



wwPDB X-ray Structure Validation Summary Report ⓘ

Oct 27, 2024 – 10:00 AM EDT

PDB ID : 1JJK
Title : Selenomethionine Substitution of Orotidine-5'-monophosphate Decarboxylase from E. coli Causes a Change in Crystal Contacts and Space Group
Authors : Poulsen, J.-C.N.; Harris, P.; Jensen, K.F.; Larsen, S.
Deposited on : 2001-07-06
Resolution : 3.00 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

MolProbity : 4.02b-467
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 1.20.1
EDS : 3.0
buster-report : 1.1.7 (2018)
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4 : 9.0.003 (Gargrove)
Density-Fitness : 1.0.11
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.39

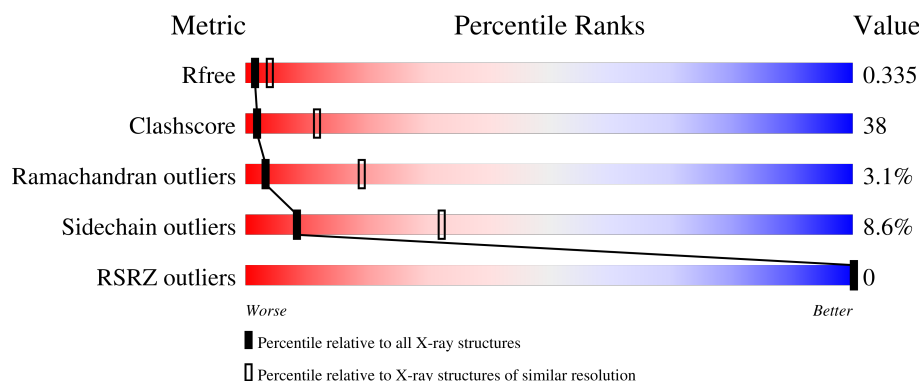
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.00 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.




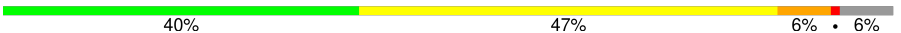
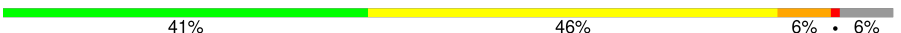


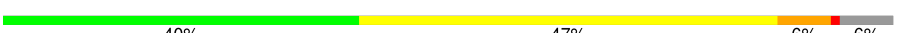
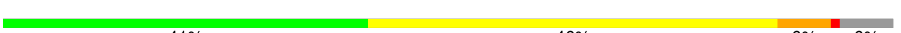




Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	164625	2511 (3.00-3.00)
Clashscore	180529	2866 (3.00-3.00)
Ramachandran outliers	177936	2778 (3.00-3.00)
Sidechain outliers	177891	2781 (3.00-3.00)
RSRZ outliers	164620	2523 (3.00-3.00)

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	245	<div> <div>41%</div> <div>46%</div> <div>6% • 6%</div> </div>
1	B	245	<div> <div>40%</div> <div>48%</div> <div>6% • 6%</div> </div>
1	C	245	<div> <div>41%</div> <div>47%</div> <div>6% • 6%</div> </div>
1	D	245	<div> <div>40%</div> <div>47%</div> <div>6% • 6%</div> </div>
1	E	245	<div> <div>41%</div> <div>47%</div> <div>6% • 6%</div> </div>

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Mol	Chain	Length	Quality of chain
1	F	245	 41% 47% 6% • 6%
1	G	245	 40% 47% 6% • 6%
1	H	245	 41% 46% 6% • 6%
1	I	245	 40% 47% 6% • 6%
1	J	245	 40% 47% 6% • 6%
1	K	245	 40% 47% 6% • 6%
1	L	245	 41% 46% 6% • 6%
1	M	245	 40% 47% 6% • 6%
1	N	245	 40% 47% 6% • 6%
1	O	245	 42% 46% 6% • 6%
1	P	245	 40% 48% 6% • 6%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 28336 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 OROTIDINE 5'-PHOSPHATE DECARBOXYLASE.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	231	Total	C	N	O	S	Se	0	0	0
			1749	1104	306	328	3	8			
1	B	231	Total	C	N	O	S	Se	0	0	0
			1749	1104	306	328	3	8			
1	C	231	Total	C	N	O	S	Se	0	0	0
			1749	1104	306	328	3	8			
1	D	231	Total	C	N	O	S	Se	0	0	0
			1749	1104	306	328	3	8			
1	E	231	Total	C	N	O	S	Se	0	0	0
			1749	1104	306	328	3	8			
1	F	231	Total	C	N	O	S	Se	0	0	0
			1749	1104	306	328	3	8			
1	G	231	Total	C	N	O	S	Se	0	0	0
			1749	1104	306	328	3	8			
1	H	231	Total	C	N	O	S	Se	0	0	0
			1749	1104	306	328	3	8			
1	I	231	Total	C	N	O	S	Se	0	0	0
			1749	1104	306	328	3	8			
1	J	231	Total	C	N	O	S	Se	0	0	0
			1749	1104	306	328	3	8			
1	K	231	Total	C	N	O	S	Se	0	0	0
			1749	1104	306	328	3	8			
1	L	231	Total	C	N	O	S	Se	0	0	0
			1749	1104	306	328	3	8			
1	M	231	Total	C	N	O	S	Se	0	0	0
			1749	1104	306	328	3	8			
1	N	231	Total	C	N	O	S	Se	0	0	0
			1749	1104	306	328	3	8			
1	O	231	Total	C	N	O	S	Se	0	0	0
			1749	1104	306	328	3	8			
1	P	231	Total	C	N	O	S	Se	0	0	0
			1749	1104	306	328	3	8			

There are 144 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	MSE	MET	modified residue	UNP P08244
A	49	MSE	MET	modified residue	UNP P08244
A	95	MSE	MET	modified residue	UNP P08244
A	106	MSE	MET	modified residue	UNP P08244
A	107	MSE	MET	modified residue	UNP P08244
A	133	MSE	MET	modified residue	UNP P08244
A	143	MSE	MET	modified residue	UNP P08244
A	205	MSE	MET	modified residue	UNP P08244
A	218	MSE	MET	modified residue	UNP P08244
B	1	MSE	MET	modified residue	UNP P08244
B	49	MSE	MET	modified residue	UNP P08244
B	95	MSE	MET	modified residue	UNP P08244
B	106	MSE	MET	modified residue	UNP P08244
B	107	MSE	MET	modified residue	UNP P08244
B	133	MSE	MET	modified residue	UNP P08244
B	143	MSE	MET	modified residue	UNP P08244
B	205	MSE	MET	modified residue	UNP P08244
B	218	MSE	MET	modified residue	UNP P08244
C	1	MSE	MET	modified residue	UNP P08244
C	49	MSE	MET	modified residue	UNP P08244
C	95	MSE	MET	modified residue	UNP P08244
C	106	MSE	MET	modified residue	UNP P08244
C	107	MSE	MET	modified residue	UNP P08244
C	133	MSE	MET	modified residue	UNP P08244
C	143	MSE	MET	modified residue	UNP P08244
C	205	MSE	MET	modified residue	UNP P08244
C	218	MSE	MET	modified residue	UNP P08244
D	1	MSE	MET	modified residue	UNP P08244
D	49	MSE	MET	modified residue	UNP P08244
D	95	MSE	MET	modified residue	UNP P08244
D	106	MSE	MET	modified residue	UNP P08244
D	107	MSE	MET	modified residue	UNP P08244
D	133	MSE	MET	modified residue	UNP P08244
D	143	MSE	MET	modified residue	UNP P08244
D	205	MSE	MET	modified residue	UNP P08244
D	218	MSE	MET	modified residue	UNP P08244
E	1	MSE	MET	modified residue	UNP P08244
E	49	MSE	MET	modified residue	UNP P08244
E	95	MSE	MET	modified residue	UNP P08244
E	106	MSE	MET	modified residue	UNP P08244
E	107	MSE	MET	modified residue	UNP P08244
E	133	MSE	MET	modified residue	UNP P08244

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Chain	Residue	Modelled	Actual	Comment	Reference
E	143	MSE	MET	modified residue	UNP P08244
E	205	MSE	MET	modified residue	UNP P08244
E	218	MSE	MET	modified residue	UNP P08244
F	1	MSE	MET	modified residue	UNP P08244
F	49	MSE	MET	modified residue	UNP P08244
F	95	MSE	MET	modified residue	UNP P08244
F	106	MSE	MET	modified residue	UNP P08244
F	107	MSE	MET	modified residue	UNP P08244
F	133	MSE	MET	modified residue	UNP P08244
F	143	MSE	MET	modified residue	UNP P08244
F	205	MSE	MET	modified residue	UNP P08244
F	218	MSE	MET	modified residue	UNP P08244
G	1	MSE	MET	modified residue	UNP P08244
G	49	MSE	MET	modified residue	UNP P08244
G	95	MSE	MET	modified residue	UNP P08244
G	106	MSE	MET	modified residue	UNP P08244
G	107	MSE	MET	modified residue	UNP P08244
G	133	MSE	MET	modified residue	UNP P08244
G	143	MSE	MET	modified residue	UNP P08244
G	205	MSE	MET	modified residue	UNP P08244
G	218	MSE	MET	modified residue	UNP P08244
H	1	MSE	MET	modified residue	UNP P08244
H	49	MSE	MET	modified residue	UNP P08244
H	95	MSE	MET	modified residue	UNP P08244
H	106	MSE	MET	modified residue	UNP P08244
H	107	MSE	MET	modified residue	UNP P08244
H	133	MSE	MET	modified residue	UNP P08244
H	143	MSE	MET	modified residue	UNP P08244
H	205	MSE	MET	modified residue	UNP P08244
H	218	MSE	MET	modified residue	UNP P08244
I	1	MSE	MET	modified residue	UNP P08244
I	49	MSE	MET	modified residue	UNP P08244
I	95	MSE	MET	modified residue	UNP P08244
I	106	MSE	MET	modified residue	UNP P08244
I	107	MSE	MET	modified residue	UNP P08244
I	133	MSE	MET	modified residue	UNP P08244
I	143	MSE	MET	modified residue	UNP P08244
I	205	MSE	MET	modified residue	UNP P08244
I	218	MSE	MET	modified residue	UNP P08244
J	1	MSE	MET	modified residue	UNP P08244
J	49	MSE	MET	modified residue	UNP P08244
J	95	MSE	MET	modified residue	UNP P08244

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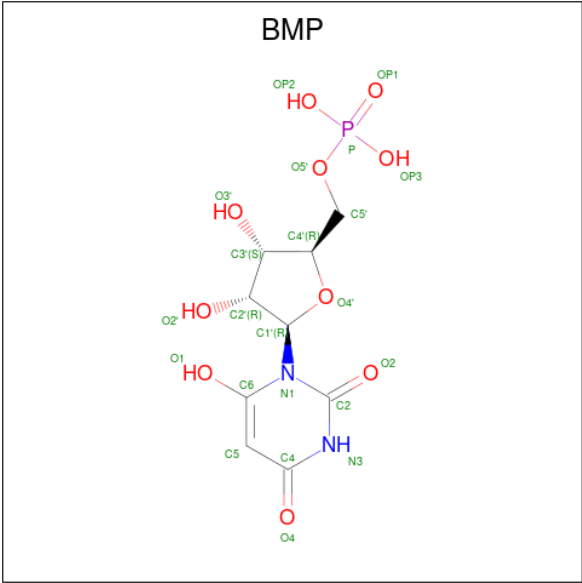
Chain	Residue	Modelled	Actual	Comment	Reference
J	106	MSE	MET	modified residue	UNP P08244
J	107	MSE	MET	modified residue	UNP P08244
J	133	MSE	MET	modified residue	UNP P08244
J	143	MSE	MET	modified residue	UNP P08244
J	205	MSE	MET	modified residue	UNP P08244
J	218	MSE	MET	modified residue	UNP P08244
K	1	MSE	MET	modified residue	UNP P08244
K	49	MSE	MET	modified residue	UNP P08244
K	95	MSE	MET	modified residue	UNP P08244
K	106	MSE	MET	modified residue	UNP P08244
K	107	MSE	MET	modified residue	UNP P08244
K	133	MSE	MET	modified residue	UNP P08244
K	143	MSE	MET	modified residue	UNP P08244
K	205	MSE	MET	modified residue	UNP P08244
K	218	MSE	MET	modified residue	UNP P08244
L	1	MSE	MET	modified residue	UNP P08244
L	49	MSE	MET	modified residue	UNP P08244
L	95	MSE	MET	modified residue	UNP P08244
L	106	MSE	MET	modified residue	UNP P08244
L	107	MSE	MET	modified residue	UNP P08244
L	133	MSE	MET	modified residue	UNP P08244
L	143	MSE	MET	modified residue	UNP P08244
L	205	MSE	MET	modified residue	UNP P08244
L	218	MSE	MET	modified residue	UNP P08244
M	1	MSE	MET	modified residue	UNP P08244
M	49	MSE	MET	modified residue	UNP P08244
M	95	MSE	MET	modified residue	UNP P08244
M	106	MSE	MET	modified residue	UNP P08244
M	107	MSE	MET	modified residue	UNP P08244
M	133	MSE	MET	modified residue	UNP P08244
M	143	MSE	MET	modified residue	UNP P08244
M	205	MSE	MET	modified residue	UNP P08244
M	218	MSE	MET	modified residue	UNP P08244
N	1	MSE	MET	modified residue	UNP P08244
N	49	MSE	MET	modified residue	UNP P08244
N	95	MSE	MET	modified residue	UNP P08244
N	106	MSE	MET	modified residue	UNP P08244
N	107	MSE	MET	modified residue	UNP P08244
N	133	MSE	MET	modified residue	UNP P08244
N	143	MSE	MET	modified residue	UNP P08244
N	205	MSE	MET	modified residue	UNP P08244
N	218	MSE	MET	modified residue	UNP P08244

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Chain	Residue	Modelled	Actual	Comment	Reference
O	1	MSE	MET	modified residue	UNP P08244
O	49	MSE	MET	modified residue	UNP P08244
O	95	MSE	MET	modified residue	UNP P08244
O	106	MSE	MET	modified residue	UNP P08244
O	107	MSE	MET	modified residue	UNP P08244
O	133	MSE	MET	modified residue	UNP P08244
O	143	MSE	MET	modified residue	UNP P08244
O	205	MSE	MET	modified residue	UNP P08244
O	218	MSE	MET	modified residue	UNP P08244
P	1	MSE	MET	modified residue	UNP P08244
P	49	MSE	MET	modified residue	UNP P08244
P	95	MSE	MET	modified residue	UNP P08244
P	106	MSE	MET	modified residue	UNP P08244
P	107	MSE	MET	modified residue	UNP P08244
P	133	MSE	MET	modified residue	UNP P08244
P	143	MSE	MET	modified residue	UNP P08244
P	205	MSE	MET	modified residue	UNP P08244
P	218	MSE	MET	modified residue	UNP P08244

- Molecule 2 is 6-HYDROXYURIDINE-5'-PHOSPHATE (three-letter code: BMP) (formula: C₉H₁₃N₂O₁₀P).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			22	9	2	10	1		
2	B	1	Total	C	N	O	P	0	0
			22	9	2	10	1		

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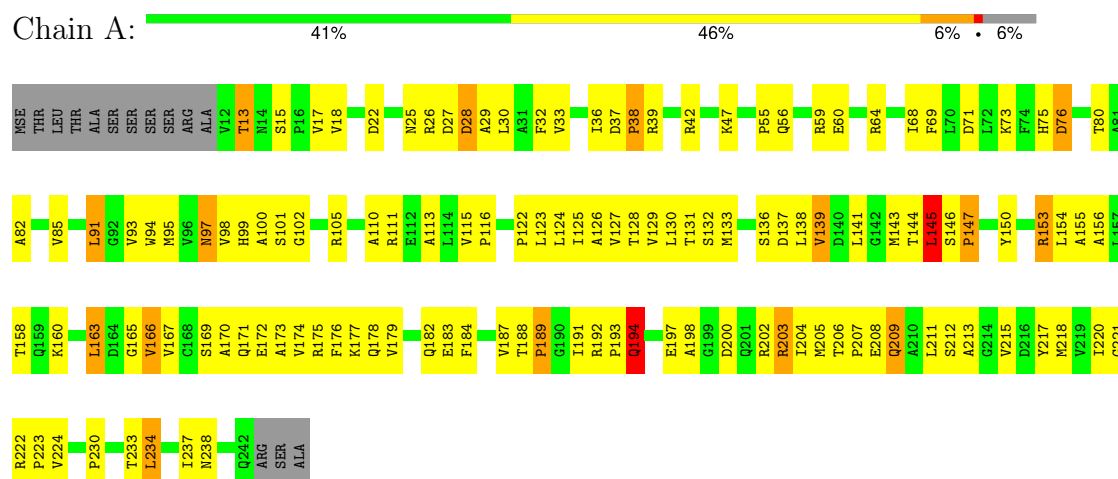
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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	C	1	Total 22	C 9	N 2	O 10	P 1	0	0
2	D	1	Total 22	C 9	N 2	O 10	P 1	0	0
2	E	1	Total 22	C 9	N 2	O 10	P 1	0	0
2	F	1	Total 22	C 9	N 2	O 10	P 1	0	0
2	G	1	Total 22	C 9	N 2	O 10	P 1	0	0
2	H	1	Total 22	C 9	N 2	O 10	P 1	0	0
2	I	1	Total 22	C 9	N 2	O 10	P 1	0	0
2	J	1	Total 22	C 9	N 2	O 10	P 1	0	0
2	K	1	Total 22	C 9	N 2	O 10	P 1	0	0
2	L	1	Total 22	C 9	N 2	O 10	P 1	0	0
2	M	1	Total 22	C 9	N 2	O 10	P 1	0	0
2	N	1	Total 22	C 9	N 2	O 10	P 1	0	0
2	O	1	Total 22	C 9	N 2	O 10	P 1	0	0
2	P	1	Total 22	C 9	N 2	O 10	P 1	0	0

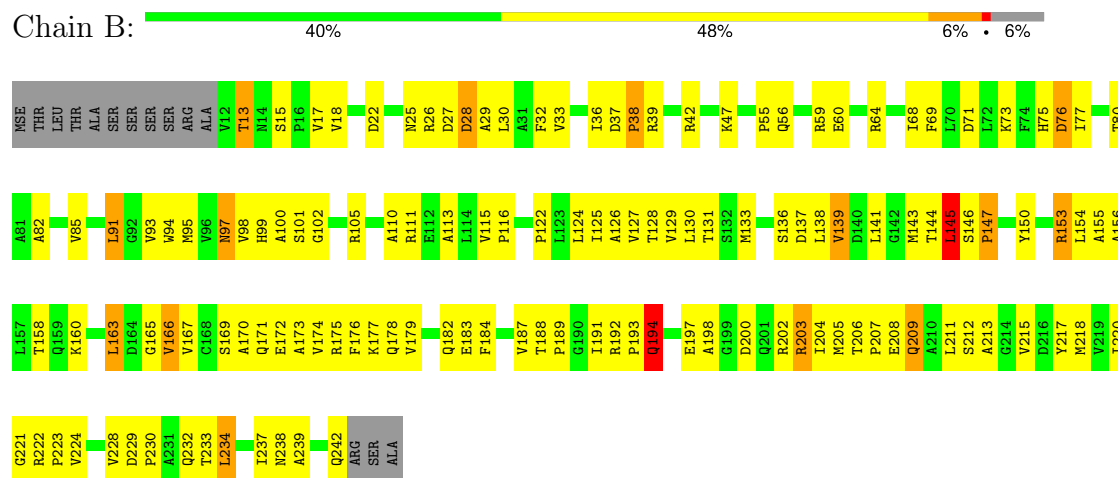
3 Residue-property plots

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.

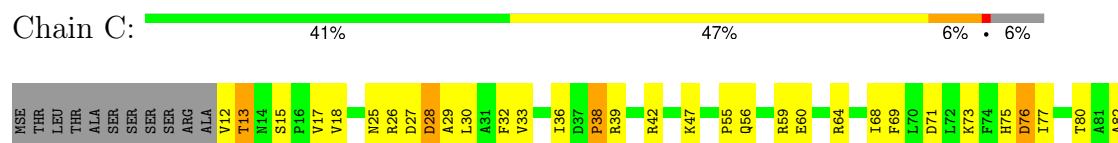
• Molecule 1: OROTIDINE 5'-PHOSPHATE DECARBOXYLASE

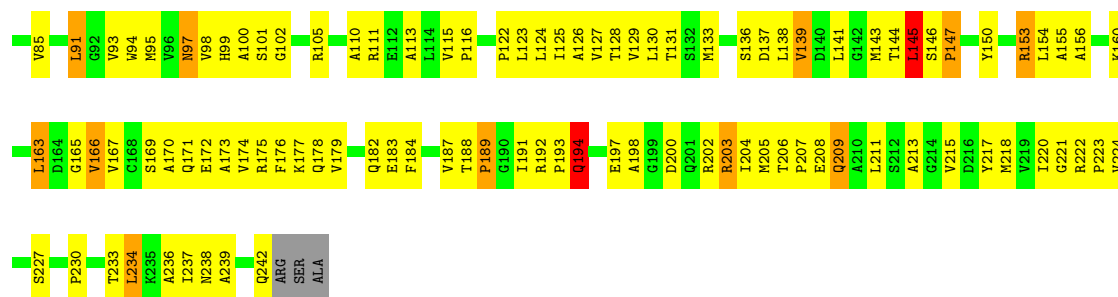


• Molecule 1: OROTIDINE 5'-PHOSPHATE DECARBOXYLASE



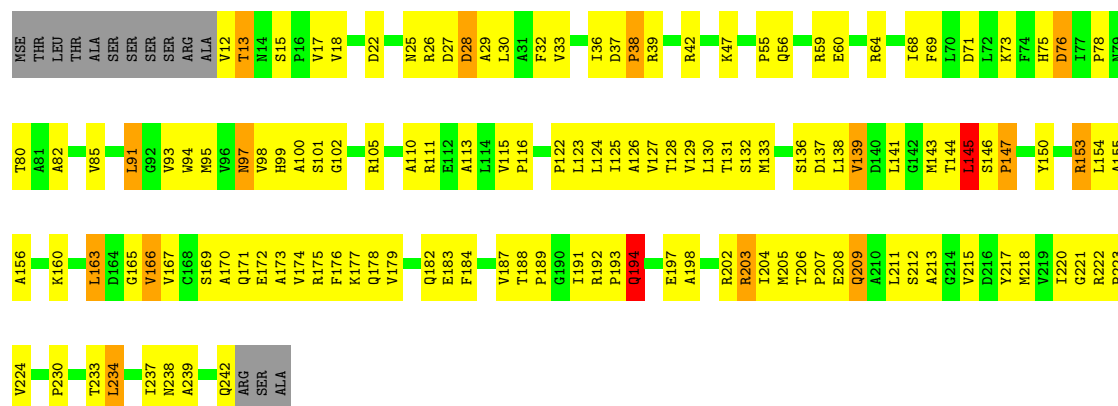
• Molecule 1: OROTIDINE 5'-PHOSPHATE DECARBOXYLASE





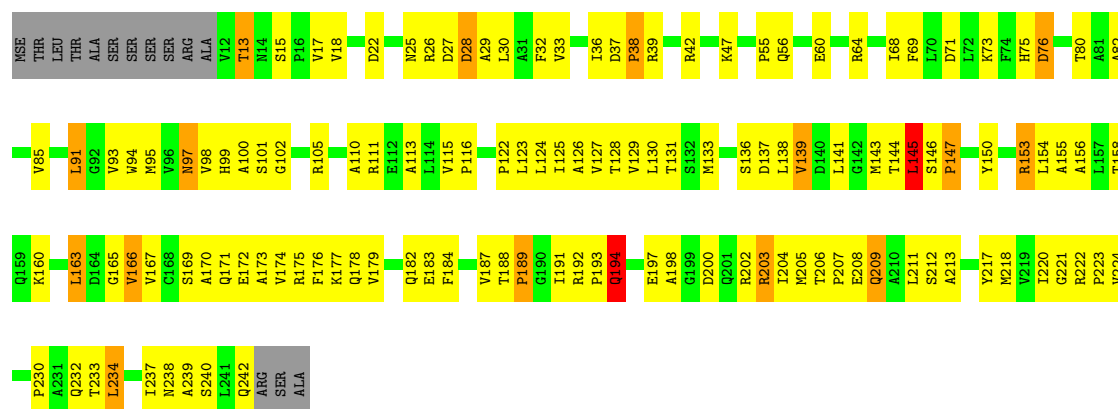
• Molecule 1: OROTIDINE 5'-PHOSPHATE DECARBOXYLASE

Chain D: 40% 47% 6% • 6%



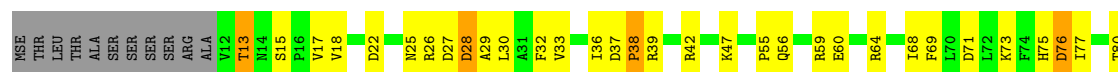
• Molecule 1: OROTIDINE 5'-PHOSPHATE DECARBOXYLASE

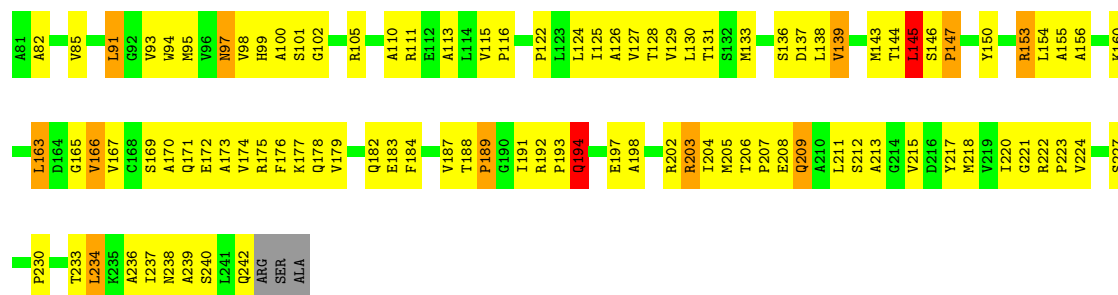
Chain E: 41% 47% 6% • 6%

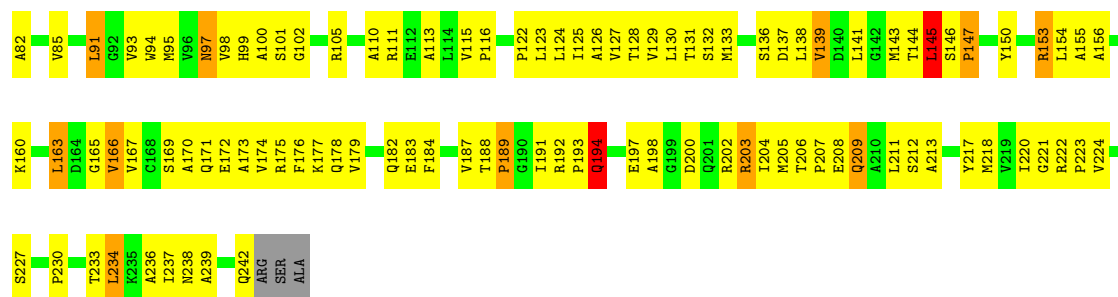


• Molecule 1: OROTIDINE 5'-PHOSPHATE DECARBOXYLASE

Chain F: 41% 47% 6% • 6%

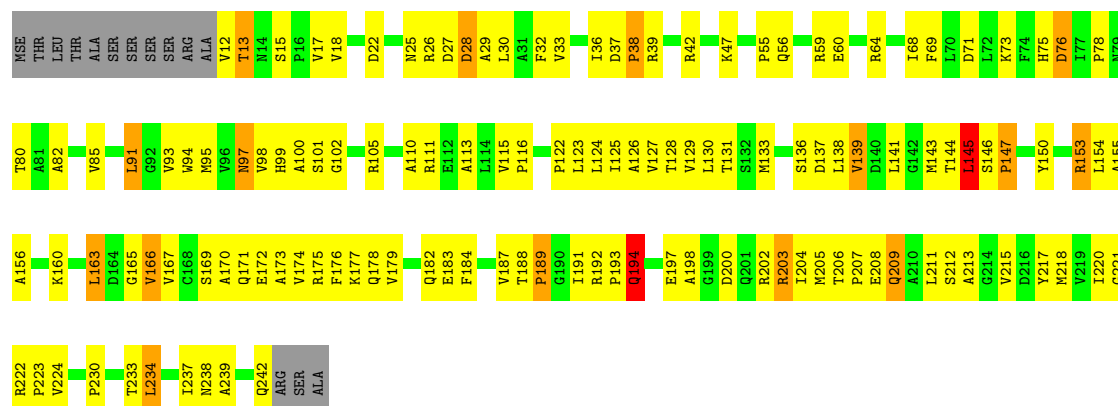






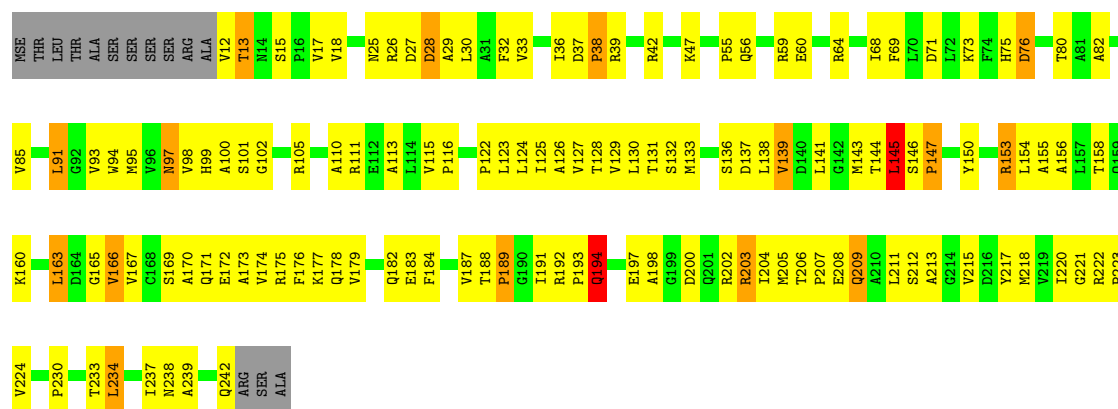
• Molecule 1: OROTIDINE 5'-PHOSPHATE DECARBOXYLASE

Chain J: 40% 47% 6% • 6%



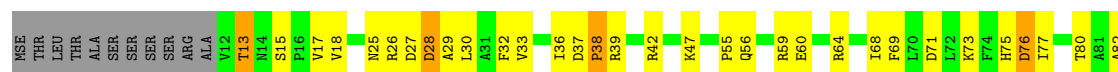
• Molecule 1: OROTIDINE 5'-PHOSPHATE DECARBOXYLASE

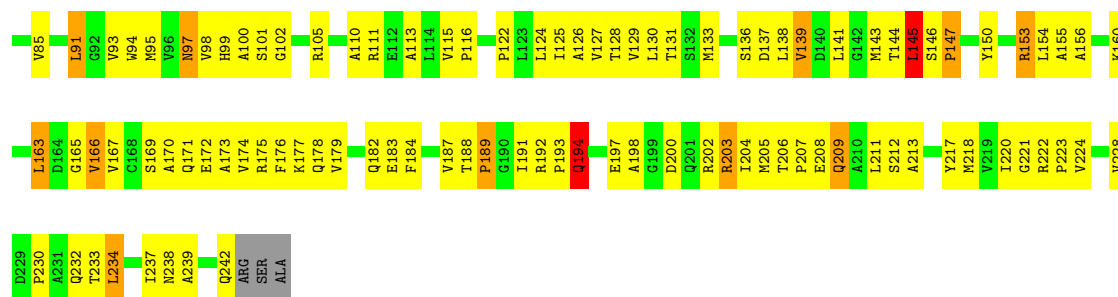
Chain K: 40% 47% 6% • 6%



• Molecule 1: OROTIDINE 5'-PHOSPHATE DECARBOXYLASE

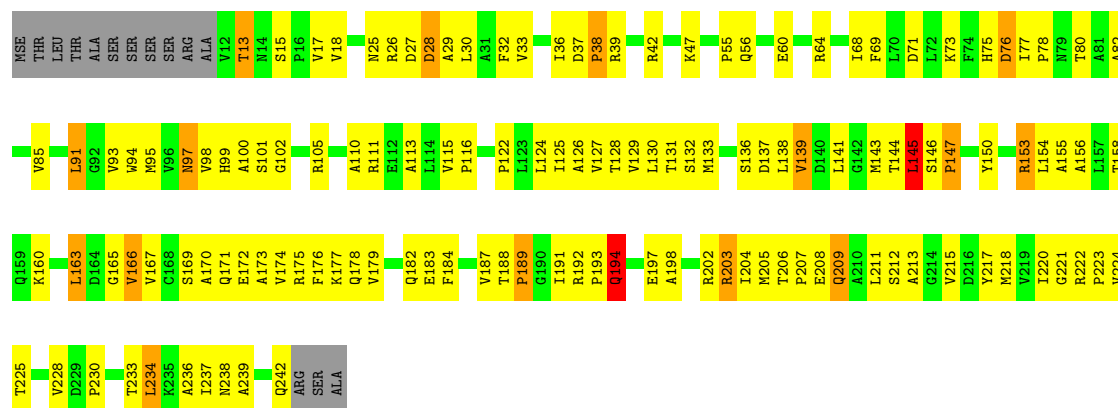
Chain L: 41% 46% 6% • 6%





• Molecule 1: OROTIDINE 5'-PHOSPHATE DECARBOXYLASE

Chain M: 40% 47% 6% • 6%



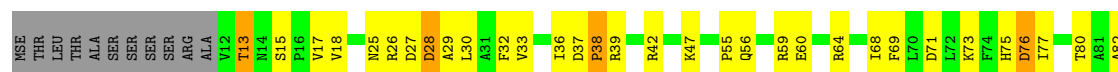
• Molecule 1: OROTIDINE 5'-PHOSPHATE DECARBOXYLASE

Chain N: 40% 47% 6% • 6%



• Molecule 1: OROTIDINE 5'-PHOSPHATE DECARBOXYLASE

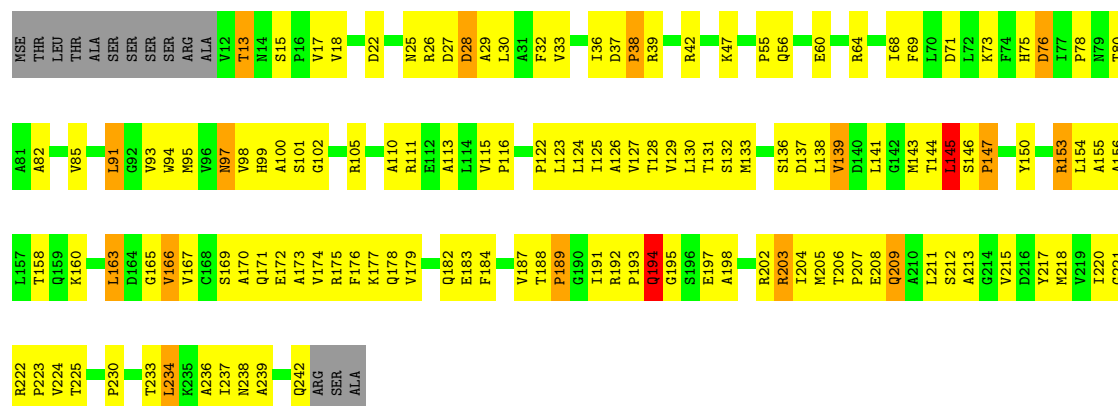
Chain O: 42% 46% 6% • 6%





• Molecule 1: OROTIDINE 5'-PHOSPHATE DECARBOXYLASE

Chain P: 40% 48% 6% • 6%



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	115.50Å 149.00Å 115.60Å 90.00° 115.30° 90.00°	Depositor
Resolution (Å)	30.00 – 3.00 30.00 – 3.00	Depositor EDS
% Data completeness (in resolution range)	91.5 (30.00-3.00) 91.4 (30.00-3.00)	Depositor EDS
R_{merge}	0.14	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	4.41 (at 3.00Å)	Xtriage
Refinement program	CNS 0.9	Depositor
R, R_{free}	0.344 , 0.344 0.338 , 0.335	Depositor DCC
R_{free} test set	3274 reflections (5.08%)	wwPDB-VP
Wilson B-factor (Å ²)	31.2	Xtriage
Anisotropy	0.492	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 28.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.41$, $\langle L^2 \rangle = 0.24$	Xtriage
Estimated twinning fraction	0.376 for l,-k,h	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	28336	wwPDB-VP
Average B, all atoms (Å ²)	23.0	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 76.09 % 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 1.1146e-06. 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: BMP

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
1	A	0.40	0/1772	0.67	0/2392
1	B	0.40	0/1772	0.67	0/2392
1	C	0.40	0/1772	0.67	0/2392
1	D	0.40	0/1772	0.67	0/2392
1	E	0.40	0/1772	0.67	0/2392
1	F	0.40	0/1772	0.67	0/2392
1	G	0.40	0/1772	0.67	0/2392
1	H	0.40	0/1772	0.67	0/2392
1	I	0.40	0/1772	0.67	0/2392
1	J	0.40	0/1772	0.67	0/2392
1	K	0.40	0/1772	0.67	0/2392
1	L	0.40	0/1772	0.67	0/2392
1	M	0.40	0/1772	0.67	0/2392
1	N	0.40	0/1772	0.67	0/2392
1	O	0.40	0/1772	0.67	0/2392
1	P	0.40	0/1772	0.67	0/2392
All	All	0.40	0/28352	0.67	0/38272

There are no bond length outliers.

There are no bond angle outliers.

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	1749	0	1758	139	1
1	B	1749	0	1758	162	0
1	C	1749	0	1758	163	0
1	D	1749	0	1758	141	0
1	E	1749	0	1758	138	3
1	F	1749	0	1758	152	0
1	G	1749	0	1758	155	0
1	H	1749	0	1758	135	1
1	I	1749	0	1758	138	2
1	J	1749	0	1758	148	1
1	K	1749	0	1758	145	2
1	L	1749	0	1758	138	2
1	M	1749	0	1758	144	2
1	N	1749	0	1758	143	0
1	O	1749	0	1758	135	1
1	P	1749	0	1758	141	3
2	A	22	0	11	2	0
2	B	22	0	11	2	0
2	C	22	0	11	2	0
2	D	22	0	11	2	0
2	E	22	0	11	3	0
2	F	22	0	11	2	0
2	G	22	0	11	2	0
2	H	22	0	11	2	0
2	I	22	0	11	2	0
2	J	22	0	11	2	0
2	K	22	0	11	2	0
2	L	22	0	11	2	0
2	M	22	0	11	3	0
2	N	22	0	11	4	0
2	O	22	0	11	2	0
2	P	22	0	11	2	0
All	All	28336	0	28304	2177	9

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 38.

The worst 5 of 2177 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:C:182:GLN:HG3	1:J:12:VAL:CG1	1.65	1.26
1:B:232:GLN:NE2	1:C:227:SER:HA	1.53	1.22

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:236:ALA:CB	1:G:228:VAL:HG21	1.77	1.13
1:F:236:ALA:CB	1:G:228:VAL:CG2	2.26	1.11
1:F:236:ALA:HB3	1:G:228:VAL:HG21	1.37	1.04

The worst 5 of 9 symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:178:GLN:OE1	1:O:242:GLN:OE1[2_545]	1.39	0.81
1:E:242:GLN:OE1	1:K:178:GLN:OE1[1_454]	1.53	0.67
1:M:228:VAL:CG2	1:P:236:ALA:CB[1_455]	1.84	0.36
1:J:56:GLN:NE2	1:P:27:ASP:CB[2_646]	2.01	0.19
1:M:236:ALA:CB	1:P:195:GLY:O[1_455]	2.07	0.13

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	229/245 (94%)	184 (80%)	38 (17%)	7 (3%)	3	19
1	B	229/245 (94%)	184 (80%)	38 (17%)	7 (3%)	3	19
1	C	229/245 (94%)	184 (80%)	38 (17%)	7 (3%)	3	19
1	D	229/245 (94%)	184 (80%)	38 (17%)	7 (3%)	3	19
1	E	229/245 (94%)	185 (81%)	37 (16%)	7 (3%)	3	19
1	F	229/245 (94%)	184 (80%)	38 (17%)	7 (3%)	3	19
1	G	229/245 (94%)	184 (80%)	38 (17%)	7 (3%)	3	19
1	H	229/245 (94%)	183 (80%)	39 (17%)	7 (3%)	3	19
1	I	229/245 (94%)	184 (80%)	38 (17%)	7 (3%)	3	19
1	J	229/245 (94%)	184 (80%)	38 (17%)	7 (3%)	3	19

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	K	229/245 (94%)	184 (80%)	38 (17%)	7 (3%)	3	19
1	L	229/245 (94%)	184 (80%)	38 (17%)	7 (3%)	3	19
1	M	229/245 (94%)	184 (80%)	38 (17%)	7 (3%)	3	19
1	N	229/245 (94%)	184 (80%)	38 (17%)	7 (3%)	3	19
1	O	229/245 (94%)	184 (80%)	38 (17%)	7 (3%)	3	19
1	P	229/245 (94%)	184 (80%)	38 (17%)	7 (3%)	3	19
All	All	3664/3920 (94%)	2944 (80%)	608 (17%)	112 (3%)	3	19

5 of 112 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	145	LEU
1	A	194	GLN
1	B	145	LEU
1	B	194	GLN
1	C	145	LEU

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	185/187 (99%)	169 (91%)	16 (9%)	8	32
1	B	185/187 (99%)	169 (91%)	16 (9%)	8	32
1	C	185/187 (99%)	169 (91%)	16 (9%)	8	32
1	D	185/187 (99%)	169 (91%)	16 (9%)	8	32
1	E	185/187 (99%)	169 (91%)	16 (9%)	8	32
1	F	185/187 (99%)	169 (91%)	16 (9%)	8	32
1	G	185/187 (99%)	169 (91%)	16 (9%)	8	32
1	H	185/187 (99%)	169 (91%)	16 (9%)	8	32
1	I	185/187 (99%)	169 (91%)	16 (9%)	8	32
1	J	185/187 (99%)	169 (91%)	16 (9%)	8	32

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	K	185/187 (99%)	169 (91%)	16 (9%)	8	32
1	L	185/187 (99%)	169 (91%)	16 (9%)	8	32
1	M	185/187 (99%)	169 (91%)	16 (9%)	8	32
1	N	185/187 (99%)	169 (91%)	16 (9%)	8	32
1	O	185/187 (99%)	169 (91%)	16 (9%)	8	32
1	P	185/187 (99%)	169 (91%)	16 (9%)	8	32
All	All	2960/2992 (99%)	2704 (91%)	256 (9%)	8	32

5 of 256 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	O	139	VAL
1	O	209	GLN
1	G	28	ASP
1	F	209	GLN
1	P	76	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 162 such sidechains are listed below:

Mol	Chain	Res	Type
1	L	83	HIS
1	O	56	GLN
1	L	226	GLN
1	M	238	ASN
1	O	238	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry

16 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
2	BMP	J	310	-	23,23,23	2.27	6 (26%)	31,35,35	1.71	7 (22%)
2	BMP	O	315	-	23,23,23	2.27	6 (26%)	31,35,35	1.71	7 (22%)
2	BMP	F	306	-	23,23,23	2.26	6 (26%)	31,35,35	1.71	7 (22%)
2	BMP	I	309	-	23,23,23	2.26	6 (26%)	31,35,35	1.72	7 (22%)
2	BMP	L	312	-	23,23,23	2.26	6 (26%)	31,35,35	1.71	7 (22%)
2	BMP	H	308	-	23,23,23	2.27	6 (26%)	31,35,35	1.71	7 (22%)
2	BMP	C	303	-	23,23,23	2.26	6 (26%)	31,35,35	1.72	7 (22%)
2	BMP	G	307	-	23,23,23	2.26	6 (26%)	31,35,35	1.71	7 (22%)
2	BMP	M	313	-	23,23,23	2.26	6 (26%)	31,35,35	1.71	7 (22%)
2	BMP	K	311	-	23,23,23	2.26	6 (26%)	31,35,35	1.70	7 (22%)
2	BMP	N	314	-	23,23,23	2.27	6 (26%)	31,35,35	1.71	7 (22%)
2	BMP	P	316	-	23,23,23	2.26	6 (26%)	31,35,35	1.71	7 (22%)
2	BMP	A	301	-	23,23,23	2.27	6 (26%)	31,35,35	1.71	7 (22%)
2	BMP	B	302	-	23,23,23	2.27	6 (26%)	31,35,35	1.72	7 (22%)
2	BMP	E	305	-	23,23,23	2.27	6 (26%)	31,35,35	1.71	7 (22%)
2	BMP	D	304	-	23,23,23	2.26	6 (26%)	31,35,35	1.72	7 (22%)

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	BMP	J	310	-	-	0/10/26/26	0/2/2/2
2	BMP	O	315	-	-	0/10/26/26	0/2/2/2
2	BMP	F	306	-	-	0/10/26/26	0/2/2/2
2	BMP	I	309	-	-	0/10/26/26	0/2/2/2
2	BMP	L	312	-	-	0/10/26/26	0/2/2/2

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	BMP	H	308	-	-	0/10/26/26	0/2/2/2
2	BMP	C	303	-	-	0/10/26/26	0/2/2/2
2	BMP	G	307	-	-	0/10/26/26	0/2/2/2
2	BMP	M	313	-	-	0/10/26/26	0/2/2/2
2	BMP	K	311	-	-	0/10/26/26	0/2/2/2
2	BMP	N	314	-	-	0/10/26/26	0/2/2/2
2	BMP	P	316	-	-	0/10/26/26	0/2/2/2
2	BMP	A	301	-	-	0/10/26/26	0/2/2/2
2	BMP	B	302	-	-	0/10/26/26	0/2/2/2
2	BMP	E	305	-	-	0/10/26/26	0/2/2/2
2	BMP	D	304	-	-	0/10/26/26	0/2/2/2

The worst 5 of 96 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	N	314	BMP	O2-C2	6.02	1.33	1.23
2	J	310	BMP	O2-C2	6.00	1.33	1.23
2	P	316	BMP	O2-C2	6.00	1.33	1.23
2	O	315	BMP	O2-C2	6.00	1.33	1.23
2	E	305	BMP	O2-C2	5.99	1.33	1.23

The worst 5 of 112 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	304	BMP	O1-C6-C5	-4.22	116.72	125.58
2	H	308	BMP	O1-C6-C5	-4.21	116.73	125.58
2	N	314	BMP	O1-C6-C5	-4.21	116.73	125.58
2	O	315	BMP	O1-C6-C5	-4.21	116.73	125.58
2	B	302	BMP	O1-C6-C5	-4.21	116.74	125.58

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

16 monomers are involved in 36 short contacts:

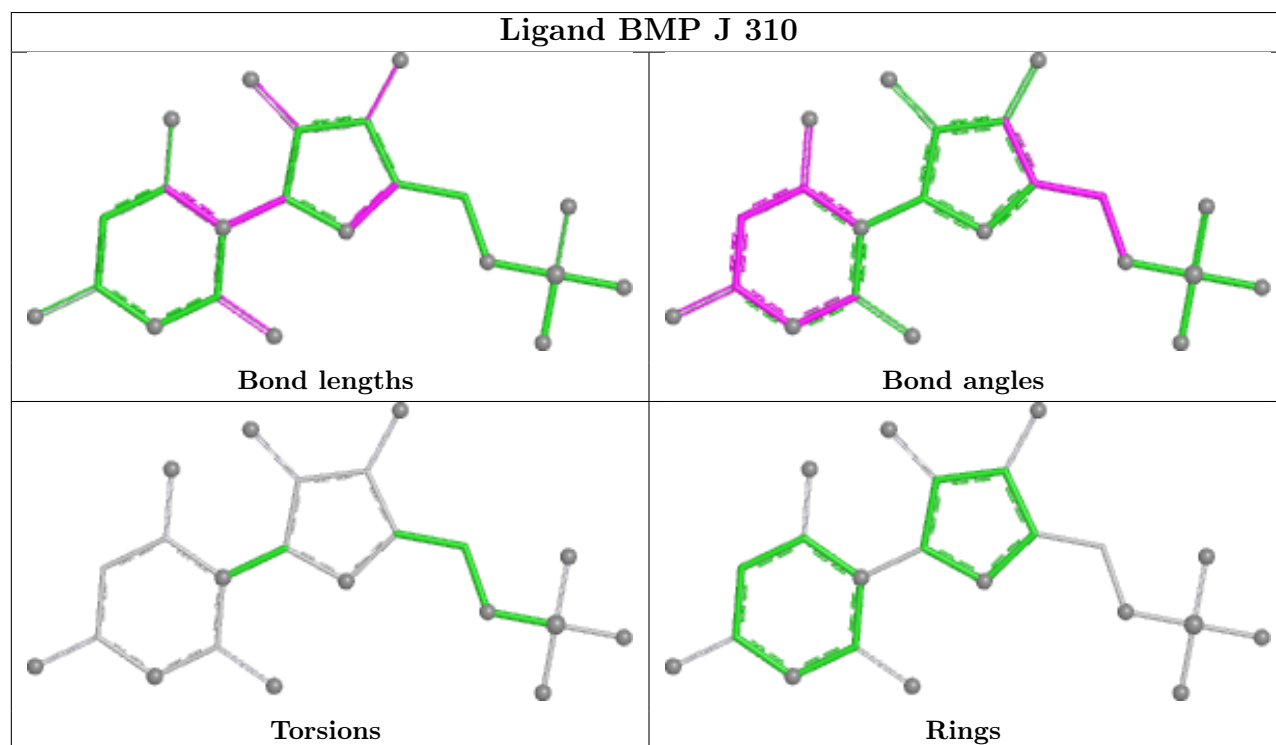
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	J	310	BMP	2	0
2	O	315	BMP	2	0
2	F	306	BMP	2	0
2	I	309	BMP	2	0
2	L	312	BMP	2	0

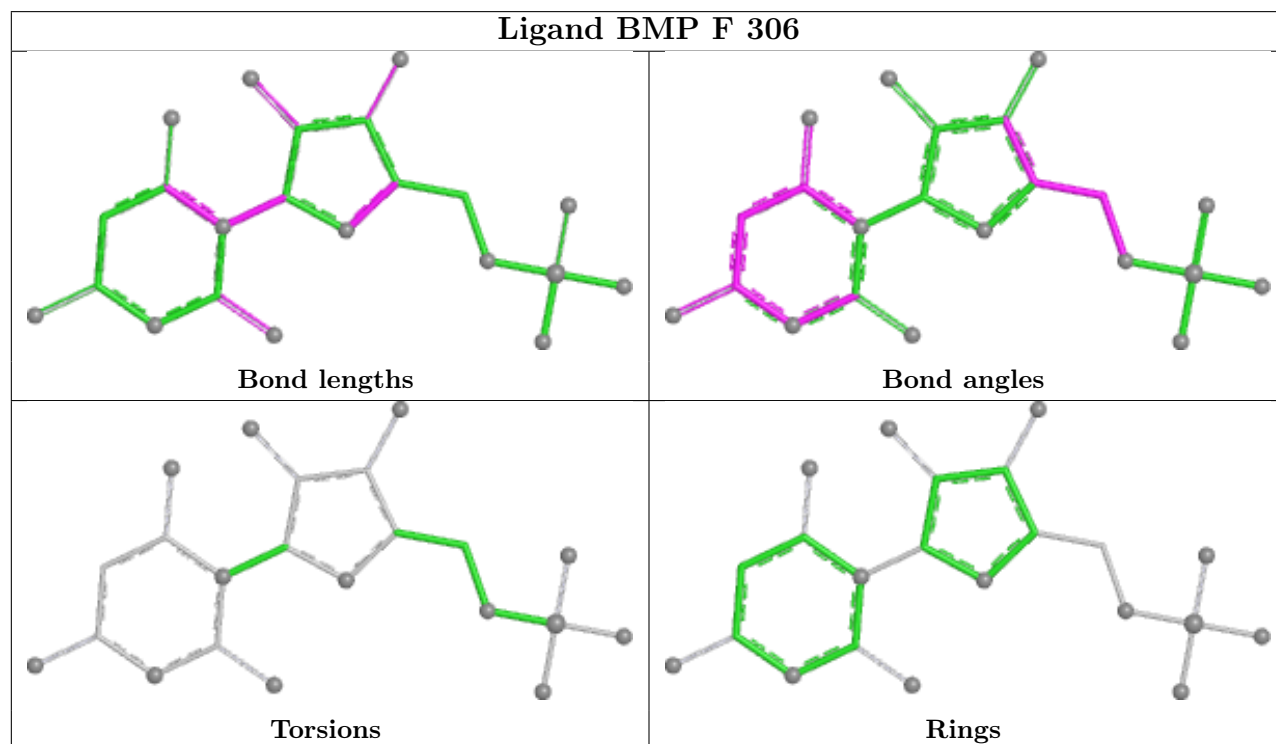
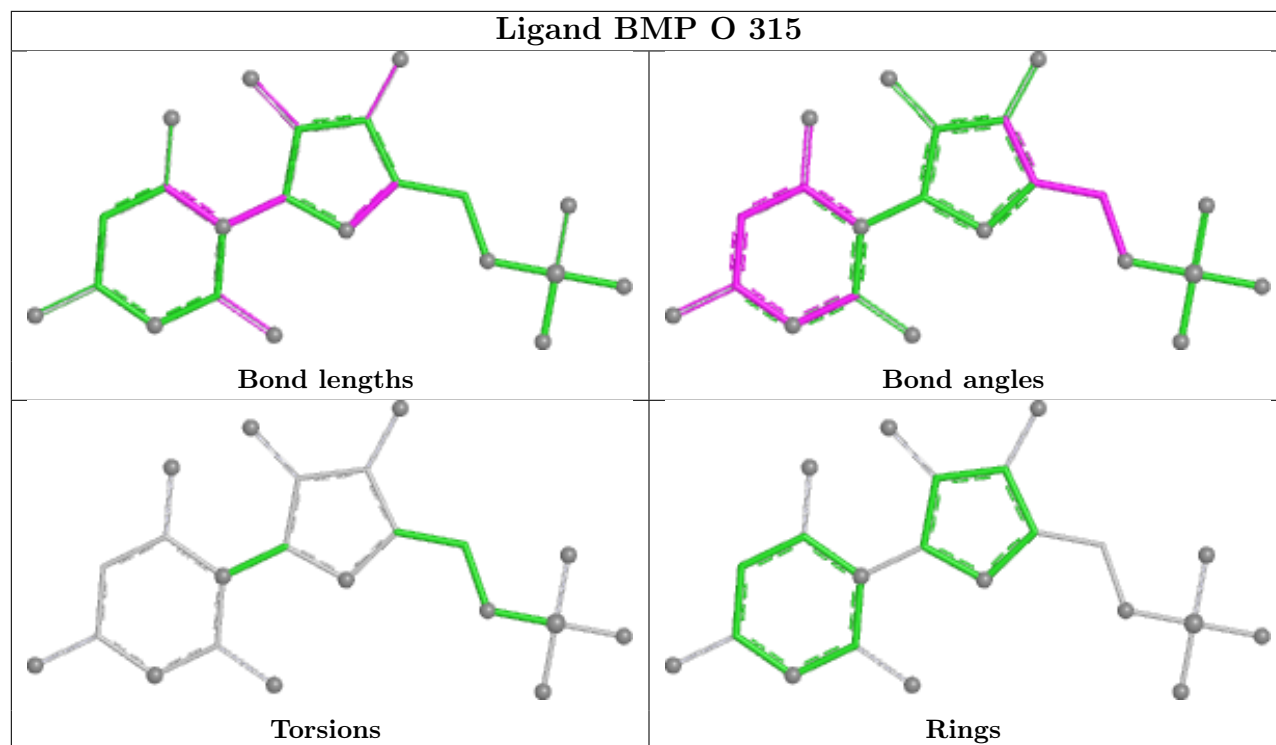
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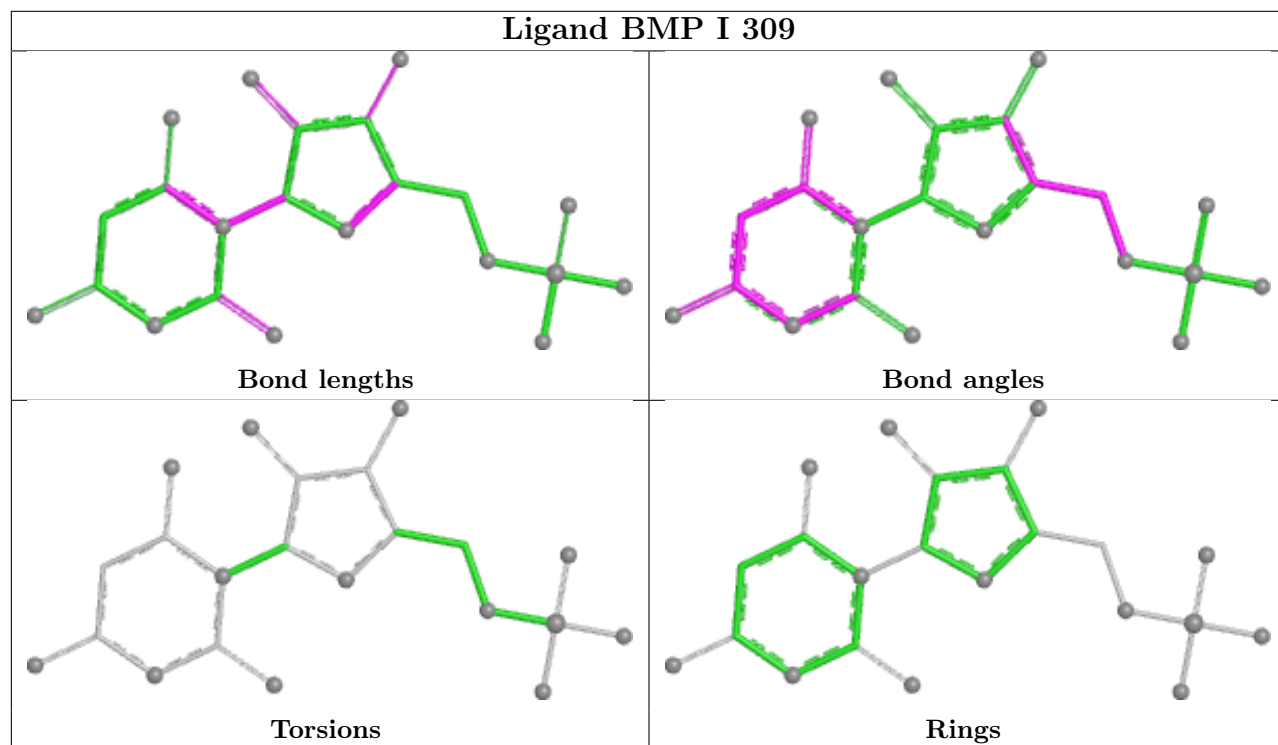
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	H	308	BMP	2	0
2	C	303	BMP	2	0
2	G	307	BMP	2	0
2	M	313	BMP	3	0
2	K	311	BMP	2	0
2	N	314	BMP	4	0
2	P	316	BMP	2	0
2	A	301	BMP	2	0
2	B	302	BMP	2	0
2	E	305	BMP	3	0
2	D	304	BMP	2	0

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.

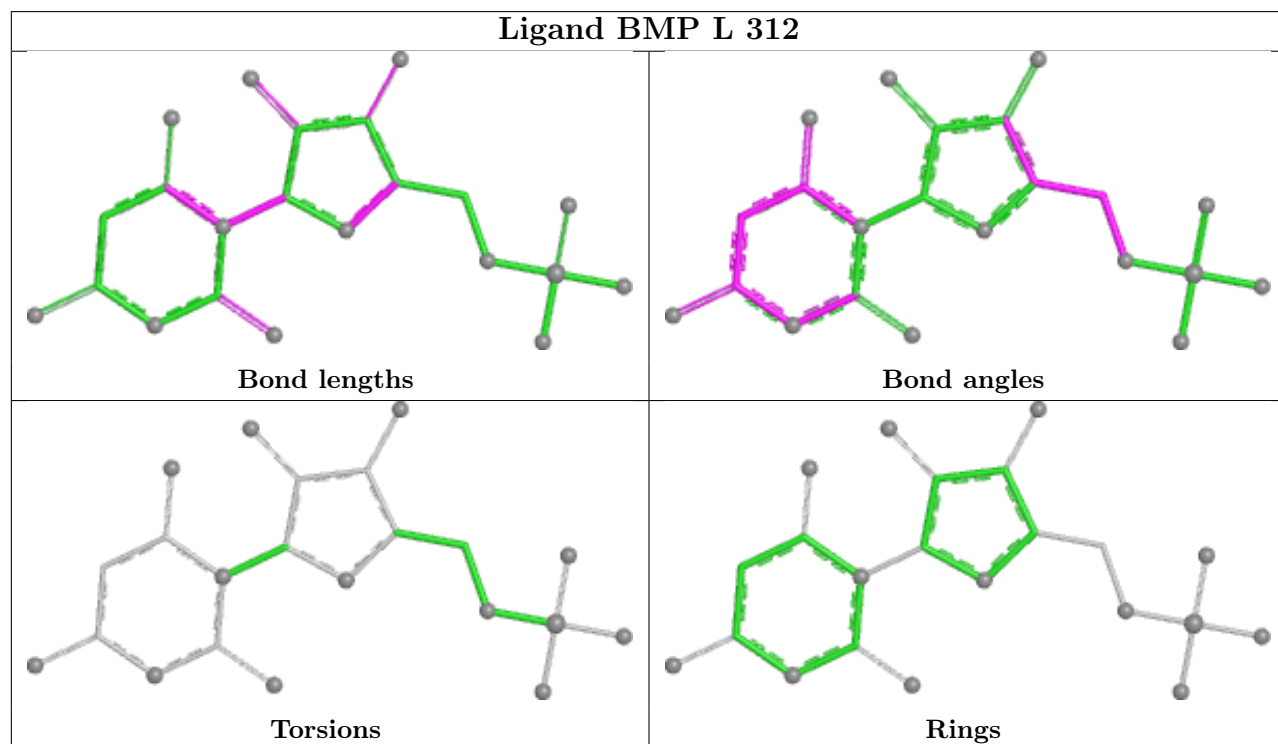


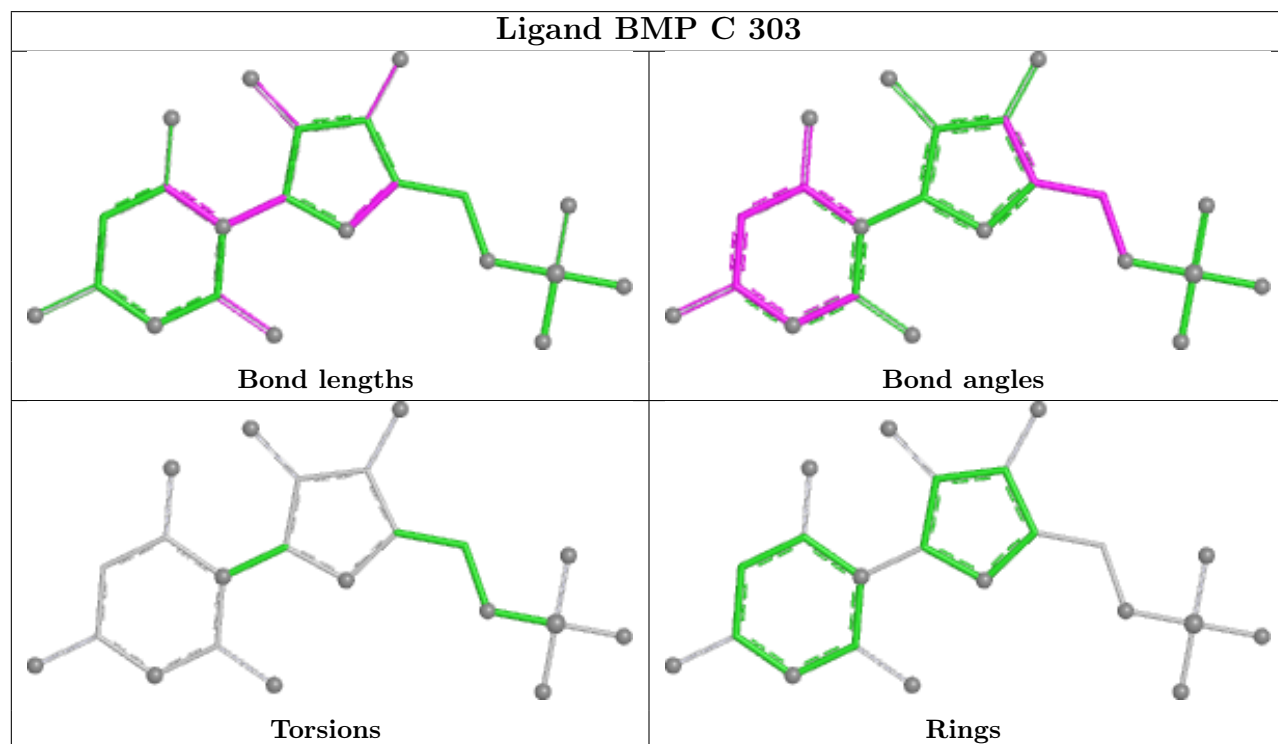
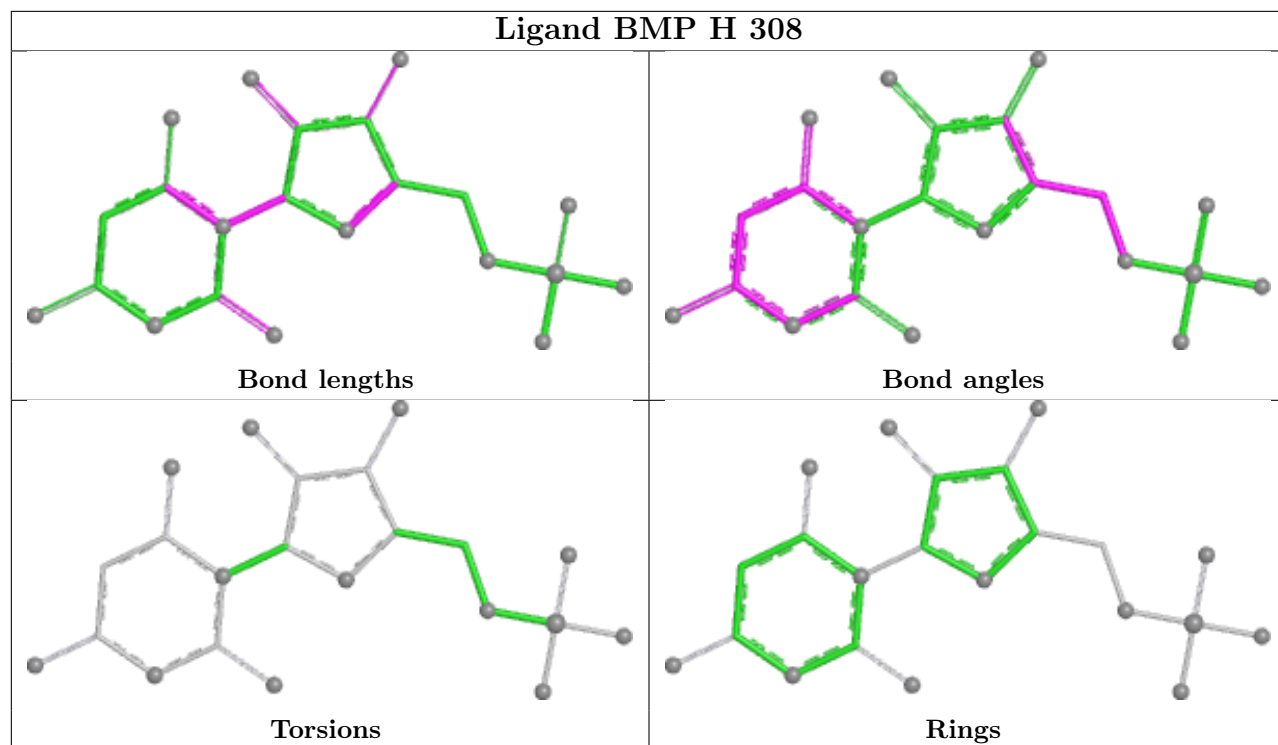


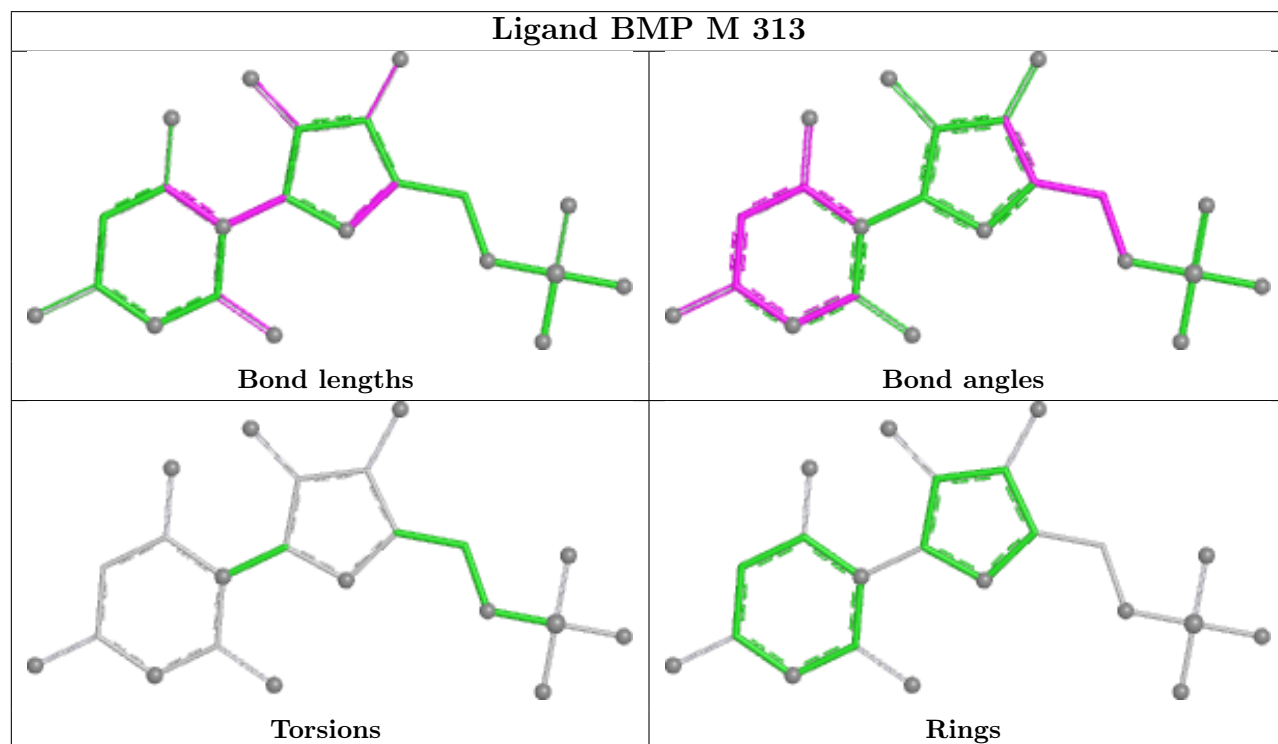
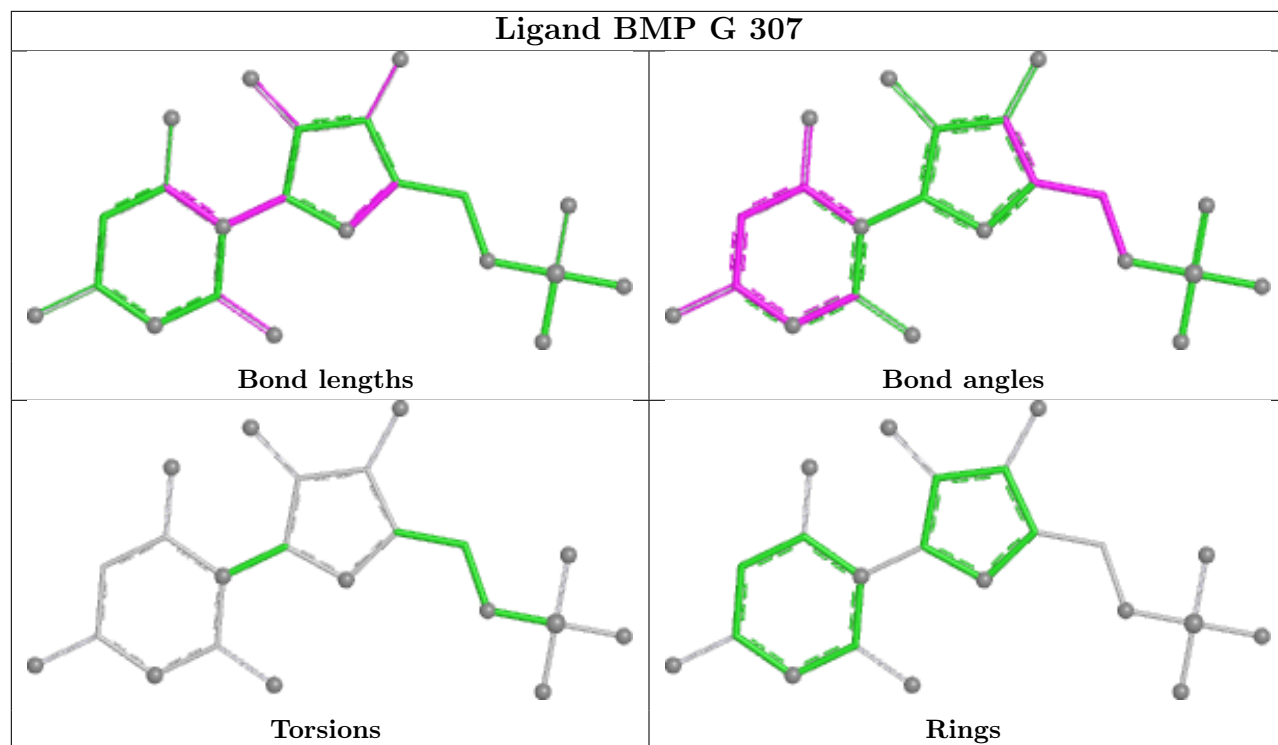
Ligand BMP I 309

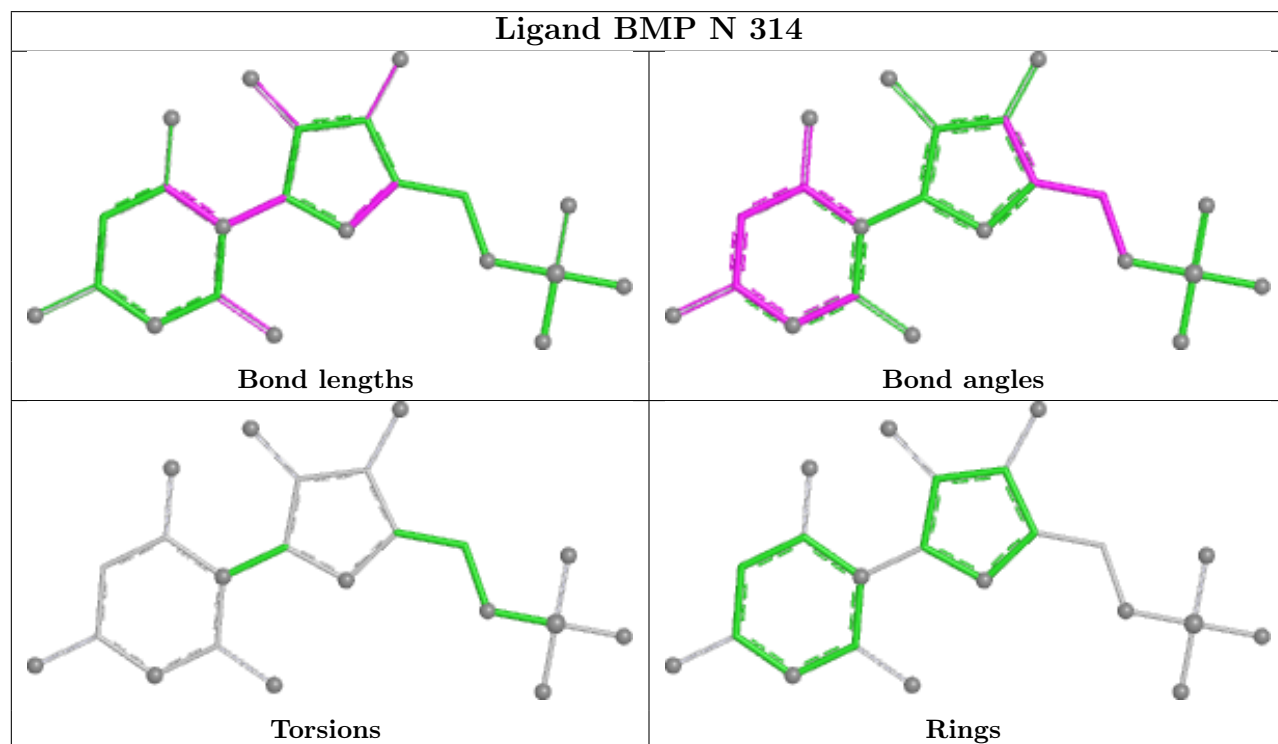
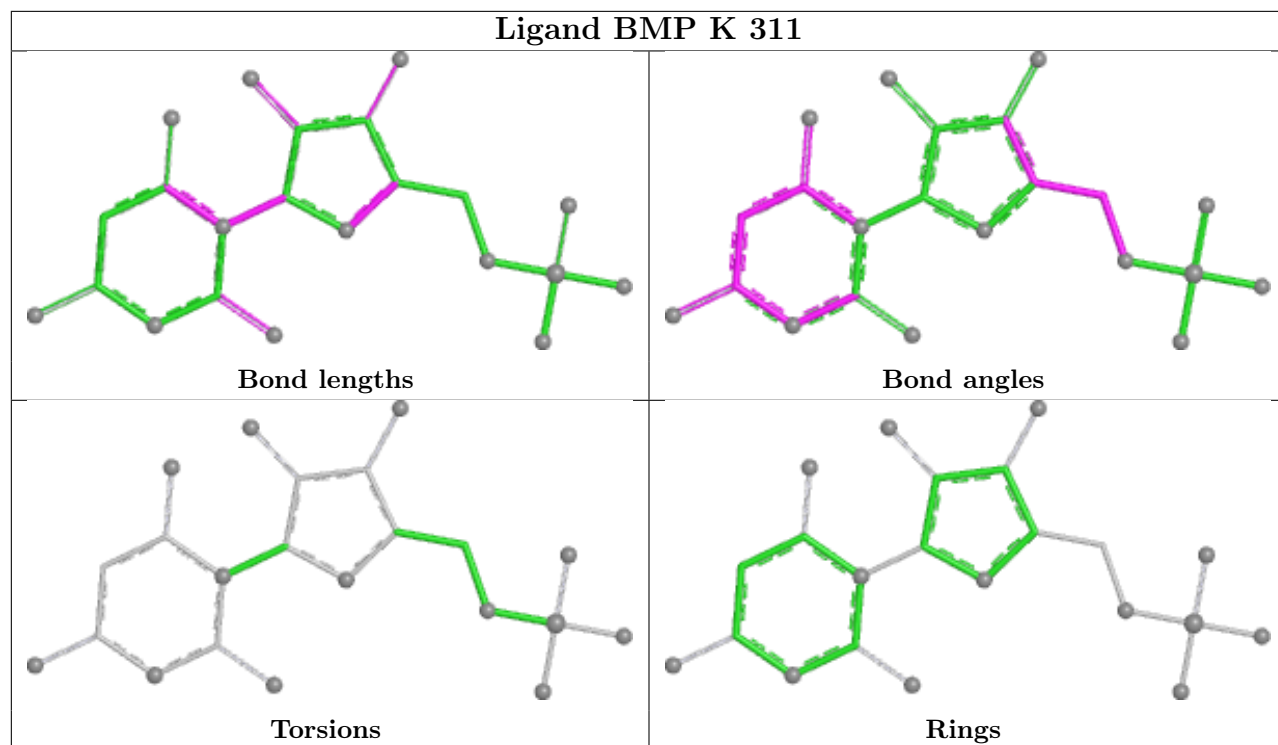


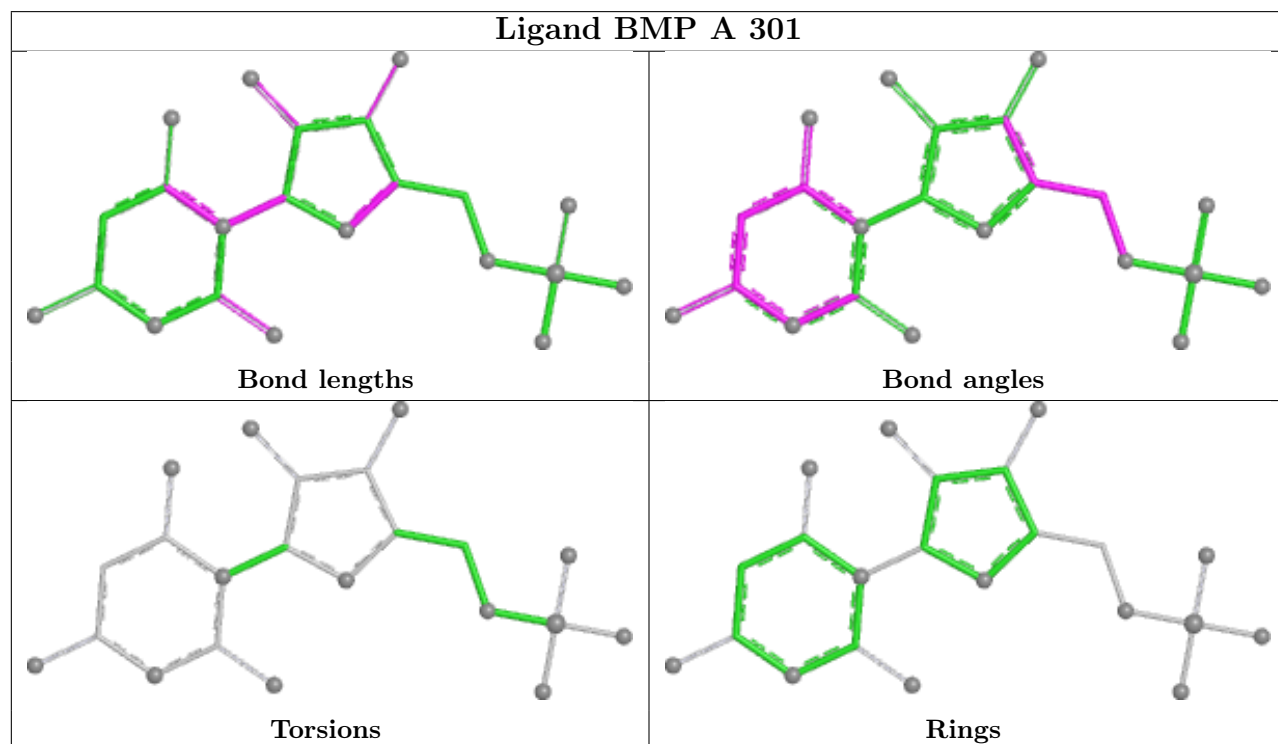
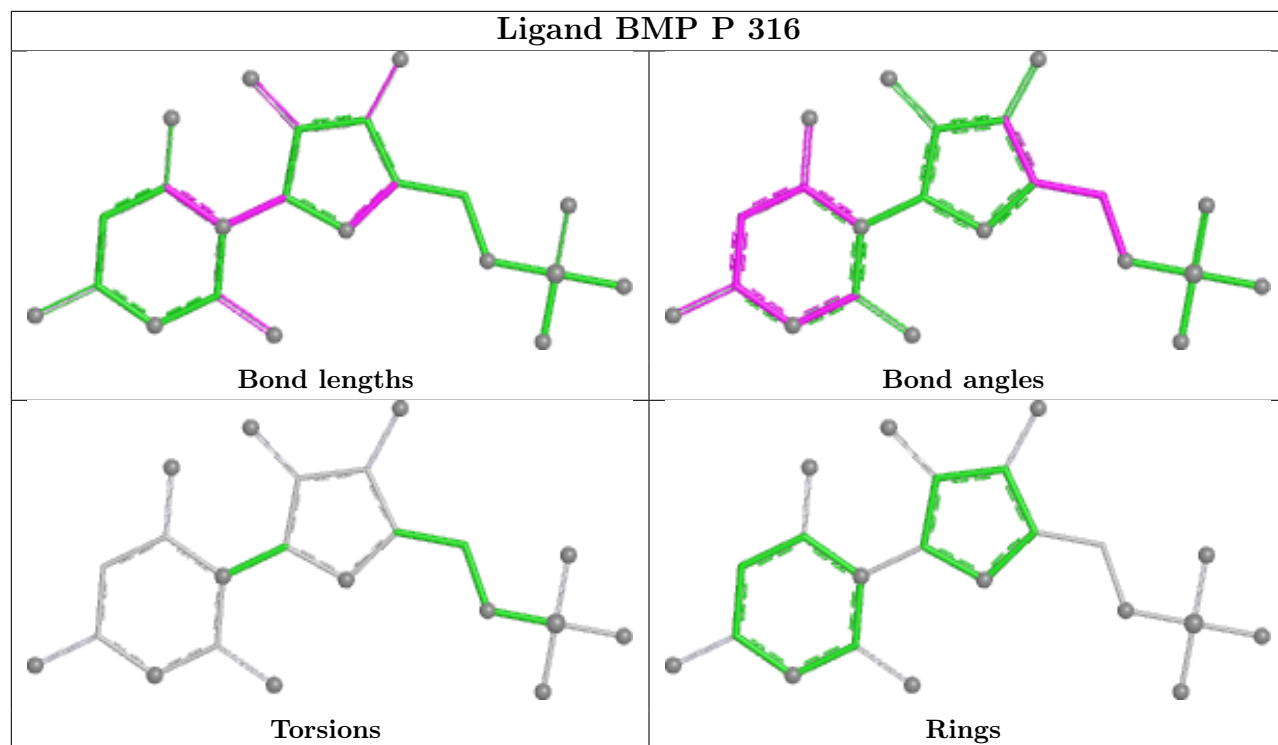
Ligand BMP L 312

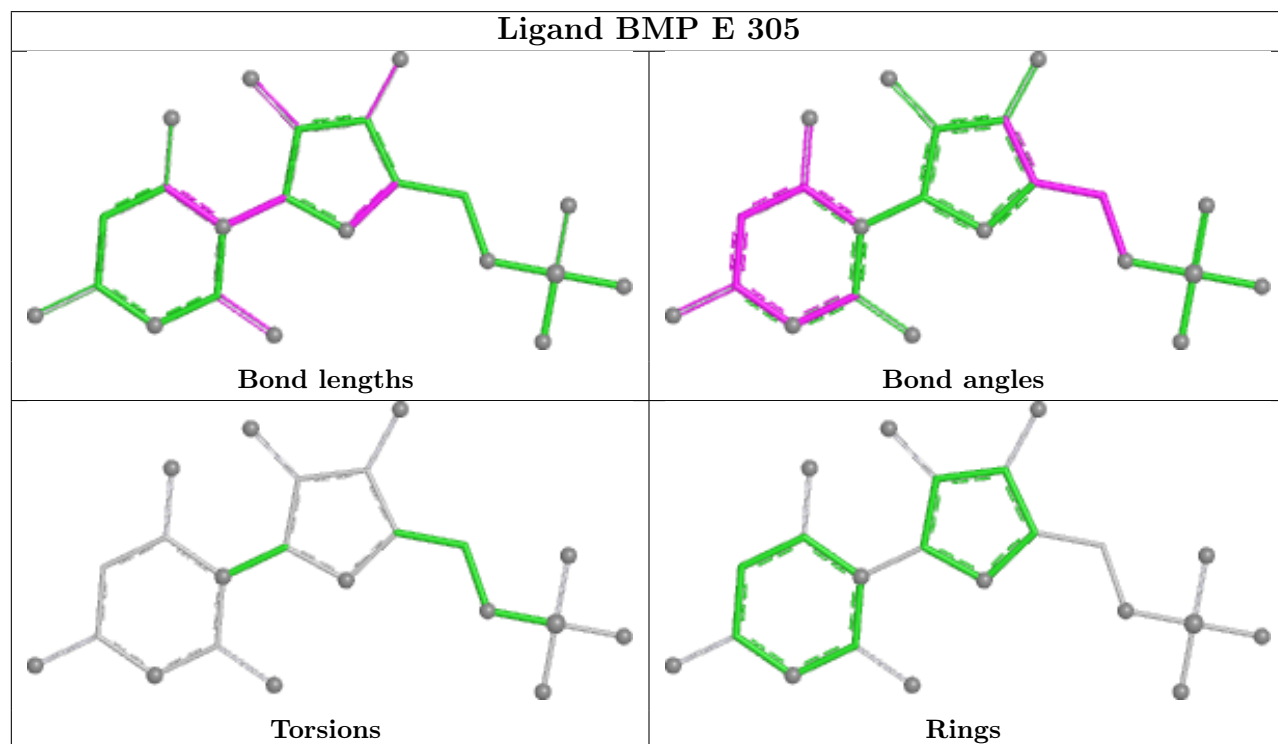
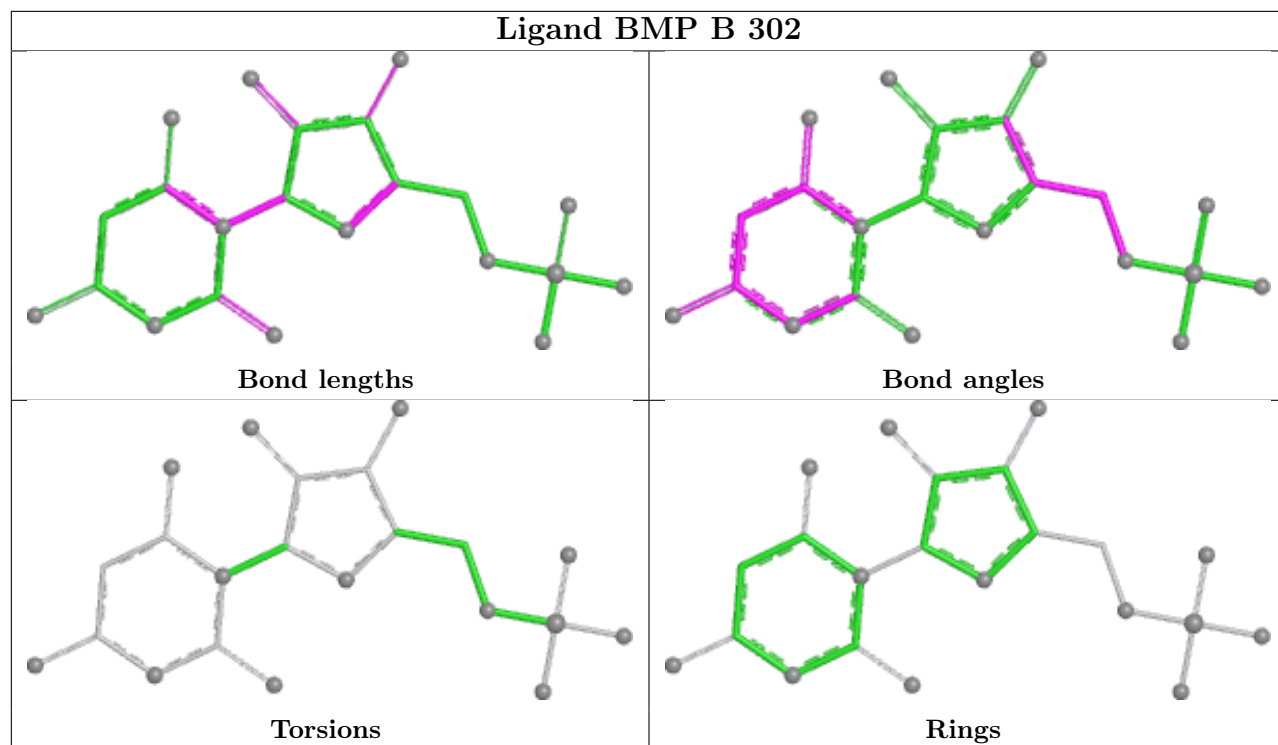


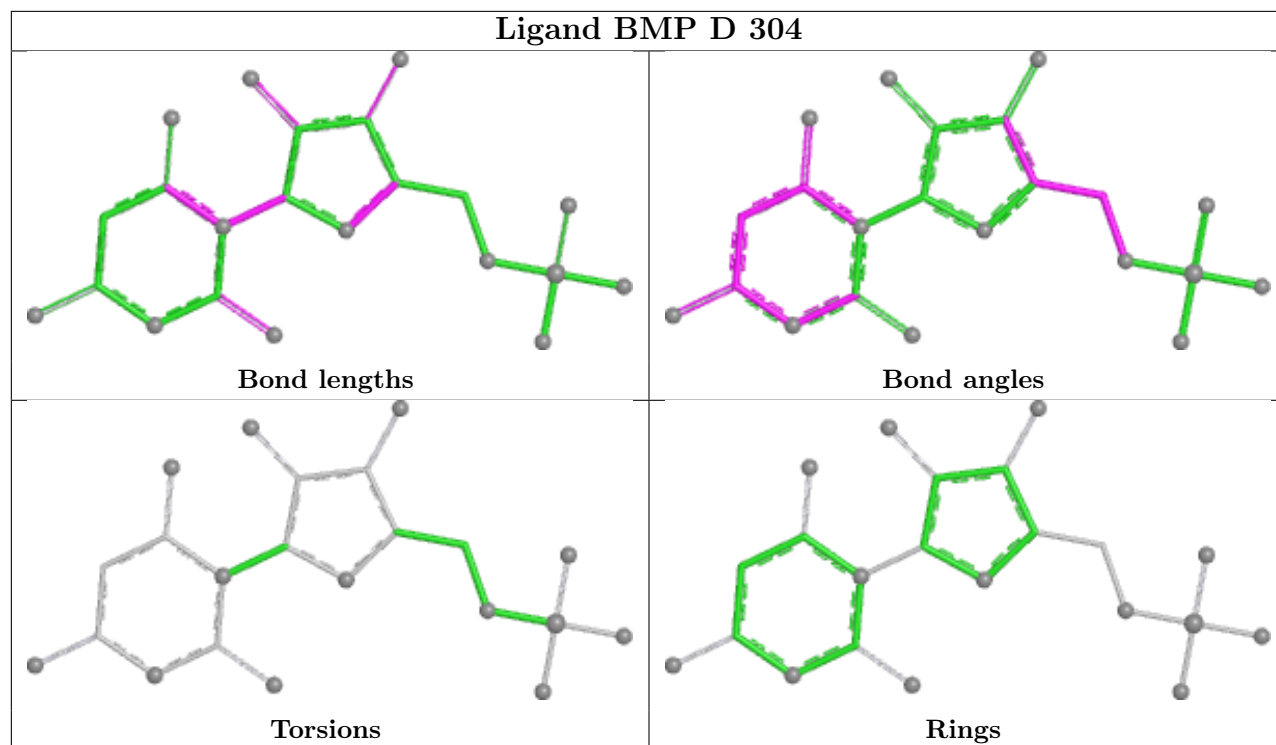












5.7 Other polymers [i](#)

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	223/245 (91%)	-1.63	0 100 100	1, 23, 44, 59	0
1	B	223/245 (91%)	-1.61	0 100 100	1, 23, 44, 59	0
1	C	223/245 (91%)	-1.63	0 100 100	1, 23, 44, 59	0
1	D	223/245 (91%)	-1.63	0 100 100	1, 23, 44, 59	0
1	E	223/245 (91%)	-1.63	0 100 100	1, 23, 44, 59	0
1	F	223/245 (91%)	-1.58	0 100 100	1, 23, 44, 59	0
1	G	223/245 (91%)	-1.61	0 100 100	1, 23, 44, 59	0
1	H	223/245 (91%)	-1.62	0 100 100	1, 23, 44, 59	0
1	I	223/245 (91%)	-1.59	0 100 100	1, 23, 44, 59	0
1	J	223/245 (91%)	-1.59	0 100 100	1, 23, 44, 59	0
1	K	223/245 (91%)	-1.58	0 100 100	1, 23, 44, 59	0
1	L	223/245 (91%)	-1.57	0 100 100	1, 23, 44, 59	0
1	M	223/245 (91%)	-1.56	0 100 100	1, 23, 44, 59	0
1	N	223/245 (91%)	-1.54	0 100 100	1, 23, 44, 59	0
1	O	223/245 (91%)	-1.52	0 100 100	1, 23, 44, 59	0
1	P	223/245 (91%)	-1.54	0 100 100	1, 23, 44, 59	0
All	All	3568/3920 (91%)	-1.59	0 100 100	1, 23, 45, 59	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 monosaccharides in this entry.

6.4 Ligands [i](#)

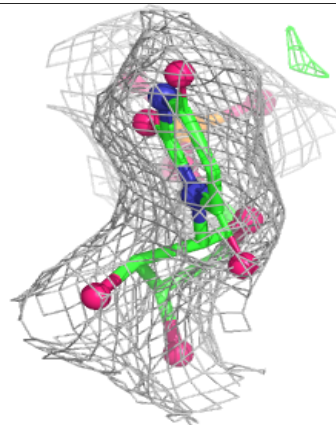
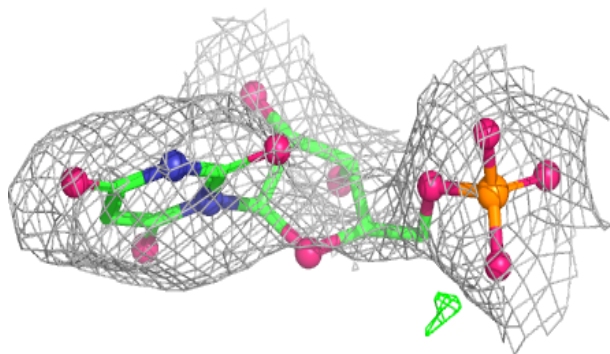
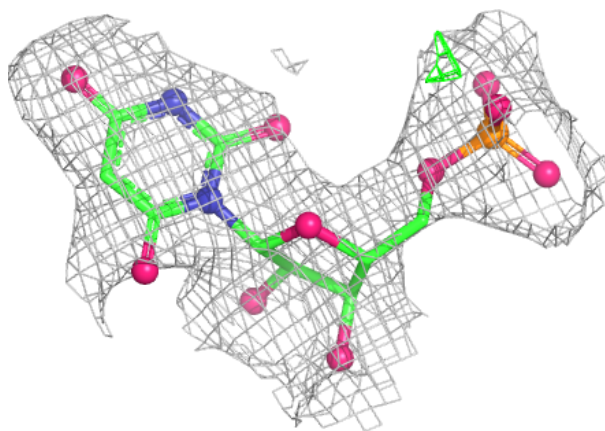
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
2	BMP	B	302	22/22	0.99	0.04	6,8,12,13	0
2	BMP	F	306	22/22	0.99	0.03	6,8,12,13	0
2	BMP	H	308	22/22	0.99	0.03	6,8,12,13	0
2	BMP	I	309	22/22	0.99	0.03	6,8,12,13	0
2	BMP	J	310	22/22	0.99	0.03	6,8,12,13	0
2	BMP	K	311	22/22	0.99	0.04	6,8,12,13	0
2	BMP	L	312	22/22	0.99	0.03	6,8,12,13	0
2	BMP	M	313	22/22	0.99	0.03	6,8,12,13	0
2	BMP	N	314	22/22	0.99	0.04	6,8,12,13	0
2	BMP	P	316	22/22	0.99	0.03	6,8,12,13	0
2	BMP	A	301	22/22	1.00	0.03	6,8,12,13	0
2	BMP	G	307	22/22	1.00	0.03	6,8,12,13	0
2	BMP	C	303	22/22	1.00	0.03	6,8,12,13	0
2	BMP	D	304	22/22	1.00	0.03	6,8,12,13	0
2	BMP	O	315	22/22	1.00	0.03	6,8,12,13	0
2	BMP	E	305	22/22	1.00	0.03	6,8,12,13	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.

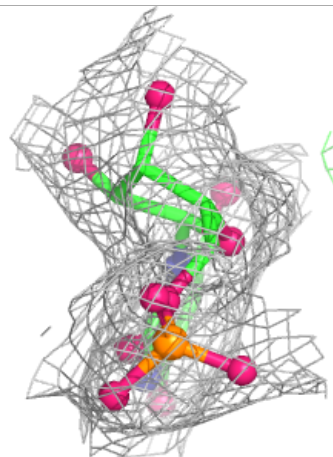
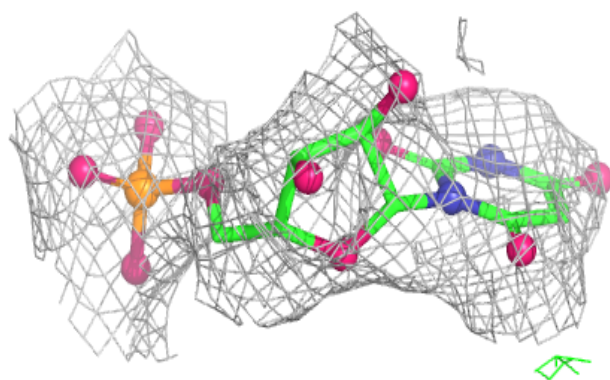
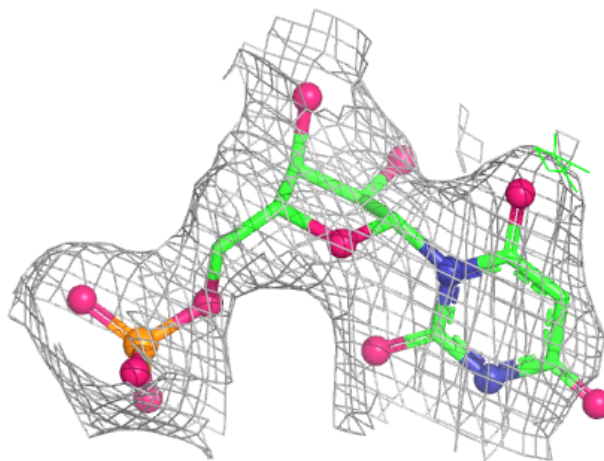
Electron density around BMP B 302:

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



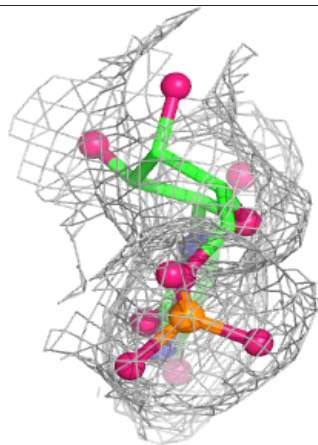
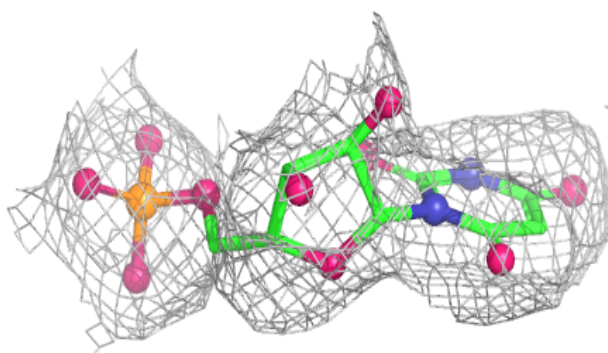
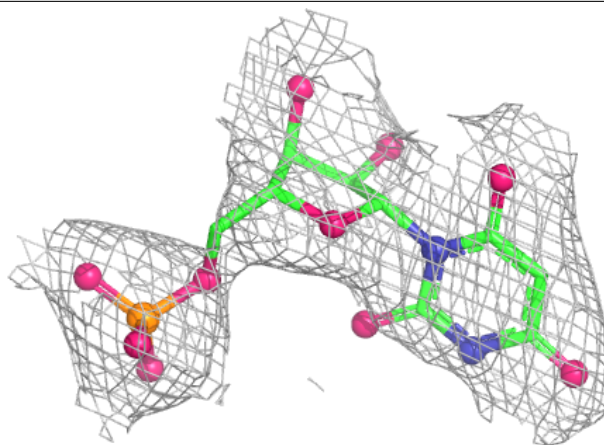
Electron density around BMP F 306:

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



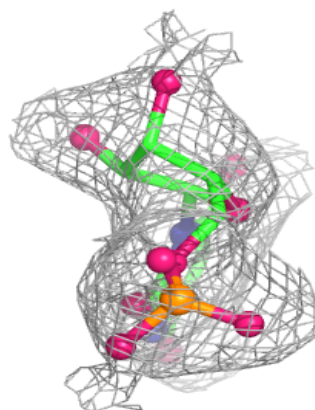
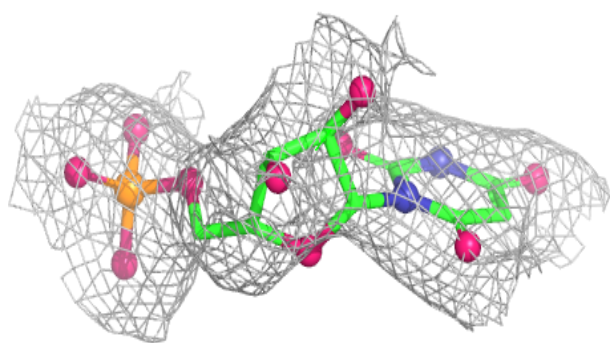
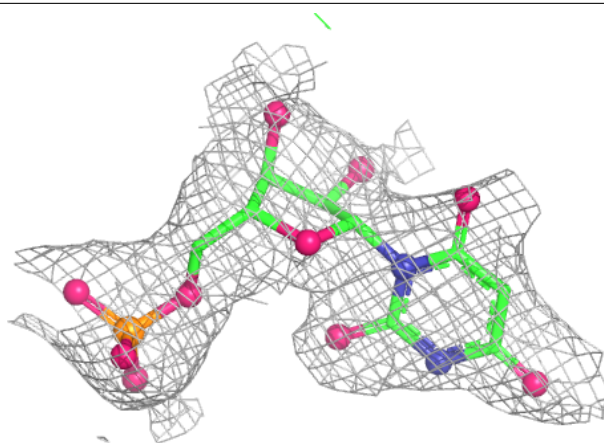
Electron density around BMP H 308:

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



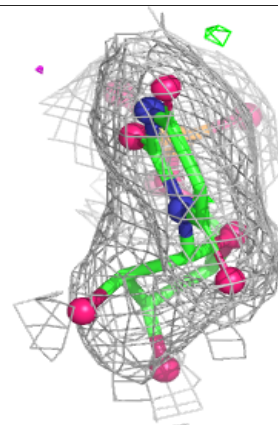
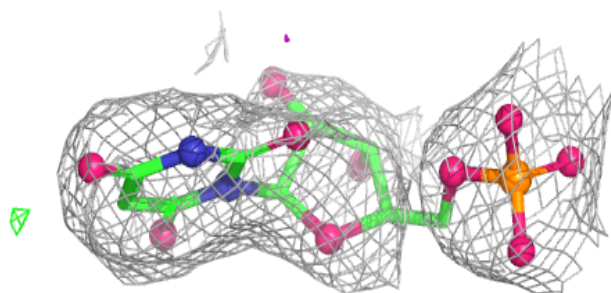
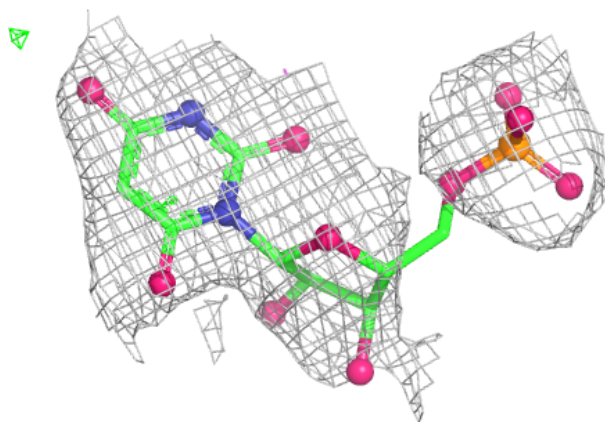
Electron density around BMP I 309:

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



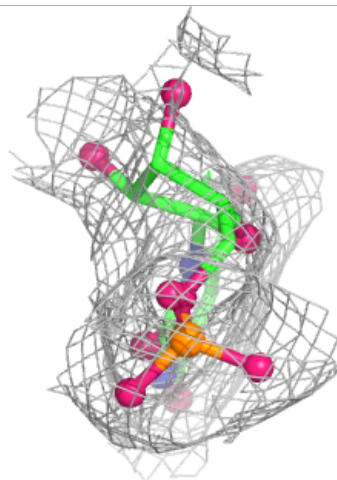
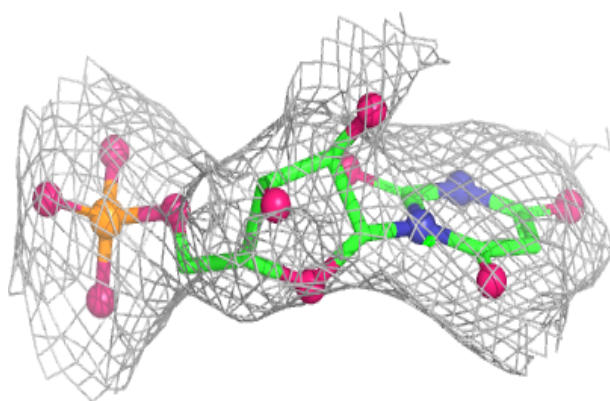
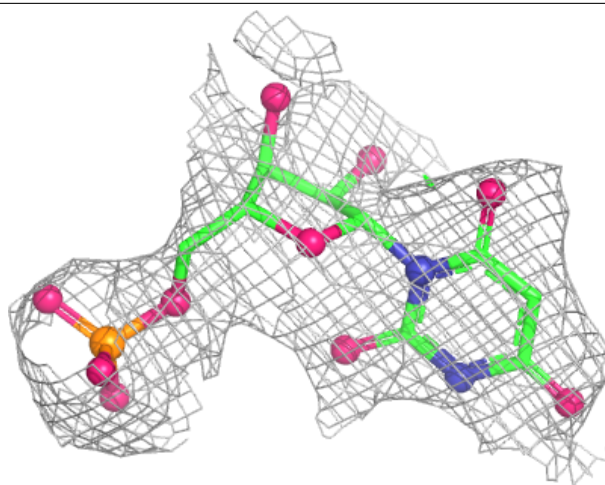
Electron density around BMP J 310:

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



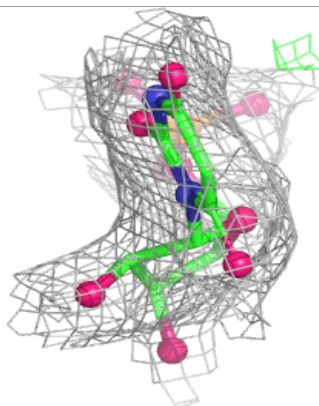
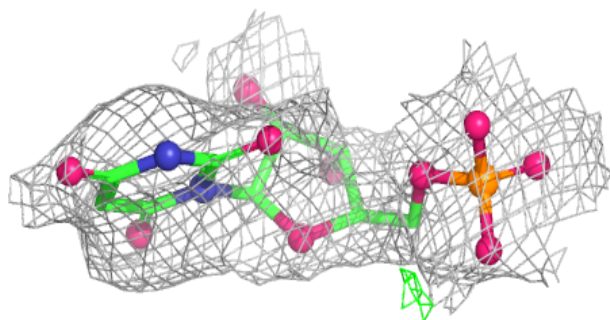
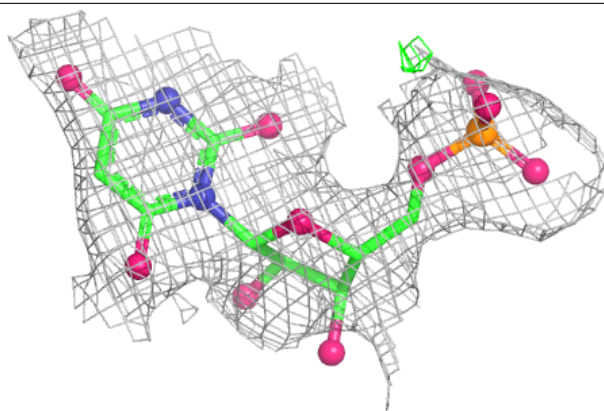
Electron density around BMP K 311:

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

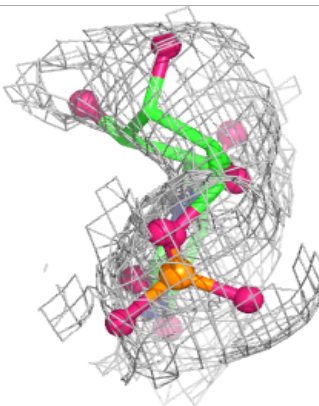
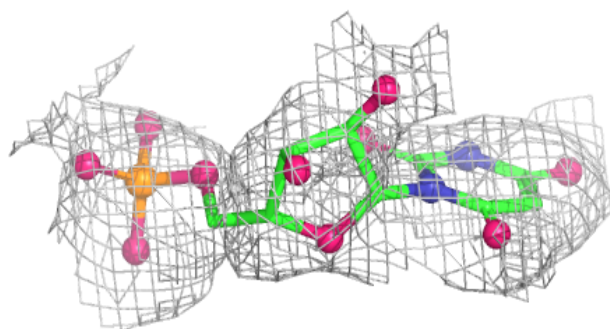
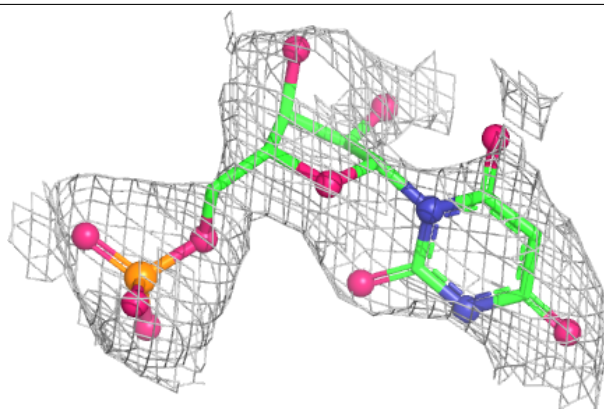


Electron density around BMP L 312:

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

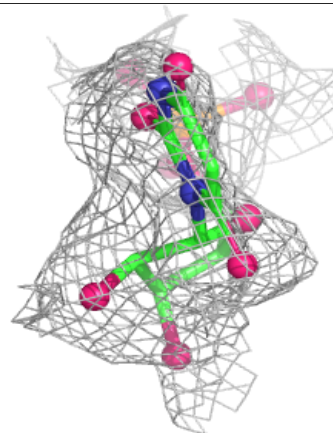
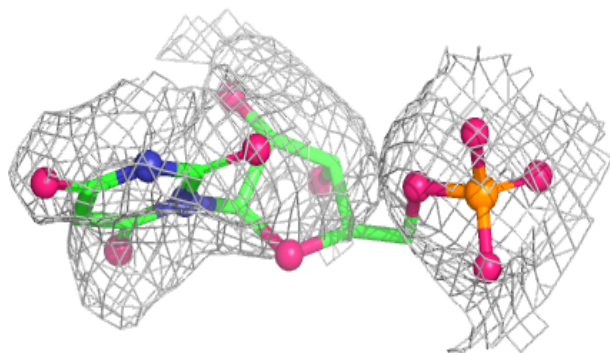
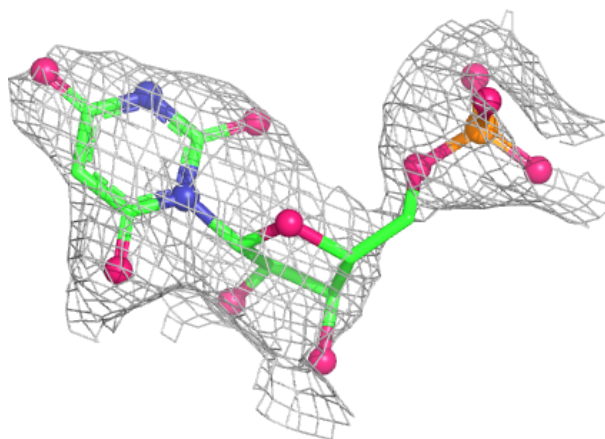
**Electron density around BMP M 313:**

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



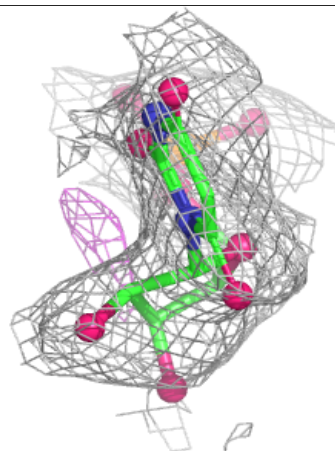
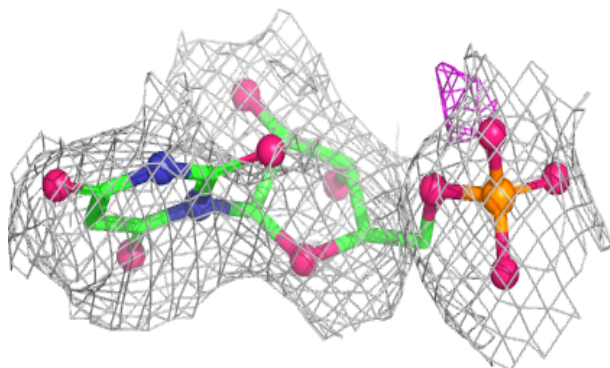
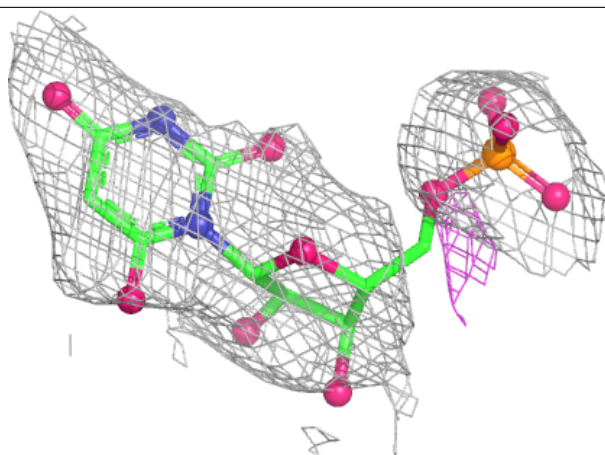
Electron density around BMP N 314:

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



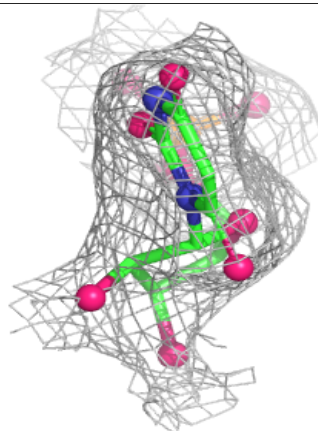
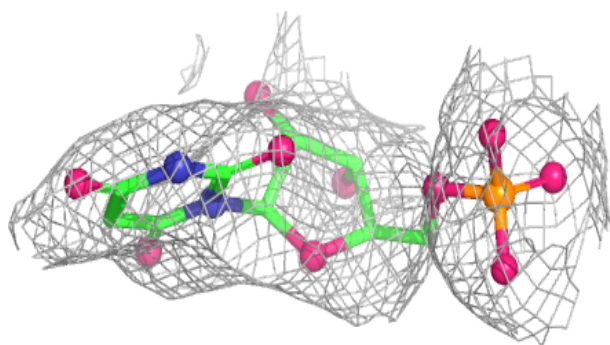
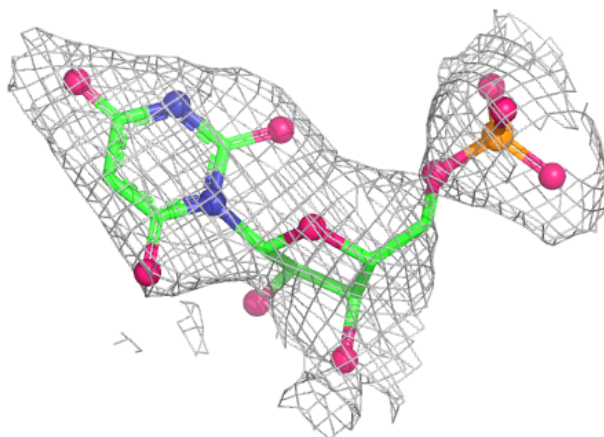
Electron density around BMP P 316:

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

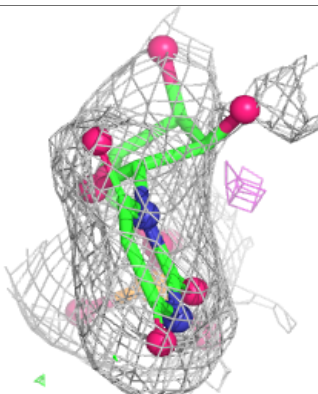
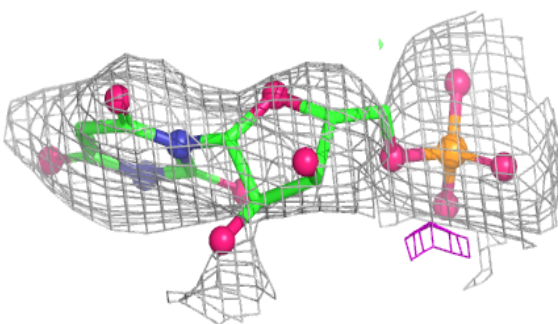
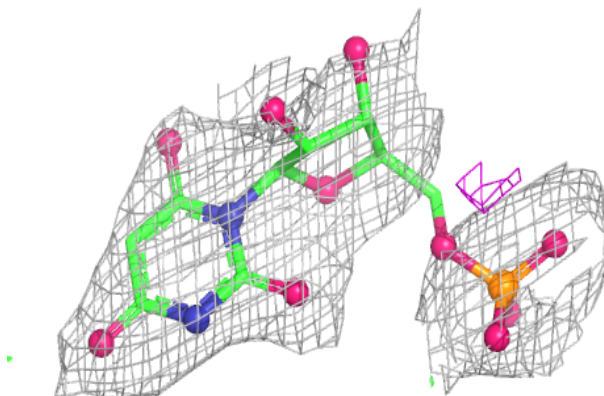


Electron density around BMP A 301:

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

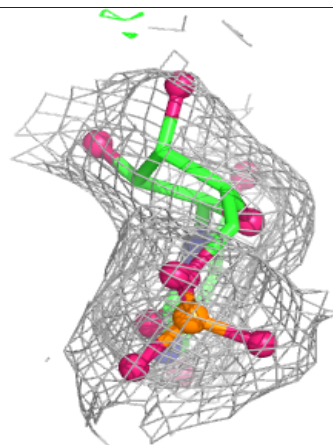
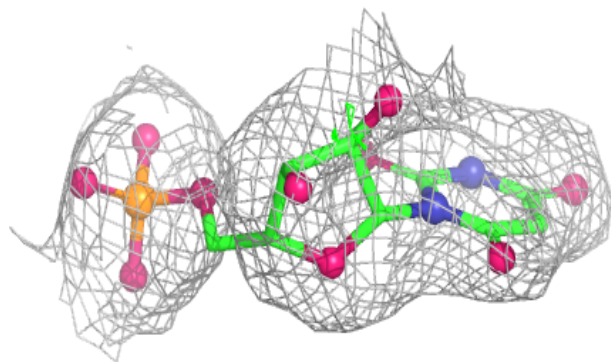
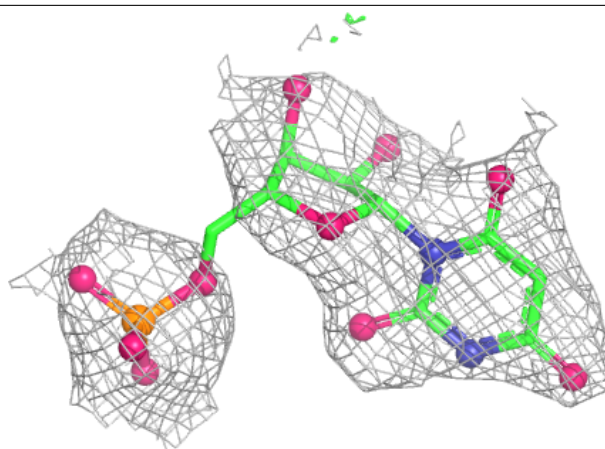
**Electron density around BMP G 307:**

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



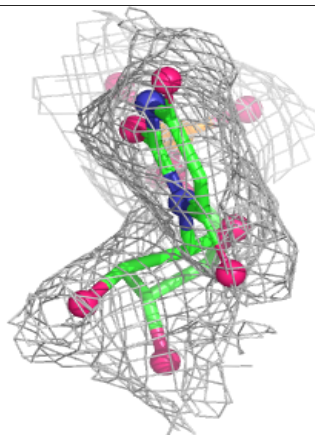
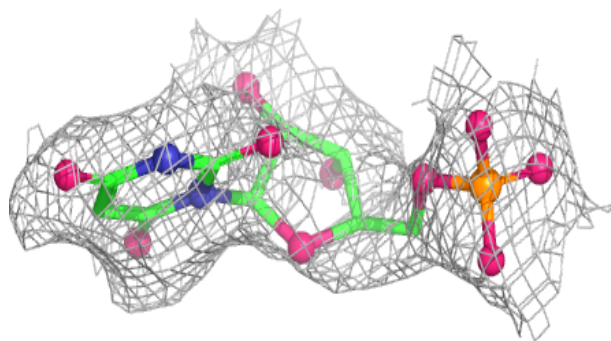
Electron density around BMP C 303:

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



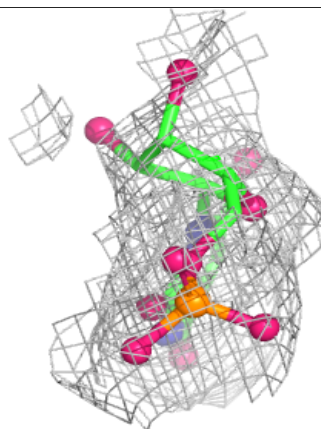
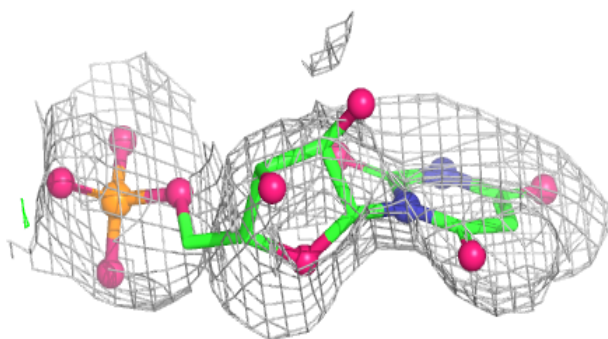
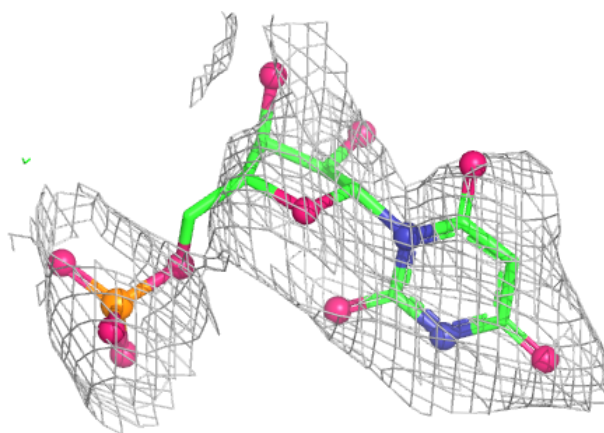
Electron density around BMP D 304:

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

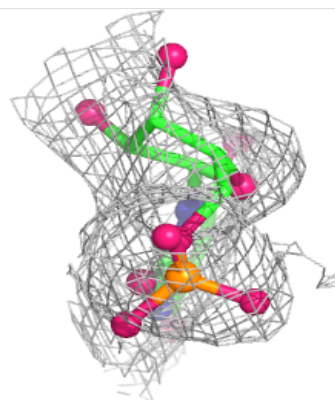
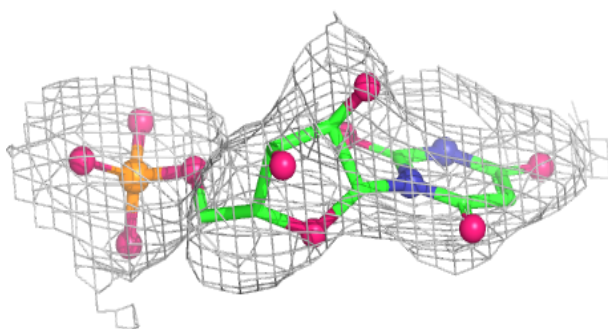
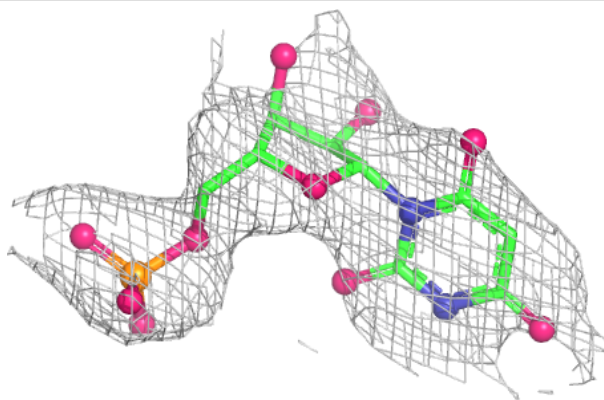


Electron density around BMP O 315:

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

**Electron density around BMP E 305:**

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



6.5 Other polymers [i](#)

There are no such residues in this entry.