



Full wwPDB X-ray Structure Validation Report ⓘ

Apr 18, 2026 – 04:26 PM UTC

PDB ID : 4EY0 / pdb_00004ey0
Title : Structure of tandem SH2 domains from PLCgamma1
Authors : Cole, A.R.; Mas-Droux, C.P.; Bunney, T.D.; Katan, M.
Deposited on : 2012-05-01
Resolution : 2.80 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
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

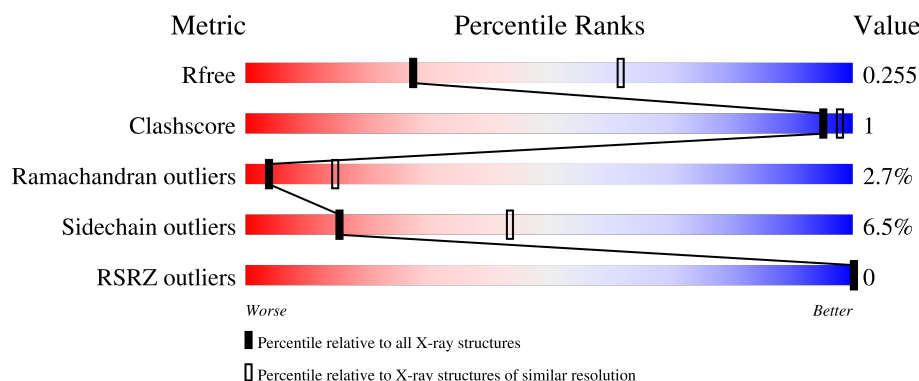
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.80 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	3866 (2.80-2.80)
Clashscore	190562	4276 (2.80-2.80)
Ramachandran outliers	187476	4196 (2.80-2.80)
Sidechain outliers	187428	4198 (2.80-2.80)
RSRZ outliers	180081	3869 (2.80-2.80)

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	246	
1	B	246	
1	C	246	
1	D	246	

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 7695 atoms, of which 16 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 1-phosphatidylinositol 4,5-bisphosphate phosphodiesterase gamma-1.

Mol	Chain	Residues	Atoms							ZeroOcc	AltConf	Trace
1	A	235	Total	C	H	N	O	P	S	0	1	0
			1898	1187	16	329	355	1	10			
1	B	235	Total	C	N	O	P	S		0	0	0
			1884	1188	331	354	1	10				
1	C	235	Total	C	N	O	P	S		0	0	0
			1883	1187	335	350	1	10				
1	D	235	Total	C	N	O	P	S		0	0	0
			1867	1176	328	352	1	10				

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	771	PHE	TYR	engineered mutation	UNP P19174
A	775	PHE	TYR	engineered mutation	UNP P19174
B	771	PHE	TYR	engineered mutation	UNP P19174
B	775	PHE	TYR	engineered mutation	UNP P19174
C	771	PHE	TYR	engineered mutation	UNP P19174
C	775	PHE	TYR	engineered mutation	UNP P19174
D	771	PHE	TYR	engineered mutation	UNP P19174
D	775	PHE	TYR	engineered mutation	UNP P19174

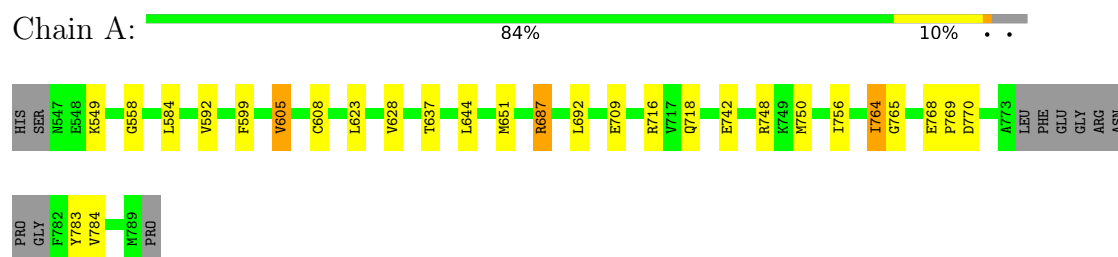
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	45	Total	O	0	0
			45	45		
2	B	38	Total	O	0	0
			38	38		
2	C	41	Total	O	0	0
			41	41		
2	D	39	Total	O	0	0
			39	39		

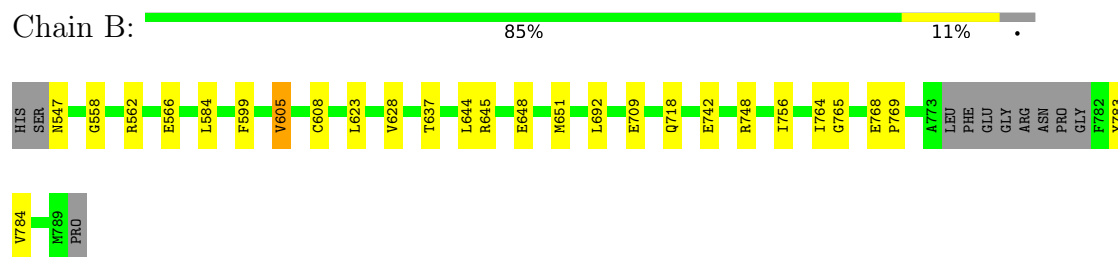
3 Residue-property plots [i](#)

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.

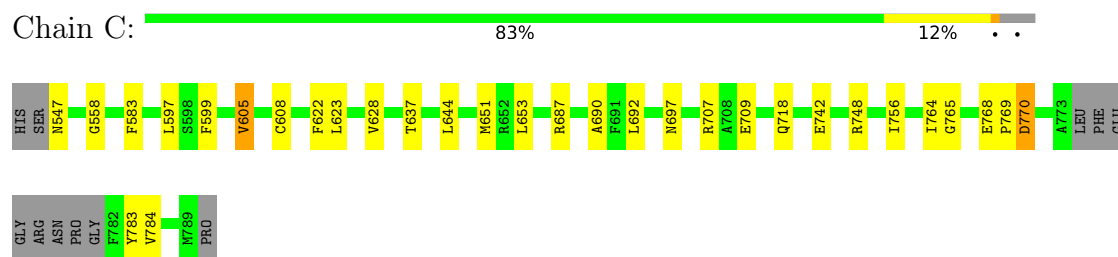
- Molecule 1: 1-phosphatidylinositol 4,5-bisphosphate phosphodiesterase gamma-1



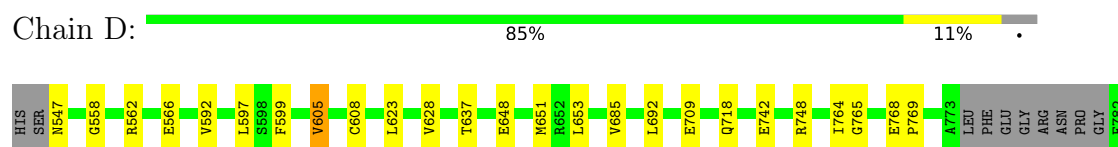
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- Molecule 1: 1-phosphatidylinositol 4,5-bisphosphate phosphodiesterase gamma-1





4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	54.90Å 59.20Å 79.20Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	47.42 – 2.80 47.42 – 2.80	Depositor EDS
% Data completeness (in resolution range)	92.3 (47.42-2.80) 92.3 (47.42-2.80)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.59 (at 2.81Å)	Xtriage
Refinement program	BUSTER 2.10.0	Depositor
R, R_{free}	0.197 , 0.242 0.211 , 0.255	Depositor DCC
R_{free} test set	1152 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å ²)	54.5	Xtriage
Anisotropy	0.103	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 52.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.449 for h,-k,-l 0.448 for -h,k,-l 0.447 for -h,-k,l	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	7695	wwPDB-VP
Average B, all atoms (Å ²)	53.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.99% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

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

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: PTR

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	0.90	0/1915	1.25	5/2593 (0.2%)
1	B	0.89	0/1914	1.22	3/2589 (0.1%)
1	C	0.89	0/1913	1.22	5/2588 (0.2%)
1	D	0.88	0/1897	1.22	2/2570 (0.1%)
All	All	0.89	0/7639	1.23	15/10340 (0.1%)

There are no bond length outliers.

All (15) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	605	VAL	CB-CA-C	5.77	117.59	110.73
1	B	605	VAL	CB-CA-C	5.73	117.55	110.73
1	A	770	ASP	N-CA-C	5.72	118.77	110.42
1	A	605	VAL	CB-CA-C	5.65	117.46	110.73
1	D	605	VAL	CB-CA-C	5.65	117.45	110.73
1	C	770	ASP	N-CA-C	5.62	118.62	110.42
1	C	742	GLU	N-CA-C	-5.52	104.90	111.69
1	A	742	GLU	N-CA-C	-5.47	104.97	111.69
1	D	742	GLU	N-CA-C	-5.45	104.99	111.69
1	B	742	GLU	N-CA-C	-5.41	105.04	111.69
1	A	549	LYS	CA-C-N	5.30	127.92	120.28
1	A	549	LYS	C-N-CA	5.30	127.92	120.28
1	B	756	ILE	N-CA-C	5.19	116.17	108.23
1	C	622	PHE	N-CA-C	5.07	116.77	108.76
1	C	583	PHE	N-CA-C	5.01	115.65	108.74

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	1882	16	1737	4	0
1	B	1884	0	1754	4	0
1	C	1883	0	1752	6	0
1	D	1867	0	1713	4	0
2	A	45	0	0	0	0
2	B	38	0	0	0	0
2	C	41	0	0	0	0
2	D	39	0	0	0	0
All	All	7679	16	6956	18	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 (18) 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:A:584:LEU:HD12	1:A:584:LEU:C	2.35	0.51
1:D:597:LEU:HD21	1:D:653:LEU:HD21	1.93	0.51
1:D:599:PHE:CD1	1:D:651:MET:HE1	2.47	0.50
1:B:599:PHE:CD1	1:B:651:MET:HE1	2.47	0.49
1:C:599:PHE:CD1	1:C:651:MET:HE1	2.47	0.49
1:A:599:PHE:CD1	1:A:651:MET:HE1	2.47	0.48
1:D:562:ARG:O	1:D:566:GLU:HG3	2.15	0.46
1:C:692:LEU:C	1:C:692:LEU:HD12	2.42	0.45
1:D:692:LEU:HD12	1:D:692:LEU:C	2.42	0.45
1:A:692:LEU:C	1:A:692:LEU:HD12	2.43	0.44
1:B:692:LEU:C	1:B:692:LEU:HD12	2.43	0.43
1:B:562:ARG:O	1:B:566:GLU:HG3	2.19	0.43
1:C:707:ARG:HH11	1:C:707:ARG:HG2	1.84	0.42
1:A:687:ARG:NH1	1:A:764:ILE:HG23	2.34	0.42
1:C:597:LEU:HD21	1:C:653:LEU:HD21	2.02	0.42
1:C:687:ARG:O	1:C:707:ARG:HG2	2.21	0.41
1:C:690:ALA:HB1	1:C:756:ILE:HD11	2.02	0.41
1:B:584:LEU:HD12	1:B:584:LEU:C	2.47	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	231/246 (94%)	211 (91%)	13 (6%)	7 (3%)	3	12
1	B	230/246 (94%)	211 (92%)	13 (6%)	6 (3%)	4	15
1	C	230/246 (94%)	210 (91%)	14 (6%)	6 (3%)	4	15
1	D	230/246 (94%)	211 (92%)	13 (6%)	6 (3%)	4	15
All	All	921/984 (94%)	843 (92%)	53 (6%)	25 (3%)	4	15

All (25) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	558	GLY
1	A	764	ILE
1	A	765	GLY
1	B	558	GLY
1	B	764	ILE
1	B	765	GLY
1	C	558	GLY
1	C	764	ILE
1	C	765	GLY
1	C	769	PRO
1	D	558	GLY
1	D	764	ILE
1	D	765	GLY
1	A	769	PRO
1	B	769	PRO
1	D	769	PRO
1	A	748	ARG
1	B	748	ARG
1	C	748	ARG
1	D	748	ARG

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Mol	Chain	Res	Type
1	A	687	ARG
1	A	768	GLU
1	D	768	GLU
1	B	768	GLU
1	C	768	GLU

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	190/213 (89%)	177 (93%)	13 (7%)	14	42
1	B	192/213 (90%)	180 (94%)	12 (6%)	16	45
1	C	190/213 (89%)	178 (94%)	12 (6%)	16	45
1	D	187/213 (88%)	175 (94%)	12 (6%)	16	44
All	All	759/852 (89%)	710 (94%)	49 (6%)	15	43

All (49) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	592	VAL
1	A	605	VAL
1	A	608	CYS
1	A	623	LEU
1	A	628	VAL
1	A	637	THR
1	A	644	LEU
1	A	709	GLU
1	A	716	ARG
1	A	718	GLN
1	A	750	MET
1	A	756	ILE
1	A	784	VAL
1	B	547	ASN
1	B	605	VAL
1	B	608	CYS

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Mol	Chain	Res	Type
1	B	623	LEU
1	B	628	VAL
1	B	637	THR
1	B	644	LEU
1	B	645	ARG
1	B	648	GLU
1	B	709	GLU
1	B	718	GLN
1	B	784	VAL
1	C	547	ASN
1	C	605	VAL
1	C	608	CYS
1	C	623	LEU
1	C	628	VAL
1	C	637	THR
1	C	644	LEU
1	C	697	ASN
1	C	709	GLU
1	C	718	GLN
1	C	770	ASP
1	C	784	VAL
1	D	547	ASN
1	D	592	VAL
1	D	605	VAL
1	D	608	CYS
1	D	623	LEU
1	D	628	VAL
1	D	637	THR
1	D	648	GLU
1	D	685	VAL
1	D	709	GLU
1	D	718	GLN
1	D	784	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (10) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	700	ASN
1	A	719	GLN
1	A	722	GLN
1	B	700	ASN
1	B	719	GLN

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Mol	Chain	Res	Type
1	C	719	GLN
1	C	722	GLN
1	D	663	HIS
1	D	719	GLN
1	D	722	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

4 non-standard protein/DNA/RNA residues 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
1	PTR	A	783	1	15,16,17	1.49	2 (13%)	17,22,24	1.67	5 (29%)
1	PTR	C	783	1	15,16,17	1.71	3 (20%)	17,22,24	1.68	5 (29%)
1	PTR	D	783	1	15,16,17	1.35	2 (13%)	17,22,24	1.48	3 (17%)
1	PTR	B	783	1	15,16,17	1.50	2 (13%)	17,22,24	2.73	9 (52%)

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
1	PTR	A	783	1	-	2/10/11/13	0/1/1/1
1	PTR	C	783	1	-	2/10/11/13	0/1/1/1
1	PTR	D	783	1	-	2/10/11/13	0/1/1/1
1	PTR	B	783	1	-	2/10/11/13	0/1/1/1

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	783	PTR	P-OH	-3.89	1.52	1.59
1	B	783	PTR	P-OH	-3.26	1.53	1.59
1	A	783	PTR	P-OH	-2.91	1.54	1.59
1	C	783	PTR	CE2-CZ	2.53	1.43	1.38
1	B	783	PTR	CE2-CZ	2.42	1.43	1.38
1	D	783	PTR	P-OH	-2.40	1.55	1.59
1	A	783	PTR	CE2-CZ	2.39	1.43	1.38
1	D	783	PTR	CE2-CZ	2.13	1.42	1.38
1	C	783	PTR	CE2-CD2	2.04	1.42	1.38

All (22) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	783	PTR	O3P-P-OH	6.13	123.43	105.32
1	B	783	PTR	O3P-P-O1P	-5.01	91.32	110.83
1	B	783	PTR	OH-P-O1P	-4.39	94.82	109.48
1	A	783	PTR	CE2-CD2-CG	-3.16	116.85	121.00
1	A	783	PTR	OH-P-O1P	3.15	119.99	109.48
1	C	783	PTR	OH-P-O1P	3.08	119.74	109.48
1	D	783	PTR	OH-P-O1P	3.03	119.57	109.48
1	C	783	PTR	CE2-CD2-CG	-2.89	117.19	121.00
1	B	783	PTR	CE2-CD2-CG	-2.74	117.39	121.00
1	C	783	PTR	CB-CG-CD1	-2.63	116.01	120.90
1	D	783	PTR	CE2-CD2-CG	-2.63	117.55	121.00
1	A	783	PTR	CD2-CE2-CZ	2.60	122.70	119.73
1	B	783	PTR	CB-CG-CD1	-2.50	116.24	120.90
1	A	783	PTR	CB-CG-CD1	-2.42	116.41	120.90
1	C	783	PTR	CD2-CE2-CZ	2.33	122.39	119.73
1	C	783	PTR	CD2-CG-CD1	2.26	121.59	118.23
1	B	783	PTR	O2P-P-OH	2.25	111.97	105.32
1	B	783	PTR	CD2-CE2-CZ	2.22	122.27	119.73
1	B	783	PTR	CD2-CG-CD1	2.21	121.52	118.23
1	D	783	PTR	CB-CG-CD1	-2.18	116.84	120.90
1	A	783	PTR	CD2-CG-CD1	2.18	121.47	118.23
1	B	783	PTR	O3P-P-O2P	2.13	115.80	107.80

There are no chirality outliers.

All (8) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	783	PTR	C-CA-CB-CG

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Mol	Chain	Res	Type	Atoms
1	B	783	PTR	C-CA-CB-CG
1	C	783	PTR	C-CA-CB-CG
1	D	783	PTR	C-CA-CB-CG
1	A	783	PTR	N-CA-CB-CG
1	B	783	PTR	N-CA-CB-CG
1	C	783	PTR	N-CA-CB-CG
1	D	783	PTR	N-CA-CB-CG

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

There are no ligands in this entry.

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, 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	234/246 (95%)	-1.42	0 100 100	26, 52, 82, 98	1 (0%)
1	B	234/246 (95%)	-1.44	0 100 100	27, 52, 81, 107	0
1	C	234/246 (95%)	-1.41	0 100 100	25, 53, 77, 101	0
1	D	234/246 (95%)	-1.43	0 100 100	27, 53, 79, 102	0
All	All	936/984 (95%)	-1.42	0 100 100	25, 52, 80, 107	1 (0%)

There are no RSRZ outliers to report.

6.2 Non-standard residues in protein, DNA, RNA chains [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
1	PTR	A	783	16/17	0.99	0.03	52,58,63,64	0
1	PTR	B	783	16/17	0.99	0.04	60,61,62,63	0
1	PTR	C	783	16/17	0.99	0.03	58,61,62,62	0
1	PTR	D	783	16/17	0.99	0.03	53,64,70,77	0

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

There are no ligands in this entry.

6.5 Other polymers ⓘ

There are no such residues in this entry.