



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 05:06 AM UTC

PDB ID : 6YRT / pdb_00006yrt
Title : Transaldolase variant T30D 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 : 1.65 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	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

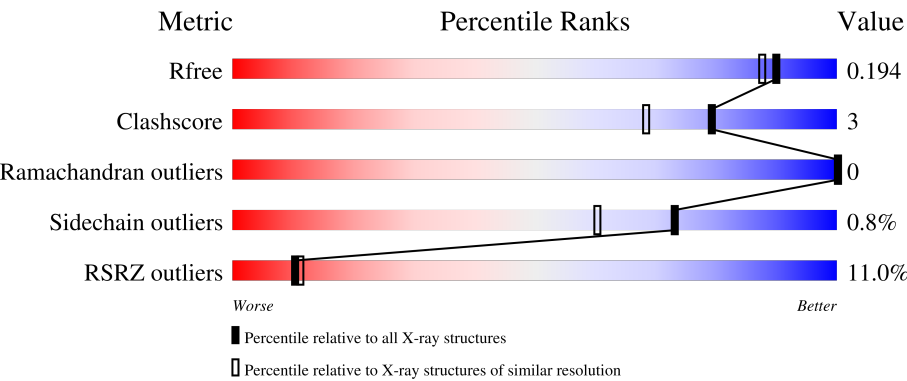
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.65 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}	180053	2563 (1.66-1.66)
Clashscore	190562	2662 (1.66-1.66)
Ramachandran outliers	187476	2621 (1.66-1.66)
Sidechain outliers	187428	2621 (1.66-1.66)
RSRZ outliers	180081	2564 (1.66-1.66)

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	223	9% 90% 7% .
1	B	223	8% 90% 7% .
1	C	223	10% 94% 6%
1	D	223	10% 92% 8%
1	E	223	17% 88% 8% ..

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
4	ACT	B	303	-	X	X	-
4	ACT	C	304	-	X	-	-

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 9425 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.

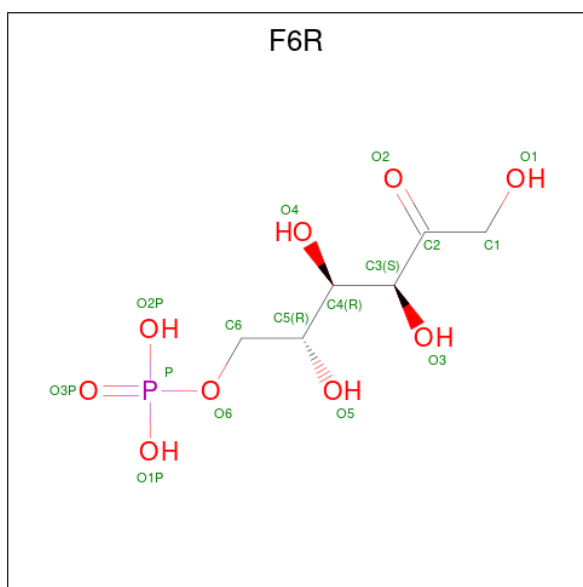
- Molecule 1 is a protein called Transaldolase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	217	Total	C	N	O	S	0	14	0
			1785	1132	299	347	7			
1	B	217	Total	C	N	O	S	0	8	0
			1737	1108	293	329	7			
1	C	223	Total	C	N	O	S	0	9	0
			1794	1143	301	343	7			
1	D	223	Total	C	N	O	S	0	11	0
			1809	1150	303	349	7			
1	E	217	Total	C	N	O	S	0	5	0
			1717	1095	289	326	7			

There are 10 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	30	ASP	THR	engineered mutation	UNP Q9HKKI3
A	126	VAL	ALA	conflict	UNP Q9HKKI3
B	30	ASP	THR	engineered mutation	UNP Q9HKKI3
B	126	VAL	ALA	conflict	UNP Q9HKKI3
C	30	ASP	THR	engineered mutation	UNP Q9HKKI3
C	126	VAL	ALA	conflict	UNP Q9HKKI3
D	30	ASP	THR	engineered mutation	UNP Q9HKKI3
D	126	VAL	ALA	conflict	UNP Q9HKKI3
E	30	ASP	THR	engineered mutation	UNP Q9HKKI3
E	126	VAL	ALA	conflict	UNP Q9HKKI3

- Molecule 2 is FRUCTOSE -6-PHOSPHATE (CCD ID: F6R) (formula: C₆H₁₃O₉P) (labeled as "Ligand of Interest" by depositor).



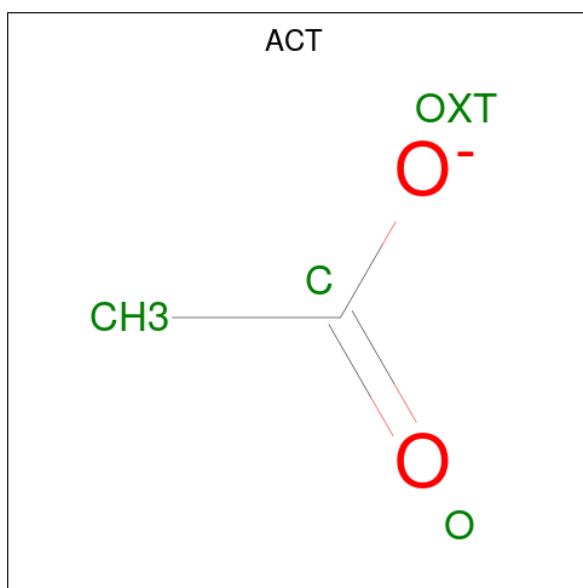
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	O	P	0	1
			17	7	9	1		
2	B	1	Total	C	O	P	0	1
			17	7	9	1		
2	C	1	Total	C	O	P	0	1
			17	7	9	1		
2	D	1	Total	C	O	P	0	1
			17	7	9	1		
2	E	1	Total	C	O	P	0	1
			17	7	9	1		

- Molecule 3 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).



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

- Molecule 4 is ACETATE ION (CCD ID: ACT) (formula: C₂H₃O₂).



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

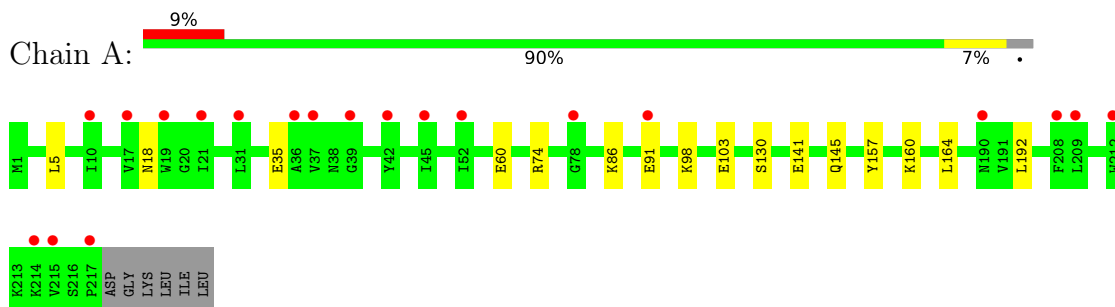
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	92	Total 92	O 92	0	1
5	B	91	Total 91	O 91	0	0
5	C	84	Total 85	O 85	0	1
5	D	82	Total 82	O 82	0	0
5	E	83	Total 84	O 84	0	1

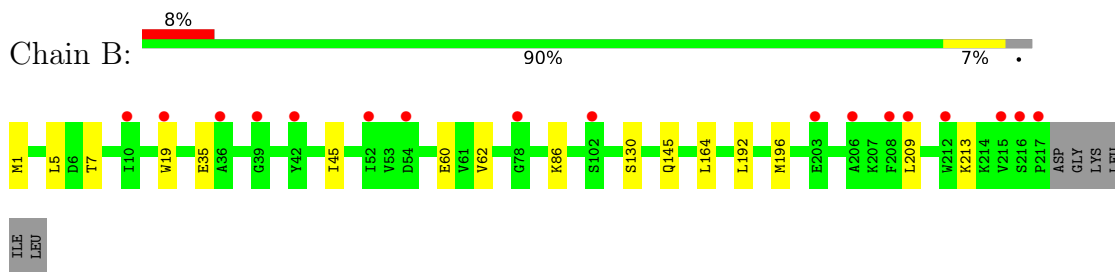
3 Residue-property plots

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.

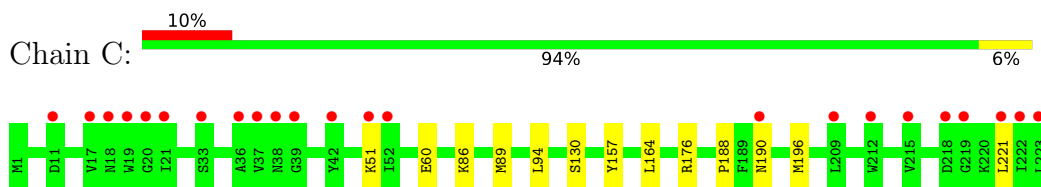
- Molecule 1: Transaldolase



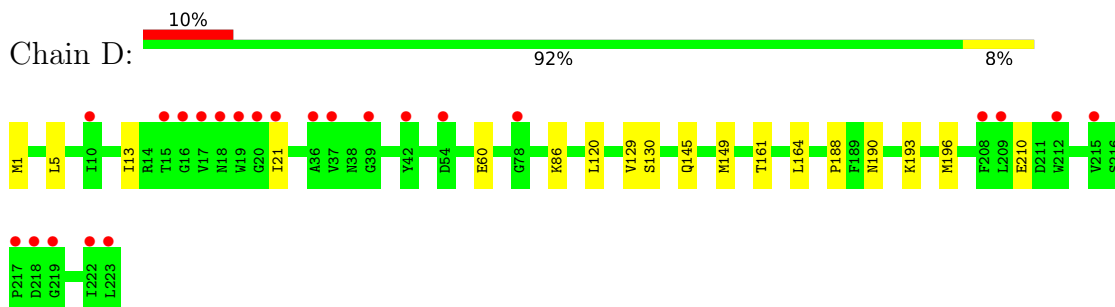
- Molecule 1: Transaldolase



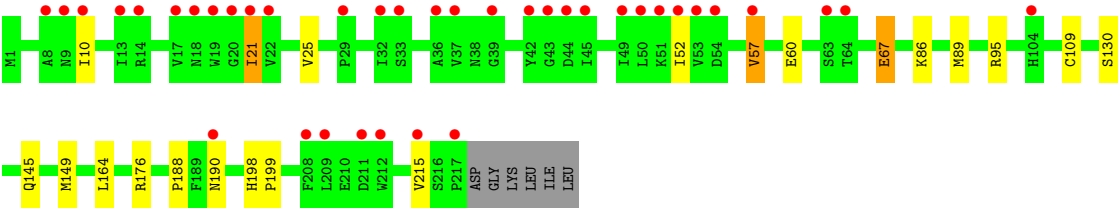
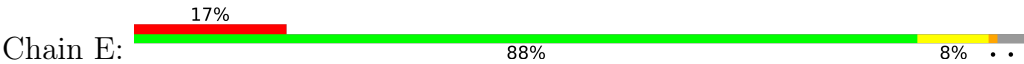
- Molecule 1: Transaldolase



- Molecule 1: Transaldolase



● Molecule 1: Transaldolase



4 Data and refinement statistics

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α , β , γ	149.04Å 172.52Å 100.40Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	112.78 – 1.65 112.78 – 1.65	Depositor EDS
% Data completeness (in resolution range)	99.5 (112.78-1.65) 93.5 (112.78-1.65)	Depositor EDS
R_{merge}	0.04	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.02 (at 1.65Å)	Xtriage
Refinement program	PHENIX 1.13_2998	Depositor
R, R_{free}	0.168 , 0.187 0.176 , 0.194	Depositor DCC
R_{free} test set	7698 reflections (3.27%)	wwPDB-VP
Wilson B-factor (Å ²)	33.6	Xtriage
Anisotropy	0.537	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 51.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	9425	wwPDB-VP
Average B, all atoms (Å ²)	55.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.60% 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

5.1 Standard geometry

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

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	0/1811	0.65	0/2455
1	B	0.60	0/1763	0.67	0/2391
1	C	0.60	0/1820	0.68	0/2465
1	D	0.56	0/1835	0.61	0/2486
1	E	0.59	0/1743	0.68	0/2363
All	All	0.59	0/8972	0.66	0/12160

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1785	0	1816	11	0
1	B	1737	0	1794	11	0
1	C	1794	0	1849	10	0
1	D	1809	0	1851	9	0
1	E	1717	0	1772	13	0
2	A	17	0	6	0	0
2	B	17	0	6	0	0
2	C	17	0	6	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	D	17	0	6	0	0
2	E	17	0	6	0	0
3	A	12	0	16	0	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	3	0
4	A	4	0	3	0	0
4	B	4	0	3	2	0
4	C	4	0	3	0	0
4	E	4	0	3	0	0
5	A	92	0	0	0	0
5	B	91	0	0	3	0
5	C	85	0	0	0	0
5	D	82	0	0	0	0
5	E	84	0	0	1	0
All	All	9425	0	9188	50	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 (50) 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:D:120:LEU:HD22	1:E:21:ILE:HG12	1.70	0.73
1:B:145[B]:GLN:NE2	5:B:402:HOH:O	2.24	0.70
3:E:302:GOL:H12	5:E:474:HOH:O	1.93	0.69
4:B:303:ACT:O	5:B:401:HOH:O	2.14	0.65
1:D:129[B]:VAL:HG23	1:D:161:THR:HG21	1.81	0.62
4:B:303:ACT:H1	5:B:479:HOH:O	2.00	0.62
1:B:5[B]:LEU:HD21	1:B:192:LEU:HD22	1.85	0.58
1:D:145[B]:GLN:HG2	1:D:149:MET:HE2	1.85	0.58
1:A:91[B]:GLU:HG3	1:B:19:TRP:CD1	2.40	0.57
1:C:176:ARG:HG2	3:C:302:GOL:H31	1.87	0.56
1:A:60:GLU:HA	1:A:86:LYS:HB3	1.92	0.51
1:A:91[A]:GLU:HG2	1:B:196:MET:SD	2.51	0.51
1:B:62:VAL:HG22	1:C:221:LEU:HB2	1.93	0.51
1:C:176:ARG:CG	3:C:302:GOL:H31	2.41	0.50
1:D:188:PRO:HB2	1:D:190[A]:ASN:OD1	2.12	0.49
1:D:60:GLU:HA	1:D:86:LYS:HB3	1.95	0.49
1:C:89:MET:HE1	1:C:94:LEU:HD21	1.93	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:176:ARG:HE	3:E:302:GOL:C2	2.26	0.49
1:E:60:GLU:HA	1:E:86:LYS:HB3	1.96	0.48
1:B:60:GLU:HA	1:B:86:LYS:HB3	1.95	0.48
1:E:198:HIS:CG	1:E:199:PRO:HD2	2.49	0.48
1:C:60:GLU:HA	1:C:86:LYS:HB3	1.96	0.47
1:A:160:LYS:HA	1:A:160:LYS:HD3	1.73	0.47
1:B:5[A]:LEU:HG	1:B:7:THR:HG22	1.97	0.46
1:D:21:ILE:CD1	1:D:196:MET:HE3	2.45	0.46
1:E:176:ARG:NE	3:E:302:GOL:O2	2.45	0.46
1:A:141[B]:GLU:HG2	1:A:145[B]:GLN:OE1	2.16	0.46
1:D:5:LEU:HD23	1:D:13:ILE:HA	1.98	0.46
1:E:67[A]:GLU:H	1:E:67[A]:GLU:CD	2.23	0.45
1:A:5:LEU:HD13	1:A:192:LEU:HD22	1.99	0.45
1:C:188:PRO:HB2	1:C:190[A]:ASN:OD1	2.18	0.44
1:B:130:SER:HA	1:B:164:LEU:O	2.18	0.44
1:C:86:LYS:HE2	2:C:301[B]:F6R:H1C2	1.68	0.44
1:A:74:ARG:NH2	1:A:103:GLU:OE2	2.37	0.44
1:E:10:ILE:HD11	1:E:52:ILE:HD12	2.00	0.44
1:A:18:ASN:O	1:E:95:ARG:HD3	2.18	0.43
1:D:130:SER:HA	1:D:164:LEU:O	2.18	0.43
1:E:130:SER:HA	1:E:164:LEU:O	2.18	0.43
1:E:188:PRO:HB2	1:E:190:ASN:OD1	2.18	0.43
1:A:98:LYS:HE2	1:A:98:LYS:HB2	1.84	0.43
1:A:157:TYR:CZ	1:B:1:MET:HB2	2.53	0.43
1:C:130:SER:HA	1:C:164:LEU:O	2.19	0.42
1:B:209:LEU:O	1:B:213:LYS:HG3	2.19	0.42
1:A:130:SER:HA	1:A:164:LEU:O	2.20	0.42
1:C:157:TYR:CZ	1:D:1:MET:HB2	2.55	0.42
1:B:35:GLU:HB2	1:B:45:ILE:HD13	2.03	0.41
1:C:196:MET:HE3	1:C:196:MET:HB2	1.98	0.41
1:E:25:VAL:O	1:E:57:VAL:HA	2.20	0.41
1:E:145[A]:GLN:HG2	1:E:149:MET:HE2	2.03	0.40
1:E:89:MET:HE2	1:E:109:CYS:SG	2.61	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	229/223 (103%)	227 (99%)	2 (1%)	0	100	100
1	B	223/223 (100%)	217 (97%)	6 (3%)	0	100	100
1	C	230/223 (103%)	227 (99%)	3 (1%)	0	100	100
1	D	232/223 (104%)	230 (99%)	2 (1%)	0	100	100
1	E	220/223 (99%)	214 (97%)	6 (3%)	0	100	100
All	All	1134/1115 (102%)	1115 (98%)	19 (2%)	0	100	100

There are no Ramachandran outliers to report.

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	202/193 (105%)	200 (99%)	2 (1%)	68	52
1	B	196/193 (102%)	196 (100%)	0	100	100
1	C	202/193 (105%)	201 (100%)	1 (0%)	81	72
1	D	204/193 (106%)	201 (98%)	3 (2%)	57	37
1	E	193/193 (100%)	188 (97%)	5 (3%)	40	17
All	All	997/965 (103%)	986 (99%)	11 (1%)	73	48

All (11) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	35[A]	GLU
1	A	35[B]	GLU
1	C	51	LYS
1	D	193	LYS
1	D	210[A]	GLU
1	D	210[B]	GLU
1	E	21	ILE
1	E	57	VAL
1	E	67[A]	GLU
1	E	67[B]	GLU
1	E	215	VAL

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

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

22 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
2	F6R	D	301[B]	-	14,14,15	0.93	1 (7%)	18,19,21	1.45	3 (16%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	ACT	A	304[A]	-	3,3,3	1.49	1 (33%)	3,3,3	1.10	0
3	GOL	C	302	-	5,5,5	1.04	0	5,5,5	0.94	0
2	F6R	A	301[B]	-	14,14,15	0.76	0	18,19,21	1.15	2 (11%)
2	F6R	C	301[A]	-	14,14,15	0.76	0	18,19,21	1.36	1 (5%)
3	GOL	E	303	3	5,5,5	0.75	0	5,5,5	1.07	0
3	GOL	C	303	-	5,5,5	0.81	0	5,5,5	1.05	0
3	GOL	D	302	3	5,5,5	0.63	0	5,5,5	1.14	0
2	F6R	C	301[B]	-	14,14,15	0.74	0	18,19,21	1.39	1 (5%)
2	F6R	B	301[A]	-	14,14,15	0.96	0	18,19,21	1.20	2 (11%)
4	ACT	B	303	-	3,3,3	2.39	2 (66%)	3,3,3	1.59	1 (33%)
2	F6R	E	301[A]	-	14,14,15	1.03	1 (7%)	18,19,21	1.36	2 (11%)
3	GOL	B	302	3	5,5,5	0.61	0	5,5,5	1.13	0
3	GOL	A	303	3	5,5,5	0.94	0	5,5,5	1.15	0
4	ACT	C	304	-	3,3,3	3.13	2 (66%)	3,3,3	1.67	1 (33%)
2	F6R	B	301[B]	-	14,14,15	0.95	0	18,19,21	1.30	2 (11%)
2	F6R	E	301[B]	-	14,14,15	1.04	1 (7%)	18,19,21	1.21	2 (11%)
3	GOL	A	302	-	5,5,5	1.36	1 (20%)	5,5,5	0.81	0
3	GOL	E	302	-	5,5,5	1.04	0	5,5,5	0.87	0
2	F6R	D	301[A]	-	14,14,15	0.95	1 (7%)	18,19,21	1.50	4 (22%)
2	F6R	A	301[A]	-	14,14,15	0.77	0	18,19,21	1.08	2 (11%)
4	ACT	E	304	-	3,3,3	3.07	2 (66%)	3,3,3	1.54	0

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

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	F6R	B	301[A]	-	-	0/17/17/20	-
2	F6R	D	301[A]	-	-	0/17/17/20	-
2	F6R	E	301[A]	-	-	1/17/17/20	-
2	F6R	C	301[A]	-	-	0/17/17/20	-
2	F6R	A	301[A]	-	-	0/17/17/20	-
3	GOL	A	302	-	-	4/4/4/4	-
3	GOL	E	303	3	-	3/4/4/4	-
3	GOL	E	302	-	-	2/4/4/4	-

All (12) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	C	304	ACT	CH3-C	4.66	1.67	1.49
4	E	304	ACT	CH3-C	4.58	1.67	1.49
4	B	303	ACT	CH3-C	3.19	1.61	1.49
4	B	303	ACT	OXT-C	-2.64	1.18	1.30
4	C	304	ACT	OXT-C	-2.64	1.18	1.30
3	A	302	GOL	C3-C2	2.48	1.61	1.51
2	D	301[A]	F6R	C6-C5	2.39	1.55	1.51
2	D	301[B]	F6R	C6-C5	2.39	1.55	1.51
4	E	304	ACT	OXT-C	-2.30	1.20	1.30
4	A	304[A]	ACT	CH3-C	2.09	1.57	1.49
2	E	301[A]	F6R	O5-C5	2.04	1.47	1.43
2	E	301[B]	F6R	O5-C5	2.04	1.47	1.43

All (23) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	301[B]	F6R	C1-C2-C3	4.08	122.68	112.65
2	C	301[A]	F6R	C1-C2-C3	3.75	121.86	112.65
2	B	301[B]	F6R	C1-C2-C3	3.71	121.77	112.65
2	D	301[A]	F6R	C2-C3-C4	-3.70	108.10	113.97
2	D	301[B]	F6R	C2-C3-C4	-3.70	108.10	113.97
2	E	301[A]	F6R	C1-C2-C3	3.65	121.61	112.65
2	B	301[A]	F6R	C1-C2-C3	3.12	120.32	112.65
2	D	301[A]	F6R	O2P-P-O1P	3.09	119.40	107.80
2	D	301[B]	F6R	O2P-P-O1P	3.09	119.40	107.80
2	A	301[B]	F6R	C1-C2-C3	2.80	119.52	112.65
2	E	301[B]	F6R	C1-C2-C3	2.58	118.99	112.65
2	A	301[A]	F6R	C2-C3-C4	-2.49	110.03	113.97
2	A	301[B]	F6R	C2-C3-C4	-2.49	110.03	113.97

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	301[A]	F6R	C1-C2-C3	2.35	118.42	112.65
4	B	303	ACT	OXT-C-O	2.25	130.38	122.03
2	E	301[A]	F6R	O1P-P-O6	2.25	112.53	106.67
2	E	301[B]	F6R	O1P-P-O6	2.25	112.53	106.67
2	A	301[A]	F6R	C1-C2-C3	2.13	117.89	112.65
4	C	304	ACT	OXT-C-O	2.10	129.81	122.03
2	B	301[A]	F6R	C2-C3-C4	-2.04	110.73	113.97
2	B	301[B]	F6R	C2-C3-C4	-2.04	110.73	113.97
2	D	301[A]	F6R	O5-C5-C4	2.02	113.97	109.25
2	D	301[B]	F6R	O5-C5-C4	2.02	113.97	109.25

There are no chirality outliers.

All (26) torsion outliers are listed below:

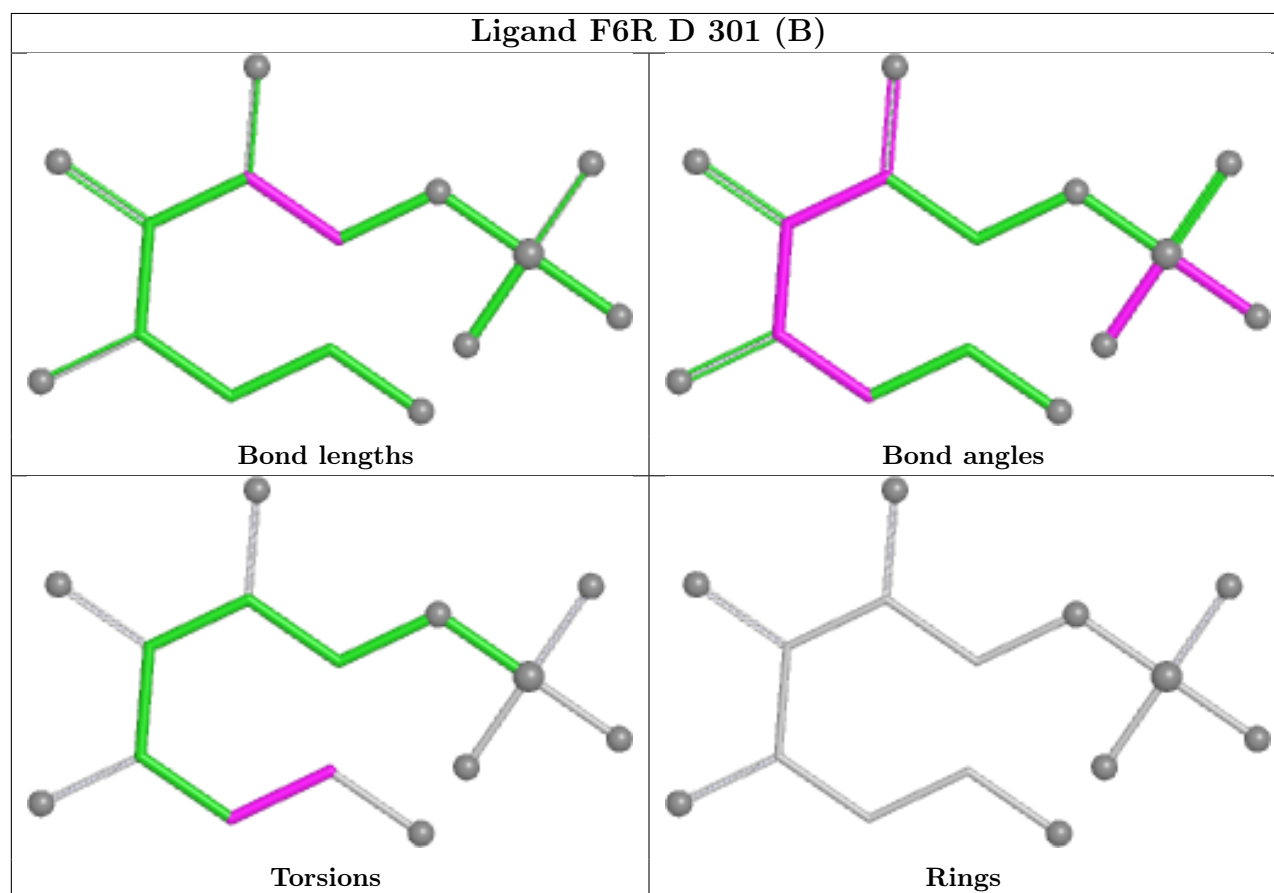
Mol	Chain	Res	Type	Atoms
2	A	301[B]	F6R	O1-C1-C2-C3
2	D	301[B]	F6R	O1-C1-C2-C3
2	E	301[A]	F6R	O1-C1-C2-C3
3	A	302	GOL	O1-C1-C2-C3
3	A	303	GOL	C1-C2-C3-O3
3	C	302	GOL	O1-C1-C2-O2
3	C	302	GOL	O1-C1-C2-C3
3	C	302	GOL	C1-C2-C3-O3
3	E	302	GOL	O1-C1-C2-C3
3	A	303	GOL	O2-C2-C3-O3
3	A	302	GOL	C1-C2-C3-O3
3	B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

There are no ring outliers.

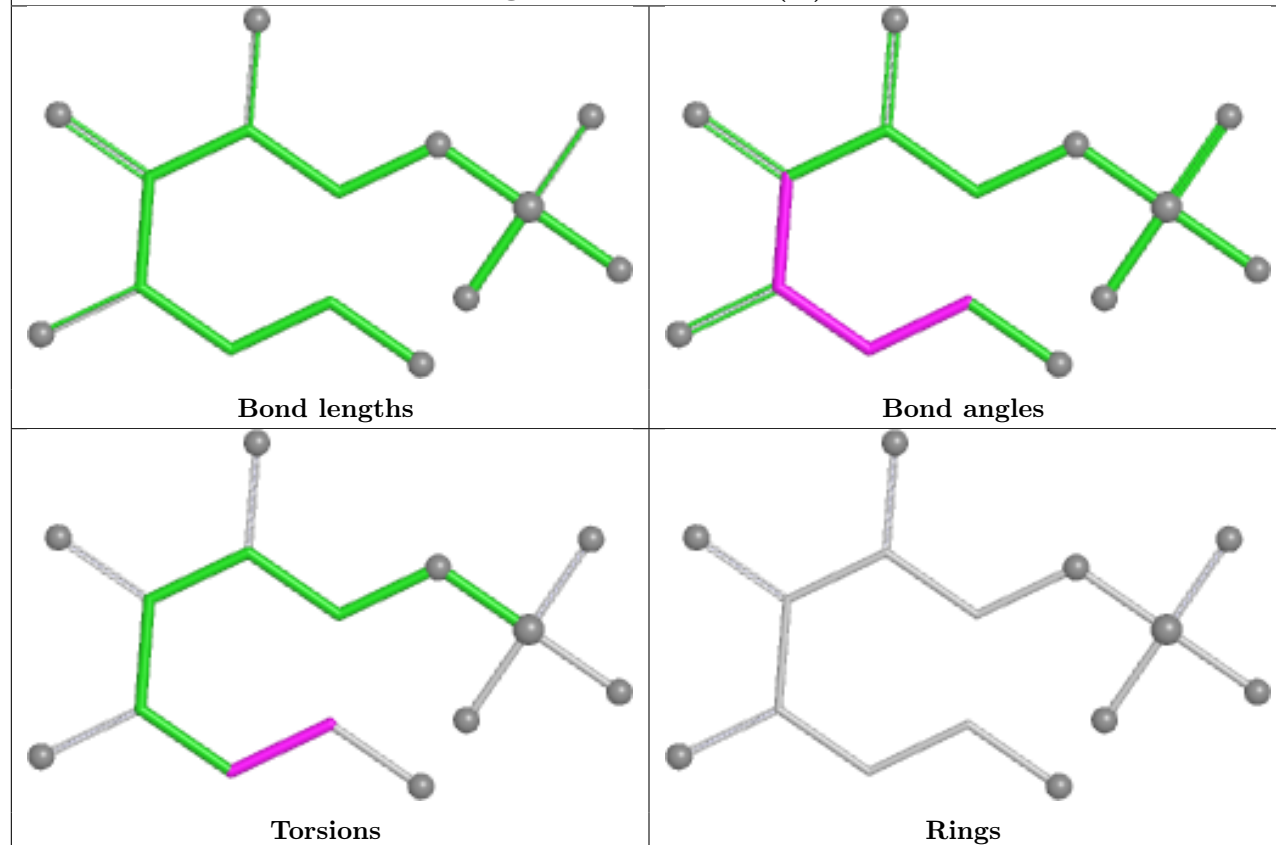
4 monomers are involved in 8 short contacts:

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

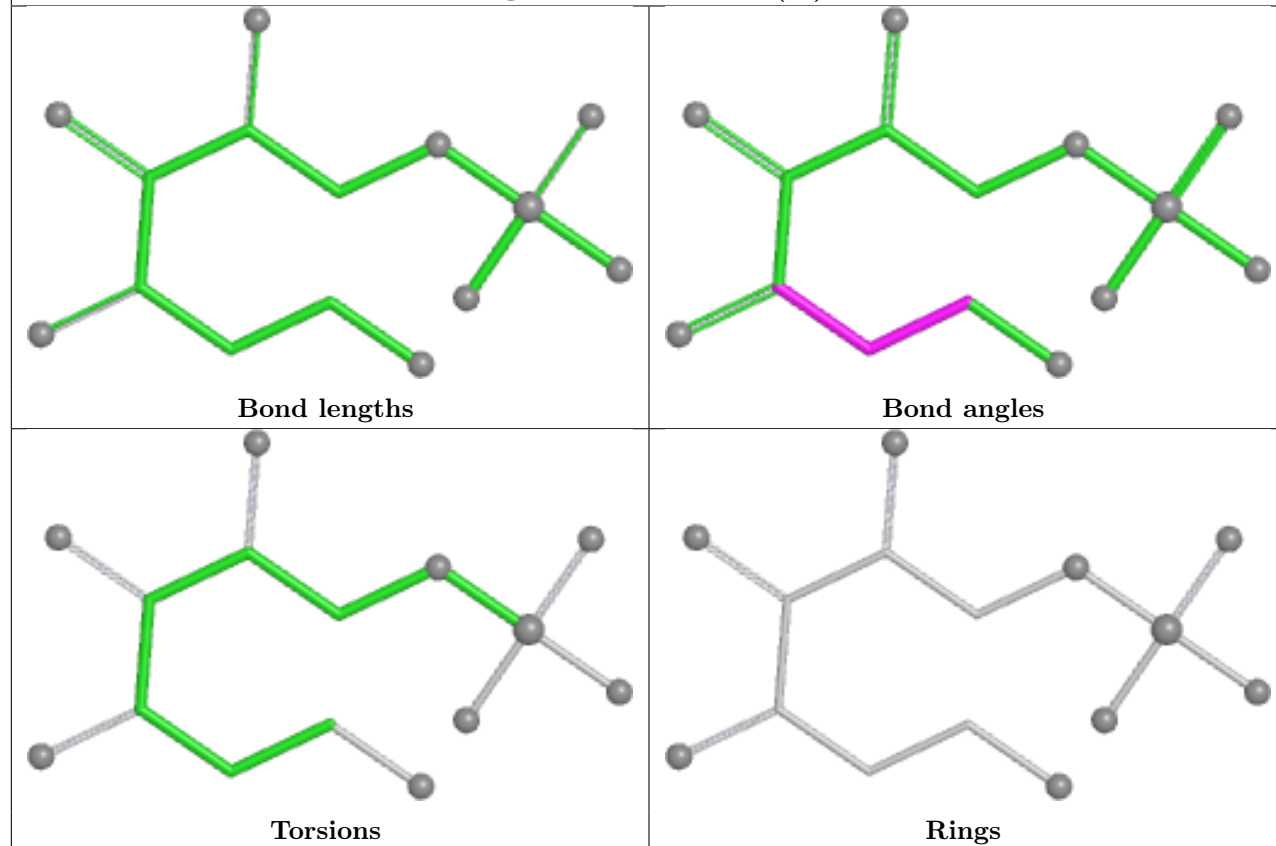
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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.



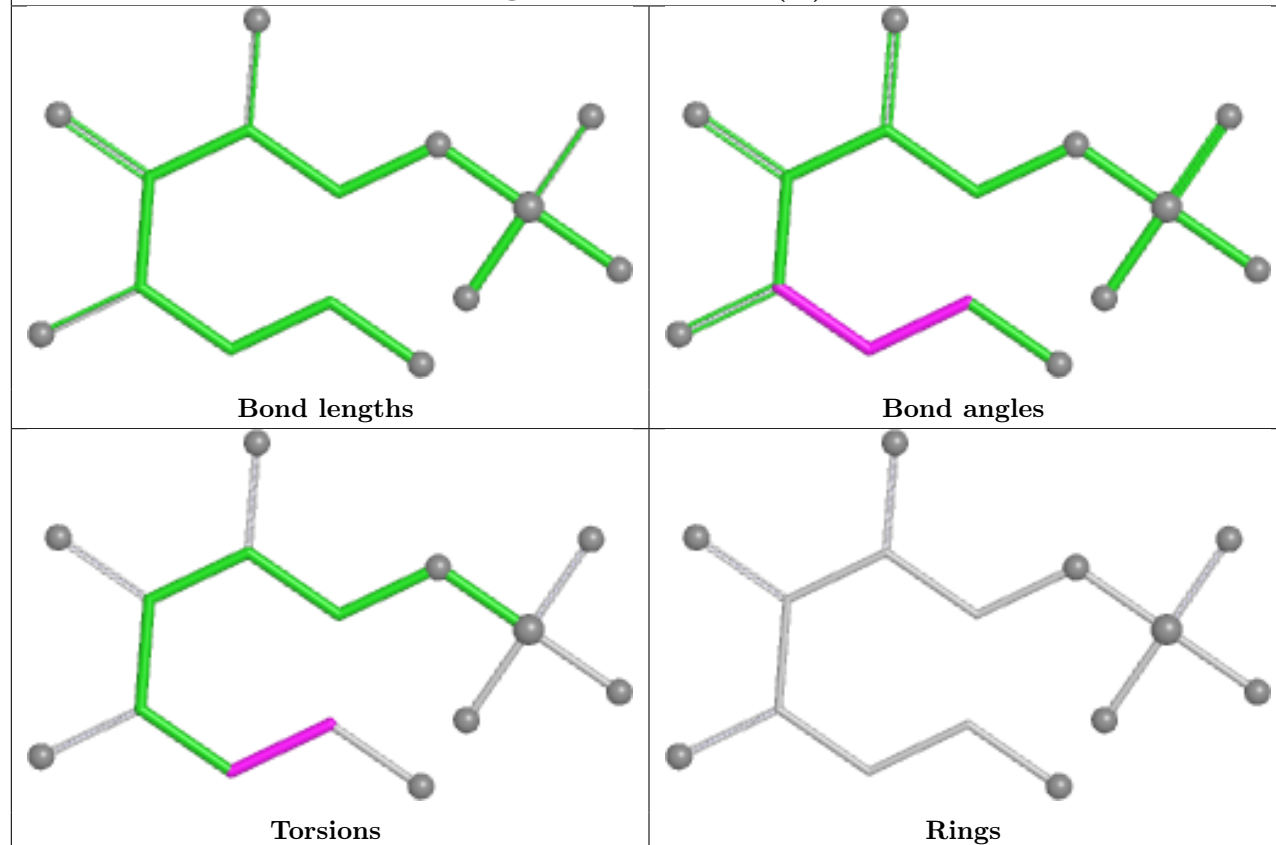
Ligand F6R A 301 (B)



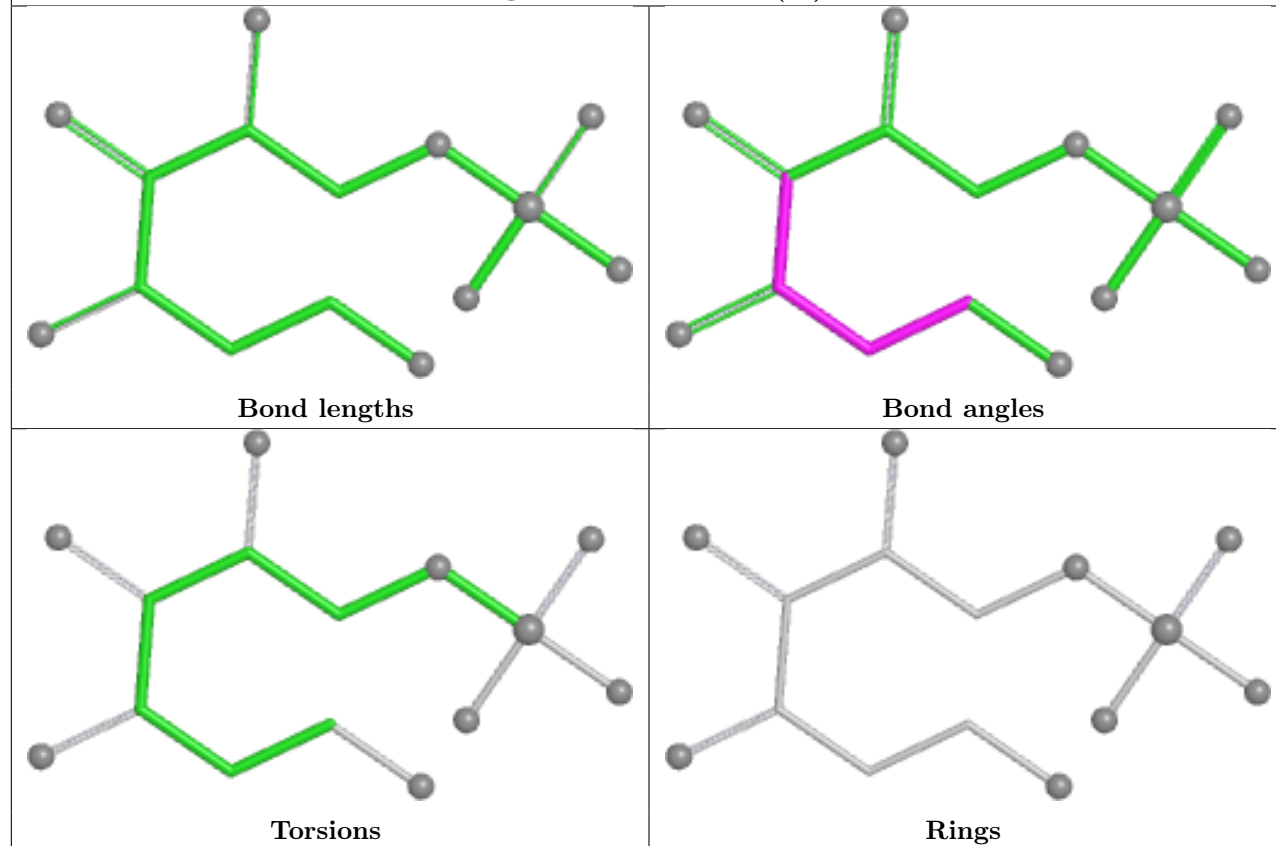
Ligand F6R C 301 (A)



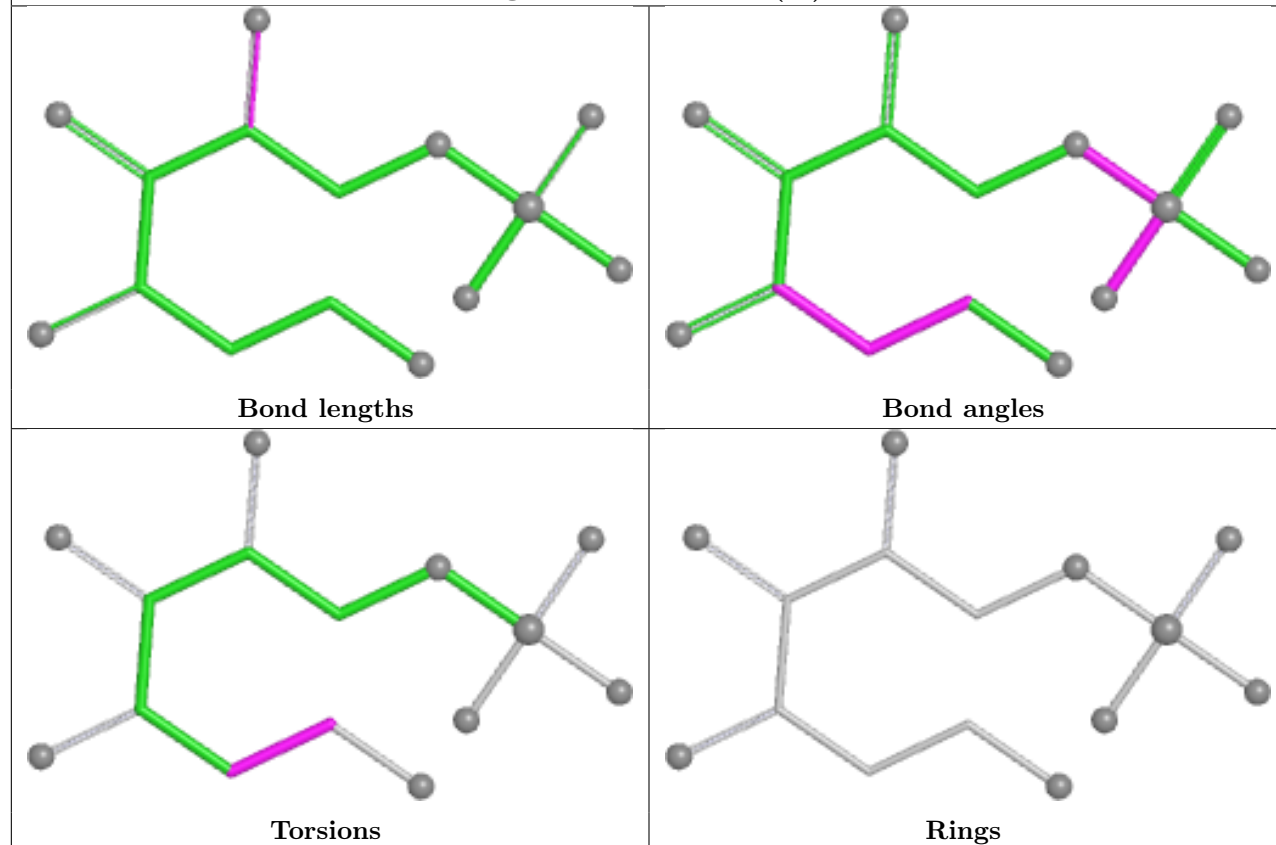
Ligand F6R C 301 (B)



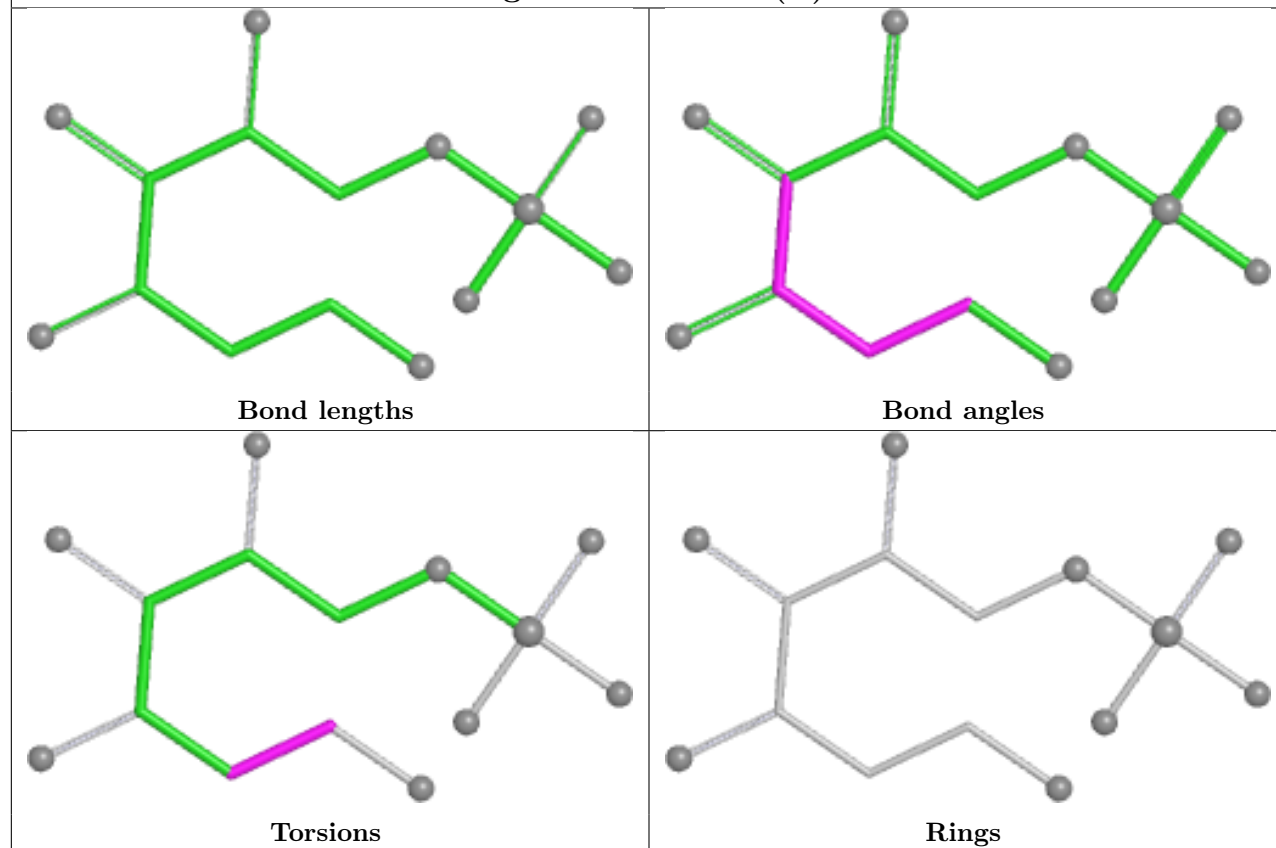
Ligand F6R B 301 (A)



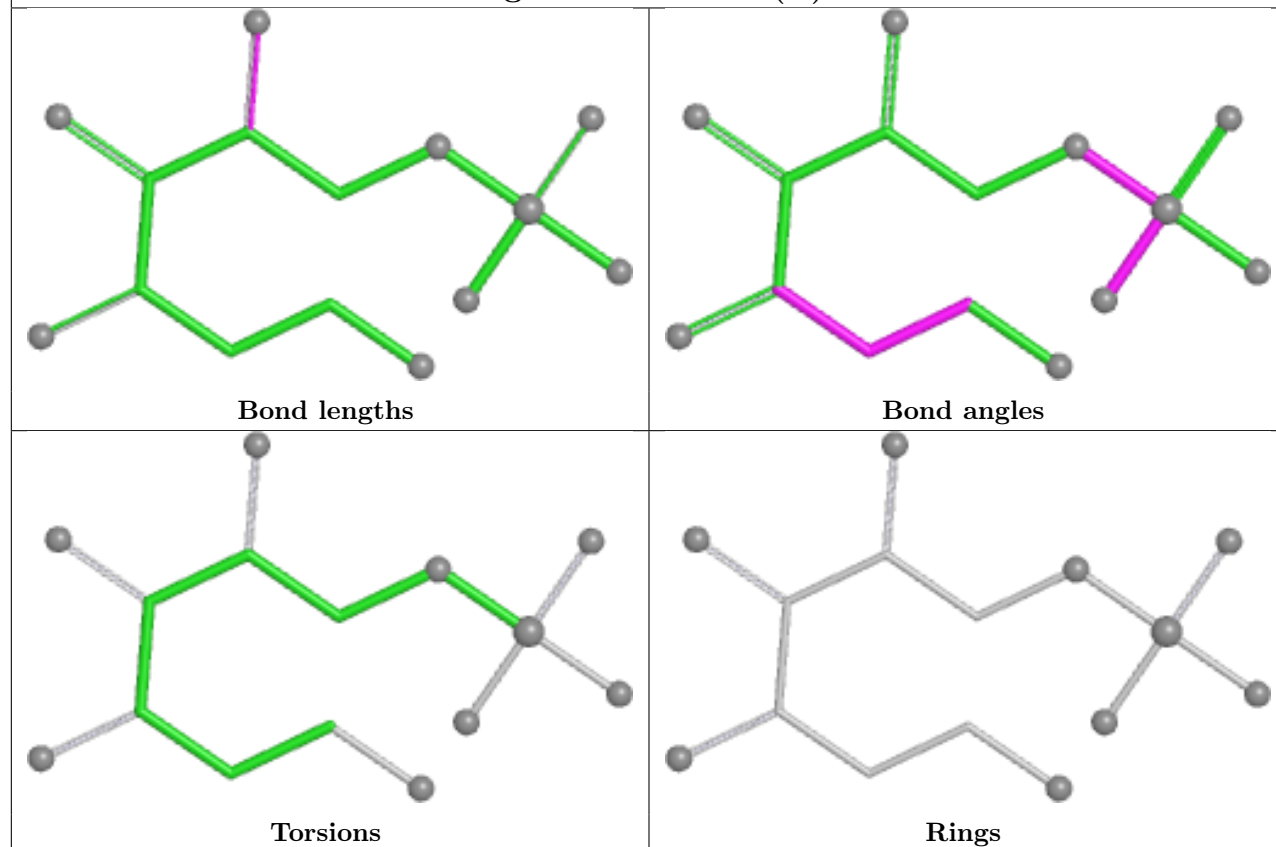
Ligand F6R E 301 (A)



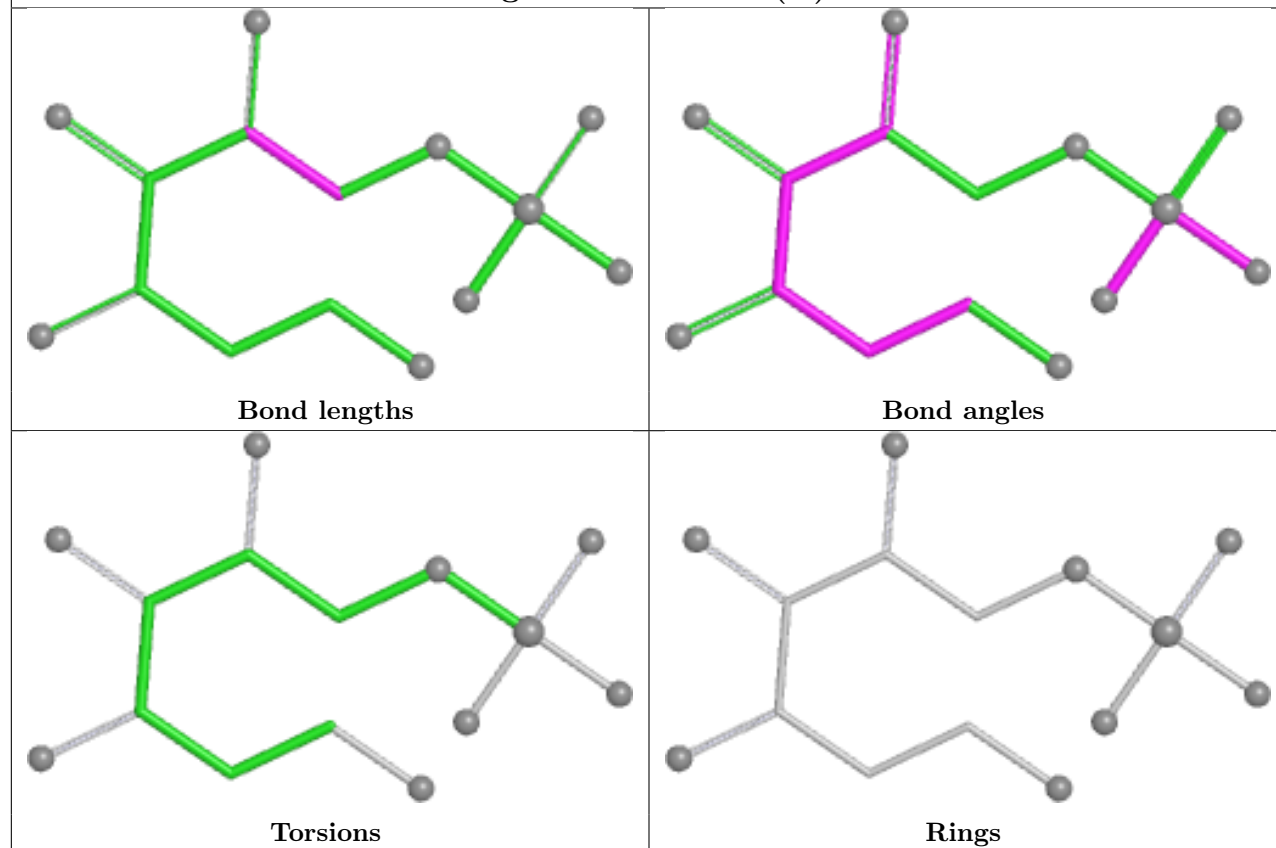
Ligand F6R B 301 (B)

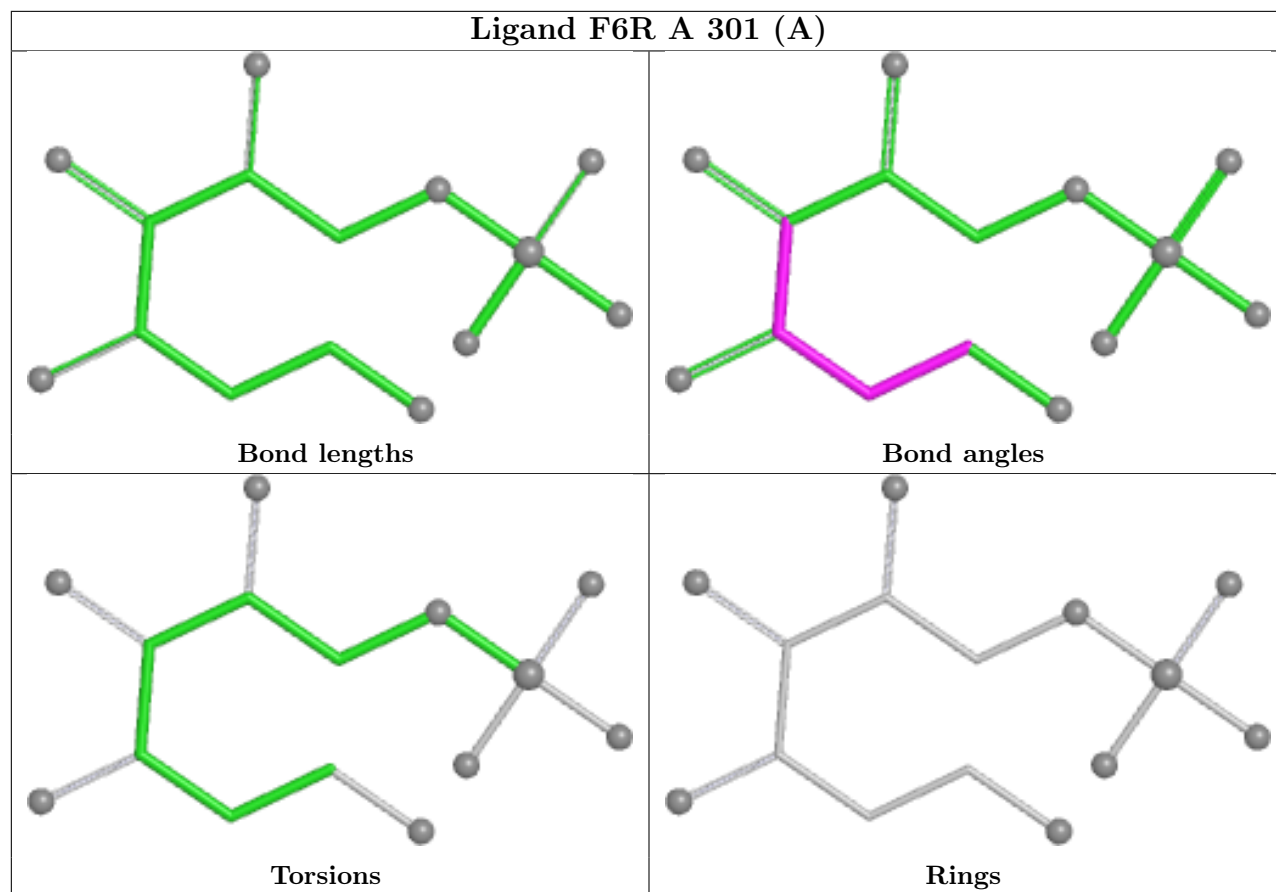


Ligand F6R E 301 (B)



Ligand F6R D 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

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	217/223 (97%)	0.61	20 (9%)	14 16	16, 45, 102, 146	14 (6%)
1	B	217/223 (97%)	0.58	17 (7%)	19 22	17, 47, 89, 140	8 (3%)
1	C	223/223 (100%)	0.69	23 (10%)	12 12	18, 49, 96, 143	9 (4%)
1	D	223/223 (100%)	0.62	23 (10%)	12 12	17, 46, 102, 157	11 (4%)
1	E	217/223 (97%)	0.89	38 (17%)	4 4	17, 51, 114, 163	5 (2%)
All	All	1097/1115 (98%)	0.68	121 (11%)	10 11	16, 48, 102, 163	47 (4%)

All (121) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	E	36	ALA	4.8
1	E	18	ASN	4.6
1	E	10	ILE	4.5
1	E	17	VAL	4.3
1	E	215	VAL	4.3
1	A	212	TRP	4.2
1	A	217	PRO	4.1
1	B	215	VAL	4.0
1	A	208	PHE	3.9
1	B	217	PRO	3.9
1	D	42	TYR	3.8
1	D	212	TRP	3.8
1	D	36	ALA	3.7
1	E	21	ILE	3.6
1	E	52	ILE	3.6
1	E	209	LEU	3.6
1	A	39	GLY	3.6
1	A	17	VAL	3.6
1	C	37	VAL	3.5
1	A	10	ILE	3.5

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Mol	Chain	Res	Type	RSRZ
1	A	37	VAL	3.5
1	C	42	TYR	3.4
1	E	20	GLY	3.4
1	B	212	TRP	3.3
1	E	212	TRP	3.3
1	B	209	LEU	3.3
1	E	50	LEU	3.3
1	E	8	ALA	3.2
1	D	16	GLY	3.2
1	E	42	TYR	3.2
1	A	45	ILE	3.2
1	E	217	PRO	3.2
1	D	208	PHE	3.2
1	D	39	GLY	3.2
1	D	37	VAL	3.2
1	C	20	GLY	3.2
1	C	52	ILE	3.1
1	E	37	VAL	3.1
1	C	209	LEU	3.1
1	D	209	LEU	3.1
1	D	219	GLY	3.0
1	B	36	ALA	3.0
1	C	222	ILE	3.0
1	D	217	PRO	3.0
1	C	215	VAL	2.9
1	C	221	LEU	2.9
1	E	45	ILE	2.9
1	C	21	ILE	2.9
1	E	19	TRP	2.9
1	C	17	VAL	2.9
1	B	10	ILE	2.9
1	B	54	ASP	2.9
1	E	63	SER	2.9
1	B	206	ALA	2.8
1	E	53	VAL	2.8
1	E	49	ILE	2.8
1	C	19	TRP	2.8
1	C	219	GLY	2.8
1	C	190[A]	ASN	2.8
1	D	215	VAL	2.8
1	E	190	ASN	2.7
1	B	216	SER	2.7

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Mol	Chain	Res	Type	RSRZ
1	B	208	PHE	2.7
1	A	19	TRP	2.7
1	A	215	VAL	2.7
1	E	39	GLY	2.7
1	A	42	TYR	2.7
1	E	208	PHE	2.6
1	D	18	ASN	2.6
1	A	21	ILE	2.6
1	E	43	GLY	2.6
1	D	218	ASP	2.5
1	B	102	SER	2.5
1	A	36	ALA	2.5
1	E	9	ASN	2.5
1	D	10	ILE	2.5
1	B	39	GLY	2.5
1	E	29	PRO	2.5
1	C	51	LYS	2.5
1	A	78	GLY	2.4
1	B	78	GLY	2.4
1	C	38	ASN	2.4
1	E	22	VAL	2.3
1	C	18	ASN	2.3
1	D	15	THR	2.3
1	A	190[A]	ASN	2.3
1	D	17	VAL	2.3
1	B	52	ILE	2.3
1	E	211	ASP	2.3
1	D	19	TRP	2.2
1	C	36	ALA	2.2
1	C	212	TRP	2.2
1	A	52	ILE	2.2
1	E	14	ARG	2.2
1	E	51	LYS	2.2
1	E	44	ASP	2.2
1	D	223	LEU	2.2
1	D	222	ILE	2.2
1	E	13	ILE	2.2
1	E	64	THR	2.2
1	A	91[A]	GLU	2.1
1	C	223	LEU	2.1
1	D	54[A]	ASP	2.1
1	E	33	SER	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	31	LEU	2.1
1	A	209	LEU	2.1
1	C	11	ASP	2.1
1	D	21	ILE	2.1
1	D	20	GLY	2.1
1	C	33	SER	2.1
1	A	214	LYS	2.1
1	E	32	ILE	2.1
1	E	57	VAL	2.0
1	B	203[A]	GLU	2.0
1	C	39	GLY	2.0
1	D	78	GLY	2.0
1	B	19	TRP	2.0
1	B	42	TYR	2.0
1	C	218	ASP	2.0
1	E	54	ASP	2.0
1	E	104	HIS	2.0

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 oligosaccharides 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
4	ACT	A	304[A]	4/4	0.83	0.17	45,45,45,46	4
3	GOL	E	302	6/6	0.87	0.18	65,70,77,85	0
4	ACT	B	303	4/4	0.87	0.17	31,42,50,53	4
3	GOL	C	302	6/6	0.89	0.13	59,66,69,72	0
3	GOL	A	302	6/6	0.89	0.14	57,71,76,77	0
4	ACT	E	304	4/4	0.89	0.15	42,47,48,58	4

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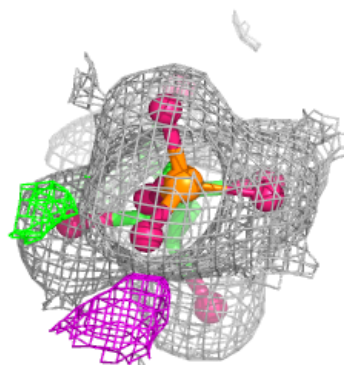
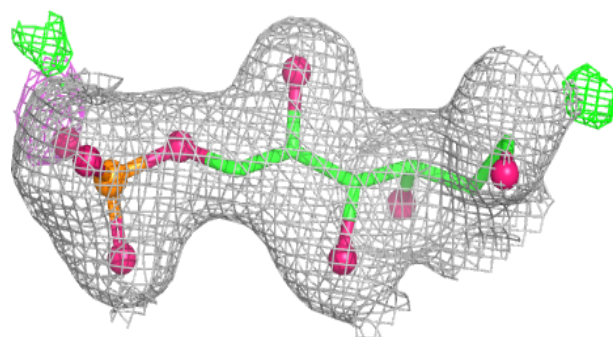
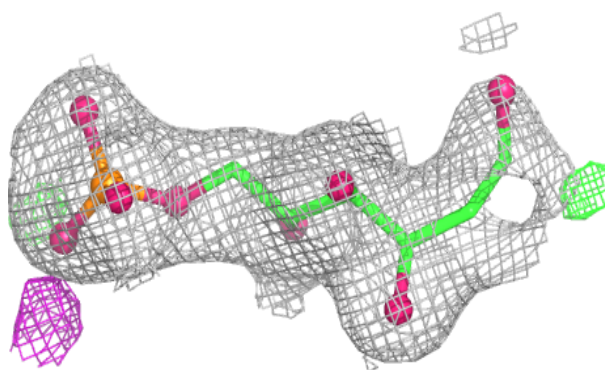
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
4	ACT	C	304	4/4	0.92	0.12	37,42,43,44	4
3	GOL	C	303	6/6	0.94	0.12	42,48,48,50	6
3	GOL	D	302	6/6	0.94	0.09	41,47,50,50	6
3	GOL	A	303	6/6	0.94	0.08	38,46,48,48	6
3	GOL	E	303	6/6	0.94	0.09	42,47,47,49	6
2	F6R	E	301[A]	15/16	0.95	0.08	40,45,54,54	2
2	F6R	E	301[B]	15/16	0.95	0.08	40,45,54,54	2
2	F6R	A	301[A]	15/16	0.95	0.08	38,41,51,52	2
2	F6R	A	301[B]	15/16	0.95	0.08	37,41,51,52	2
3	GOL	B	302	6/6	0.95	0.10	42,48,49,50	6
2	F6R	D	301[A]	15/16	0.95	0.08	41,45,49,54	2
2	F6R	D	301[B]	15/16	0.95	0.08	39,45,49,54	2
2	F6R	B	301[A]	15/16	0.96	0.08	37,43,51,55	2
2	F6R	B	301[B]	15/16	0.96	0.08	36,43,51,55	2
2	F6R	C	301[A]	15/16	0.96	0.07	40,42,49,51	2
2	F6R	C	301[B]	15/16	0.96	0.07	40,42,49,51	2

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.

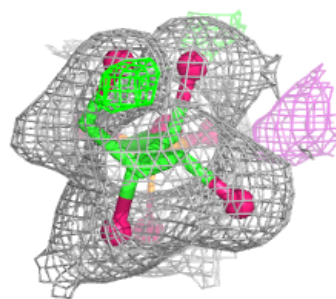
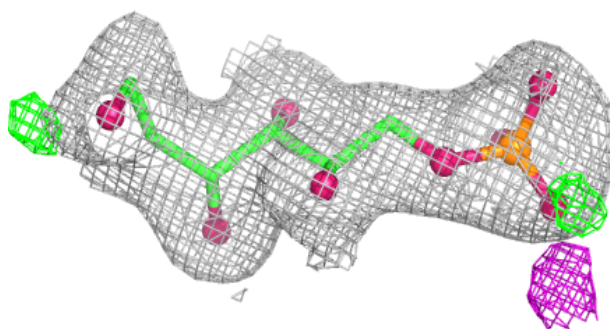
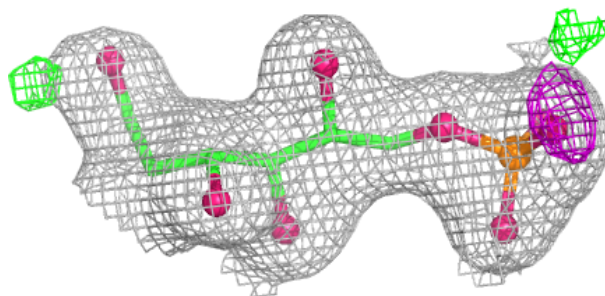
Electron density around F6R E 301 (A):

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

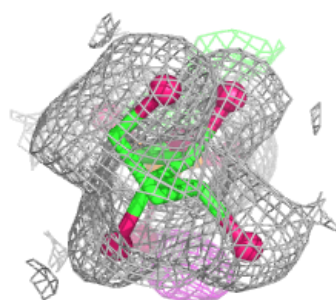
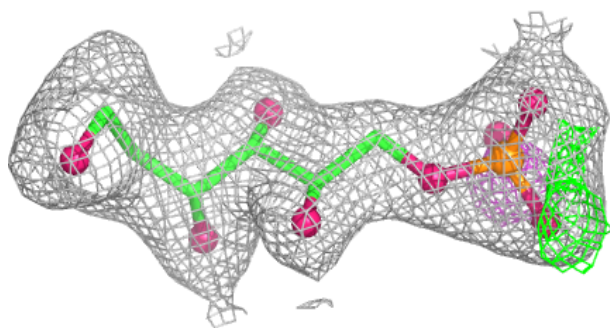
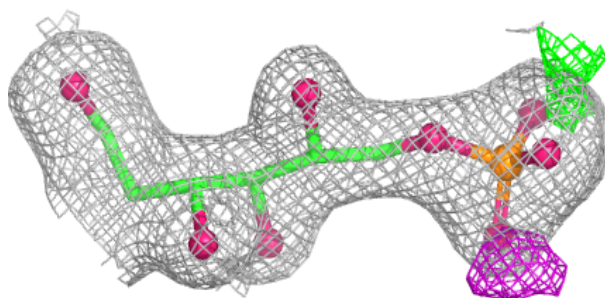


Electron density around F6R E 301 (B):

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

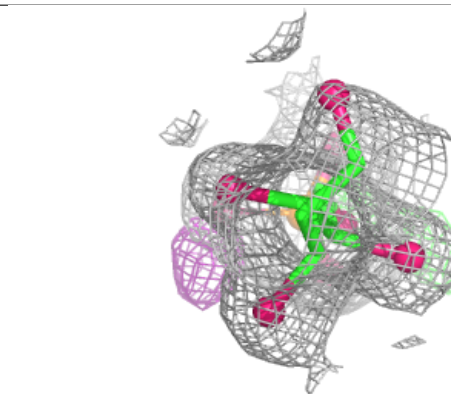
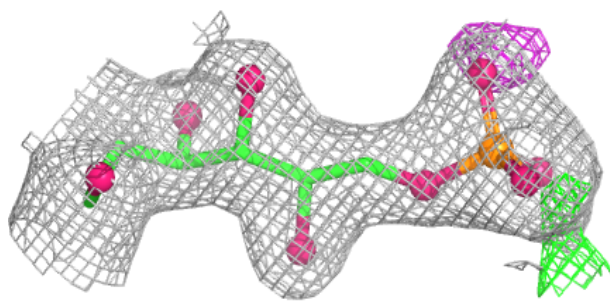
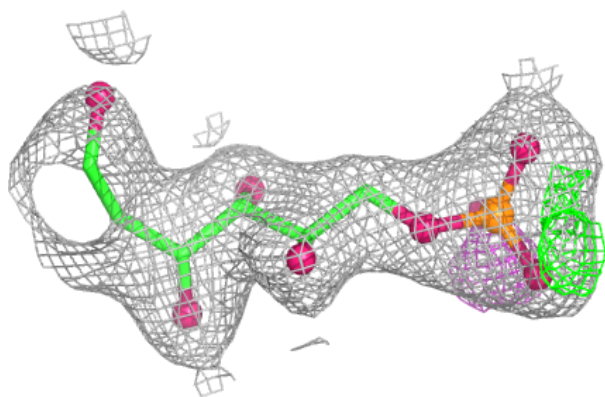
**Electron density around F6R A 301 (A):**

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

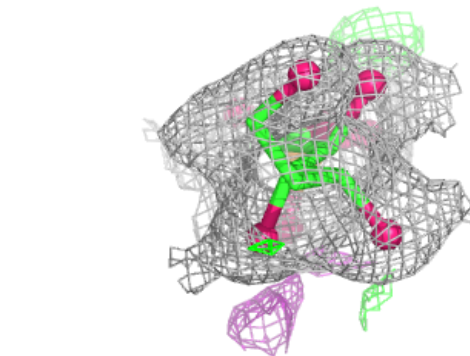
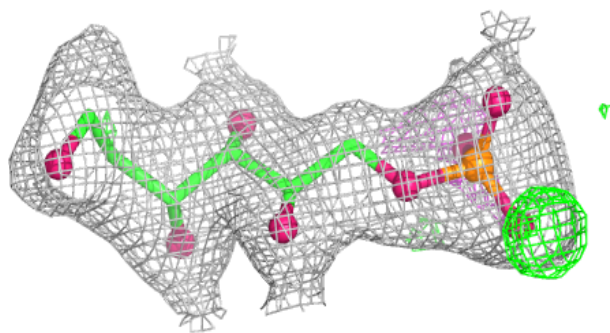
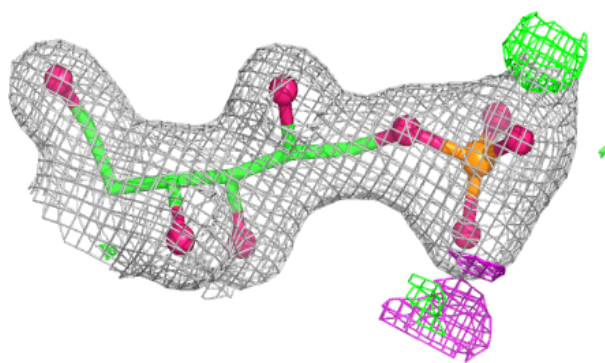


Electron density around F6R A 301 (B):

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

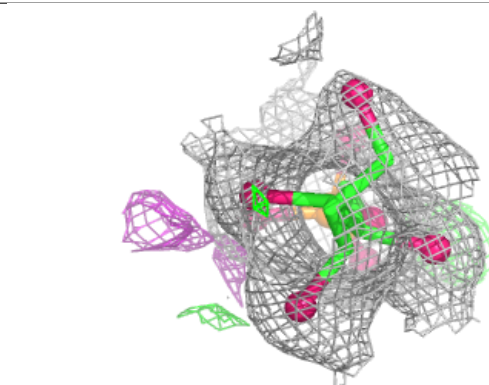
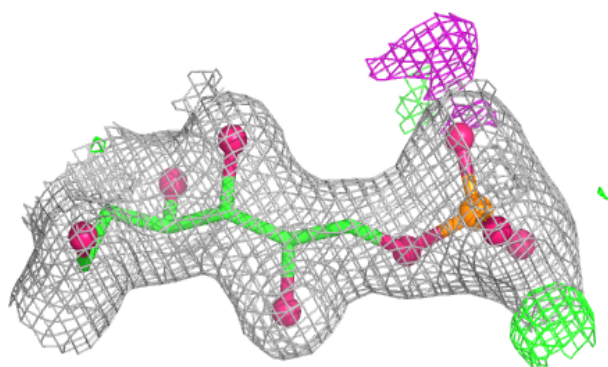
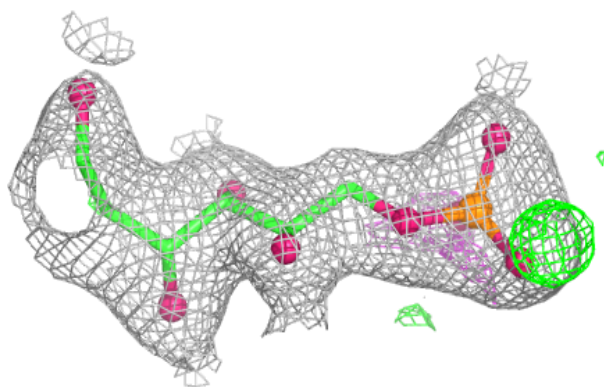
**Electron density around F6R D 301 (A):**

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

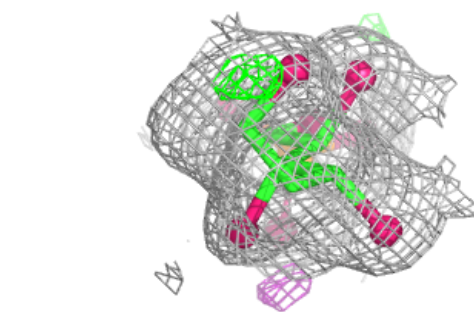
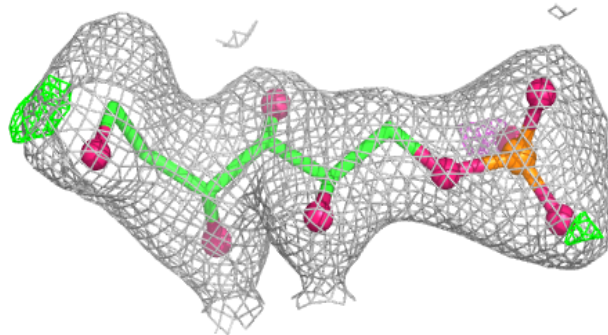
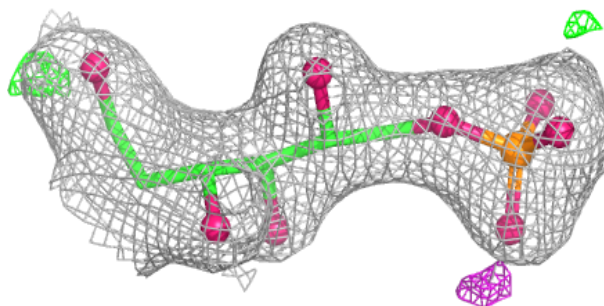


Electron density around F6R D 301 (B):

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

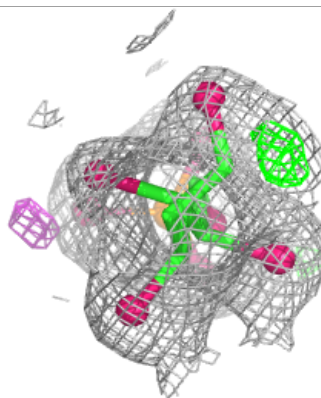
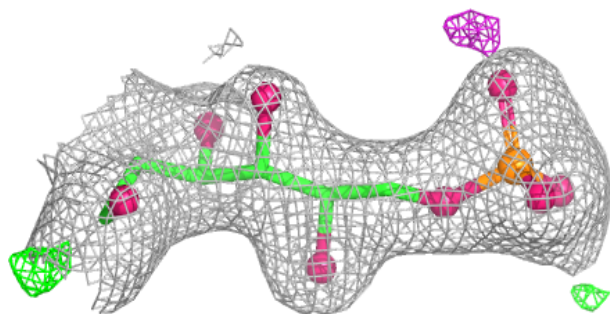
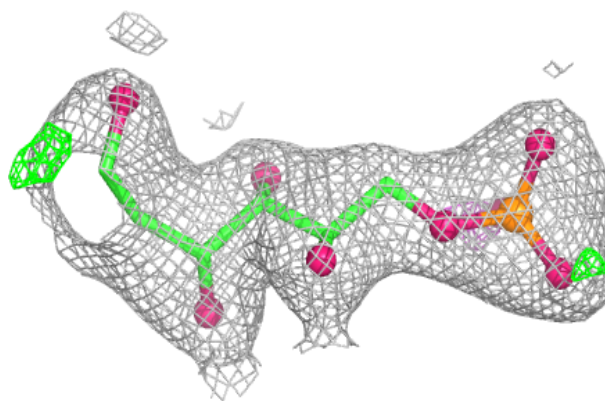
**Electron density around F6R B 301 (A):**

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

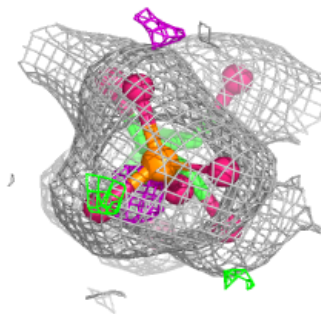
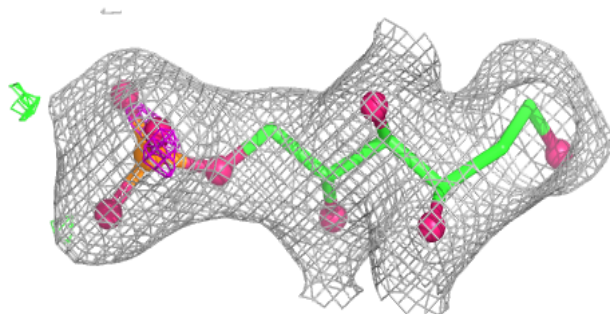
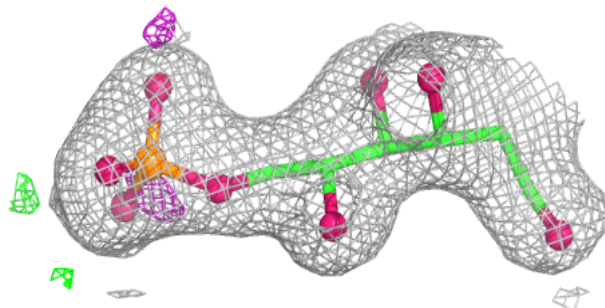


Electron density around F6R B 301 (B):

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

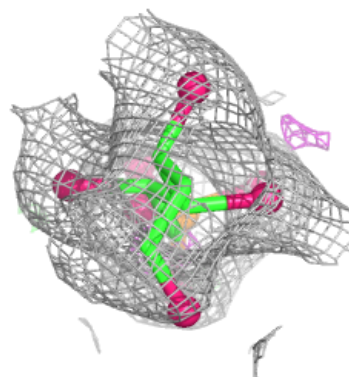
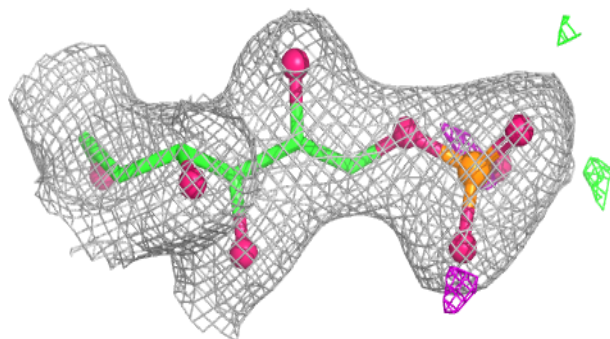
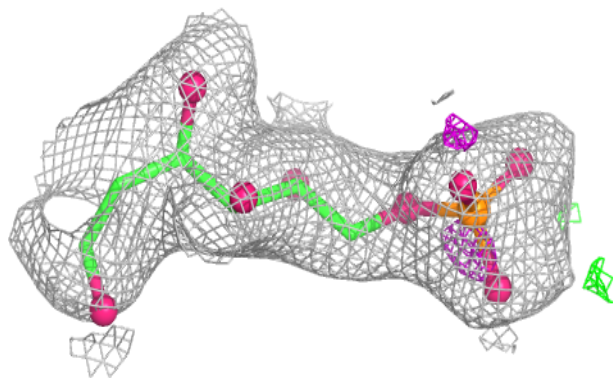
**Electron density around F6R C 301 (A):**

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



Electron density around F6R C 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)



6.5 Other polymers [i](#)

There are no such residues in this entry.