



Full wwPDB X-ray Structure Validation Report ⓘ

May 7, 2026 – 09:48 AM EDT

PDB ID : 2WXP / pdb_00002wxp
Title : The crystal structure of the murine class IA PI 3-kinase p110delta in complex with GDC-0941.
Authors : Berndt, A.; Miller, S.; Williams, O.; Lee, D.D.; Houseman, B.T.; Pacold, J.I.; Gorrec, F.; Hon, W.-C.; Liu, Y.; Rommel, C.; Gaillard, P.; Ruckle, T.; Schwarz, M.K.; Shokat, K.M.; Shaw, J.P.; Williams, R.L.
Deposited on : 2009-11-09
Resolution : 2.30 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](#) ①) were used in the production of this report:

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

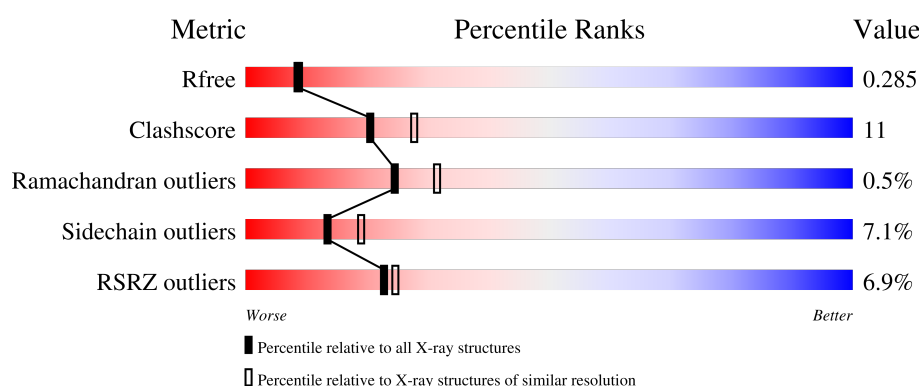
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.30 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	6319 (2.30-2.30)
Clashscore	190562	6919 (2.30-2.30)
Ramachandran outliers	187476	6854 (2.30-2.30)
Sidechain outliers	187428	6854 (2.30-2.30)
RSRZ outliers	180081	6325 (2.30-2.30)

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	940	

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 6711 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.

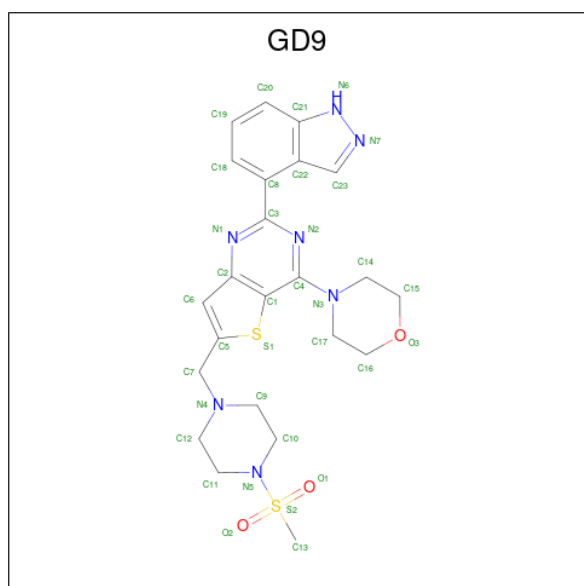
- Molecule 1 is a protein called PHOSPHATIDYLINOSITOL-4,5-BISPHOSPHATE 3-KINASE CATALYTIC SUBUNIT DELTA ISOFORM.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	822	Total	C	N	O	S	0	0	0
			6633	4254	1126	1199	54			

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	105	GLY	-	expression tag	UNP Q3UDT3

- Molecule 2 is 2-(1H-indazol-4-yl)-6-{{4-(methylsulfonyl)piperazin-1-yl}methyl}-4-morpholin-4-yl-thieno[3,2-d]pyrimidine (CCD ID: GD9) (formula: C₂₃H₂₇N₇O₃S₂).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	S	0	0
			35	23	7	3	2		

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	43	Total 43	O 43	0	0

4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	142.72Å 64.04Å 117.74Å 90.00° 103.62° 90.00°	Depositor
Resolution (Å)	58.12 – 2.30 58.12 – 2.30	Depositor EDS
% Data completeness (in resolution range)	99.5 (58.12-2.30) 99.5 (58.12-2.30)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.95 (at 2.29Å)	Xtriage
Refinement program	REFMAC 5.5.0046	Depositor
R, R_{free}	0.220 , 0.279 0.226 , 0.285	Depositor DCC
R_{free} test set	1422 reflections (3.09%)	wwPDB-VP
Wilson B-factor (Å ²)	45.7	Xtriage
Anisotropy	0.081	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 52.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.45$, $\langle L^2 \rangle = 0.27$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.91	EDS
Total number of atoms	6711	wwPDB-VP
Average B, all atoms (Å ²)	23.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.81% 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: GD9

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	0.79	1/6776 (0.0%)	0.96	10/9142 (0.1%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	930	VAL	CA-CB	5.37	1.61	1.54

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	334	ASN	N-CA-C	11.94	123.73	107.73
1	A	416	CYS	CA-C-N	6.30	126.25	119.76
1	A	416	CYS	C-N-CA	6.30	126.25	119.76
1	A	462	ASN	CA-C-N	5.55	125.17	119.56
1	A	462	ASN	C-N-CA	5.55	125.17	119.56
1	A	770	SER	N-CA-C	5.50	118.80	111.75
1	A	444	SER	N-CA-C	5.47	118.61	110.52
1	A	367	SER	CA-C-N	5.21	131.09	121.70
1	A	367	SER	C-N-CA	5.21	131.09	121.70
1	A	849	ALA	N-CA-C	-5.01	106.33	112.90

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	6633	0	6615	147	0
2	A	35	0	27	2	0
3	A	43	0	0	11	0
All	All	6711	0	6642	149	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 11.

All (149) 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:745:CYS:HB2	3:A:2025:HOH:O	1.35	1.25
1:A:834:ILE:CD1	1:A:901:ILE:HD11	1.66	1.24
1:A:962:ARG:HG2	1:A:962:ARG:HH11	1.15	1.12
1:A:1009:GLU:HG2	3:A:2042:HOH:O	1.53	1.06
1:A:549:LEU:HG	1:A:564:MET:HE1	1.39	1.03
1:A:834:ILE:HD13	1:A:901:ILE:HD11	1.38	1.01
1:A:834:ILE:HD11	1:A:901:ILE:HD11	1.50	0.93
1:A:367:SER:HB3	1:A:368:GLU:HB3	1.52	0.91
1:A:617:GLN:HE21	1:A:984:ALA:HA	1.40	0.87
2:A:1500:GD9:S1	2:A:1500:GD9:H14A	2.15	0.86
1:A:617:GLN:NE2	1:A:984:ALA:HA	1.91	0.85
1:A:549:LEU:CG	1:A:564:MET:HE1	2.07	0.83
1:A:756:MET:HE2	1:A:781:GLY:HA3	1.60	0.82
1:A:962:ARG:HG2	1:A:962:ARG:NH1	1.89	0.82
1:A:367:SER:CB	1:A:368:GLU:HB3	2.09	0.81
1:A:367:SER:HB3	1:A:368:GLU:CB	2.09	0.81
1:A:245:GLY:HA3	1:A:768:ALA:HB2	1.63	0.80
1:A:367:SER:HB3	1:A:368:GLU:CA	2.10	0.80
1:A:745:CYS:CB	3:A:2025:HOH:O	2.05	0.77
1:A:367:SER:HB3	1:A:368:GLU:C	2.12	0.75
1:A:834:ILE:CD1	1:A:901:ILE:CD1	2.58	0.74
1:A:895:HIS:H	1:A:898:ASN:HD21	1.36	0.73
1:A:834:ILE:HD11	1:A:901:ILE:CD1	2.19	0.73
1:A:841:LYS:CD	1:A:841:LYS:H	2.02	0.72
1:A:532:TRP:HZ3	1:A:564:MET:HE2	1.56	0.71
1:A:745:CYS:SG	3:A:2025:HOH:O	2.46	0.69
1:A:387:MET:HE3	1:A:590:CYS:HB3	1.74	0.69
1:A:334:ASN:CG	1:A:335:ALA:H	2.00	0.68
1:A:549:LEU:HG	1:A:564:MET:CE	2.21	0.68

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:830:HIS:HD2	3:A:2037:HOH:O	1.77	0.67
1:A:110:LYS:HZ1	1:A:144:ARG:HH12	1.43	0.66
1:A:386:ARG:HG3	1:A:387:MET:HE2	1.79	0.65
1:A:789:LEU:HD13	1:A:981:MET:HE2	1.79	0.65
1:A:700:LYS:HZ3	1:A:756:MET:HE3	1.62	0.63
1:A:246:ARG:NH1	1:A:248:GLU:OE1	2.32	0.63
1:A:435:GLY:HA2	1:A:475:LEU:O	1.99	0.63
1:A:915:PHE:CD2	1:A:915:PHE:C	2.75	0.62
1:A:847:THR:HB	3:A:2034:HOH:O	1.98	0.62
1:A:915:PHE:C	1:A:915:PHE:HD2	2.07	0.62
1:A:929:ARG:N	3:A:2038:HOH:O	2.31	0.62
1:A:278:HIS:HD2	1:A:280:SER:OG	1.82	0.61
1:A:343:VAL:H	1:A:360:SER:HB2	1.66	0.61
1:A:110:LYS:NZ	1:A:144:ARG:HH12	1.99	0.61
1:A:917:GLY:C	1:A:919:PHE:H	2.07	0.61
1:A:195:LYS:HG3	1:A:275:THR:HG23	1.83	0.60
1:A:224:LYS:O	1:A:228:PHE:HB2	2.03	0.59
1:A:553:THR:CG2	1:A:564:MET:HE3	2.31	0.59
1:A:534:MET:O	1:A:538:VAL:HG23	2.03	0.58
1:A:841:LYS:H	1:A:841:LYS:HD3	1.70	0.57
1:A:553:THR:HG22	1:A:564:MET:HE3	1.88	0.56
1:A:742:GLU:HG3	1:A:765:SER:HB2	1.88	0.56
1:A:534:MET:HA	1:A:534:MET:HE2	1.88	0.56
1:A:123:LYS:NZ	1:A:127:GLU:OE1	2.35	0.55
1:A:335:ALA:C	1:A:365:VAL:HG21	2.32	0.55
1:A:343:VAL:H	1:A:360:SER:CB	2.20	0.55
1:A:617:GLN:HE21	1:A:984:ALA:CA	2.17	0.54
1:A:332:LYS:HE3	1:A:333:VAL:N	2.22	0.54
1:A:387:MET:HE3	1:A:590:CYS:SG	2.47	0.54
1:A:139:PHE:CE2	1:A:666:LEU:HB3	2.43	0.54
1:A:344:GLN:HB2	1:A:395:TYR:OH	2.08	0.54
1:A:699:VAL:HG21	1:A:715:MET:CE	2.38	0.53
1:A:549:LEU:CD1	1:A:564:MET:HE1	2.38	0.53
1:A:715:MET:HE1	1:A:751:PHE:HB3	1.91	0.53
1:A:387:MET:HE3	1:A:590:CYS:CB	2.39	0.52
1:A:787:ASP:OD1	1:A:912:PHE:O	2.26	0.52
1:A:843:ASN:C	1:A:844:MET:HG2	2.34	0.52
1:A:512:ARG:NH1	1:A:534:MET:HB3	2.24	0.52
1:A:895:HIS:H	1:A:898:ASN:ND2	2.06	0.51
1:A:271:THR:O	1:A:273:HIS:HD2	1.93	0.51
1:A:621:TYR:CZ	1:A:983:ALA:HB2	2.46	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:834:ILE:HD13	1:A:901:ILE:CD1	2.25	0.50
2:A:1500:GD9:H11A	3:A:2043:HOH:O	2.11	0.50
1:A:328:ILE:HD11	1:A:474:TYR:HB2	1.93	0.50
1:A:394:LEU:HD22	1:A:441:MET:HE1	1.93	0.50
1:A:700:LYS:NZ	1:A:756:MET:HE3	2.28	0.49
1:A:982:ARG:NH2	1:A:991:CYS:HA	2.28	0.49
1:A:334:ASN:CG	1:A:335:ALA:N	2.71	0.49
1:A:841:LYS:CG	1:A:844:MET:HG3	2.43	0.49
1:A:191:LEU:O	1:A:272:PRO:HD2	2.13	0.48
1:A:208:SER:OG	1:A:210:LYS:HG2	2.12	0.48
1:A:192:VAL:HG13	1:A:272:PRO:HB2	1.95	0.47
1:A:364:ASN:O	1:A:366:CYS:N	2.47	0.47
1:A:917:GLY:C	1:A:919:PHE:N	2.72	0.47
1:A:756:MET:HG3	1:A:780:ASN:O	2.13	0.47
1:A:859:LEU:HD21	1:A:905:GLY:HA2	1.97	0.47
1:A:431:GLN:HB2	1:A:484:TYR:CE1	2.49	0.47
1:A:618:VAL:HG12	1:A:629:LEU:CD2	2.44	0.47
1:A:328:ILE:HG22	1:A:329:GLU:HG2	1.97	0.46
1:A:371:TRP:O	1:A:373:GLN:HG2	2.14	0.46
1:A:696:ASN:HD22	1:A:778:PHE:HD2	1.62	0.46
1:A:699:VAL:HG21	1:A:715:MET:HE3	1.97	0.46
1:A:419:ALA:HB3	1:A:441:MET:HE3	1.97	0.46
1:A:679:MET:O	1:A:683:MET:HG3	2.16	0.46
1:A:846:ALA:HA	1:A:857:ASN:HB3	1.96	0.46
1:A:553:THR:HG21	1:A:564:MET:HG2	1.97	0.46
1:A:439:LEU:N	1:A:471:LEU:O	2.44	0.46
1:A:489:GLU:HG3	1:A:490:LYS:N	2.31	0.46
1:A:838:GLN:NE2	1:A:937:ASP:OD2	2.48	0.46
1:A:532:TRP:CZ3	1:A:564:MET:HE2	2.43	0.46
1:A:332:LYS:HA	3:A:2004:HOH:O	2.15	0.46
1:A:394:LEU:CD2	1:A:441:MET:HE1	2.46	0.45
1:A:603:LEU:HD22	1:A:607:GLU:HB3	1.99	0.45
1:A:247:HIS:HB2	1:A:738:SER:HA	1.97	0.45
1:A:285:MET:O	1:A:289:GLN:HG3	2.16	0.45
1:A:898:ASN:HD22	1:A:898:ASN:C	2.24	0.45
1:A:367:SER:OG	1:A:368:GLU:HB3	2.16	0.45
1:A:213:PRO:HD3	1:A:254:TYR:O	2.16	0.45
1:A:550:LEU:O	1:A:553:THR:HG23	2.17	0.45
1:A:987:PRO:HD2	3:A:2028:HOH:O	2.16	0.45
1:A:162:TRP:CE3	1:A:286:ARG:HG3	2.52	0.45
1:A:332:LYS:HB2	1:A:333:VAL:H	1.56	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:962:ARG:NH1	1:A:962:ARG:CG	2.67	0.45
1:A:368:GLU:O	1:A:368:GLU:HG3	2.17	0.44
1:A:617:GLN:HE22	1:A:620:LYS:NZ	2.15	0.44
1:A:154:ARG:HG2	1:A:154:ARG:HH11	1.83	0.44
1:A:553:THR:HG21	1:A:564:MET:HE3	1.99	0.44
1:A:953:PHE:O	1:A:956:PHE:HB3	2.18	0.43
1:A:289:GLN:HG2	1:A:677:HIS:CD2	2.54	0.43
1:A:955:ARG:CZ	1:A:959:TYR:OH	2.66	0.43
1:A:938:PHE:N	1:A:938:PHE:CD1	2.86	0.43
1:A:842:SER:O	1:A:844:MET:HG2	2.18	0.43
1:A:225:ALA:O	1:A:230:GLN:N	2.52	0.43
1:A:839:LEU:HD23	1:A:839:LEU:HA	1.92	0.43
1:A:976:HIS:O	1:A:980:LEU:HG	2.19	0.42
1:A:211:ASP:O	1:A:256:LEU:HG	2.19	0.42
1:A:291:ASN:O	3:A:2003:HOH:O	2.21	0.42
1:A:929:ARG:HH22	1:A:1001:SER:CB	2.33	0.42
1:A:955:ARG:NH2	1:A:959:TYR:OH	2.52	0.42
1:A:364:ASN:C	1:A:366:CYS:H	2.28	0.41
1:A:368:GLU:N	1:A:369:PRO:CD	2.83	0.41
1:A:435:GLY:O	1:A:475:LEU:N	2.49	0.41
1:A:915:PHE:HD2	1:A:915:PHE:O	2.03	0.41
1:A:356:LYS:HE2	1:A:378:ASP:OD2	2.20	0.41
1:A:984:ALA:HB1	1:A:986:LEU:HD13	2.02	0.41
1:A:437:ARG:O	1:A:472:VAL:HA	2.21	0.41
1:A:768:ALA:HB3	1:A:772:GLY:HA3	2.01	0.41
1:A:620:LYS:HE2	1:A:660:VAL:HG11	2.01	0.41
1:A:512:ARG:NH2	1:A:538:VAL:HG22	2.36	0.41
1:A:278:HIS:CD2	1:A:280:SER:H	2.38	0.41
1:A:187:ASN:N	1:A:210:LYS:HD3	2.36	0.41
1:A:432:LEU:HG	1:A:433:LYS:N	2.35	0.41
1:A:513:GLU:O	1:A:517:ARG:HD2	2.21	0.41
1:A:525:GLU:O	1:A:528:LYS:HB2	2.21	0.41
1:A:364:ASN:C	1:A:366:CYS:N	2.80	0.40
1:A:715:MET:HE2	1:A:759:LEU:HD22	2.03	0.40
1:A:952:LYS:HD3	1:A:952:LYS:HA	1.95	0.40
1:A:256:LEU:O	1:A:262:ILE:HB	2.21	0.40
1:A:532:TRP:CZ3	1:A:553:THR:HB	2.56	0.40
1:A:699:VAL:HG21	1:A:715:MET:HE2	2.01	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	800/940 (85%)	762 (95%)	34 (4%)	4 (0%)	24	31

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	365	VAL
1	A	478	VAL
1	A	332	LYS
1	A	366	CYS

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	728/827 (88%)	676 (93%)	52 (7%)	13	19

All (52) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	111	LYS
1	A	188	ARG
1	A	190	LEU
1	A	200	GLU
1	A	228	PHE
1	A	263	CYS
1	A	264	SER

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Mol	Chain	Res	Type
1	A	270	LEU
1	A	275	THR
1	A	281	SER
1	A	316	LEU
1	A	317	TRP
1	A	319	LEU
1	A	331	ARG
1	A	332	LYS
1	A	333	VAL
1	A	339	MET
1	A	340	LYS
1	A	352	GLU
1	A	356	LYS
1	A	365	VAL
1	A	367	SER
1	A	374	ARG
1	A	397	VAL
1	A	423	LEU
1	A	453	LEU
1	A	467	SER
1	A	475	LEU
1	A	511	LEU
1	A	514	ILE
1	A	517	ARG
1	A	530	LEU
1	A	553	THR
1	A	599	SER
1	A	618	VAL
1	A	634	LEU
1	A	642	LYS
1	A	726	GLU
1	A	743	GLU
1	A	756	MET
1	A	795	GLN
1	A	804	GLU
1	A	841	LYS
1	A	855	LEU
1	A	898	ASN
1	A	901	ILE
1	A	915	PHE
1	A	930	VAL
1	A	951	GLU

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Mol	Chain	Res	Type
1	A	962	ARG
1	A	1004	LEU
1	A	1009	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (23) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	116	GLN
1	A	155	GLN
1	A	156	GLN
1	A	206	GLN
1	A	273	HIS
1	A	278	HIS
1	A	291	ASN
1	A	344	GLN
1	A	349	HIS
1	A	536	HIS
1	A	539	GLN
1	A	617	GLN
1	A	721	GLN
1	A	730	HIS
1	A	780	ASN
1	A	830	HIS
1	A	898	ASN
1	A	914	HIS
1	A	918	ASN
1	A	943	GLN
1	A	948	ASN
1	A	970	HIS
1	A	1014	HIS

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

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$
2	GD9	A	1500	-	39,40,40	3.63	10 (25%)	51,59,59	2.43	20 (39%)

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	GD9	A	1500	-	-	6/18/36/36	0/6/6/6

All (10) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	1500	GD9	N6-N7	-16.56	1.23	1.36
2	A	1500	GD9	C22-C23	-7.46	1.33	1.42
2	A	1500	GD9	C2-C6	-5.41	1.34	1.42
2	A	1500	GD9	O1-S2	5.32	1.51	1.43
2	A	1500	GD9	C8-C3	-4.97	1.38	1.48
2	A	1500	GD9	O2-S2	4.41	1.50	1.43
2	A	1500	GD9	S2-N5	4.40	1.70	1.63
2	A	1500	GD9	C5-S1	-4.28	1.65	1.74
2	A	1500	GD9	C22-C21	-3.22	1.38	1.41
2	A	1500	GD9	C23-N7	3.04	1.34	1.32

All (20) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	1500	GD9	C23-N7-N6	6.25	109.28	106.02
2	A	1500	GD9	O1-S2-O2	-6.09	109.35	118.46
2	A	1500	GD9	C2-N1-C3	4.52	120.38	116.24
2	A	1500	GD9	C22-C23-N7	-4.51	109.46	111.34
2	A	1500	GD9	C1-S1-C5	4.44	94.34	91.92
2	A	1500	GD9	C20-C21-C22	-3.96	119.52	122.66
2	A	1500	GD9	C17-N3-C14	3.70	119.89	111.57
2	A	1500	GD9	C10-N5-S2	-3.60	110.95	116.71
2	A	1500	GD9	O1-S2-N5	3.46	109.91	107.02
2	A	1500	GD9	C2-C1-S1	-3.34	106.28	110.33
2	A	1500	GD9	C12-C11-N5	3.13	112.29	108.97
2	A	1500	GD9	C1-C4-N2	-3.10	118.63	122.33
2	A	1500	GD9	C21-N6-N7	-2.90	110.10	111.52
2	A	1500	GD9	C13-S2-N5	2.63	110.36	107.27
2	A	1500	GD9	O3-C16-C17	2.43	117.01	111.77
2	A	1500	GD9	C16-O3-C15	2.39	117.60	109.88
2	A	1500	GD9	C12-N4-C9	2.31	113.81	108.84
2	A	1500	GD9	C11-N5-S2	-2.26	113.10	116.71
2	A	1500	GD9	C4-N2-C3	2.15	120.96	115.92
2	A	1500	GD9	C7-N4-C9	-2.12	107.85	111.14

There are no chirality outliers.

All (6) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	1500	GD9	C6-C5-C7-N4
2	A	1500	GD9	C10-N5-S2-O2
2	A	1500	GD9	S1-C5-C7-N4
2	A	1500	GD9	C5-C7-N4-C9
2	A	1500	GD9	C5-C7-N4-C12
2	A	1500	GD9	C10-N5-S2-C13

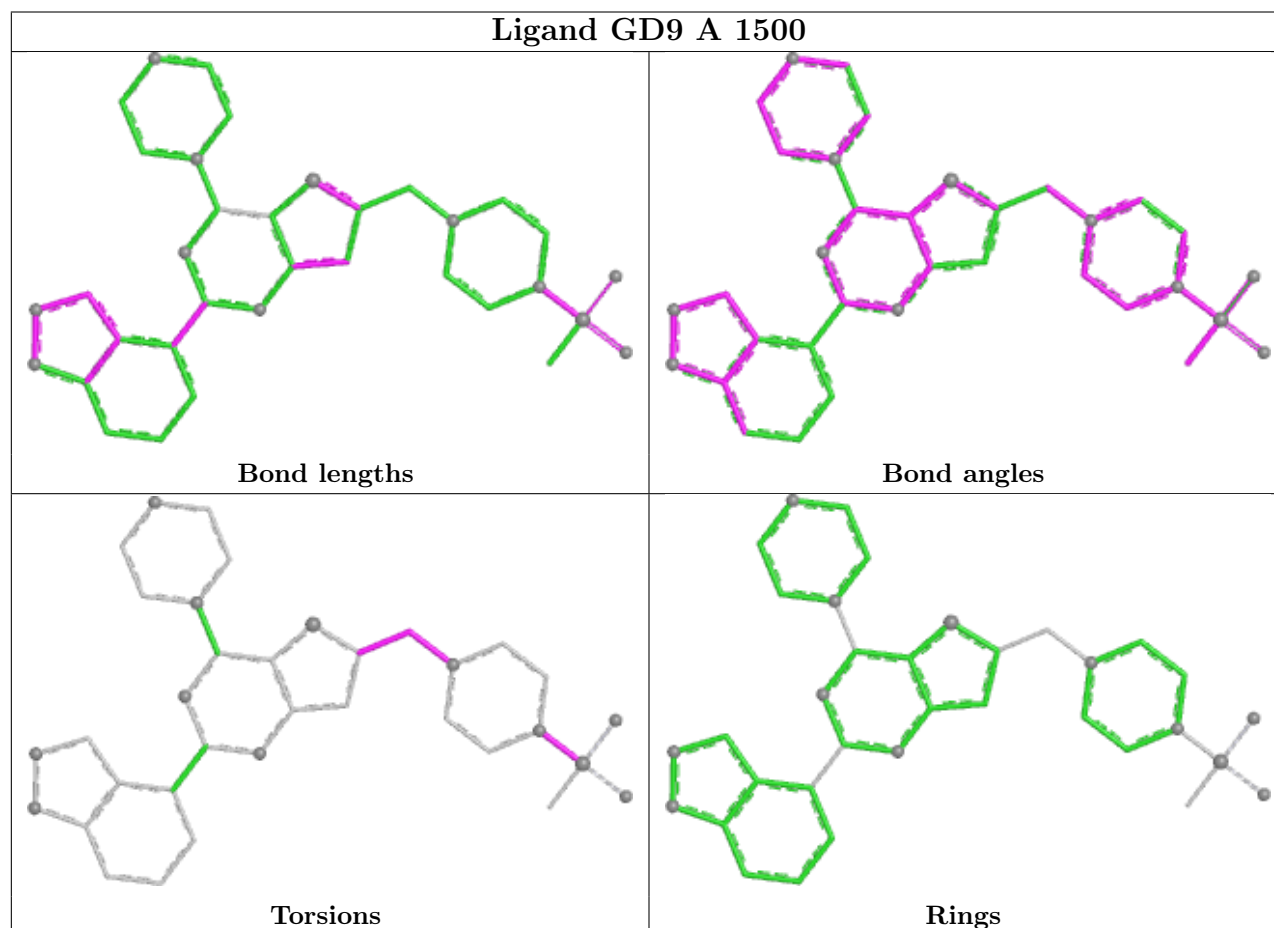
There are no ring outliers.

1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	1500	GD9	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

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	822/940 (87%)	0.43	57 (6%) 23 25	9, 22, 37, 56	0

All (57) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	479	ALA	8.0
1	A	494	LEU	7.1
1	A	482	PRO	5.9
1	A	428	TYR	5.8
1	A	487	ALA	5.5
1	A	846	ALA	5.4
1	A	478	VAL	5.4
1	A	318	SER	4.7
1	A	334	ASN	4.5
1	A	317	TRP	4.5
1	A	341	LEU	4.0
1	A	486	PRO	3.9
1	A	445	VAL	3.4
1	A	367	SER	3.4
1	A	386	ARG	3.4
1	A	491	ILE	3.2
1	A	484	TYR	3.2
1	A	485	PHE	3.1
1	A	388	ALA	3.0
1	A	1027	TRP	3.0
1	A	847	THR	3.0
1	A	387	MET	3.0
1	A	335	ALA	2.9
1	A	840	ASN	2.7
1	A	511	LEU	2.6
1	A	460	ARG	2.6
1	A	349	HIS	2.5

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Mol	Chain	Res	Type	RSRZ
1	A	463	PRO	2.5
1	A	514	ILE	2.5
1	A	512	ARG	2.4
1	A	398	VAL	2.4
1	A	492	LEU	2.4
1	A	395	TYR	2.3
1	A	490	LYS	2.3
1	A	291	ASN	2.3
1	A	385	PRO	2.3
1	A	435	GLY	2.3
1	A	591	TYR	2.3
1	A	468	ALA	2.3
1	A	913	GLY	2.2
1	A	323	PHE	2.2
1	A	350	GLY	2.2
1	A	483	VAL	2.2
1	A	427	ASP	2.2
1	A	461	GLY	2.2
1	A	431	GLN	2.2
1	A	424	MET	2.1
1	A	319	LEU	2.1
1	A	384	LEU	2.1
1	A	322	PRO	2.1
1	A	919	PHE	2.1
1	A	434	THR	2.1
1	A	325	ILE	2.1
1	A	429	LYS	2.0
1	A	430	ASP	2.0
1	A	459	VAL	2.0
1	A	637	ALA	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 ⓘ

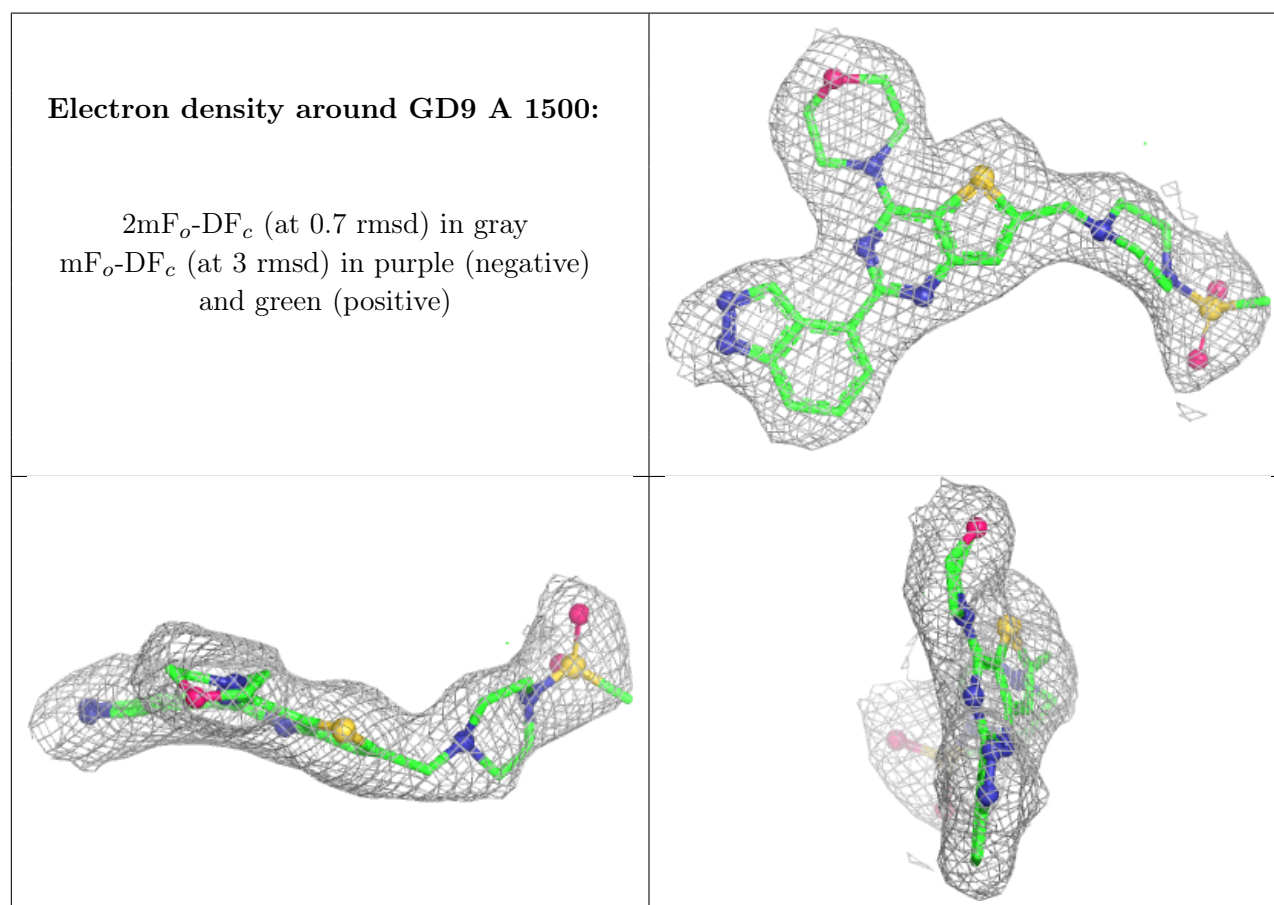
There are no oligosaccharides in this entry.

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
2	GD9	A	1500	35/35	0.94	0.09	34,40,70,72	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.