



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 04:01 PM UTC

PDB ID : 5G2N / pdb_00005g2n
Title : X-ray structure of PI3Kinase Gamma in complex with Copanlisib
Authors : Schaefer, M.; Scott, W.J.; Hentemann, M.F.; Rowley, R.B.; Bull, C.O.; Jenkins, S.; Bullion, A.M.; Johnson, J.; Redman, A.; Robbins, A.H.; Esler, W.; Fracasso, R.P.; Garrison, T.; Hamilton, M.; Michels, M.; Wood, J.E.; Wilkie, D.P.; Xiao, H.; Levy, J.; Liu, N.; Stasik, E.; Brands, M.; Lefranc, J.
Deposited on : 2016-04-11
Resolution : 2.68 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

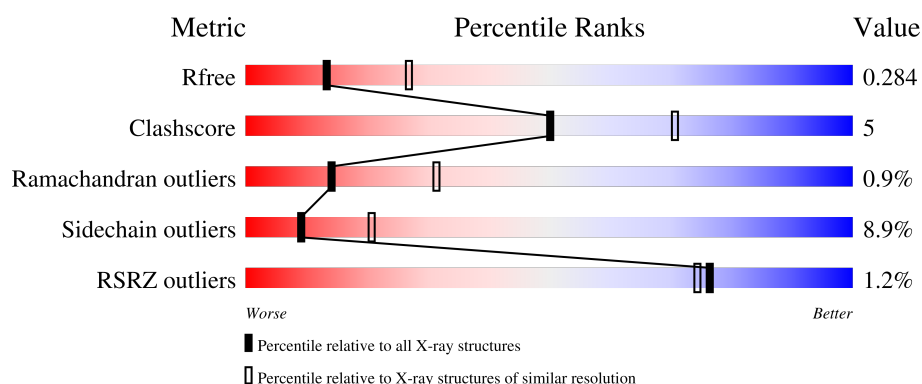
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.68 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	5070 (2.70-2.66)
Clashscore	190562	5409 (2.70-2.66)
Ramachandran outliers	187476	5324 (2.70-2.66)
Sidechain outliers	187428	5324 (2.70-2.66)
RSRZ outliers	180081	5070 (2.70-2.66)

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	980	67% 14% • 16%

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 6710 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.

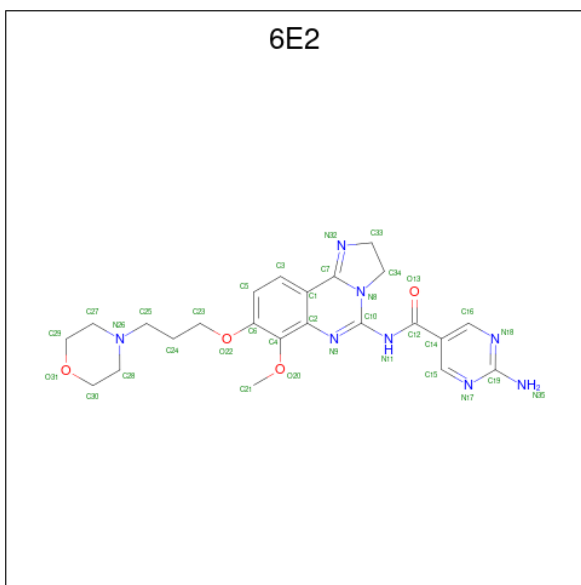
- Molecule 1 is a protein called PHOSPHATIDYLINOSITOL-4,5-BISPHOSPHATE 3-KINASE CATALYTIC SUBUNIT GAMMA ISOFORM.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	823	Total	C	N	O	S	0	0	0
			6659	4287	1127	1210	35			

There are 21 discrepancies between the modelled and reference sequences:

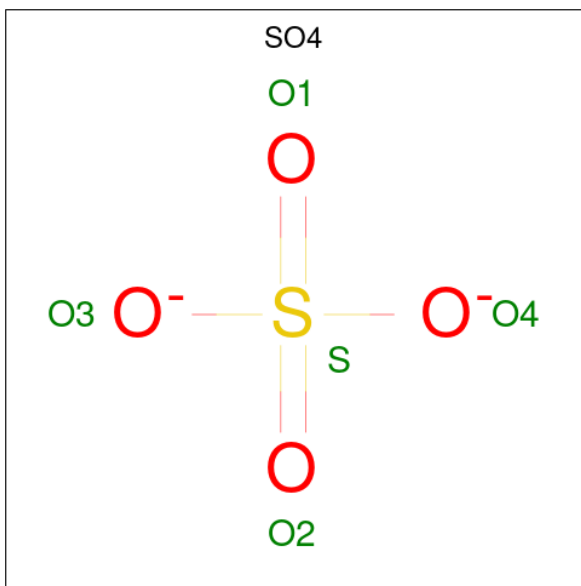
Chain	Residue	Modelled	Actual	Comment	Reference
A	139	MET	-	expression tag	UNP P48736
A	140	LEU	-	expression tag	UNP P48736
A	141	LEU	-	expression tag	UNP P48736
A	142	GLY	-	expression tag	UNP P48736
A	143	SER	-	expression tag	UNP P48736
A	1103	GLU	-	expression tag	UNP P48736
A	1104	PHE	-	expression tag	UNP P48736
A	1105	GLY	-	expression tag	UNP P48736
A	1106	LEU	-	expression tag	UNP P48736
A	1107	VAL	-	expression tag	UNP P48736
A	1108	PRO	-	expression tag	UNP P48736
A	1109	ARG	-	expression tag	UNP P48736
A	1110	GLY	-	expression tag	UNP P48736
A	1111	SER	-	expression tag	UNP P48736
A	1112	GLY	-	expression tag	UNP P48736
A	1113	HIS	-	expression tag	UNP P48736
A	1114	HIS	-	expression tag	UNP P48736
A	1115	HIS	-	expression tag	UNP P48736
A	1116	HIS	-	expression tag	UNP P48736
A	1117	HIS	-	expression tag	UNP P48736
A	1118	HIS	-	expression tag	UNP P48736

- Molecule 2 is 2-azanyl- {N}-[7-methoxy-8-(3-morpholin-4-ylpropoxy)-2,3-dihydroimidazo[1,2-c]quinazolin-5-yl]pyrimidine-5-carboxamide (CCD ID: 6E2) (formula: C₂₃H₂₈N₈O₄).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			35	23	8	4		

- Molecule 3 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	O	S	0	0
			5	4	1		

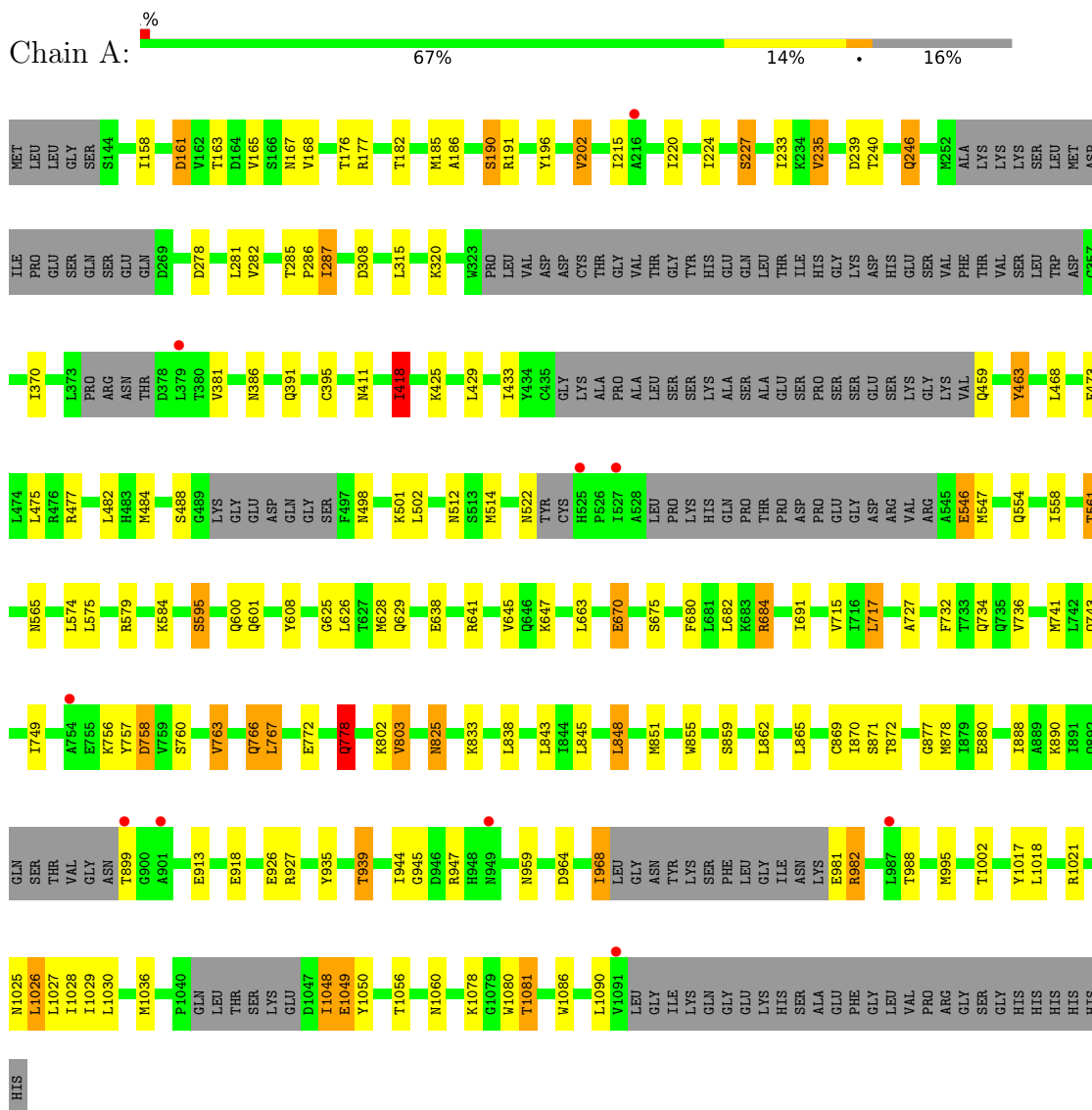
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	11	Total	O	0	0
			11	11		

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 GAMMA ISOFORM



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	144.76Å 68.34Å 106.47Å 90.00° 95.11° 90.00°	Depositor
Resolution (Å)	61.78 – 2.68 61.78 – 2.68	Depositor EDS
% Data completeness (in resolution range)	96.0 (61.78-2.68) 95.9 (61.78-2.68)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.02 (at 2.69Å)	Xtriage
Refinement program	REFMAC 5.8.0124	Depositor
R, R_{free}	0.211 , 0.285 0.211 , 0.284	Depositor DCC
R_{free} test set	1410 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	57.2	Xtriage
Anisotropy	0.849	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 57.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.29$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	6710	wwPDB-VP
Average B, all atoms (Å ²)	71.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.93% 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: SO4, 6E2

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	1.16	8/6802 (0.1%)	1.20	17/9203 (0.2%)

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	670	GLU	CA-C	5.90	1.60	1.53
1	A	554	GLN	CA-C	-5.53	1.45	1.52
1	A	185	MET	N-CA	-5.50	1.39	1.46
1	A	425	LYS	N-CA	-5.27	1.39	1.46
1	A	546	GLU	N-CA	5.22	1.51	1.46
1	A	386	ASN	C-O	-5.19	1.18	1.24
1	A	584	LYS	N-CA	-5.12	1.39	1.46
1	A	579	ARG	C-O	-5.03	1.18	1.24

All (17) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	418	ILE	CB-CA-C	-6.97	102.01	111.63
1	A	684	ARG	CA-C-N	5.89	126.52	119.98
1	A	684	ARG	C-N-CA	5.89	126.52	119.98
1	A	803	VAL	N-CA-C	-5.83	100.08	108.53
1	A	482	LEU	N-CA-C	5.64	117.71	108.52
1	A	161	ASP	N-CA-C	5.43	117.49	108.20
1	A	411	ASN	N-CA-C	5.34	118.62	111.24
1	A	600	GLN	N-CA-C	5.34	117.36	108.02
1	A	1025	ASN	N-CA-C	5.33	117.17	111.36
1	A	691	ILE	CB-CA-C	-5.29	105.20	111.97
1	A	1048	ILE	CB-CA-C	-5.28	105.17	112.24
1	A	595	SER	N-CA-C	-5.22	104.35	111.56
1	A	645	VAL	N-CA-C	-5.19	105.47	110.72

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	715	VAL	O-C-N	5.18	126.90	121.87
1	A	463	TYR	N-CA-C	5.09	116.80	109.07
1	A	502	LEU	N-CA-C	5.08	119.62	113.38
1	A	1027	LEU	N-CA-C	-5.04	105.70	111.14

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	6659	0	6666	71	0
2	A	35	0	0	1	0
3	A	5	0	0	0	0
4	A	11	0	0	0	0
All	All	6710	0	6666	71	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 5.

All (71) 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:629:GLN:HG2	1:A:1029:ILE:HD11	1.62	0.82
1:A:767:LEU:HD12	1:A:803:VAL:HG23	1.72	0.71
1:A:475:LEU:HD21	1:A:522:ASN:HB2	1.74	0.70
1:A:939:THR:HG23	1:A:945:GLY:CA	2.27	0.64
1:A:763:VAL:HA	1:A:766:GLN:HE22	1.63	0.64
1:A:186:ALA:O	1:A:190:SER:HB2	1.97	0.64
1:A:161:ASP:OD1	1:A:163:THR:OG1	2.16	0.63
1:A:629:GLN:HG2	1:A:1029:ILE:CD1	2.29	0.62
1:A:935:TYR:O	1:A:939:THR:HB	2.00	0.60
1:A:395:CYS:HB3	1:A:418:ILE:HD11	1.83	0.60
1:A:1086:TRP:CZ3	1:A:1090:LEU:HD11	2.38	0.59
1:A:395:CYS:CB	1:A:418:ILE:HD11	2.34	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:825:ASN:HD22	1:A:825:ASN:N	2.03	0.57
1:A:734:GLN:HE21	1:A:734:GLN:HA	1.69	0.56
1:A:641:ARG:HE	1:A:670:GLU:CD	2.14	0.55
1:A:939:THR:CG2	1:A:945:GLY:CA	2.85	0.54
1:A:1048:ILE:O	1:A:1049:GLU:C	2.50	0.54
1:A:202:VAL:HG22	1:A:285:THR:HG21	1.90	0.53
1:A:880:GLU:O	2:A:2001:6E2:C33	2.57	0.53
1:A:939:THR:HG23	1:A:945:GLY:HA2	1.90	0.52
1:A:625:GLY:O	1:A:629:GLN:HG3	2.11	0.51
1:A:1017:TYR:OH	1:A:1056:THR:HG22	2.10	0.51
1:A:224:ILE:HD12	1:A:224:ILE:N	2.25	0.51
1:A:869:CYS:O	1:A:870:ILE:HD13	2.10	0.51
1:A:239:ASP:O	1:A:286:PRO:HA	2.09	0.50
1:A:927:ARG:HD3	1:A:959:ASN:HB2	1.92	0.50
1:A:1021:ARG:HE	1:A:1056:THR:HG23	1.77	0.50
1:A:308:ASP:N	1:A:308:ASP:OD1	2.44	0.49
1:A:176:THR:O	1:A:177:ARG:C	2.56	0.48
1:A:756:LYS:O	1:A:758:ASP:N	2.46	0.48
1:A:278:ASP:OD1	1:A:278:ASP:C	2.56	0.48
1:A:220:ILE:N	1:A:235:VAL:O	2.47	0.47
1:A:558:ILE:HG21	1:A:575:LEU:HD21	1.96	0.47
1:A:370:ILE:O	1:A:370:ILE:HG23	2.15	0.47
1:A:944:ILE:HG22	1:A:968:ILE:HB	1.97	0.46
1:A:1080:TRP:O	1:A:1081:THR:C	2.58	0.46
1:A:935:TYR:O	1:A:939:THR:CB	2.64	0.46
1:A:741:MET:HE1	1:A:778:GLN:O	2.16	0.46
1:A:429:LEU:HB2	1:A:468:LEU:HD21	1.97	0.46
1:A:315:LEU:O	1:A:727:ALA:HB2	2.17	0.45
1:A:246:GLN:HA	1:A:246:GLN:OE1	2.16	0.45
1:A:947:ARG:NH2	1:A:964:ASP:O	2.50	0.45
1:A:546:GLU:CG	1:A:547:MET:H	2.29	0.45
1:A:628:MET:HE1	1:A:663:LEU:CD2	2.47	0.45
1:A:433:ILE:HD12	1:A:484:MET:HE1	1.98	0.44
1:A:939:THR:CG2	1:A:945:GLY:HA3	2.47	0.44
1:A:1021:ARG:NE	1:A:1056:THR:HG23	2.33	0.44
1:A:939:THR:CG2	1:A:945:GLY:HA2	2.47	0.44
1:A:512:ASN:N	1:A:512:ASN:HD22	2.15	0.43
1:A:158:ILE:HG12	1:A:717:LEU:HD13	2.00	0.43
1:A:927:ARG:NH1	1:A:959:ASN:HD22	2.16	0.43
1:A:561:THR:HG21	1:A:565:ASN:ND2	2.33	0.43
1:A:1026:LEU:O	1:A:1030:LEU:HG	2.18	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:463:TYR:CE2	1:A:501:LYS:HA	2.53	0.43
1:A:608:TYR:CD1	1:A:608:TYR:N	2.85	0.43
1:A:608:TYR:N	1:A:608:TYR:HD1	2.16	0.43
1:A:848:LEU:HD12	1:A:851:MET:CE	2.49	0.43
1:A:1060:ASN:OD1	1:A:1060:ASN:C	2.61	0.43
1:A:743:GLN:NE2	1:A:872:THR:OG1	2.52	0.42
1:A:498:ASN:HB2	1:A:1036:MET:O	2.20	0.42
1:A:855:TRP:CE3	1:A:862:LEU:HD23	2.55	0.42
1:A:167:ASN:CG	1:A:167:ASN:O	2.59	0.41
1:A:484:MET:SD	1:A:514:MET:HG3	2.61	0.41
1:A:760:SER:O	1:A:763:VAL:N	2.51	0.41
1:A:680:PHE:O	1:A:684:ARG:HG2	2.21	0.41
1:A:732:PHE:O	1:A:736:VAL:HG23	2.20	0.41
1:A:981:GLU:HA	1:A:982:ARG:CZ	2.50	0.41
1:A:191:ARG:HD2	1:A:196:TYR:CD1	2.55	0.41
1:A:1049:GLU:O	1:A:1050:TYR:C	2.63	0.41
1:A:872:THR:OG1	1:A:877:GLY:HA2	2.22	0.40
1:A:1048:ILE:O	1:A:1050:TYR:N	2.55	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	801/980 (82%)	733 (92%)	61 (8%)	7 (1%)	14 31

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	757	TYR
1	A	1049	GLU
1	A	227	SER

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Mol	Chain	Res	Type
1	A	287	ILE
1	A	778	GLN
1	A	1081	THR
1	A	758	ASP

5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	A	733/874 (84%)	668 (91%)	65 (9%)	9 21

All (65) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	165	VAL
1	A	168	VAL
1	A	182	THR
1	A	190	SER
1	A	202	VAL
1	A	215	ILE
1	A	227	SER
1	A	233	ILE
1	A	235	VAL
1	A	240	THR
1	A	246	GLN
1	A	281	LEU
1	A	282	VAL
1	A	287	ILE
1	A	320	LYS
1	A	381	VAL
1	A	391	GLN
1	A	418	ILE
1	A	459	GLN
1	A	473	PHE
1	A	477	ARG
1	A	488	SER

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Mol	Chain	Res	Type
1	A	561	THR
1	A	574	LEU
1	A	595	SER
1	A	601	GLN
1	A	626	LEU
1	A	638	GLU
1	A	647	LYS
1	A	675	SER
1	A	682	LEU
1	A	717	LEU
1	A	749	ILE
1	A	763	VAL
1	A	766	GLN
1	A	767	LEU
1	A	772	GLU
1	A	778	GLN
1	A	802	LYS
1	A	825	ASN
1	A	833	LYS
1	A	838	LEU
1	A	843	LEU
1	A	845	LEU
1	A	848	LEU
1	A	859	SER
1	A	865	LEU
1	A	871	SER
1	A	878	MET
1	A	888	ILE
1	A	890	LYS
1	A	899	THR
1	A	913	GLU
1	A	918	GLU
1	A	926	GLU
1	A	939	THR
1	A	968	ILE
1	A	982	ARG
1	A	988	THR
1	A	995	MET
1	A	1002	THR
1	A	1018	LEU
1	A	1026	LEU
1	A	1028	ILE

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Mol	Chain	Res	Type
1	A	1078	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (20) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	291	GLN
1	A	304	HIS
1	A	392	GLN
1	A	396	GLN
1	A	486	GLN
1	A	512	ASN
1	A	522	ASN
1	A	525	HIS
1	A	549	ASN
1	A	550	GLN
1	A	600	GLN
1	A	639	ASN
1	A	705	GLN
1	A	708	HIS
1	A	734	GLN
1	A	743	GLN
1	A	766	GLN
1	A	825	ASN
1	A	1023	HIS
1	A	1083	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry

2 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
3	SO4	A	2092	-	4,4,4	0.49	0	6,6,6	0.41	0
2	6E2	A	2001	-	39,39,39	1.67	8 (20%)	47,54,54	2.30	16 (34%)

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	6E2	A	2001	-	-	3/17/31/31	0/5/5/5

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	2001	6E2	C10-N9	4.98	1.37	1.30
2	A	2001	6E2	C10-N8	-3.32	1.37	1.39
2	A	2001	6E2	C34-N8	-2.89	1.43	1.47
2	A	2001	6E2	C1-C7	-2.75	1.39	1.45
2	A	2001	6E2	C12-N11	-2.57	1.33	1.37
2	A	2001	6E2	O20-C4	-2.11	1.34	1.38
2	A	2001	6E2	C28-N26	2.09	1.52	1.46
2	A	2001	6E2	C2-N9	-2.04	1.34	1.38

All (16) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	2001	6E2	N8-C10-N9	-9.42	119.19	124.17
2	A	2001	6E2	C23-O22-C6	4.79	129.24	117.69
2	A	2001	6E2	C30-C28-N26	4.20	116.50	110.12
2	A	2001	6E2	C34-C33-N32	-3.09	102.11	106.53

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	2001	6E2	C1-C2-N9	-3.08	119.29	122.33
2	A	2001	6E2	O31-C29-C27	-2.97	105.36	111.77
2	A	2001	6E2	C15-C14-C16	2.88	118.87	115.36
2	A	2001	6E2	C27-N26-C28	2.83	114.94	108.84
2	A	2001	6E2	C29-C27-N26	2.82	114.40	110.12
2	A	2001	6E2	O31-C30-C28	2.80	117.81	111.77
2	A	2001	6E2	C14-C16-N18	-2.48	119.94	123.59
2	A	2001	6E2	C4-C2-N9	2.43	122.25	118.14
2	A	2001	6E2	C14-C15-N17	-2.42	120.03	123.59
2	A	2001	6E2	N17-C19-N18	-2.15	122.34	124.54
2	A	2001	6E2	N35-C19-N18	2.13	119.60	117.40
2	A	2001	6E2	C15-N17-C19	2.07	119.94	116.29

There are no chirality outliers.

All (3) torsion outliers are listed below:

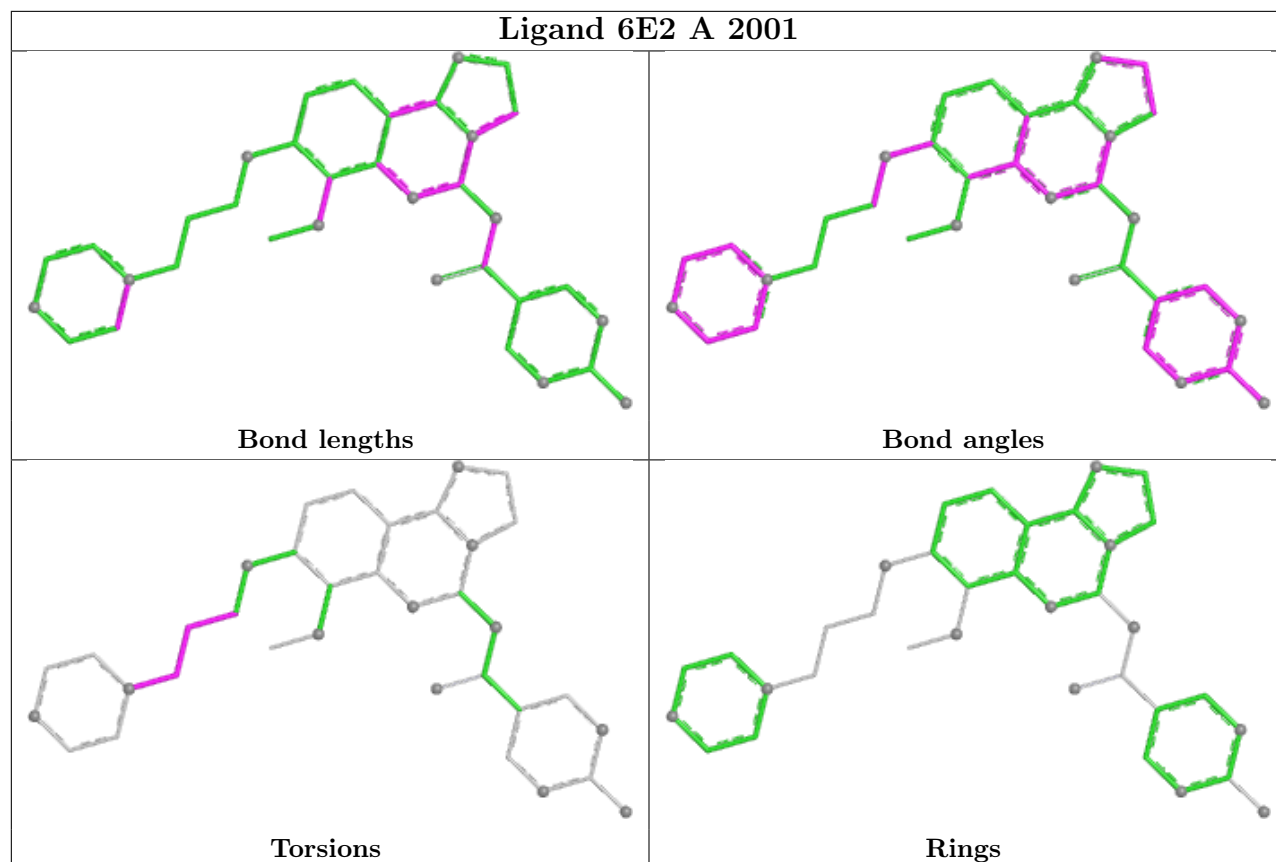
Mol	Chain	Res	Type	Atoms
2	A	2001	6E2	C23-C24-C25-N26
2	A	2001	6E2	O22-C23-C24-C25
2	A	2001	6E2	C24-C25-N26-C27

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	2001	6E2	1	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, 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	823/980 (83%)	0.05	10 (1%) 76 74	41, 69, 107, 140	0

All (10) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	901	ALA	3.2
1	A	899	THR	3.0
1	A	754	ALA	2.9
1	A	527	ILE	2.9
1	A	949	ASN	2.7
1	A	1091	VAL	2.7
1	A	379	LEU	2.7
1	A	216	ALA	2.2
1	A	987	LEU	2.2
1	A	525	HIS	2.1

6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

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

6.3 Carbohydrates [i](#)

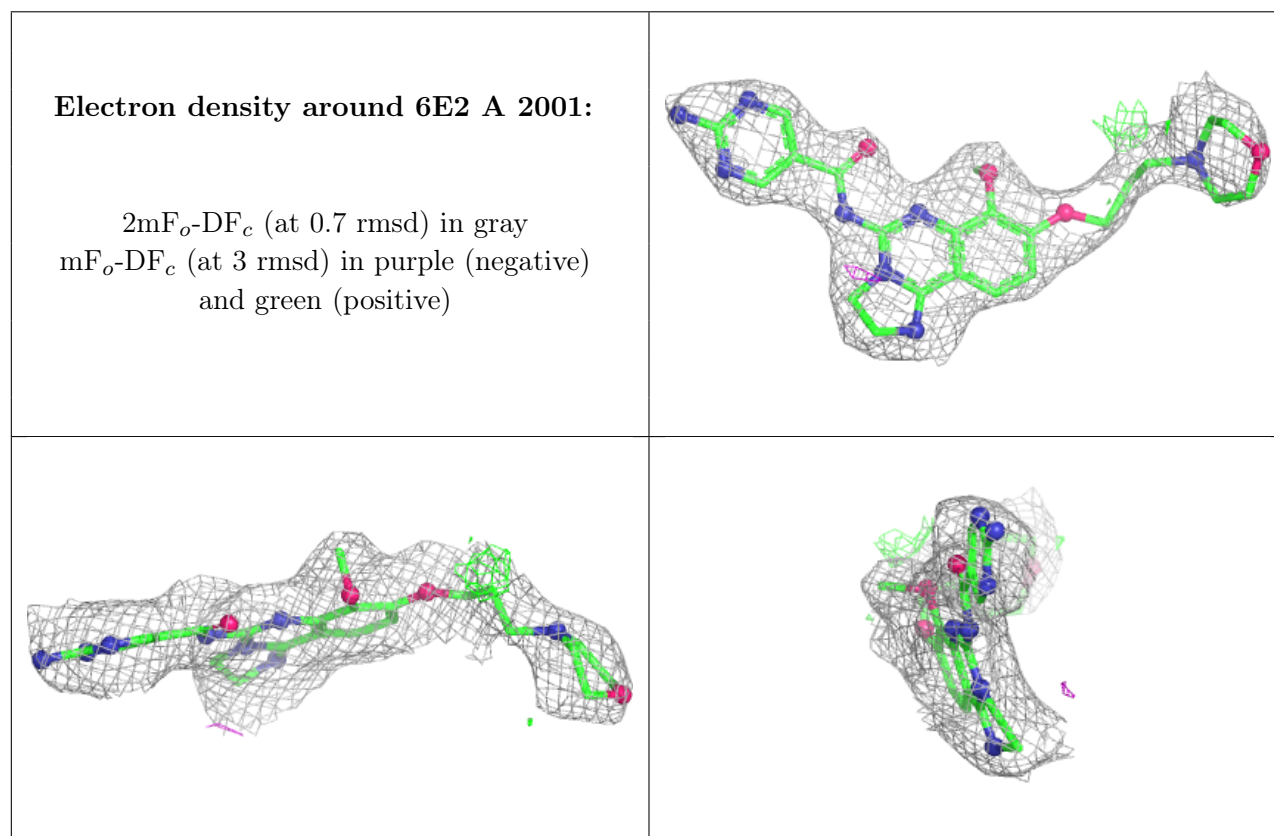
There are no oligosaccharides in this entry.

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	SO4	A	2092	5/5	0.80	0.15	106,108,115,124	0
2	6E2	A	2001	35/35	0.91	0.10	55,60,88,90	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.