



Full wwPDB X-ray Structure Validation Report ⓘ

Jun 18, 2024 – 12:27 PM EDT

PDB ID : 4MA4
Title : S-glutathionylated PFKFB3
Authors : Lee, Y.-H.; Seo, M.-S.
Deposited on : 2013-08-15
Resolution : 2.23 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 : 4.02b-467
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 1.20.1
EDS : 2.37.1
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) : 2.37.1

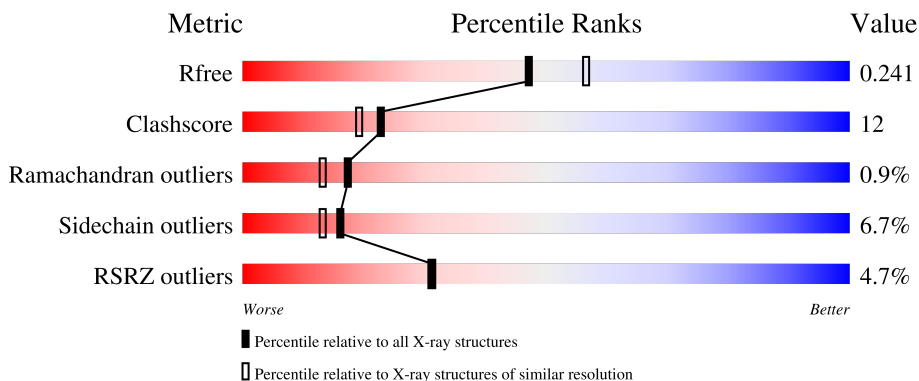
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.23 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}	130704	2391 (2.26-2.22)
Clashscore	141614	2539 (2.26-2.22)
Ramachandran outliers	138981	2489 (2.26-2.22)
Sidechain outliers	138945	2490 (2.26-2.22)
RSRZ outliers	127900	2353 (2.26-2.22)

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	520	

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	GSH	A	604	-	-	X	X

2 Entry composition [i](#)

There are 7 unique types of molecules in this entry. The entry contains 3880 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 6-phosphofructo-2-kinase/fructose-2,6-bisphosphatase 3.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	444	3637	2297	642	676	22	0	3	0

- Molecule 2 is ADENOSINE-5'-DIPHOSPHATE (three-letter code: ADP) (formula: $C_{10}H_{15}N_5O_{10}P_2$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
2	A	1	27	10	5	10	2	0	0

- Molecule 3 is MALONIC ACID (three-letter code: MLA) (formula: $C_3H_4O_4$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			7	3	4		
3	A	1	Total	C	O	0	0
			7	3	4		

- Molecule 4 is ACETIC ACID (three-letter code: ACY) (formula: $C_2H_4O_2$).



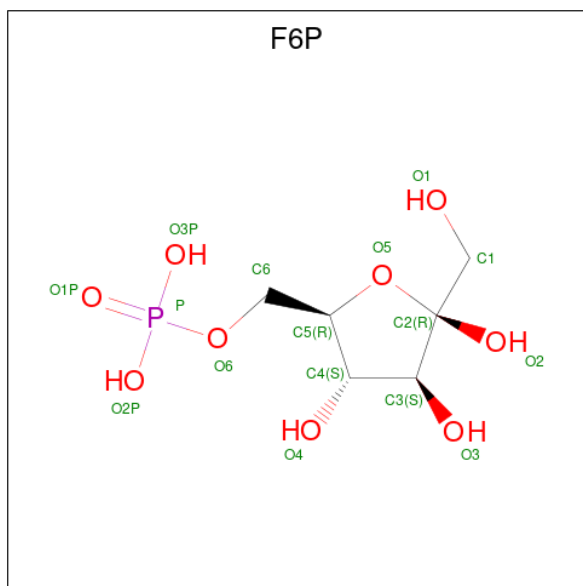
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			4	2	2		

- Molecule 5 is GLUTATHIONE (three-letter code: GSH) (formula: $C_{10}H_{17}N_3O_6S$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	S		
5	A	1	20	10	3	6	1	0	0

- Molecule 6 is 6-O-phosphono-beta-D-fructofuranose (three-letter code: F6P) (formula: $C_6H_{13}O_9P$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	O	P		
6	A	1	16	6	9	1	0	0

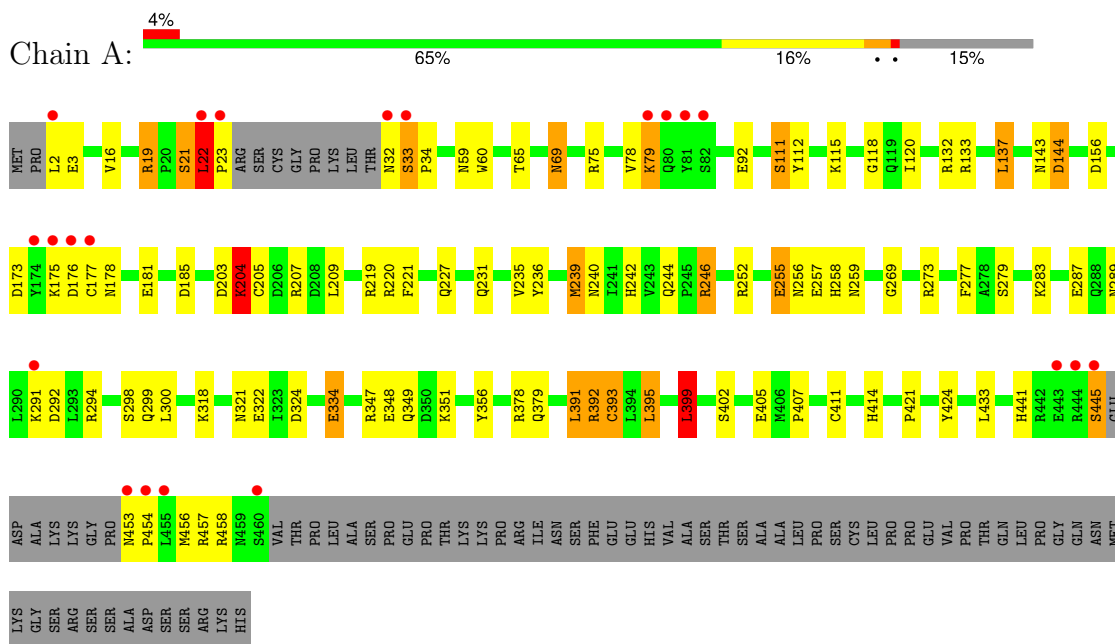
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	162	Total 162	O 162	0	0

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: 6-phosphofructo-2-kinase/fructose-2,6-bisphosphatase 3



4 Data and refinement statistics

Property	Value	Source
Space group	P 65 2 2	Depositor
Cell constants a, b, c, α , β , γ	102.51Å 102.51Å 260.61Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	47.70 – 2.23 47.70 – 2.24	Depositor EDS
% Data completeness (in resolution range)	99.3 (47.70-2.23) 99.4 (47.70-2.24)	Depositor EDS
R_{merge}	0.68	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.97 (at 2.24Å)	Xtrriage
Refinement program	REFMAC 5.5.0072	Depositor
R, R_{free}	0.199 , 0.242 0.198 , 0.241	Depositor DCC
R_{free} test set	2004 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å ²)	43.6	Xtrriage
Anisotropy	0.120	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.38 , 50.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	3880	wwPDB-VP
Average B, all atoms (Å ²)	45.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.15% 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 i

5.1 Standard geometry i

Bond lengths and bond angles in the following residue types are not validated in this section: ADP, GSH, ACY, MLA, F6P

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	1.08	3/3716 (0.1%)	1.07	20/5021 (0.4%)

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	A	0	1

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	356	TYR	CE1-CZ	6.39	1.46	1.38
1	A	255	GLU	CG-CD	5.42	1.60	1.51
1	A	60	TRP	CD2-CE2	5.24	1.47	1.41

All (20) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	132	ARG	NE-CZ-NH1	-9.30	115.65	120.30
1	A	378	ARG	NE-CZ-NH1	7.73	124.17	120.30
1	A	246	ARG	NE-CZ-NH2	-6.50	117.05	120.30
1	A	133	ARG	NE-CZ-NH1	6.43	123.52	120.30
1	A	392	ARG	NE-CZ-NH1	6.16	123.38	120.30
1	A	292	ASP	N-CA-C	-6.00	94.81	111.00
1	A	392	ARG	NE-CZ-NH2	-5.92	117.34	120.30
1	A	393	CYS	CA-CB-SG	-5.88	103.42	114.00
1	A	22	LEU	CB-CG-CD1	-5.86	101.04	111.00
1	A	156	ASP	CB-CG-OD1	5.83	123.54	118.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	347	ARG	NE-CZ-NH1	5.79	123.20	120.30
1	A	273	ARG	CB-CG-CD	-5.78	96.57	111.60
1	A	322	GLU	OE1-CD-OE2	-5.51	116.69	123.30
1	A	239	MET	CG-SD-CE	-5.49	91.42	100.20
1	A	185	ASP	CB-CG-OD1	5.37	123.13	118.30
1	A	133	ARG	NE-CZ-NH2	-5.30	117.65	120.30
1	A	318	LYS	CD-CE-NZ	-5.26	99.60	111.70
1	A	324	ASP	CB-CG-OD1	5.05	122.84	118.30
1	A	399	LEU	CB-CG-CD1	5.02	119.53	111.00
1	A	395	LEU	CB-CG-CD2	-5.01	102.48	111.00

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	458	ARG	Peptide

5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3637	0	3628	80	0
2	A	27	0	12	1	0
3	A	14	0	4	3	0
4	A	4	0	3	0	0
5	A	20	0	15	10	0
6	A	16	0	11	0	0
7	A	162	0	0	12	0
All	All	3880	0	3673	84	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 12.

All (84) 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:A:204:LYS:HE3	5:A:604:GSH:O11	1.33	1.26
1:A:393:CYS:HB3	7:A:746:HOH:O	1.15	1.25
1:A:411:CYS:HB2	7:A:827:HOH:O	0.97	1.14
1:A:19:ARG:NE	1:A:19:ARG:HA	1.61	1.08
1:A:204:LYS:CE	5:A:604:GSH:O11	2.14	0.95
1:A:235:VAL:O	1:A:239:MET:HG3	1.67	0.93
1:A:19:ARG:HA	1:A:19:ARG:HE	1.16	0.92
1:A:393:CYS:CB	7:A:746:HOH:O	1.85	0.91
1:A:22:LEU:HD12	1:A:22:LEU:H	1.35	0.89
1:A:411:CYS:CB	7:A:827:HOH:O	1.65	0.86
1:A:411:CYS:SG	7:A:827:HOH:O	2.21	0.85
1:A:255:GLU:H	1:A:414:HIS:HE1	1.20	0.85
1:A:256:ASN:H	1:A:259:ASN:HD22	1.23	0.84
1:A:205:CYS:CB	5:A:604:GSH:SG2	2.67	0.83
1:A:348:GLU:OE1	1:A:445:SER:HB2	1.80	0.81
1:A:393:CYS:SG	7:A:746:HOH:O	2.33	0.79
1:A:78:VAL:O	1:A:79:LYS:HB2	1.83	0.78
1:A:205:CYS:HB3	5:A:604:GSH:SG2	2.25	0.77
1:A:256:ASN:H	1:A:259:ASN:ND2	1.86	0.73
1:A:2:LEU:HB3	7:A:824:HOH:O	1.88	0.72
1:A:22:LEU:HB3	1:A:23:PRO:HA	1.72	0.71
1:A:22:LEU:HD12	1:A:22:LEU:N	2.06	0.69
1:A:255:GLU:H	1:A:414:HIS:CE1	2.07	0.69
1:A:242:HIS:CD2	1:A:244:GLN:HB2	2.30	0.66
1:A:236:TYR:O	1:A:240:ASN:ND2	2.27	0.66
1:A:69:ASN:C	1:A:69:ASN:HD22	1.98	0.66
1:A:269:GLY:HA3	7:A:705:HOH:O	1.95	0.66
1:A:204:LYS:HE3	5:A:604:GSH:C1	2.23	0.65
1:A:351:LYS:HD3	1:A:407:PRO:HB2	1.78	0.65
1:A:92:GLU:OE2	7:A:790:HOH:O	2.14	0.65
1:A:178:ASN:ND2	1:A:181:GLU:CD	2.51	0.64
1:A:19:ARG:O	1:A:22:LEU:HD12	1.97	0.63
1:A:348:GLU:OE1	1:A:445:SER:CB	2.47	0.63
1:A:334:GLU:HB3	7:A:809:HOH:O	1.99	0.63
1:A:19:ARG:HB3	1:A:22:LEU:HD11	1.81	0.61
5:A:604:GSH:SG2	5:A:604:GSH:N1	2.73	0.61
1:A:299:GLN:H	1:A:321:ASN:ND2	1.97	0.60
1:A:402:SER:OG	1:A:405:GLU:HG2	2.00	0.60
1:A:19:ARG:O	1:A:22:LEU:CD1	2.50	0.60
1:A:59:ASN:HD21	1:A:65:THR:H	1.51	0.59
1:A:19:ARG:HB3	1:A:22:LEU:CD1	2.33	0.58
1:A:22:LEU:CB	1:A:23:PRO:HA	2.33	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:204:LYS:CD	5:A:604:GSH:O11	2.51	0.57
1:A:294:ARG:HG3	1:A:379:GLN:NE2	2.20	0.57
1:A:242:HIS:HD2	1:A:244:GLN:HB2	1.69	0.55
1:A:19:ARG:NE	1:A:19:ARG:CA	2.46	0.55
3:A:602:MLA:O3B	3:A:602:MLA:O1A	2.18	0.53
1:A:19:ARG:NH2	1:A:21:SER:HB2	2.25	0.52
5:A:604:GSH:CD1	5:A:604:GSH:HN12	2.22	0.52
1:A:256:ASN:N	1:A:259:ASN:HD22	2.00	0.51
1:A:252:ARG:HG3	1:A:391:LEU:HD23	1.93	0.51
5:A:604:GSH:N1	5:A:604:GSH:CD1	2.74	0.51
1:A:421:PRO:O	1:A:421:PRO:HG2	2.11	0.50
1:A:220:ARG:HG2	1:A:221:PHE:N	2.27	0.49
1:A:300:LEU:CD2	3:A:602:MLA:HC21	2.42	0.49
1:A:299:GLN:H	1:A:321:ASN:HD21	1.58	0.49
1:A:298:SER:HB2	1:A:321:ASN:HD22	1.77	0.48
1:A:16:VAL:HG23	1:A:16:VAL:O	2.14	0.47
1:A:395:LEU:HG	1:A:399:LEU:HD22	1.95	0.47
1:A:178:ASN:HD22	1:A:181:GLU:CD	2.17	0.47
1:A:16:VAL:O	1:A:16:VAL:CG2	2.63	0.47
1:A:204:LYS:HD2	5:A:604:GSH:O11	2.15	0.46
1:A:300:LEU:HD23	3:A:602:MLA:HC21	1.98	0.46
1:A:75:ARG:HD2	7:A:798:HOH:O	2.16	0.46
1:A:65:THR:HA	1:A:120:ILE:O	2.17	0.45
1:A:392:ARG:HH21	1:A:441:HIS:CD2	2.36	0.44
1:A:137:LEU:HD21	1:A:209:LEU:HD21	2.00	0.44
1:A:283:LYS:HE2	1:A:287:GLU:OE1	2.18	0.44
1:A:421:PRO:O	1:A:421:PRO:CG	2.66	0.43
1:A:22:LEU:CB	1:A:23:PRO:CA	2.96	0.43
1:A:277:PHE:CE1	1:A:433:LEU:HD12	2.54	0.43
1:A:453:ASN:N	1:A:454:PRO:CD	2.81	0.43
1:A:207:ARG:CZ	1:A:207:ARG:HB3	2.48	0.43
1:A:227:GLN:NE2	1:A:231:GLN:HE22	2.17	0.43
1:A:242:HIS:HD2	1:A:244:GLN:H	1.66	0.42
1:A:69:ASN:C	1:A:69:ASN:ND2	2.71	0.42
1:A:19:ARG:HH22	1:A:21:SER:HB2	1.84	0.42
1:A:424:TYR:OH	2:A:601:ADP:O1A	2.27	0.41
1:A:33:SER:HA	1:A:34:PRO:HD2	1.87	0.41
1:A:111:SER:O	1:A:115:LYS:HB2	2.20	0.41
1:A:143:ASN:O	1:A:144:ASP:CB	2.68	0.41
1:A:204:LYS:HB2	1:A:204:LYS:HE2	1.87	0.41
1:A:173:ASP:HA	7:A:798:HOH:O	2.21	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:112:TYR:CE2	1:A:118:GLY:HA3	2.56	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all 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	440/520 (85%)	419 (95%)	17 (4%)	4 (1%)	17 13

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	79	LYS
1	A	204	LYS
1	A	203	ASP
1	A	33	SER

5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all 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	404/468 (86%)	377 (93%)	27 (7%)	16 13

All (27) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	3	GLU
1	A	19	ARG
1	A	21	SER
1	A	22	LEU
1	A	32	ASN
1	A	69	ASN
1	A	111	SER
1	A	137	LEU
1	A	144	ASP
1	A	175	LYS
1	A	176	ASP
1	A	177	CYS
1	A	204	LYS
1	A	219	ARG
1	A	246	ARG
1	A	257	GLU
1	A	258	HIS
1	A	279	SER
1	A	289	ASN
1	A	291	LYS
1	A	334	GLU
1	A	349	GLN
1	A	391	LEU
1	A	399	LEU
1	A	445	SER
1	A	456	MET
1	A	457	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (12) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	59	ASN
1	A	69	ASN
1	A	163	ASN
1	A	224	ASN
1	A	227	GLN
1	A	242	HIS
1	A	259	ASN
1	A	316	GLN
1	A	321	ASN
1	A	379	GLN
1	A	414	HIS
1	A	441	HIS

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

6 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
5	GSH	A	604	1	18,19,19	1.78	5 (27%)	21,24,24	3.24	7 (33%)
2	ADP	A	601	-	24,29,29	1.36	3 (12%)	29,45,45	1.70	6 (20%)
6	F6P	A	606	-	15,16,16	0.86	0	16,25,25	1.64	2 (12%)
3	MLA	A	602	-	6,6,6	1.41	1 (16%)	7,7,7	1.62	2 (28%)
4	ACY	A	603	-	3,3,3	0.79	0	3,3,3	0.99	0
3	MLA	A	605	-	6,6,6	1.31	0	7,7,7	2.73	4 (57%)

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. '2' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	GSH	A	604	1	-	7/24/24/24	-
6	F6P	A	606	-	-	1/9/28/28	0/1/1/1
3	MLA	A	602	-	-	2/4/4/4	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	ADP	A	601	-	-	3/12/32/32	0/3/3/3
3	MLA	A	605	-	-	0/4/4/4	-

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	601	ADP	O4'-C1'	4.26	1.46	1.40
5	A	604	GSH	CB2-SG2	3.60	1.88	1.81
2	A	601	ADP	C2-N3	2.63	1.36	1.32
5	A	604	GSH	OE1-CD1	2.58	1.28	1.23
5	A	604	GSH	CA3-N3	2.54	1.51	1.45
5	A	604	GSH	O31-C3	2.42	1.30	1.22
2	A	601	ADP	PA-O3A	2.32	1.62	1.59
5	A	604	GSH	O11-C1	2.26	1.28	1.22
3	A	602	MLA	O1B-C1	2.16	1.29	1.22

All (21) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	604	GSH	CA2-CB2-SG2	-11.56	101.13	114.16
5	A	604	GSH	CB1-CG1-CD1	-5.30	101.24	113.06
6	A	606	F6P	O3P-P-O6	-5.08	93.42	106.67
3	A	605	MLA	C3-C2-C1	-4.99	95.34	112.95
2	A	601	ADP	O4'-C1'-N9	-4.69	102.53	108.75
5	A	604	GSH	O2-C2-CA2	-3.48	113.19	120.48
2	A	601	ADP	N3-C2-N1	-3.23	124.29	128.67
3	A	602	MLA	C3-C2-C1	-3.16	101.78	112.95
5	A	604	GSH	CA2-N2-CD1	-3.07	113.99	121.68
3	A	605	MLA	O3B-C3-C2	2.88	123.43	114.51
2	A	601	ADP	C4-C5-N7	-2.87	106.31	109.34
3	A	605	MLA	O1A-C1-C2	2.78	123.12	114.51
5	A	604	GSH	CG1-CB1-CA1	-2.66	107.75	113.86
5	A	604	GSH	OE1-CD1-CG1	-2.44	117.60	122.02
2	A	601	ADP	O3'-C3'-C4'	-2.42	104.12	111.08
2	A	601	ADP	C4'-O4'-C1'	-2.41	107.72	109.92
5	A	604	GSH	CB2-CA2-C2	2.40	114.73	109.50
3	A	602	MLA	O1A-C1-O1B	2.36	129.41	123.33
2	A	601	ADP	C2'-C3'-C4'	2.17	106.81	102.61
6	A	606	F6P	O1-C1-C2	-2.11	107.00	111.67
3	A	605	MLA	O3B-C3-O3A	-2.01	118.15	123.33

There are no chirality outliers.

All (13) torsion outliers are listed below:

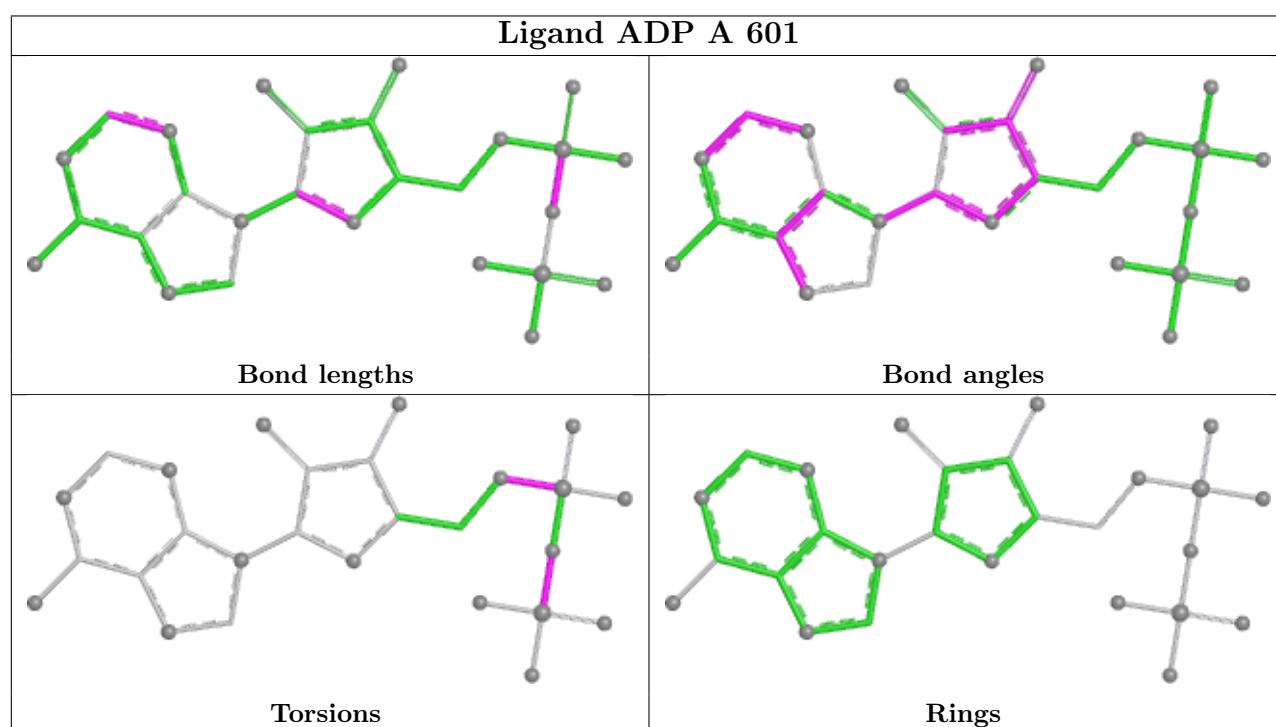
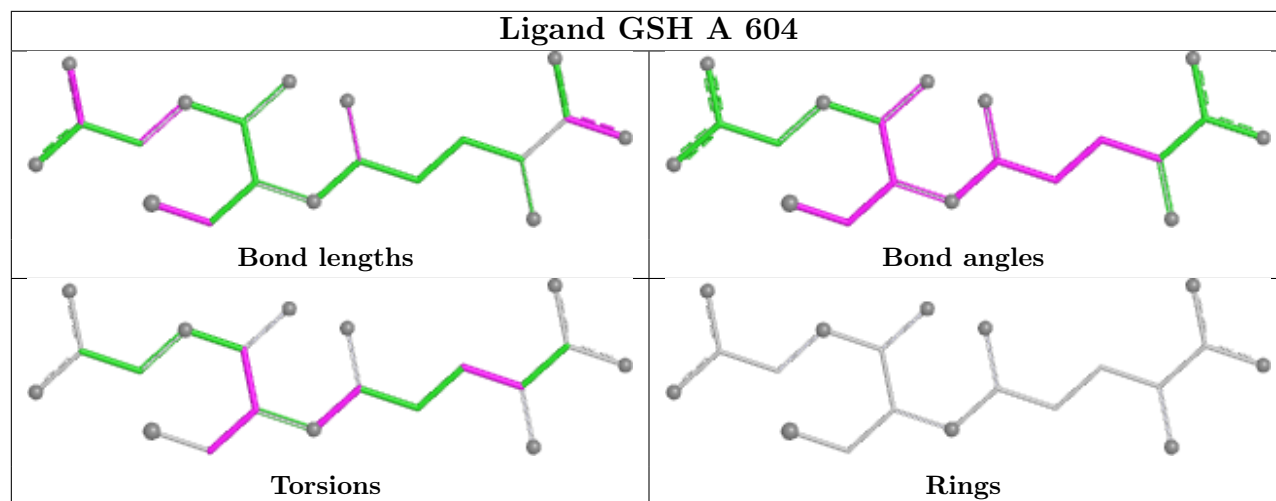
Mol	Chain	Res	Type	Atoms
2	A	601	ADP	C5'-O5'-PA-O1A
5	A	604	GSH	N1-CA1-CB1-CG1
5	A	604	GSH	C1-CA1-CB1-CG1
2	A	601	ADP	C5'-O5'-PA-O3A
5	A	604	GSH	O2-C2-CA2-N2
2	A	601	ADP	PA-O3A-PB-O1B
5	A	604	GSH	CG1-CD1-N2-CA2
6	A	606	F6P	C5-C6-O6-P
5	A	604	GSH	C2-CA2-CB2-SG2
5	A	604	GSH	N3-C2-CA2-N2
3	A	602	MLA	C1-C2-C3-O3A
5	A	604	GSH	OE1-CD1-N2-CA2
3	A	602	MLA	C1-C2-C3-O3B

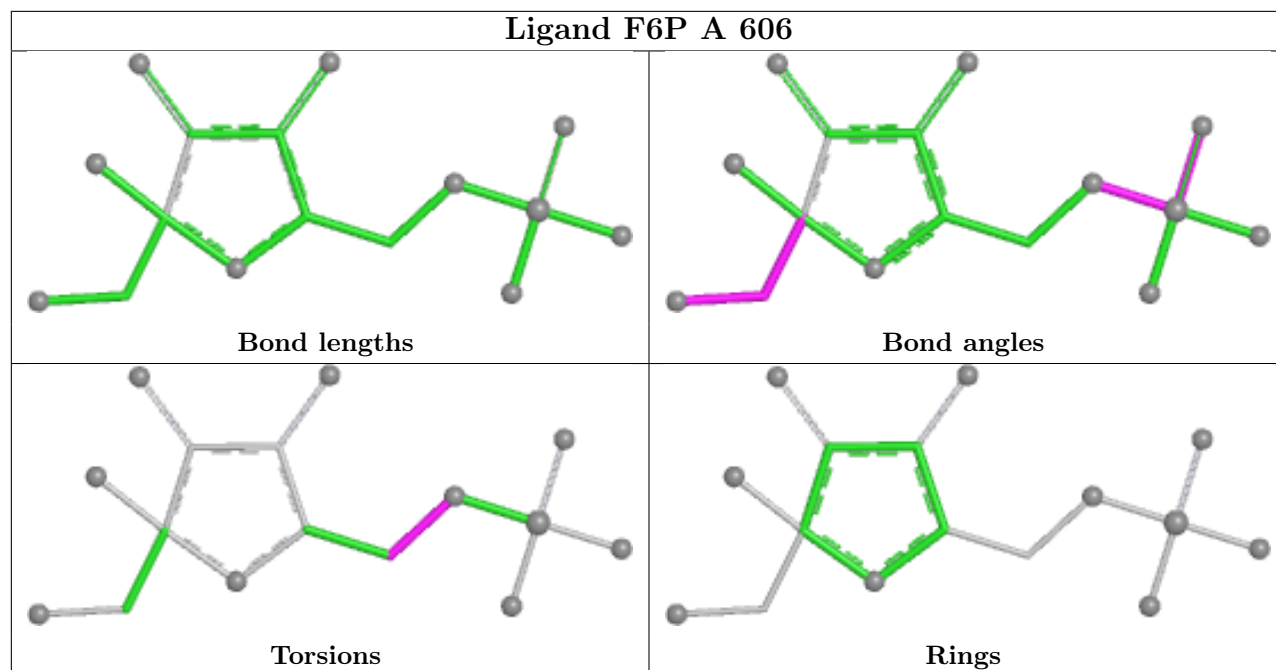
There are no ring outliers.

3 monomers are involved in 14 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	604	GSH	10	0
2	A	601	ADP	1	0
3	A	602	MLA	3	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.





5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data [i](#)

6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	444/520 (85%)	0.20	21 (4%) 31 31	26, 42, 74, 118	0

All (21) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	2	LEU	8.7
1	A	460	SER	7.9
1	A	455	LEU	5.9
1	A	454	PRO	5.3
1	A	445	SER	5.1
1	A	176	ASP	4.0
1	A	291	LYS	4.0
1	A	23	PRO	3.6
1	A	175	LYS	3.4
1	A	444	ARG	3.4
1	A	81	TYR	2.9
1	A	79	LYS	2.8
1	A	32	ASN	2.7
1	A	82	SER	2.4
1	A	174	TYR	2.4
1	A	177	CYS	2.3
1	A	33	SER	2.2
1	A	453	ASN	2.2
1	A	80	GLN	2.2
1	A	22	LEU	2.1
1	A	443	GLU	2.1

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](#)

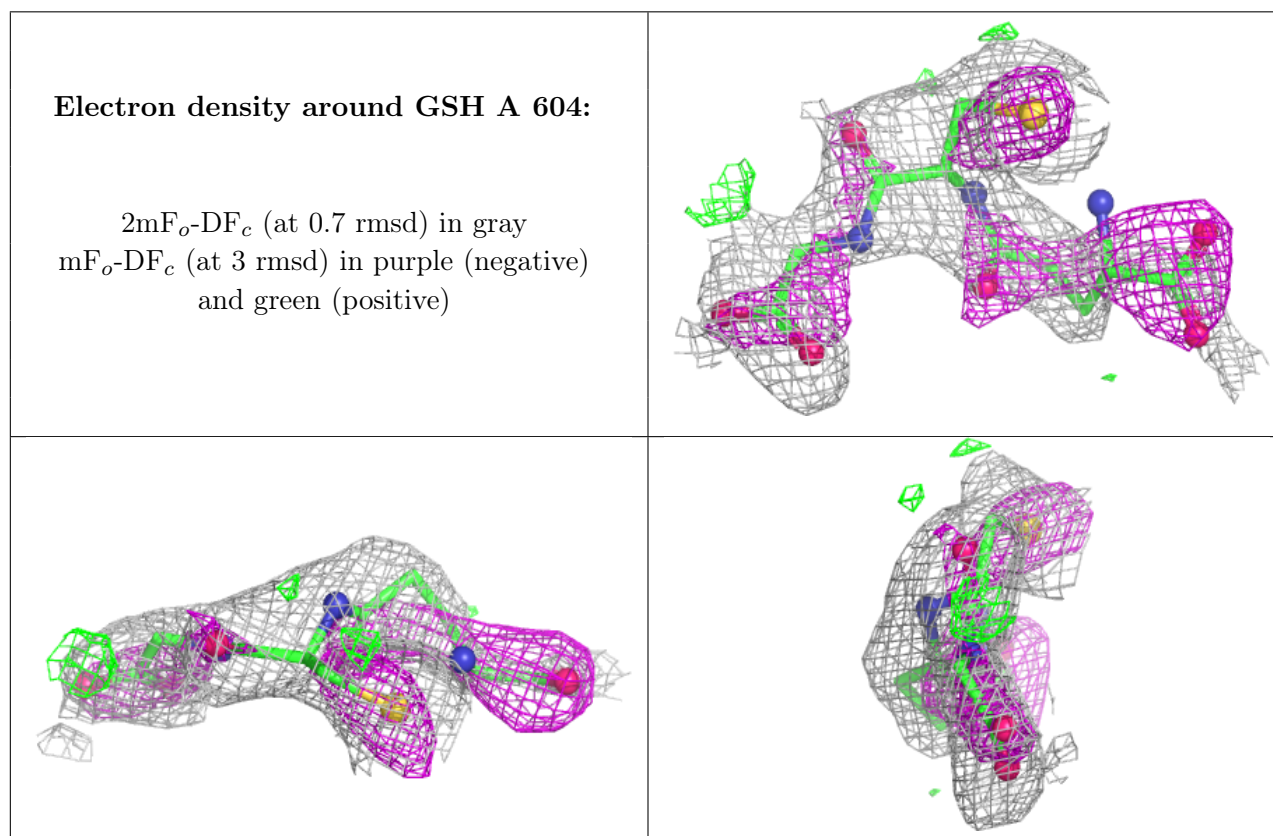
There are no monosaccharides in this entry.

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.

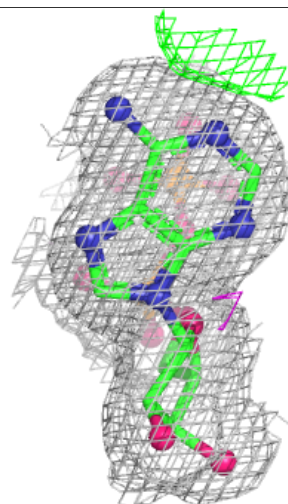
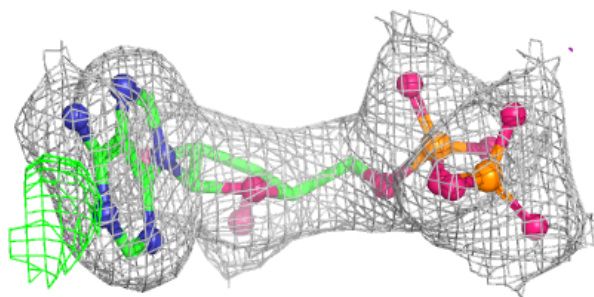
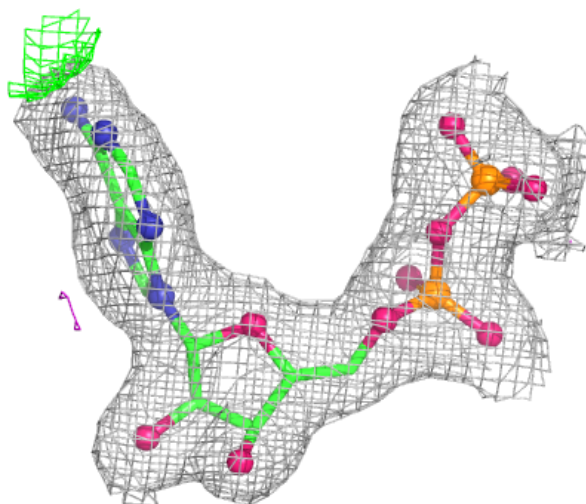
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
5	GSH	A	604	20/20	0.78	0.46	44,54,62,63	0
3	MLA	A	605	7/7	0.83	0.16	39,46,52,52	0
4	ACY	A	603	4/4	0.86	0.23	62,70,75,79	0
3	MLA	A	602	7/7	0.91	0.16	44,56,62,67	0
2	ADP	A	601	27/27	0.98	0.12	29,36,41,43	0
6	F6P	A	606	16/16	0.98	0.10	28,32,36,38	0

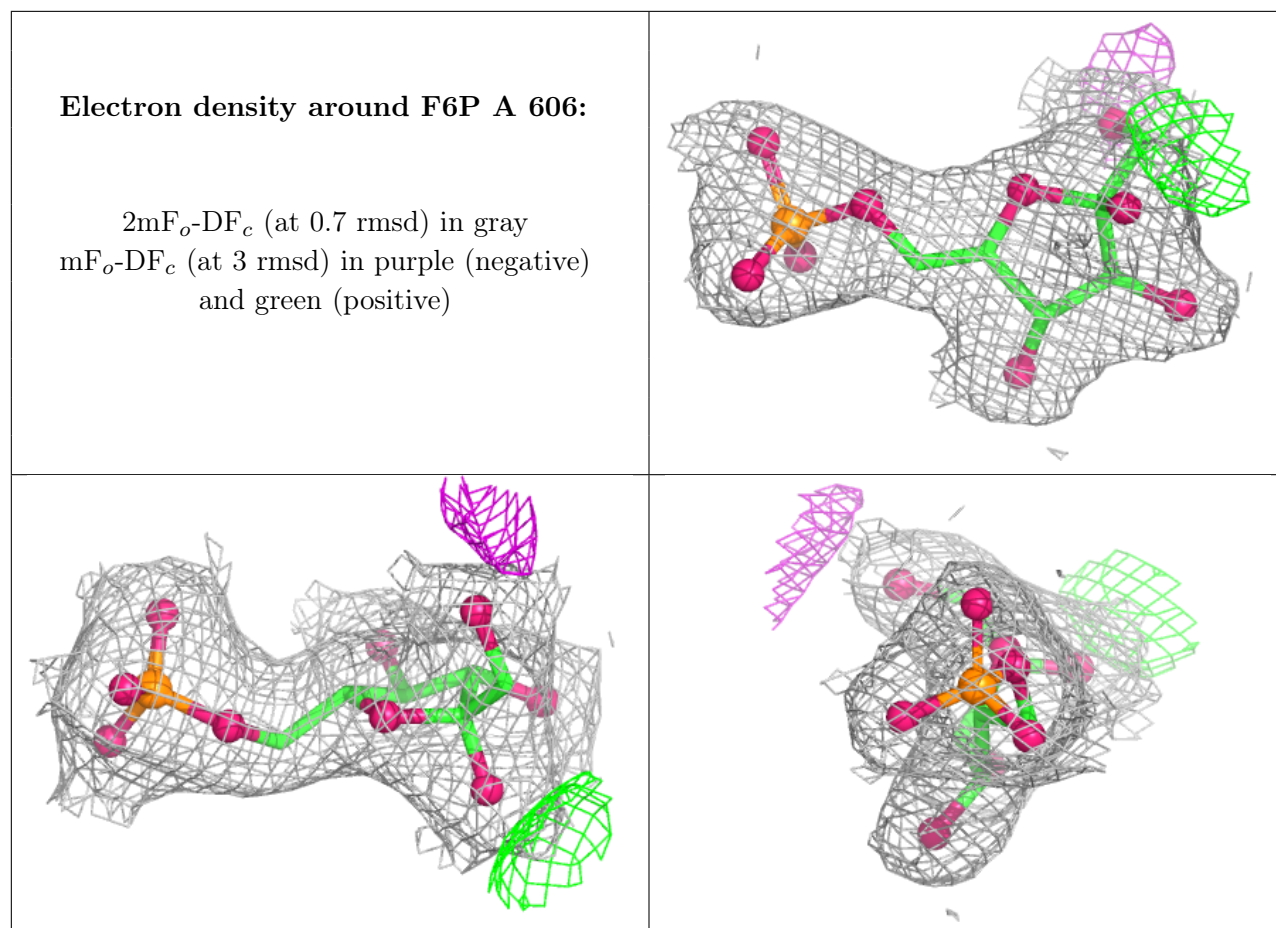
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.



Electron density around ADP A 601:

$2mF_o-DF_c$ (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.