



# Full wwPDB X-ray Structure Validation Report ⓘ

Jun 15, 2020 – 05:35 am BST

PDB ID : 4PH7  
Title : Structure of Osh6p in complex with phosphatidylinositol 4-phosphate  
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Deposited on : 2014-05-05  
Resolution : 2.55 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](mailto: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.

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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 : 2.11  
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) : 2.11

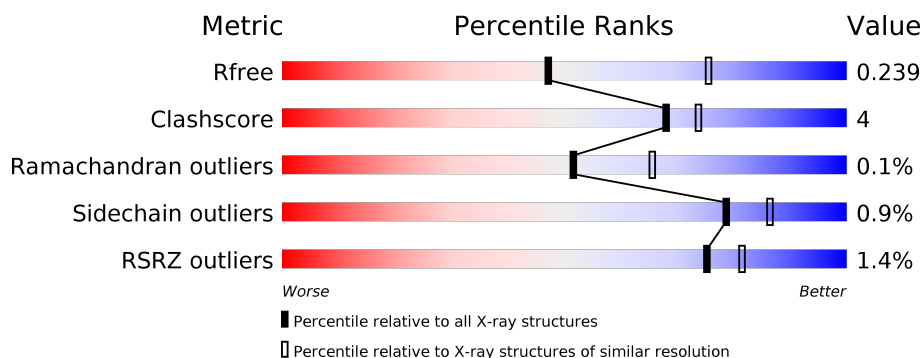
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.55 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	1284 (2.56-2.52)
Clashscore	141614	1332 (2.56-2.52)
Ramachandran outliers	138981	1315 (2.56-2.52)
Sidechain outliers	138945	1315 (2.56-2.52)
RSRZ outliers	127900	1272 (2.56-2.52)

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 on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 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	450	<div> <div>2%</div> <div> <div></div> <div>80%</div> <div>9%</div> <div>11%</div> </div> </div>
1	B	450	<div> <div></div> <div> <div>80%</div> <div>8%</div> <div>12%</div> </div> </div>
1	C	450	<div> <div>2%</div> <div> <div></div> <div>80%</div> <div>8%</div> <div>12%</div> </div> </div>
1	D	450	<div> <div>%</div> <div> <div></div> <div>79%</div> <div>11%</div> <div>10%</div> </div> </div>

## 2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 13500 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.

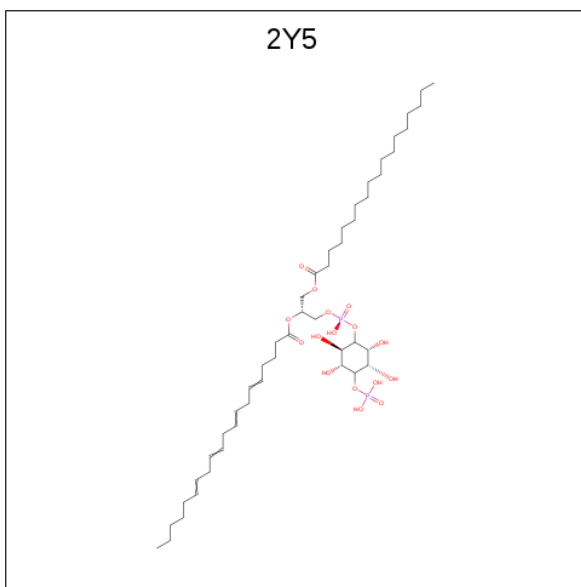
- Molecule 1 is a protein called Oxysterol-binding protein homolog 6.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	401	Total	C	N	O	S	0	0	0
			3196	2053	535	597	11			
1	B	395	Total	C	N	O	S	0	1	0
			3153	2030	521	592	10			
1	C	395	Total	C	N	O	S	0	1	0
			3119	2012	520	575	12			
1	D	407	Total	C	N	O	S	0	0	0
			3229	2080	534	603	12			

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-1	GLY	-	expression tag	UNP Q02201
A	0	SER	-	expression tag	UNP Q02201
B	-1	GLY	-	expression tag	UNP Q02201
B	0	SER	-	expression tag	UNP Q02201
C	-1	GLY	-	expression tag	UNP Q02201
C	0	SER	-	expression tag	UNP Q02201
D	-1	GLY	-	expression tag	UNP Q02201
D	0	SER	-	expression tag	UNP Q02201

- Molecule 2 is (2R)-1-[[[(R)-hydroxy{[(1R,2R,3R,4R,5S,6R)-2,3,5,6-tetrahydroxy-4-(phosphonoxy)cyclohexyl]oxy}phosphoryl]oxy}-3-(octadecanoyloxy)propan-2-yl (5Z,8Z,11Z,14Z)-icos-5,8,11,14-tetraenoate (three-letter code: 2Y5) (formula: C<sub>47</sub>H<sub>84</sub>O<sub>16</sub>P<sub>2</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	O	P	0	0
			65	47	16	2		
2	B	1	Total	C	O	P	0	0
			65	47	16	2		
2	C	1	Total	C	O	P	0	0
			65	47	16	2		
2	D	1	Total	C	O	P	0	0
			65	47	16	2		

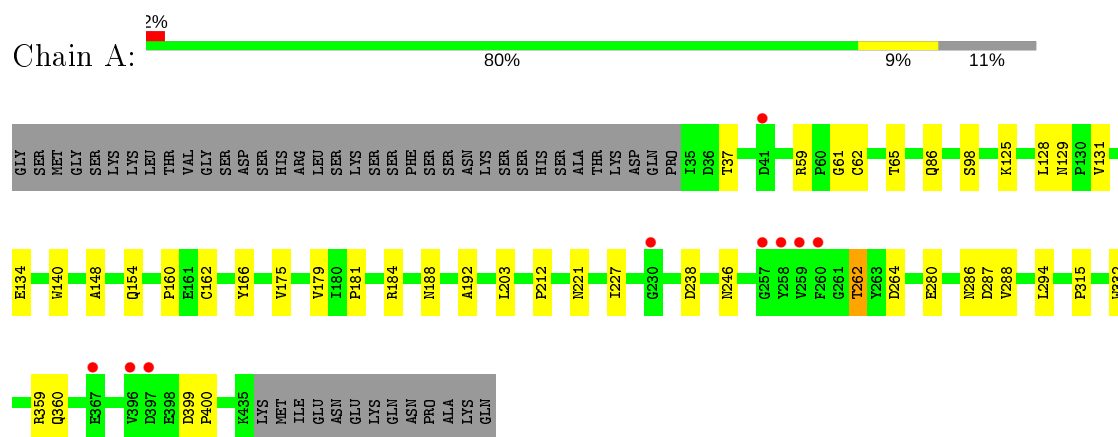
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	137	Total	O	0	0
			137	137		
3	B	148	Total	O	0	0
			148	148		
3	C	123	Total	O	0	0
			123	123		
3	D	135	Total	O	0	0
			135	135		

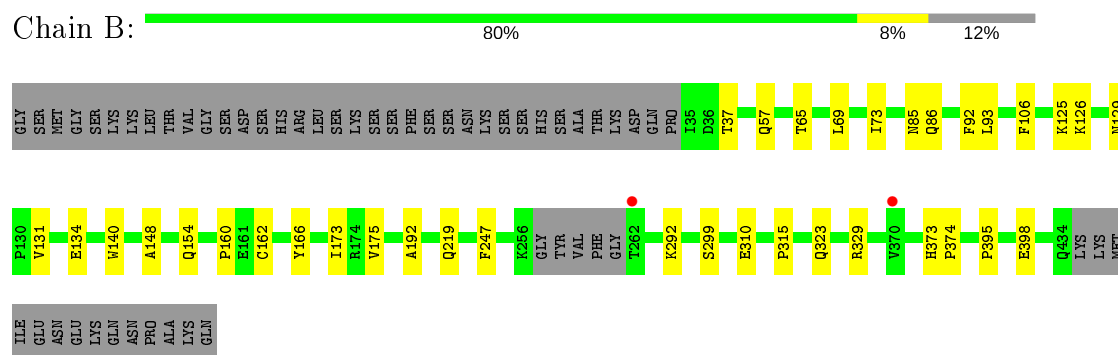
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA 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.

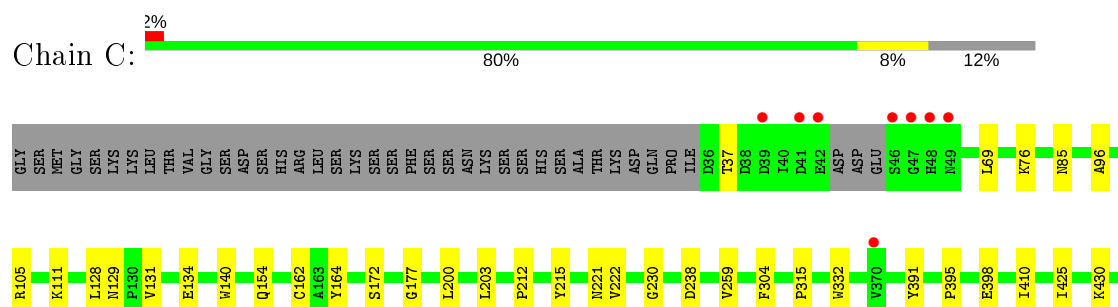
#### • Molecule 1: Oxysterol-binding protein homolog 6

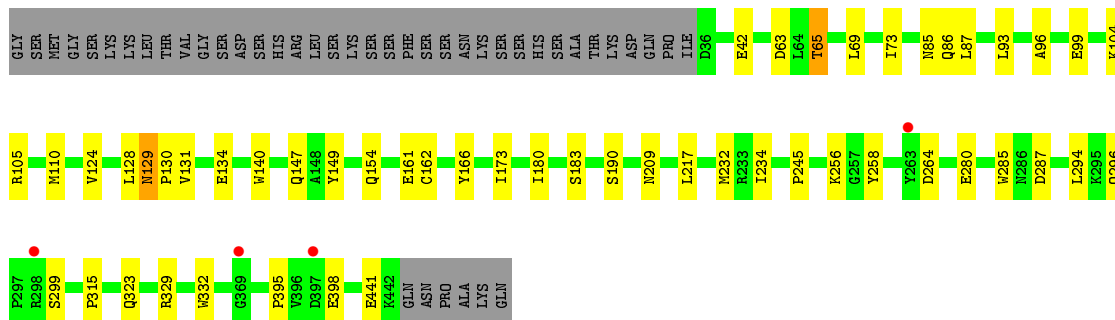


#### • Molecule 1: Oxysterol-binding protein homolog 6



#### • Molecule 1: Oxysterol-binding protein homolog 6





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	114.11Å 122.26Å 141.49Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.56 – 2.55 48.56 – 2.55	Depositor EDS
% Data completeness (in resolution range)	100.0 (48.56-2.55) 100.0 (48.56-2.55)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.11	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.96 (at 2.54Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.8.4_1496)	Depositor
R, $R_{free}$	0.188 , 0.237 0.190 , 0.239	Depositor DCC
$R_{free}$ test set	3258 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	36.8	Xtriage
Anisotropy	0.331	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.32 , 33.2	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	13500	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	33.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.53% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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: 2Y5

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	0.23	0/3279	0.40	0/4452
1	B	0.23	0/3238	0.40	0/4400
1	C	0.23	0/3206	0.38	0/4357
1	D	0.23	0/3315	0.39	0/4502
All	All	0.23	0/13038	0.39	0/17711

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 [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	3196	0	3085	23	0
1	B	3153	0	3034	21	0
1	C	3119	0	2979	21	0
1	D	3229	0	3098	30	0
2	A	65	0	81	4	0
2	B	65	0	81	4	0
2	C	65	0	81	3	0
2	D	65	0	81	5	0
3	A	137	0	0	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	148	0	0	2	0
3	C	123	0	0	2	0
3	D	135	0	0	3	0
All	All	13500	0	12520	96	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 (96) 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:192:ALA:HB2	2:B:501:2Y5:H28	1.78	0.65
1:D:395:PRO:HB2	1:D:398:GLU:HB2	1.80	0.64
1:A:86:GLN:HG3	2:A:501:2Y5:H82	1.84	0.60
1:D:42:GLU:OE1	3:D:601:HOH:O	2.16	0.60
1:D:69:LEU:HB3	1:D:73:ILE:HD11	1.85	0.58
1:D:147:GLN:NE2	1:D:149:TYR:OH	2.36	0.57
1:B:37:THR:O	1:B:125:LYS:NZ	2.38	0.56
1:C:203:LEU:HA	1:C:212:PRO:HB3	1.88	0.56
1:A:37:THR:O	1:A:125:LYS:NZ	2.35	0.56
1:D:280:GLU:HG3	1:D:294:LEU:HD11	1.88	0.56
1:C:222:VAL:HG12	2:C:501:2Y5:H29	1.87	0.56
1:B:395:PRO:HB2	1:B:398:GLU:HB2	1.87	0.55
1:C:395:PRO:HB2	1:C:398:GLU:HB2	1.87	0.55
1:D:161:GLU:HG3	1:D:180:ILE:HG12	1.88	0.54
1:A:140:TRP:HB2	1:A:148:ALA:HB3	1.90	0.54
1:A:221:ASN:ND2	1:A:238:ASP:OD2	2.35	0.54
1:B:65[A]:THR:HG21	1:B:160:PRO:HD3	1.90	0.53
1:A:192:ALA:HB2	2:A:501:2Y5:H28	1.92	0.51
1:C:425:ILE:O	1:C:430:LYS:NZ	2.36	0.51
1:B:69:LEU:HB3	1:B:73:ILE:HD11	1.91	0.51
1:D:183:SER:HB3	2:D:501:2Y5:H22	1.91	0.51
1:D:124:VAL:HG21	1:D:232:MET:HB3	1.91	0.51
1:A:227:ILE:HD12	2:A:501:2Y5:H49	1.93	0.51
1:D:93:LEU:HG	1:D:173:ILE:HD13	1.93	0.50
2:A:501:2Y5:H34	2:A:501:2Y5:H65	1.93	0.50
1:C:222:VAL:HG21	2:C:501:2Y5:H68	1.94	0.49
1:A:65:THR:HG21	1:A:160:PRO:HD3	1.94	0.49
1:C:129:ASN:ND2	3:C:607:HOH:O	2.44	0.49
1:B:85:ASN:ND2	3:B:606:HOH:O	2.45	0.49
1:C:221:ASN:ND2	1:C:238:ASP:OD2	2.37	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:92:PHE:HZ	1:B:310:GLU:HG3	1.78	0.48
1:D:85:ASN:ND2	3:D:609:HOH:O	2.46	0.48
2:B:501:2Y5:H59	2:B:501:2Y5:H17	1.94	0.48
1:C:69:LEU:CD1	2:C:501:2Y5:H16	2.43	0.48
1:D:256:LYS:HE3	1:D:258:TYR:CZ	2.49	0.47
1:B:166:TYR:HB3	1:B:175:VAL:HB	1.96	0.47
1:A:179:VAL:HG12	1:A:181:PRO:HD3	1.96	0.47
1:C:200:LEU:HB3	1:C:215:TYR:HB2	1.95	0.47
1:C:37:THR:OG1	1:C:76:LYS:NZ	2.48	0.47
1:A:61:GLY:O	1:D:209:ASN:ND2	2.46	0.47
1:D:323:GLN:HE22	1:D:329:ARG:HB2	1.79	0.46
1:B:131:VAL:HG22	1:B:134:GLU:HB2	1.97	0.46
1:C:230:GLY:HA3	1:C:259:VAL:HG23	1.98	0.46
1:B:57:GLN:N	1:B:57:GLN:OE1	2.49	0.46
1:A:131:VAL:HG22	1:A:134:GLU:HB2	1.97	0.46
1:C:154:GLN:OE1	1:C:162:CYS:HB3	2.17	0.45
1:C:128:LEU:HD13	1:C:332:TRP:CD2	2.52	0.45
1:A:246:ASN:ND2	3:A:610:HOH:O	2.50	0.45
1:D:128:LEU:HD13	1:D:332:TRP:CD2	2.52	0.45
1:D:190:SER:HB3	2:D:501:2Y5:H23	1.99	0.44
1:D:86:GLN:NE2	3:D:613:HOH:O	2.49	0.44
1:C:85:ASN:ND2	3:C:609:HOH:O	2.50	0.44
1:A:140:TRP:CZ2	1:A:315:PRO:HB3	2.52	0.44
1:B:154:GLN:OE1	1:B:162:CYS:HB3	2.18	0.44
1:B:323:GLN:HE22	1:B:329:ARG:HB2	1.83	0.44
1:D:63:ASP:OD1	1:D:65:THR:HB	2.16	0.44
1:A:166:TYR:HB3	1:A:175:VAL:HB	2.00	0.44
1:D:296:GLN:HB2	1:D:299:SER:OG	2.18	0.44
1:B:126:LYS:HB3	2:B:501:2Y5:H40	1.99	0.43
1:D:96:ALA:O	1:D:105:ARG:HG3	2.18	0.43
1:A:184:ARG:NH2	1:D:245:PRO:O	2.50	0.43
1:A:280:GLU:HG3	1:A:294:LEU:HD11	1.99	0.43
1:B:140:TRP:HB2	1:B:148:ALA:HB3	2.00	0.43
1:C:111:LYS:NZ	1:C:304:PHE:O	2.39	0.43
1:A:59:ARG:O	1:A:62:CYS:HB2	2.18	0.43
1:B:106:PHE:CD1	1:B:247:PHE:HB2	2.54	0.43
1:B:93:LEU:HG	1:B:173:ILE:HD13	2.00	0.43
1:D:87:LEU:HD13	1:D:166:TYR:CD2	2.54	0.43
1:A:264:ASP:OD2	1:A:286:ASN:ND2	2.50	0.42
1:D:140:TRP:CZ2	1:D:315:PRO:HB3	2.54	0.42
1:B:140:TRP:CZ2	1:B:315:PRO:HB3	2.55	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:131:VAL:HG22	1:D:134:GLU:HB2	2.02	0.42
1:D:234:ILE:HD11	2:D:501:2Y5:H35	2.01	0.42
1:D:104:LYS:HB2	1:D:104:LYS:HE3	1.91	0.42
1:D:129:ASN:HD22	1:D:130:PRO:HD2	1.84	0.42
1:C:164:TYR:CZ	1:C:177:GLY:HA3	2.55	0.42
1:D:264:ASP:HB3	1:D:285:TRP:NE1	2.34	0.42
1:B:373:HIS:HA	1:B:374:PRO:HD3	1.91	0.42
1:A:154:GLN:OE1	1:A:162:CYS:HB3	2.20	0.42
1:C:140:TRP:CZ2	1:C:315:PRO:HB3	2.55	0.42
1:D:99:GLU:HG2	1:D:104:LYS:HB3	2.02	0.42
1:A:128:LEU:HD13	1:A:332:TRP:CD2	2.55	0.41
1:B:219:GLN:NE2	3:B:613:HOH:O	2.52	0.41
1:B:292:LYS:NZ	1:B:299:SER:O	2.52	0.41
1:C:391:TYR:CZ	1:C:430:LYS:HE3	2.55	0.41
1:C:391:TYR:CE2	1:C:410:ILE:HG23	2.54	0.41
1:C:96:ALA:O	1:C:105:ARG:HG3	2.20	0.41
1:D:86:GLN:HG3	2:D:501:2Y5:H83	2.02	0.41
1:A:203:LEU:HA	1:A:212:PRO:HB3	2.00	0.41
2:D:501:2Y5:H9	2:D:501:2Y5:H12	2.02	0.41
1:A:188:ASN:O	1:A:227:ILE:HG22	2.21	0.41
1:A:399:ASP:HA	1:A:400:PRO:HD2	1.78	0.41
1:B:86:GLN:HG3	2:B:501:2Y5:H83	2.03	0.41
1:A:287:ASP:HB3	1:A:288:VAL:H	1.68	0.40
1:C:131:VAL:HG22	1:C:134:GLU:HB2	2.03	0.40
1:D:154:GLN:OE1	1:D:162:CYS:HB3	2.21	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	399/450 (89%)	382 (96%)	16 (4%)	1 (0%)	41 51

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	392/450 (87%)	379 (97%)	13 (3%)	0	100	100
1	C	392/450 (87%)	380 (97%)	12 (3%)	0	100	100
1	D	405/450 (90%)	390 (96%)	14 (4%)	1 (0%)	47	60
All	All	1588/1800 (88%)	1531 (96%)	55 (4%)	2 (0%)	51	65

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	262	THR
1	D	287	ASP

### 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	339/406 (84%)	334 (98%)	5 (2%)	65	77
1	B	335/406 (82%)	334 (100%)	1 (0%)	92	96
1	C	325/406 (80%)	324 (100%)	1 (0%)	92	96
1	D	341/406 (84%)	336 (98%)	5 (2%)	65	77
All	All	1340/1624 (82%)	1328 (99%)	12 (1%)	78	86

All (12) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	98	SER
1	A	129	ASN
1	A	262	THR
1	A	359	ARG
1	A	360	GLN
1	B	129	ASN
1	C	172	SER
1	D	65	THR
1	D	110	MET

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Mol	Chain	Res	Type
1	D	129	ASN
1	D	217	LEU
1	D	441	GLU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (39) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	53	ASN
1	A	85	ASN
1	A	86	GLN
1	A	129	ASN
1	A	146	GLN
1	A	147	GLN
1	A	219	GLN
1	A	246	ASN
1	A	296	GLN
1	A	323	GLN
1	A	358	GLN
1	A	434	GLN
1	B	85	ASN
1	B	95	GLN
1	B	129	ASN
1	B	146	GLN
1	B	147	GLN
1	B	201	GLN
1	B	219	GLN
1	B	296	GLN
1	B	323	GLN
1	C	85	ASN
1	C	129	ASN
1	C	146	GLN
1	C	147	GLN
1	C	201	GLN
1	C	219	GLN
1	C	323	GLN
1	C	358	GLN
1	D	85	ASN
1	D	95	GLN
1	D	129	ASN
1	D	146	GLN
1	D	147	GLN
1	D	219	GLN

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Mol	Chain	Res	Type
1	D	296	GLN
1	D	323	GLN
1	D	403	GLN
1	D	434	GLN

### 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 carbohydrates in this entry.

### 5.6 Ligand geometry ⓘ

4 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	2Y5	D	501	-	65,65,65	0.59	0	77,80,80	0.88	3 (3%)
2	2Y5	C	501	-	65,65,65	0.59	0	77,80,80	0.88	3 (3%)
2	2Y5	B	501	-	65,65,65	0.59	0	77,80,80	0.88	3 (3%)
2	2Y5	A	501	-	65,65,65	0.59	0	77,80,80	0.88	3 (3%)

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	2Y5	D	501	-	-	17/61/85/85	0/1/1/1
2	2Y5	C	501	-	-	20/61/85/85	0/1/1/1
2	2Y5	B	501	-	-	24/61/85/85	0/1/1/1
2	2Y5	A	501	-	-	22/61/85/85	0/1/1/1

There are no bond length outliers.

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	501	2Y5	C8-O16-C10	-3.38	109.47	117.79
2	A	501	2Y5	C8-O16-C10	-3.37	109.50	117.79
2	C	501	2Y5	C8-O16-C10	-3.36	109.53	117.79
2	D	501	2Y5	C8-O16-C10	-3.36	109.53	117.79
2	A	501	2Y5	C12-C13-C14	-2.09	109.51	113.23
2	C	501	2Y5	C12-C13-C14	-2.08	109.52	113.23
2	D	501	2Y5	C9-O18-C11	-2.07	109.44	117.12
2	B	501	2Y5	C12-C13-C14	-2.07	109.54	113.23
2	D	501	2Y5	C12-C13-C14	-2.06	109.55	113.23
2	A	501	2Y5	C9-O18-C11	-2.06	109.50	117.12
2	C	501	2Y5	C9-O18-C11	-2.05	109.53	117.12
2	B	501	2Y5	C9-O18-C11	-2.05	109.53	117.12

There are no chirality outliers.

All (83) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	D	501	2Y5	C22-C23-C24-C25
2	C	501	2Y5	C7-O13-P1-O11
2	B	501	2Y5	C4-O4-P4-O41
2	A	501	2Y5	C7-O13-P1-O11
2	A	501	2Y5	C10-C12-C13-C14
2	D	501	2Y5	C10-C12-C13-C14
2	D	501	2Y5	C1-O1-P1-O13
2	C	501	2Y5	C1-O1-P1-O13
2	B	501	2Y5	C1-O1-P1-O13
2	A	501	2Y5	C1-O1-P1-O13
2	D	501	2Y5	C37-C38-C39-C40
2	B	501	2Y5	C32-C33-C34-C35
2	D	501	2Y5	C32-C33-C34-C35
2	B	501	2Y5	C26-C27-C28-C29
2	B	501	2Y5	C10-C12-C13-C14

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Mol	Chain	Res	Type	Atoms
2	A	501	2Y5	C33-C34-C35-C36
2	C	501	2Y5	C10-C12-C13-C14
2	D	501	2Y5	C43-C44-C45-C46
2	B	501	2Y5	C33-C34-C35-C36
2	A	501	2Y5	C11-C31-C32-C33
2	A	501	2Y5	C34-C35-C36-C37
2	D	501	2Y5	C31-C32-C33-C34
2	B	501	2Y5	C43-C44-C45-C46
2	C	501	2Y5	C26-C27-C28-C29
2	D	501	2Y5	C36-C37-C38-C39
2	A	501	2Y5	C42-C43-C44-C45
2	D	501	2Y5	C17-C18-C19-C20
2	A	501	2Y5	C7-O13-P1-O1
2	B	501	2Y5	C14-C15-C16-C17
2	B	501	2Y5	C20-C21-C22-C23
2	B	501	2Y5	C23-C24-C25-C26
2	D	501	2Y5	C12-C13-C14-C15
2	C	501	2Y5	C31-C32-C33-C34
2	D	501	2Y5	C20-C21-C22-C23
2	A	501	2Y5	C20-C21-C22-C23
2	C	501	2Y5	C23-C24-C25-C26
2	A	501	2Y5	C14-C15-C16-C17
2	B	501	2Y5	C11-C31-C32-C33
2	A	501	2Y5	C39-C40-C41-C42
2	C	501	2Y5	C17-C18-C19-C20
2	C	501	2Y5	C27-C28-C29-C30
2	D	501	2Y5	C15-C16-C17-C18
2	C	501	2Y5	C18-C19-C20-C21
2	C	501	2Y5	C19-C20-C21-C22
2	C	501	2Y5	C22-C23-C24-C25
2	B	501	2Y5	C18-C19-C20-C21
2	B	501	2Y5	C21-C22-C23-C24
2	A	501	2Y5	C18-C19-C20-C21
2	A	501	2Y5	C22-C23-C24-C25
2	A	501	2Y5	C40-C41-C42-C43
2	C	501	2Y5	C35-C36-C37-C38
2	C	501	2Y5	C12-C13-C14-C15
2	B	501	2Y5	C12-C13-C14-C15
2	A	501	2Y5	C7-O13-P1-O12
2	B	501	2Y5	C35-C36-C37-C38
2	A	501	2Y5	C36-C37-C38-C39
2	D	501	2Y5	C35-C36-C37-C38

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Mol	Chain	Res	Type	Atoms
2	A	501	2Y5	C17-C18-C19-C20
2	C	501	2Y5	C7-O13-P1-O1
2	B	501	2Y5	C24-C25-C26-C27
2	D	501	2Y5	C23-C24-C25-C26
2	B	501	2Y5	C13-C14-C15-C16
2	C	501	2Y5	C11-C31-C32-C33
2	D	501	2Y5	C18-C19-C20-C21
2	A	501	2Y5	C21-C22-C23-C24
2	A	501	2Y5	C32-C33-C34-C35
2	D	501	2Y5	C14-C15-C16-C17
2	C	501	2Y5	O13-C7-C8-O16
2	A	501	2Y5	C41-C42-C43-C44
2	B	501	2Y5	C40-C41-C42-C43
2	B	501	2Y5	C7-O13-P1-O1
2	B	501	2Y5	C41-C42-C43-C44
2	C	501	2Y5	C37-C38-C39-C40
2	D	501	2Y5	C24-C25-C26-C27
2	C	501	2Y5	C4-O4-P4-O42
2	A	501	2Y5	C4-O4-P4-O42
2	C	501	2Y5	C24-C25-C26-C27
2	B	501	2Y5	O18-C11-C31-C32
2	B	501	2Y5	C38-C39-C40-C41
2	B	501	2Y5	C7-O13-P1-O11
2	A	501	2Y5	C24-C25-C26-C27
2	B	501	2Y5	O19-C11-C31-C32
2	C	501	2Y5	O18-C11-C31-C32

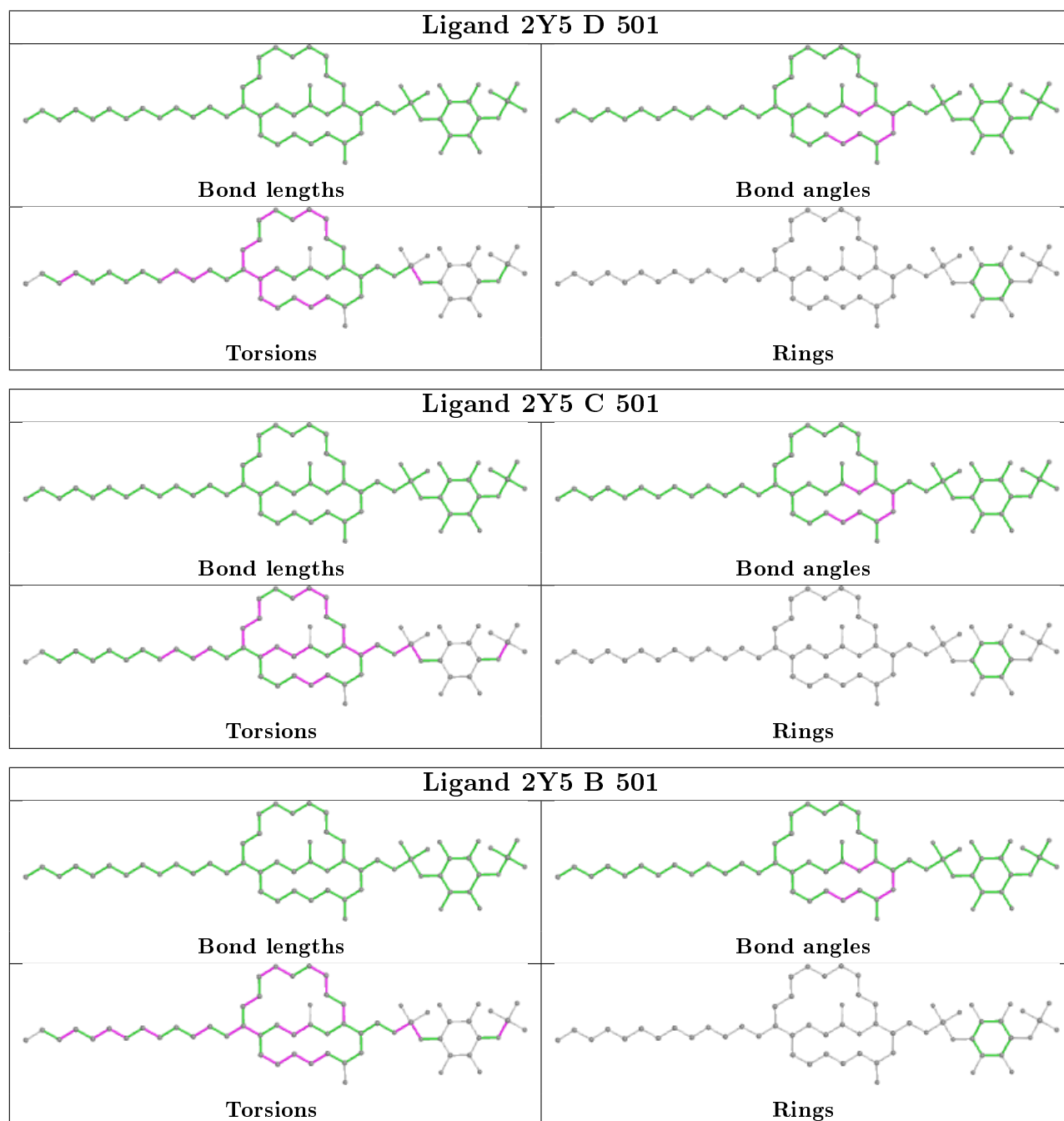
There are no ring outliers.

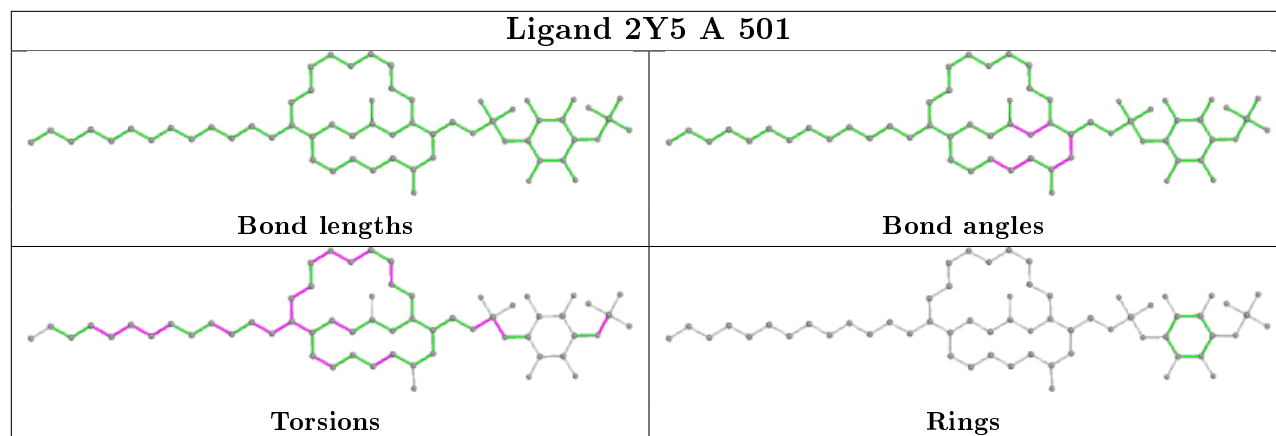
4 monomers are involved in 16 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	D	501	2Y5	5	0
2	C	501	2Y5	3	0
2	B	501	2Y5	4	0
2	A	501	2Y5	4	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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	401/450 (89%)	-0.08	9 (2%) 62 68	23, 34, 49, 64	0
1	B	395/450 (87%)	-0.15	2 (0%) 91 94	22, 33, 52, 61	0
1	C	395/450 (87%)	-0.03	8 (2%) 65 72	21, 34, 51, 62	0
1	D	407/450 (90%)	-0.14	4 (0%) 82 86	22, 32, 45, 58	0
All	All	1598/1800 (88%)	-0.10	23 (1%) 75 81	21, 33, 50, 64	0

All (23) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	258	TYR	3.7
1	D	397	ASP	3.3
1	B	262	THR	3.1
1	C	42	GLU	3.0
1	A	260	PHE	2.8
1	A	230	GLY	2.8
1	D	369	GLY	2.7
1	A	257	GLY	2.7
1	A	259	VAL	2.6
1	C	47	GLY	2.6
1	C	46	SER	2.5
1	A	41	ASP	2.4
1	C	49	ASN	2.4
1	A	367	GLU	2.4
1	B	370	VAL	2.4
1	A	396	VAL	2.4
1	C	41	ASP	2.4
1	C	39	ASP	2.3
1	C	370	VAL	2.3
1	C	48	HIS	2.2
1	D	298	ARG	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	397	ASP	2.1
1	D	263	TYR	2.1

## 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 carbohydrates in this entry.

## 6.4 Ligands [i](#)

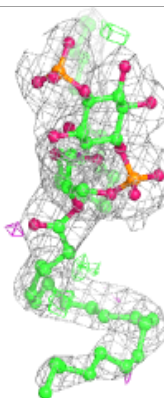
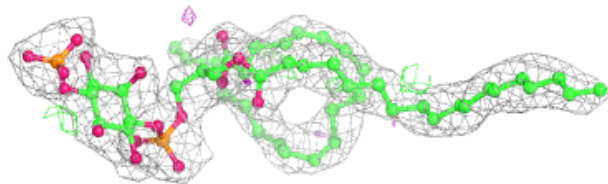
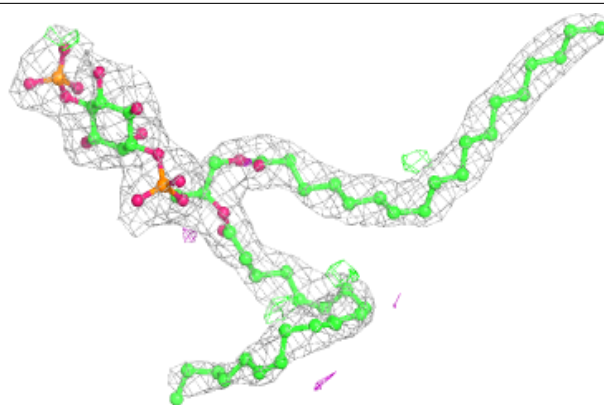
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
2	2Y5	C	501	65/65	0.94	0.16	23,32,39,42	0
2	2Y5	D	501	65/65	0.95	0.16	23,27,34,36	0
2	2Y5	B	501	65/65	0.95	0.16	25,36,42,46	0
2	2Y5	A	501	65/65	0.96	0.15	28,32,37,39	0

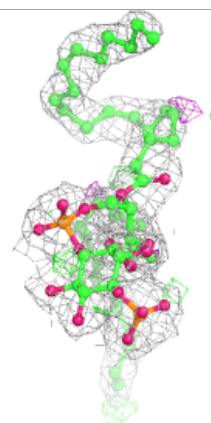
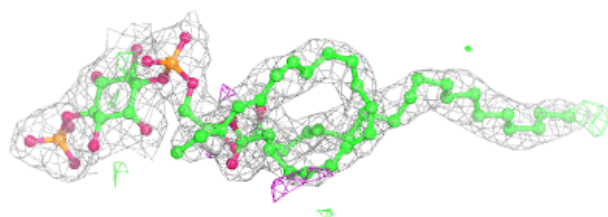
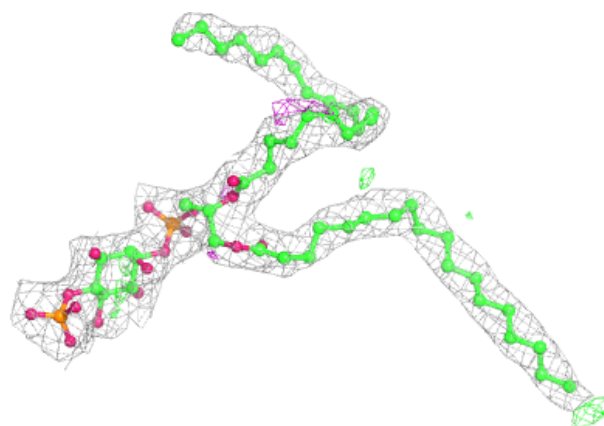
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

**Electron density around 2Y5 C 501:**

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

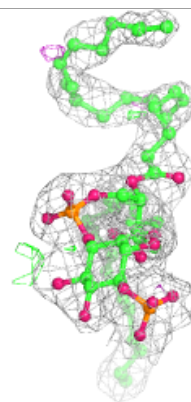
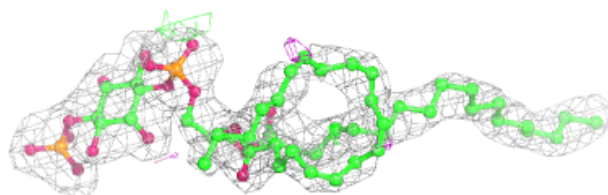
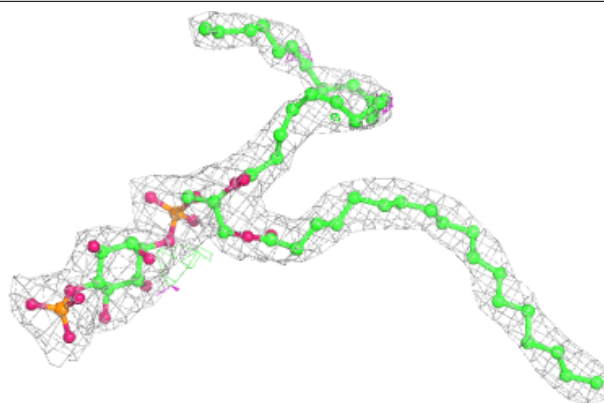
**Electron density around 2Y5 D 501:**

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

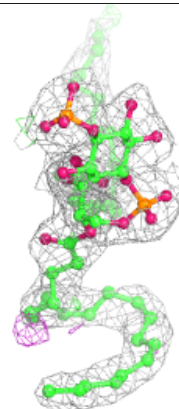
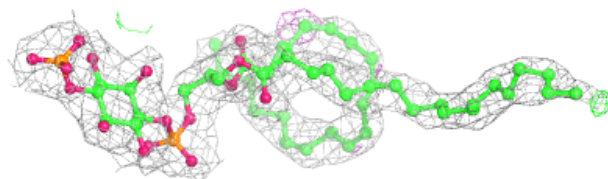
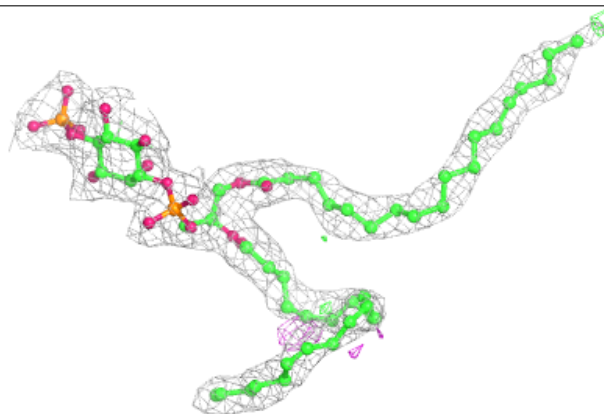


**Electron density around 2Y5 B 501:**

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

**Electron density around 2Y5 A 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.