



# Full wwPDB X-ray Structure Validation Report ⓘ

Apr 29, 2024 – 05:53 am BST

PDB ID : 5OKN  
Title : Crystal structure of human SHIP2 Phosphatase-C2 D607A mutant  
Authors : Le Coq, J.; Lietha, D.  
Deposited on : 2017-07-25  
Resolution : 2.65 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](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.

The types of validation reports are described at

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

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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 : 1.8.4, CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.36.2  
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) : 2.36.2

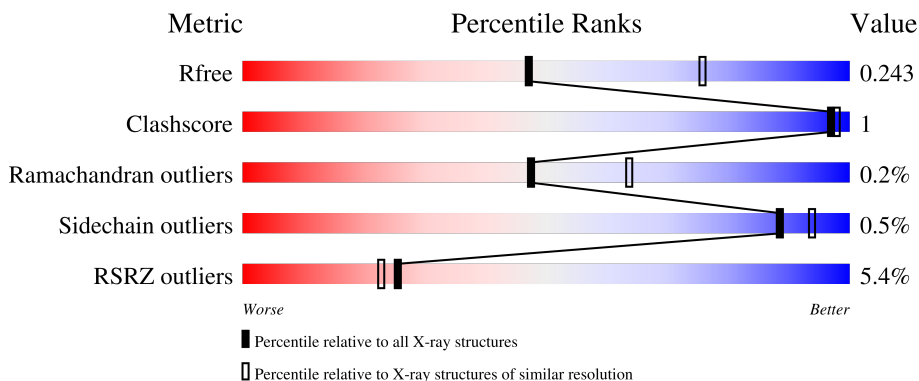
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.65 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.



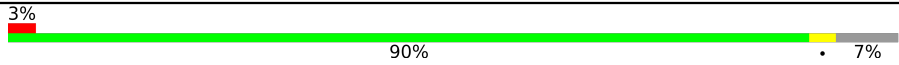
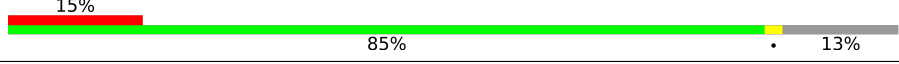
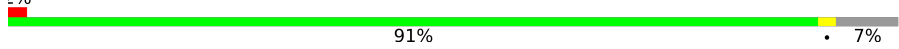
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	130704	1332 (2.68-2.64)
Clashscore	141614	1374 (2.68-2.64)
Ramachandran outliers	138981	1349 (2.68-2.64)
Sidechain outliers	138945	1349 (2.68-2.64)
RSRZ outliers	127900	1318 (2.68-2.64)

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  $\geq 3$ , 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	461	
1	B	461	
1	C	461	
1	D	461	
1	E	461	

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Mol	Chain	Length	Quality of chain
1	F	461	 3% 90% 7%
1	G	461	 15% 85% 13%
1	H	461	 2% 91% 7%

## 2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 28076 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 Phosphatidylinositol 3,4,5-trisphosphate 5-phosphatase 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	434	Total 3509	C 2239	N 593	O 663	S 14	0	1	0
1	B	431	Total 3482	C 2223	N 588	O 657	S 14	0	0	0
1	C	421	Total 3412	C 2178	N 575	O 645	S 14	0	0	0
1	D	433	Total 3501	C 2233	N 591	O 663	S 14	0	0	0
1	E	427	Total 3460	C 2207	N 585	O 654	S 14	0	0	0
1	F	427	Total 3461	C 2208	N 586	O 653	S 14	0	0	0
1	G	402	Total 3253	C 2082	N 548	O 611	S 12	0	0	0
1	H	430	Total 3477	C 2219	N 588	O 656	S 14	0	0	0

There are 24 discrepancies between the modelled and reference sequences:

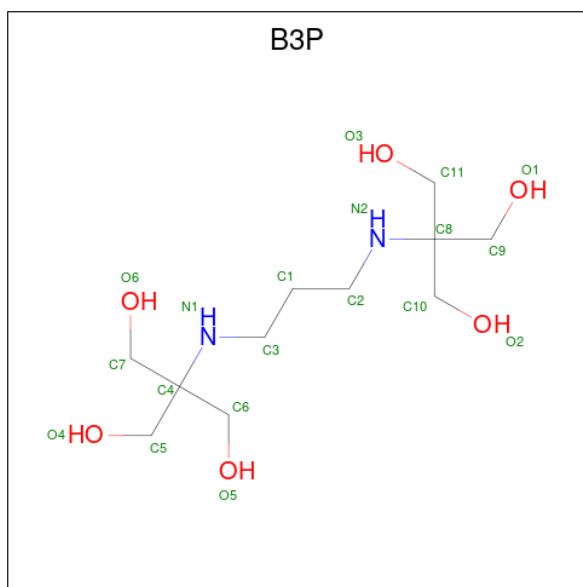
Chain	Residue	Modelled	Actual	Comment	Reference
A	418	GLY	-	expression tag	UNP O15357
A	419	PRO	-	expression tag	UNP O15357
A	607	ALA	ASP	engineered mutation	UNP O15357
B	418	GLY	-	expression tag	UNP O15357
B	419	PRO	-	expression tag	UNP O15357
B	607	ALA	ASP	engineered mutation	UNP O15357
C	418	GLY	-	expression tag	UNP O15357
C	419	PRO	-	expression tag	UNP O15357
C	607	ALA	ASP	engineered mutation	UNP O15357
D	418	GLY	-	expression tag	UNP O15357
D	419	PRO	-	expression tag	UNP O15357
D	607	ALA	ASP	engineered mutation	UNP O15357
E	418	GLY	-	expression tag	UNP O15357

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Chain	Residue	Modelled	Actual	Comment	Reference
E	419	PRO	-	expression tag	UNP O15357
E	607	ALA	ASP	engineered mutation	UNP O15357
F	418	GLY	-	expression tag	UNP O15357
F	419	PRO	-	expression tag	UNP O15357
F	607	ALA	ASP	engineered mutation	UNP O15357
G	418	GLY	-	expression tag	UNP O15357
G	419	PRO	-	expression tag	UNP O15357
G	607	ALA	ASP	engineered mutation	UNP O15357
H	418	GLY	-	expression tag	UNP O15357
H	419	PRO	-	expression tag	UNP O15357
H	607	ALA	ASP	engineered mutation	UNP O15357

- Molecule 2 is 2-[3-(2-HYDROXY-1,1-DIHYDROXYMETHYL-ETHYLAMINO)-PROPYL AMINO]-2-HYDROXYMETHYL-PROPANE-1,3-DIOL (three-letter code: B3P) (formula: C<sub>11</sub>H<sub>26</sub>N<sub>2</sub>O<sub>6</sub>).



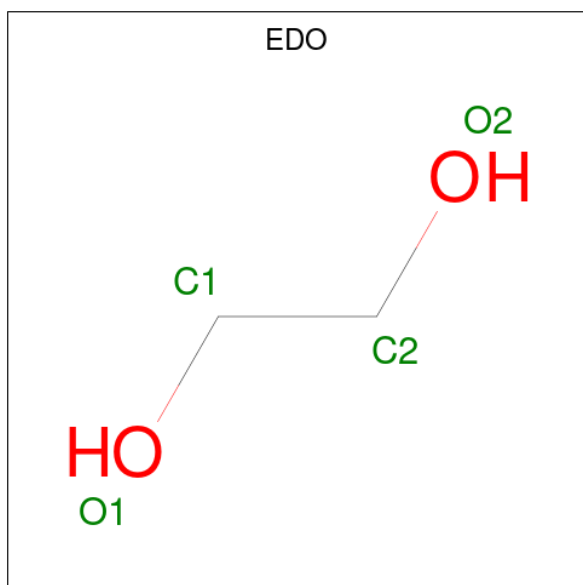
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
2	A	1	Total	C	N	O	0	0
			19	11	2	6		
2	B	1	Total	C	N	O	0	0
			19	11	2	6		
2	C	1	Total	C	N	O	0	0
			19	11	2	6		
2	D	1	Total	C	N	O	0	0
			19	11	2	6		
2	E	1	Total	C	N	O	0	0
			19	11	2	6		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	F	1	Total	C	N	O	0	0
			19	11	2	6		
2	H	1	Total	C	N	O	0	0
			19	11	2	6		

- Molecule 3 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C<sub>2</sub>H<sub>6</sub>O<sub>2</sub>).



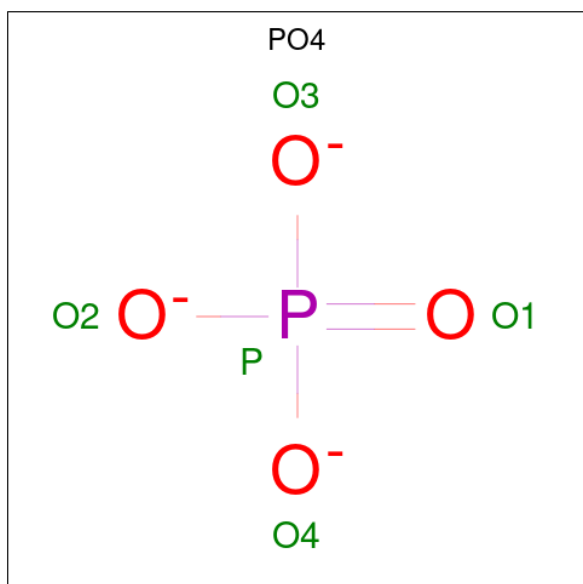
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			4	2	2		
3	B	1	Total	C	O	0	0
			4	2	2		
3	B	1	Total	C	O	0	0
			4	2	2		
3	B	1	Total	C	O	0	0
			4	2	2		
3	B	1	Total	C	O	0	0
			4	2	2		
3	B	1	Total	C	O	0	0
			4	2	2		
3	D	1	Total	C	O	0	0
			4	2	2		
3	D	1	Total	C	O	0	0
			4	2	2		
3	D	1	Total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

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	E	1	Total C O 4 2 2	0	0
3	E	1	Total C O 4 2 2	0	0
3	F	1	Total C O 4 2 2	0	0
3	F	1	Total C O 4 2 2	0	0
3	F	1	Total C O 4 2 2	0	0
3	F	1	Total C O 4 2 2	0	0
3	G	1	Total C O 4 2 2	0	0
3	H	1	Total C O 4 2 2	0	0

- Molecule 4 is PHOSPHATE ION (three-letter code: PO4) (formula: O<sub>4</sub>P).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	C	1	Total O P 5 4 1	0	0
4	D	1	Total O P 5 4 1	0	0
4	E	1	Total O P 5 4 1	0	0

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	F	1	Total O P 5 4 1	0	0
4	G	1	Total O P 5 4 1	0	0
4	H	1	Total O P 5 4 1	0	0

- Molecule 5 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	C	1	Total Mg 1 1	0	0
5	D	1	Total Mg 1 1	0	0
5	E	1	Total Mg 1 1	0	0
5	F	1	Total Mg 1 1	0	0
5	G	1	Total Mg 1 1	0	0
5	H	1	Total Mg 1 1	0	0

- Molecule 6 is water.

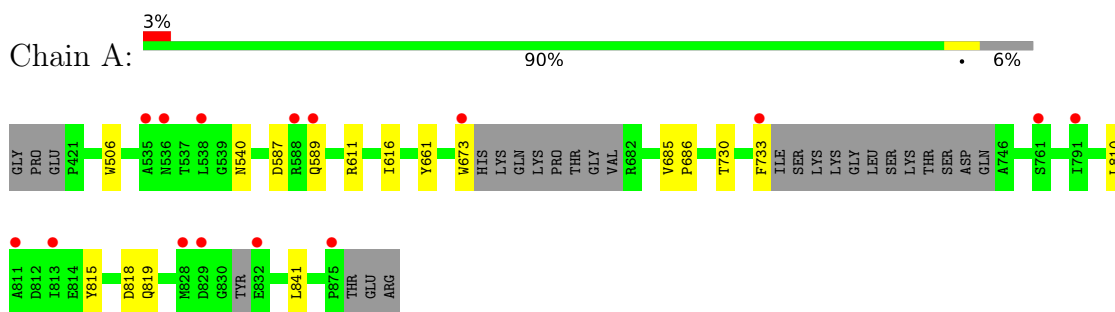
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	47	Total O 47 47	0	0
6	B	51	Total O 51 51	0	0
6	C	15	Total O 15 15	0	0
6	D	40	Total O 40 40	0	0
6	E	33	Total O 33 33	0	0
6	F	34	Total O 34 34	0	0
6	G	11	Total O 11 11	0	0
6	H	53	Total O 53 53	0	0



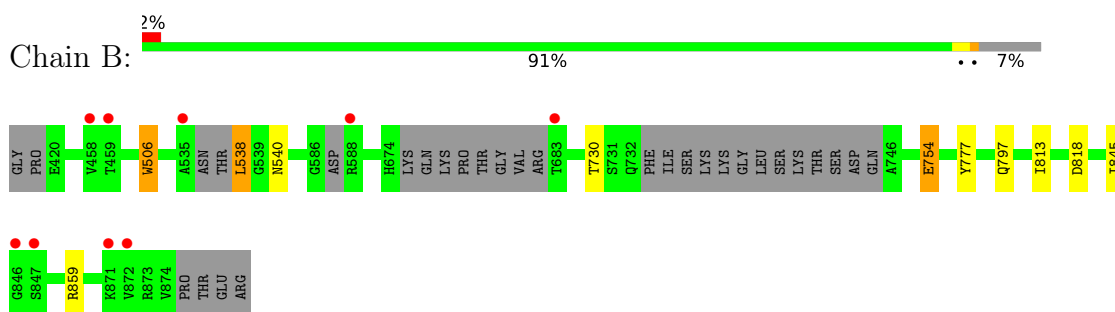
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ( $RSRZ > 2$ ). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

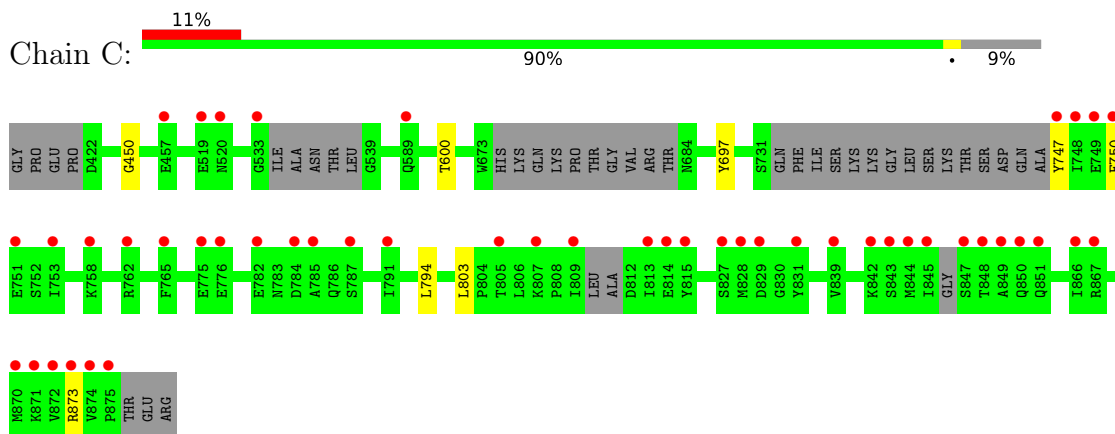
- Molecule 1: Phosphatidylinositol 3,4,5-trisphosphate 5-phosphatase 2



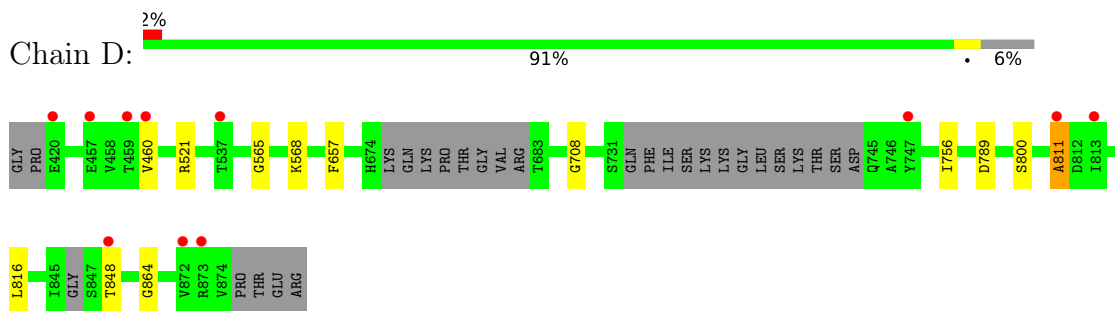
- Molecule 1: Phosphatidylinositol 3,4,5-trisphosphate 5-phosphatase 2



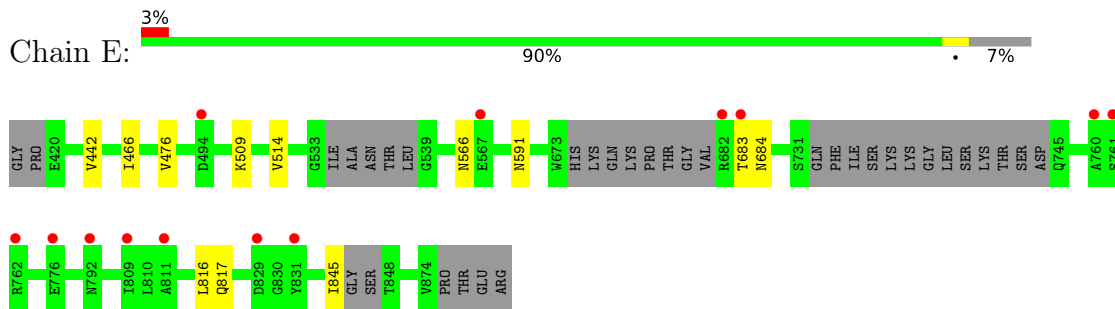
- Molecule 1: Phosphatidylinositol 3,4,5-trisphosphate 5-phosphatase 2



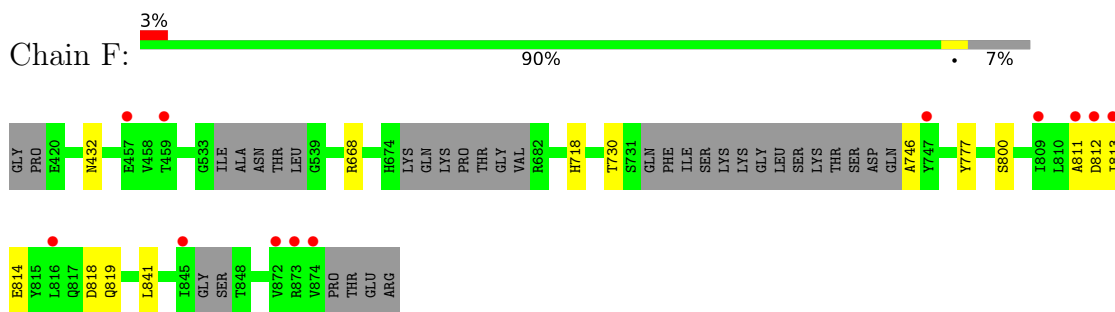
- Molecule 1: Phosphatidylinositol 3,4,5-trisphosphate 5-phosphatase 2



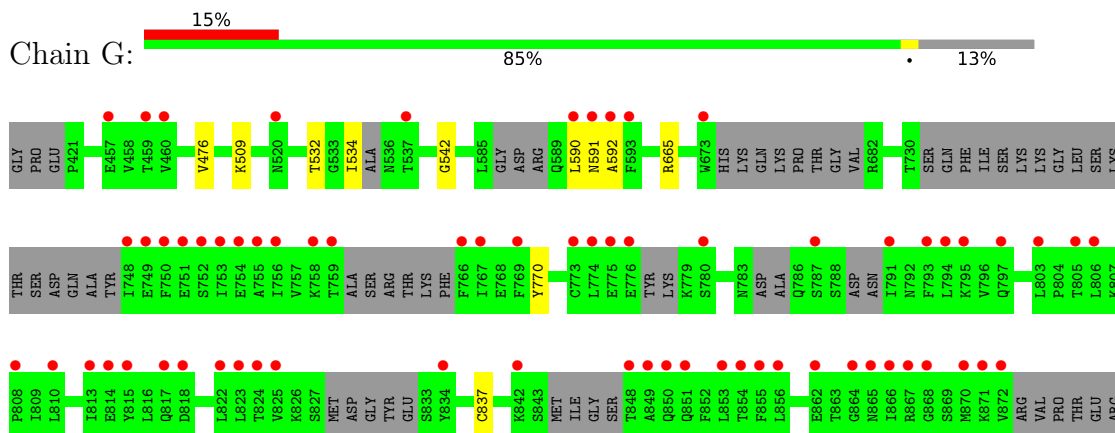
- Molecule 1: Phosphatidylinositol 3,4,5-trisphosphate 5-phosphatase 2



- Molecule 1: Phosphatidylinositol 3,4,5-trisphosphate 5-phosphatase 2

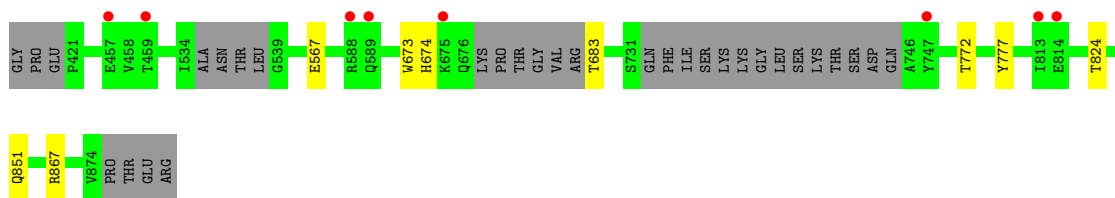


- Molecule 1: Phosphatidylinositol 3,4,5-trisphosphate 5-phosphatase 2



- Molecule 1: Phosphatidylinositol 3,4,5-trisphosphate 5-phosphatase 2





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	137.06Å 177.14Å 177.37Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	49.17 – 2.65 49.17 – 2.65	Depositor EDS
% Data completeness (in resolution range)	99.9 (49.17-2.65) 100.0 (49.17-2.65)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.22 (at 2.65Å)	Xtrriage
Refinement program	REFMAC 5.8.0158	Depositor
R, $R_{free}$	0.206 , 0.245 0.208 , 0.243	Depositor DCC
$R_{free}$ test set	6370 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	40.9	Xtrriage
Anisotropy	0.148	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.32 , 29.6	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	0.022 for -h,l,k	Xtrriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	28076	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	61.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.53% 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

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: PO4, MG, B3P, EDO

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	0.47	0/3593	0.67	0/4863
1	B	0.50	0/3562	0.68	1/4820 (0.0%)
1	C	0.45	0/3490	0.65	0/4720
1	D	0.48	0/3582	0.68	1/4850 (0.0%)
1	E	0.47	0/3539	0.67	0/4788
1	F	0.48	0/3541	0.67	1/4791 (0.0%)
1	G	0.46	0/3322	0.65	1/4489 (0.0%)
1	H	0.47	0/3558	0.67	0/4814
All	All	0.47	0/28187	0.67	4/38135 (0.0%)

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	G	665	ARG	NE-CZ-NH1	5.31	122.95	120.30
1	B	859	ARG	NE-CZ-NH1	5.27	122.94	120.30
1	F	668	ARG	NE-CZ-NH1	5.18	122.89	120.30
1	D	521	ARG	NE-CZ-NH1	5.16	122.88	120.30

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	3509	0	3437	10	0
1	B	3482	0	3405	6	0
1	C	3412	0	3329	4	0
1	D	3501	0	3420	4	0
1	E	3460	0	3380	8	0
1	F	3461	0	3379	6	0
1	G	3253	0	3191	6	0
1	H	3477	0	3402	6	0
2	A	19	0	26	0	0
2	B	19	0	26	0	0
2	C	19	0	26	1	0
2	D	19	0	26	0	0
2	E	19	0	26	0	0
2	F	19	0	26	0	0
2	H	19	0	26	0	0
3	A	4	0	6	0	0
3	B	20	0	30	0	0
3	D	12	0	18	0	0
3	E	8	0	12	2	0
3	F	16	0	24	0	0
3	G	4	0	6	0	0
3	H	4	0	6	1	0
4	C	5	0	0	0	0
4	D	5	0	0	0	0
4	E	5	0	0	0	0
4	F	5	0	0	0	0
4	G	5	0	0	0	0
4	H	5	0	0	0	0
5	C	1	0	0	0	0
5	D	1	0	0	0	0
5	E	1	0	0	0	0
5	F	1	0	0	0	0
5	G	1	0	0	0	0
5	H	1	0	0	0	0
6	A	47	0	0	0	0
6	B	51	0	0	0	0
6	C	15	0	0	0	0
6	D	40	0	0	0	0
6	E	33	0	0	0	0
6	F	34	0	0	0	0
6	G	11	0	0	0	0
6	H	53	0	0	1	0
All	All	28076	0	27227	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 1.

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:E:442:VAL:HG21	3:E:904:EDO:H22	1.62	0.79
1:G:590:LEU:HD21	1:G:770:TYR:CG	2.30	0.66
1:B:538:LEU:HD12	1:B:538:LEU:N	2.12	0.65
1:A:587:ASP:OD2	1:A:589:GLN:HG2	2.03	0.58
1:C:450:GLY:O	2:C:903:B3P:N1	2.37	0.57
1:E:683:THR:HG22	1:E:684:ASN:H	1.70	0.57
1:D:565:GLY:HA3	1:D:568:LYS:HG3	1.87	0.56
1:G:590:LEU:HD21	1:G:770:TYR:CD2	2.40	0.55
1:B:506:TRP:CZ3	1:B:540:ASN:HB3	2.42	0.55
1:A:733:PHE:CD1	1:A:815:TYR:HD1	2.24	0.55
1:E:683:THR:HG22	1:E:684:ASN:N	2.22	0.55
1:A:730:THR:HG21	1:A:818:ASP:HB3	1.90	0.52
1:A:733:PHE:CD1	1:A:815:TYR:CD1	2.98	0.51
1:H:673:TRP:CE3	1:H:674:HIS:HB2	2.46	0.51
1:F:746:ALA:HB2	1:F:811:ALA:HB2	1.93	0.51
1:E:566:ASN:ND2	1:E:683:THR:O	2.44	0.51
1:D:811:ALA:O	1:D:816:LEU:HD13	2.10	0.50
1:C:750:PHE:HB3	1:C:803:LEU:HD13	1.94	0.50
1:F:746:ALA:HB2	1:F:811:ALA:CB	2.43	0.49
1:B:538:LEU:N	1:B:538:LEU:CD1	2.78	0.47
1:A:506:TRP:CE3	1:A:540:ASN:HA	2.50	0.46
1:E:442:VAL:CG2	3:E:904:EDO:H22	2.38	0.46
1:G:590:LEU:O	1:G:590:LEU:HG	2.15	0.46
1:E:817:GLN:HG3	1:E:845:ILE:HD12	1.97	0.46
1:D:657:PHE:CD1	1:D:708:GLY:HA2	2.51	0.46
1:H:567:GLU:OE1	1:H:567:GLU:N	2.44	0.46
1:H:683:THR:N	6:H:1002:HOH:O	2.49	0.46
1:A:733:PHE:HB3	1:A:810:LEU:HD22	1.99	0.45
1:A:611:ARG:NH1	1:A:685:VAL:O	2.49	0.45
1:B:730:THR:HG21	1:B:818:ASP:HB3	1.99	0.45
1:G:532:THR:HG23	1:G:542:GLY:HA2	1.97	0.45
1:A:616:ILE:HG12	1:A:673:TRP:CE3	2.52	0.45
1:F:730:THR:HG21	1:F:818:ASP:HB3	1.99	0.44
1:F:812:ASP:O	1:F:814:GLU:N	2.50	0.44
1:H:851:GLN:OE1	1:H:867:ARG:NH2	2.50	0.44
1:G:476:VAL:O	1:G:509:LYS:NZ	2.50	0.44
1:E:466:ILE:HG12	1:E:514:VAL:HG12	2.00	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:661:TYR:O	1:A:686:PRO:HA	2.19	0.43
1:B:754:GLU:HG2	1:B:797:GLN:HG3	2.01	0.43
1:F:819:GLN:HB2	1:F:841:LEU:HD12	2.01	0.43
1:H:673:TRP:CZ3	1:H:674:HIS:HB2	2.53	0.43
1:C:747:TYR:HB2	1:C:873:ARG:HB3	2.02	0.42
1:A:819:GLN:HB2	1:A:841:LEU:HD12	2.02	0.42
1:C:600:THR:HA	1:C:697:TYR:CD2	2.56	0.41
1:E:476:VAL:O	1:E:509:LYS:NZ	2.51	0.41
1:F:432:ASN:HB3	1:F:718:HIS:CG	2.55	0.41
1:D:756:ILE:O	1:D:864:GLY:HA3	2.22	0.40
1:B:813:ILE:HG23	1:B:845:ILE:HG21	2.03	0.40
1:H:772:THR:HG23	3:H:904:EDO:O1	2.21	0.40
1:G:590:LEU:O	1:G:592:ALA:N	2.55	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	427/461 (93%)	415 (97%)	12 (3%)	0	100 100
1	B	421/461 (91%)	414 (98%)	6 (1%)	1 (0%)	47 64
1	C	409/461 (89%)	397 (97%)	12 (3%)	0	100 100
1	D	425/461 (92%)	409 (96%)	13 (3%)	3 (1%)	22 33
1	E	417/461 (90%)	404 (97%)	13 (3%)	0	100 100
1	F	417/461 (90%)	401 (96%)	15 (4%)	1 (0%)	47 64
1	G	380/461 (82%)	365 (96%)	14 (4%)	1 (0%)	41 56
1	H	422/461 (92%)	413 (98%)	9 (2%)	0	100 100
All	All	3318/3688 (90%)	3218 (97%)	94 (3%)	6 (0%)	47 64



All (6) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	811	ALA
1	F	813	ILE
1	G	591	ASN
1	B	506	TRP
1	D	460	VAL
1	D	848	THR

### 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	393/416 (94%)	393 (100%)	0	100	100
1	B	389/416 (94%)	386 (99%)	3 (1%)	81	89
1	C	383/416 (92%)	382 (100%)	1 (0%)	92	96
1	D	392/416 (94%)	390 (100%)	2 (0%)	88	94
1	E	387/416 (93%)	385 (100%)	2 (0%)	88	94
1	F	387/416 (93%)	385 (100%)	2 (0%)	88	94
1	G	367/416 (88%)	365 (100%)	2 (0%)	88	94
1	H	389/416 (94%)	387 (100%)	2 (0%)	88	94
All	All	3087/3328 (93%)	3073 (100%)	14 (0%)	88	94

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

Mol	Chain	Res	Type
1	B	538	LEU
1	B	754	GLU
1	B	777	TYR
1	C	794	LEU
1	D	789	ASP
1	D	800	SER
1	E	591	ASN
1	E	816	LEU

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Mol	Chain	Res	Type
1	F	777	TYR
1	F	800	SER
1	G	534	ILE
1	G	837	CYS
1	H	777	TYR
1	H	824	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	817	GLN
1	B	792	ASN
1	C	684	ASN
1	C	705	ASN
1	D	609	ASN
1	E	591	ASN
1	E	705	ASN
1	E	817	GLN
1	F	792	ASN
1	G	551	ASN
1	G	792	ASN

### 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](#)

Of 36 ligands modelled in this entry, 6 are monoatomic - leaving 30 for Mogul analysis.

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	EDO	B	904	-	3,3,3	0.55	0	2,2,2	0.13	0
4	PO4	H	901	5	4,4,4	0.97	0	6,6,6	0.43	0
2	B3P	B	901	-	18,18,18	0.97	0	21,23,23	1.40	4 (19%)
2	B3P	H	903	-	18,18,18	0.71	0	21,23,23	1.10	1 (4%)
3	EDO	H	904	-	3,3,3	0.44	0	2,2,2	0.29	0
3	EDO	E	905	-	3,3,3	0.42	0	2,2,2	0.38	0
3	EDO	D	905	-	3,3,3	0.57	0	2,2,2	0.03	0
3	EDO	F	905	-	3,3,3	0.53	0	2,2,2	0.11	0
3	EDO	B	902	-	3,3,3	0.37	0	2,2,2	0.32	0
3	EDO	B	905	-	3,3,3	0.49	0	2,2,2	0.14	0
4	PO4	G	901	5	4,4,4	0.93	0	6,6,6	0.48	0
3	EDO	F	904	-	3,3,3	0.53	0	2,2,2	0.17	0
3	EDO	D	906	-	3,3,3	0.42	0	2,2,2	0.25	0
3	EDO	F	907	-	3,3,3	0.50	0	2,2,2	0.18	0
4	PO4	E	901	5	4,4,4	0.85	0	6,6,6	0.47	0
3	EDO	B	903	-	3,3,3	0.50	0	2,2,2	0.22	0
4	PO4	D	901	5	4,4,4	0.87	0	6,6,6	0.60	0
3	EDO	D	904	-	3,3,3	0.54	0	2,2,2	0.15	0
4	PO4	F	901	5	4,4,4	0.95	0	6,6,6	0.54	0
2	B3P	C	903	-	18,18,18	0.90	0	21,23,23	1.12	2 (9%)
3	EDO	A	902	-	3,3,3	0.47	0	2,2,2	0.35	0
4	PO4	C	901	5	4,4,4	0.94	0	6,6,6	0.40	0
2	B3P	E	903	-	18,18,18	0.74	0	21,23,23	1.42	1 (4%)
3	EDO	G	903	-	3,3,3	0.45	0	2,2,2	0.28	0
2	B3P	D	903	-	18,18,18	0.85	0	21,23,23	1.23	2 (9%)
2	B3P	F	903	-	18,18,18	0.77	0	21,23,23	1.17	1 (4%)
2	B3P	A	901	-	18,18,18	1.05	2 (11%)	21,23,23	1.39	3 (14%)
3	EDO	E	904	-	3,3,3	0.42	0	2,2,2	0.21	0
3	EDO	F	906	-	3,3,3	0.48	0	2,2,2	0.23	0
3	EDO	B	906	-	3,3,3	0.51	0	2,2,2	0.09	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	EDO	B	904	-	-	1/1/1/1	-
2	B3P	B	901	-	-	1/28/28/28	-
2	B3P	H	903	-	-	0/28/28/28	-
3	EDO	H	904	-	-	0/1/1/1	-
3	EDO	E	905	-	-	0/1/1/1	-
3	EDO	D	905	-	-	0/1/1/1	-
3	EDO	F	905	-	-	0/1/1/1	-
3	EDO	B	902	-	-	1/1/1/1	-
3	EDO	B	905	-	-	0/1/1/1	-
3	EDO	F	904	-	-	0/1/1/1	-
3	EDO	D	906	-	-	0/1/1/1	-
3	EDO	F	907	-	-	1/1/1/1	-
3	EDO	B	903	-	-	1/1/1/1	-
3	EDO	D	904	-	-	1/1/1/1	-
2	B3P	C	903	-	-	0/28/28/28	-
3	EDO	A	902	-	-	0/1/1/1	-
2	B3P	E	903	-	-	0/28/28/28	-
3	EDO	G	903	-	-	0/1/1/1	-
2	B3P	D	903	-	-	3/28/28/28	-
2	B3P	F	903	-	-	0/28/28/28	-
2	B3P	A	901	-	-	7/28/28/28	-
3	EDO	E	904	-	-	0/1/1/1	-
3	EDO	F	906	-	-	1/1/1/1	-
3	EDO	B	906	-	-	0/1/1/1	-

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	901	B3P	C3-N1	2.47	1.49	1.46
2	A	901	B3P	C6-C4	-2.11	1.51	1.53

All (14) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	E	903	B3P	C2-N2-C8	-3.80	110.69	116.08
2	B	901	B3P	O5-C6-C4	-2.81	105.94	111.63
2	D	903	B3P	C6-C4-C5	-2.73	104.27	110.04
2	A	901	B3P	C7-C4-C6	-2.70	104.34	110.04
2	F	903	B3P	C2-N2-C8	-2.70	112.25	116.08
2	A	901	B3P	C2-N2-C8	-2.68	112.27	116.08
2	B	901	B3P	O3-C11-C8	-2.64	106.30	111.63

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	901	B3P	O5-C6-C4	-2.52	106.53	111.63
2	D	903	B3P	C2-N2-C8	-2.50	112.54	116.08
2	B	901	B3P	C2-N2-C8	-2.48	112.56	116.08
2	C	903	B3P	O4-C5-C4	-2.35	106.89	111.63
2	B	901	B3P	O4-C5-C4	-2.28	107.01	111.63
2	H	903	B3P	C2-N2-C8	-2.18	112.99	116.08
2	C	903	B3P	C2-N2-C8	-2.17	113.00	116.08

There are no chirality outliers.

All (17) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	901	B3P	C7-C4-C5-O4
2	D	903	B3P	O3-C11-C8-N2
2	D	903	B3P	O3-C11-C8-C9
2	D	903	B3P	O3-C11-C8-C10
2	A	901	B3P	N1-C4-C5-O4
3	D	904	EDO	O1-C1-C2-O2
2	A	901	B3P	C9-C8-N2-C2
2	A	901	B3P	C11-C8-N2-C2
3	B	903	EDO	O1-C1-C2-O2
2	A	901	B3P	N2-C8-C9-O1
3	B	902	EDO	O1-C1-C2-O2
2	A	901	B3P	C2-C1-C3-N1
2	A	901	B3P	C6-C4-C5-O4
3	F	907	EDO	O1-C1-C2-O2
3	B	904	EDO	O1-C1-C2-O2
3	F	906	EDO	O1-C1-C2-O2
2	B	901	B3P	N1-C4-C7-O6

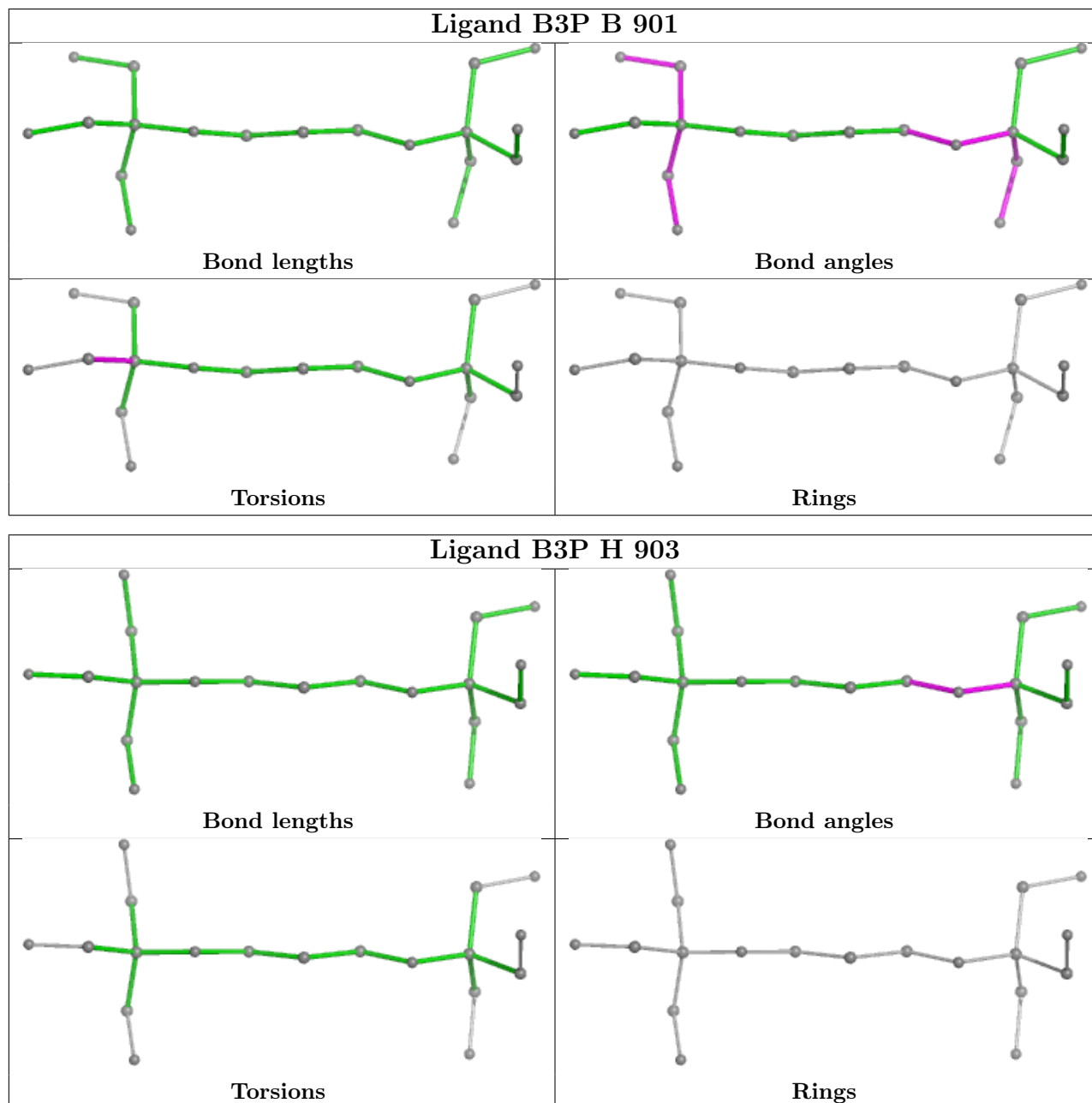
There are no ring outliers.

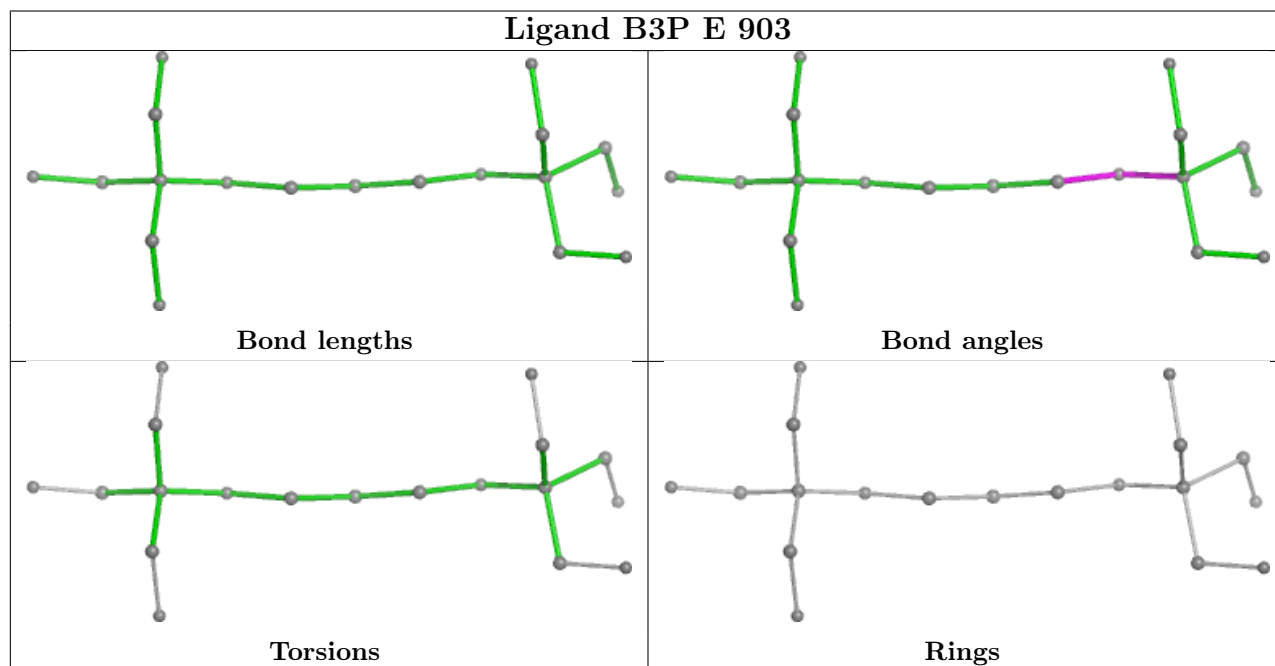
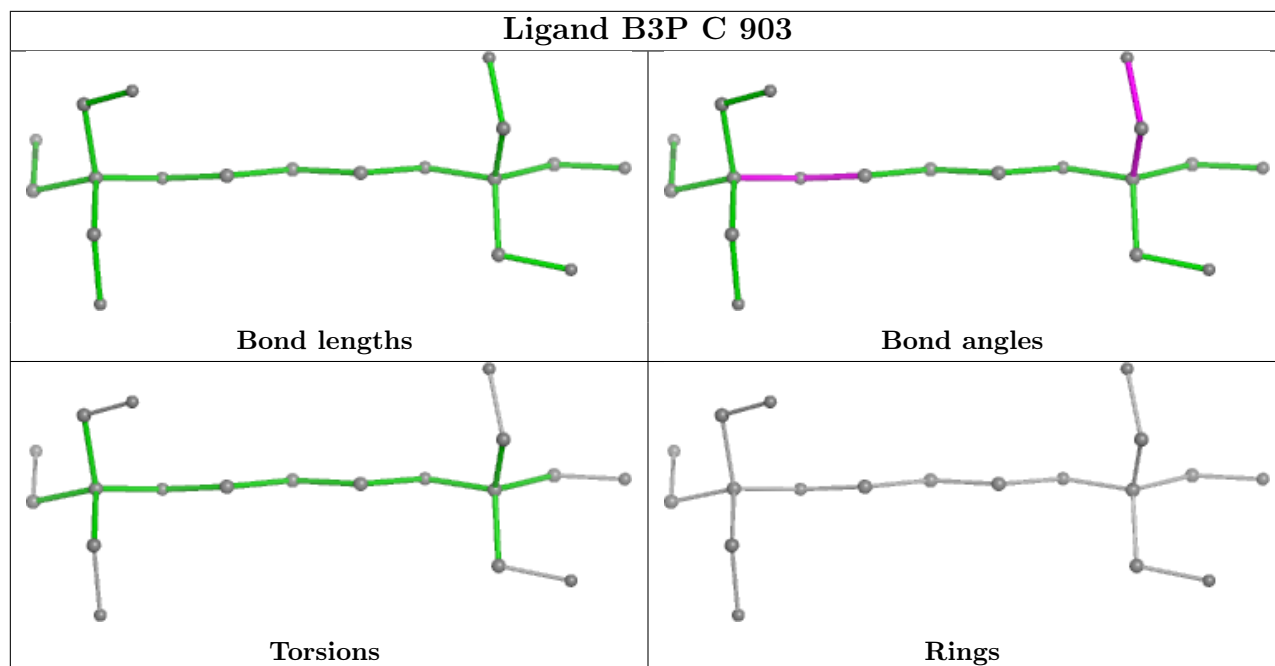
3 monomers are involved in 4 short contacts:

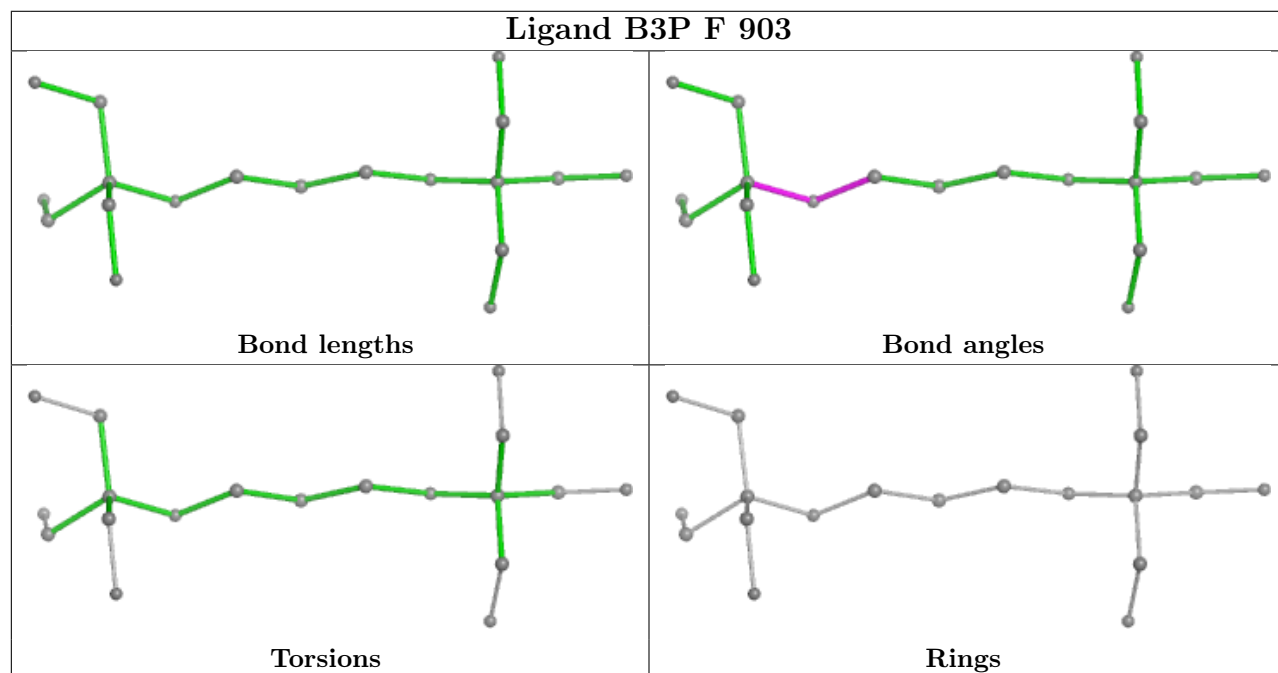
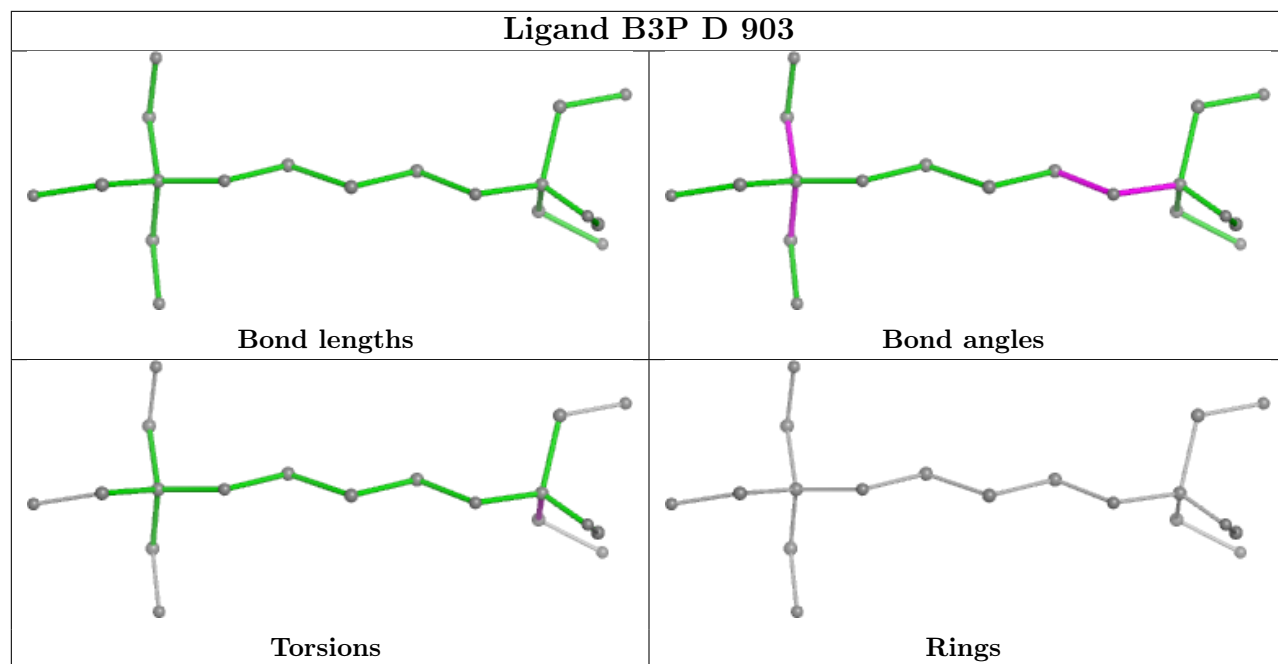
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	H	904	EDO	1	0
2	C	903	B3P	1	0
3	E	904	EDO	2	0

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

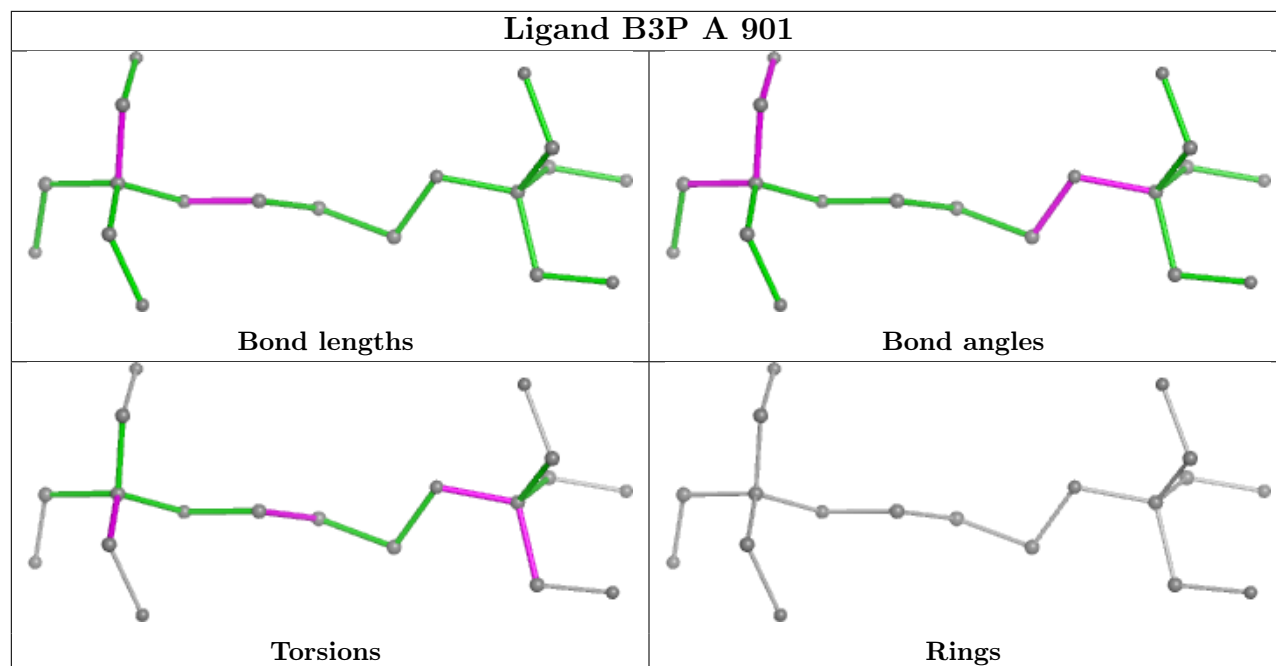
also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted 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 [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 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	434/461 (94%)	0.11	15 (3%) 44 40	31, 52, 97, 133	0
1	B	431/461 (93%)	-0.10	9 (2%) 63 59	32, 48, 82, 102	0
1	C	421/461 (91%)	0.50	49 (11%) 4 3	40, 70, 134, 156	0
1	D	433/461 (93%)	-0.07	11 (2%) 57 53	32, 49, 87, 117	0
1	E	427/461 (92%)	0.06	13 (3%) 50 47	32, 54, 98, 127	0
1	F	427/461 (92%)	-0.09	12 (2%) 53 49	33, 49, 88, 134	0
1	G	402/461 (87%)	0.71	68 (16%) 1 1	39, 75, 135, 157	0
1	H	430/461 (93%)	-0.09	8 (1%) 66 63	33, 52, 90, 112	0
All	All	3405/3688 (92%)	0.12	185 (5%) 25 23	31, 55, 112, 157	0

All (185) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	872	VAL	6.4
1	C	874	VAL	6.0
1	G	813	ILE	5.8
1	A	811	ALA	5.7
1	C	747	TYR	5.5
1	E	811	ALA	5.2
1	G	769	PHE	5.2
1	C	809	ILE	5.1
1	E	683	THR	5.0
1	A	535	ALA	4.7
1	C	848	THR	4.6
1	A	791	ILE	4.5
1	G	872	VAL	4.3
1	G	767	ILE	4.3
1	G	750	PHE	4.2
1	C	873	ARG	4.2

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	G	848	THR	4.1
1	G	868	GLY	4.1
1	A	536	ASN	4.1
1	G	814	GLU	4.1
1	G	753	ILE	4.1
1	G	759	THR	4.0
1	G	758	LYS	3.9
1	G	851	GLN	3.9
1	C	814	GLU	3.8
1	D	813	ILE	3.8
1	G	748	ILE	3.8
1	G	459	THR	3.8
1	C	753	ILE	3.7
1	F	845	ILE	3.7
1	C	871	LYS	3.7
1	E	762	ARG	3.6
1	A	829	ASP	3.6
1	D	872	VAL	3.6
1	G	853	LEU	3.6
1	C	762	ARG	3.6
1	G	865	ASN	3.6
1	C	813	ILE	3.6
1	F	459	THR	3.6
1	G	834	TYR	3.5
1	C	844	MET	3.5
1	G	749	GLU	3.5
1	C	805	THR	3.5
1	C	748	ILE	3.5
1	C	870	MET	3.5
1	D	459	THR	3.4
1	G	842	LYS	3.4
1	C	845	ILE	3.4
1	G	854	THR	3.4
1	C	776	GLU	3.4
1	F	813	ILE	3.4
1	H	588	ARG	3.4
1	A	538	LEU	3.3
1	F	812	ASP	3.3
1	G	751	GLU	3.3
1	G	864	GLY	3.3
1	G	776	GLU	3.3
1	F	872	VAL	3.3

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	G	773	CYS	3.3
1	C	589	GLN	3.3
1	A	588	ARG	3.2
1	E	760	ALA	3.1
1	G	793	PHE	3.1
1	G	780	SER	3.1
1	G	855	PHE	3.1
1	E	809	ILE	3.1
1	B	847	SER	3.1
1	H	675	LYS	3.1
1	G	537	THR	3.0
1	C	866	ILE	3.0
1	C	831	TYR	3.0
1	B	872	VAL	3.0
1	G	755	ALA	3.0
1	E	792	ASN	3.0
1	C	828	MET	3.0
1	G	810	LEU	3.0
1	G	817	GLN	3.0
1	G	815	TYR	3.0
1	G	754	GLU	3.0
1	F	811	ALA	3.0
1	G	673	TRP	2.9
1	D	811	ALA	2.9
1	H	457	GLU	2.9
1	G	808	PRO	2.9
1	C	775	GLU	2.9
1	G	824	THR	2.9
1	F	747	TYR	2.9
1	C	843	SER	2.8
1	G	590	LEU	2.8
1	B	871	LYS	2.8
1	C	849	ALA	2.8
1	C	847	SER	2.8
1	C	782	GLU	2.8
1	G	457	GLU	2.8
1	C	750	PHE	2.8
1	C	829	ASP	2.7
1	B	535	ALA	2.7
1	C	842	LYS	2.7
1	B	846	GLY	2.7
1	E	682	ARG	2.7

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	A	828	MET	2.7
1	G	805	THR	2.7
1	G	591	ASN	2.6
1	E	829	ASP	2.6
1	G	766	PHE	2.6
1	G	849	ALA	2.6
1	B	458	VAL	2.6
1	H	813	ILE	2.6
1	E	776	GLU	2.6
1	G	870	MET	2.6
1	A	733	PHE	2.6
1	C	751	GLU	2.6
1	E	761	SER	2.6
1	C	807	LYS	2.6
1	G	806	LEU	2.6
1	G	756	ILE	2.5
1	H	747	TYR	2.5
1	A	673	TRP	2.5
1	D	537	THR	2.5
1	C	851	GLN	2.5
1	G	791	ILE	2.5
1	C	839	VAL	2.5
1	D	457	GLU	2.5
1	G	460	VAL	2.5
1	C	787	SER	2.5
1	A	832	GLU	2.5
1	C	875	PRO	2.5
1	G	795	LYS	2.4
1	H	459	THR	2.4
1	D	873	ARG	2.4
1	F	816	LEU	2.4
1	A	589	GLN	2.4
1	G	871	LYS	2.4
1	G	752	SER	2.4
1	G	803	LEU	2.4
1	G	593	PHE	2.4
1	E	831	TYR	2.4
1	A	875	PRO	2.4
1	G	787	SER	2.4
1	G	850	GLN	2.4
1	G	862	GLU	2.4
1	C	815	TYR	2.4

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	G	867	ARG	2.4
1	B	459	THR	2.3
1	C	533	GLY	2.3
1	F	457	GLU	2.3
1	A	761	SER	2.3
1	C	867	ARG	2.3
1	F	873	ARG	2.3
1	C	758	LYS	2.3
1	G	823	LEU	2.3
1	C	850	GLN	2.2
1	G	794	LEU	2.2
1	G	775	GLU	2.2
1	G	520	ASN	2.2
1	B	683	THR	2.2
1	G	856	LEU	2.2
1	D	848	THR	2.2
1	C	784	ASP	2.2
1	G	818	ASP	2.2
1	B	588	ARG	2.2
1	G	774	LEU	2.2
1	G	822	LEU	2.2
1	H	814	GLU	2.2
1	D	747	TYR	2.2
1	C	519	GLU	2.2
1	D	460	VAL	2.1
1	F	874	VAL	2.1
1	A	813	ILE	2.1
1	H	589	GLN	2.1
1	C	749	GLU	2.1
1	C	791	ILE	2.1
1	E	567	GLU	2.1
1	C	765	PHE	2.1
1	C	827	SER	2.1
1	E	494	ASP	2.1
1	G	825	VAL	2.1
1	C	457	GLU	2.1
1	D	420	GLU	2.1
1	F	809	ILE	2.1
1	G	592	ALA	2.1
1	C	520	ASN	2.1
1	G	797	GLN	2.0
1	G	866	ILE	2.0

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Mol	Chain	Res	Type	RSRZ
1	C	785	ALA	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, 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.

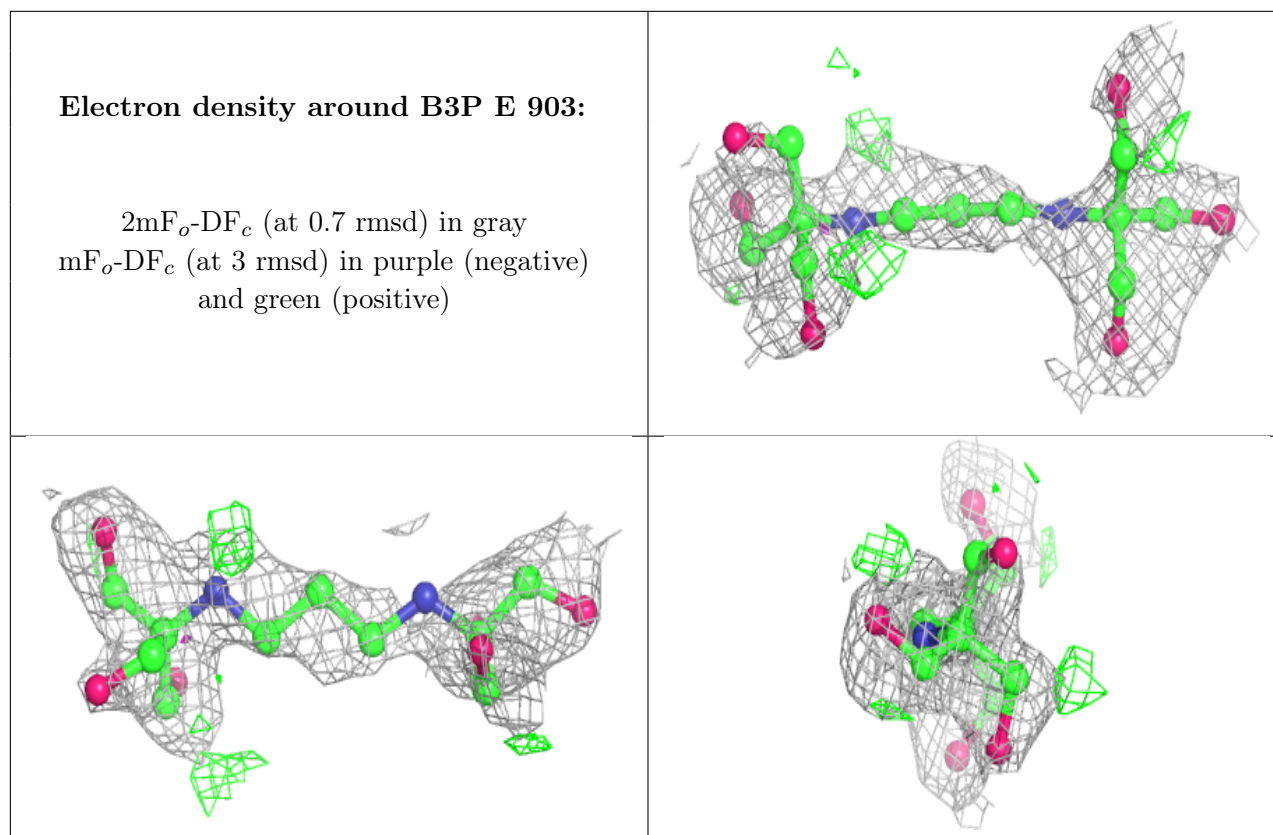
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
2	B3P	E	903	19/19	0.74	0.28	58,61,64,65	19
2	B3P	A	901	19/19	0.78	0.25	69,74,78,78	0
2	B3P	C	903	19/19	0.79	0.34	65,69,72,74	0
3	EDO	B	904	4/4	0.79	0.21	69,71,71,72	0
5	MG	C	902	1/1	0.83	0.30	83,83,83,83	0
2	B3P	D	903	19/19	0.84	0.30	64,70,81,83	0
2	B3P	H	903	19/19	0.86	0.26	58,62,66,69	0
5	MG	E	902	1/1	0.86	0.42	78,78,78,78	0
2	B3P	F	903	19/19	0.87	0.25	57,59,63,64	0
3	EDO	A	902	4/4	0.88	0.23	67,67,68,73	0
5	MG	G	902	1/1	0.88	0.28	75,75,75,75	0
3	EDO	B	906	4/4	0.89	0.21	69,70,71,71	0
3	EDO	H	904	4/4	0.89	0.34	39,40,40,40	0
5	MG	F	902	1/1	0.89	0.13	58,58,58,58	0
4	PO4	C	901	5/5	0.89	0.20	108,109,109,110	0
5	MG	H	902	1/1	0.89	0.11	60,60,60,60	0
4	PO4	G	901	5/5	0.90	0.20	113,114,115,117	0
2	B3P	B	901	19/19	0.90	0.25	64,67,70,73	0
3	EDO	F	906	4/4	0.92	0.25	63,65,65,65	0
4	PO4	E	901	5/5	0.92	0.28	109,110,112,112	0
3	EDO	E	904	4/4	0.93	0.24	35,36,37,38	0
3	EDO	F	904	4/4	0.93	0.22	52,55,55,57	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
3	EDO	B	902	4/4	0.93	0.36	55,56,58,63	0
3	EDO	B	903	4/4	0.93	0.21	53,54,55,56	0
4	PO4	F	901	5/5	0.94	0.18	82,83,85,85	0
3	EDO	F	907	4/4	0.94	0.25	57,58,58,58	0
3	EDO	D	905	4/4	0.94	0.17	44,45,45,46	0
5	MG	D	902	1/1	0.94	0.10	50,50,50,50	0
3	EDO	F	905	4/4	0.95	0.23	57,61,62,62	0
3	EDO	B	905	4/4	0.95	0.20	51,51,51,53	0
4	PO4	H	901	5/5	0.96	0.12	71,71,74,74	0
3	EDO	E	905	4/4	0.97	0.21	38,39,39,40	0
3	EDO	G	903	4/4	0.97	0.21	59,59,59,60	0
3	EDO	D	904	4/4	0.98	0.21	47,49,49,50	0
4	PO4	D	901	5/5	0.98	0.11	60,61,61,62	0
3	EDO	D	906	4/4	0.98	0.20	43,43,44,45	0

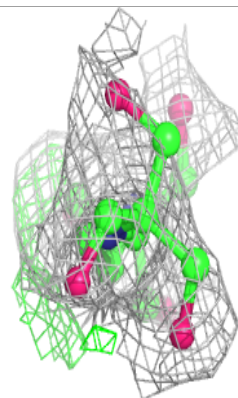
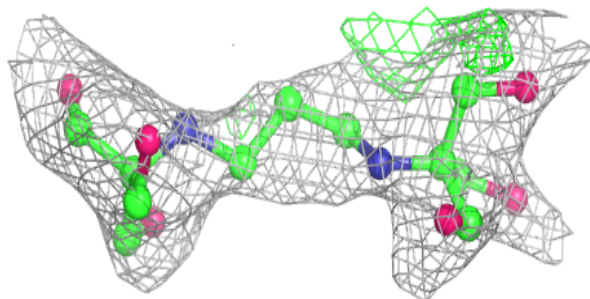
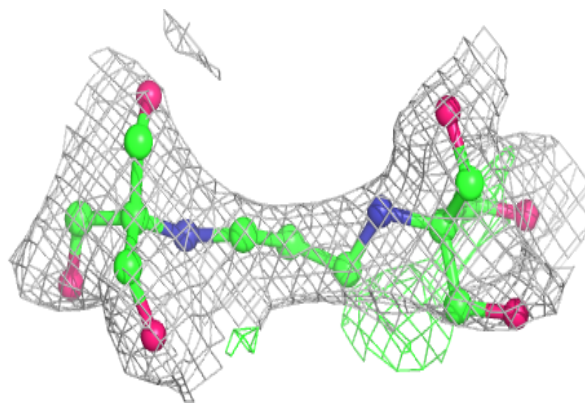
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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



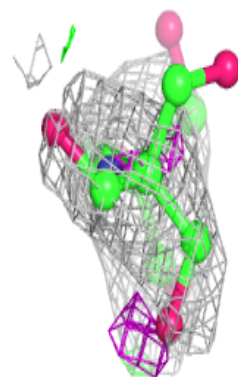
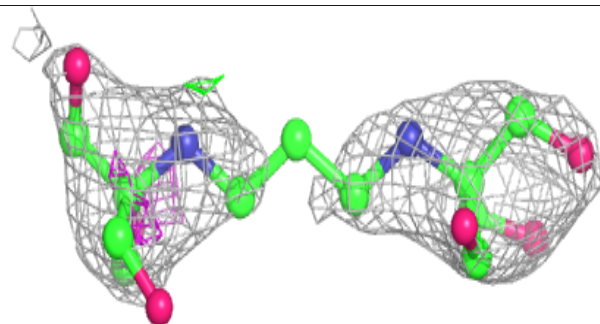
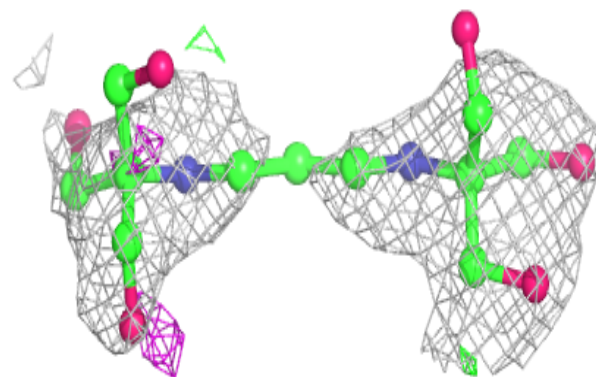


**Electron density around B3P A 901:**

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

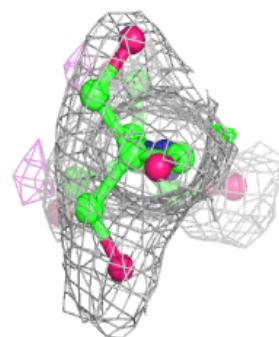
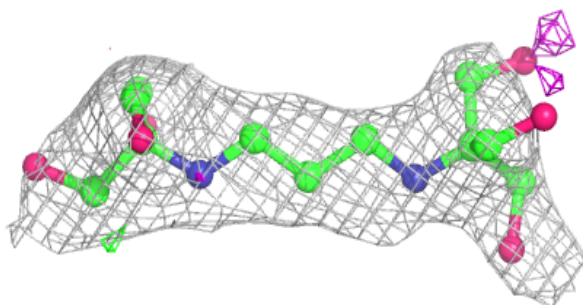
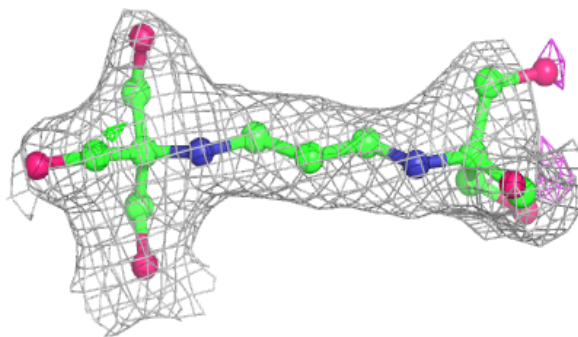
**Electron density around B3P C 903:**

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

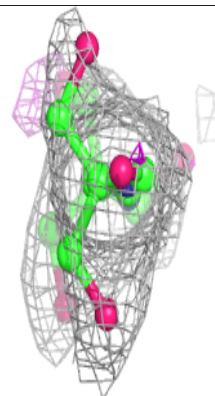
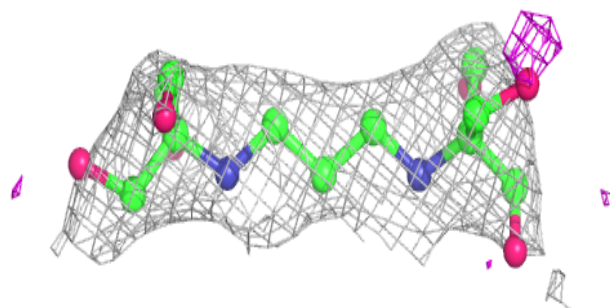
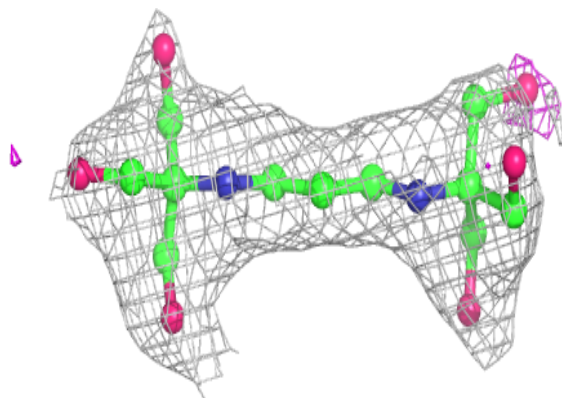


**Electron density around B3P D 903:**

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

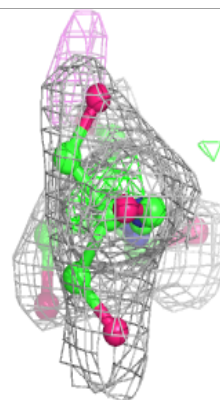
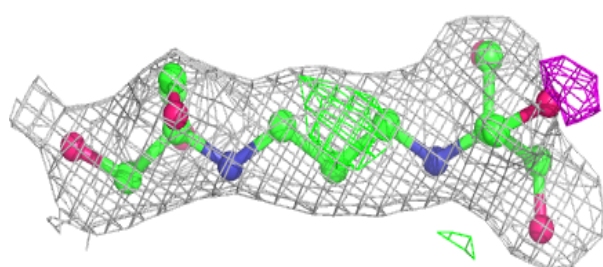
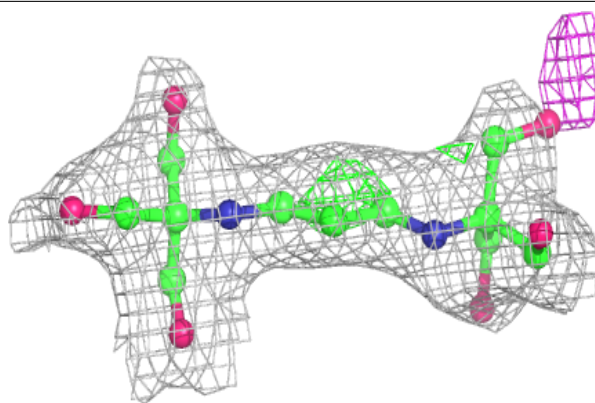
**Electron density around B3P H 903:**

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

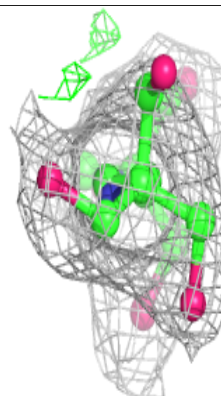
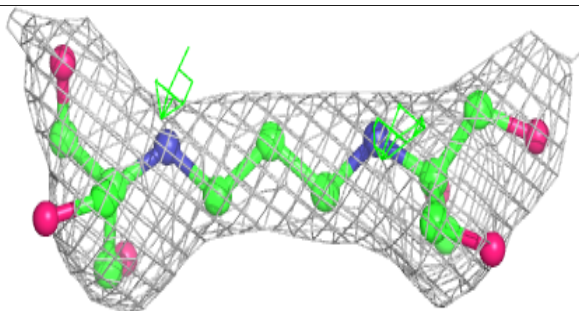
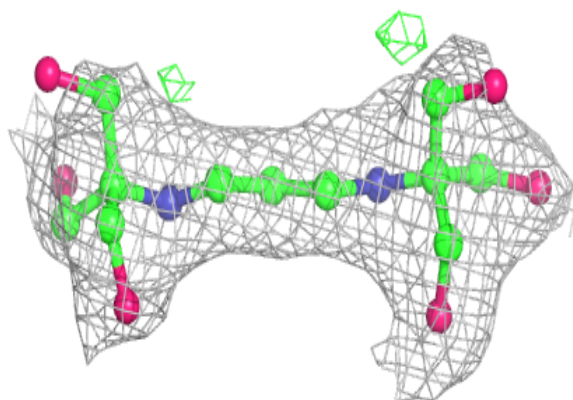


**Electron density around B3P F 903:**

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

**Electron density around B3P B 901:**

$2mF_o-DF_c$  (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.