



Full wwPDB X-ray Structure Validation Report ⓘ

Sep 4, 2023 – 10:11 PM JST

PDB ID : 8JYE
Title : Crystal Structure of Intracellular B30.2 Domain of BTN3A1 and BTN2A1 in Complex with HMBPP
Authors : Yuan, L.J.; Yang, Y.Y.; Li, X.; Cai, N.N.; Chen, C.-C.; Guo, R.-T.; Zhang, Y.H.
Deposited on : 2023-07-03
Resolution : 2.18 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

MolProbity : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.35
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) : 2.35

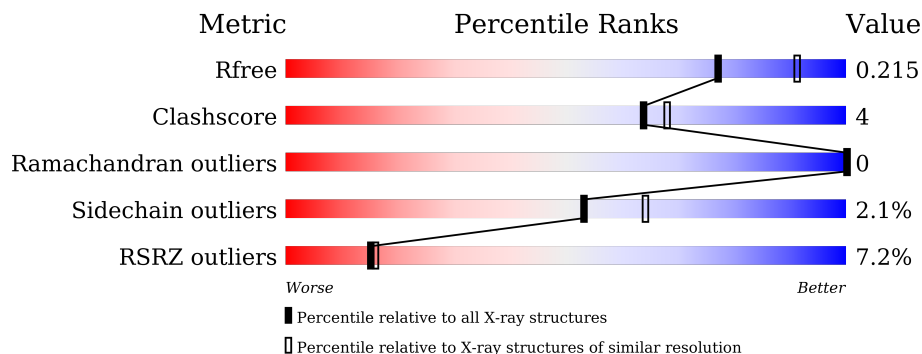
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.18 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	6864 (2.20-2.16)
Clashscore	141614	7689 (2.20-2.16)
Ramachandran outliers	138981	7564 (2.20-2.16)
Sidechain outliers	138945	7564 (2.20-2.16)
RSRZ outliers	127900	6738 (2.20-2.16)

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	218	 3% 83% 7% 8%
1	B	218	 6% 86% 6% 8%
2	C	196	 7% 86% 7% 8%
2	D	196	 11% 76% 14% 9%

2 Entry composition [i](#)

There are 8 unique types of molecules in this entry. The entry contains 6622 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 Butyrophilin subfamily 2 member A1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	200	Total 1614	C 1020	N 290	O 295	S 9	0	1	0
1	B	200	Total 1603	C 1014	N 286	O 294	S 9	0	0	0

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	310	GLY	-	expression tag	UNP Q7KYR7
A	311	ALA	-	expression tag	UNP Q7KYR7
A	312	GLY	-	expression tag	UNP Q7KYR7
A	313	ALA	-	expression tag	UNP Q7KYR7
A	314	GLY	-	expression tag	UNP Q7KYR7
A	315	ALA	-	expression tag	UNP Q7KYR7
B	310	GLY	-	expression tag	UNP Q7KYR7
B	311	ALA	-	expression tag	UNP Q7KYR7
B	312	GLY	-	expression tag	UNP Q7KYR7
B	313	ALA	-	expression tag	UNP Q7KYR7
B	314	GLY	-	expression tag	UNP Q7KYR7
B	315	ALA	-	expression tag	UNP Q7KYR7

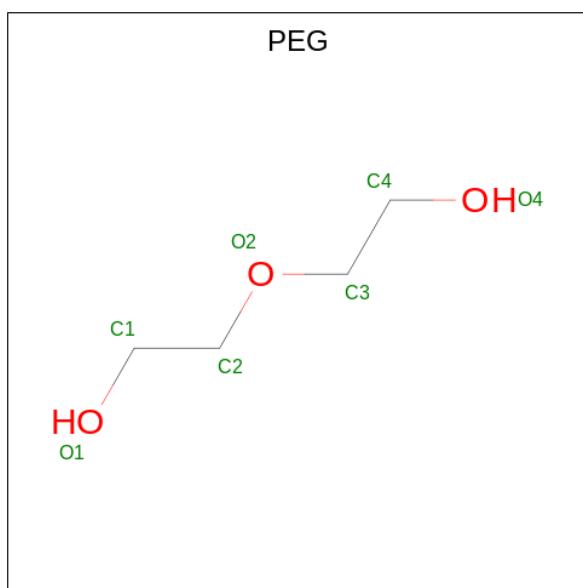
- Molecule 2 is a protein called Butyrophilin subfamily 3 member A1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	C	181	Total 1474	C 949	N 249	O 270	S 6	0	2	0
2	D	178	Total 1437	C 926	N 242	O 263	S 6	0	0	0

There are 20 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	296	MET	-	expression tag	UNP O00481
C	297	GLY	-	expression tag	UNP O00481
C	484	LEU	-	expression tag	UNP O00481
C	485	GLU	-	expression tag	UNP O00481
C	486	HIS	-	expression tag	UNP O00481
C	487	HIS	-	expression tag	UNP O00481
C	488	HIS	-	expression tag	UNP O00481
C	489	HIS	-	expression tag	UNP O00481
C	490	HIS	-	expression tag	UNP O00481
C	491	HIS	-	expression tag	UNP O00481
D	296	MET	-	expression tag	UNP O00481
D	297	GLY	-	expression tag	UNP O00481
D	484	LEU	-	expression tag	UNP O00481
D	485	GLU	-	expression tag	UNP O00481
D	486	HIS	-	expression tag	UNP O00481
D	487	HIS	-	expression tag	UNP O00481
D	488	HIS	-	expression tag	UNP O00481
D	489	HIS	-	expression tag	UNP O00481
D	490	HIS	-	expression tag	UNP O00481
D	491	HIS	-	expression tag	UNP O00481

- Molecule 3 is DI(HYDROXYETHYL)ETHER (three-letter code: PEG) (formula: C₄H₁₀O₃).



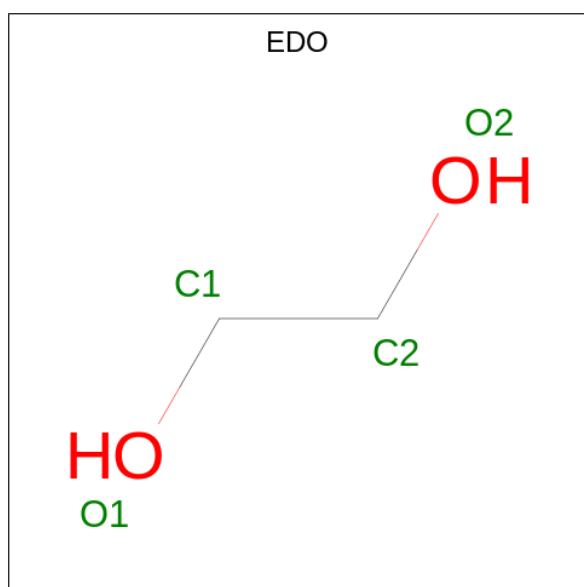
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			7	4	3		
3	A	1	Total	C	O	0	0
			7	4	3		

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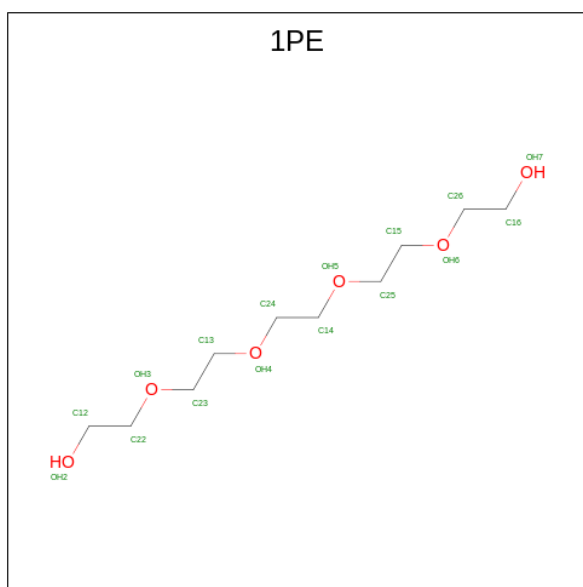
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	B	1	Total	C	O	0	0
			7	4	3		
3	B	1	Total	C	O	0	0
			7	4	3		

- Molecule 4 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C₂H₆O₂).



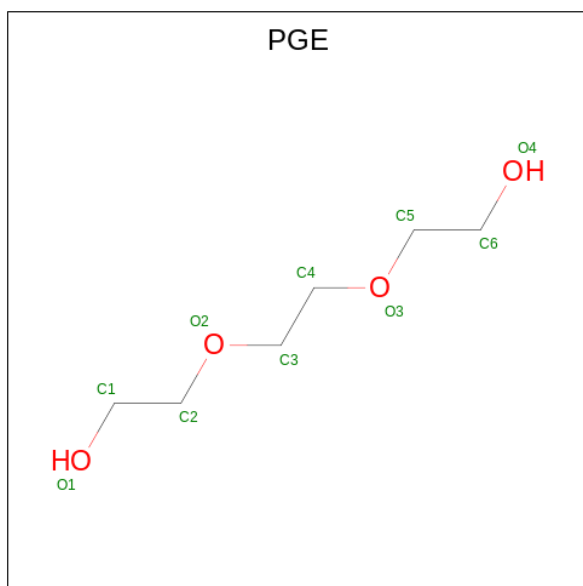
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			4	2	2		
4	B	1	Total	C	O	0	0
			4	2	2		
4	B	1	Total	C	O	0	0
			4	2	2		
4	C	1	Total	C	O	0	0
			4	2	2		

- Molecule 5 is PENTAETHYLENE GLYCOL (three-letter code: 1PE) (formula: C₁₀H₂₂O₆).



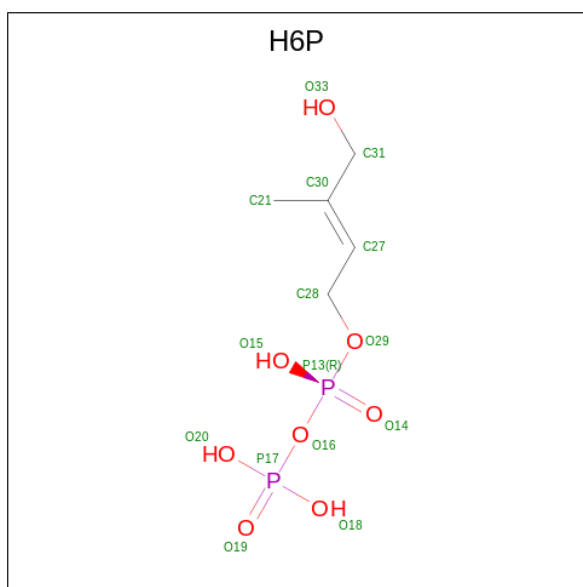
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	C	1	Total	C O	0	0
			16	10 6		

- Molecule 6 is TRIETHYLENE GLYCOL (three-letter code: PGE) (formula: $C_6H_{14}O_4$).



Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	C	1	Total	C O	0	0
			10	6 4		

- Molecule 7 is (2E)-4-hydroxy-3-methylbut-2-en-1-yl trihydrogen diphosphate (three-letter code: H6P) (formula: $C_5H_{12}O_8P_2$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
7	C	1	Total	C	O	P	0	0
			15	5	8	2		
7	D	1	Total	C	O	P	0	0
			15	5	8	2		

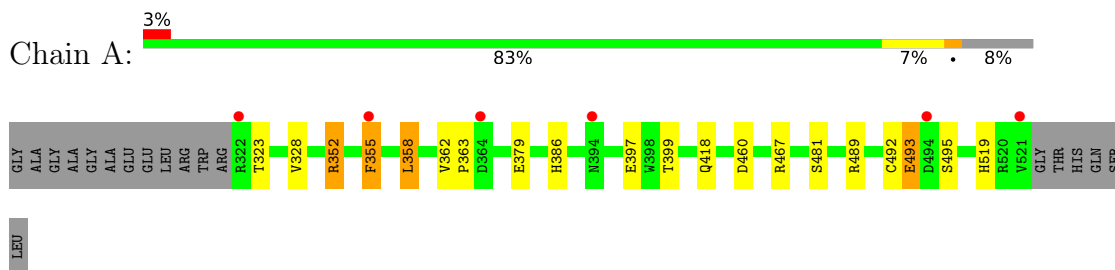
- Molecule 8 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	118	Total	O	0	0
			118	118		
8	B	122	Total	O	0	0
			122	122		
8	C	92	Total	O	0	0
			92	92		
8	D	62	Total	O	0	0
			62	62		

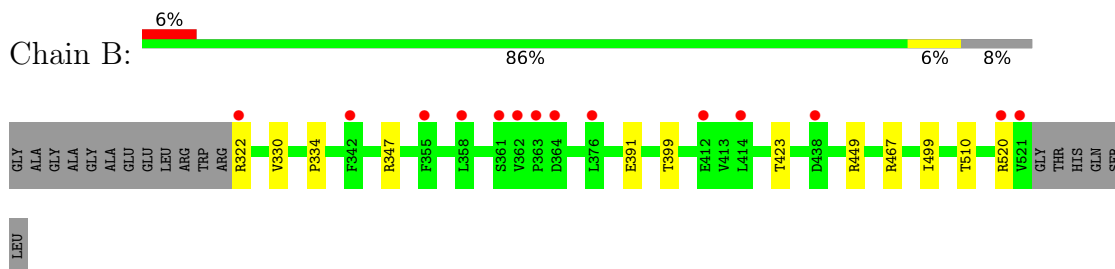
3 Residue-property plots [i](#)

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.

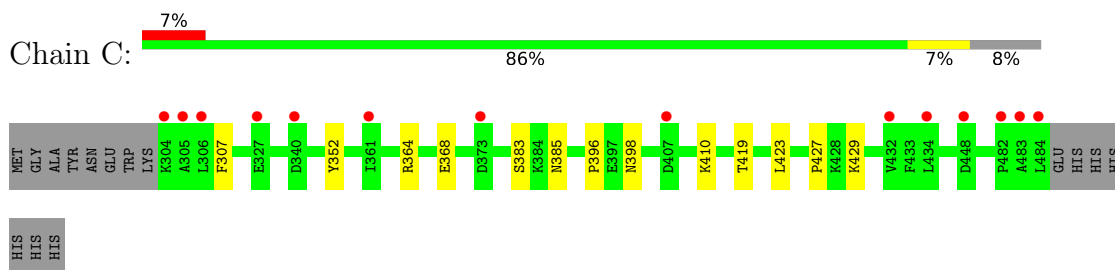
- Molecule 1: Butyrophilin subfamily 2 member A1



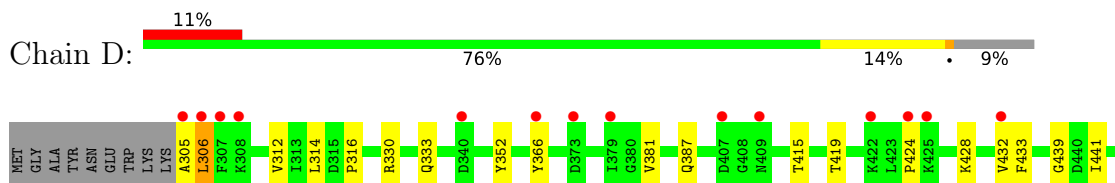
- Molecule 1: Butyrophilin subfamily 2 member A1



- Molecule 2: Butyrophilin subfamily 3 member A1



- Molecule 2: Butyrophilin subfamily 3 member A1





4 Data and refinement statistics

Property	Value	Source
Space group	P 41	Depositor
Cell constants a, b, c, α , β , γ	89.82Å 89.82Å 169.34Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.03 – 2.18 20.02 – 2.18	Depositor EDS
% Data completeness (in resolution range)	98.1 (20.03-2.18) 98.2 (20.02-2.18)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	4.04 (at 2.17Å)	Xtrriage
Refinement program	REFMAC 5.8.0238	Depositor
R, R_{free}	0.175 , 0.210 0.183 , 0.215	Depositor DCC
R_{free} test set	3385 reflections (4.93%)	wwPDB-VP
Wilson B-factor (Å ²)	40.9	Xtrriage
Anisotropy	0.248	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 54.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	0.030 for h,-k,-l	Xtrriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	6622	wwPDB-VP
Average B, all atoms (Å ²)	47.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.16% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: 1PE, EDO, PGE, PEG, H6P

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	0.79	0/1658	0.97	2/2253 (0.1%)
1	B	0.78	0/1647	0.91	2/2239 (0.1%)
2	C	0.76	0/1517	0.96	2/2064 (0.1%)
2	D	0.70	0/1480	0.93	1/2014 (0.0%)
All	All	0.76	0/6302	0.94	7/8570 (0.1%)

There are no bond length outliers.

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	352	ARG	CG-CD-NE	-6.56	98.03	111.80
2	C	352	TYR	CB-CG-CD2	-6.50	117.10	121.00
2	C	352	TYR	CB-CG-CD1	6.47	124.88	121.00
2	D	352	TYR	CB-CG-CD1	5.62	124.37	121.00
1	B	520	ARG	NE-CZ-NH2	-5.57	117.52	120.30
1	B	520	ARG	NE-CZ-NH1	5.08	122.84	120.30
1	A	352	ARG	NE-CZ-NH2	-5.04	117.78	120.30

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	1614	0	1563	15	0
1	B	1603	0	1551	8	0
2	C	1474	0	1445	8	0
2	D	1437	0	1407	16	0
3	A	14	0	20	2	0
3	B	14	0	20	3	0
4	A	4	0	6	0	0
4	B	8	0	12	0	0
4	C	4	0	6	0	0
5	C	16	0	22	1	0
6	C	10	0	14	5	0
7	C	15	0	9	0	0
7	D	15	0	9	0	0
8	A	118	0	0	2	0
8	B	122	0	0	1	0
8	C	92	0	0	7	0
8	D	62	0	0	2	0
All	All	6622	0	6084	52	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 4.

All (52) 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:419:THR:HG23	8:C:630:HOH:O	1.82	0.78
1:B:347:ARG:NH2	3:B:601:PEG:H42	2.05	0.71
1:A:355:PHE:HB3	1:A:358:LEU:HD22	1.73	0.70
1:B:347:ARG:HH21	3:B:601:PEG:H42	1.57	0.69
1:B:510:THR:O	8:B:701:HOH:O	2.16	0.62
2:C:410:LYS:NZ	8:C:602:HOH:O	2.32	0.61
6:C:503:PGE:C2	8:C:669:HOH:O	2.50	0.58
2:D:305:ALA:HA	8:D:624:HOH:O	2.03	0.58
2:C:419:THR:CG2	8:C:630:HOH:O	2.48	0.58
1:B:391:GLU:OE2	1:B:449:ARG:HD3	2.04	0.57
1:A:352:ARG:HB3	1:A:492:CYS:O	2.05	0.56
6:C:503:PGE:H52	8:C:636:HOH:O	2.05	0.55
3:A:601:PEG:H42	1:B:467:ARG:HG3	1.88	0.55
2:D:387:GLN:HG3	8:D:635:HOH:O	2.05	0.55
2:D:330:ARG:NH2	2:D:482:PRO:HA	2.24	0.53
6:C:503:PGE:H22	8:C:669:HOH:O	2.07	0.53
2:D:306:LEU:HD12	2:D:306:LEU:N	2.24	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:312:VAL:HG12	2:D:480:ILE:HD13	1.91	0.52
2:C:423:LEU:HD23	2:C:427:PRO:HD3	1.92	0.52
1:A:397:GLU:HB2	1:A:492:CYS:HB3	1.91	0.51
2:C:383:SER:HB3	2:C:385:ASN:OD1	2.10	0.51
2:D:314:LEU:O	2:D:316:PRO:HD3	2.11	0.50
1:B:334:PRO:HB2	3:B:601:PEG:H21	1.92	0.50
1:A:355:PHE:CD1	1:A:355:PHE:N	2.80	0.50
2:C:368:GLU:OE1	2:C:429:LYS:HD2	2.13	0.49
1:A:355:PHE:N	1:A:355:PHE:HD1	2.11	0.48
1:A:355:PHE:HB3	1:A:358:LEU:CD2	2.41	0.48
1:A:418:GLN:HG3	8:A:719:HOH:O	2.14	0.47
2:D:381:VAL:HA	2:D:465:TYR:O	2.14	0.47
6:C:503:PGE:H2	8:C:669:HOH:O	2.12	0.47
2:D:306:LEU:HD12	2:D:306:LEU:H	1.79	0.46
2:D:448:ASP:C	2:D:448:ASP:OD1	2.54	0.46
2:D:330:ARG:HH21	2:D:482:PRO:HA	1.80	0.45
1:A:467:ARG:HA	3:A:601:PEG:H21	1.99	0.45
2:D:366:TYR:HA	2:D:432:VAL:O	2.16	0.45
2:D:433:PHE:O	2:D:441:ILE:HA	2.18	0.44
2:C:307:PHE:CD2	2:C:364:ARG:HB3	2.54	0.43
6:C:503:PGE:H52	6:C:503:PGE:H32	1.77	0.43
2:D:415:THR:OG1	2:D:419:THR:HG23	2.18	0.43
1:A:362:VAL:HG13	1:A:363:PRO:HD2	2.02	0.42
2:D:439:GLY:HA3	2:D:458:VAL:O	2.20	0.41
1:B:399:THR:CG2	1:B:423:THR:HB	2.49	0.41
1:A:328:VAL:CG2	1:A:386:HIS:HB3	2.50	0.41
2:C:398:ASN:OD1	5:C:502:1PE:H222	2.20	0.41
1:A:519:HIS:HD2	8:A:804:HOH:O	2.03	0.41
1:A:399:THR:HB	1:A:489:ARG:HB3	2.03	0.41
1:B:330:VAL:HB	1:B:499:ILE:HG21	2.02	0.40
2:D:445:ASN:OD1	2:D:447:VAL:HG22	2.20	0.40
2:D:481:CYS:HA	2:D:482:PRO:HD3	1.94	0.40
1:A:379:GLU:CD	1:A:379:GLU:H	2.25	0.40
1:A:493:GLU:O	1:A:493:GLU:HG3	2.17	0.40
1:A:460:ASP:C	1:A:460:ASP:OD1	2.60	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	199/218 (91%)	193 (97%)	6 (3%)	0	100	100
1	B	198/218 (91%)	193 (98%)	5 (2%)	0	100	100
2	C	181/196 (92%)	174 (96%)	7 (4%)	0	100	100
2	D	176/196 (90%)	170 (97%)	6 (3%)	0	100	100
All	All	754/828 (91%)	730 (97%)	24 (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	A	180/190 (95%)	174 (97%)	6 (3%)	38	46
1	B	179/190 (94%)	178 (99%)	1 (1%)	86	92
2	C	164/175 (94%)	163 (99%)	1 (1%)	86	92
2	D	160/175 (91%)	154 (96%)	6 (4%)	33	39
All	All	683/730 (94%)	669 (98%)	14 (2%)	53	66

All (14) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	323	THR
1	A	355	PHE

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Mol	Chain	Res	Type
1	A	358	LEU
1	A	481	SER
1	A	493	GLU
1	A	495	SER
1	B	322	ARG
2	C	396	PRO
2	D	306	LEU
2	D	333	GLN
2	D	424	PRO
2	D	428	LYS
2	D	450	SER
2	D	473	LEU

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](#)

12 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	PEG	A	601	-	6,6,6	0.28	0	5,5,5	0.48	0
7	H6P	C	504	-	11,14,14	0.81	0	13,20,20	1.28	1 (7%)
7	H6P	D	501	-	11,14,14	0.71	0	13,20,20	1.45	1 (7%)
5	1PE	C	502	-	15,15,15	0.68	0	14,14,14	0.44	0
4	EDO	A	603	-	3,3,3	0.28	0	2,2,2	0.44	0
4	EDO	B	603	-	3,3,3	0.23	0	2,2,2	0.48	0
4	EDO	B	604	-	3,3,3	0.12	0	2,2,2	0.05	0
3	PEG	B	601	-	6,6,6	0.38	0	5,5,5	0.34	0
3	PEG	B	602	-	6,6,6	0.13	0	5,5,5	0.10	0
4	EDO	C	501	-	3,3,3	0.08	0	2,2,2	0.22	0
6	PGE	C	503	-	9,9,9	0.43	0	8,8,8	0.38	0
3	PEG	A	602	-	6,6,6	0.20	0	5,5,5	0.11	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. '2' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	PEG	A	601	-	-	2/4/4/4	-
7	H6P	C	504	-	-	4/15/15/15	-
7	H6P	D	501	-	-	3/15/15/15	-
5	1PE	C	502	-	-	4/13/13/13	-
4	EDO	A	603	-	-	1/1/1/1	-
4	EDO	B	603	-	-	0/1/1/1	-
4	EDO	B	604	-	-	1/1/1/1	-
3	PEG	B	601	-	-	1/4/4/4	-
3	PEG	B	602	-	-	1/4/4/4	-
4	EDO	C	501	-	-	1/1/1/1	-
6	PGE	C	503	-	-	3/7/7/7	-
3	PEG	A	602	-	-	2/4/4/4	-

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	D	501	H6P	O20-P17-O18	3.02	119.18	107.64
7	C	504	H6P	O20-P17-O18	2.25	116.22	107.64

There are no chirality outliers.

All (23) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
7	C	504	H6P	P13-O16-P17-O20
7	D	501	H6P	P13-O16-P17-O18
3	A	601	PEG	C4-C3-O2-C2
3	A	602	PEG	O1-C1-C2-O2
3	B	602	PEG	O1-C1-C2-O2
5	C	502	1PE	OH2-C12-C22-OH3
3	A	601	PEG	O2-C3-C4-O4
6	C	503	PGE	C3-C4-O3-C5
4	C	501	EDO	O1-C1-C2-O2
4	A	603	EDO	O1-C1-C2-O2
7	C	504	H6P	P17-O16-P13-O29
5	C	502	1PE	C14-C24-OH4-C13
5	C	502	1PE	C12-C22-OH3-C23
4	B	604	EDO	O1-C1-C2-O2
6	C	503	PGE	O2-C3-C4-O3
3	A	602	PEG	C1-C2-O2-C3
6	C	503	PGE	C6-C5-O3-C4
7	C	504	H6P	P13-O16-P17-O18
7	D	501	H6P	P13-O16-P17-O20
5	C	502	1PE	OH5-C14-C24-OH4
3	B	601	PEG	O1-C1-C2-O2
7	C	504	H6P	P13-O16-P17-O19
7	D	501	H6P	P13-O16-P17-O19

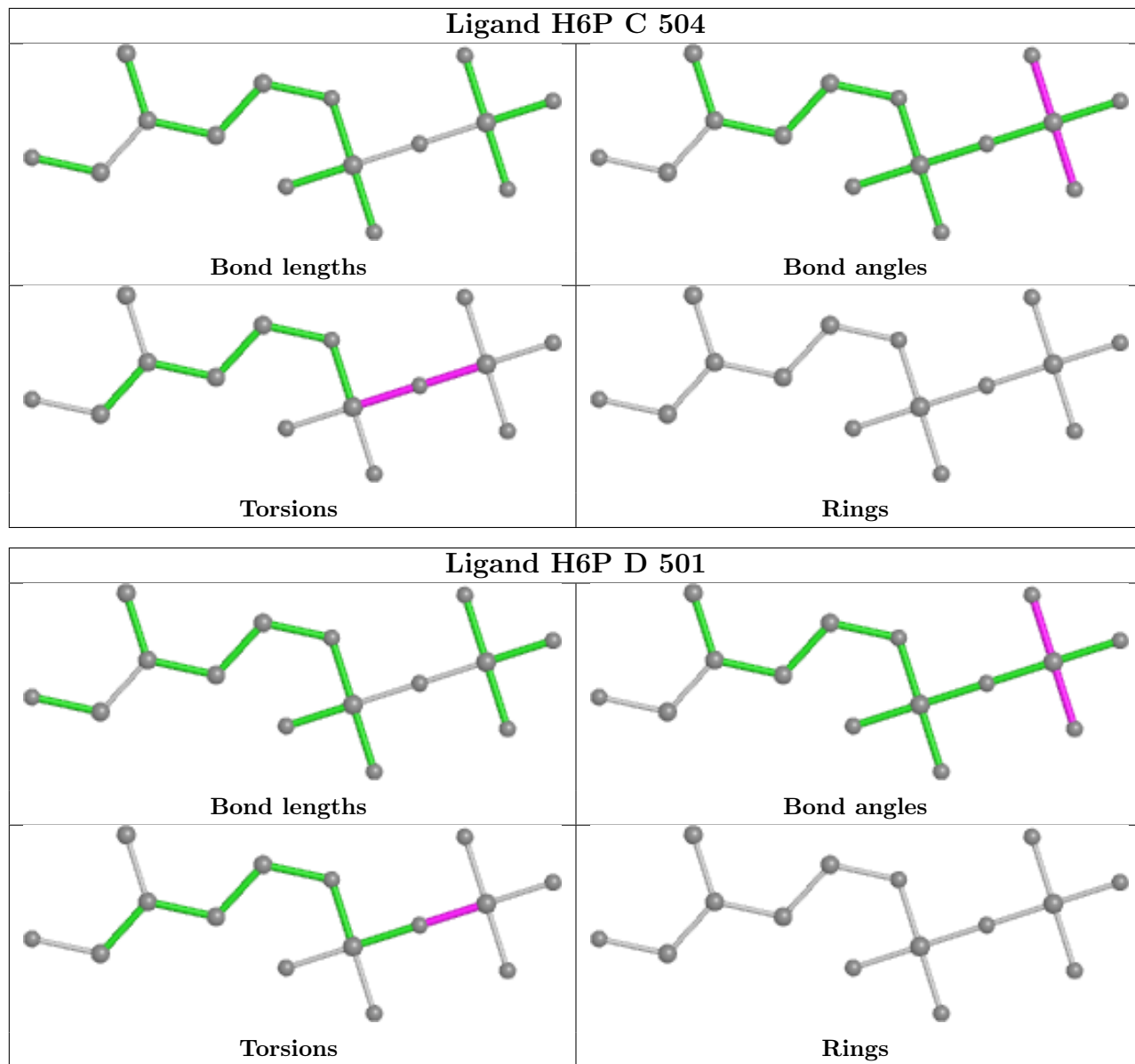
There are no ring outliers.

4 monomers are involved in 11 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	601	PEG	2	0
5	C	502	1PE	1	0
3	B	601	PEG	3	0
6	C	503	PGE	5	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and

any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data

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	200/218 (91%)	0.00	6 (3%) 50 51	27, 36, 60, 99	0
1	B	200/218 (91%)	0.23	14 (7%) 16 17	26, 41, 64, 95	0
2	C	181/196 (92%)	0.43	14 (7%) 13 14	29, 46, 69, 102	0
2	D	178/196 (90%)	0.66	21 (11%) 4 4	32, 55, 83, 100	0
All	All	759/828 (91%)	0.32	55 (7%) 15 16	26, 43, 75, 102	0

All (55) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	355	PHE	6.0
2	C	305	ALA	5.6
1	B	521	VAL	5.5
1	A	355	PHE	5.0
2	C	484	LEU	4.8
2	D	424	PRO	4.7
1	A	322	ARG	4.6
2	C	483	ALA	4.4
2	C	306	LEU	4.0
1	A	521	VAL	3.9
2	D	306	LEU	3.8
2	D	459	SER	3.7
2	D	305	ALA	3.7
2	D	340	ASP	3.5
1	B	363	PRO	3.5
1	B	414	LEU	3.4
2	D	475	PRO	3.4
2	D	422	LYS	3.3
2	C	340	ASP	3.3
1	B	322	ARG	3.3
2	D	307	PHE	3.1

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Mol	Chain	Res	Type	RSRZ
2	C	361	ILE	3.1
2	C	482	PRO	3.1
2	D	366	TYR	3.1
2	C	327	GLU	3.1
2	D	425	LYS	2.9
2	C	373	ASP	2.8
1	B	438	ASP	2.7
2	D	447	VAL	2.7
2	D	379	ILE	2.7
2	D	482	PRO	2.7
2	D	461	SER	2.6
1	A	494	ASP	2.6
2	D	373	ASP	2.6
1	B	412	GLU	2.6
2	D	407	ASP	2.5
2	D	432	VAL	2.5
1	A	394	ASN	2.4
2	D	409	ASN	2.3
1	B	362	VAL	2.3
2	C	407	ASP	2.3
2	C	434	LEU	2.3
2	C	304	LYS	2.2
1	B	342	PHE	2.1
2	C	432	VAL	2.1
2	D	467	VAL	2.1
1	B	361	SER	2.1
2	D	457	ASP	2.1
1	B	376	LEU	2.1
1	B	364	ASP	2.1
2	C	448	ASP	2.1
1	A	364	ASP	2.0
1	B	358	LEU	2.0
1	B	520	ARG	2.0
2	D	308	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](#)

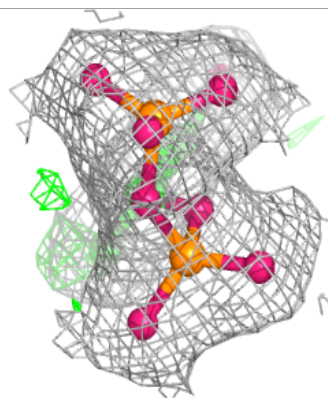
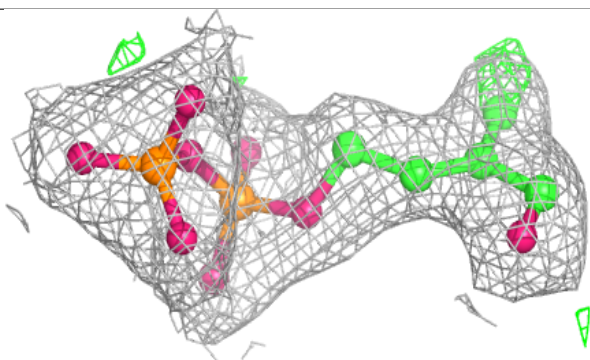
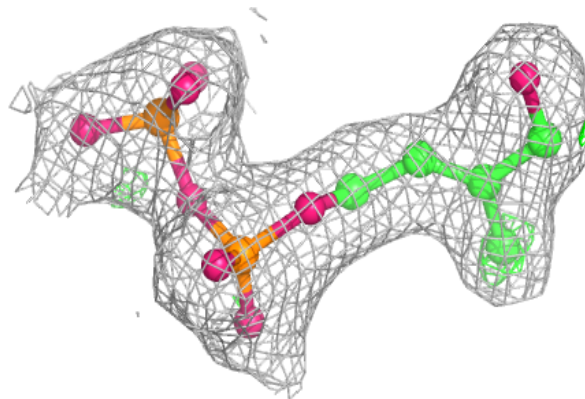
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists 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	EDO	C	501	4/4	0.68	0.21	74,75,77,82	0
4	EDO	B	604	4/4	0.71	0.26	64,70,72,72	0
3	PEG	B	601	7/7	0.75	0.22	66,72,79,80	0
5	1PE	C	502	16/16	0.84	0.28	54,64,70,73	0
6	PGE	C	503	10/10	0.84	0.21	45,70,79,80	0
3	PEG	A	602	7/7	0.88	0.38	72,76,78,81	0
4	EDO	B	603	4/4	0.90	0.11	60,74,74,79	0
4	EDO	A	603	4/4	0.91	0.16	48,51,55,55	0
3	PEG	B	602	7/7	0.92	0.15	60,66,72,75	0
3	PEG	A	601	7/7	0.94	0.17	50,53,65,70	0
7	H6P	C	504	15/15	0.98	0.12	25,30,34,35	0
7	H6P	D	501	15/15	0.98	0.10	27,34,36,39	0

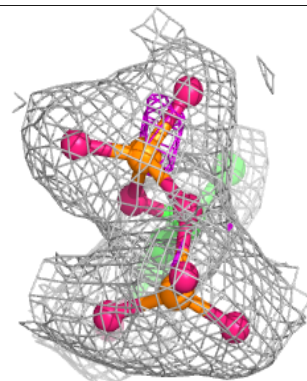
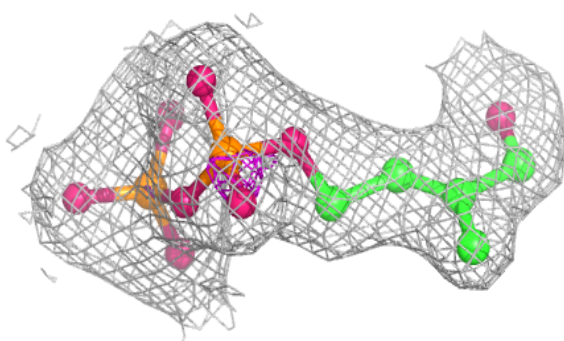
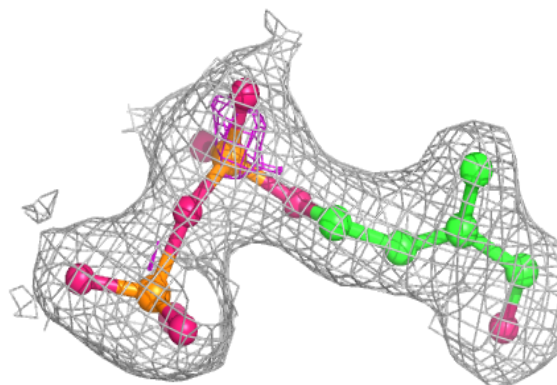
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around H6P C 504:

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

**Electron density around H6P D 501:**

$2mF_o-DF_c$ (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.