



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 02:54 PM UTC

PDB ID : 8JYE / pdb_00008jye
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 : 4-5-2 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

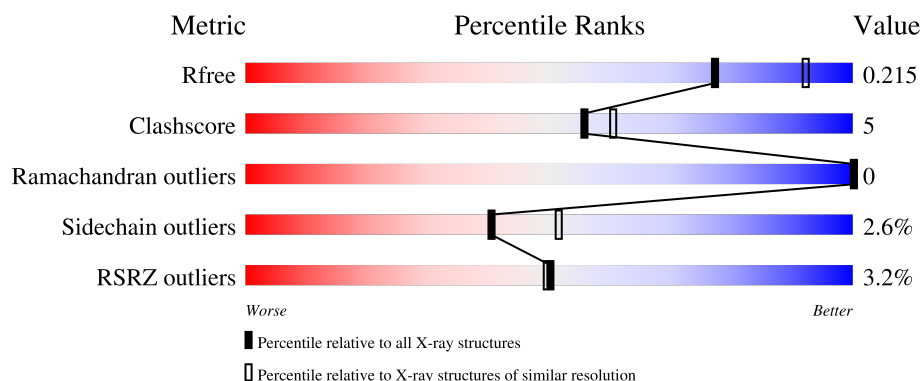
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

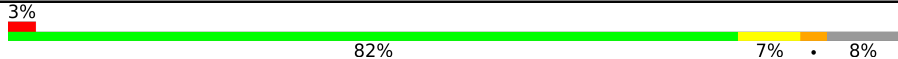
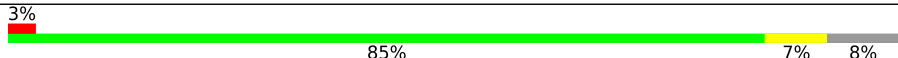
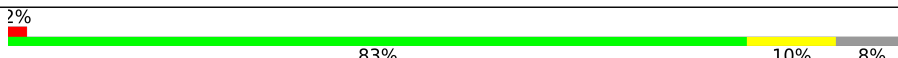
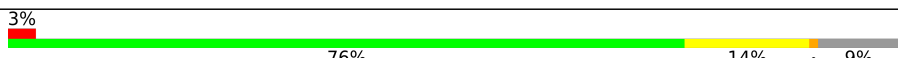
The reported resolution of this entry is 2.18 Å.

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}	180053	8975 (2.20-2.16)
Clashscore	190562	9786 (2.20-2.16)
Ramachandran outliers	187476	9664 (2.20-2.16)
Sidechain outliers	187428	9664 (2.20-2.16)
RSRZ outliers	180081	8979 (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	
1	B	218	
2	C	196	
2	D	196	

2 Entry composition

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
1	A	200	Total	C	N	O	S	0	1	0
			1614	1020	290	295	9			
1	B	200	Total	C	N	O	S	0	0	0
			1603	1014	286	294	9			

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

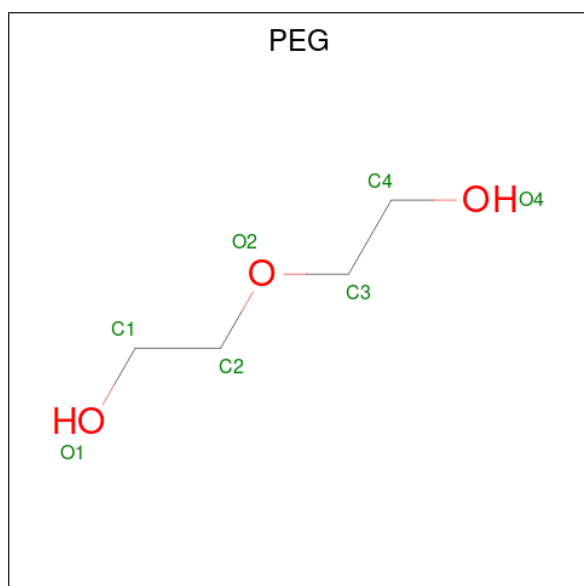
- Molecule 2 is a protein called Butyrophilin subfamily 3 member A1.

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

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 (CCD ID: PEG) (formula: $C_4H_{10}O_3$).



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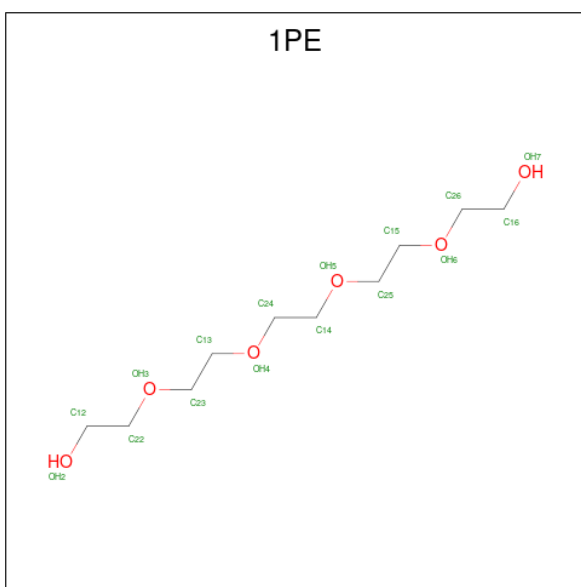
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	B	1	Total	C	O	0	0
			7	4	3		
3	B	1	Total	C	O	0	0
			7	4	3		

- Molecule 4 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: $C_2H_6O_2$).



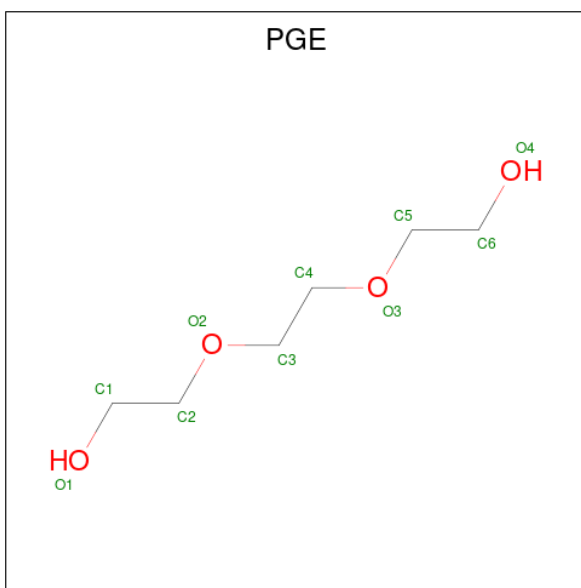
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			4	2	2		
4	B	1	Total	C	O	0	0
			4	2	2		
4	B	1	Total	C	O	0	0
			4	2	2		
4	C	1	Total	C	O	0	0
			4	2	2		

- Molecule 5 is PENTAETHYLENE GLYCOL (CCD ID: 1PE) (formula: $C_{10}H_{22}O_6$).



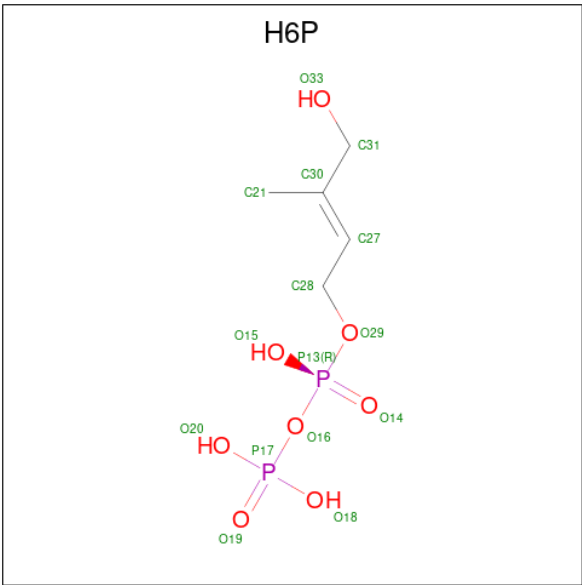
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	C	1	Total	C	O	0	0
			16	10	6		

- Molecule 6 is TRIETHYLENE GLYCOL (CCD ID: PGE) (formula: $\text{C}_6\text{H}_{14}\text{O}_4$).



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 (CCD ID: 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		

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 20.03 – 2.18	Depositor EDS
% Data completeness (in resolution range)	98.1 (20.03-2.18) 98.5 (20.03-2.18)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	4.04 (at 2.17Å)	Xtriage
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 (4.83%)	wwPDB-VP
Wilson B-factor (Å ²)	40.9	Xtriage
Anisotropy	0.248	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 47.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.030 for h,-k,-l	Xtriage
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

Xtriage'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: EDO, H6P, 1PE, PEG, PGE

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\# Z > 5$	RMSZ	$\# Z > 5$
1	A	1.12	2/1658 (0.1%)	1.32	1/2253 (0.0%)
1	B	1.13	0/1647	1.25	0/2239
2	C	1.11	1/1517 (0.1%)	1.36	2/2064 (0.1%)
2	D	1.07	0/1480	1.32	2/2014 (0.1%)
All	All	1.11	3/6302 (0.0%)	1.31	5/8570 (0.1%)

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	316	PRO	C-O	-7.71	1.14	1.24
1	A	386	HIS	CE1-NE2	5.92	1.38	1.32
1	A	492	CYS	N-CA	5.86	1.52	1.46

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	352	ARG	CG-CD-NE	-6.35	98.03	112.00
2	C	440	ASP	CA-CB-CG	5.53	118.13	112.60
2	C	428	LYS	N-CA-C	-5.46	107.17	113.88
2	D	450	SER	CA-C-N	5.05	128.04	120.87
2	D	450	SER	C-N-CA	5.05	128.04	120.87

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	16	0
1	B	1603	0	1551	10	0
2	C	1474	0	1445	10	0
2	D	1437	0	1407	18	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	8	0
8	D	62	0	0	2	0
All	All	6622	0	6084	58	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 5.

All (58) 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
2:C:438:THR:OG1	8:C:601:HOH:O	2.08	0.71
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
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

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:C:410:LYS:NZ	8:C:602:HOH:O	2.32	0.53
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
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:D:448:ASP:C	2:D:448:ASP:OD1	2.54	0.49
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
1:A:513:GLU:OE2	2:C:393:LYS:NZ	2.39	0.47
2:D:306:LEU:HD12	2:D:306:LEU:H	1.79	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
1:A:379:GLU:CD	1:A:379:GLU:H	2.25	0.45
2:D:349:ASN:OD1	2:D:349:ASN:C	2.60	0.44
2:D:433:PHE:O	2:D:441:ILE:HA	2.18	0.44
1:B:379:GLU:H	1:B:379:GLU:CD	2.26	0.44
2:C:307:PHE:CD2	2:C:364:ARG:HB3	2.54	0.43
1:A:460:ASP:C	1:A:460:ASP:OD1	2.60	0.43
6:C:503:PGE:H52	6:C:503:PGE:H32	1.77	0.43
2:D:328:ASP:C	2:D:328:ASP:OD1	2.60	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
1:B:333:ASP:OD1	1:B:333:ASP:C	2.63	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

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
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:493:GLU:O	1:A:493:GLU:HG3	2.17	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%)	33	42
1	B	179/190 (94%)	176 (98%)	3 (2%)	53	66

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	C	164/175 (94%)	161 (98%)	3 (2%)	51	65
2	D	160/175 (91%)	154 (96%)	6 (4%)	29	37
All	All	683/730 (94%)	665 (97%)	18 (3%)	40	51

All (18) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	323	THR
1	A	355	PHE
1	A	358	LEU
1	A	481	SER
1	A	493	GLU
1	A	495	SER
1	B	322	ARG
1	B	413	VAL
1	B	521	VAL
2	C	336	LYS
2	C	396	PRO
2	C	456	LEU
2	D	306	LEU
2	D	333	GLN
2	D	336	LYS
2	D	450	SER
2	D	471	LEU
2	D	473	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	394	ASN

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 [i](#)

There are no oligosaccharides 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	B	601	-	6,6,6	0.38	0	5,5,5	0.33	0
3	PEG	B	602	-	6,6,6	0.13	0	5,5,5	0.10	0
4	EDO	B	603	-	3,3,3	0.23	0	2,2,2	0.39	0
4	EDO	B	604	-	3,3,3	0.12	0	2,2,2	0.08	0
6	PGE	C	503	-	9,9,9	0.44	0	8,8,8	0.37	0
4	EDO	C	501	-	3,3,3	0.08	0	2,2,2	0.15	0
7	H6P	D	501	-	13,14,14	0.79	0	15,20,20	1.39	1 (6%)
7	H6P	C	504	-	13,14,14	0.79	0	15,20,20	1.31	1 (6%)
3	PEG	A	601	-	6,6,6	0.28	0	5,5,5	0.48	0
3	PEG	A	602	-	6,6,6	0.21	0	5,5,5	0.11	0
4	EDO	A	603	-	3,3,3	0.27	0	2,2,2	0.36	0
5	1PE	C	502	-	15,15,15	0.68	0	14,14,14	0.44	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	PEG	B	601	-	-	1/4/4/4	-
3	PEG	B	602	-	-	1/4/4/4	-
4	EDO	B	603	-	-	0/1/1/1	-
4	EDO	B	604	-	-	1/1/1/1	-
6	PGE	C	503	-	-	3/7/7/7	-
4	EDO	C	501	-	-	1/1/1/1	-
7	H6P	D	501	-	-	3/15/15/15	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
7	H6P	C	504	-	-	4/15/15/15	-
3	PEG	A	601	-	-	2/4/4/4	-
3	PEG	A	602	-	-	2/4/4/4	-
4	EDO	A	603	-	-	1/1/1/1	-
5	1PE	C	502	-	-	4/13/13/13	-

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	3.03	119.18	107.80
7	C	504	H6P	O20-P17-O18	2.24	116.22	107.80

There are no chirality outliers.

All (23) torsion outliers are listed below:

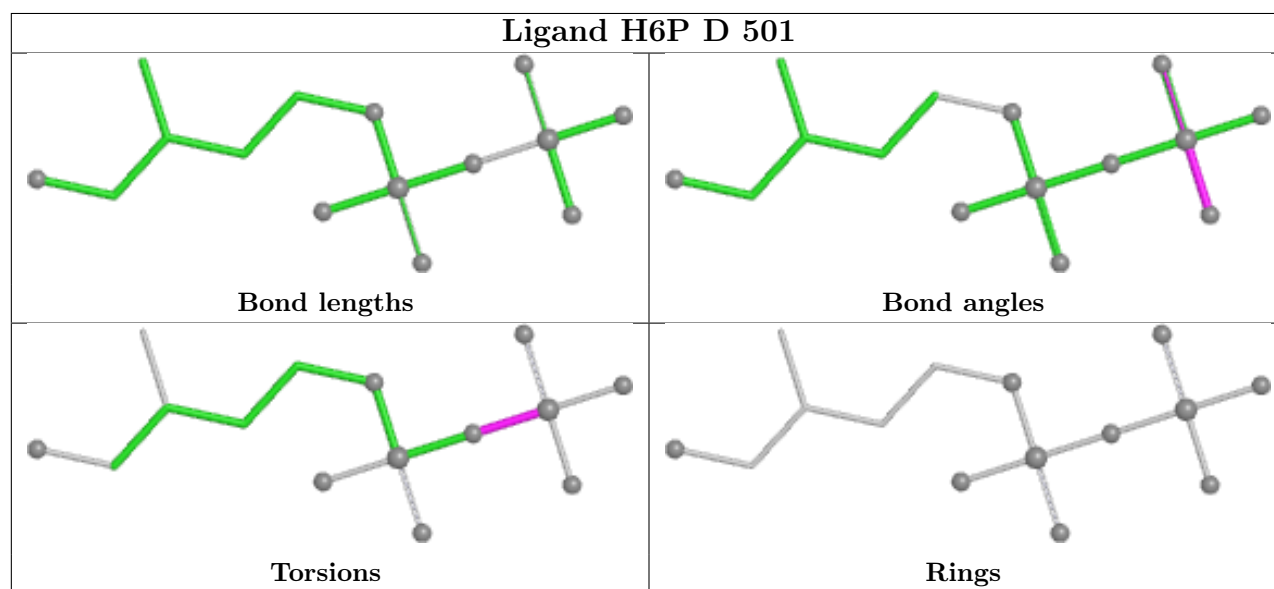
Mol	Chain	Res	Type	Atoms
7	C	504	H6P	P13-O16-P17-O20
7	D	501	H6P	P13-O16-P17-O18
3	A	601	PEG	C4-C3-O2-C2
3	A	602	PEG	O1-C1-C2-O2
3	B	602	PEG	O1-C1-C2-O2
5	C	502	1PE	OH2-C12-C22-OH3
3	A	601	PEG	O2-C3-C4-O4
4	C	501	EDO	O1-C1-C2-O2
6	C	503	PGE	C3-C4-O3-C5
7	C	504	H6P	P17-O16-P13-O29
5	C	502	1PE	C14-C24-OH4-C13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

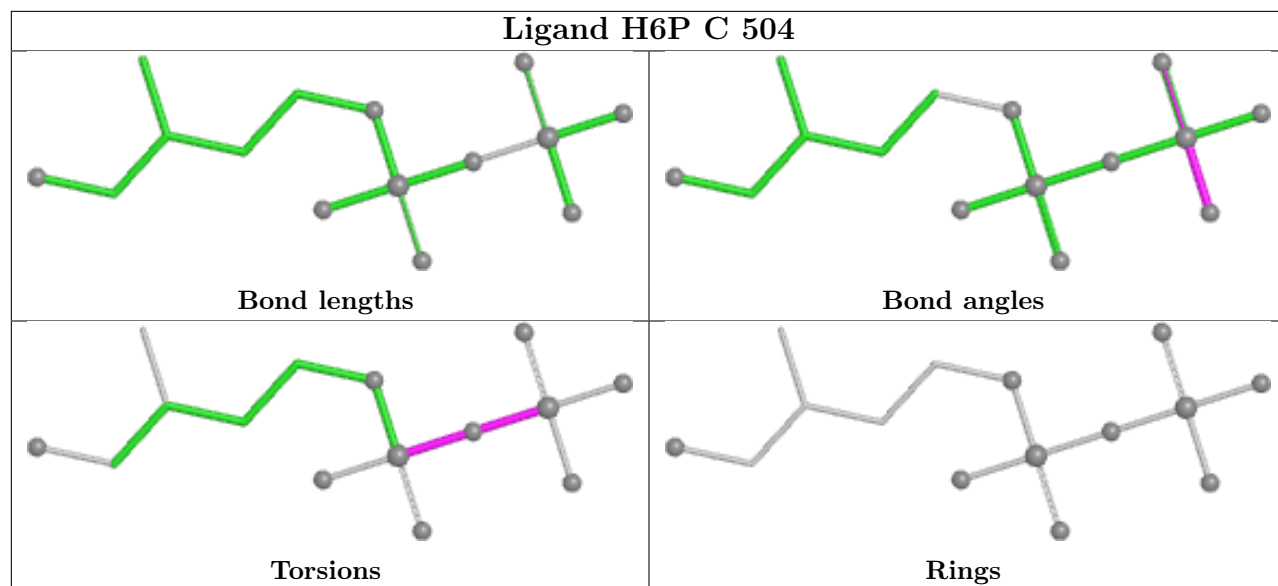
There are no ring outliers.

4 monomers are involved in 11 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	601	PEG	3	0
6	C	503	PGE	5	0
3	A	601	PEG	2	0
5	C	502	1PE	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 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%)	-0.22	7 (3%) 47 46	17, 36, 60, 99	1 (0%)
1	B	200/218 (91%)	-0.10	7 (3%) 47 46	26, 41, 64, 95	0
2	C	181/196 (92%)	0.25	4 (2%) 62 61	19, 46, 69, 102	2 (1%)
2	D	178/196 (90%)	0.54	6 (3%) 48 47	32, 55, 83, 100	0
All	All	759/828 (91%)	0.10	24 (3%) 50 49	17, 43, 75, 102	3 (0%)

All (24) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	C	484	LEU	4.1
1	B	363	PRO	4.1
1	A	355	PHE	4.0
2	D	306	LEU	3.6
2	C	483	ALA	3.4
1	A	521	VAL	3.4
1	A	323	THR	3.4
1	A	322	ARG	3.3
1	B	362	VAL	3.1
2	D	447	VAL	3.1
2	D	366	TYR	3.0
2	D	305	ALA	2.9
1	B	521	VAL	2.8
1	B	355	PHE	2.8
2	D	307	PHE	2.7
1	A	494	ASP	2.5
1	B	322	ARG	2.4
1	A	324	PHE	2.4
2	D	309	PRO	2.4
1	B	342	PHE	2.2
2	C	313	ILE	2.2

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Mol	Chain	Res	Type	RSRZ
2	C	305	ALA	2.2
1	B	361	SER	2.1
1	A	492	CYS	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 oligosaccharides in this entry.

6.4 Ligands [i](#)

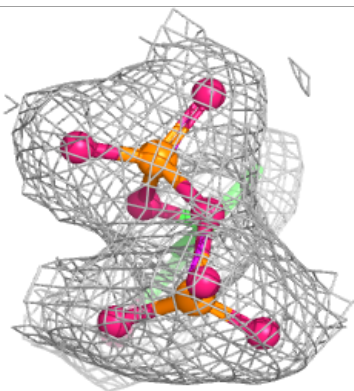
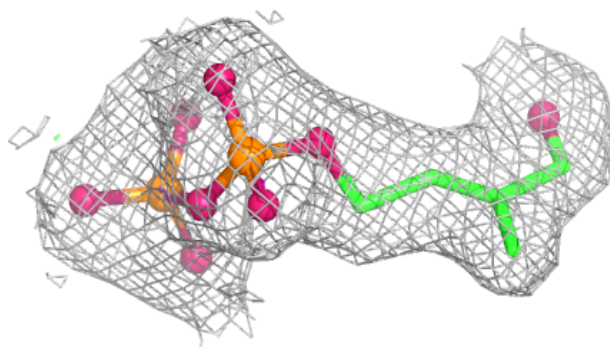
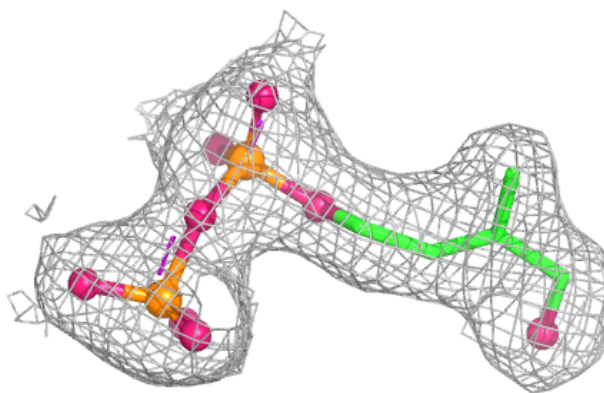
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists 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	B	604	4/4	0.75	0.15	64,70,72,72	0
3	PEG	B	601	7/7	0.83	0.19	66,72,79,80	0
3	PEG	A	602	7/7	0.83	0.14	72,76,78,81	0
4	EDO	B	603	4/4	0.85	0.16	60,74,74,79	0
5	1PE	C	502	16/16	0.90	0.12	54,64,70,73	0
6	PGE	C	503	10/10	0.90	0.15	45,70,79,80	0
3	PEG	A	601	7/7	0.93	0.12	50,53,65,70	0
3	PEG	B	602	7/7	0.93	0.11	60,66,72,75	0
4	EDO	C	501	4/4	0.94	0.10	74,75,77,82	0
4	EDO	A	603	4/4	0.96	0.11	48,51,55,55	0
7	H6P	D	501	15/15	0.98	0.06	27,34,36,39	0
7	H6P	C	504	15/15	0.99	0.04	25,30,34,35	0

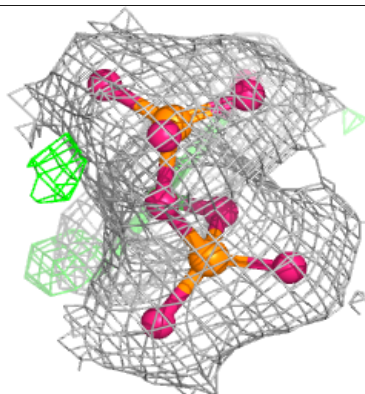
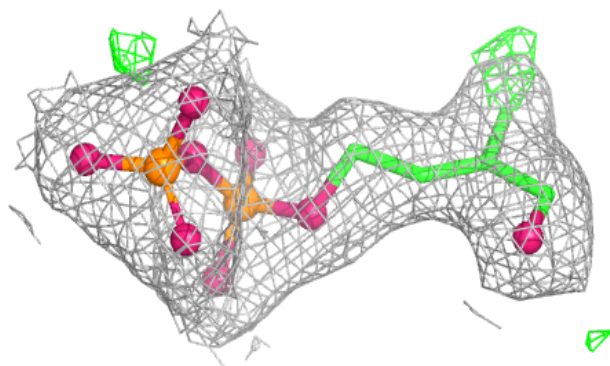
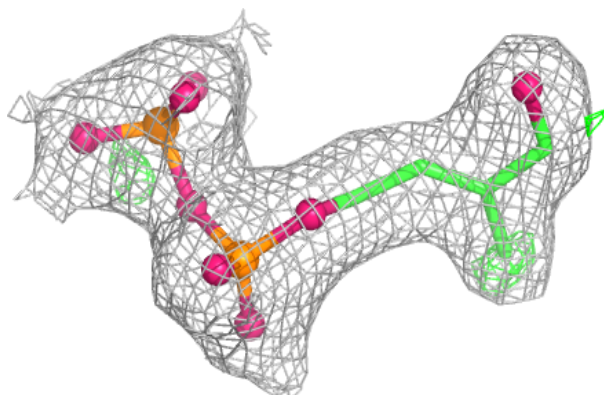
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around H6P 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)

**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)



6.5 Other polymers [i](#)

There are no such residues in this entry.