Full wwPDB X-ray Structure Validation Report (i)

Jun 26, 2024 – 09:29 AM EDT

PDB ID	:	6YS0
Title	:	Transaldolase variant D211A from T. acidophilum in complex with D-fructose 6-phosphate Schiff-base intermediate
Authors	:	Sautner, V.; Klaus, M.; Tittmann, K.
Deposited on	:	2020-04-20
Resolution	:	1.70 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:

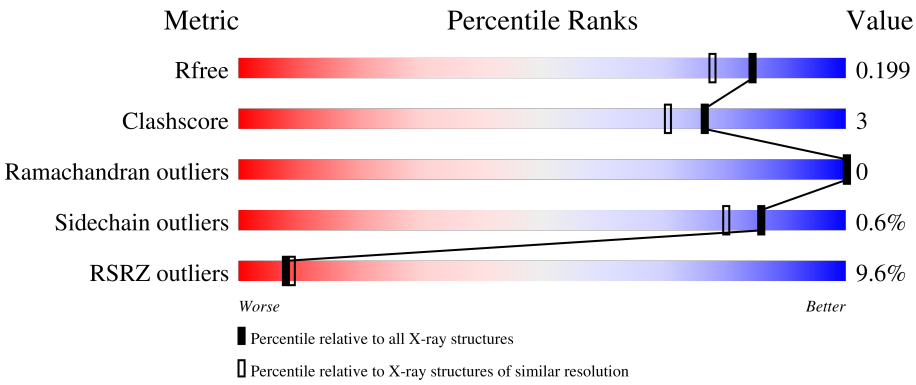
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.37.1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & 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 1.70 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	4298 (1.70-1.70)
Clashscore	141614	4695 (1.70-1.70)
Ramachandran outliers	138981	4610 (1.70-1.70)
Sidechain outliers	138945	4610 (1.70-1.70)
RSRZ outliers	127900	4222 (1.70-1.70)

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	223	12% 92% 5% •
1	B	223	5% 89% 8% •
1	C	223	4% 93% 7%
1	D	223	12% 90% 10%
1	E	223	14% 87% 9% • •

2 Entry composition (i)

There are 5 unique types of molecules in this entry. The entry contains 9196 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.

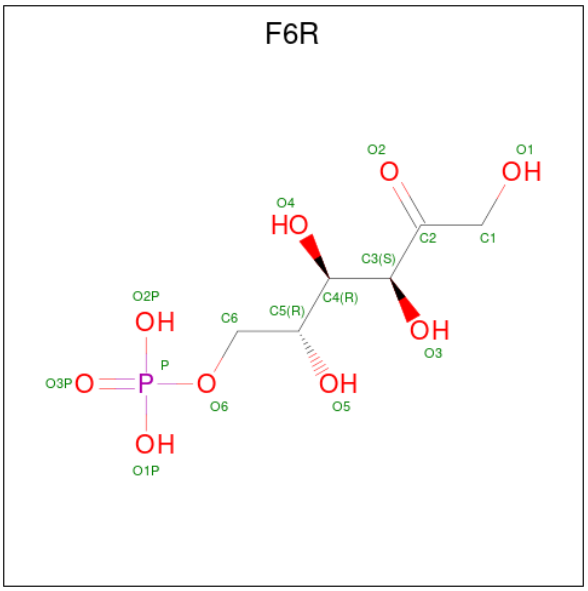
- Molecule 1 is a protein called Probable transaldolase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	217	1710	1092	289	322	7	0	5	0
1	B	217	1702	1086	289	320	7	0	4	0
1	C	223	1748	1116	296	329	7	0	4	0
1	D	223	1772	1129	298	338	7	0	7	0
1	E	216	1703	1085	289	322	7	0	5	0

There are 10 discrepancies between the modelled and reference sequences:

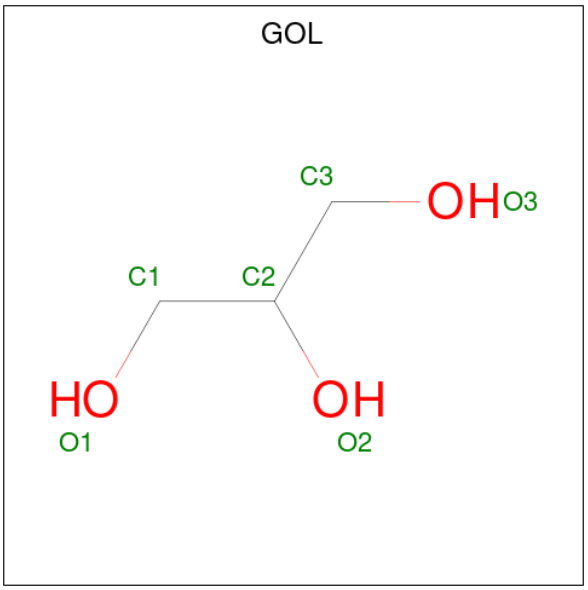
Chain	Residue	Modelled	Actual	Comment	Reference
A	126	VAL	ALA	conflict	UNP Q9HKI3
A	211	ALA	ASP	engineered mutation	UNP Q9HKI3
B	126	VAL	ALA	conflict	UNP Q9HKI3
B	211	ALA	ASP	engineered mutation	UNP Q9HKI3
C	126	VAL	ALA	conflict	UNP Q9HKI3
C	211	ALA	ASP	engineered mutation	UNP Q9HKI3
D	126	VAL	ALA	conflict	UNP Q9HKI3
D	211	ALA	ASP	engineered mutation	UNP Q9HKI3
E	126	VAL	ALA	conflict	UNP Q9HKI3
E	211	ALA	ASP	engineered mutation	UNP Q9HKI3

- Molecule 2 is FRUCTOSE -6-PHOSPHATE (three-letter code: F6R) (formula: $C_6H_{13}O_9P$) (labeled as "Ligand of Interest" by depositor).



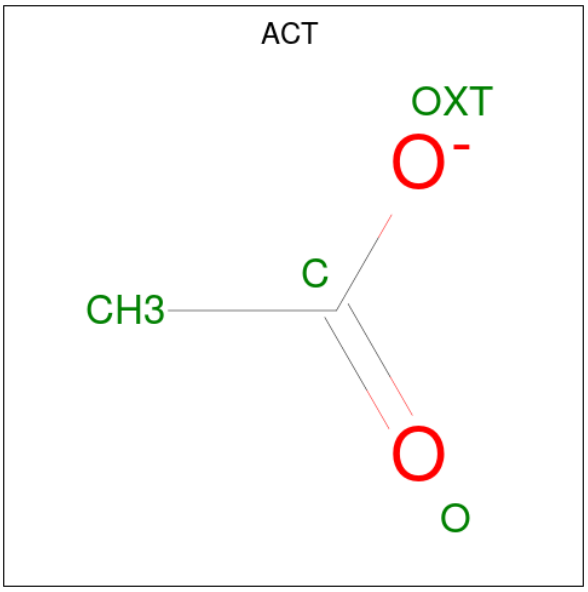
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	O	P	0	0
			15	6	8	1		
2	B	1	Total	C	O	P	0	1
			17	7	9	1		
2	C	1	Total	C	O	P	0	0
			15	6	8	1		
2	D	1	Total	C	O	P	0	0
			15	6	8	1		
2	E	1	Total	C	O	P	0	0
			15	6	8	1		

- Molecule 3 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
3	A	1	6	3	3	0	0
			Total	C	O		
3	A	1	6	3	3	0	0
			Total	C	O		
3	B	1	6	3	3	0	0
			Total	C	O		
3	C	1	6	3	3	0	0
			Total	C	O		
3	C	1	6	3	3	0	0
			Total	C	O		
3	D	1	6	3	3	0	0
			Total	C	O		
3	E	1	6	3	3	0	0
			Total	C	O		
3	E	1	6	3	3	0	0

- Molecule 4 is ACETATE ION (three-letter code: ACT) (formula: $C_2H_3O_2$).



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

- Molecule 5 is water.

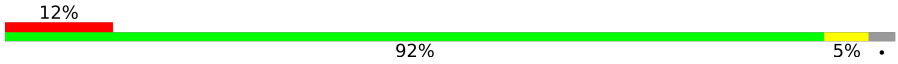
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
5	A	75	75	75	0	0
			Total	O		
5	B	91	92	92	0	1
			Total	O		
5	C	98	98	98	0	0
			Total	O		
5	D	80	80	80	0	0
			Total	O		
5	E	75	75	75	0	0

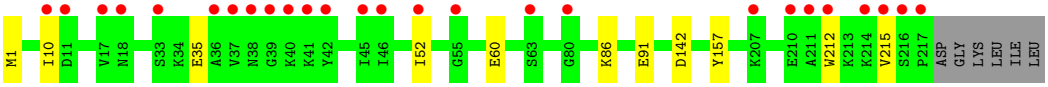
3 Residue-property plots (i)

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: Probable transaldolase

Chain A:



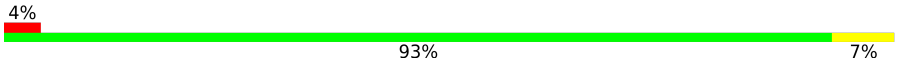


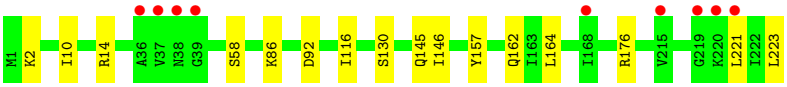
• Molecule 1: Probable transaldolase

Chain B:

• Molecule 1: Probable transaldolase

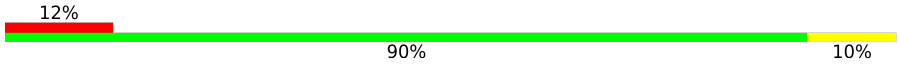
Chain C:

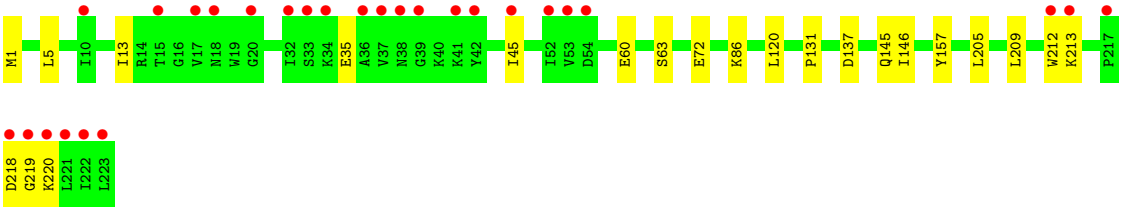




• Molecule 1: Probable transaldolase

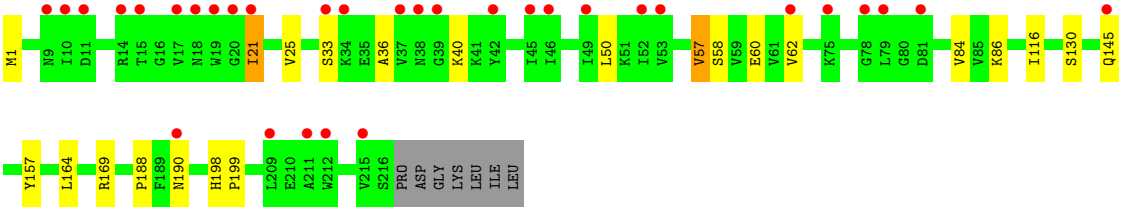
Chain D:





• Molecule 1: Probable transaldolase

Chain E:


M1
N9
I10
D11
R14
T15
G16
V17
N18
W19
G20
I21
V25
S33
K34
E35
A36
V37
N38
G39
K40
K41
Y42
I45
I46
I49
L50
K51
I52
V53
V57
S58
V59
E60
V61
V62
K75
G78
L79
G80
D81
V84
V85
K86
I116
S130
Q145
Y157
L164
R169
P188
F189
N190
H198
P199
L209
E210
A211
W212
V215
S216
PRO
ASP
GLY
LYS
LEU
ILE
LEU

4 Data and refinement statistics (i)

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α, β, γ	148.00Å 172.61Å 99.31Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	65.14 – 1.70 65.14 – 1.70	Depositor EDS
% Data completeness (in resolution range)	99.0 (65.14-1.70) 93.1 (65.14-1.70)	Depositor EDS
R_{merge}	0.03	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.37 (at 1.70Å)	Xtriage
Refinement program	PHENIX 1.13_2998	Depositor
R, R_{free}	0.173 , 0.198 0.175 , 0.199	Depositor DCC
R_{free} test set	6887 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å^2)	34.5	Xtriage
Anisotropy	0.542	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.35 , 56.6	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.97	EDS
Total number of atoms	9196	wwPDB-VP
Average B, all atoms (Å^2)	56.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.32% 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 (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: F6R, ACT, GOL

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	0.59	0/1736	0.66	0/2354
1	B	0.62	0/1728	0.68	0/2343
1	C	0.64	0/1774	0.70	0/2403
1	D	0.60	0/1798	0.64	1/2435 (0.0%)
1	E	0.59	0/1728	0.65	0/2342
All	All	0.61	0/8764	0.67	1/11877 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	D	137	ASP	CB-CG-OD1	5.07	122.86	118.30

There are no chirality outliers.

There are no planarity outliers.

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	1710	0	1773	8	0
1	B	1702	0	1766	11	0
1	C	1748	0	1819	13	0
1	D	1772	0	1831	13	0
1	E	1703	0	1763	17	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	A	15	0	11	0	0
2	B	17	0	6	0	0
2	C	15	0	11	1	0
2	D	15	0	11	1	0
2	E	15	0	11	0	0
3	A	12	0	16	1	0
3	B	6	0	8	0	0
3	C	12	0	16	2	0
3	D	6	0	8	0	0
3	E	12	0	16	0	0
4	A	4	0	3	0	0
4	B	4	0	3	1	0
4	C	4	0	3	0	0
4	E	4	0	3	1	0
5	A	75	0	0	0	0
5	B	92	0	0	1	0
5	C	98	0	0	0	0
5	D	80	0	0	0	0
5	E	75	0	0	1	0
All	All	9196	0	9078	53	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 3.

All (53) 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:B:145[B]:GLN:HG2	1:B:146:ILE:HD12	1.47	0.94
1:D:145[B]:GLN:HG2	1:D:146:ILE:HD12	1.61	0.83
1:D:120:LEU:HD22	1:E:21:ILE:HG12	1.74	0.70
1:A:142:ASP:HB2	3:A:302:GOL:H11	1.74	0.68
1:A:10:ILE:HD11	1:A:52:ILE:HD12	1.75	0.68
1:C:58[A]:SER:OG	1:C:86:LYS:HG3	2.04	0.57
1:C:176:ARG:CG	3:C:302:GOL:H31	2.35	0.56
1:D:212:TRP:HE1	1:D:219:GLY:C	2.09	0.55
1:D:60:GLU:HA	1:D:86:LYS:HB3	1.89	0.54
1:C:176:ARG:HG2	3:C:302:GOL:H31	1.91	0.53
1:A:91[B]:GLU:HG2	1:B:196:MET:SD	2.49	0.52
1:A:157:TYR:CZ	1:B:1:MET:HB2	2.44	0.52
1:B:60:GLU:HA	1:B:86:LYS:HB3	1.92	0.51
1:D:145[B]:GLN:CG	1:D:146:ILE:HD12	2.37	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:209:LEU:HD11	1:B:213:LYS:HE3	1.93	0.51
1:D:209:LEU:HG	1:D:213:LYS:HE3	1.94	0.50
1:E:188:PRO:HB2	1:E:190[A]:ASN:OD1	2.13	0.49
1:D:157:TYR:CZ	1:E:1:MET:HB2	2.49	0.48
1:A:60:GLU:HA	1:A:86:LYS:HB3	1.95	0.48
1:C:145[B]:GLN:CG	1:C:146:ILE:HD12	2.44	0.48
1:A:215:VAL:HG11	1:E:33:SER:HA	1.95	0.47
1:B:67:GLU:O	1:B:71:GLU:HG3	2.13	0.47
1:A:212:TRP:CD2	1:E:62:VAL:HG11	2.49	0.47
1:E:198:HIS:CG	1:E:199:PRO:HD2	2.50	0.47
1:B:35:GLU:HB2	1:B:45:ILE:HD13	1.97	0.46
1:C:10:ILE:O	1:C:14:ARG:HG3	2.15	0.46
1:E:60:GLU:HA	1:E:86:LYS:HB3	1.98	0.46
1:D:218:ASP:OD1	1:D:220:LYS:N	2.47	0.46
1:E:145[A]:GLN:HG3	5:E:468:HOH:O	2.15	0.46
1:D:5:LEU:HD23	1:D:13:ILE:HA	1.99	0.45
4:B:303:ACT:H1	5:B:480:HOH:O	2.15	0.45
1:E:36:ALA:HA	1:E:40:LYS:HB2	1.99	0.45
1:B:79:LEU:HD11	1:C:223:LEU:HD13	1.98	0.44
1:E:50:LEU:HD23	1:E:57:VAL:HG11	1.98	0.44
1:C:130:SER:HA	1:C:164:LEU:O	2.17	0.44
1:B:74:ARG:NH2	1:B:103:GLU:OE2	2.36	0.43
1:E:25:VAL:O	1:E:57:VAL:HA	2.19	0.43
1:D:86:LYS:HE2	2:D:301:F6R:H1C1	1.80	0.42
1:C:145[B]:GLN:HG3	1:C:146:ILE:HD12	2.01	0.42
1:E:130:SER:HA	1:E:164:LEU:O	2.19	0.42
1:D:35:GLU:HB2	1:D:45:ILE:HD13	2.01	0.42
1:B:130:SER:HA	1:B:164:LEU:O	2.20	0.42
1:E:169:ARG:HB3	4:E:304:ACT:H3	2.01	0.42
1:C:86:LYS:HE2	2:C:301:F6R:H1C1	1.85	0.42
1:E:198:HIS:ND1	1:E:199:PRO:HD2	2.35	0.41
1:E:58:SER:HA	1:E:84:VAL:O	2.21	0.41
1:A:1:MET:HB2	1:E:157:TYR:CZ	2.55	0.41
1:B:62:VAL:HG22	1:C:221:LEU:HB2	2.03	0.41
1:C:116:ILE:HD13	1:C:116:ILE:HA	1.93	0.41
1:C:2:LYS:NZ	1:C:162:GLN:OE1	2.54	0.41
1:C:157:TYR:CZ	1:D:1:MET:HB2	2.56	0.41
1:D:63[B]:SER:OG	1:D:72[B]:GLU:OE2	2.28	0.40
1:E:116:ILE:HD13	1:E:116:ILE:HA	1.97	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	220/223 (99%)	218 (99%)	2 (1%)	0	100	100
1	B	219/223 (98%)	217 (99%)	2 (1%)	0	100	100
1	C	225/223 (101%)	224 (100%)	1 (0%)	0	100	100
1	D	228/223 (102%)	226 (99%)	2 (1%)	0	100	100
1	E	219/223 (98%)	216 (99%)	3 (1%)	0	100	100
All	All	1111/1115 (100%)	1101 (99%)	10 (1%)	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	A	192/192 (100%)	191 (100%)	1 (0%)	88	83
1	B	191/192 (100%)	191 (100%)	0	100	100
1	C	196/192 (102%)	195 (100%)	1 (0%)	88	83
1	D	199/192 (104%)	197 (99%)	2 (1%)	76	67
1	E	191/192 (100%)	189 (99%)	2 (1%)	76	67
All	All	969/960 (101%)	963 (99%)	6 (1%)	86	80

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

Mol	Chain	Res	Type
1	A	35	GLU
1	C	92	ASP
1	D	131	PRO
1	D	205	LEU
1	E	21	ILE
1	E	57	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

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)

18 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	$\#\|Z\| > 2$
4	ACT	E	304	-	3,3,3	2.45	2 (66%)	3,3,3	0.99	0
4	ACT	C	304	-	3,3,3	2.46	2 (66%)	3,3,3	1.27	0
2	F6R	B	301[B]	-	14,14,15	0.85	1 (7%)	18,19,21	1.25	3 (16%)
2	F6R	D	301	1	14,14,15	1.01	1 (7%)	18,19,21	1.18	2 (11%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
3	GOL	C	302	-	5,5,5	1.36	1 (20%)	5,5,5	0.77	0
3	GOL	C	303	-	5,5,5	0.85	0	5,5,5	0.97	0
4	ACT	A	304	-	3,3,3	1.55	1 (33%)	3,3,3	1.32	0
3	GOL	E	303	3	5,5,5	0.66	0	5,5,5	0.96	0
3	GOL	A	303	3	5,5,5	0.67	0	5,5,5	0.91	0
4	ACT	B	303	-	3,3,3	2.25	2 (66%)	3,3,3	1.37	0
2	F6R	A	301	1	14,14,15	0.59	0	18,19,21	1.38	4 (22%)
2	F6R	C	301	1	14,14,15	0.92	0	18,19,21	1.52	2 (11%)
2	F6R	E	301	1	14,14,15	0.83	0	18,19,21	1.71	4 (22%)
3	GOL	A	302	-	5,5,5	1.00	0	5,5,5	1.12	0
3	GOL	B	302	3	5,5,5	0.81	0	5,5,5	1.03	0
3	GOL	D	302	3	5,5,5	0.53	0	5,5,5	1.09	0
3	GOL	E	302	-	5,5,5	0.88	0	5,5,5	1.08	0
2	F6R	B	301[A]	-	14,14,15	0.86	1 (7%)	18,19,21	1.50	3 (16%)

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	F6R	B	301[B]	-	-	1/17/17/20	-
2	F6R	D	301	1	-	0/17/17/20	-
3	GOL	C	302	-	-	4/4/4/4	-
3	GOL	C	303	-	-	0/4/4/4	-
3	GOL	E	303	3	-	3/4/4/4	-
3	GOL	A	303	3	-	2/4/4/4	-
2	F6R	A	301	1	-	0/17/17/20	-
2	F6R	C	301	1	-	1/17/17/20	-
2	F6R	E	301	1	-	0/17/17/20	-
3	GOL	A	302	-	-	2/4/4/4	-
3	GOL	B	302	3	-	1/4/4/4	-
3	GOL	D	302	3	-	2/4/4/4	-
3	GOL	E	302	-	-	2/4/4/4	-
2	F6R	B	301[A]	-	-	0/17/17/20	-

All (11) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	E	304	ACT	CH3-C	3.56	1.64	1.49
4	C	304	ACT	CH3-C	3.37	1.63	1.49
4	B	303	ACT	CH3-C	2.78	1.60	1.49
2	D	301	F6R	C6-C5	2.64	1.55	1.51
4	C	304	ACT	OXT-C	-2.51	1.18	1.30
4	A	304	ACT	CH3-C	2.38	1.59	1.49
4	E	304	ACT	OXT-C	-2.26	1.19	1.30
3	C	302	GOL	C1-C2	2.14	1.60	1.51
4	B	303	ACT	OXT-C	-2.09	1.20	1.30
2	B	301[A]	F6R	C6-C5	2.06	1.54	1.51
2	B	301[B]	F6R	C6-C5	2.06	1.54	1.51

All (18) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	E	301	F6R	C1-C2-C3	4.68	122.03	113.07
2	B	301[A]	F6R	C1-C2-C3	4.24	121.18	113.07
2	C	301	F6R	C1-C2-C3	3.34	119.47	113.07
2	D	301	F6R	O2P-P-O1P	3.09	119.44	107.64
2	A	301	F6R	O2P-P-O3P	3.07	122.68	110.68
2	C	301	F6R	O1-C1-C2	-3.03	100.70	111.31
2	A	301	F6R	C1-C2-C3	2.96	118.74	113.07
2	B	301[A]	F6R	P-O6-C6	2.85	126.16	118.30
2	B	301[B]	F6R	P-O6-C6	2.85	126.16	118.30
2	E	301	F6R	P-O6-C6	2.80	126.00	118.30
2	E	301	F6R	O6-P-O3P	-2.59	99.21	106.47
2	B	301[B]	F6R	C1-C2-C3	2.57	117.98	113.07
2	B	301[A]	F6R	O1P-P-O3P	2.39	120.05	110.68
2	B	301[B]	F6R	O1P-P-O3P	2.39	120.05	110.68
2	D	301	F6R	O1-C1-C2	-2.33	103.14	111.31
2	E	301	F6R	O1P-P-O6	2.26	112.75	106.73
2	A	301	F6R	O5-C5-C4	2.19	114.42	109.10
2	A	301	F6R	O1-C1-C2	-2.08	104.02	111.31

There are no chirality outliers.

All (18) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	301[B]	F6R	O1-C1-C2-C3
3	A	302	GOL	C1-C2-C3-O3
3	A	303	GOL	C1-C2-C3-O3
3	C	302	GOL	C1-C2-C3-O3

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Mol	Chain	Res	Type	Atoms
3	B	302	GOL	C1-C2-C3-O3
3	C	302	GOL	O1-C1-C2-C3
3	D	302	GOL	O1-C1-C2-C3
3	E	303	GOL	C1-C2-C3-O3
3	A	302	GOL	O2-C2-C3-O3
3	A	303	GOL	O2-C2-C3-O3
3	C	302	GOL	O1-C1-C2-O2
3	C	302	GOL	O2-C2-C3-O3
3	D	302	GOL	O1-C1-C2-O2
3	E	303	GOL	O2-C2-C3-O3
3	E	302	GOL	C1-C2-C3-O3
3	E	302	GOL	O2-C2-C3-O3
3	E	303	GOL	O1-C1-C2-O2
2	C	301	F6R	O1-C1-C2-C3

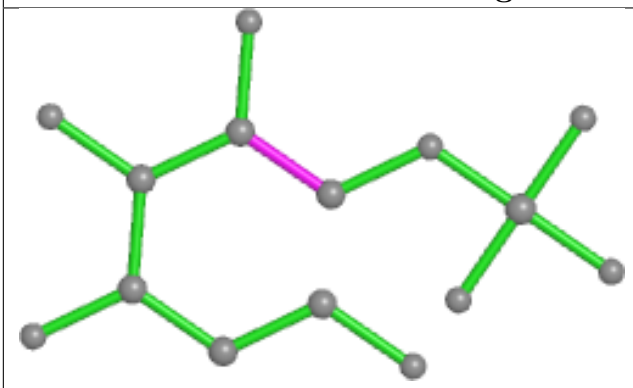
There are no ring outliers.

6 monomers are involved in 7 short contacts:

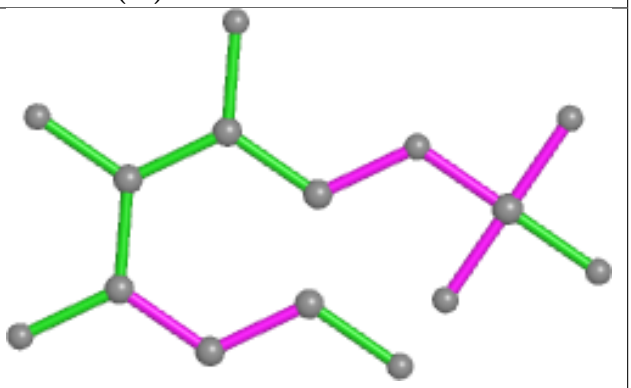
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	E	304	ACT	1	0
2	D	301	F6R	1	0
3	C	302	GOL	2	0
4	B	303	ACT	1	0
2	C	301	F6R	1	0
3	A	302	GOL	1	0

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.

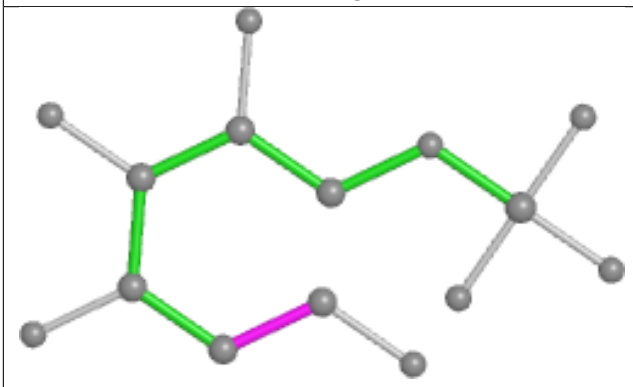
Ligand F6R B 301 (B)



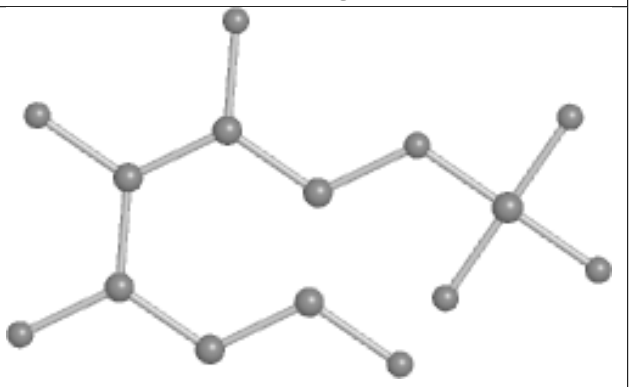
Bond lengths



Bond angles

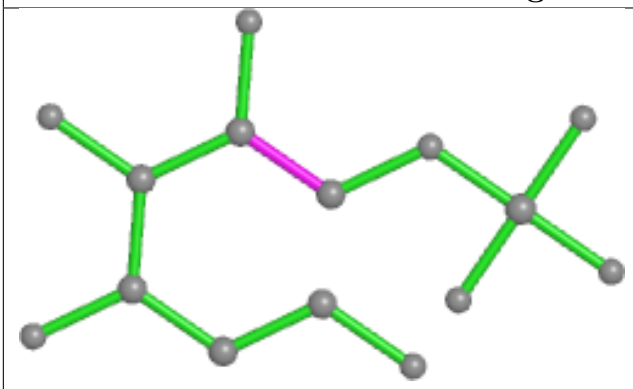


Torsions

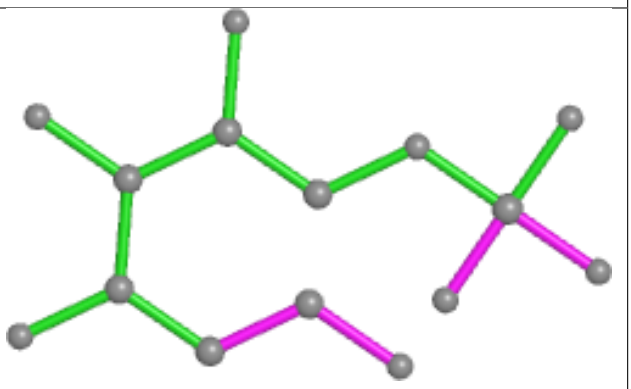


Rings

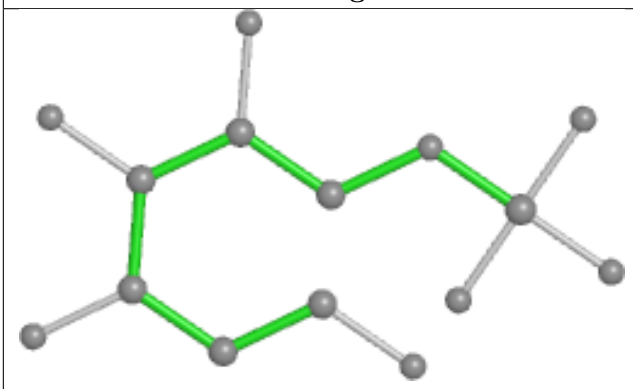
Ligand F6R D 301



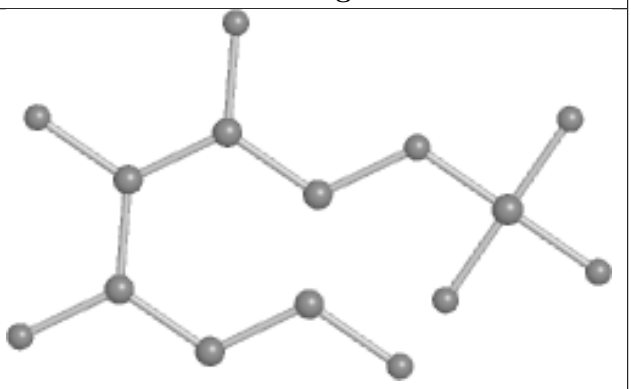
Bond lengths



Bond angles

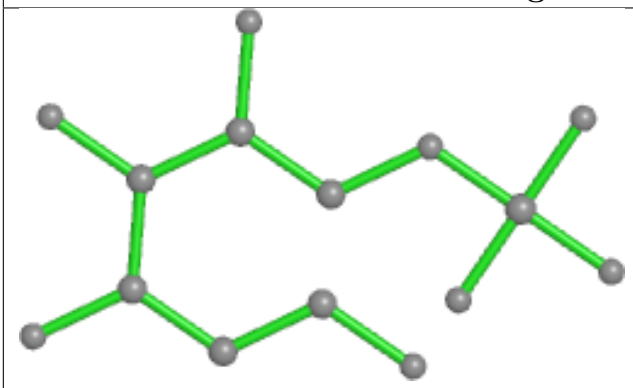


Torsions

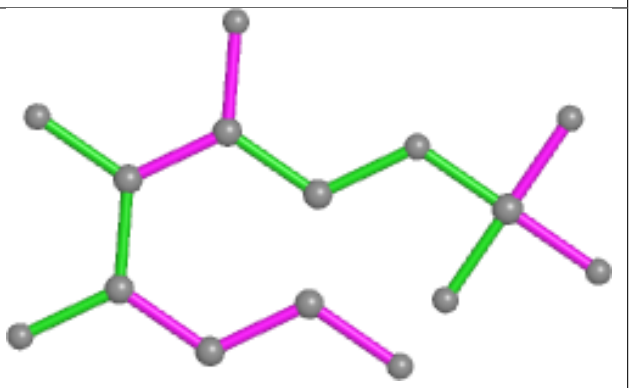


Rings

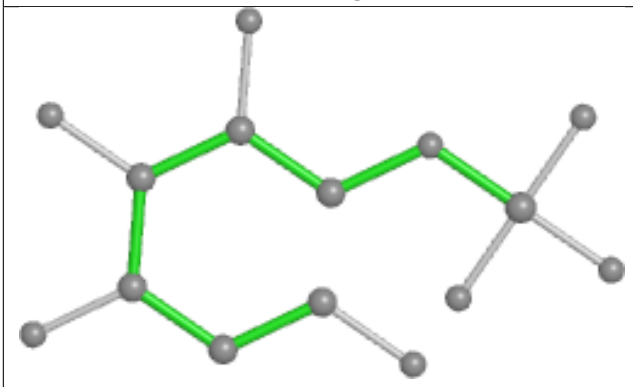
Ligand F6R A 301



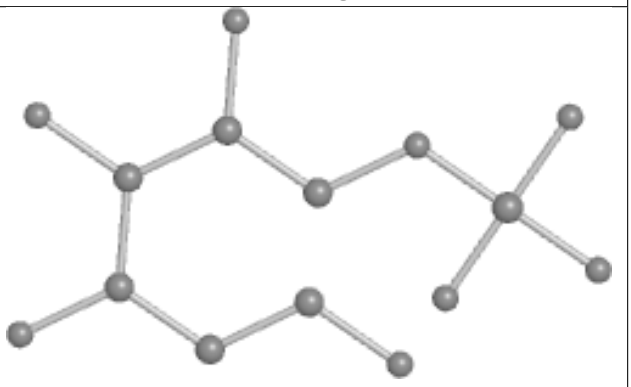
Bond lengths



Bond angles

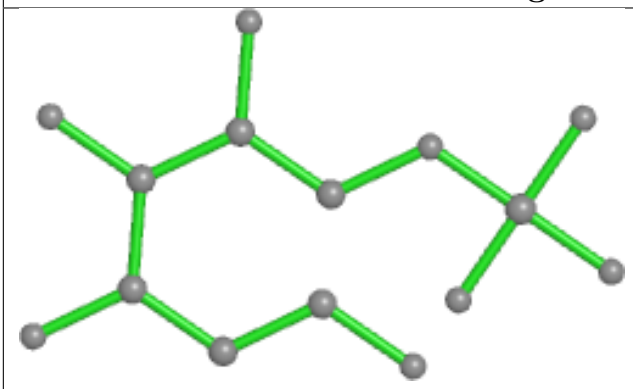


Torsions

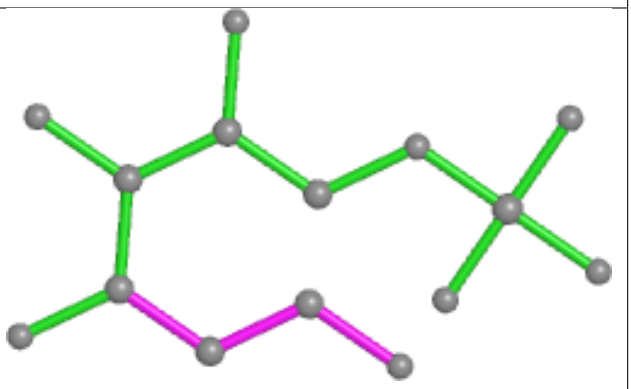


Rings

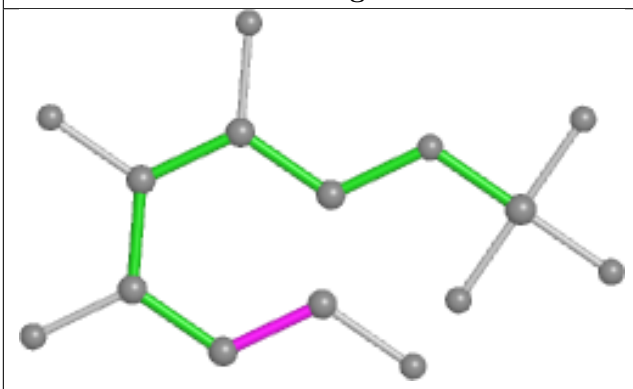
Ligand F6R C 301



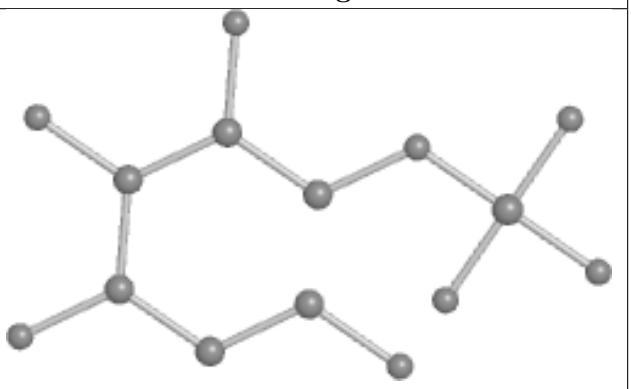
Bond lengths



Bond angles

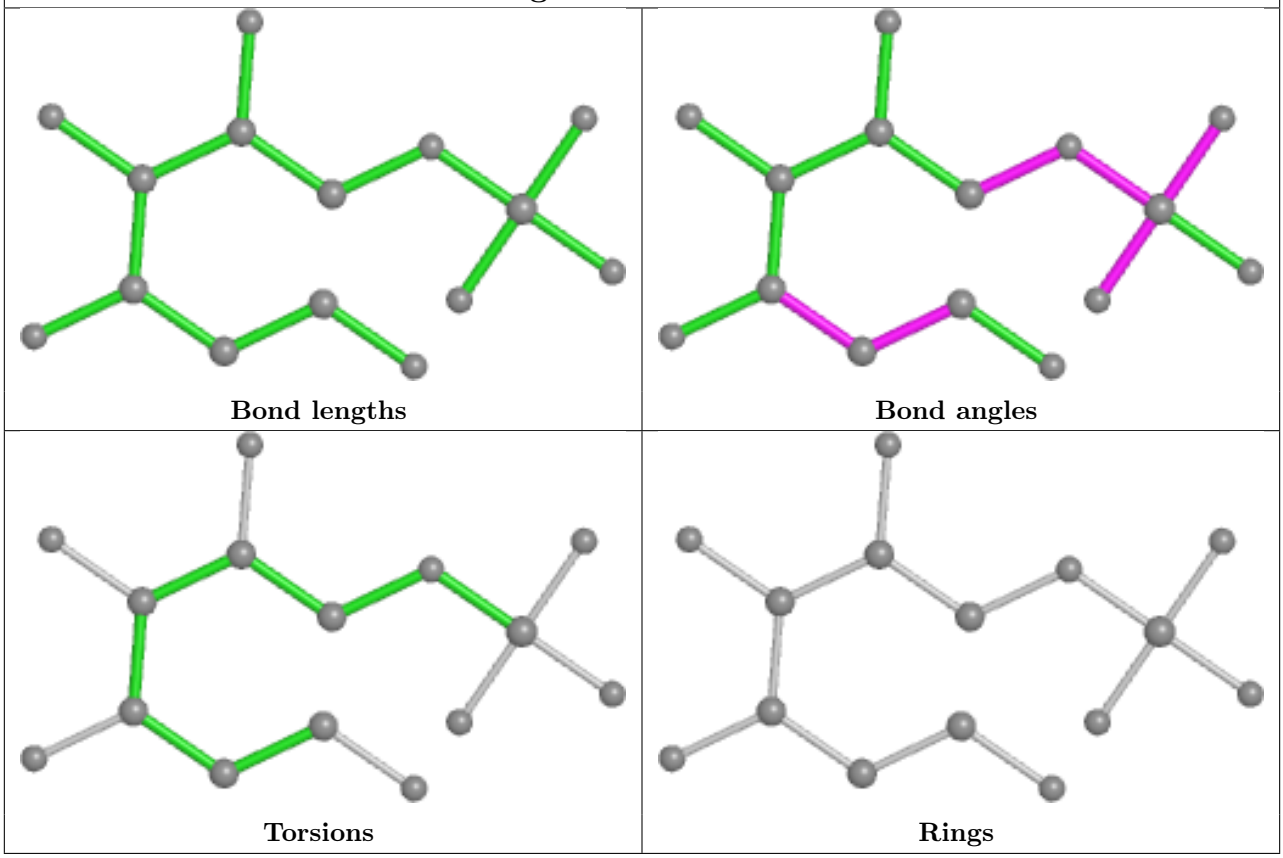


Torsions

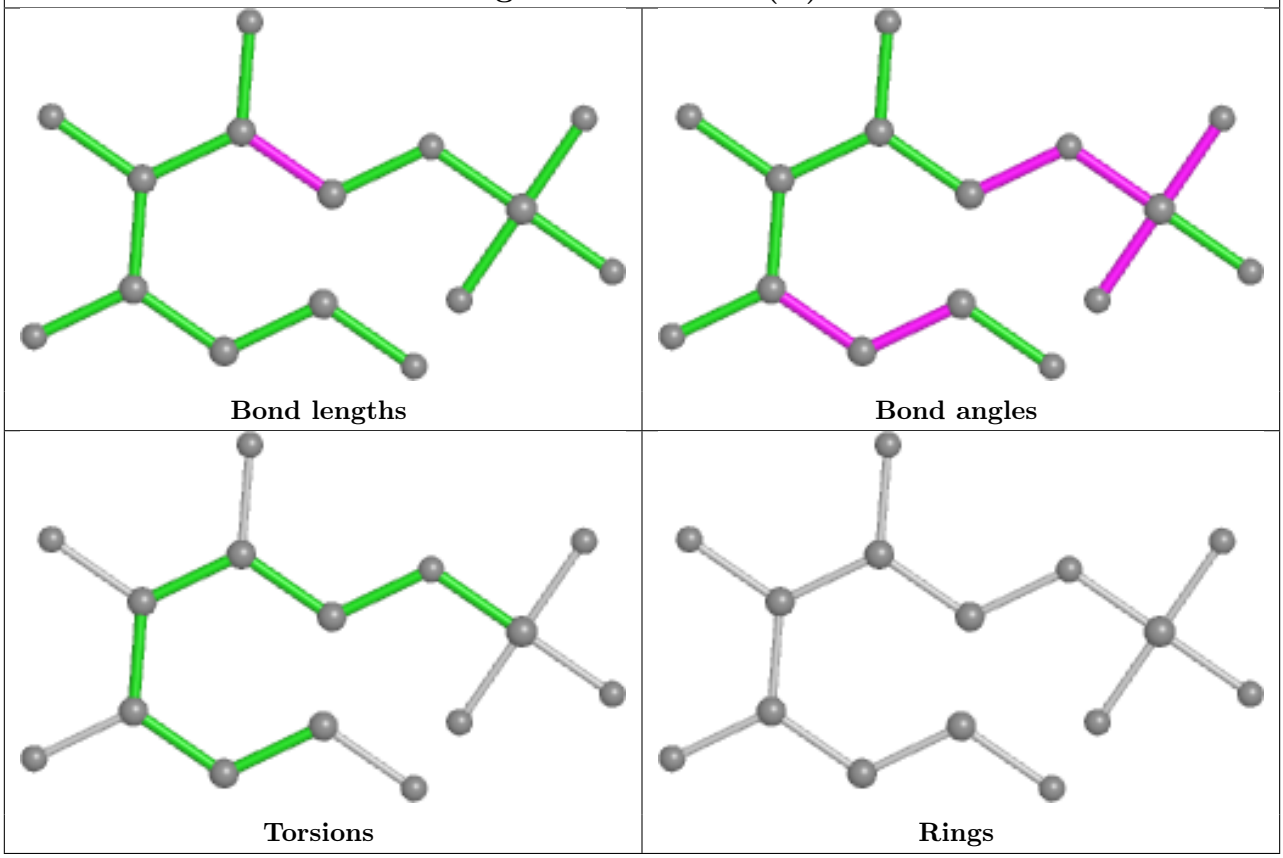


Rings

Ligand F6R E 301



Ligand F6R B 301 (A)



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	217/223 (97%)	0.64	26 (11%)	4	5	33, 53, 105, 140	0
1	B	217/223 (97%)	0.34	11 (5%)	28	31	33, 47, 79, 112	0
1	C	223/223 (100%)	0.36	9 (4%)	38	42	33, 48, 88, 129	0
1	D	223/223 (100%)	0.55	27 (12%)	4	5	33, 48, 99, 154	0
1	E	216/223 (96%)	0.81	32 (14%)	2	2	34, 55, 107, 191	0
All	All	1096/1115 (98%)	0.54	105 (9%)	8	9	33, 49, 100, 191	0

All (105) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	37	VAL	10.6
1	E	37	VAL	6.6
1	D	220	LYS	6.3
1	E	10	ILE	6.1
1	E	42	TYR	5.6
1	B	212	TRP	5.3
1	A	42	TYR	4.8
1	E	212	TRP	4.7
1	A	18	ASN	4.6
1	D	219	GLY	4.5
1	E	39	GLY	4.4
1	A	36	ALA	4.4
1	D	212	TRP	4.2
1	A	215	VAL	4.2
1	D	52	ILE	4.2
1	B	38	ASN	4.1
1	D	18	ASN	4.1
1	B	209	LEU	3.9
1	B	37	VAL	3.9
1	E	34	LYS	3.8

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Mol	Chain	Res	Type	RSRZ
1	A	38	ASN	3.8
1	A	45	ILE	3.7
1	D	54	ASP	3.7
1	E	78	GLY	3.7
1	E	38	ASN	3.6
1	E	21	ILE	3.6
1	E	45	ILE	3.6
1	A	33	SER	3.5
1	B	210	GLU	3.5
1	D	38	ASN	3.5
1	E	18	ASN	3.5
1	A	211	ALA	3.5
1	D	218	ASP	3.4
1	C	220	LYS	3.4
1	D	36	ALA	3.3
1	D	45	ILE	3.3
1	E	17	VAL	3.2
1	D	222	ILE	3.2
1	E	52	ILE	3.2
1	B	39	GLY	3.2
1	A	41	LYS	3.2
1	D	32	ILE	3.2
1	D	39	GLY	3.2
1	D	223	LEU	3.2
1	E	53	VAL	3.2
1	A	40	LYS	3.1
1	E	33	SER	3.1
1	A	217	PRO	3.1
1	A	46	ILE	3.1
1	C	36	ALA	3.1
1	B	10	ILE	3.0
1	D	37	VAL	3.0
1	E	11	ASP	3.0
1	C	219	GLY	3.0
1	D	221	LEU	3.0
1	A	52	ILE	3.0
1	D	15	THR	2.9
1	A	207	LYS	2.9
1	D	42	TYR	2.8
1	D	10	ILE	2.8
1	A	55	GLY	2.8
1	A	212	TRP	2.8

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Mol	Chain	Res	Type	RSRZ
1	E	75	LYS	2.8
1	E	15	THR	2.8
1	A	11	ASP	2.8
1	D	33	SER	2.7
1	A	216	SER	2.7
1	C	221	LEU	2.7
1	E	209	LEU	2.7
1	B	217	PRO	2.7
1	E	211	ALA	2.6
1	E	46	ILE	2.6
1	E	20	GLY	2.6
1	A	17	VAL	2.6
1	D	217	PRO	2.6
1	C	37	VAL	2.5
1	C	215	VAL	2.5
1	D	17	VAL	2.5
1	A	39	GLY	2.5
1	E	19	TRP	2.5
1	E	79	LEU	2.5
1	E	9	ASN	2.4
1	E	190[A]	ASN	2.4
1	C	168	ILE	2.4
1	D	20	GLY	2.3
1	E	215	VAL	2.3
1	D	213	LYS	2.3
1	D	41	LYS	2.3
1	D	53	VAL	2.2
1	E	62	VAL	2.2
1	A	10	ILE	2.2
1	A	214	LYS	2.2
1	E	145[A]	GLN	2.2
1	A	80	GLY	2.2
1	B	208	PHE	2.1
1	E	81	ASP	2.1
1	D	34	LYS	2.1
1	A	210	GLU	2.1
1	C	39	GLY	2.1
1	E	49	ILE	2.1
1	E	14	ARG	2.0
1	C	38	ASN	2.0
1	A	63	SER	2.0
1	B	216	SER	2.0

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Mol	Chain	Res	Type	RSRZ
1	B	179	VAL	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)

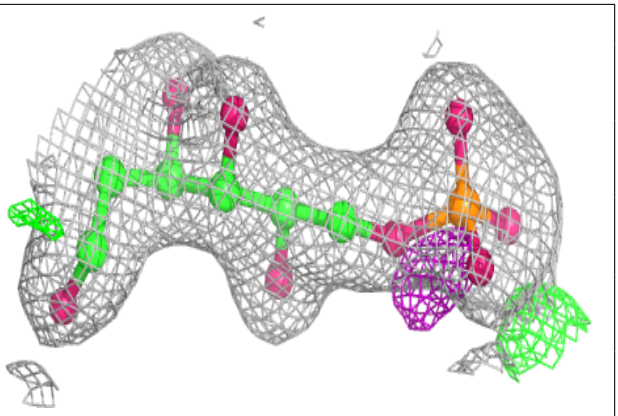
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

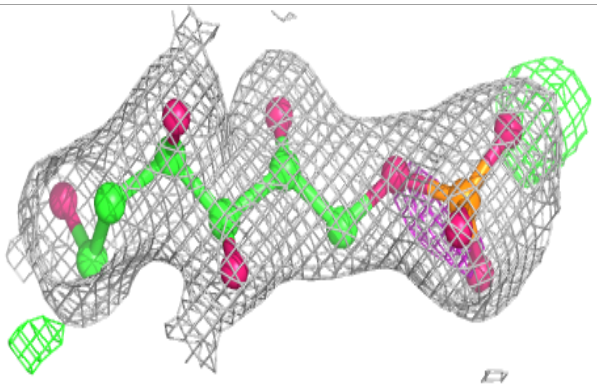
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	GOL	A	302	6/6	0.63	0.22	59,66,72,72	0
3	GOL	E	302	6/6	0.79	0.22	65,71,72,72	0
4	ACT	A	304	4/4	0.83	0.17	68,71,73,76	0
3	GOL	C	302	6/6	0.85	0.14	55,62,62,64	0
3	GOL	E	303	6/6	0.95	0.19	47,50,51,51	6
2	F6R	C	301	15/16	0.95	0.09	38,41,53,53	0
4	ACT	E	304	4/4	0.95	0.16	47,51,53,53	0
2	F6R	E	301	15/16	0.96	0.09	42,48,56,57	0
4	ACT	B	303	4/4	0.96	0.13	45,52,52,53	0
3	GOL	D	302	6/6	0.96	0.16	46,48,50,50	6
3	GOL	C	303	6/6	0.97	0.23	44,48,49,49	6
2	F6R	D	301	15/16	0.97	0.09	40,45,52,55	15
2	F6R	B	301[A]	15/16	0.97	0.08	38,44,52,58	2
2	F6R	B	301[B]	15/16	0.97	0.08	38,44,52,58	2
3	GOL	A	303	6/6	0.97	0.18	46,50,51,51	6
3	GOL	B	302	6/6	0.97	0.16	44,49,49,50	6
4	ACT	C	304	4/4	0.97	0.20	44,45,46,47	4
2	F6R	A	301	15/16	0.97	0.09	43,46,56,57	0

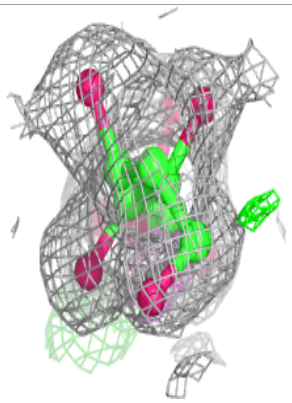
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around F6R C 301:

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

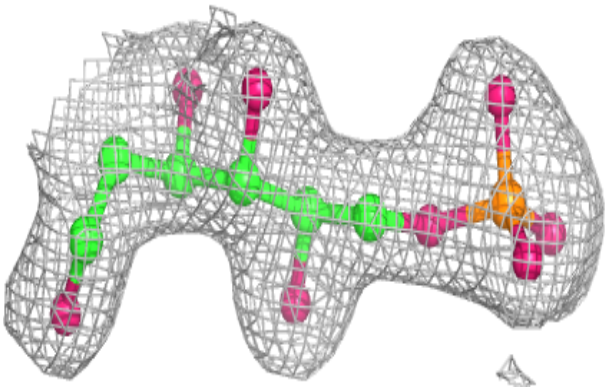


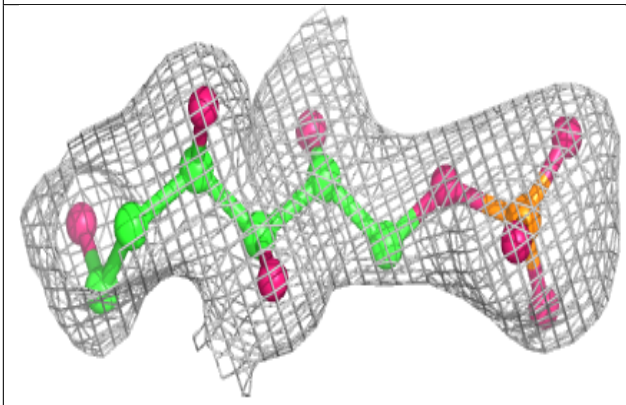


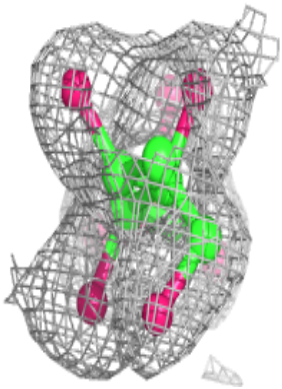


Electron density around F6R E 301:

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

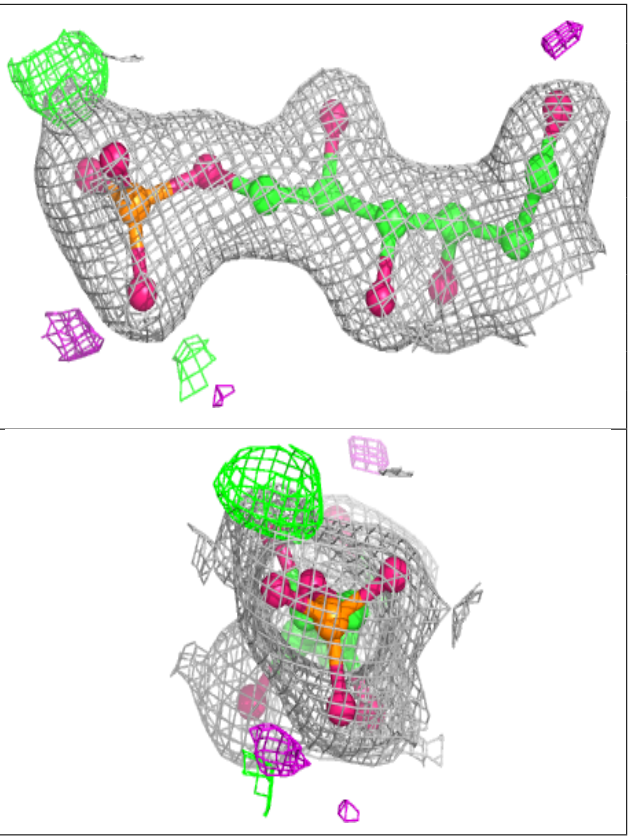






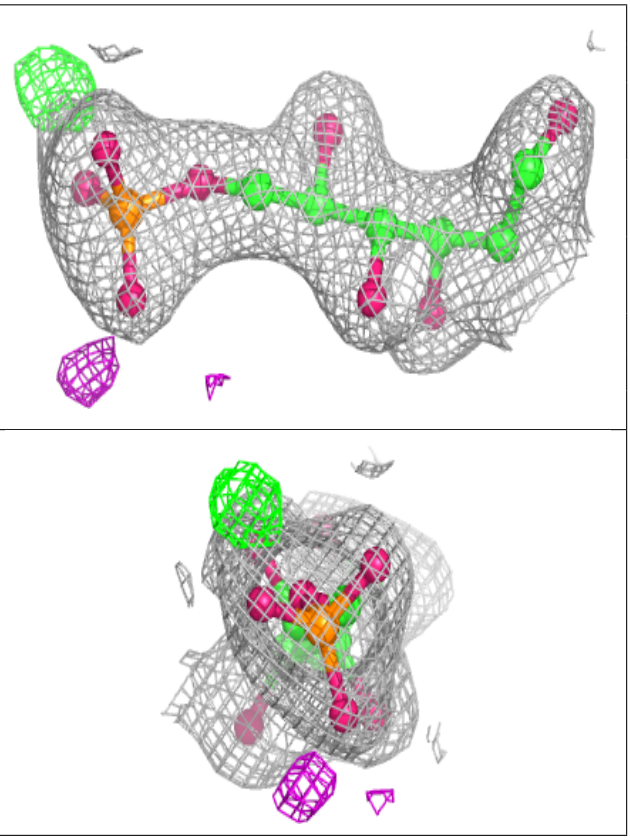
Electron density around F6R D 301:

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



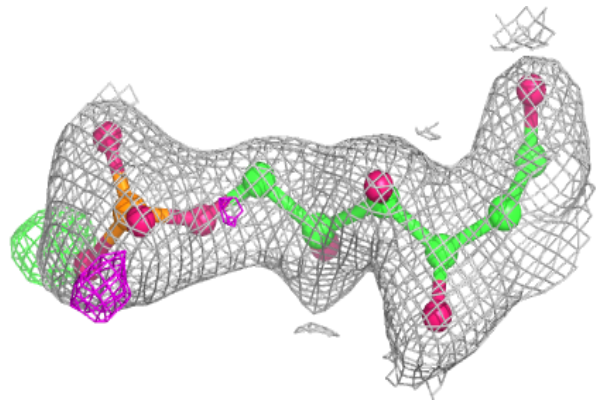
Electron density around F6R B 301 (A):

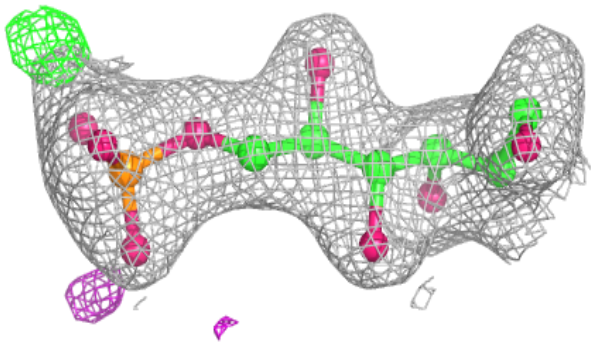
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

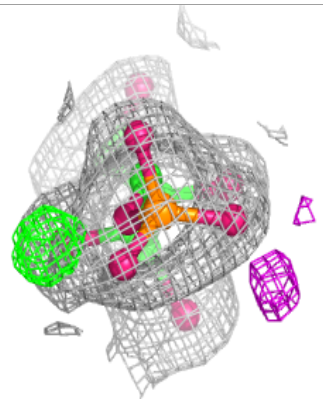


Electron density around F6R B 301 (B):

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

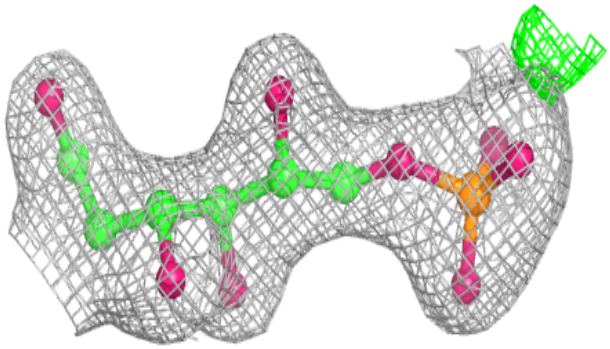


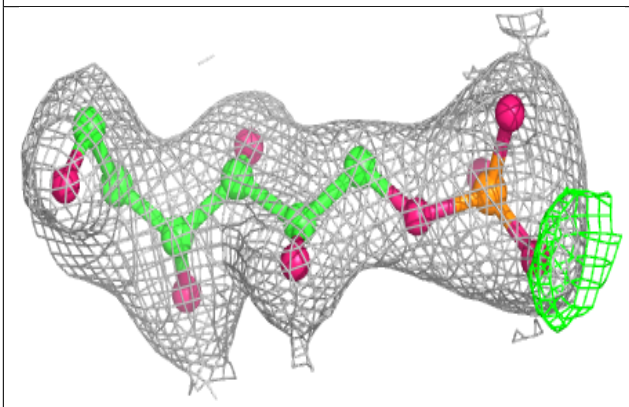


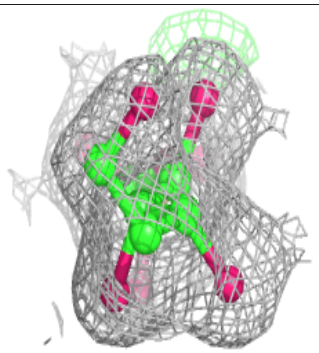


Electron density around F6R A 301:

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







6.5 Other polymers (i)

There are no such residues in this entry.