Full wwPDB X-ray Structure Validation Report (i)

Mar 8, 2026 – 05:52 PM UTC

PDB ID	:	5NWH / pdb_00005nwh
Title	:	Potent inhibitors of NUDT5 silence hormone signaling in breast cancer
Authors	:	Carter, M.; Stenmark, P.
Deposited on	:	2017-05-06
Resolution	:	2.60 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 (i) 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 (i)) were used in the production of this report:

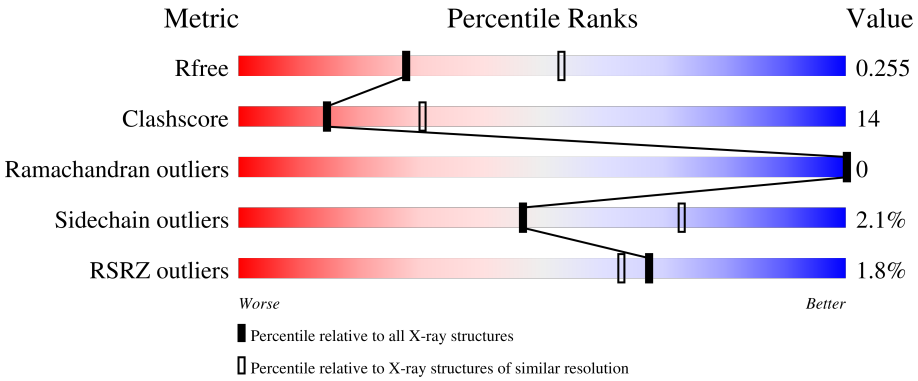
MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal 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 (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

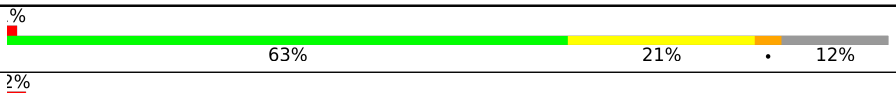
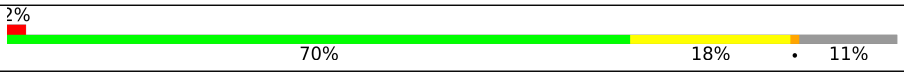
The reported resolution of this entry is 2.60 Å.

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	4008 (2.60-2.60)
Clashscore	190562	4347 (2.60-2.60)
Ramachandran outliers	187476	4277 (2.60-2.60)
Sidechain outliers	187428	4277 (2.60-2.60)
RSRZ outliers	180081	4008 (2.60-2.60)

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 <=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	219	
1	B	219	

2 Entry composition

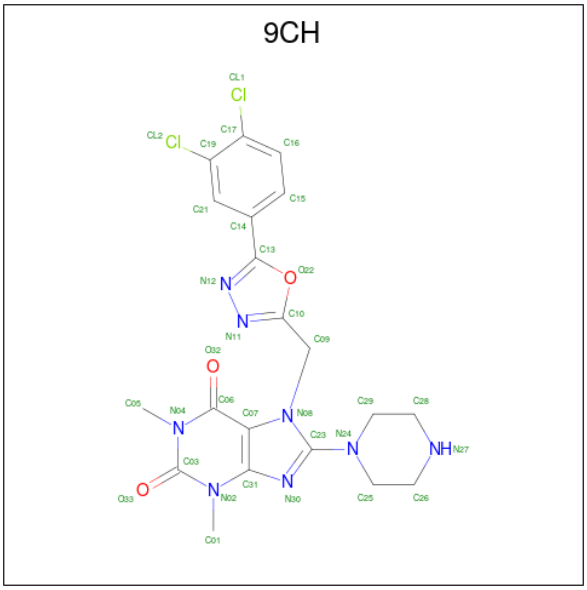
There are 3 unique types of molecules in this entry. The entry contains 3148 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 ADP-sugar pyrophosphatase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	193	Total	C	N	O	S	0	2	0
			1514	953	254	297	10			
1	B	195	Total	C	N	O	S	0	1	0
			1522	958	256	299	9			

- Molecule 2 is 7-[[5-(3,4-dichlorophenyl)-1,3,4-oxadiazol-2-yl]methyl]-1,3-dimethyl-8-piperazin-1-yl-purine-2,6-dione (CCD ID: 9CH) (formula: $C_{20}H_{20}Cl_2N_8O_3$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	Cl	N	O	0	0
			33	20	2	8	3		
2	A	1	Total	C	Cl	N	O	0	0
			33	20	2	8	3		

- Molecule 3 is water.

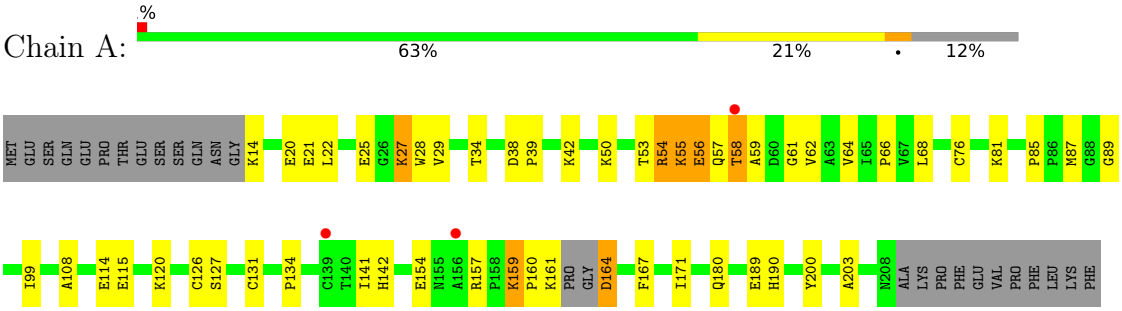
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	24	Total O 24 24	0	0
3	B	22	Total O 22 22	0	0

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.

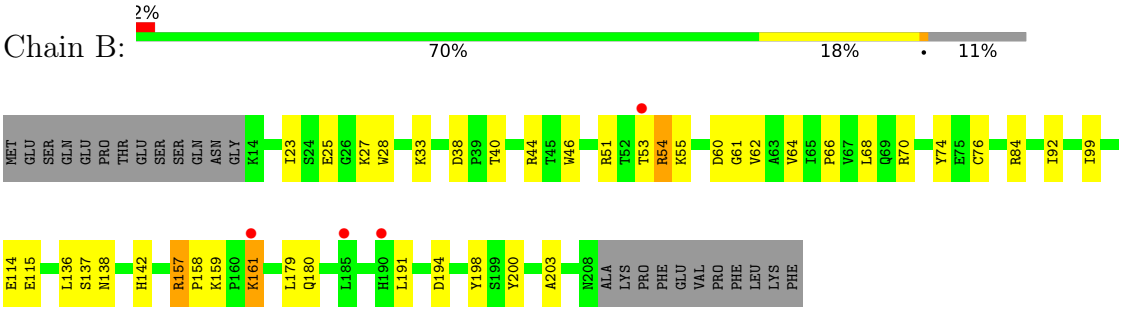
• Molecule 1: ADP-sugar pyrophosphatase

Chain A:



• Molecule 1: ADP-sugar pyrophosphatase

Chain B:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	I 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	100.56Å 40.15Å 104.06Å 90.00° 113.38° 90.00°	Depositor
Resolution (Å)	46.15 – 2.60 46.15 – 2.60	Depositor EDS
% Data completeness (in resolution range)	98.6 (46.15-2.60) 98.6 (46.15-2.60)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.95 (at 2.61Å)	Xtriage
Refinement program	PHENIX dev_1631	Depositor
R, R_{free}	0.187 , 0.253 0.193 , 0.255	Depositor DCC
R_{free} test set	836 reflections (5.60%)	wwPDB-VP
Wilson B-factor (Å^2)	49.8	Xtriage
Anisotropy	0.653	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.32 , 61.3	EDS
L-test for twinning[2]	$< \|L\| > = 0.48$, $< L^2 > = 0.31$	Xtriage
Estimated twinning fraction	0.019 for l,-k,h	Xtriage
F_o,F_c correlation	0.94	EDS
Total number of atoms	3148	wwPDB-VP
Average B, all atoms (Å^2)	61.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.64% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ 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: 9CH

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	0.50	1/1544 (0.1%)	1.12	9/2095 (0.4%)
1	B	0.40	0/1551	0.87	2/2107 (0.1%)
All	All	0.45	1/3095 (0.0%)	1.00	11/4202 (0.3%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	55	LYS	CA-C	5.82	1.60	1.52

All (11) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	189	GLU	N-CA-C	19.75	134.81	111.11
1	A	56	GLU	CA-CB-CG	11.84	137.78	114.10
1	A	189	GLU	CB-CA-C	-10.59	93.87	110.81
1	A	157	ARG	CA-C-N	7.47	128.47	120.11
1	A	157	ARG	C-N-CA	7.47	128.47	120.11
1	B	157	ARG	CA-C-N	7.25	127.68	119.92
1	B	157	ARG	C-N-CA	7.25	127.68	119.92
1	A	58	THR	N-CA-C	-6.68	104.07	111.82
1	A	56	GLU	CB-CG-CD	6.45	123.57	112.60
1	A	54	ARG	CA-CB-CG	5.95	126.00	114.10
1	A	27	LYS	CA-CB-CG	5.31	124.72	114.10

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts (i)

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	1514	0	1508	66	0
1	B	1522	0	1514	29	0
2	A	66	0	0	2	0
3	A	24	0	0	1	0
3	B	22	0	0	2	0
All	All	3148	0	3022	86	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 14.

All (86) 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:57:GLN:NE2	1:A:99:ILE:HB	1.37	1.39
1:A:57:GLN:HE22	1:A:99:ILE:CB	1.62	1.13
1:A:161:LYS:HE3	1:A:164:ASP:HB2	1.15	1.09
1:A:57:GLN:NE2	1:A:99:ILE:CB	2.20	1.04
1:A:54:ARG:HD3	1:A:56:GLU:H	1.20	1.04
1:A:57:GLN:OE1	1:A:59:ALA:O	1.77	1.02
1:A:161:LYS:CE	1:A:164:ASP:HB2	1.97	0.94
1:A:57:GLN:CD	1:A:99:ILE:HB	1.95	0.91
1:A:161:LYS:HE3	1:A:164:ASP:CB	2.02	0.89
1:A:57:GLN:HE22	1:A:99:ILE:HB	0.93	0.88
1:A:87:MET:O	1:A:190:HIS:HE1	1.64	0.79
1:A:54:ARG:HD3	1:A:56:GLU:N	1.99	0.78
1:A:89:GLY:HA3	1:A:190:HIS:CD2	2.20	0.76
1:A:87:MET:O	1:A:190:HIS:CE1	2.40	0.75
1:A:115:GLU:HA	1:A:161:LYS:HG2	1.71	0.71
1:A:54:ARG:CD	1:A:56:GLU:H	1.99	0.71
1:A:54:ARG:HD3	1:A:55:LYS:N	2.07	0.70
1:A:57:GLN:HE22	1:A:99:ILE:CA	2.06	0.68
1:A:180:GLN:H	1:A:180:GLN:CD	2.03	0.66
1:A:27:LYS:NZ	1:A:28:TRP:NE1	2.44	0.66
1:B:23:ILE:HD11	1:B:33:LYS:HB2	1.78	0.66
1:A:27:LYS:HZ3	1:A:28:TRP:NE1	1.96	0.64

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:54:ARG:HD3	1:A:55:LYS:H	1.62	0.64
1:A:126:CYS:SG	3:A:423:HOH:O	2.55	0.63
1:A:57:GLN:HE22	1:A:99:ILE:C	2.05	0.63
1:B:180:GLN:H	1:B:180:GLN:CD	2.06	0.63
1:A:57:GLN:NE2	1:A:99:ILE:O	2.32	0.63
1:B:92:ILE:HG12	1:B:191:LEU:HD13	1.81	0.62
1:A:27:LYS:HZ3	1:A:28:TRP:CD1	2.17	0.61
1:B:61:GLY:HA2	1:B:99:ILE:HG13	1.81	0.61
1:A:28:TRP:CD1	2:A:301:9CH:C03	2.85	0.60
1:B:38:ASP:OD2	1:B:44:ARG:NE	2.33	0.58
1:B:27:LYS:HG2	1:B:28:TRP:CD1	2.40	0.57
1:A:127:SER:O	1:A:142:HIS:ND1	2.38	0.56
1:A:57:GLN:NE2	1:A:99:ILE:CG2	2.69	0.56
1:A:54:ARG:HH11	1:A:56:GLU:N	2.04	0.56
1:A:61:GLY:HA2	1:A:99:ILE:HG13	1.88	0.56
1:A:20:GLU:HG2	1:A:34:THR:HG23	1.87	0.55
1:A:54:ARG:CD	1:A:55:LYS:H	2.18	0.55
1:A:161:LYS:O	1:A:161:LYS:HG3	2.04	0.55
1:A:89:GLY:HA3	1:A:190:HIS:CG	2.43	0.55
1:A:203:ALA:HB3	1:B:203:ALA:HB3	1.89	0.54
1:A:134:PRO:HB2	1:B:84:ARG:HG3	1.89	0.54
1:A:57:GLN:NE2	1:A:99:ILE:C	2.66	0.54
1:B:62:VAL:HG12	1:B:142:HIS:HB2	1.89	0.54
1:B:51:ARG:HB3	1:B:53:THR:HG22	1.90	0.53
1:A:141:ILE:HG21	2:A:301:9CH:CL1	2.46	0.53
1:A:62:VAL:HG12	1:A:142:HIS:HB2	1.90	0.52
1:B:64:VAL:O	1:B:66:PRO:HD3	2.09	0.52
1:B:114:GLU:HG2	1:B:161:LYS:HE3	1.92	0.52
1:B:54:ARG:NH2	1:B:60:ASP:OD1	2.43	0.52
1:A:81:LYS:HE3	1:A:171:ILE:HD11	1.93	0.51
1:A:64:VAL:O	1:A:66:PRO:HD3	2.10	0.51
1:A:54:ARG:CZ	1:A:55:LYS:H	2.23	0.50
1:A:99:ILE:HG23	1:A:108:ALA:HB2	1.94	0.50
1:B:74:TYR:OH	3:B:301:HOH:O	2.19	0.50
1:A:200:TYR:CD1	1:B:203:ALA:HB2	2.48	0.49
1:A:14:LYS:HD3	1:A:39:PRO:HB3	1.94	0.49
1:A:20:GLU:OE1	1:A:50:LYS:NZ	2.34	0.49
1:A:54:ARG:CD	1:A:55:LYS:N	2.75	0.48
1:A:167:PHE:HZ	1:B:40:THR:HG23	1.79	0.48
1:A:68:LEU:HB3	1:A:76:CYS:HB2	1.96	0.48
1:A:53:THR:O	1:A:54:ARG:HB2	2.13	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:179:LEU:HD11	1:B:198:TYR:CZ	2.49	0.47
1:A:159:LYS:HA	1:A:160:PRO:HD3	1.76	0.47
1:A:167:PHE:CZ	1:B:40:THR:HG23	2.50	0.46
1:B:68:LEU:HB3	1:B:76:CYS:HB2	1.97	0.46
1:A:54:ARG:NE	1:A:55:LYS:H	2.14	0.46
1:A:203:ALA:HB2	1:B:200:TYR:CD1	2.51	0.46
1:B:115:GLU:HA	1:B:161:LYS:HG3	1.96	0.46
1:B:137:SER:OG	1:B:138:ASN:N	2.50	0.45
1:A:38:ASP:OD2	1:A:42:LYS:HB3	2.17	0.45
1:B:157:ARG:HA	1:B:158:PRO:HD2	1.68	0.44
1:B:70:ARG:NH1	3:B:304:HOH:O	2.51	0.44
1:A:154:GLU:OE1	1:A:154:GLU:N	2.49	0.44
1:B:55:LYS:HD2	1:B:55:LYS:HA	1.79	0.43
1:B:180:GLN:CD	1:B:180:GLN:N	2.77	0.42
1:A:58:THR:HG22	1:A:142:HIS:NE2	2.35	0.42
1:A:115:GLU:CA	1:A:161:LYS:HG2	2.45	0.42
1:A:29:VAL:HG21	1:B:136:LEU:HD11	2.01	0.42
1:A:57:GLN:OE1	1:A:99:ILE:HD12	2.19	0.41
1:A:131:CYS:SG	1:B:194:ASP:HA	2.61	0.41
1:A:85:PRO:HG2	1:B:46:TRP:CE3	2.55	0.41
1:A:114:GLU:OE2	1:A:120:LYS:NZ	2.51	0.41
1:A:22:LEU:HD21	1:A:25:GLU:HB2	2.02	0.40
1:A:161:LYS:O	1:A:161:LYS:CG	2.68	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	191/219 (87%)	184 (96%)	7 (4%)	0	100	100
1	B	194/219 (89%)	188 (97%)	6 (3%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
All	All	385/438 (88%)	372 (97%)	13 (3%)	0	100 100

There are no Ramachandran outliers to report.

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	167/188 (89%)	164 (98%)	3 (2%)	51 76
1	B	167/188 (89%)	163 (98%)	4 (2%)	43 70
All	All	334/376 (89%)	327 (98%)	7 (2%)	47 73

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

Mol	Chain	Res	Type
1	A	21	GLU
1	A	159	LYS
1	A	164	ASP
1	B	25	GLU
1	B	54	ARG
1	B	159	LYS
1	B	161	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	57	GLN
1	A	190	HIS
1	B	208	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 oligosaccharides in this entry.

5.6 Ligand geometry (i)

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	$\#\|Z\| > 2$
2	9CH	A	301	-	37,37,37	2.27	15 (40%)	51,55,55	2.45	18 (35%)
2	9CH	A	302	-	37,37,37	2.60	13 (35%)	51,55,55	2.35	18 (35%)

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	9CH	A	301	-	-	2/12/20/20	0/5/5/5
2	9CH	A	302	-	-	3/12/20/20	0/5/5/5

All (28) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	302	9CH	C13-N12	6.20	1.38	1.29
2	A	302	9CH	C10-N11	5.88	1.36	1.28
2	A	302	9CH	O33-C03	5.87	1.33	1.22
2	A	302	9CH	O32-C06	5.83	1.35	1.23
2	A	301	9CH	C13-N12	4.82	1.36	1.29
2	A	301	9CH	O32-C06	4.79	1.32	1.23

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	301	9CH	O33-C03	4.52	1.31	1.22
2	A	302	9CH	C09-N08	4.52	1.52	1.46
2	A	301	9CH	C01-N02	-4.51	1.39	1.47
2	A	301	9CH	C10-N11	4.42	1.34	1.28
2	A	302	9CH	C01-N02	-3.48	1.40	1.47
2	A	302	9CH	O22-C10	3.27	1.41	1.36
2	A	302	9CH	C23-N30	3.22	1.38	1.33
2	A	301	9CH	C03-N04	-3.03	1.33	1.39
2	A	301	9CH	C29-N24	-3.03	1.41	1.47
2	A	302	9CH	C29-N24	-2.91	1.41	1.47
2	A	301	9CH	C06-N04	-2.89	1.34	1.40
2	A	302	9CH	C23-N24	2.84	1.45	1.37
2	A	301	9CH	C19-C17	-2.81	1.32	1.39
2	A	302	9CH	C16-C17	2.70	1.44	1.38
2	A	301	9CH	C09-N08	2.61	1.49	1.46
2	A	302	9CH	C25-N24	-2.53	1.42	1.47
2	A	301	9CH	C23-N08	-2.35	1.32	1.38
2	A	301	9CH	C25-N24	-2.34	1.42	1.47
2	A	301	9CH	C15-C14	-2.26	1.36	1.39
2	A	301	9CH	C16-C17	2.05	1.43	1.38
2	A	301	9CH	O22-C13	-2.03	1.34	1.37
2	A	302	9CH	C19-CL2	2.02	1.78	1.73

All (36) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	301	9CH	N02-C31-N30	5.36	134.35	125.59
2	A	301	9CH	C07-C06-N04	4.99	121.19	112.06
2	A	302	9CH	C23-N30-C31	4.91	107.92	102.71
2	A	301	9CH	O22-C10-N11	-4.90	108.82	112.75
2	A	301	9CH	C07-N08-C23	4.80	109.30	105.31
2	A	301	9CH	C23-N30-C31	4.72	107.72	102.71
2	A	302	9CH	O22-C13-C14	4.71	126.94	118.73
2	A	302	9CH	C07-C06-N04	4.65	120.57	112.06
2	A	302	9CH	N02-C31-N30	4.48	132.91	125.59
2	A	301	9CH	N08-C23-N30	-4.34	108.83	113.77
2	A	301	9CH	C07-C31-N30	-4.19	107.64	112.77
2	A	302	9CH	N08-C23-N30	-4.09	109.12	113.77
2	A	301	9CH	C10-O22-C13	3.98	106.68	102.71
2	A	302	9CH	O22-C10-N11	-3.95	109.58	112.75
2	A	301	9CH	C06-N04-C03	-3.95	119.24	125.66
2	A	302	9CH	C06-C07-C31	-3.94	117.95	122.92

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	302	9CH	C07-C31-N30	-3.83	108.07	112.77
2	A	302	9CH	O22-C13-N12	-3.82	108.89	112.34
2	A	302	9CH	C06-N04-C03	-3.58	119.84	125.66
2	A	301	9CH	C06-C07-C31	-3.54	118.46	122.92
2	A	302	9CH	C07-N08-C23	3.45	108.18	105.31
2	A	302	9CH	C10-O22-C13	3.39	106.10	102.71
2	A	301	9CH	N04-C03-N02	3.25	121.20	117.14
2	A	301	9CH	O22-C13-N12	-3.15	109.49	112.34
2	A	302	9CH	O32-C06-C07	-2.88	120.48	126.38
2	A	302	9CH	N04-C03-N02	2.87	120.72	117.14
2	A	302	9CH	C06-C07-N08	2.84	135.35	131.35
2	A	301	9CH	O32-C06-C07	-2.76	120.72	126.38
2	A	302	9CH	C14-C13-N12	-2.70	124.17	128.36
2	A	301	9CH	C10-N11-N12	2.64	107.68	106.25
2	A	301	9CH	C06-C07-N08	2.60	135.02	131.35
2	A	301	9CH	C07-C31-N02	-2.45	118.01	121.74
2	A	301	9CH	O33-C03-N04	-2.31	118.14	121.33
2	A	302	9CH	C13-N12-N11	2.23	108.44	106.33
2	A	302	9CH	C31-C07-N08	2.19	106.70	104.93
2	A	301	9CH	C15-C14-C21	2.14	121.72	119.25

There are no chirality outliers.

All (5) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	301	9CH	N08-C09-C10-O22
2	A	302	9CH	N08-C09-C10-O22
2	A	302	9CH	N30-C23-N24-C29
2	A	301	9CH	N08-C09-C10-N11
2	A	302	9CH	N08-C09-C10-N11

There are no ring outliers.

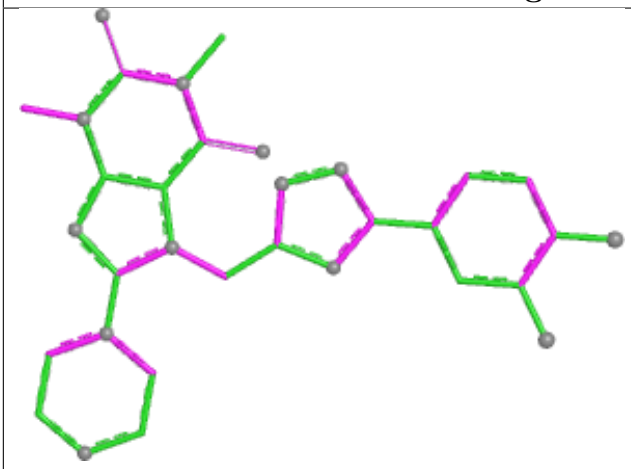
1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	301	9CH	2	0

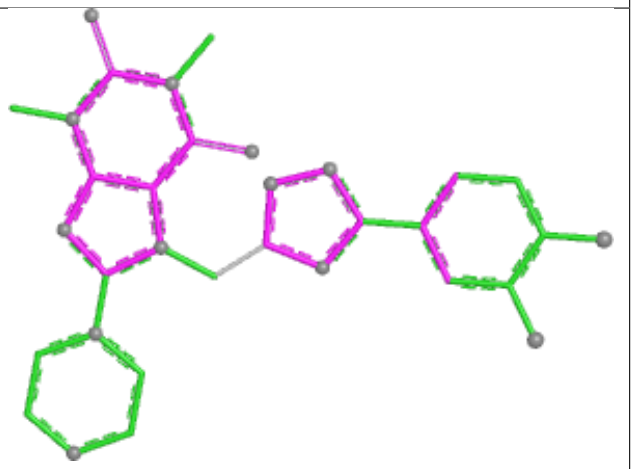
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 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.

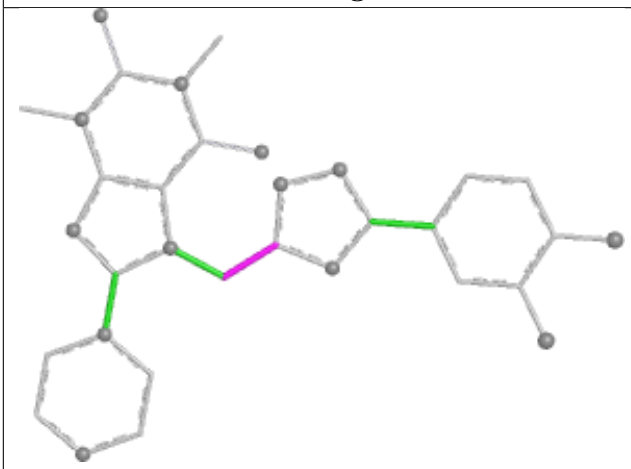
Ligand 9CH A 301



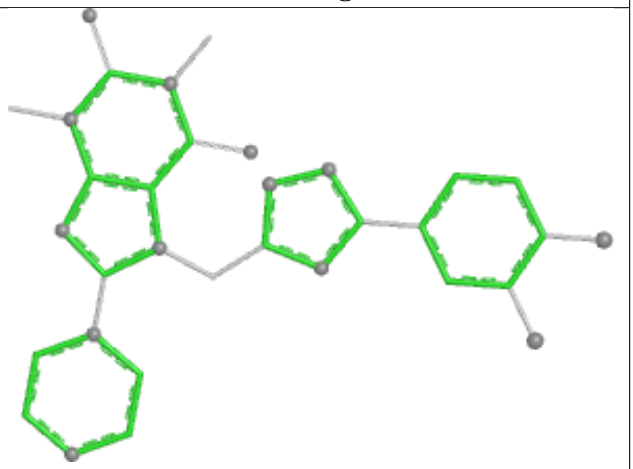
Bond lengths



Bond angles

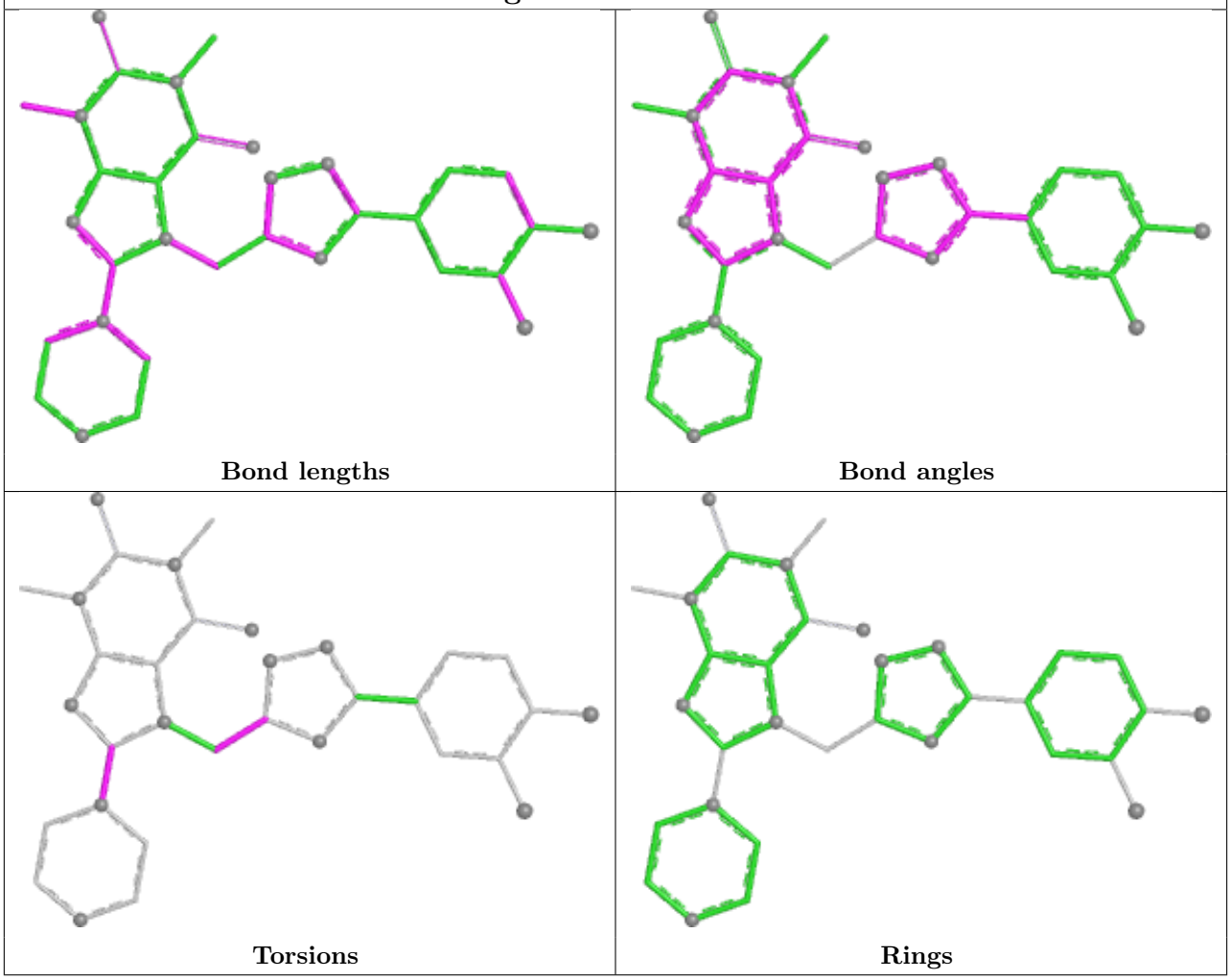


Torsions



Rings

Ligand 9CH A 302



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, 95^{th} 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	193/219 (88%)	0.04	3 (1%)	70	66	27, 57, 113, 165	2 (1%)
1	B	195/219 (89%)	-0.10	4 (2%)	63	58	22, 51, 103, 147	1 (0%)
All	All	388/438 (88%)	-0.03	7 (1%)	67	63	22, 54, 108, 165	3 (0%)

All (7) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	53	THR	3.4
1	A	58	THR	2.8
1	A	139[A]	CYS	2.4
1	A	156	ALA	2.2
1	B	190	HIS	2.2
1	B	185	LEU	2.2
1	B	161	LYS	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

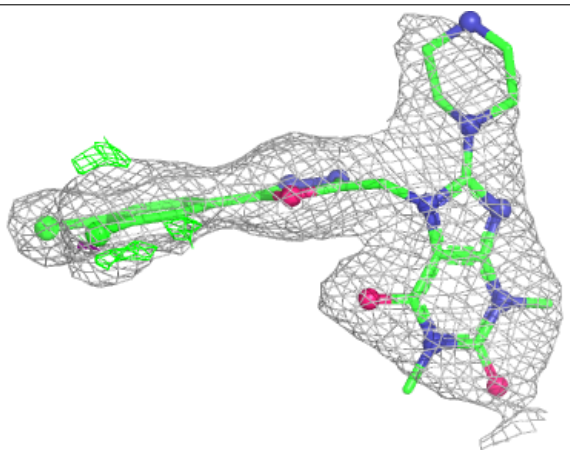
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

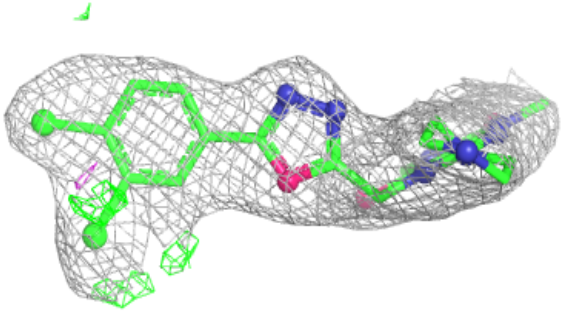
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
2	9CH	A	302	33/33	0.85	0.12	65,84,105,107	0
2	9CH	A	301	33/33	0.89	0.11	66,86,97,98	0

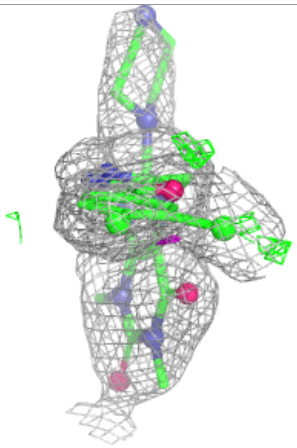
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around 9CH A 302:

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

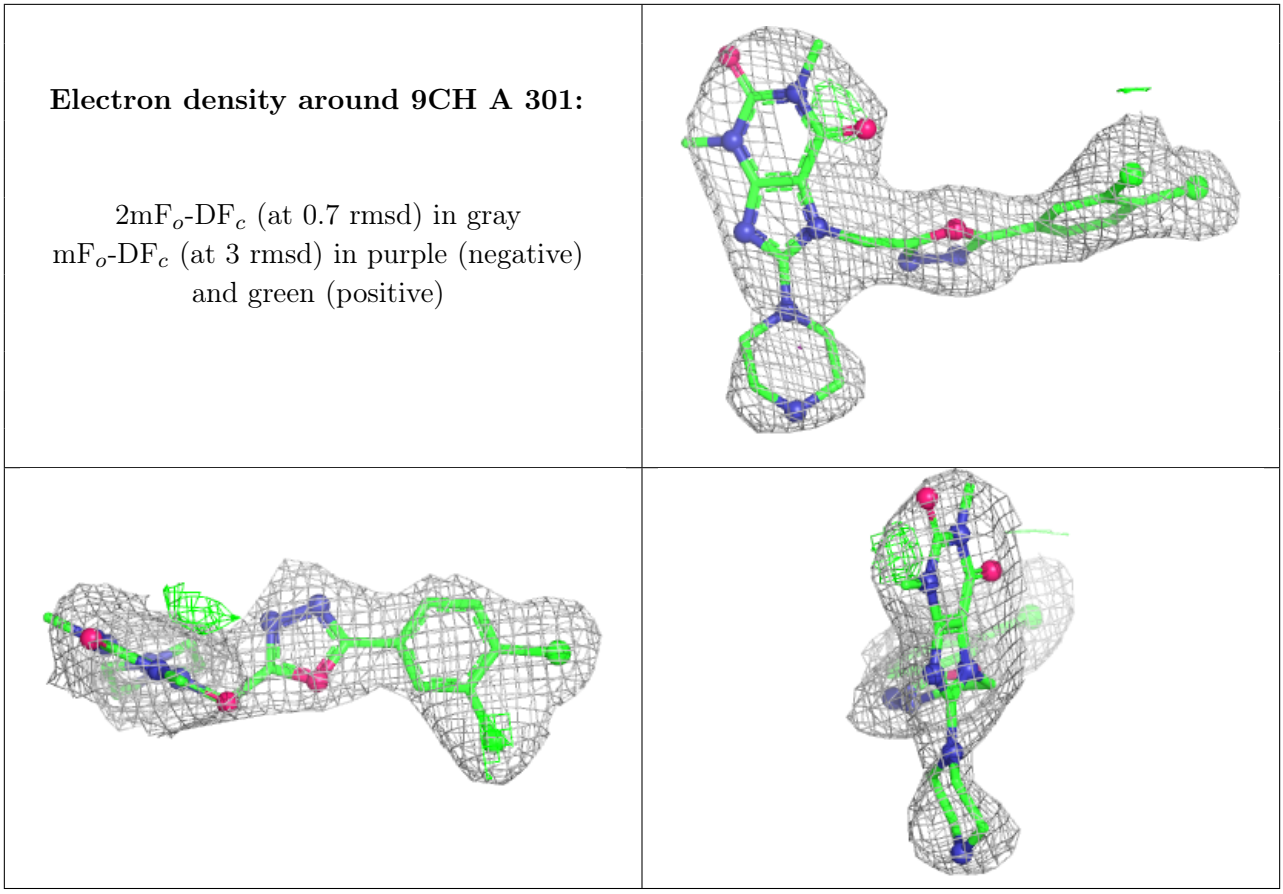






Electron density around 9CH A 301:

$2mF_o$-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

There are no such residues in this entry.