WORLDWIDE wwPDB PROTEIN DATA BANK

wwPDB X-ray Structure Validation Summary Report (i)

Jun 12, 2024 – 08:25 PM EDT

PDB ID	:	1G23
Title	:	THE STRUCTURAL BASIS OF THE CATALYTIC MECHANISM AND REGULATION OF GLUCOSE-1-PHOSPHATE THYMIDYLYLTRANSF ERASE (RMLA). GLUCOSE-1-PHOSPHATE COMPLEX.
Authors	:	Blankenfeldt, W.; Asuncion, M.; Lam, J.S.; Naismith, J.H.
Deposited on	:	2000-10-16
Resolution	:	2.80 Å(reported)

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

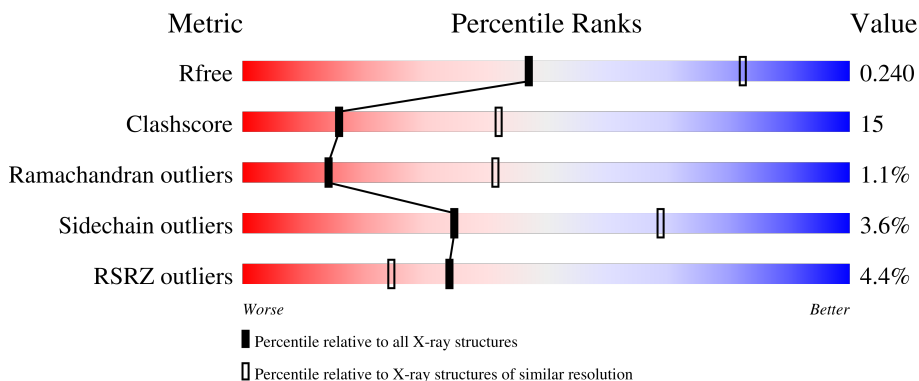|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36.2
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36.2

1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.80 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.
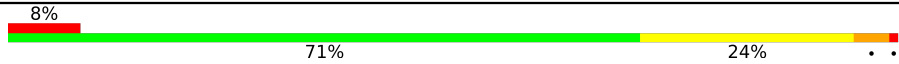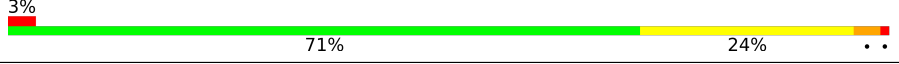
Metric	Percentile Ranks	Value
Rfree		0.240
Clashscore		15
Ramachandran outliers		1.1%
Sidechain outliers		3.6%
RSRZ outliers		4.4%

Worse   *Better*

▌ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	3140 (2.80-2.80)
Clashscore	141614	3569 (2.80-2.80)
Ramachandran outliers	138981	3498 (2.80-2.80)
Sidechain outliers	138945	3500 (2.80-2.80)
RSRZ outliers	127900	3078 (2.80-2.80)

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 <=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	293	3% / 72% / 24% / •
1	B	293	3% / 74% / 22% / • •
1	C	293	4% / 71% / 24% / • •
1	D	293	7% / 71% / 25% / • •

Continued from previous page...

Mol	Chain	Length	Quality of chain
1	E	293	8% ... 71% ... 24% ...
1	F	293	3% ... 70% ... 26% ...
1	G	293	3% ... 71% ... 24% ...
1	H	293	3% ... 69% ... 27% ...

2 Entry composition ⓘ

There are 3 unique types of molecules in this entry. The entry contains 18473 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 GLUCOSE-1-PHOSPHATE THYMIDYLYLTRANSFERASE.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	292	Total	C	N	O	S	Se	0	0	0
			2285	1462	385	434	1	3			
1	B	292	Total	C	N	O	S	Se	0	0	0
			2285	1462	385	434	1	3			
1	C	292	Total	C	N	O	S	Se	0	0	0
			2285	1462	385	434	1	3			
1	D	292	Total	C	N	O	S	Se	0	0	0
			2285	1462	385	434	1	3			
1	E	292	Total	C	N	O	S	Se	0	0	0
			2285	1462	385	434	1	3			
1	F	292	Total	C	N	O	S	Se	0	0	0
			2285	1462	385	434	1	3			
1	G	292	Total	C	N	O	S	Se	0	0	0
			2285	1462	385	434	1	3			
1	H	292	Total	C	N	O	S	Se	0	0	0
			2285	1462	385	434	1	3			

There are 32 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	MSE	MET	modified residue	UNP Q9HU22
A	35	MSE	MET	modified residue	UNP Q9HU22
A	44	MSE	MET	modified residue	UNP Q9HU22
A	217	MSE	MET	modified residue	UNP Q9HU22
B	1	MSE	MET	modified residue	UNP Q9HU22
B	35	MSE	MET	modified residue	UNP Q9HU22
B	44	MSE	MET	modified residue	UNP Q9HU22
B	217	MSE	MET	modified residue	UNP Q9HU22
C	1	MSE	MET	modified residue	UNP Q9HU22
C	35	MSE	MET	modified residue	UNP Q9HU22
C	44	MSE	MET	modified residue	UNP Q9HU22
C	217	MSE	MET	modified residue	UNP Q9HU22

Continued on next page...

Continued from previous page...

Chain	Residue	Modelled	Actual	Comment	Reference
D	1	MSE	MET	modified residue	UNP Q9HU22
D	35	MSE	MET	modified residue	UNP Q9HU22
D	44	MSE	MET	modified residue	UNP Q9HU22
D	217	MSE	MET	modified residue	UNP Q9HU22
E	1	MSE	MET	modified residue	UNP Q9HU22
E	35	MSE	MET	modified residue	UNP Q9HU22
E	44	MSE	MET	modified residue	UNP Q9HU22
E	217	MSE	MET	modified residue	UNP Q9HU22
F	1	MSE	MET	modified residue	UNP Q9HU22
F	35	MSE	MET	modified residue	UNP Q9HU22
F	44	MSE	MET	modified residue	UNP Q9HU22
F	217	MSE	MET	modified residue	UNP Q9HU22
G	1	MSE	MET	modified residue	UNP Q9HU22
G	35	MSE	MET	modified residue	UNP Q9HU22
G	44	MSE	MET	modified residue	UNP Q9HU22
G	217	MSE	MET	modified residue	UNP Q9HU22
H	1	MSE	MET	modified residue	UNP Q9HU22
H	35	MSE	MET	modified residue	UNP Q9HU22
H	44	MSE	MET	modified residue	UNP Q9HU22
H	217	MSE	MET	modified residue	UNP Q9HU22

- Molecule 2 is 1-O-phosphono-alpha-D-glucopyranose (three-letter code: G1P) (formula: $C_6H_{13}O_9P$).
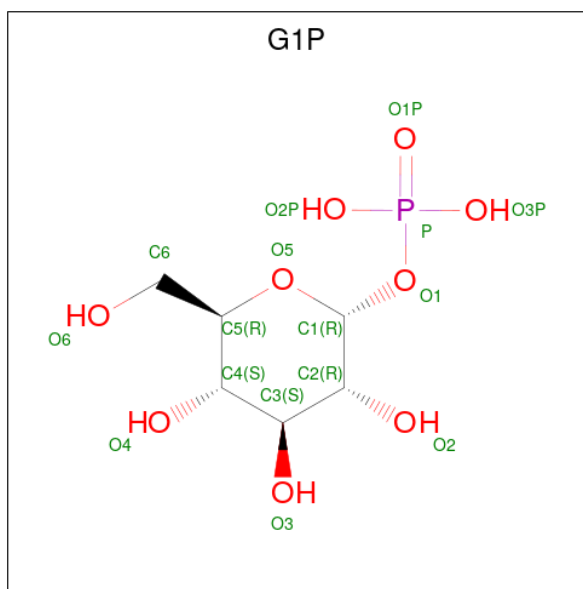
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	O	P		
2	A	1	16	6	9	1	0	0

Continued on next page...

Continued from previous page...

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	B	1	Total C O P 16 6 9 1				0	0
2	C	1	Total C O P 16 6 9 1				0	0
2	D	1	Total C O P 16 6 9 1				0	0
2	E	1	Total C O P 16 6 9 1				0	0
2	F	1	Total C O P 16 6 9 1				0	0
2	G	1	Total C O P 16 6 9 1				0	0
2	H	1	Total C O P 16 6 9 1				0	0

- Molecule 3 is SULFATE ION (three-letter code: SO4) (formula: O_4S).

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

Continued from previous page...

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	D	1	Total 5	O 4	S 1	0	0
3	E	1	Total 5	O 4	S 1	0	0
3	E	1	Total 5	O 4	S 1	0	0
3	F	1	Total 5	O 4	S 1	0	0
3	F	1	Total 5	O 4	S 1	0	0
3	F	1	Total 5	O 4	S 1	0	0
3	G	1	Total 5	O 4	S 1	0	0
3	G	1	Total 5	O 4	S 1	0	0
3	H	1	Total 5	O 4	S 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.
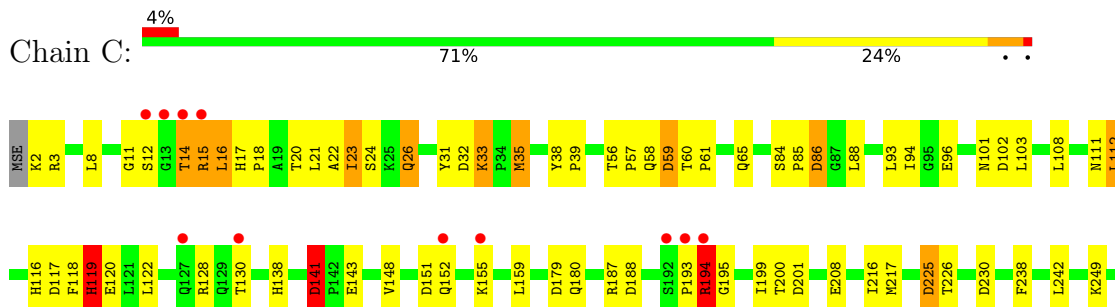
• Molecule 1: GLUCOSE-1-PHOSPHATE THYMIDYLYLTRANSFERASE
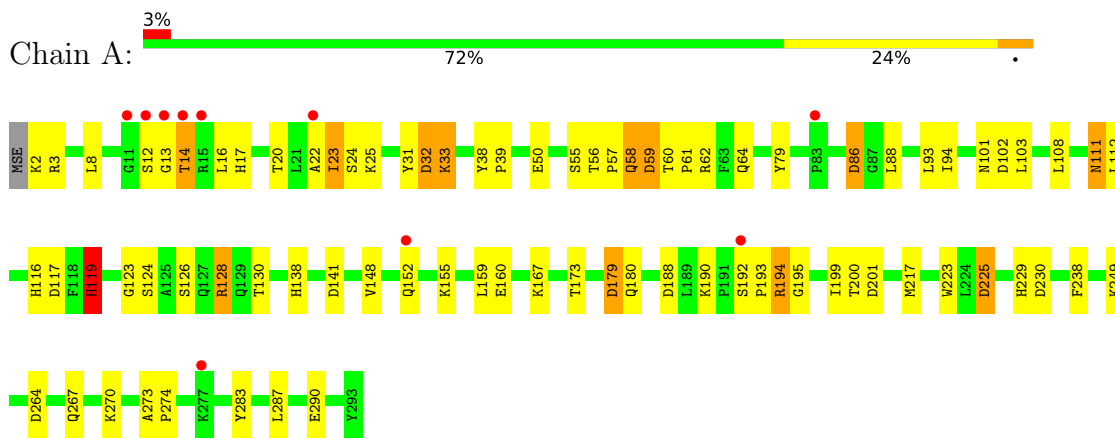
• Molecule 1: GLUCOSE-1-PHOSPHATE THYMIDYLYLTRANSFERASE

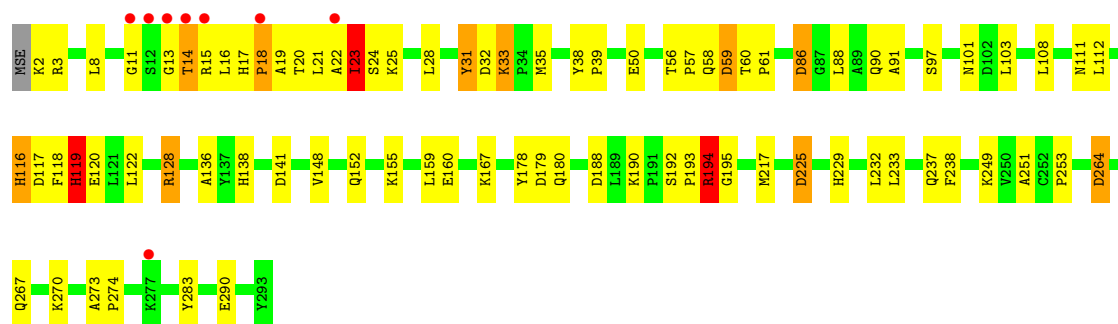• Molecule 1: GLUCOSE-1-PHOSPHATE THYMIDYLYLTRANSFERASE

• Molecule 1: GLUCOSE-1-PHOSPHATE THYMIDYLYLTRANSFERASE

Chain D:

• Molecule 1: GLUCOSE-1-PHOSPHATE THYMIDYLYLTRANSFERASE

Chain E:

• Molecule 1: GLUCOSE-1-PHOSPHATE THYMIDYLYLTRANSFERASE

Chain F:

• Molecule 1: GLUCOSE-1-PHOSPHATE THYMIDYLYLTRANSFERASE

Chain G:

• Molecule 1: GLUCOSE-1-PHOSPHATE THYMIDYLYLTRANSFERASE

Chain H:
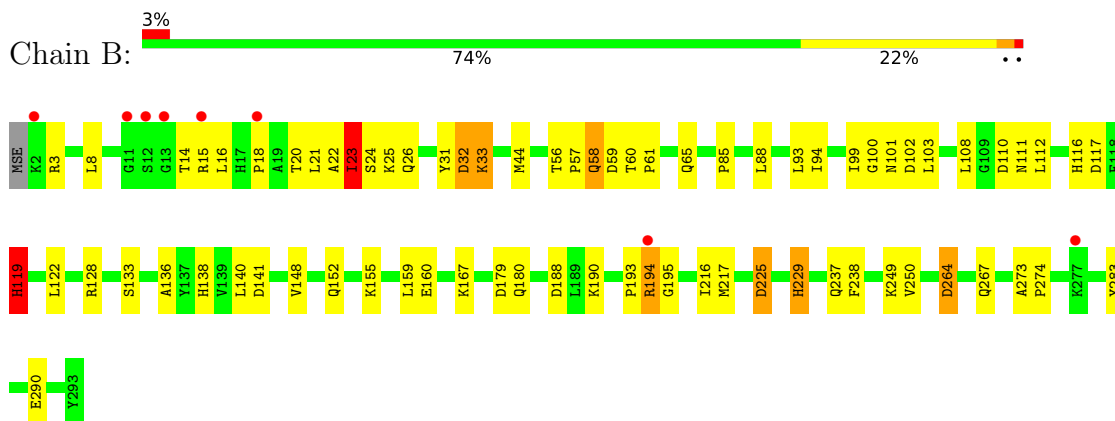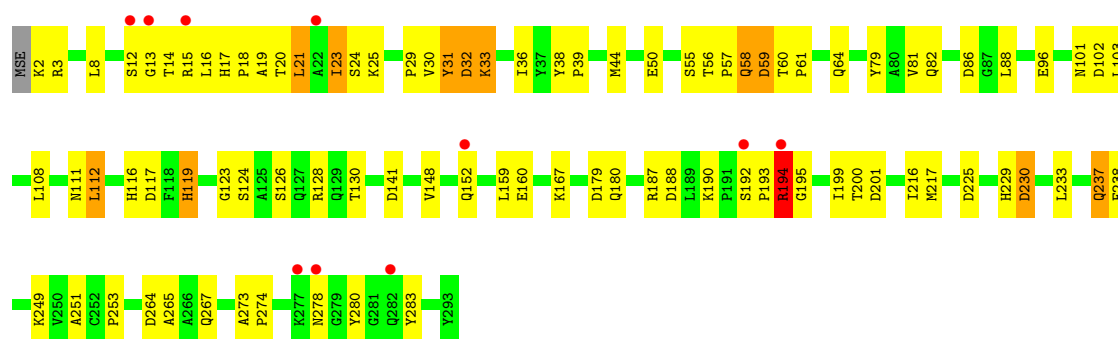
4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α, β, γ	71.58Å 73.90Å 133.75Å 89.81° 80.31° 80.18°	Depositor
Resolution (Å)	72.55 – 2.80 19.99 – 2.80	Depositor EDS
% Data completeness (in resolution range)	95.1 (72.55-2.80) 95.0 (19.99-2.80)	Depositor EDS
R_{merge}	0.02	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	8.70 (at 2.79Å)	Xtriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.199 , 0.226 0.215 , 0.240	Depositor DCC
R_{free} test set	3103 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å^2)	34.4	Xtriage
Anisotropy	0.142	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.36 , 50.2	EDS
L-test for twinning[2]	$< \lvert L \rvert > = 0.49, < L^2 > = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.90	EDS
Total number of atoms	18473	wwPDB-VP
Average B, all atoms (Å^2)	29.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.61% of the height of the origin peak. No significant pseudotranslation is detected.*

---

[1]Intensities estimated from amplitudes.
[2]Theoretical values of $< \lvert L \rvert >$, $< L^2 >$ 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: G1P, SO4

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	1.20	10/2332 (0.4%)	1.16	13/3159 (0.4%)
1	B	1.28	19/2332 (0.8%)	1.15	11/3159 (0.3%)
1	C	1.27	15/2332 (0.6%)	1.23	13/3159 (0.4%)
1	D	1.39	17/2332 (0.7%)	1.29	17/3159 (0.5%)
1	E	1.56	17/2332 (0.7%)	1.31	21/3159 (0.7%)
1	F	1.50	24/2332 (1.0%)	1.19	19/3159 (0.6%)
1	G	1.29	14/2332 (0.6%)	1.13	10/3159 (0.3%)
1	H	1.36	16/2332 (0.7%)	1.26	18/3159 (0.6%)
All	All	1.36	132/18656 (0.7%)	1.22	122/25272 (0.5%)

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	B	0	1
1	C	0	1
1	D	0	1
1	E	0	1
1	F	0	3
1	G	0	2
1	H	0	1
All	All	0	10

The worst 5 of 132 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	E	194	ARG	CZ-NH1	-26.66	0.98	1.33
1	D	194	ARG	CZ-NH1	-26.41	0.98	1.33
1	E	267	GLN	CB-CG	-22.59	0.91	1.52

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	F	155	LYS	CB-CG	-19.42	1.00	1.52
1	H	237	GLN	CB-CG	-17.86	1.04	1.52

The worst 5 of 122 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	194	ARG	NE-CZ-NH2	29.21	134.91	120.30
1	E	194	ARG	NE-CZ-NH2	29.21	134.90	120.30
1	H	23	ILE	CG1-CB-CG2	-26.59	52.90	111.40
1	C	141	ASP	CB-CG-OD1	-22.25	98.28	118.30
1	C	141	ASP	CB-CG-OD2	19.32	135.69	118.30

There are no chirality outliers.

5 of 10 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	119	HIS	Sidechain
1	C	119	HIS	Sidechain
1	D	119	HIS	Sidechain
1	E	119	HIS	Sidechain
1	F	116	HIS	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	A	2285	0	2272	63	0
1	B	2285	0	2272	60	0
1	C	2285	0	2272	71	1
1	D	2285	0	2272	84	0
1	E	2285	0	2272	81	0
1	F	2285	0	2272	68	0
1	G	2285	0	2272	86	1
1	H	2285	0	2272	67	0
2	A	16	0	11	1	0
2	B	16	0	11	1	0
2	C	16	0	11	1	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	D	16	0	11	1	0
2	E	16	0	11	1	0
2	F	16	0	11	1	0
2	G	16	0	11	1	0
2	H	16	0	11	1	0
3	A	5	0	0	0	0
3	B	5	0	0	0	0
3	C	5	0	0	0	0
3	D	10	0	0	1	0
3	E	10	0	0	0	0
3	F	15	0	0	1	0
3	G	10	0	0	0	0
3	H	5	0	0	0	0
All	All	18473	0	18264	536	1

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 15.

The worst 5 of 536 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:267:GLN:CB	1:E:267:GLN:CD	1.82	1.45
1:E:267:GLN:CG	1:E:267:GLN:CA	2.06	1.32
1:C:141:ASP:OD1	1:C:141:ASP:N	1.71	1.12
1:E:267:GLN:CB	1:E:267:GLN:HG3	1.51	1.02
1:E:267:GLN:CG	1:E:267:GLN:HB2	1.52	1.02

All (1) 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:C:208:GLU:OE1	1:G:180:GLN:NE2[1_556]	2.09	0.11

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	290/293 (99%)	281 (97%)	7 (2%)	2 (1%)	22	53
1	B	290/293 (99%)	278 (96%)	10 (3%)	2 (1%)	22	53
1	C	290/293 (99%)	276 (95%)	8 (3%)	6 (2%)	7	23
1	D	290/293 (99%)	280 (97%)	8 (3%)	2 (1%)	22	53
1	E	290/293 (99%)	273 (94%)	12 (4%)	5 (2%)	9	29
1	F	290/293 (99%)	279 (96%)	9 (3%)	2 (1%)	22	53
1	G	290/293 (99%)	281 (97%)	6 (2%)	3 (1%)	15	44
1	H	290/293 (99%)	279 (96%)	8 (3%)	3 (1%)	15	44
All	All	2320/2344 (99%)	2227 (96%)	68 (3%)	25 (1%)	14	41

5 of 25 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	16	LEU
1	C	194	ARG
1	E	12	SER
1	B	194	ARG
1	D	194	ARG

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	239/236 (101%)	230 (96%)	9 (4%)	33	67
1	B	239/236 (101%)	228 (95%)	11 (5%)	27	60
1	C	239/236 (101%)	230 (96%)	9 (4%)	33	67
1	D	239/236 (101%)	230 (96%)	9 (4%)	33	67
1	E	239/236 (101%)	230 (96%)	9 (4%)	33	67

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	F	239/236 (101%)	232 (97%)	7 (3%)	42	76
1	G	239/236 (101%)	231 (97%)	8 (3%)	38	72
1	H	239/236 (101%)	233 (98%)	6 (2%)	47	80
All	All	1912/1888 (101%)	1844 (96%)	68 (4%)	35	69

5 of 68 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	G	33	LYS
1	G	119	HIS
1	H	111	ASN
1	C	119	HIS
1	C	111	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 17 such sidechains are listed below:

Mol	Chain	Res	Type
1	H	17	HIS
1	H	237	GLN
1	D	119	HIS
1	E	119	HIS
1	F	17	HIS

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 monosaccharides in this entry.

5.6 Ligand geometry ⓘ

21 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	SO4	A	600	-	4,4,4	0.20	0	6,6,6	1.04	0
3	SO4	G	606	-	4,4,4	0.37	0	6,6,6	1.09	0
3	SO4	B	601	-	4,4,4	0.33	0	6,6,6	0.87	0
3	SO4	C	602	-	4,4,4	0.39	0	6,6,6	0.30	0
2	G1P	E	504	-	15,16,16	2.01	3 (20%)	23,24,24	4.53	10 (43%)
2	G1P	A	500	-	15,16,16	2.03	3 (20%)	23,24,24	3.89	7 (30%)
3	SO4	H	607	-	4,4,4	0.24	0	6,6,6	0.62	0
2	G1P	H	507	-	15,16,16	1.89	4 (26%)	23,24,24	3.79	4 (17%)
3	SO4	D	603	-	4,4,4	0.39	0	6,6,6	1.02	0
3	SO4	E	609	-	4,4,4	0.48	0	6,6,6	0.20	0
3	SO4	F	605	-	4,4,4	0.28	0	6,6,6	1.14	0
3	SO4	G	612	-	4,4,4	0.23	0	6,6,6	0.44	0
2	G1P	D	503	-	15,16,16	1.96	3 (20%)	23,24,24	4.16	7 (30%)
2	G1P	C	502	-	15,16,16	2.04	3 (20%)	23,24,24	3.47	7 (30%)
3	SO4	F	611	-	4,4,4	0.22	0	6,6,6	0.82	0
3	SO4	F	610	-	4,4,4	0.23	0	6,6,6	1.03	1 (16%)
3	SO4	D	608	-	4,4,4	0.36	0	6,6,6	0.47	0
2	G1P	B	501	-	15,16,16	1.93	3 (20%)	23,24,24	4.65	5 (21%)
3	SO4	E	604	-	4,4,4	0.31	0	6,6,6	1.32	1 (16%)
2	G1P	G	506	-	15,16,16	2.01	3 (20%)	23,24,24	3.63	4 (17%)
2	G1P	F	505	-	15,16,16	2.03	3 (20%)	23,24,24	4.62	8 (34%)

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.

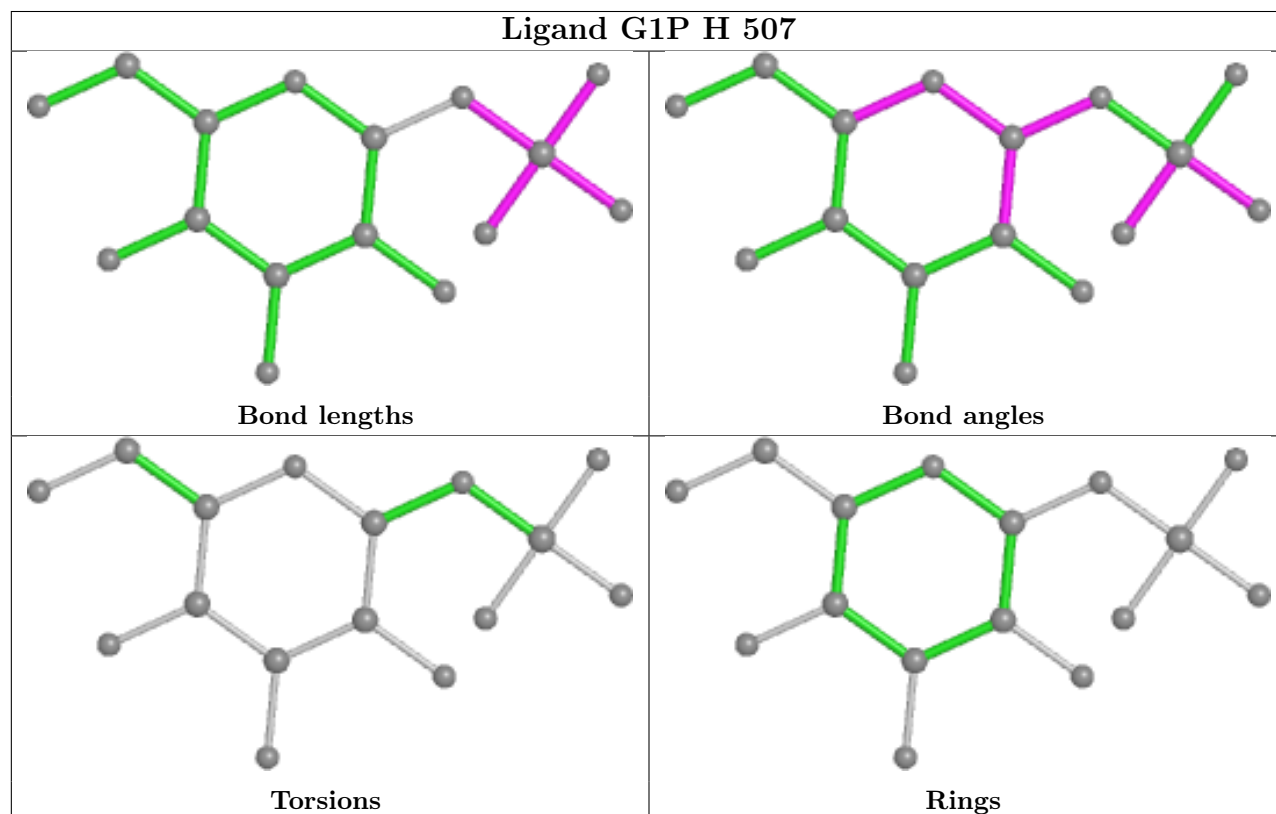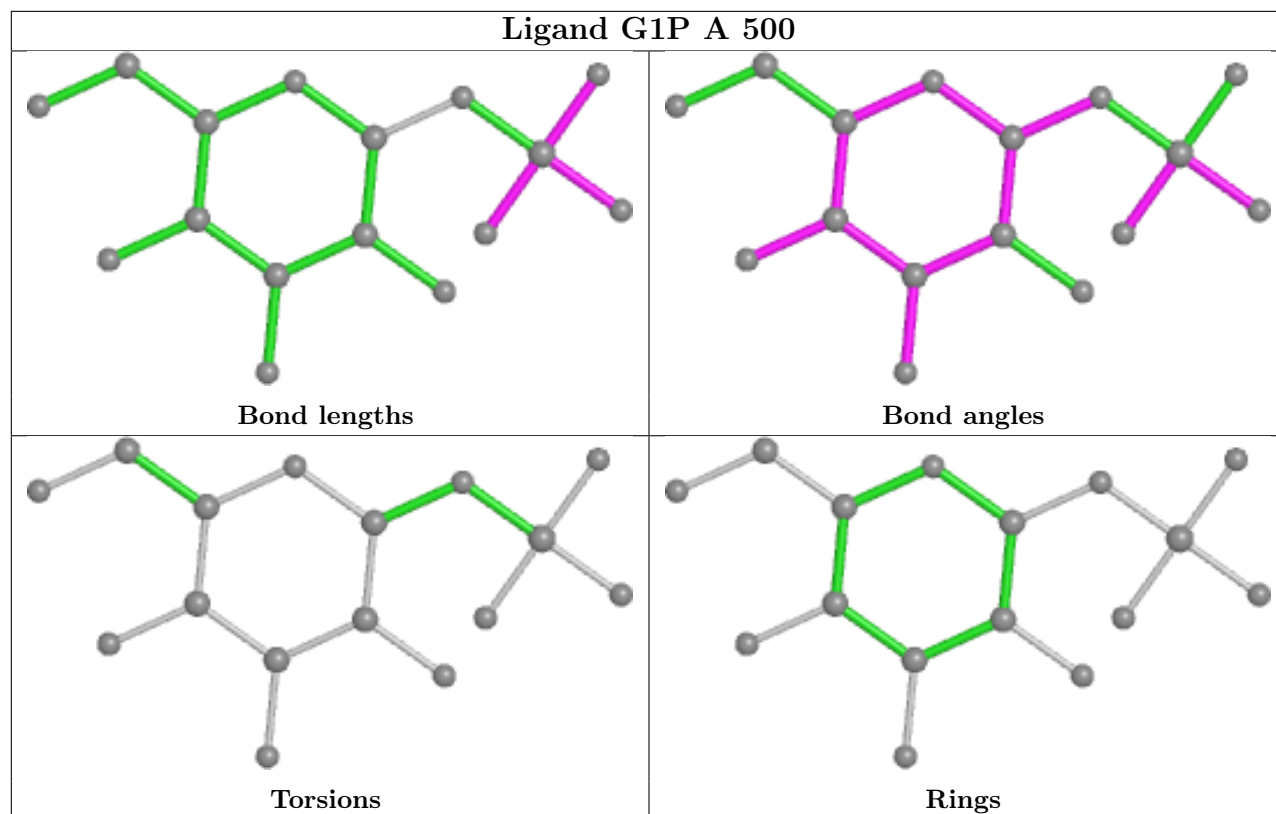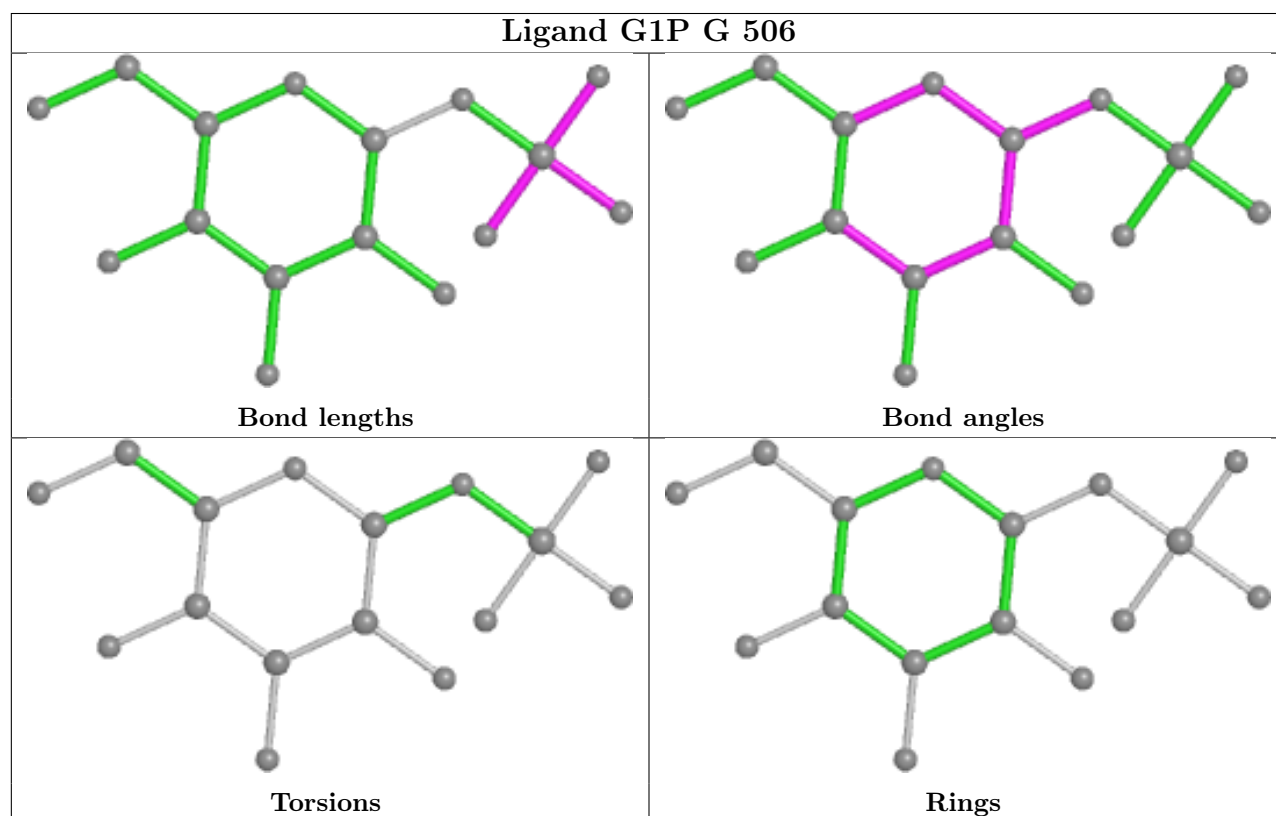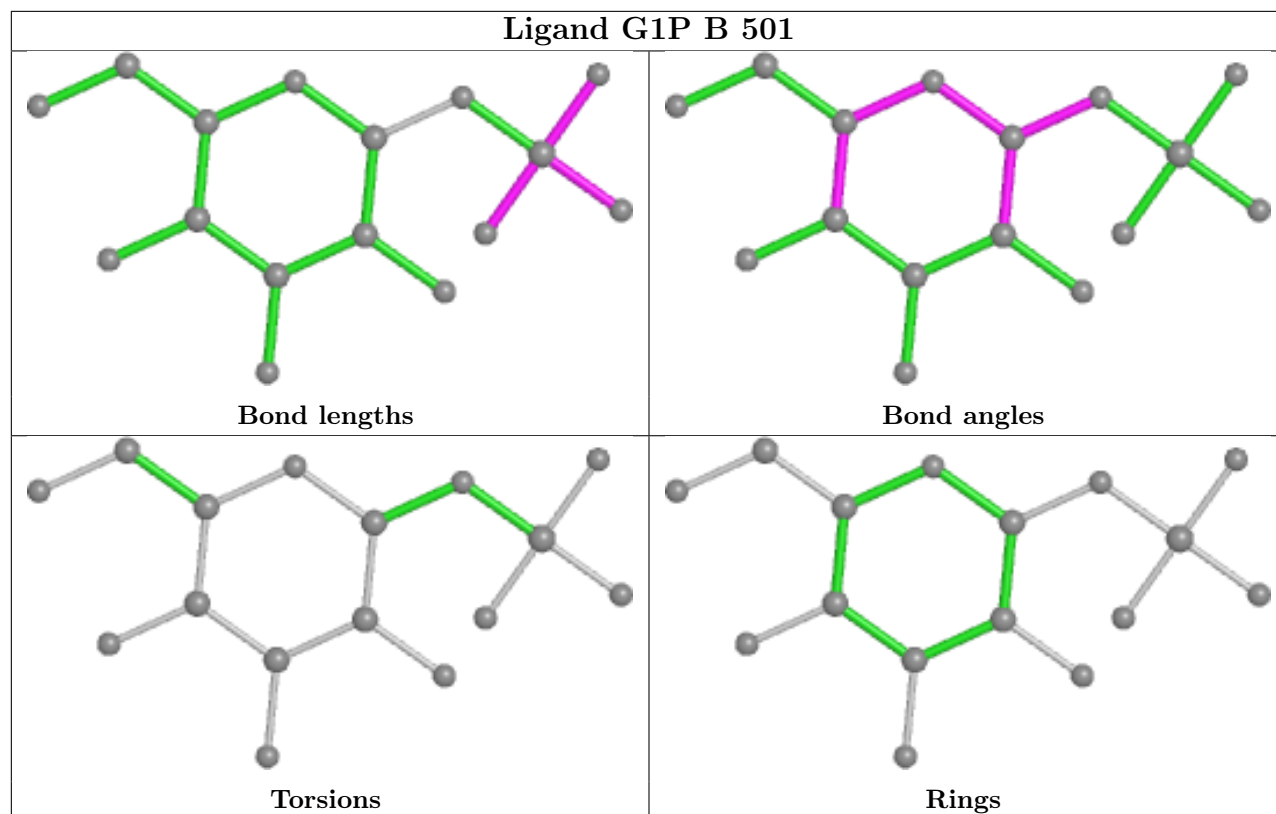| Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	G1P	B	501	-	-	0/7/27/27	0/1/1/1

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	G1P	E	504	-	-	0/7/27/27	0/1/1/1
2	G1P	D	503	-	-	0/7/27/27	0/1/1/1
2	G1P	A	500	-	-	0/7/27/27	0/1/1/1
2	G1P	H	507	-	-	0/7/27/27	0/1/1/1
2	G1P	C	502	-	-	0/7/27/27	0/1/1/1
2	G1P	G	506	-	-	0/7/27/27	0/1/1/1
2	G1P	F	505	-	-	0/7/27/27	0/1/1/1

The worst 5 of 25 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	E	504	G1P	P-O3P	4.68	1.72	1.54
2	C	502	G1P	P-O3P	4.47	1.72	1.54
2	C	502	G1P	P-O2P	4.45	1.72	1.54
2	D	503	G1P	P-O2P	4.42	1.71	1.54
2	F	505	G1P	P-O3P	4.40	1.71	1.54

The worst 5 of 54 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	501	G1P	O5-C1-O1	-20.37	84.74	111.36
2	F	505	G1P	O5-C1-O1	-19.05	86.47	111.36
2	E	504	G1P	O5-C1-O1	-18.54	87.13	111.36
2	D	503	G1P	O5-C1-O1	-17.22	88.86	111.36
2	A	500	G1P	O5-C1-O1	-16.53	89.76	111.36

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

10 monomers are involved in 10 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	E	504	G1P	1	0
2	A	500	G1P	1	0
2	H	507	G1P	1	0
2	D	503	G1P	1	0
2	C	502	G1P	1	0
3	F	610	SO4	1	0
3	D	608	SO4	1	0
2	B	501	G1P	1	0
2	G	506	G1P	1	0

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	F	505	G1P	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 then 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 G1P E 504

Bond lengths   Bond angles

Torsions   Rings

Ligand G1P A 500

Bond lengths

Bond angles

Torsions

Rings

Ligand G1P H 507

Bond lengths

Bond angles

Torsions

Rings

Ligand G1P D 503

Bond lengths

Bond angles

Torsions

Rings

Ligand G1P C 502

Bond lengths

Bond angles

Torsions

Rings

Ligand G1P B 501

Bond lengths

Bond angles

Torsions

Rings

Ligand G1P G 506

Bond lengths

Bond angles

Torsions

Rings

Ligand G1P F 505

Bond lengths

Bond angles

Torsions

Rings

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

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	A	289/293 (98%)	-0.14	10 (3%)	44	34	11, 27, 53, 69	0
1	B	289/293 (98%)	-0.18	8 (2%)	53	43	11, 27, 51, 69	0
1	C	289/293 (98%)	-0.16	11 (3%)	40	30	11, 27, 52, 69	0
1	D	289/293 (98%)	-0.07	21 (7%)	15	8	11, 27, 54, 69	0
1	E	289/293 (98%)	0.06	24 (8%)	11	6	11, 27, 54, 69	0
1	F	289/293 (98%)	-0.09	10 (3%)	44	34	11, 27, 50, 69	0
1	G	289/293 (98%)	-0.09	8 (2%)	53	43	11, 27, 54, 69	0
1	H	289/293 (98%)	-0.19	10 (3%)	44	34	11, 27, 49, 69	0
All	All	2312/2344 (98%)	-0.11	102 (4%)	34	24	11, 27, 52, 69	0

The worst 5 of 102 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	E	194	ARG	9.1
1	D	194	ARG	6.0
1	A	13	GLY	6.0
1	G	11	GLY	5.8
1	E	15	ARG	5.6

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

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

6.3 Carbohydrates ⓘ

There are no monosaccharides in this entry.

6.4 Ligands ⓘ

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
2	G1P	F	505	16/16	0.74	0.40	53,58,62,62	0
2	G1P	H	507	16/16	0.86	0.28	27,30,34,34	0
3	SO4	E	609	5/5	0.86	0.26	55,56,57,58	0
2	G1P	B	501	16/16	0.87	0.31	41,43,44,45	0
2	G1P	E	504	16/16	0.90	0.27	22,25,29,30	0
2	G1P	D	503	16/16	0.90	0.24	28,35,43,43	0
2	G1P	A	500	16/16	0.91	0.27	26,29,33,33	0
3	SO4	F	610	5/5	0.91	0.36	44,45,47,49	0
3	SO4	F	611	5/5	0.91	0.33	62,62,62,63	0
2	G1P	C	502	16/16	0.92	0.25	24,26,28,29	0
2	G1P	G	506	16/16	0.94	0.23	25,26,28,29	0
3	SO4	G	612	5/5	0.94	0.23	46,46,47,48	0
3	SO4	D	608	5/5	0.96	0.28	47,48,49,49	0
3	SO4	H	607	5/5	0.97	0.13	14,15,16,18	0
3	SO4	C	602	5/5	0.98	0.10	19,19,21,22	0
3	SO4	F	605	5/5	0.98	0.12	15,15,17,18	0
3	SO4	E	604	5/5	0.98	0.11	13,17,20,22	0
3	SO4	D	603	5/5	0.99	0.12	13,14,18,19	0
3	SO4	G	606	5/5	0.99	0.07	11,13,15,16	0
3	SO4	B	601	5/5	0.99	0.07	16,19,20,23	0
3	SO4	A	600	5/5	0.99	0.08	17,19,20,22	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 G1P F 505:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
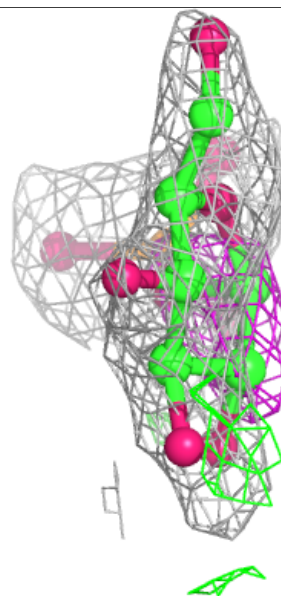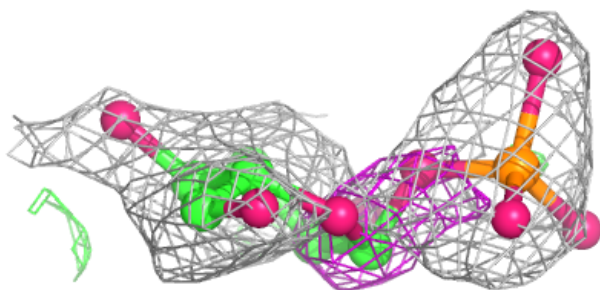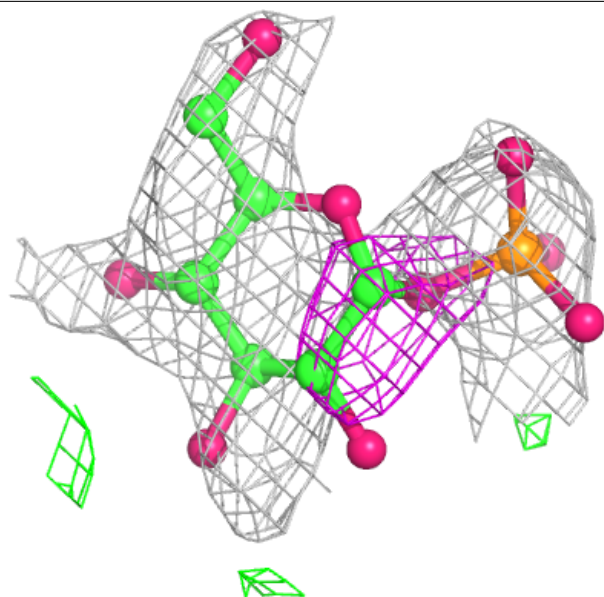
Electron density around G1P H 507:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
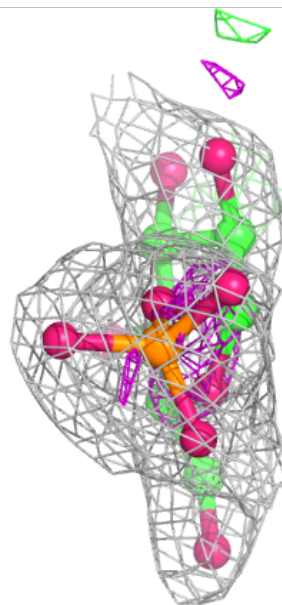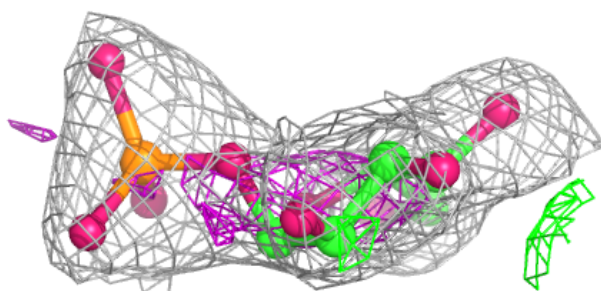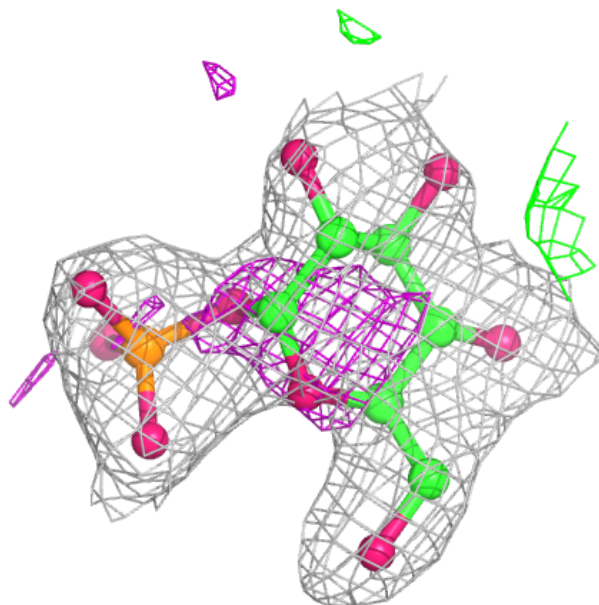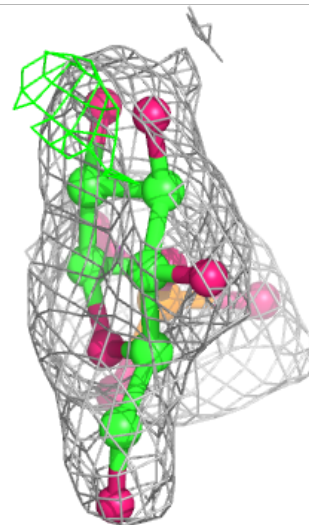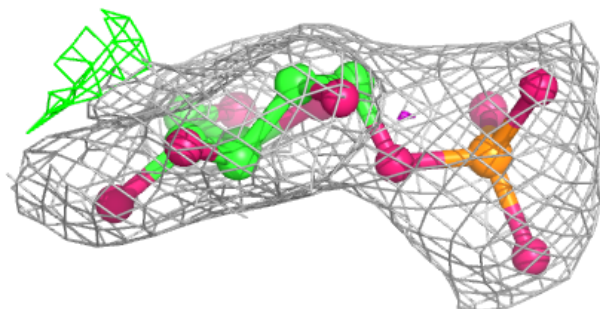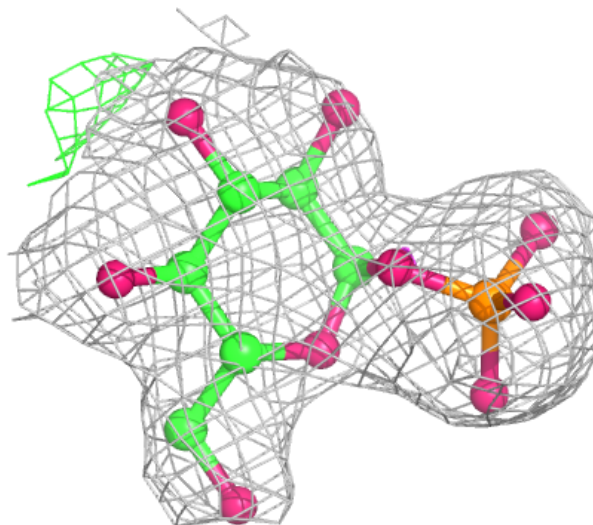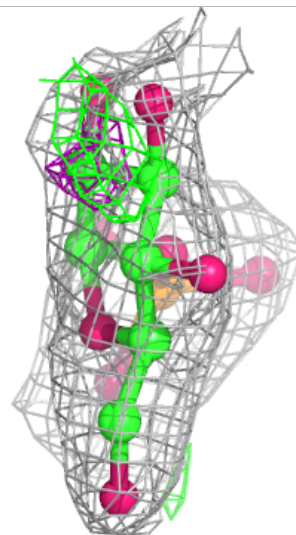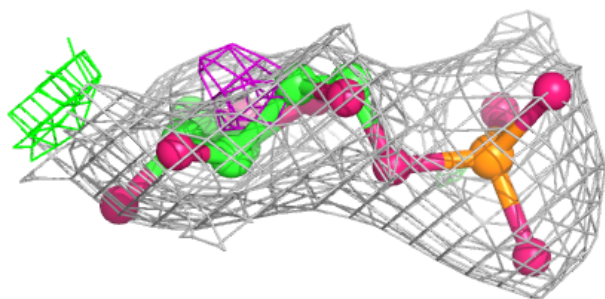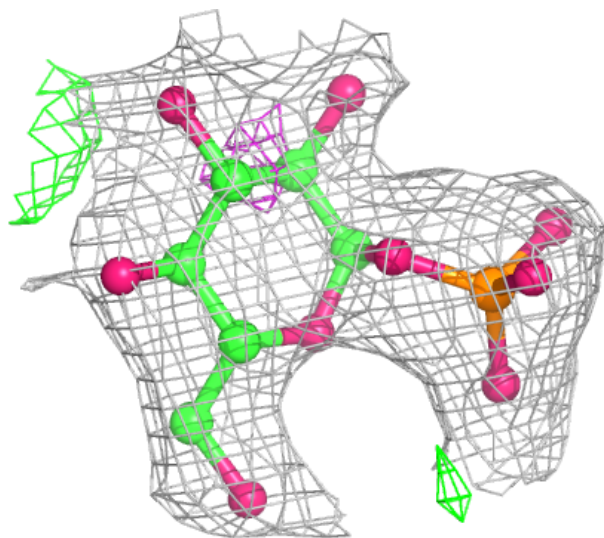$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
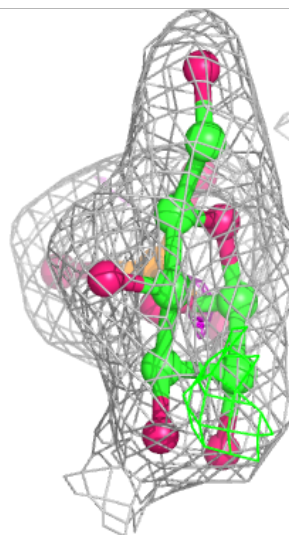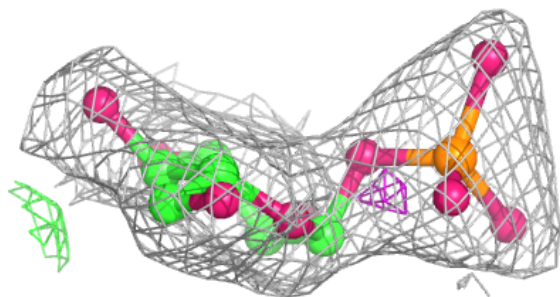and green (positive)
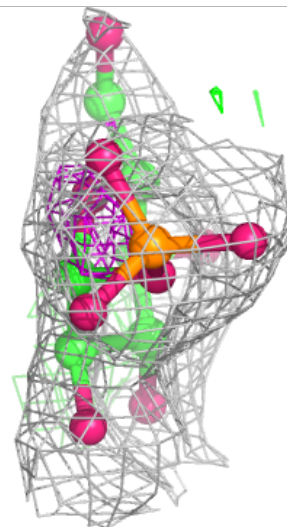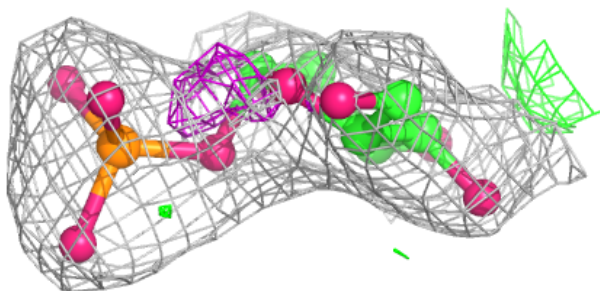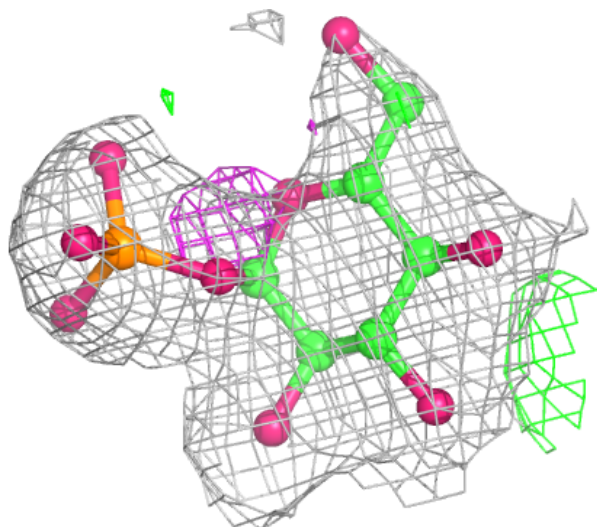
Electron density around G1P B 501:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
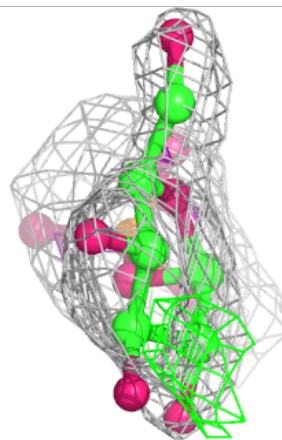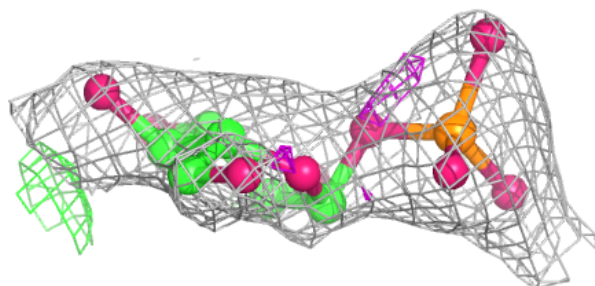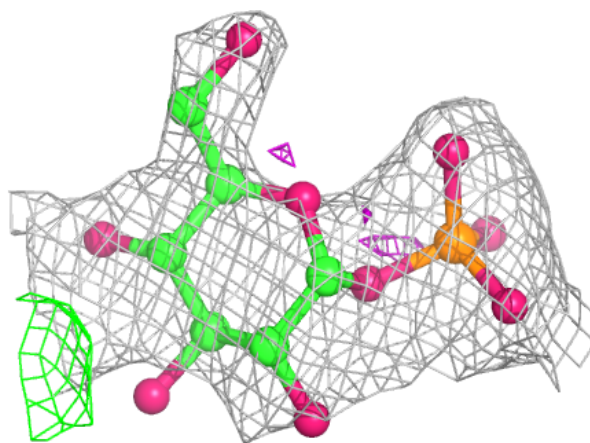
Electron density around G1P E 504:

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

Electron density around G1P D 503:

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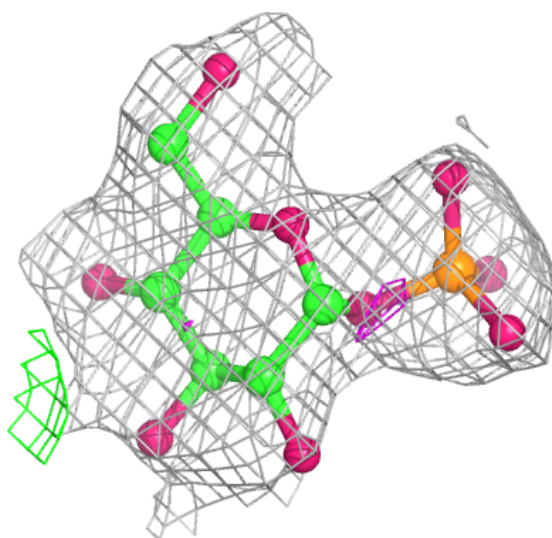$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)

Electron density around G1P A 500:

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

Electron density around G1P C 502:
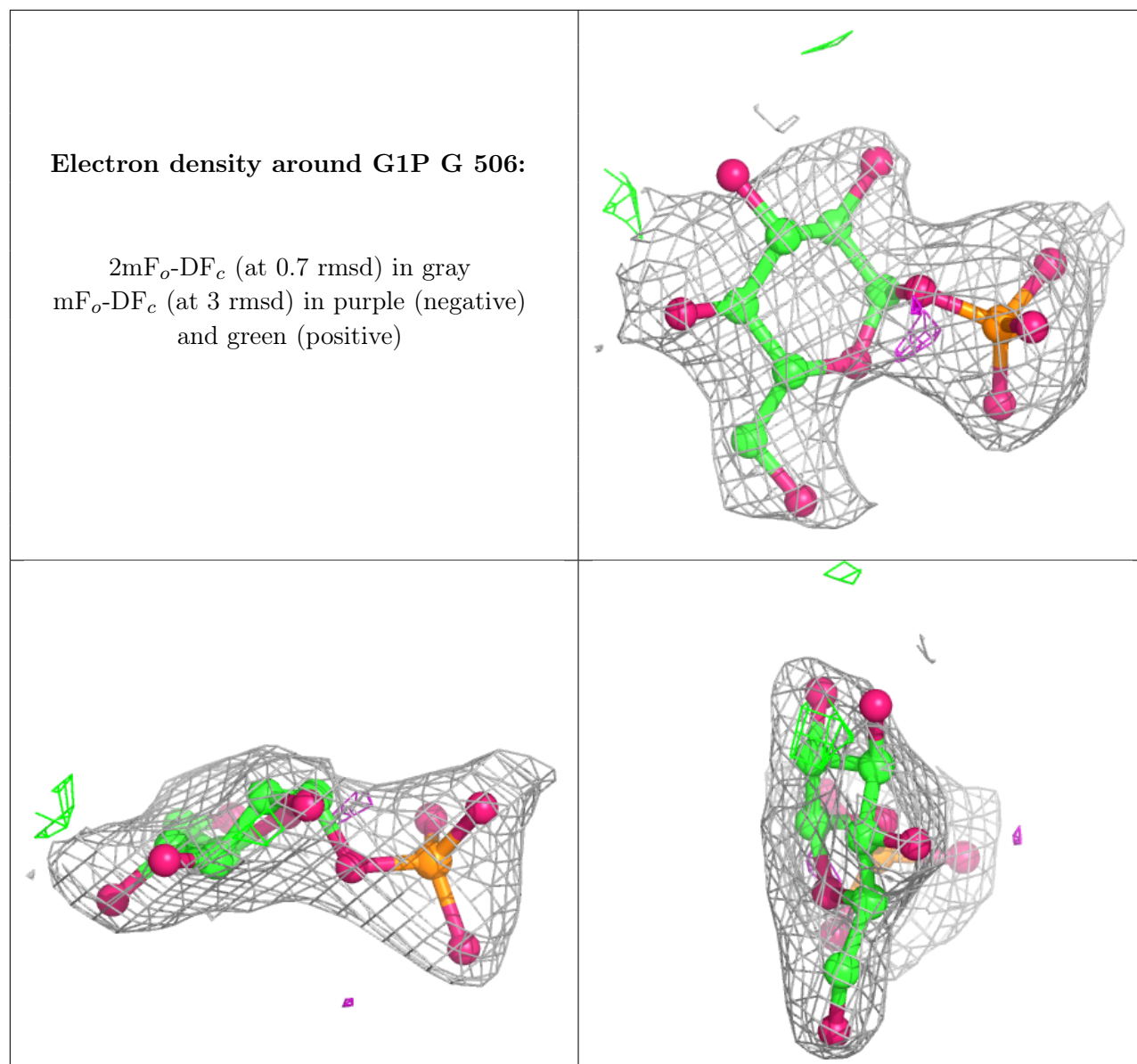
$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)

Electron density around G1P G 506:

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

6.5 Other polymers ⓘ

There are no such residues in this entry.