Full wwPDB X-ray Structure Validation Report (i)

Mar 9, 2026 – 04:17 AM UTC

PDB ID	:	6V0N / pdb_00006v0n
Title	:	PRMT5 bound to PBM peptide from Riok1
Authors	:	McMIllan, B.J.; Raymond, D.D.
Deposited on	:	2019-11-19
Resolution	:	2.11 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:

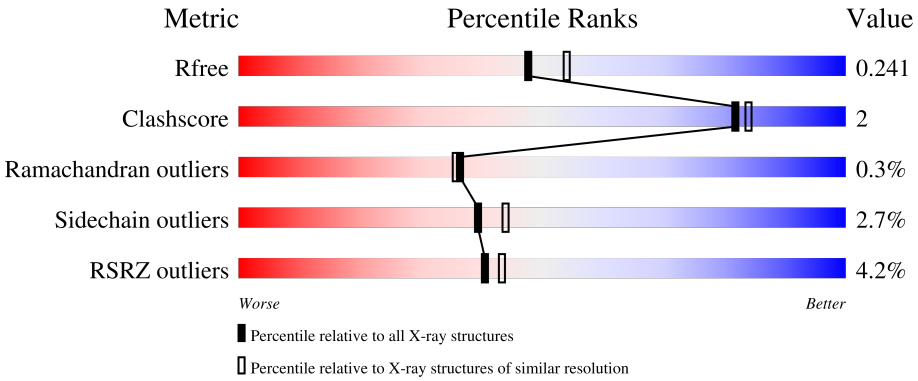
MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal 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 2.11 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	8290 (2.14-2.10)
Clashscore	190562	8817 (2.14-2.10)
Ramachandran outliers	187476	8738 (2.14-2.10)
Sidechain outliers	187428	8739 (2.14-2.10)
RSRZ outliers	180081	8294 (2.14-2.10)

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	637	5% 88% 9%
2	B	342	2% 76% 11% 13%
3	C	13	69% 8% 23%

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 7918 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 Protein arginine N-methyltransferase 5.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	624	Total	C	N	O	S	0	1	0
			5055	3234	866	931	24			

- Molecule 2 is a protein called Methylosome protein 50.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	296	Total	C	N	O	S	0	2	0
			2253	1417	384	438	14			

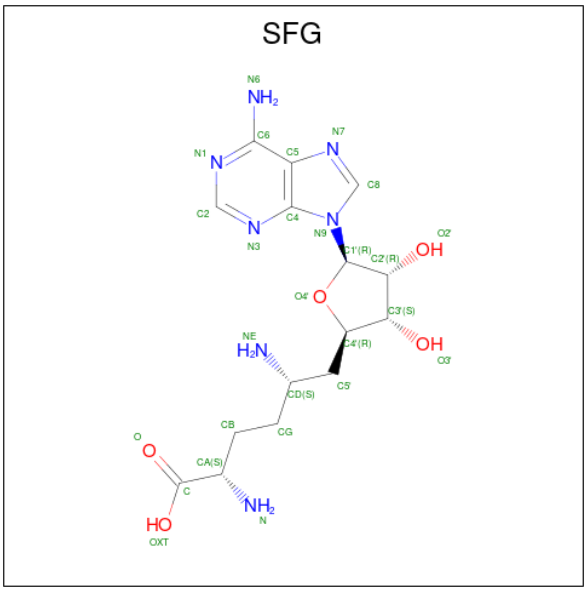
There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	1	PRO	-	expression tag	UNP Q9BQA1

- Molecule 3 is a protein called Riok1 PBM peptide.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	C	10	Total	C	N	O	0	0	0
			74	46	11	17			

- Molecule 4 is SINEFUNGIN (CCD ID: SFG) (formula: $C_{15}H_{23}N_7O_5$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C N O 27 15 7 5	0	0

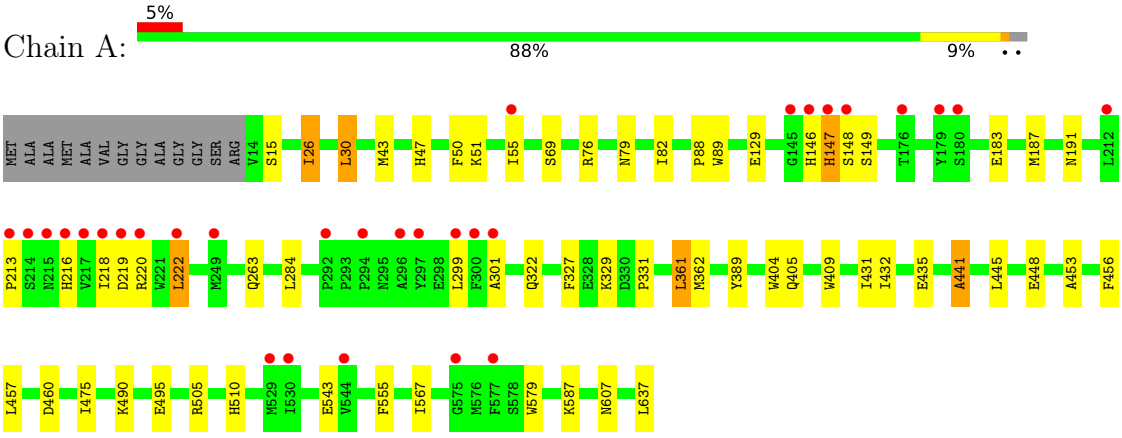
- Molecule 5 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	382	Total O 382 382	0	0
5	B	122	Total O 122 122	0	0
5	C	5	Total O 5 5	0	0

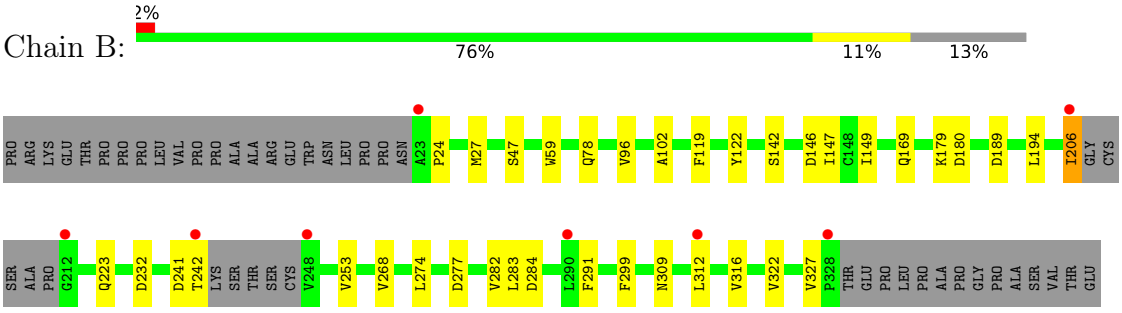
3 Residue-property plots (i)

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.

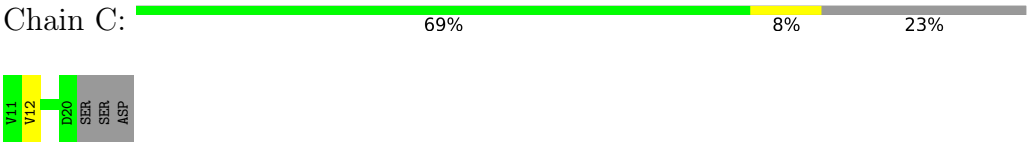
• Molecule 1: Protein arginine N-methyltransferase 5



• Molecule 2: Methylosome protein 50



• Molecule 3: Riok1 PBM peptide



4 Data and refinement statistics (i)

Property	Value	Source
Space group	I 2 2 2	Depositor
Cell constants a, b, c, α, β, γ	105.96Å 139.41Å 179.95Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	47.75 – 2.11 47.75 – 2.11	Depositor EDS
% Data completeness (in resolution range)	99.9 (47.75-2.11) 99.9 (47.75-2.11)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	0.97 (at 2.10Å)	Xtriage
Refinement program	BUSTER 2.10.3	Depositor
R, R_{free}	0.203 , 0.235 0.203 , 0.241	Depositor DCC
R_{free} test set	3833 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å^2)	47.4	Xtriage
Anisotropy	0.608	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.32 , 48.1	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	7918	wwPDB-VP
Average B, all atoms (Å^2)	60.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.14% 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 (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: SFG

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	0.89	0/5197	1.28	15/7071 (0.2%)
2	B	0.80	0/2311	1.29	14/3154 (0.4%)
3	C	1.00	0/75	1.16	0/102
All	All	0.87	0/7583	1.28	29/10327 (0.3%)

There are no bond length outliers.

All (29) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	79	ASN	CA-CB-CG	7.47	120.07	112.60
2	B	232	ASP	CA-CB-CG	6.81	119.41	112.60
1	A	148	SER	CA-C-N	6.76	130.43	120.90
1	A	148	SER	C-N-CA	6.76	130.43	120.90
2	B	179	LYS	CA-C-N	6.60	129.42	120.38
2	B	179	LYS	C-N-CA	6.60	129.42	120.38
2	B	284	ASP	CA-CB-CG	6.49	119.09	112.60
2	B	277	ASP	CA-CB-CG	6.49	119.09	112.60
1	A	456	PHE	CA-CB-CG	6.48	120.28	113.80
2	B	146	ASP	CA-CB-CG	5.92	118.52	112.60
1	A	453	ALA	CA-C-N	5.76	128.28	120.38
1	A	453	ALA	C-N-CA	5.76	128.28	120.38
2	B	241	ASP	CA-CB-CG	5.76	118.36	112.60
2	B	299	PHE	CA-CB-CG	5.64	119.44	113.80
2	B	119	PHE	CA-CB-CG	5.63	119.43	113.80
1	A	607	ASN	CA-CB-CG	5.62	118.22	112.60
2	B	142	SER	CA-C-N	5.60	125.92	121.61
2	B	142	SER	C-N-CA	5.60	125.92	121.61
1	A	146	HIS	CA-C-N	5.52	132.08	121.54
1	A	146	HIS	C-N-CA	5.52	132.08	121.54
2	B	180	ASP	CA-CB-CG	5.32	117.92	112.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	327	PHE	CA-CB-CG	5.29	119.09	113.80
1	A	82	ILE	N-CA-C	5.21	115.41	108.11
1	A	69	SER	CA-C-N	5.19	127.75	120.28
1	A	69	SER	C-N-CA	5.19	127.75	120.28
2	B	96	VAL	N-CA-C	5.10	115.31	108.17
1	A	460	ASP	CA-C-N	5.05	124.90	120.10
1	A	460	ASP	C-N-CA	5.05	124.90	120.10
2	B	189	ASP	CA-CB-CG	5.03	117.63	112.60

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	5055	0	4940	26	0
2	B	2253	0	2175	11	0
3	C	74	0	61	0	0
4	A	27	0	22	0	0
5	A	382	0	0	1	0
5	B	122	0	0	1	0
5	C	5	0	0	0	0
All	All	7918	0	7198	36	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 2.

All (36) 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:26:ILE:HD11	1:A:43:MET:HE1	1.50	0.92
1:A:129:GLU:HG3	1:A:187[B]:MET:HE1	1.69	0.74
1:A:219:ASP:HB2	1:A:222:LEU:HD12	1.75	0.69
1:A:187[B]:MET:HE3	1:A:191:ASN:ND2	2.15	0.61
2:B:194:LEU:HB2	2:B:206:ILE:HD11	1.83	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:362:MET:HG2	1:A:389:TYR:HB2	1.85	0.58
1:A:301:ALA:HB1	1:A:505:ARG:HG2	1.88	0.55
1:A:441:ALA:HB2	1:A:555:PHE:HB2	1.91	0.52
1:A:432:ILE:HG12	1:A:457:LEU:HD13	1.92	0.51
1:A:405:GLN:HA	1:A:409:TRP:HB2	1.92	0.51
1:A:183:GLU:OE2	1:A:216:HIS:HD2	1.94	0.50
2:B:24:PRO:HG3	2:B:78:GLN:HG2	1.96	0.48
2:B:253:VAL:HG21	2:B:283:LEU:HD21	1.95	0.48
1:A:15:SER:HB3	1:A:263:GLN:HG2	1.96	0.47
1:A:448:GLU:HG2	1:A:637:LEU:HD21	1.95	0.47
1:A:495:GLU:HB3	1:A:587:LYS:HE2	1.97	0.46
2:B:47:SER:HB2	5:B:401:HOH:O	2.16	0.45
1:A:147:HIS:C	1:A:149:SER:H	2.26	0.44
2:B:102:ALA:HB2	2:B:122:TYR:CD1	2.54	0.43
2:B:282:VAL:HB	2:B:291:PHE:HB3	2.00	0.43
1:A:55:ILE:HD13	5:A:1046:HOH:O	2.18	0.43
1:A:213:PRO:HG2	1:A:218:ILE:HG13	2.01	0.43
1:A:567:ILE:HG21	1:A:579:TRP:HB2	2.01	0.42
1:A:51:LYS:HG2	1:A:89:TRP:CG	2.54	0.42
2:B:282:VAL:HG11	2:B:327:VAL:HG11	2.00	0.42
1:A:187[B]:MET:HE3	1:A:191:ASN:HD22	1.83	0.41
2:B:309:ASN:HB3	2:B:312:LEU:HD12	2.01	0.41
1:A:47:HIS:HB3	1:A:50:PHE:HB2	2.02	0.41
2:B:316:VAL:HG12	2:B:322:VAL:HG22	2.02	0.41
1:A:222:LEU:HB3	1:A:510:HIS:HB2	2.01	0.41
1:A:88:PRO:HB2	2:B:169:GLN:HE22	1.85	0.41
1:A:361:LEU:HD11	1:A:431:ILE:HD12	2.03	0.41
1:A:30:LEU:HD23	1:A:30:LEU:HA	1.98	0.40
2:B:27:MET:HG3	2:B:59:TRP:NE1	2.36	0.40
1:A:329:LYS:O	1:A:331:PRO:HD3	2.21	0.40
1:A:361:LEU:HG	1:A:431:ILE:HB	2.04	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	623/637 (98%)	603 (97%)	18 (3%)	2 (0%)	36 36
2	B	292/342 (85%)	284 (97%)	7 (2%)	1 (0%)	36 36
3	C	8/13 (62%)	8 (100%)	0	0	100 100
All	All	923/992 (93%)	895 (97%)	25 (3%)	3 (0%)	36 36

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	147	ILE
1	A	147	HIS
1	A	441	ALA

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	557/562 (99%)	542 (97%)	15 (3%)	39 44
2	B	253/290 (87%)	247 (98%)	6 (2%)	43 48
3	C	8/11 (73%)	7 (88%)	1 (12%)	4 2
All	All	818/863 (95%)	796 (97%)	22 (3%)	39 44

All (22) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	26	ILE
1	A	30	LEU
1	A	76	ARG
1	A	220	ARG
1	A	222	LEU
1	A	284	LEU
1	A	299	LEU

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Mol	Chain	Res	Type
1	A	322	GLN
1	A	361	LEU
1	A	404	TRP
1	A	435	GLU
1	A	445	LEU
1	A	475	ILE
1	A	490	LYS
1	A	543	GLU
2	B	149	ILE
2	B	206	ILE
2	B	223	GLN
2	B	242	THR
2	B	268	VAL
2	B	274	LEU
3	C	12	VAL

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

Mol	Chain	Res	Type
1	A	36	GLN
1	A	66	GLN
1	A	112	ASN
1	A	128	GLN
1	A	143	HIS
1	A	191	ASN
1	A	216	HIS
1	A	289	GLN
1	A	482	ASN
1	A	510	HIS
1	A	511	GLN
1	A	532	ASN
2	B	169	GLN
2	B	223	GLN
2	B	325	HIS

5.3.3 RNA

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates (i)

There are no oligosaccharides in this entry.

5.6 Ligand geometry (i)

1 ligand is modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
4	SFG	A	701	-	28,29,29	0.34	0	34,42,42	0.54	0

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
4	SFG	A	701	-	-	3/17/33/33	0/3/3/3

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (3) torsion outliers are listed below:

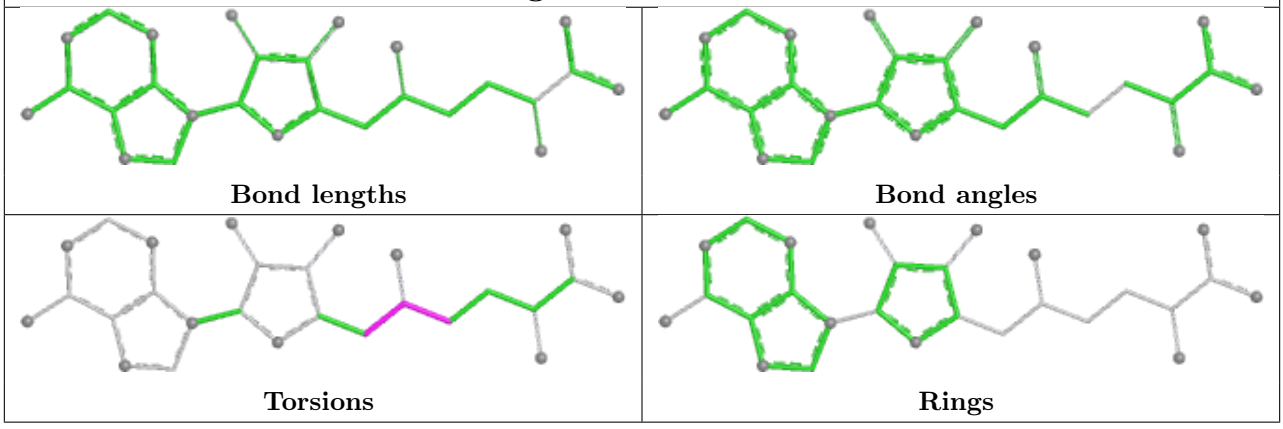
Mol	Chain	Res	Type	Atoms
4	A	701	SFG	NE-CD-CG-CB
4	A	701	SFG	C5'-CD-CG-CB
4	A	701	SFG	C4'-C5'-CD-NE

There are no ring outliers.

No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less 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 SFG A 701



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	624/637 (97%)	0.30	31 (4%) 34 37	23, 53, 85, 119	1 (0%)
2	B	296/342 (86%)	0.42	8 (2%) 56 59	36, 64, 89, 105	2 (0%)
3	C	10/13 (76%)	0.75	0 100 100	68, 76, 84, 118	0
All	All	930/992 (93%)	0.34	39 (4%) 40 43	23, 57, 88, 119	3 (0%)

All (39) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	206	ILE	5.7
1	A	218	ILE	5.6
1	A	147	HIS	5.2
2	B	242	THR	4.8
1	A	217	VAL	4.5
2	B	248	VAL	4.4
1	A	212	LEU	3.7
2	B	290	LEU	3.7
1	A	220	ARG	3.7
1	A	146	HIS	3.6
1	A	219	ASP	3.4
1	A	222	LEU	3.4
1	A	214	SER	3.2
1	A	145	GLY	3.2
1	A	544	VAL	3.0
1	A	179	TYR	3.0
1	A	577	PHE	3.0
1	A	299	LEU	2.9
1	A	249	MET	2.8
1	A	530	ILE	2.8
1	A	213	PRO	2.8
1	A	294	PRO	2.8
2	B	23	ALA	2.8

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Mol	Chain	Res	Type	RSRZ
2	B	312	LEU	2.7
2	B	328	PRO	2.7
1	A	176	THR	2.6
2	B	212	GLY	2.6
1	A	180	SER	2.5
1	A	292	PRO	2.4
1	A	148	SER	2.4
1	A	301	ALA	2.4
1	A	296	ALA	2.4
1	A	300	PHE	2.4
1	A	297	TYR	2.3
1	A	529	MET	2.3
1	A	216	HIS	2.2
1	A	55	ILE	2.2
1	A	575	GLY	2.2
1	A	215	ASN	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)

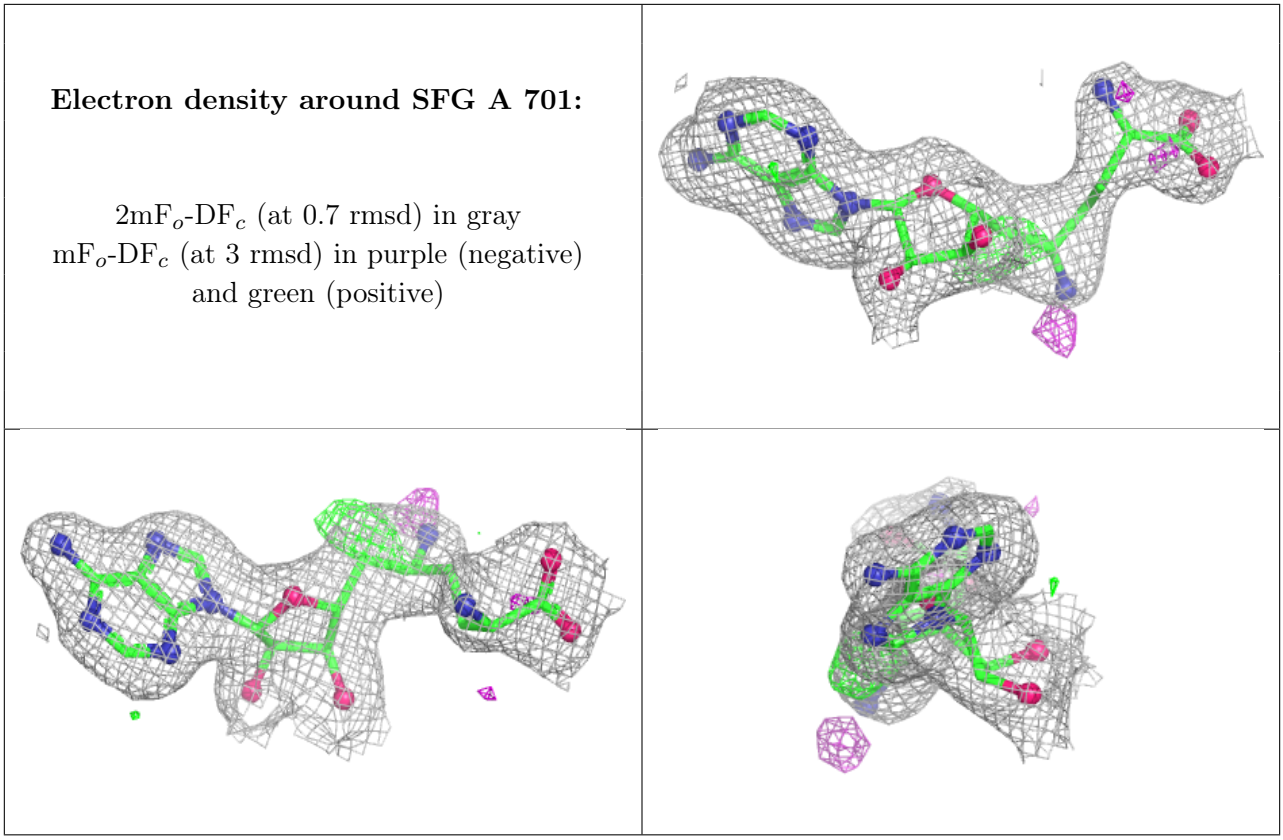
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' 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
4	SFG	A	701	27/27	0.94	0.10	41,46,70,72	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.

Electron density around SFG A 701:

$2mF_o$-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 (i)

There are no such residues in this entry.