



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 09:18 AM UTC

PDB ID : 5DXU / pdb_00005dxu
Title : p110delta/p85alpha with GDC-0326
Authors : Heffron, T.P.; Heald, R.A.; Ndubaku, C.; Wei, B.Q.; Augustin, M.; Do, S.; Edgar, K.; Eigenbrot, C.; Friedman, L.; Gancia, E.; Jackson, P.S.; Jones, G.; Kolesnikov, A.; Lee, L.B.; Lesnick, J.D.; Lewis, C.; McLean, N.; Mortle, M.; Nonomiya, J.; Pang, J.; Price, S.; Prior, W.W.; Salphati, L.; Sideris, S.; Staben, S.T.; Steinbacher, S.; Tsui, V.; Wallin, J.; Sampath, D.; Olivero, A.
Deposited on : 2015-09-23
Resolution : 2.64 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)

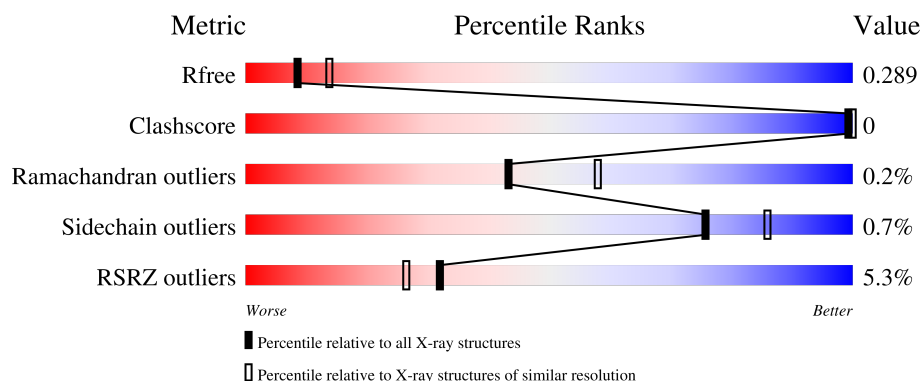
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

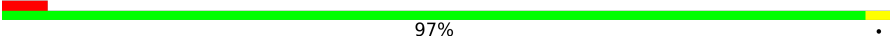
The reported resolution of this entry is 2.64 Å.

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	2053 (2.66-2.62)
Clashscore	190562	2097 (2.66-2.62)
Ramachandran outliers	187476	2066 (2.66-2.62)
Sidechain outliers	187428	2066 (2.66-2.62)
RSRZ outliers	180081	2052 (2.66-2.62)

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	1043	 5% 87% 12%
2	B	169	 5% 97%

Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 8955 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.

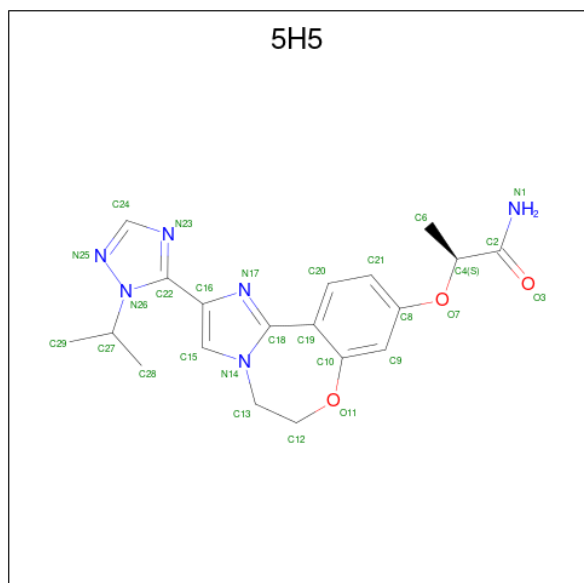
- Molecule 1 is a protein called Phosphatidylinositol 4,5-bisphosphate 3-kinase catalytic subunit delta isoform.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	922	7458	4777	1270	1358	53	226	0	0

- Molecule 2 is a protein called Phosphatidylinositol 3-kinase regulatory subunit alpha.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	169	1465	911	265	284	5	80	0	0

- Molecule 3 is (2S)-2-({2-[1-(propan-2-yl)-1H-1,2,4-triazol-5-yl]-5,6-dihydroimidazo[1,2-d][1,4]benzoxazepin-9-yl}oxy)propanamide (CCD ID: 5H5) (formula: C₁₉H₂₂N₆O₃).



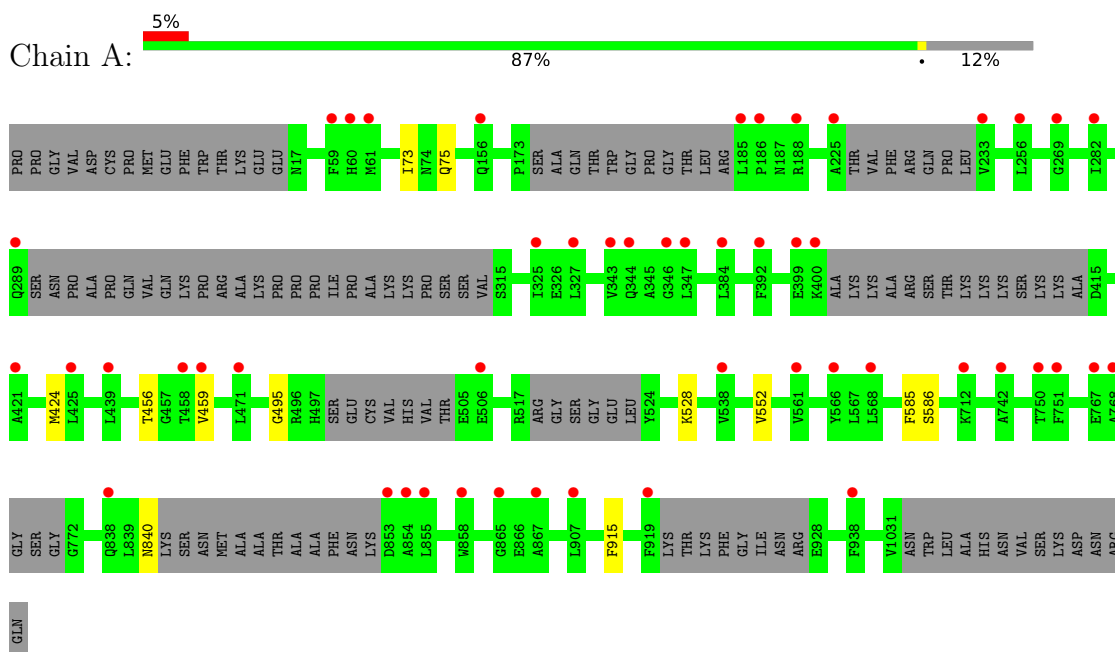
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	4	Total	O	0	0
			4	4		

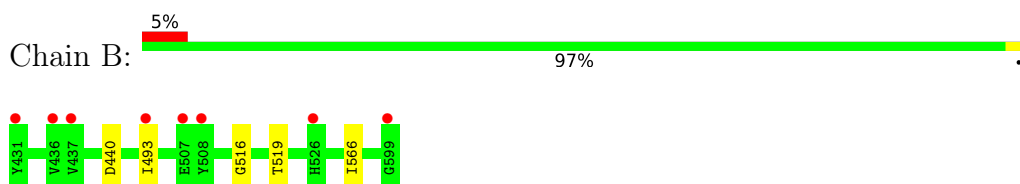
3 Residue-property plots

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 4,5-bisphosphate 3-kinase catalytic subunit delta isoform



- Molecule 2: Phosphatidylinositol 3-kinase regulatory subunit alpha



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	91.05Å 108.75Å 142.43Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	86.43 – 2.64 86.43 – 2.64	Depositor EDS
% Data completeness (in resolution range)	95.8 (86.43-2.64) 95.9 (86.43-2.64)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.05	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.16 (at 2.65Å)	Xtriage
Refinement program	REFMAC 5.2.0005	Depositor
R, R_{free}	0.248 , 0.284 0.234 , 0.289	Depositor DCC
R_{free} test set	836 reflections (1.98%)	wwPDB-VP
Wilson B-factor (Å ²)	71.1	Xtriage
Anisotropy	0.469	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.29 , 41.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	8955	wwPDB-VP
Average B, all atoms (Å ²)	83.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.40% 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: 5H5

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	0.57	0/7620	0.80	0/10300
2	B	0.61	0/1485	0.90	0/1981
All	All	0.58	0/9105	0.82	0/12281

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

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	7458	0	7440	4	0
2	B	1465	0	1456	1	0
3	A	28	0	22	0	0
4	A	4	0	0	0	0
All	All	8955	0	8918	4	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 0.

All (4) 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:528:LYS:HG2	1:A:552:VAL:HG12	1.92	0.52
1:A:424:MET:HG2	1:A:459:VAL:HG11	1.92	0.50
1:A:73:ILE:HD11	2:B:493:ILE:HD12	1.97	0.47
1:A:456:THR:HA	1:A:585:PHE:CE2	2.57	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	902/1043 (86%)	878 (97%)	23 (2%)	1 (0%)	48 64
2	B	167/169 (99%)	163 (98%)	3 (2%)	1 (1%)	21 31
All	All	1069/1212 (88%)	1041 (97%)	26 (2%)	2 (0%)	43 58

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	516	GLY
1	A	495	GLY

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	824/926 (89%)	820 (100%)	4 (0%)	81 89

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	B	160/160 (100%)	157 (98%)	3 (2%)	50	70
All	All	984/1086 (91%)	977 (99%)	7 (1%)	76	86

All (7) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	75	GLN
1	A	586	SER
1	A	840	ASN
1	A	915	PHE
2	B	440	ASP
2	B	519	THR
2	B	566	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (15) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	51	HIS
1	A	116	GLN
1	A	267	HIS
1	A	349	HIS
1	A	431	GLN
1	A	539	GLN
1	A	656	HIS
1	A	696	ASN
1	A	786	GLN
1	A	795	GLN
1	A	840	ASN
1	A	940	HIS
1	A	943	GLN
2	B	453	ASN
2	B	457	GLN

5.3.3 RNA ⓘ

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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

1 ligand is 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	5H5	A	1101	-	31,31,31	1.21	4 (12%)	36,45,45	3.29	13 (36%)

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	5H5	A	1101	-	-	1/16/26/26	0/4/4/4

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	1101	5H5	C18-N14	3.87	1.39	1.36
3	A	1101	5H5	O11-C10	-2.31	1.34	1.38
3	A	1101	5H5	N26-N25	2.05	1.40	1.37
3	A	1101	5H5	C16-N17	-2.02	1.34	1.38

All (13) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	1101	5H5	C24-N23-C22	8.95	109.83	101.80
3	A	1101	5H5	C16-N17-C18	8.48	111.59	106.23
3	A	1101	5H5	C24-N25-N26	8.22	107.55	101.28
3	A	1101	5H5	C27-N26-N25	5.52	125.32	119.62
3	A	1101	5H5	C8-O7-C4	5.13	126.77	118.40
3	A	1101	5H5	N25-C24-N23	-4.89	109.02	116.78
3	A	1101	5H5	N14-C18-N17	-4.04	106.50	111.67
3	A	1101	5H5	C12-O11-C10	3.66	122.20	116.13
3	A	1101	5H5	C22-C16-N17	3.30	126.72	121.46
3	A	1101	5H5	C15-C16-N17	-2.95	106.96	111.12
3	A	1101	5H5	C4-C2-N1	2.80	118.98	117.31
3	A	1101	5H5	O3-C2-C4	2.26	120.56	118.93
3	A	1101	5H5	C16-C22-N23	2.11	124.73	121.31

There are no chirality outliers.

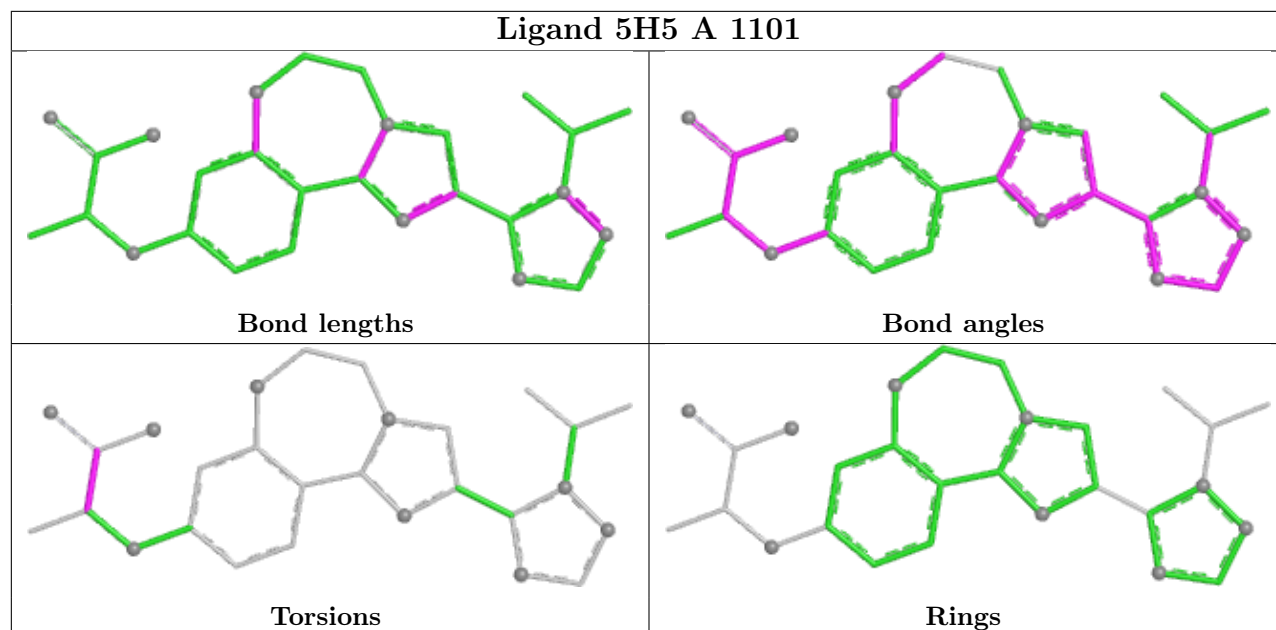
All (1) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	1101	5H5	N1-C2-C4-O7

There are no ring outliers.

No monomer is involved in short contacts.

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	922/1043 (88%)	0.48	50 (5%) 31 26	33, 78, 117, 157	66 (7%)
2	B	169/169 (100%)	0.39	8 (4%) 36 30	38, 74, 109, 158	23 (13%)
All	All	1091/1212 (90%)	0.47	58 (5%) 32 26	33, 76, 116, 158	89 (8%)

All (58) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	471	LEU	4.6
1	A	344	GLN	4.1
2	B	431	TYR	3.8
1	A	768	ALA	3.8
2	B	508	TYR	3.7
1	A	421	ALA	3.4
1	A	459	VAL	3.4
2	B	599	GLY	3.2
1	A	392	PHE	3.2
1	A	938	PHE	3.2
1	A	425	LEU	3.1
1	A	867	ALA	3.0
1	A	854	ALA	3.0
1	A	858	TRP	2.9
1	A	269	GLY	2.9
1	A	853	ASP	2.8
2	B	526	HIS	2.8
1	A	233	VAL	2.7
2	B	437	VAL	2.7
1	A	568	LEU	2.7
1	A	282	ILE	2.6
1	A	346	GLY	2.5
1	A	185	LEU	2.5
1	A	400	LYS	2.5

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	A	347	LEU	2.5
1	A	186	PRO	2.5
1	A	742	ALA	2.5
1	A	60	HIS	2.4
1	A	538	VAL	2.4
1	A	188	ARG	2.3
1	A	399	GLU	2.3
1	A	838	GLN	2.3
1	A	919	PHE	2.3
1	A	225	ALA	2.3
1	A	750	THR	2.3
1	A	855	LEU	2.3
1	A	156	GLN	2.2
1	A	289	GLN	2.2
1	A	439	LEU	2.2
1	A	59	PHE	2.2
1	A	561	VAL	2.2
1	A	325	ILE	2.2
1	A	256	LEU	2.2
2	B	436	VAL	2.2
1	A	767	GLU	2.1
1	A	907	LEU	2.1
1	A	343	VAL	2.1
2	B	507	GLU	2.1
1	A	61	MET	2.1
1	A	751	PHE	2.1
1	A	566	TYR	2.1
1	A	506	GLU	2.1
1	A	712	LYS	2.1
1	A	458	THR	2.1
1	A	384	LEU	2.1
1	A	327	LEU	2.0
2	B	493	ILE	2.0
1	A	865	GLY	2.0

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

There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates [i](#)

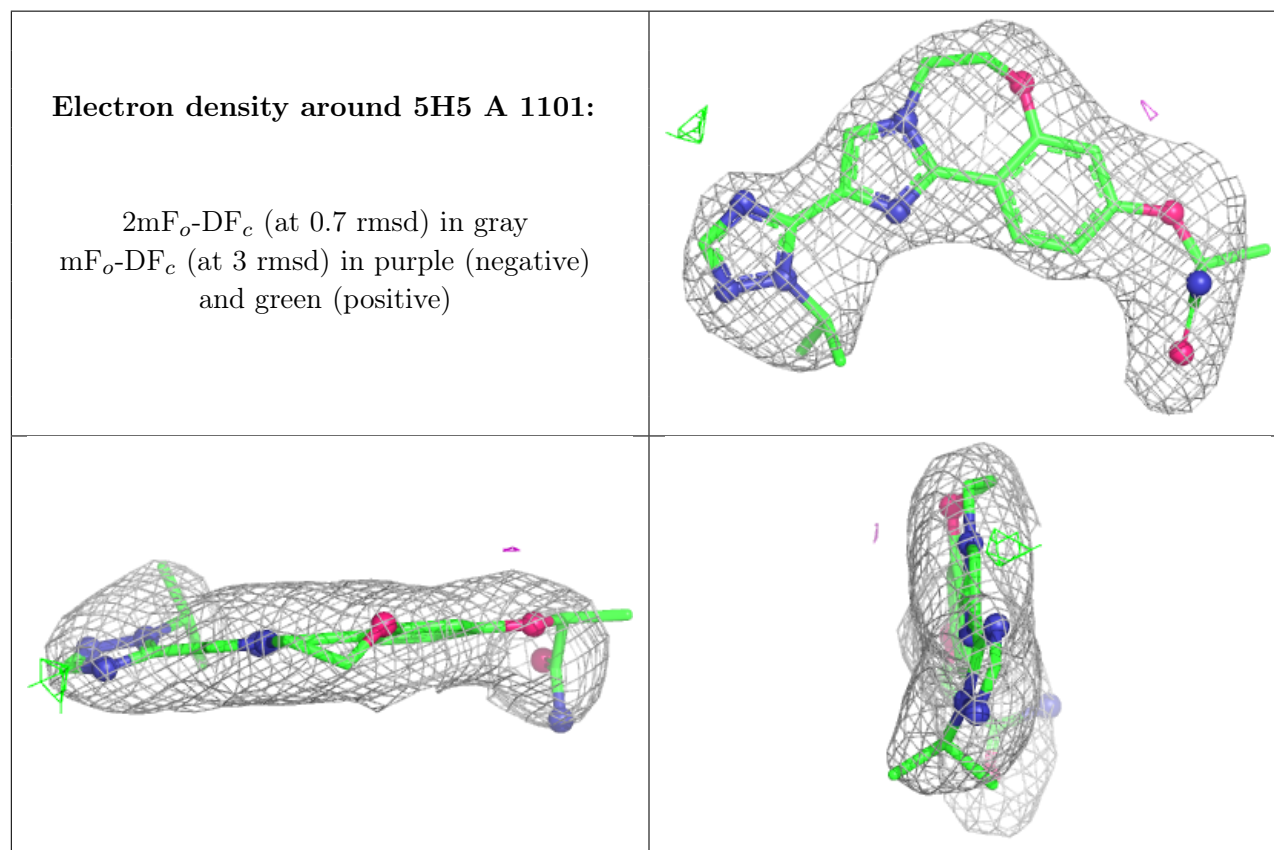
There are no oligosaccharides in this entry.

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($\text{\AA}^2$)	Q<0.9
3	5H5	A	1101	28/28	0.94	0.09	73,75,80,84	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.



6.5 Other polymers [i](#)

There are no such residues in this entry.