Full wwPDB X-ray Structure Validation Report (i)

Jun 23, 2024 – 03:57 AM EDT

PDB ID	:	6LKG
Title	:	two-component system protein mediate signal transduction
Authors	:	Wang, M.; Tao, Y.
Deposited on	:	2019-12-19
Resolution	:	1.95 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 (i) 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 (i)) were used in the production of this report:

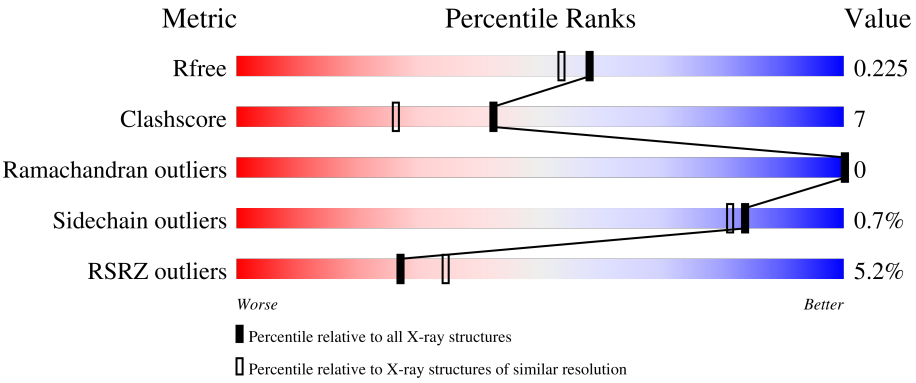
MolProbity	:	4.02b-467
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.20.1
EDS	:	2.37.1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.37.1

1 Overall quality at a glance (i)

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

The reported resolution of this entry is 1.95 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	4310 (1.96-1.92)
Clashscore	141614	1023 (1.94-1.94)
Ramachandran outliers	138981	1007 (1.94-1.94)
Sidechain outliers	138945	1007 (1.94-1.94)
RSRZ outliers	127900	4250 (1.96-1.92)

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	B	172	2% 84% 15%
1	D	172	% 92% 8%
2	A	294	4% 86% 14%
2	C	294	11% 85% 13%

2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 8224 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 Sensor protein kinase HptS.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	B	170	Total	C	N	O	S	0	0	0
			1429	903	253	269	4			
1	D	171	Total	C	N	O	S	0	0	0
			1438	907	254	273	4			

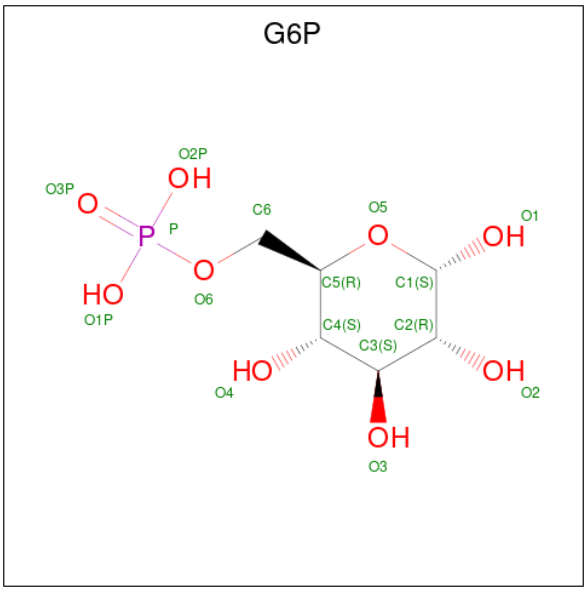
There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	44	SER	-	expression tag	UNP Q2G1E0
B	68	SER	ILE	conflict	UNP Q2G1E0
D	44	SER	-	expression tag	UNP Q2G1E0
D	68	SER	ILE	conflict	UNP Q2G1E0

- Molecule 2 is a protein called ABC transporter, solute-binding protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	A	294	Total	C	N	O	S	0	0	0
			2376	1506	413	450	7			
2	C	294	Total	C	N	O	S	0	0	0
			2376	1506	413	450	7			

- Molecule 3 is 6-O-phosphono-alpha-D-glucopyranose (three-letter code: G6P) (formula: $C_6H_{13}O_9P$) (labeled as "Ligand of Interest" by depositor).



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

- Molecule 4 is water.

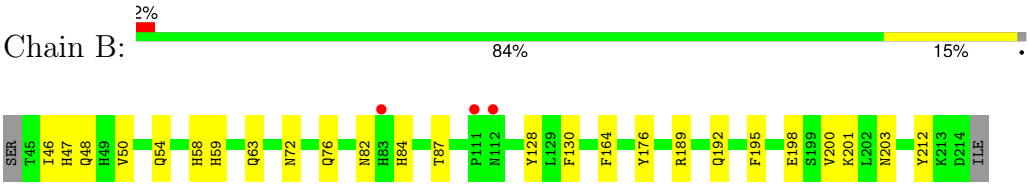
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	B	125	Total O 125 125	0	0
4	A	165	Total O 165 165	0	0
4	C	166	Total O 166 166	0	0
4	D	117	Total O 117 117	0	0

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.

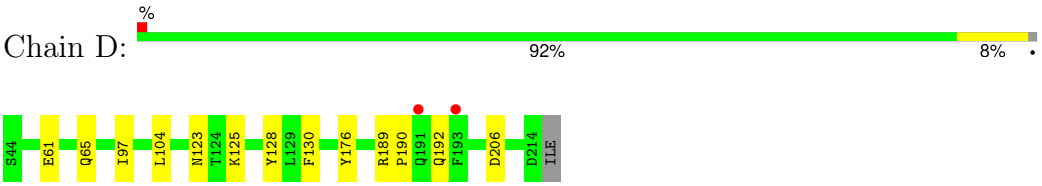
• Molecule 1: Sensor protein kinase HptS

Chain B:



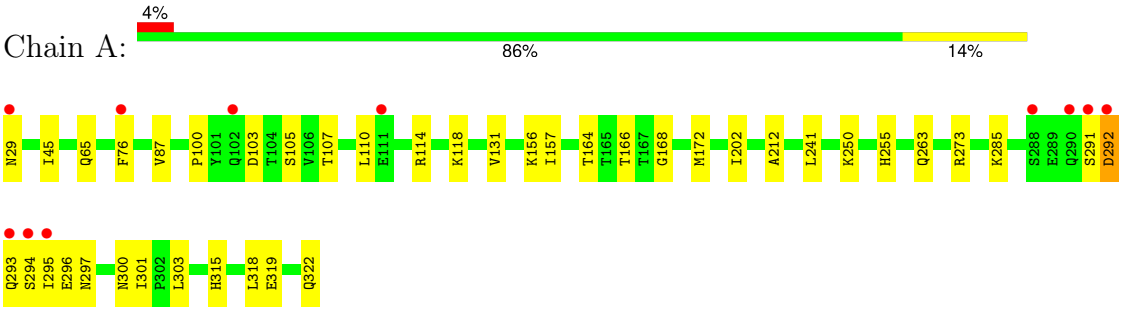
• Molecule 1: Sensor protein kinase HptS

Chain D:



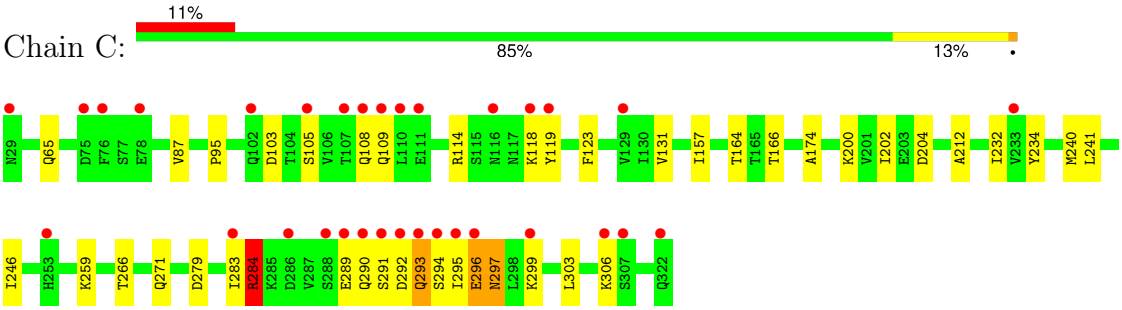
• Molecule 2: ABC transporter, solute-binding protein

Chain A:



• Molecule 2: ABC transporter, solute-binding protein

Chain C:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	72.30Å 89.97Å 92.83Å 90.00° 100.87° 90.00°	Depositor
Resolution (Å)	38.16 – 1.95 38.16 – 1.95	Depositor EDS
% Data completeness (in resolution range)	99.7 (38.16-1.95) 99.7 (38.16-1.95)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.05 (at 1.95Å)	Xtriage
Refinement program	PHENIX 1.11.1_2575	Depositor
R, R_{free}	0.204 , 0.225 0.204 , 0.225	Depositor DCC
R_{free} test set	4331 reflections (5.09%)	wwPDB-VP
Wilson B-factor (Å^2)	33.8	Xtriage
Anisotropy	0.191	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.35 , 43.4	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	8224	wwPDB-VP
Average B, all atoms (Å^2)	41.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.44% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ 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: G6P

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	B	0.32	0/1463	0.46	0/1977
1	D	0.33	0/1472	0.46	0/1989
2	A	0.26	0/2428	0.49	1/3288 (0.0%)
2	C	0.37	1/2428 (0.0%)	0.64	3/3288 (0.1%)
All	All	0.32	1/7791 (0.0%)	0.53	4/10542 (0.0%)

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
2	C	0	2

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	283	ILE	C-N	7.15	1.50	1.34

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	C	284	ARG	O-C-N	-13.59	100.95	122.70
2	C	283	ILE	C-N-CA	9.43	145.26	121.70
2	A	292	ASP	N-CA-C	-8.29	88.61	111.00
2	C	293	GLN	N-CA-C	-6.92	92.33	111.00

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	C	284	ARG	Mainchain
2	C	296	GLU	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	B	1429	0	1377	15	0
1	D	1438	0	1384	8	0
2	A	2376	0	2373	38	0
2	C	2376	0	2373	43	0
3	A	16	0	11	0	0
3	C	16	0	11	0	0
4	A	165	0	0	1	0
4	B	125	0	0	3	0
4	C	166	0	0	5	0
4	D	117	0	0	0	0
All	All	8224	0	7529	104	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 7.

All (104) 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)
2:C:232:ILE:HB	2:C:295:ILE:HD13	1.21	1.21
2:C:232:ILE:HB	2:C:295:ILE:CD1	2.02	0.87
2:C:103:ASP:OD1	2:C:105:SER:HB3	1.75	0.87
2:C:232:ILE:HD12	2:C:295:ILE:HD12	1.56	0.85
2:A:294:SER:O	2:A:295:ILE:HD12	1.78	0.82
2:A:293:GLN:HG2	2:A:294:SER:HA	1.64	0.79
1:B:189:ARG:NH1	1:B:192:GLN:OE1	2.17	0.78
2:C:294:SER:C	2:C:295:ILE:HG13	2.04	0.77
2:C:290:GLN:NE2	2:C:292:ASP:OD2	2.19	0.76
2:A:295:ILE:HG23	2:A:296:GLU:OE2	1.86	0.76
2:C:118:LYS:HG3	4:C:575:HOH:O	1.86	0.75
2:C:234:TYR:HE1	2:C:295:ILE:HG23	1.53	0.74

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:103:ASP:OD2	2:A:105:SER:OG	2.06	0.73
2:C:297:ASN:ND2	2:C:299:LYS:H	1.88	0.71
2:C:234:TYR:HE1	2:C:295:ILE:CG2	2.03	0.71
1:B:201:LYS:NZ	4:B:303:HOH:O	2.22	0.70
2:A:294:SER:C	2:A:295:ILE:HD12	2.11	0.70
2:C:294:SER:O	2:C:295:ILE:HG13	1.93	0.69
2:A:291:SER:O	2:A:292:ASP:C	2.31	0.69
1:D:123:ASN:HD21	1:D:125:LYS:HE3	1.59	0.68
2:C:234:TYR:CE1	2:C:295:ILE:CG2	2.77	0.68
2:C:234:TYR:OH	2:C:295:ILE:HG22	1.94	0.67
2:A:293:GLN:HA	2:A:294:SER:O	1.94	0.67
2:C:232:ILE:CB	2:C:295:ILE:HD13	2.13	0.66
2:C:291:SER:CB	2:C:297:ASN:HB3	2.26	0.65
2:C:95:PRO:HB3	2:C:119:TYR:CE2	2.32	0.65
2:C:291:SER:HB3	2:C:297:ASN:HB3	1.79	0.65
2:A:293:GLN:CG	2:A:294:SER:HA	2.27	0.64
2:A:156:LYS:NZ	4:A:501:HOH:O	2.22	0.63
2:A:318:LEU:O	2:A:322:GLN:HG2	2.00	0.62
2:A:291:SER:O	2:A:293:GLN:N	2.33	0.61
2:C:279:ASP:OD2	4:C:501:HOH:O	2.16	0.61
2:A:45:ILE:CD1	2:A:273:ARG:HD3	2.32	0.60
2:A:294:SER:O	2:A:295:ILE:CD1	2.48	0.59
2:C:95:PRO:HB3	2:C:119:TYR:HE2	1.68	0.59
2:A:315:HIS:O	2:A:319:GLU:HG3	2.04	0.57
2:C:109:GLN:HA	2:C:284:ARG:HA	1.86	0.56
2:C:296:GLU:CD	4:C:502:HOH:O	2.43	0.56
2:A:87:VAL:HG22	2:A:166:THR:HG23	1.88	0.56
2:C:87:VAL:HG22	2:C:166:THR:HG23	1.87	0.55
1:B:47:HIS:HD2	1:B:198:GLU:OE2	1.89	0.55
2:C:289:GLU:OE2	2:C:297:ASN:HB2	2.07	0.55
2:A:100:PRO:HB3	2:A:118:LYS:HD3	1.88	0.54
2:C:232:ILE:HD12	2:C:295:ILE:CD1	2.33	0.54
2:A:296:GLU:CG	2:A:300:ASN:HB2	2.37	0.54
2:C:234:TYR:OH	2:C:295:ILE:CG2	2.56	0.53
2:A:296:GLU:HG3	2:A:297:ASN:H	1.74	0.52
2:C:118:LYS:HG3	4:C:641:HOH:O	2.08	0.52
1:B:87:THR:OG1	4:B:301:HOH:O	2.18	0.52
2:C:109:GLN:O	2:C:114:ARG:NH1	2.37	0.52
1:D:123:ASN:ND2	1:D:125:LYS:HG2	2.24	0.52
2:C:241:LEU:HB2	2:C:303:LEU:HD22	1.92	0.51
2:A:296:GLU:HG3	2:A:297:ASN:N	2.24	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:189:ARG:HB3	1:D:192:GLN:HG3	1.93	0.51
1:B:128:TYR:HB2	1:B:176:TYR:HB2	1.93	0.50
2:A:295:ILE:HG23	2:A:296:GLU:HB2	1.94	0.50
2:A:157:ILE:HG22	2:A:212:ALA:HB3	1.94	0.49
2:C:259:LYS:HG3	4:C:625:HOH:O	2.13	0.49
1:D:128:TYR:HB2	1:D:176:TYR:HB2	1.94	0.49
1:B:82:ASN:OD1	1:B:84:HIS:HD2	1.96	0.49
2:A:107:THR:HA	2:A:114:ARG:NH1	2.29	0.48
2:C:297:ASN:HD22	2:C:299:LYS:H	1.60	0.48
1:B:48:GLN:OE1	4:B:302:HOH:O	2.20	0.47
1:B:47:HIS:CD2	1:B:198:GLU:OE2	2.67	0.47
1:B:164:PHE:HB2	1:B:212:TYR:CZ	2.49	0.47
2:A:293:GLN:HA	2:A:294:SER:C	2.34	0.47
2:C:103:ASP:OD2	2:C:266:THR:OG1	2.24	0.47
1:B:189:ARG:NH1	1:B:192:GLN:HB2	2.30	0.47
2:C:65:GLN:HB2	2:C:164:THR:HA	1.96	0.47
1:B:54:GLN:HB2	1:B:200:VAL:HG11	1.97	0.47
2:A:65:GLN:HB2	2:A:164:THR:HA	1.96	0.46
2:C:108:GLN:HE21	2:C:284:ARG:HH22	1.63	0.46
2:A:29:ASN:O	2:A:255:HIS:NE2	2.46	0.46
2:A:76:PHE:HE1	2:A:250:LYS:HG2	1.80	0.46
1:B:59:HIS:O	1:B:63:GLN:HG3	2.16	0.46
2:C:157:ILE:HG22	2:C:212:ALA:HB3	1.98	0.45
1:B:46:ILE:O	1:B:50:VAL:HG23	2.17	0.45
1:B:58:HIS:CE1	1:B:203:ASN:HD22	2.35	0.45
2:A:131:VAL:HG11	2:A:202:ILE:HD13	1.99	0.45
2:A:45:ILE:HD11	2:A:273:ARG:HD3	1.98	0.45
2:C:294:SER:O	2:C:295:ILE:CG1	2.65	0.44
2:A:241:LEU:HB2	2:A:303:LEU:HD22	2.00	0.44
2:A:315:HIS:CD2	2:A:319:GLU:OE2	2.70	0.44
2:A:110:LEU:HD23	2:A:285:LYS:HG2	1.99	0.43
1:D:61:GLU:OE2	1:D:65:GLN:NE2	2.48	0.43
2:C:234:TYR:CE1	2:C:295:ILE:HG23	2.42	0.42
2:A:295:ILE:CG2	2:A:296:GLU:HB2	2.49	0.42
2:C:131:VAL:HG11	2:C:202:ILE:HD13	2.01	0.42
2:C:174:ALA:HB2	2:C:240:MET:HB2	2.02	0.42
2:A:103:ASP:OD1	2:A:263:GLN:NE2	2.53	0.42
2:C:294:SER:C	2:C:295:ILE:CG1	2.82	0.41
2:A:297:ASN:O	2:A:301:ILE:HG13	2.20	0.41
2:C:123:PHE:HB2	2:C:246:ILE:HG13	2.02	0.41
2:A:168:GLY:O	2:A:172:MET:HG2	2.21	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:C:200:LYS:HE3	2:C:204:ASP:OD2	2.20	0.41
2:C:292:ASP:O	2:C:293:GLN:C	2.59	0.41
1:D:97:ILE:HD12	1:D:104:LEU:HB2	2.03	0.41
1:B:72:ASN:O	1:B:76:GLN:HG3	2.21	0.41
1:D:189:ARG:HA	1:D:190:PRO:HD2	1.95	0.41
2:A:291:SER:OG	2:A:292:ASP:N	2.53	0.41
1:D:189:ARG:HA	1:D:189:ARG:HD3	1.88	0.40
2:C:271:GLN:HG3	2:C:284:ARG:HD3	2.02	0.40
2:A:292:ASP:HB2	2:A:293:GLN:H	1.76	0.40
2:A:296:GLU:HG2	2:A:300:ASN:HB2	2.03	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	B	168/172 (98%)	166 (99%)	2 (1%)	0	100	100
1	D	169/172 (98%)	168 (99%)	1 (1%)	0	100	100
2	A	292/294 (99%)	282 (97%)	10 (3%)	0	100	100
2	C	292/294 (99%)	279 (96%)	13 (4%)	0	100	100
All	All	921/932 (99%)	895 (97%)	26 (3%)	0	100	100

There are no Ramachandran outliers to report.

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	B	160/163 (98%)	158 (99%)	2 (1%)	69 62
1	D	162/163 (99%)	160 (99%)	2 (1%)	71 64
2	A	271/271 (100%)	271 (100%)	0	100 100
2	C	271/271 (100%)	269 (99%)	2 (1%)	84 81
All	All	864/868 (100%)	858 (99%)	6 (1%)	84 81

All (6) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	130	PHE
1	B	195	PHE
2	C	297	ASN
2	C	306	LYS
1	D	130	PHE
1	D	206	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	47	HIS
1	B	83	HIS
1	B	84	HIS
2	A	109	GLN
2	A	163	ASN
2	A	322	GLN
2	C	108	GLN
2	C	297	ASN
1	D	123	ASN

5.3.3 RNA (i)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

2 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	G6P	C	401	-	16,16,16	1.50	3 (18%)	23,24,24	1.46	3 (13%)
3	G6P	A	401	-	16,16,16	1.49	4 (25%)	23,24,24	1.49	3 (13%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	G6P	C	401	-	-	0/6/26/26	0/1/1/1
3	G6P	A	401	-	-	0/6/26/26	0/1/1/1

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	401	G6P	P-O6	3.00	1.69	1.60
3	C	401	G6P	P-O6	2.91	1.69	1.60
3	A	401	G6P	O3-C3	2.85	1.50	1.43
3	C	401	G6P	O3-C3	2.83	1.50	1.43
3	A	401	G6P	C4-C3	-2.16	1.46	1.52
3	C	401	G6P	C4-C3	-2.08	1.46	1.52
3	A	401	G6P	O5-C1	2.02	1.47	1.42

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	C	401	G6P	O5-C1-C2	4.97	119.04	110.30
3	A	401	G6P	O5-C1-C2	4.96	119.03	110.30
3	C	401	G6P	C1-O5-C5	2.68	118.83	113.65
3	A	401	G6P	C1-C2-C3	2.67	115.80	110.36
3	A	401	G6P	C1-O5-C5	2.53	118.55	113.65
3	C	401	G6P	C1-C2-C3	2.45	115.36	110.36

There are no chirality outliers.

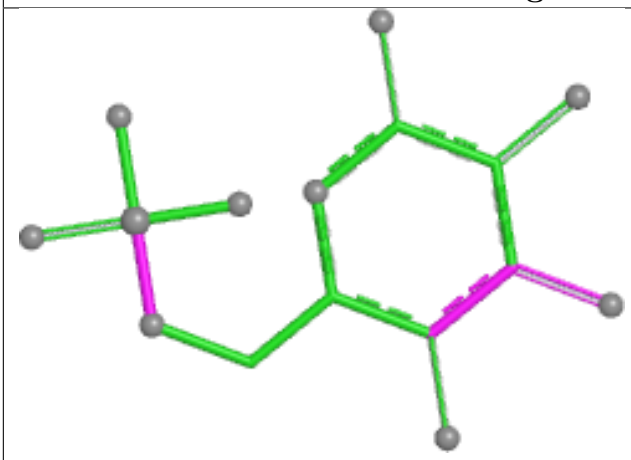
There are no torsion outliers.

There are no ring outliers.

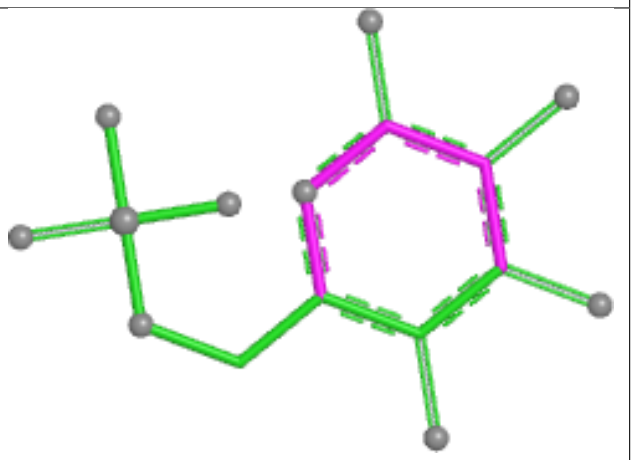
No monomer is involved in short contacts.

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.

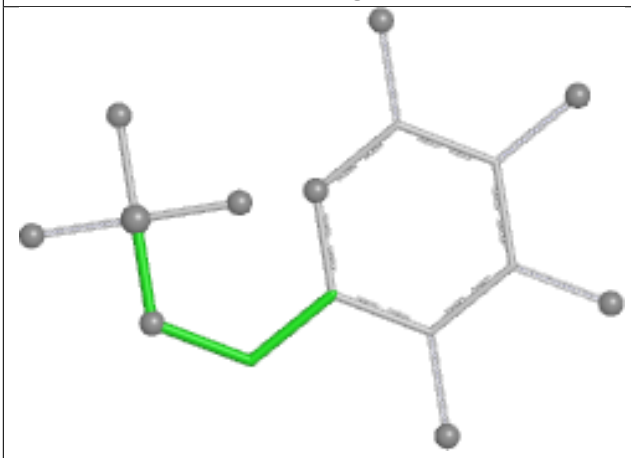
Ligand G6P C 401



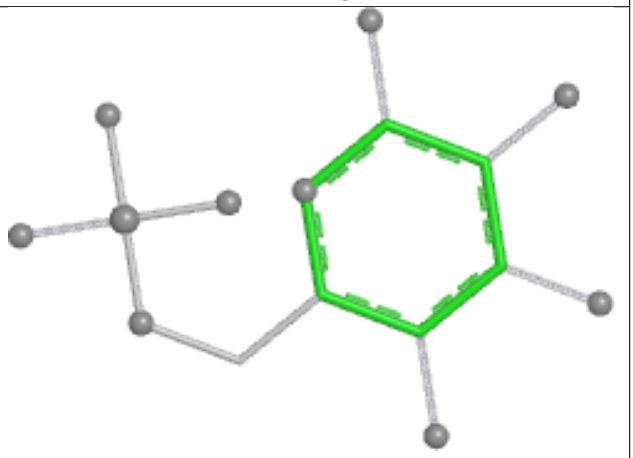
Bond lengths



Bond angles

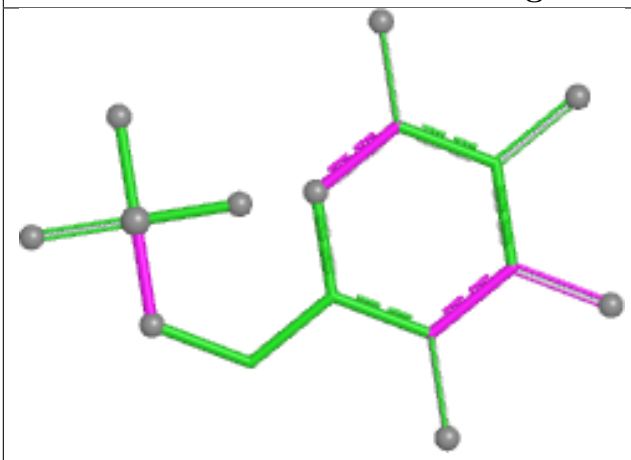


Torsions

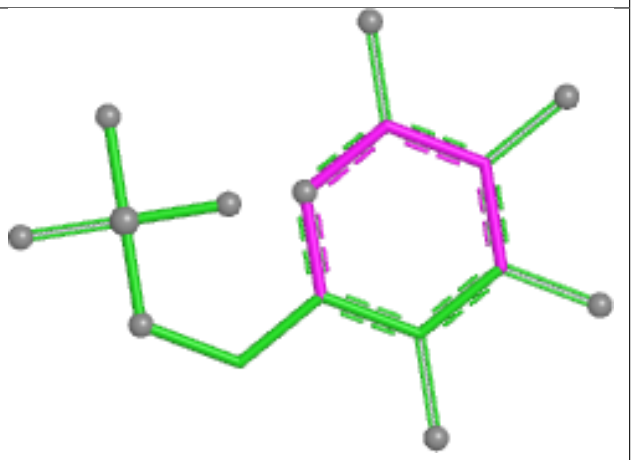


Rings

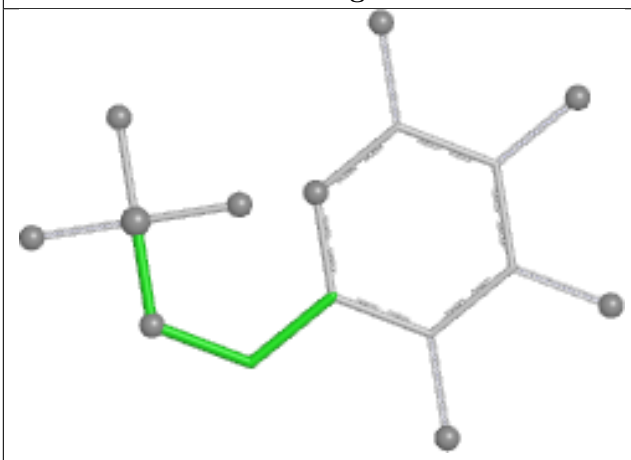
Ligand G6P A 401



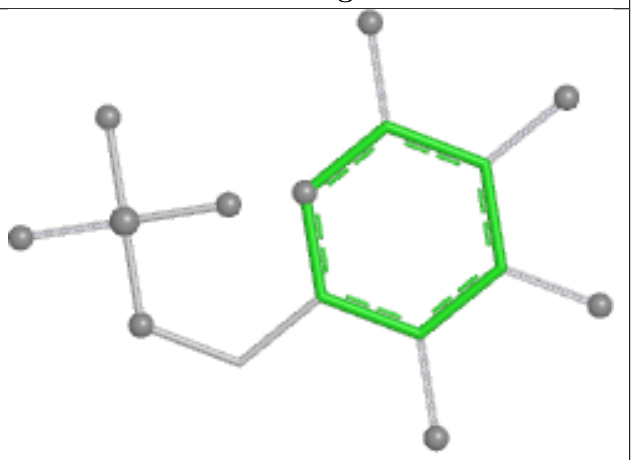
Bond lengths



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, 95^{th} 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	B	170/172 (98%)	-0.02	3 (1%) 68 74	27, 39, 54, 71	0
1	D	171/172 (99%)	-0.06	2 (1%) 79 83	26, 38, 62, 76	0
2	A	294/294 (100%)	0.25	11 (3%) 41 49	26, 38, 62, 109	0
2	C	294/294 (100%)	0.62	32 (10%) 5 8	23, 37, 76, 127	0
All	All	929/932 (99%)	0.26	48 (5%) 27 34	23, 38, 66, 127	0

All (48) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	C	291	SER	13.2
2	C	295	ILE	10.1
2	A	295	ILE	9.8
2	C	294	SER	7.7
2	C	288	SER	7.0
2	C	296	GLU	6.9
2	A	291	SER	6.4
2	A	294	SER	6.1
2	C	293	GLN	6.0
2	C	105	SER	5.4
2	A	292	ASP	5.3
1	B	112	ASN	5.2
2	C	290	GLN	4.6
2	A	29	ASN	4.1
1	B	111	PRO	4.0
2	C	119	TYR	4.0
2	C	289	GLU	4.0
2	A	293	GLN	3.8
2	A	102	GLN	3.6
2	C	107	THR	3.5
2	C	253	HIS	3.5

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Mol	Chain	Res	Type	RSRZ
1	B	83	HIS	3.4
2	C	292	ASP	3.4
2	C	118	LYS	3.4
1	D	191	GLN	3.3
2	C	110	LEU	3.1
2	C	76	PHE	3.1
2	A	76	PHE	3.1
2	C	29	ASN	3.0
2	C	283	ILE	3.0
2	C	116	ASN	2.9
2	C	109	GLN	2.6
2	C	129	VAL	2.6
2	C	75	ASP	2.5
2	C	111	GLU	2.5
2	C	78	GLU	2.4
2	C	102	GLN	2.4
1	D	193	PHE	2.3
2	C	306	LYS	2.3
2	C	286	ASP	2.3
2	A	288	SER	2.2
2	C	307	SER	2.2
2	C	233	VAL	2.2
2	A	111	GLU	2.2
2	C	322	GLN	2.2
2	C	108	GLN	2.1
2	A	290	GLN	2.0
2	C	299	LYS	2.0

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

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

6.3 Carbohydrates (i)

There are no 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,

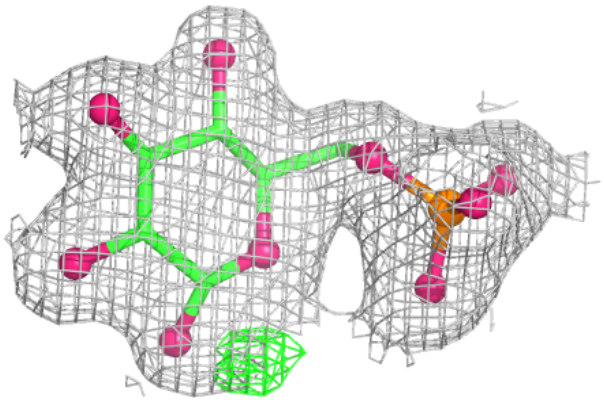
median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

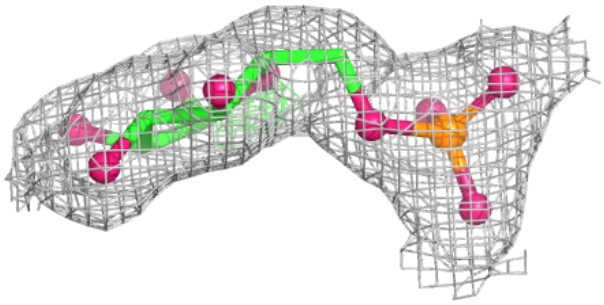
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	G6P	A	401	16/16	0.98	0.16	25,30,34,35	0
3	G6P	C	401	16/16	0.98	0.15	21,25,29,29	0

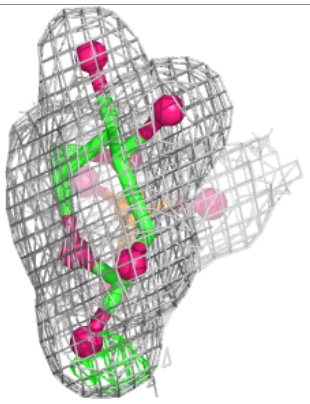
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around G6P A 401:

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

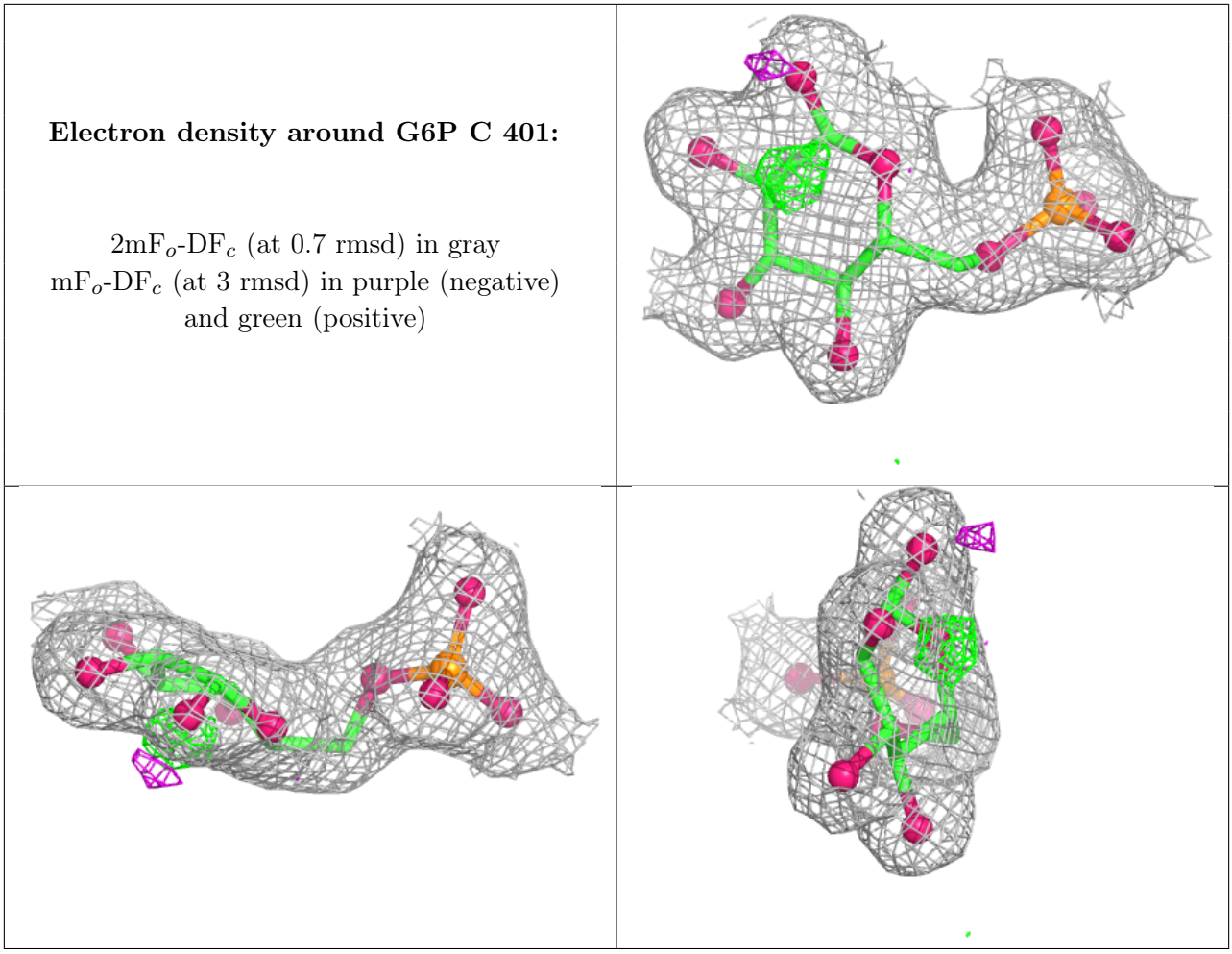






Electron density around G6P C 401:

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



6.5 Other polymers

There are no such residues in this entry.