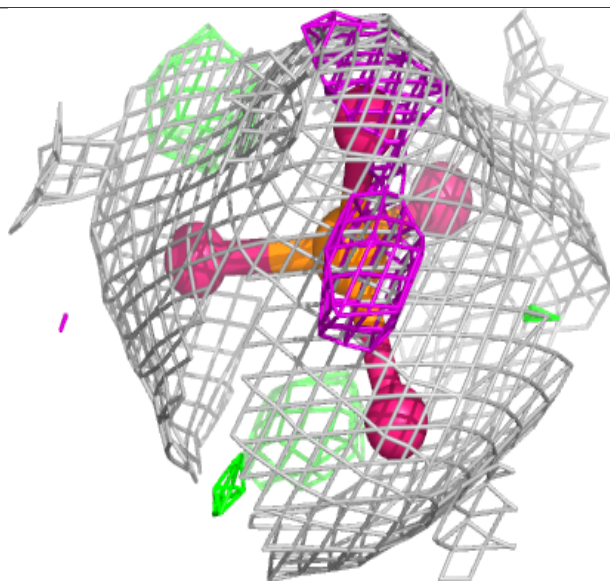
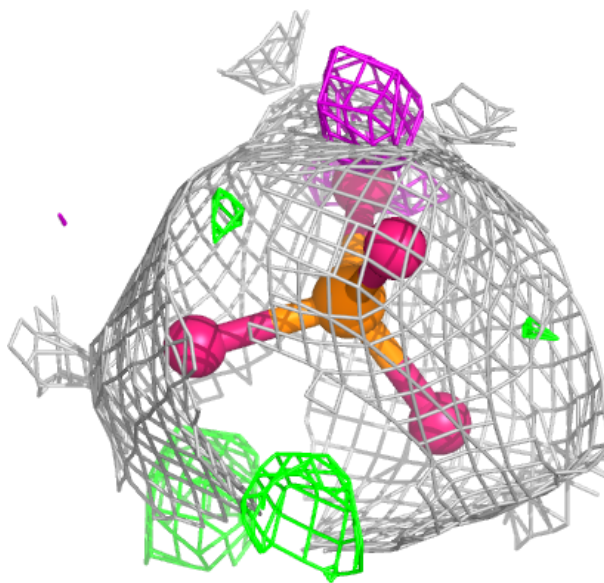
Electron density around FMN R 201:

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 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



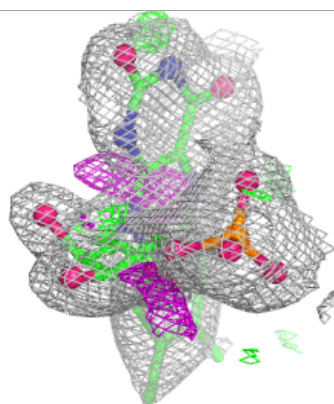
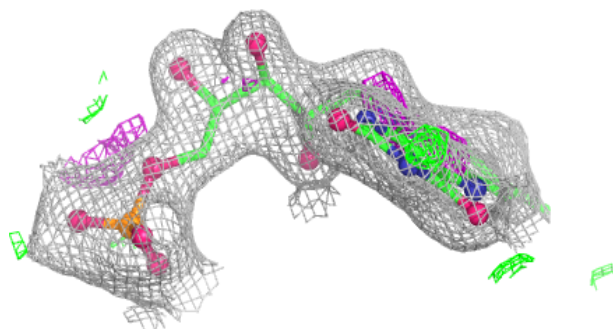
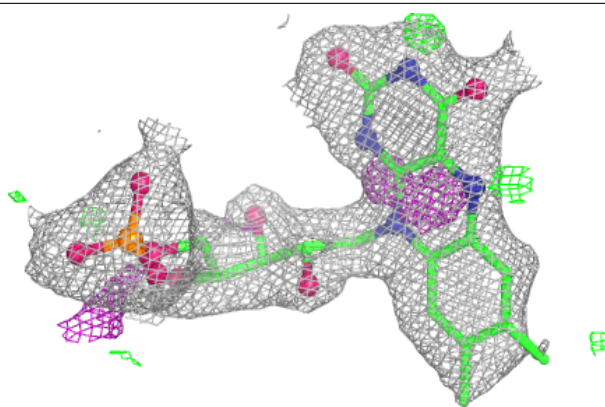
Electron density around PO4 I 203:

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and green (positive)

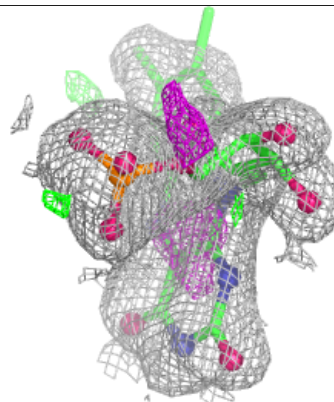
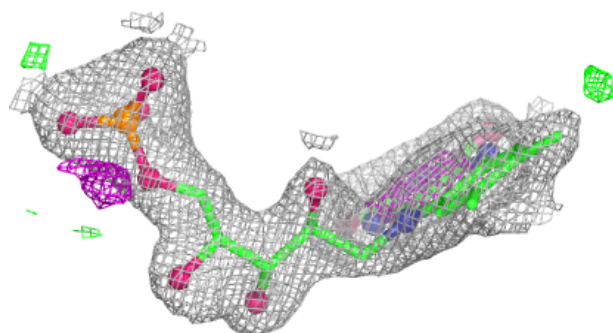
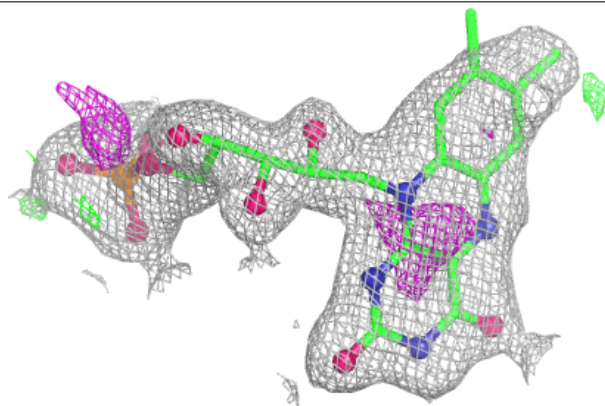


Electron density around FMN D 201:

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and green (positive)

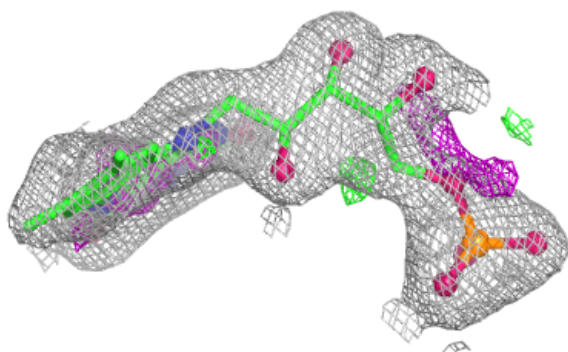
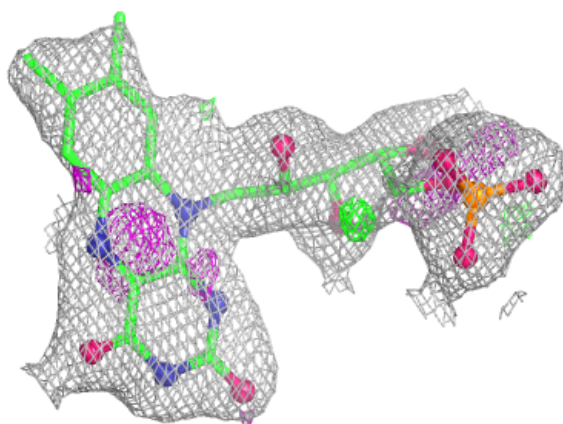
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and green (positive)

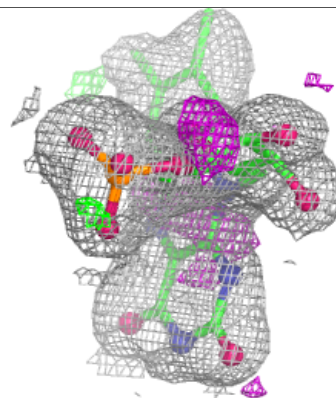
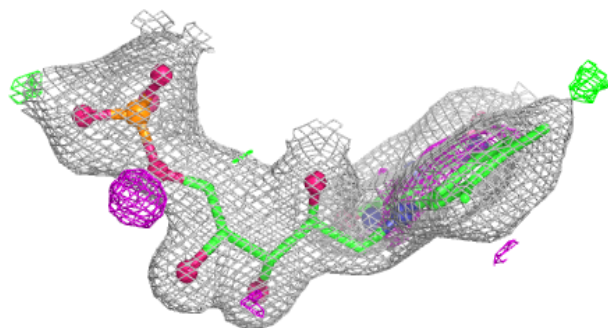
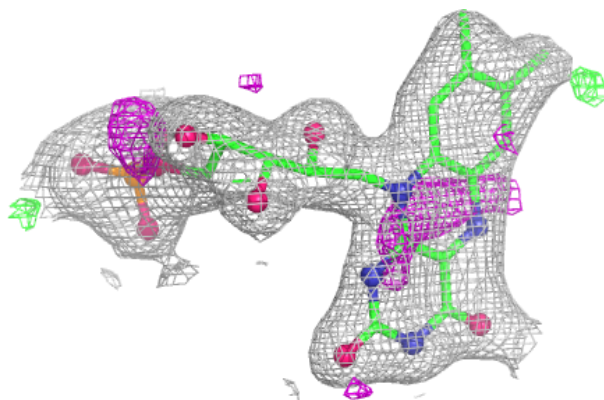


Electron density around FMN Q 201:

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and green (positive)

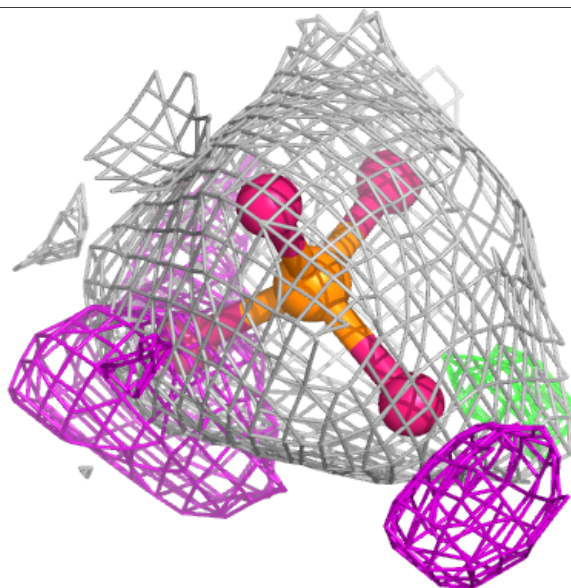
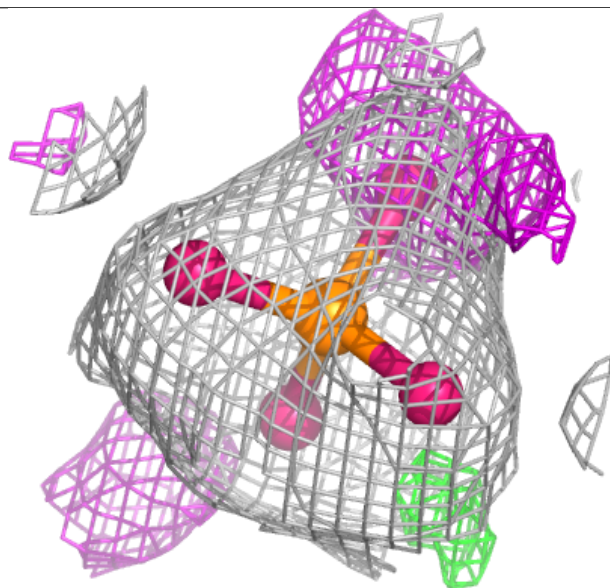
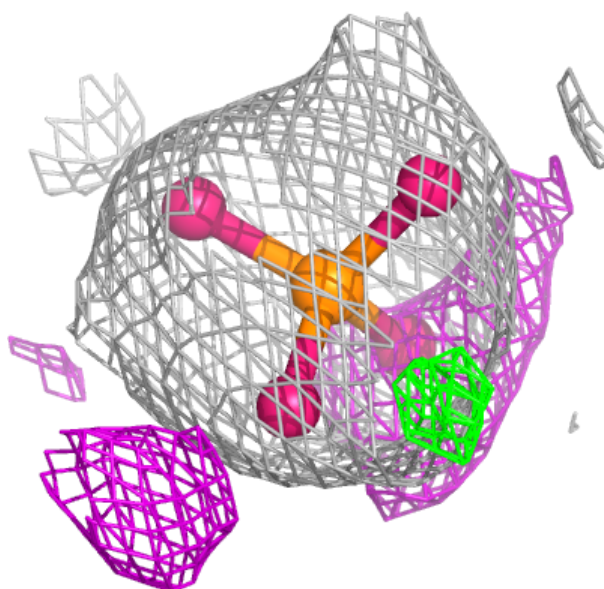
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and green (positive)



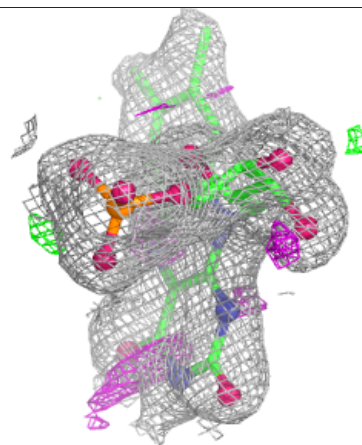
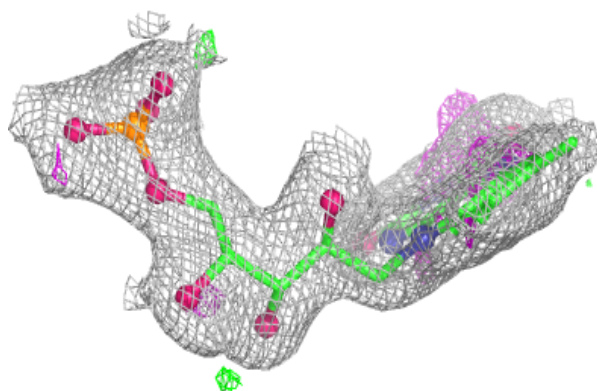
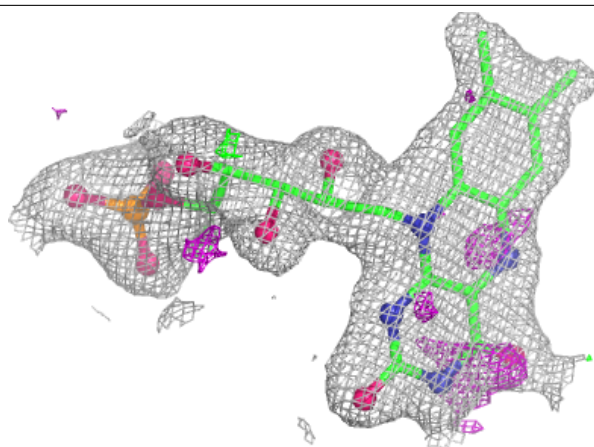
Electron density around PO4 P 203:

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and green (positive)



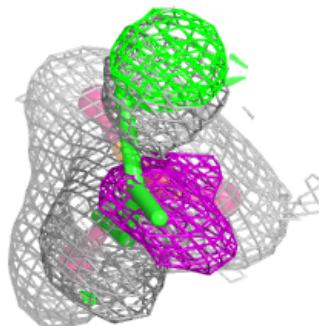
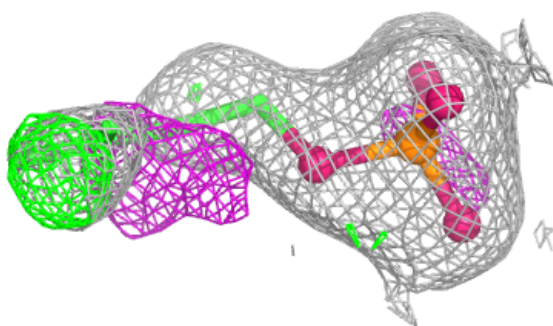
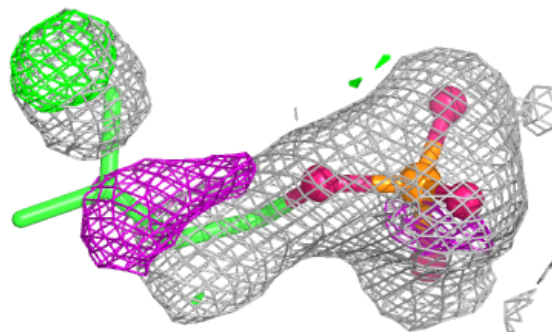
Electron density around FMN E 201:

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and green (positive)

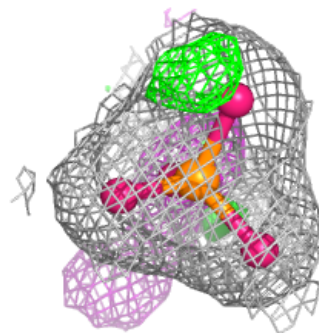
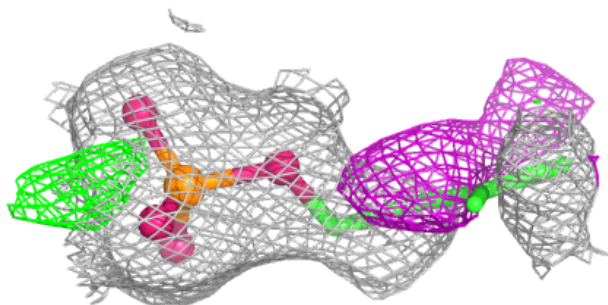
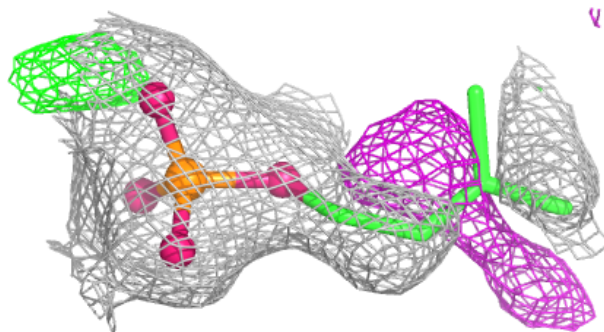


Electron density around 4LR M 202:

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 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

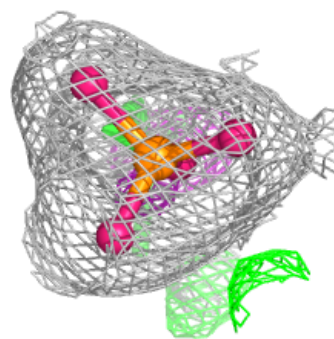
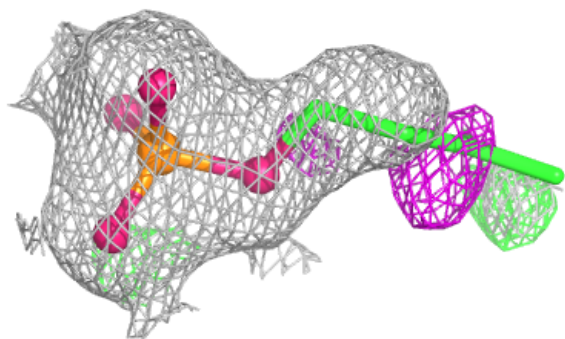
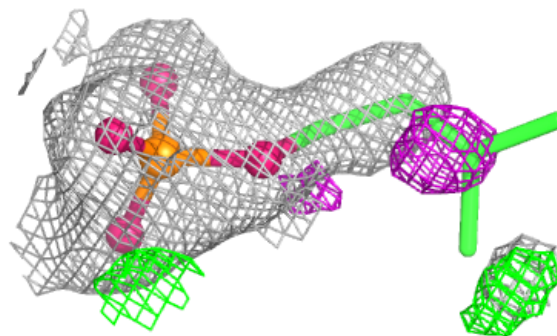
**Electron density around 4LR O 202:**

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and green (positive)



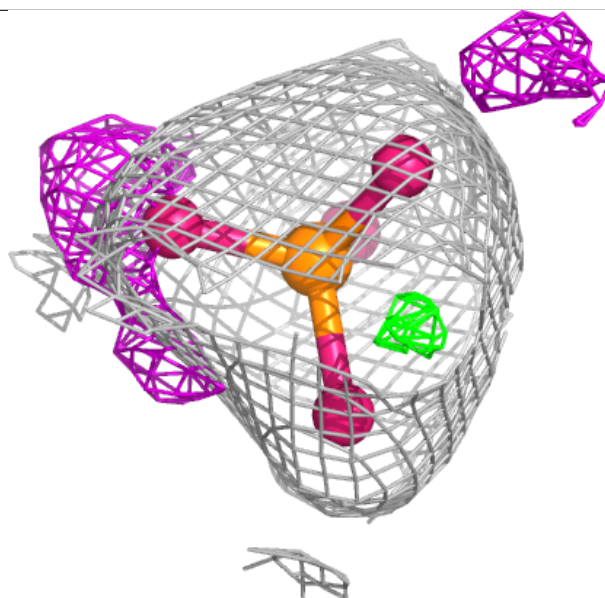
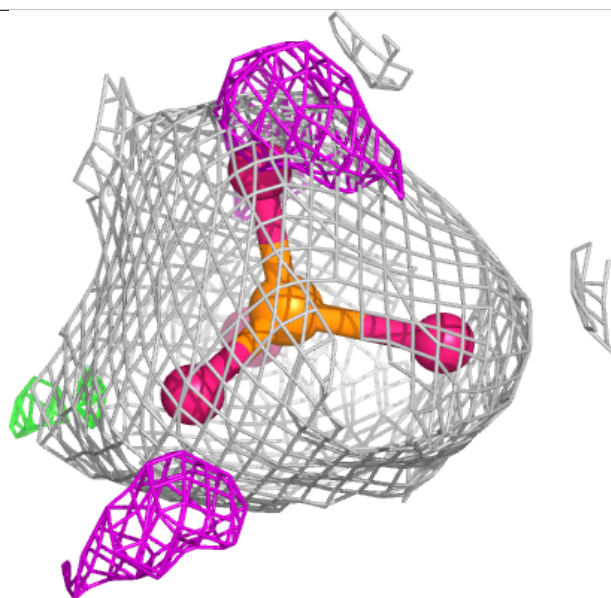
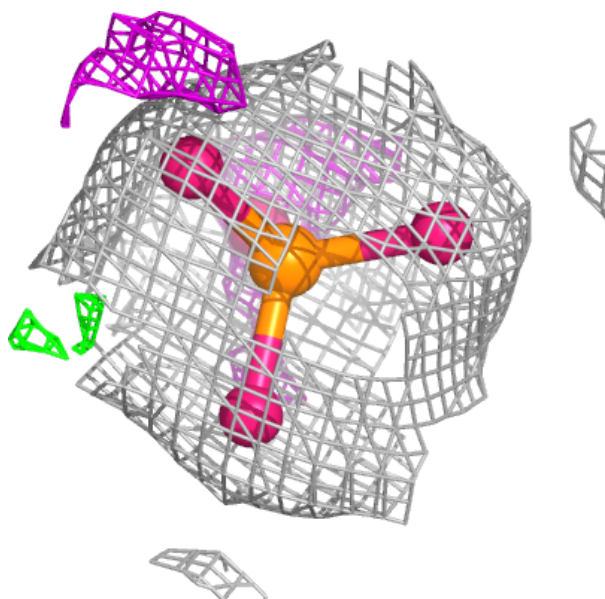
Electron density around 4LR R 202:

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and green (positive)



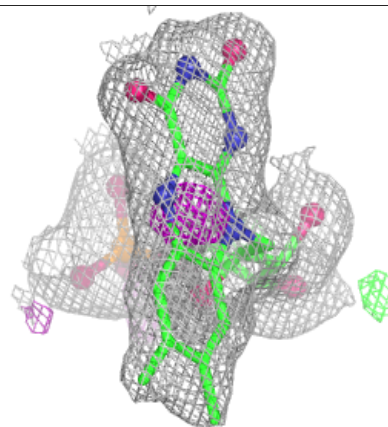
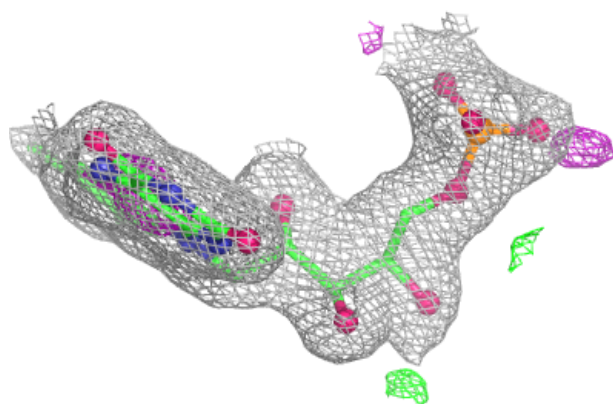
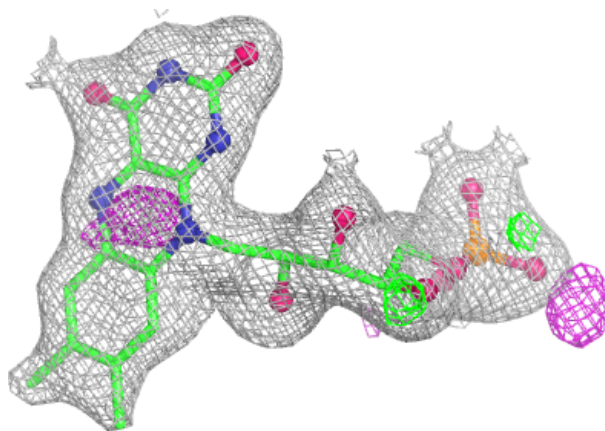
Electron density around PO4 D 203:

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 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



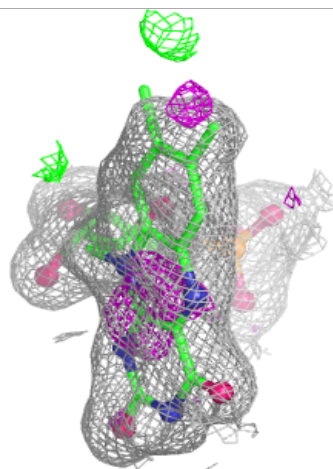
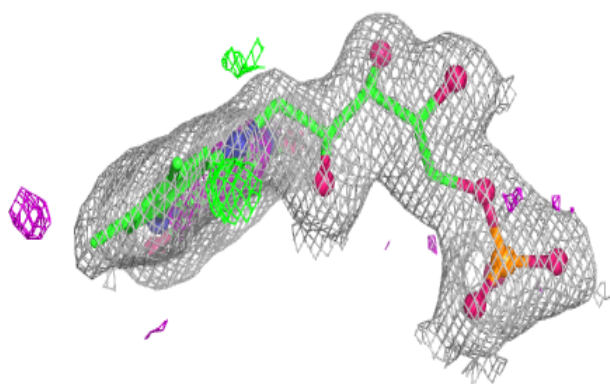
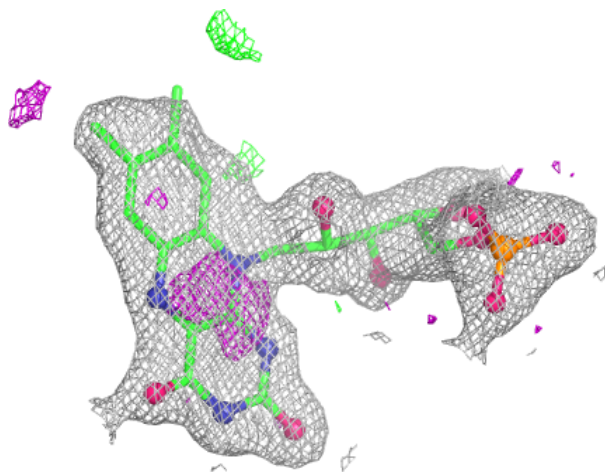
Electron density around FMN M 201:

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



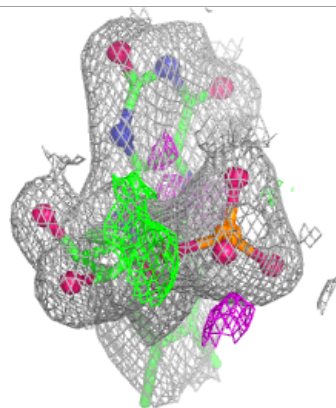
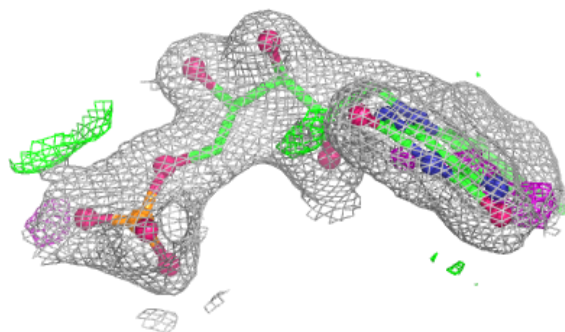
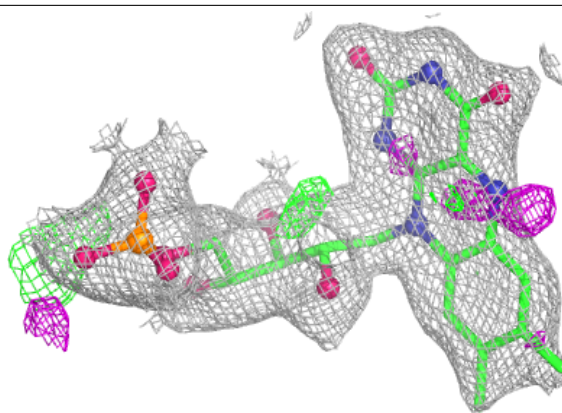
Electron density around FMN F 201:

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



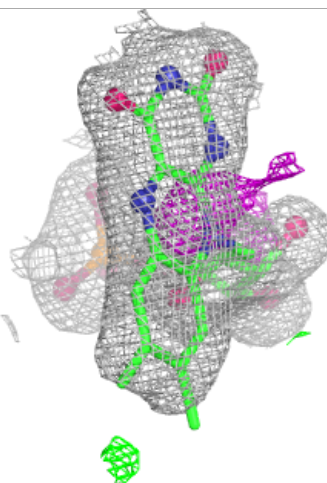
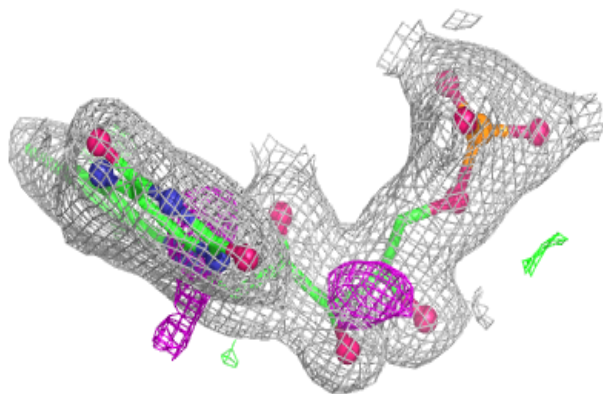
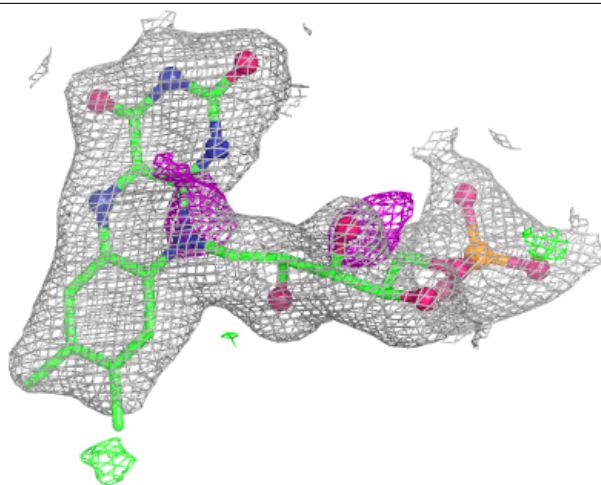
Electron density around FMN O 201:

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



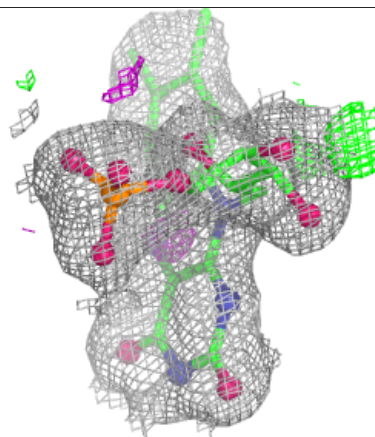
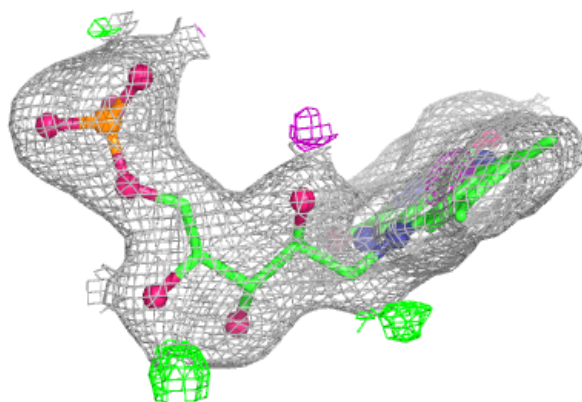
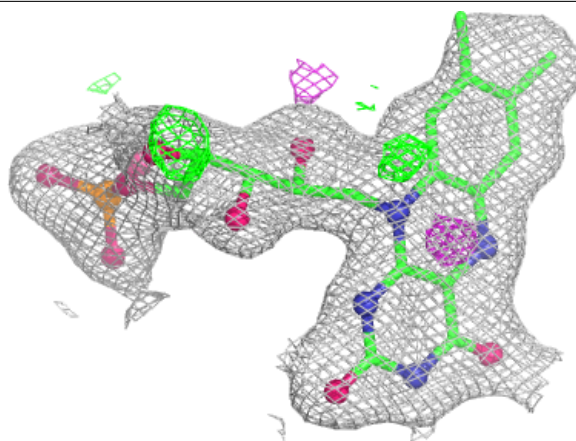
Electron density around FMN P 201:

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



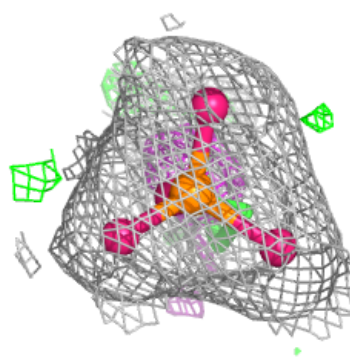
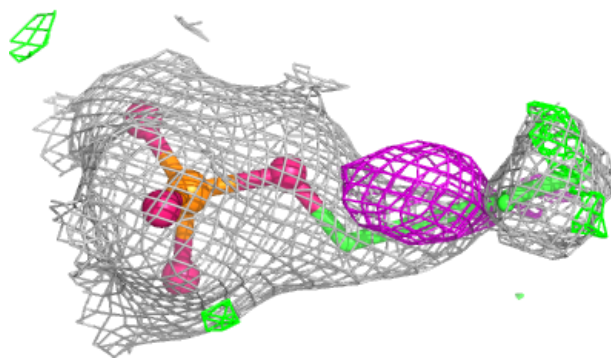
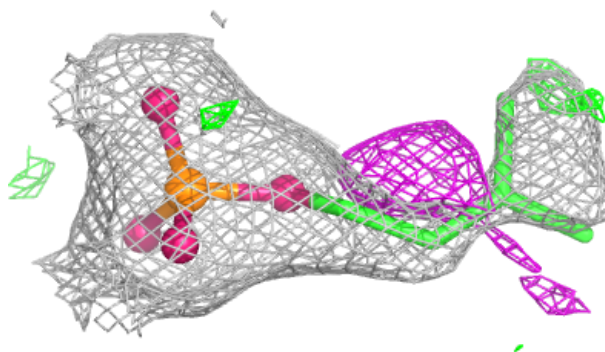
Electron density around FMN I 201:

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

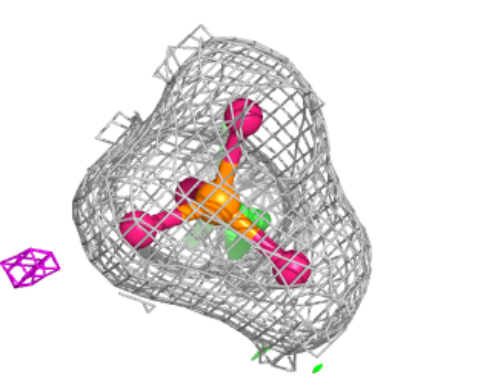
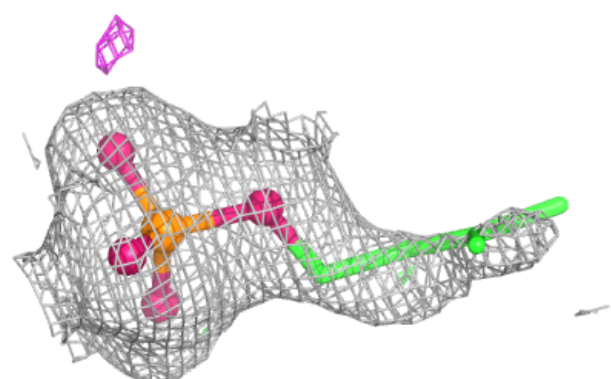
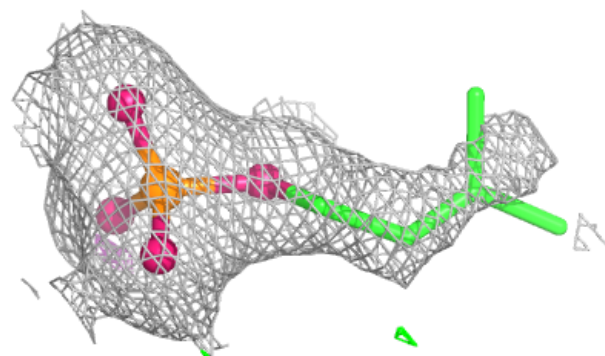


Electron density around 4LR Q 202:

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

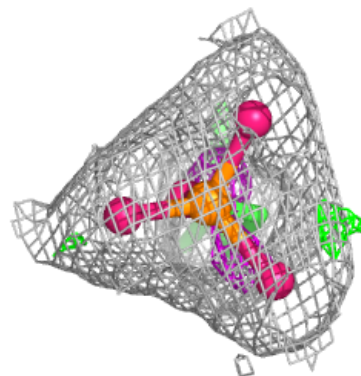
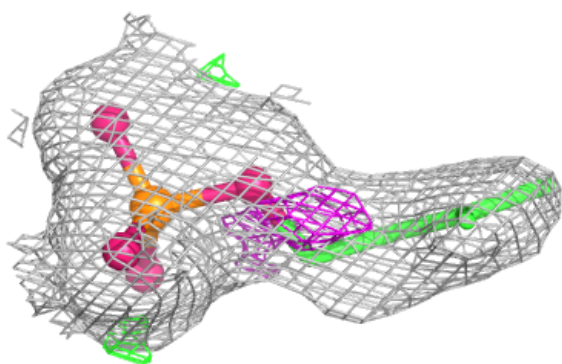
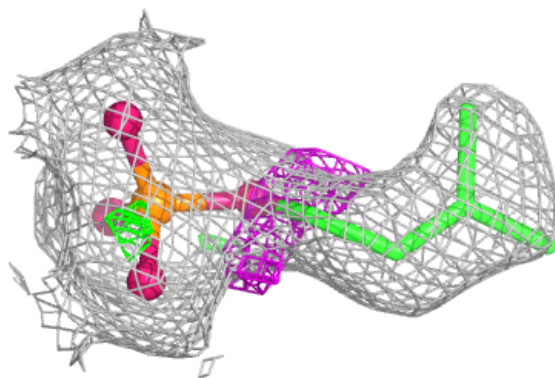
**Electron density around 4LR I 202:**

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

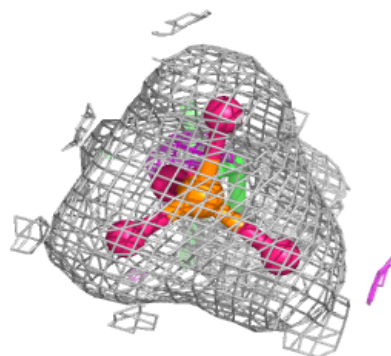
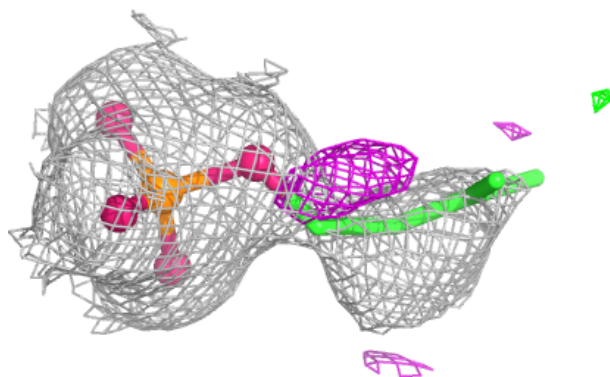
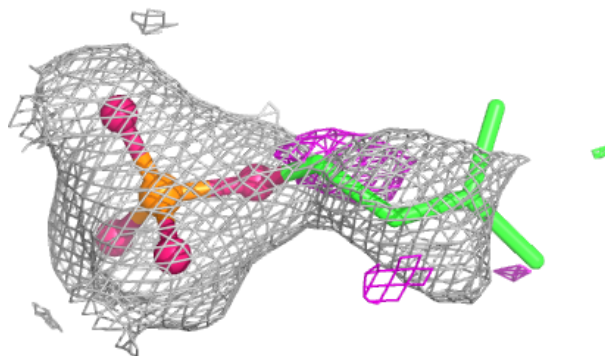


Electron density around 4LR K 202:

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

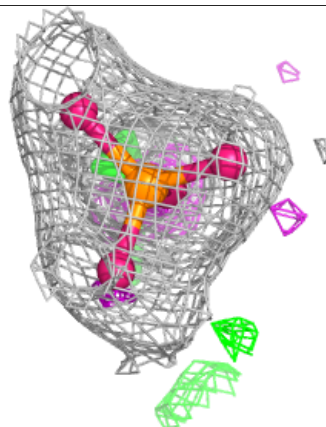
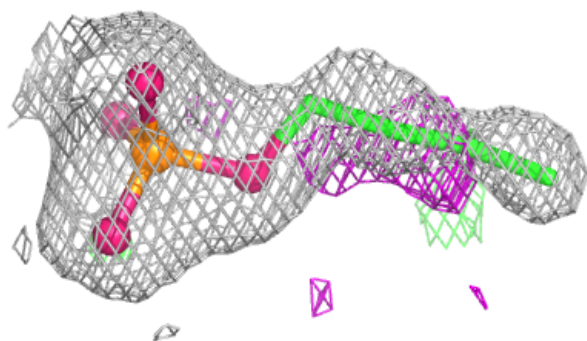
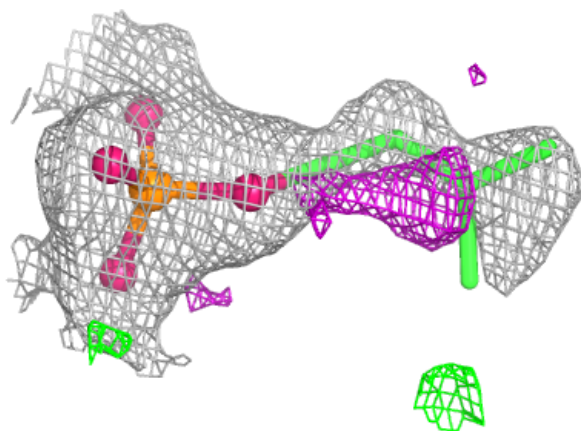
**Electron density around 4LR L 202:**

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

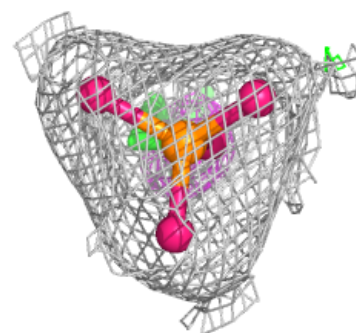
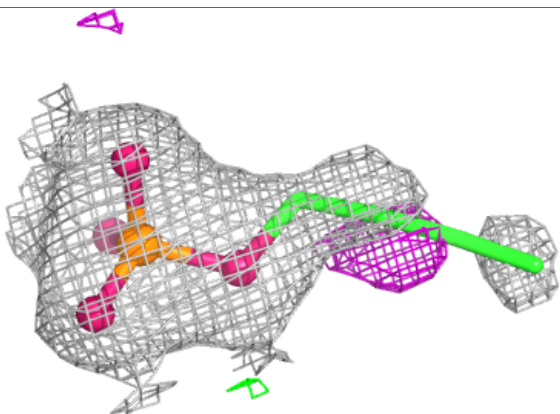
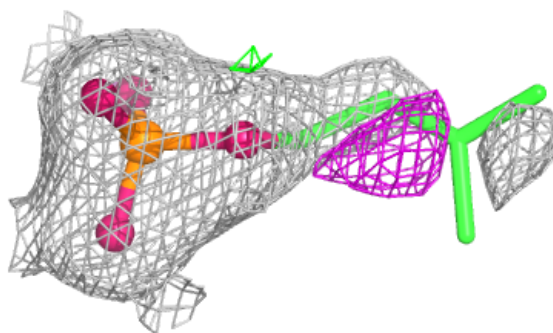


Electron density around 4LR D 202:

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

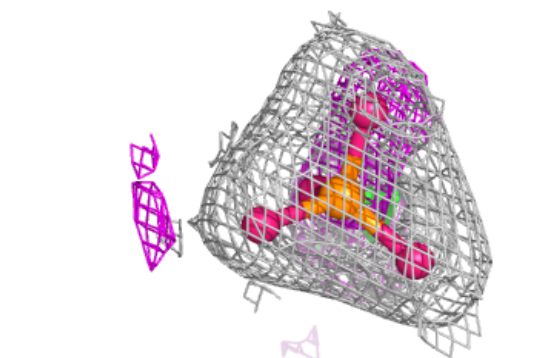
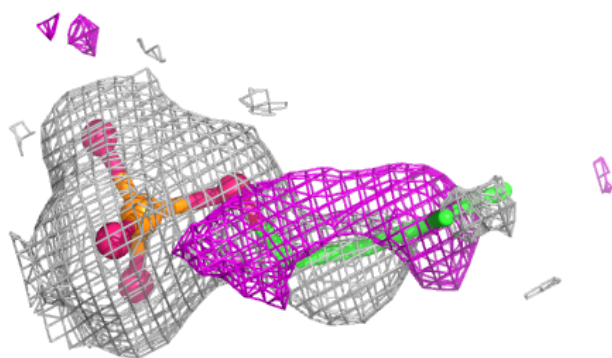
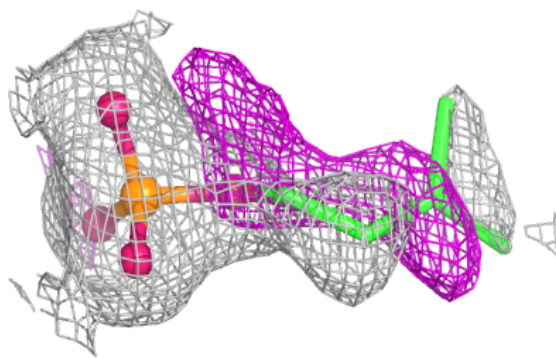
**Electron density around 4LR N 202:**

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

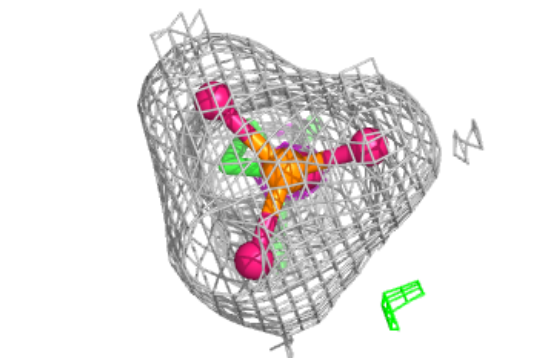
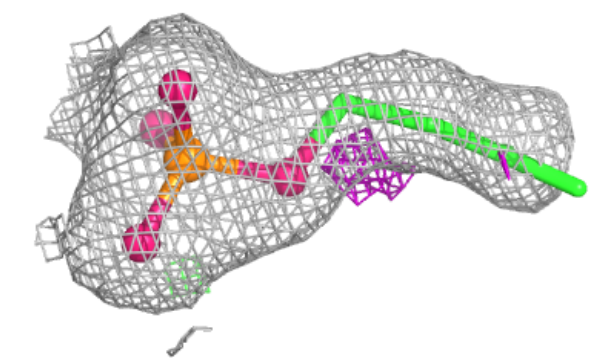
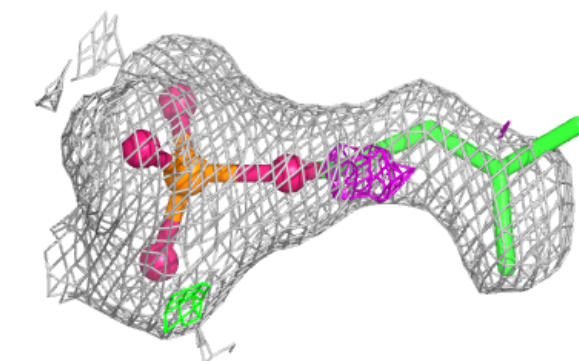


Electron density around 4LR E 202:

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

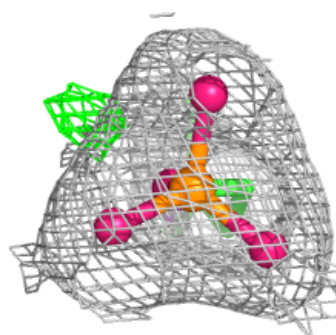
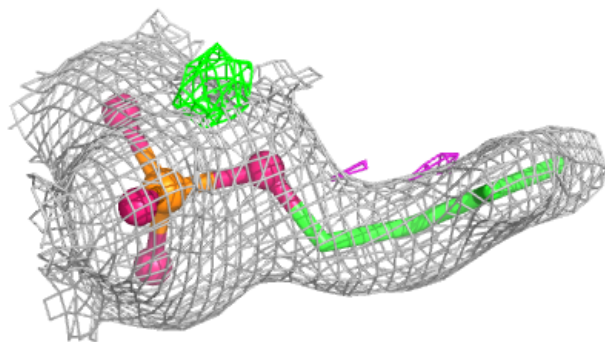
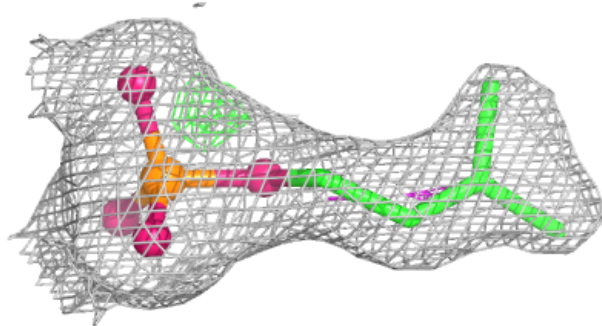
**Electron density around 4LR P 202:**

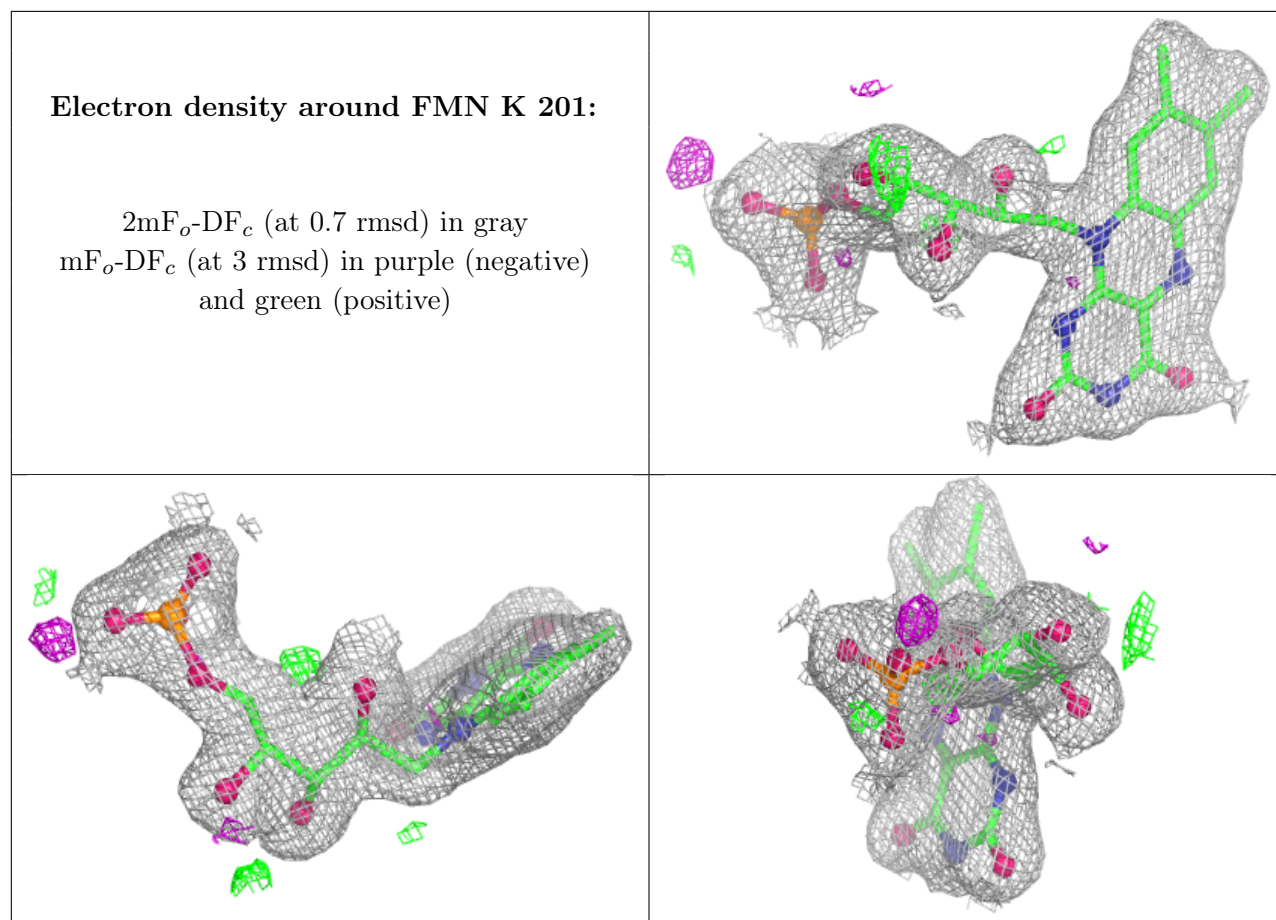
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around 4LR F 202:

$2mF_o-DF_c$ (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.