



wwPDB X-ray Structure Validation Summary Report ⓘ

Oct 27, 2024 – 06:26 PM EDT

PDB ID : 9DLW
Title : Crystal structure of the ternary complex of DCAF1 and WDR5 with PROTAC, OICR-41114
Authors : Mabanglo, M.F.; Mamai, A.; Wilson, B.J.; Hoffer, L.; Al-awar, R.; Vedadi, M.
Deposited on : 2024-09-11
Resolution : 2.07 Å (reported)

This is a wwPDB X-ray Structure Validation Summary 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 : 4.02b-467
Mogul : 2022.3.0, CSD as543be (2022)
Xtrriage (Phenix) : 1.20.1
EDS : 3.0
buster-report : 1.1.7 (2018)
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4 : 9.0.003 (Gargrove)
Density-Fitness : 1.0.11
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.39

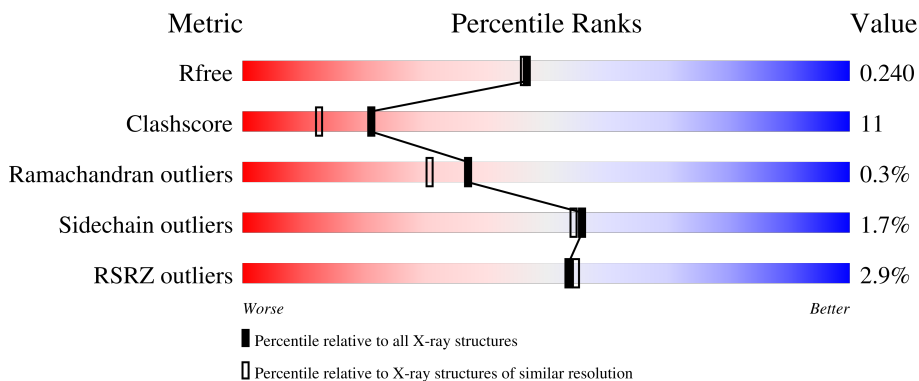
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.07 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}	164625	3436 (2.08-2.04)
Clashscore	180529	3661 (2.08-2.04)
Ramachandran outliers	177936	3649 (2.08-2.04)
Sidechain outliers	177891	3649 (2.08-2.04)
RSRZ outliers	164620	3436 (2.08-2.04)

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	B	338	
2	A	329	

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 5466 atoms, of which 83 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 DDB1- and CUL4-associated factor 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	B	311	2491	1569	424	479	19	0	2	0

There are 27 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	1053	MET	-	initiating methionine	UNP Q9Y4B6
B	1054	GLY	-	expression tag	UNP Q9Y4B6
B	1055	SER	-	expression tag	UNP Q9Y4B6
B	1056	SER	-	expression tag	UNP Q9Y4B6
B	1057	HIS	-	expression tag	UNP Q9Y4B6
B	1058	HIS	-	expression tag	UNP Q9Y4B6
B	1059	HIS	-	expression tag	UNP Q9Y4B6
B	1060	HIS	-	expression tag	UNP Q9Y4B6
B	1061	HIS	-	expression tag	UNP Q9Y4B6
B	1062	HIS	-	expression tag	UNP Q9Y4B6
B	1063	SER	-	expression tag	UNP Q9Y4B6
B	1064	SER	-	expression tag	UNP Q9Y4B6
B	1065	GLY	-	expression tag	UNP Q9Y4B6
B	1066	ARG	-	expression tag	UNP Q9Y4B6
B	1067	GLU	-	expression tag	UNP Q9Y4B6
B	1068	ASN	-	expression tag	UNP Q9Y4B6
B	1069	LEU	-	expression tag	UNP Q9Y4B6
B	1070	TYR	-	expression tag	UNP Q9Y4B6
B	1071	PHE	-	expression tag	UNP Q9Y4B6
B	1072	GLN	-	expression tag	UNP Q9Y4B6
B	1073	GLY	-	expression tag	UNP Q9Y4B6
B	1074	SER	-	expression tag	UNP Q9Y4B6
B	1075	SER	-	expression tag	UNP Q9Y4B6
B	1076	ARG	-	expression tag	UNP Q9Y4B6
B	1077	ALA	-	expression tag	UNP Q9Y4B6
B	1078	SER	-	expression tag	UNP Q9Y4B6
B	1079	ALA	-	expression tag	UNP Q9Y4B6

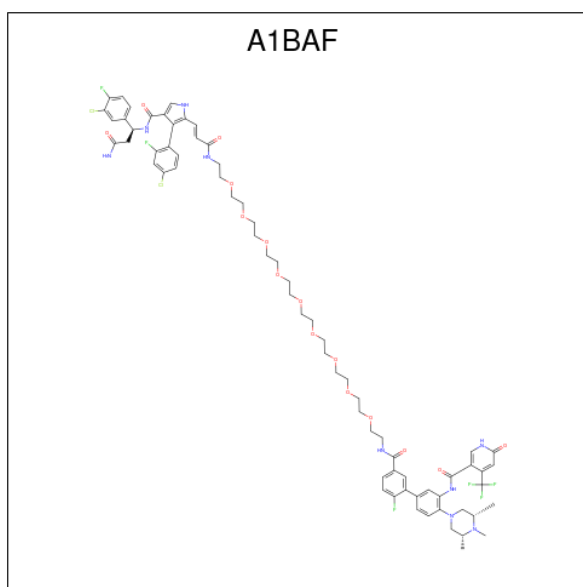
- Molecule 2 is a protein called WD repeat-containing protein 5.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	A	304	2371	1513	394	453	11	0	3	0

There are 18 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	6	MET	-	initiating methionine	UNP P61964
A	7	HIS	-	expression tag	UNP P61964
A	8	HIS	-	expression tag	UNP P61964
A	9	HIS	-	expression tag	UNP P61964
A	10	HIS	-	expression tag	UNP P61964
A	11	HIS	-	expression tag	UNP P61964
A	12	HIS	-	expression tag	UNP P61964
A	13	SER	-	expression tag	UNP P61964
A	14	SER	-	expression tag	UNP P61964
A	15	GLY	-	expression tag	UNP P61964
A	16	ARG	-	expression tag	UNP P61964
A	17	GLU	-	expression tag	UNP P61964
A	18	ASN	-	expression tag	UNP P61964
A	19	LEU	-	expression tag	UNP P61964
A	20	TYR	-	expression tag	UNP P61964
A	21	PHE	-	expression tag	UNP P61964
A	22	GLN	-	expression tag	UNP P61964
A	23	GLY	-	expression tag	UNP P61964

- Molecule 3 is N-((1P)-5'-((32E)-33-[(3P)-4-[(1S)-3-amino-1-(3-chloro-4-fluorophenyl)-3-oxopropyl]carbamoyl]-3-(4-chloro-2-fluorophenyl)-1H-pyrrol-2-yl]-31-oxo-3,6,9,12,15,18,21,24,27-nonaoxa-30-azatritriacont-32-en-1-yl}carbamoyl)-2'-fluoro-4-[(3R,5S)-3,4,5-trimethylpiperazin-1-yl][1,1'-biphenyl]-3-yl}-6-oxo-4-(trifluoromethyl)-1,6-dihydropyridine-3-carboxamide (three-letter code: A1BAF) (formula: C₇₀H₈₃Cl₂F₆N₉O₁₅) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms							ZeroOcc	AltConf
			Total	C	Cl	F	H	N	O		
3	B	1	185	70	2	6	83	9	15	0	0

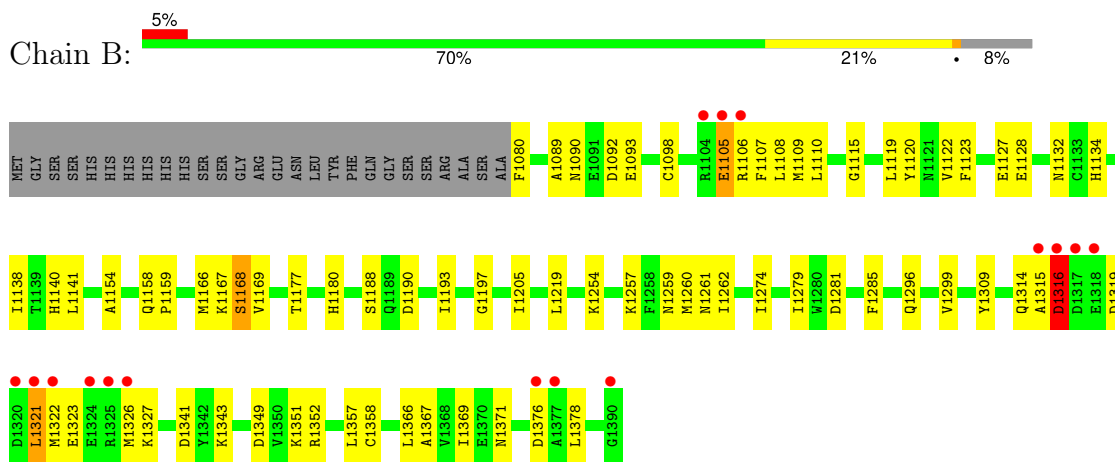
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	B	187	Total	O	0	0
			187	187		
4	A	232	Total	O	0	0
			232	232		

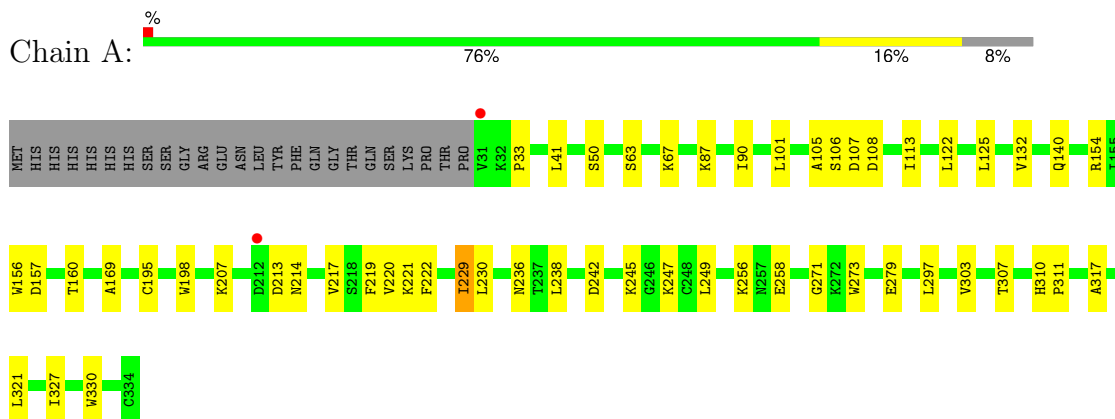
3 Residue-property plots

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: DDB1- and CUL4-associated factor 1



- Molecule 2: WD repeat-containing protein 5



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	80.22Å 83.88Å 131.48Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	28.59 – 2.07 28.59 – 2.07	Depositor EDS
% Data completeness (in resolution range)	95.8 (28.59-2.07) 95.8 (28.59-2.07)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.81 (at 2.06Å)	Xtrriage
Refinement program	PHENIX 1.21.1_5286	Depositor
R, R_{free}	0.200 , 0.242 0.198 , 0.240	Depositor DCC
R_{free} test set	2752 reflections (5.04%)	wwPDB-VP
Wilson B-factor (Å ²)	16.8	Xtrriage
Anisotropy	0.068	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 48.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	0.016 for k,h,-l	Xtrriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	5466	wwPDB-VP
Average B, all atoms (Å ²)	20.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.54% 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: A1BAF

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	B	0.37	0/2551	0.60	0/3456
2	A	0.41	0/2433	0.57	0/3299
All	All	0.39	0/4984	0.58	0/6755

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	B	2491	0	2382	68	0
2	A	2371	0	2359	37	0
3	B	102	83	0	2	0
4	A	232	0	0	11	0
4	B	187	0	0	13	1
All	All	5383	83	4741	105	1

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.

The worst 5 of 105 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)
2:A:256:LYS:HD3	2:A:279:GLU:HB2	1.40	1.01
1:B:1259:ASN:HD21	1:B:1262:ILE:H	1.08	0.97
2:A:113:ILE:HG22	4:A:409:HOH:O	1.73	0.89
1:B:1326:MET:HG2	4:B:1682:HOH:O	1.74	0.87
1:B:1314:GLN:OE1	4:B:1501:HOH:O	1.94	0.85

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:B:1508:HOH:O	4:B:1625:HOH:O[3_544]	2.16	0.04

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	B	311/338 (92%)	297 (96%)	12 (4%)	2 (1%)	22	13
2	A	305/329 (93%)	293 (96%)	12 (4%)	0	100	100
All	All	616/667 (92%)	590 (96%)	24 (4%)	2 (0%)	37	31

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	1168	SER
1	B	1316	ASP

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	B	277/297 (93%)	270 (98%)	7 (2%)	42	38
2	A	269/289 (93%)	267 (99%)	2 (1%)	81	82
All	All	546/586 (93%)	537 (98%)	9 (2%)	56	57

5 of 9 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	A	207	LYS
2	A	229	ILE
1	B	1177	THR
1	B	1188	SER
1	B	1316	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 6 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	1353	ASN
1	B	1372	GLN
2	A	289	GLN
1	B	1158	GLN
1	B	1090	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

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 >
3	A1BAF	B	1401	-	107,108,108	3.52	38 (35%)	135,145,145	1.74	22 (16%)

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	A1BAF	B	1401	-	-	10/81/101/101	0/7/7/7

The worst 5 of 38 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	1401	A1BAF	C28-C27	10.62	1.54	1.38
3	B	1401	A1BAF	C35-C34	10.12	1.55	1.39
3	B	1401	A1BAF	C17-C16	9.44	1.54	1.37
3	B	1401	A1BAF	C29-C24	9.05	1.52	1.39
3	B	1401	A1BAF	C20-C15	8.94	1.53	1.40

The worst 5 of 22 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	1401	A1BAF	C33-C34-N06	6.39	130.40	118.61
3	B	1401	A1BAF	C11-C10-C09	6.24	133.66	124.18
3	B	1401	A1BAF	C40-N07-C41	-6.12	119.45	124.13
3	B	1401	A1BAF	C70-C43-C39	-5.14	118.28	123.08
3	B	1401	A1BAF	C22-N04-C21	-4.29	117.23	122.34

There are no chirality outliers.

5 of 10 torsion outliers are listed below:

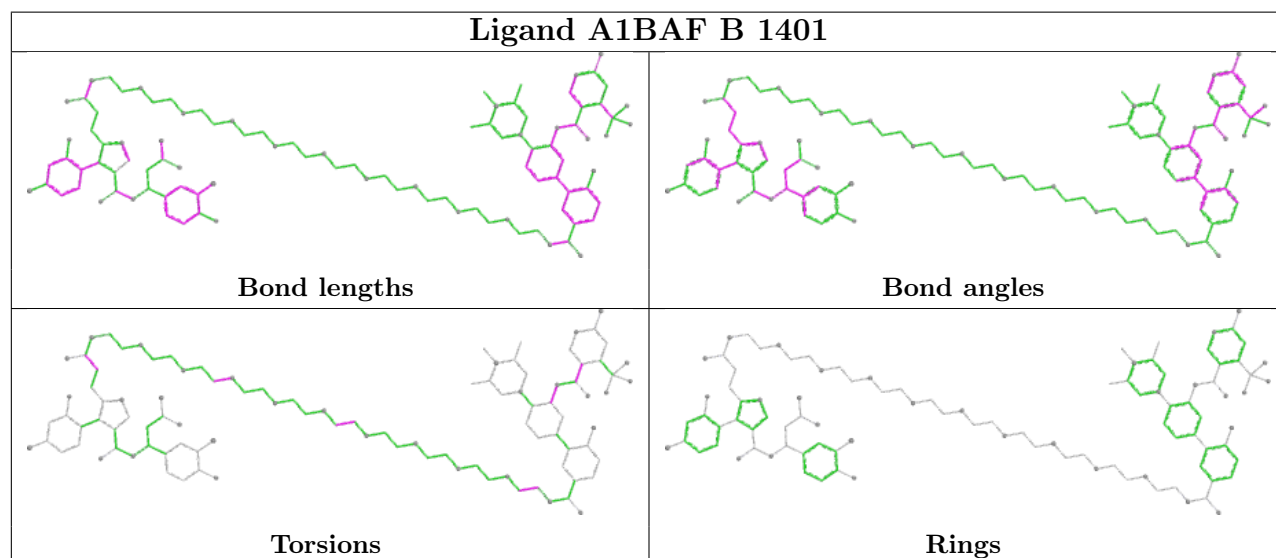
Mol	Chain	Res	Type	Atoms
3	B	1401	A1BAF	O04-C38-C39-C43
3	B	1401	A1BAF	N06-C38-C39-C43
3	B	1401	A1BAF	O01-C08-C09-C10
3	B	1401	A1BAF	O04-C38-C39-C40
3	B	1401	A1BAF	N09-C08-C09-C10

There are no ring outliers.

1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	1401	A1BAF	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

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	B	311/338 (92%)	-0.19	16 (5%) 34 36	7, 19, 52, 83	2 (0%)
2	A	304/329 (92%)	-0.57	2 (0%) 84 86	7, 15, 29, 41	3 (0%)
All	All	615/667 (92%)	-0.38	18 (2%) 54 55	7, 17, 38, 83	5 (0%)

The worst 5 of 18 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	1321	LEU	5.1
1	B	1316	ASP	3.4
1	B	1315	ALA	3.3
1	B	1390	GLY	3.1
1	B	1325	ARG	2.8

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](#)

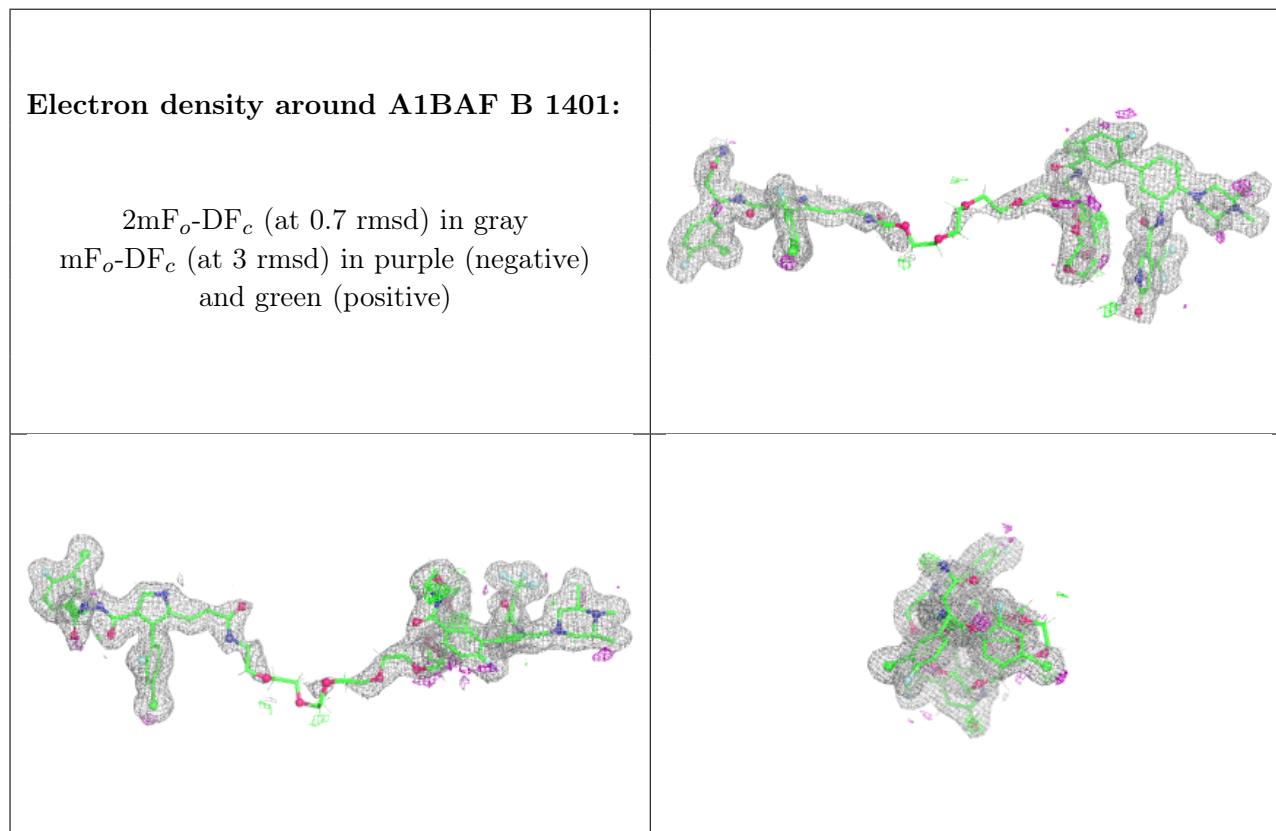
There are no monosaccharides in this entry.

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(\AA^2)	Q<0.9
3	A1BAF	B	1401	102/102	0.95	0.10	6,20,80,97	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.