Full wwPDB X-ray Structure Validation Report

May 14, 2026 – 06:32 PM EDT

PDB ID	:	7I98 / pdb_00007i98
Title	:	Crystal Structure of 10 bound to the PH domain of Btk
Authors	:	Brear, P.; West, R.M.; Nicolescu, R.C.B.; Blaszczyk, B.K.; Anwar, A.; Deingruber, T.; Sanders, M.G.; Perez-Areales, F.J.; Stephens, L.R.; Hawkins, P.T.; Spring, D.R.; Hyvonen, M.
Deposited on	:	2025-03-24
Resolution	:	2.07 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 ⓘ) were used in the production of this report:

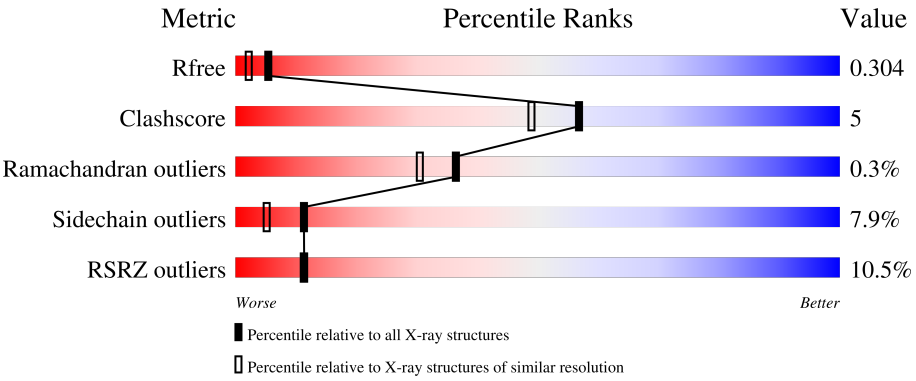
MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal 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 2.07 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}	180053	3774 (2.08-2.04)
Clashscore	190562	3883 (2.08-2.04)
Ramachandran outliers	187476	3860 (2.08-2.04)
Sidechain outliers	187428	3860 (2.08-2.04)
RSRZ outliers	180081	3775 (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 <=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	169	8% 83% 15% ••
1	B	169	7% 82% 9% • 5%
1	C	169	11% 72% 18% • 9%
1	D	169	15% 75% 17% • 7%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	ZN	A	202	-	-	-	X
3	ZN	C	202	-	-	X	-

2 Entry composition (i)

There are 5 unique types of molecules in this entry. The entry contains 5634 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.

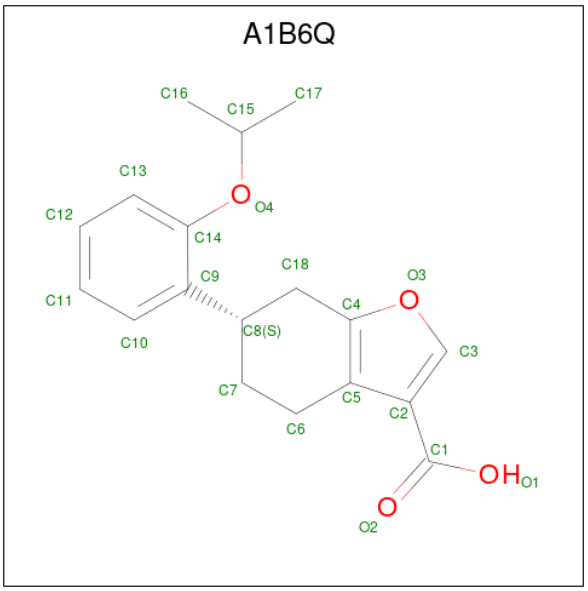
- Molecule 1 is a protein called Tyrosine-protein kinase BTK.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	167	Total	C	N	O	S	0	0	0
			1388	891	241	250	6			
1	B	160	Total	C	N	O	S	0	1	0
			1343	866	232	240	5			
1	C	154	Total	C	N	O	S	0	0	0
			1281	829	219	228	5			
1	D	157	Total	C	N	O	S	0	1	0
			1318	852	228	233	5			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	145	SER	CYS	conflict	UNP Q06187
B	145	SER	CYS	conflict	UNP Q06187
C	145	SER	CYS	conflict	UNP Q06187
D	145	SER	CYS	conflict	UNP Q06187

- Molecule 2 is (6S)-6-{2-[(propan-2-yl)oxy]phenyl}-4,5,6,7-tetrahydro-1-benzofuran-3-carboxylic acid (CCD ID: A1B6Q) (formula: $C_{18}H_{20}O_4$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total C O 22 18 4	0	0
2	B	1	Total C O 22 18 4	0	0
2	C	1	Total C O 22 18 4	0	0
2	D	1	Total C O 22 18 4	0	0

- Molecule 3 is ZINC ION (CCD ID: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total Zn 1 1	0	0
3	B	1	Total Zn 1 1	0	0
3	C	1	Total Zn 1 1	0	0
3	D	1	Total Zn 1 1	1	0

- Molecule 4 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total Mg 1 1	0	0

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	C	1	Total Mg 1 1	0	0
4	D	1	Total Mg 1 1	1	0

- Molecule 5 is water.

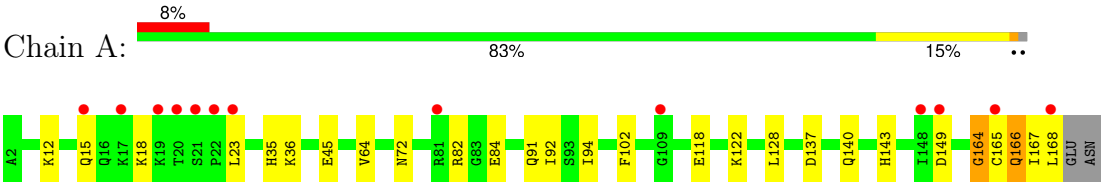
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	68	Total O 69 69	0	1
5	B	69	Total O 70 70	0	1
5	C	41	Total O 41 41	0	0
5	D	29	Total O 29 29	0	0

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.

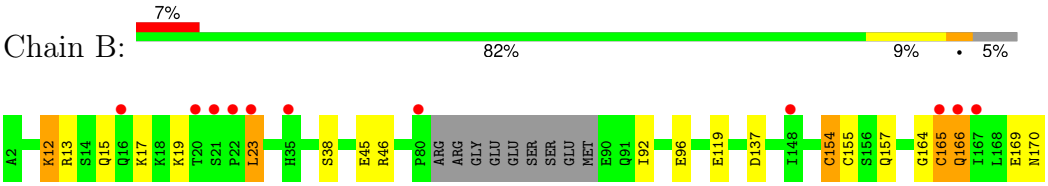
• Molecule 1: Tyrosine-protein kinase BTK

Chain A:



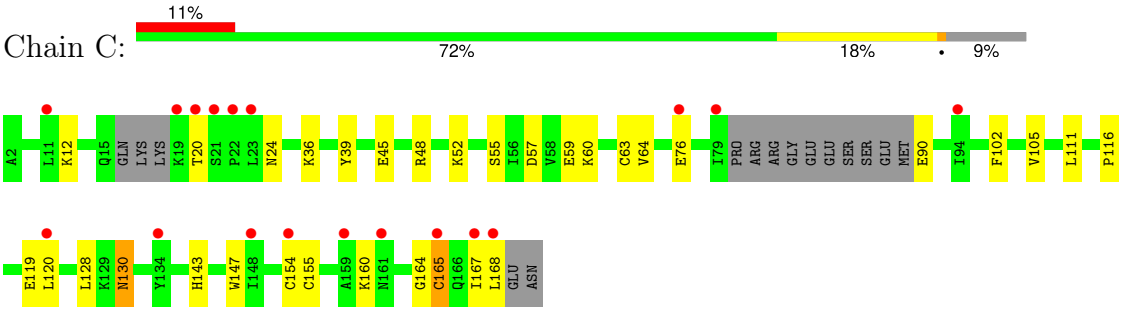
• Molecule 1: Tyrosine-protein kinase BTK

Chain B:



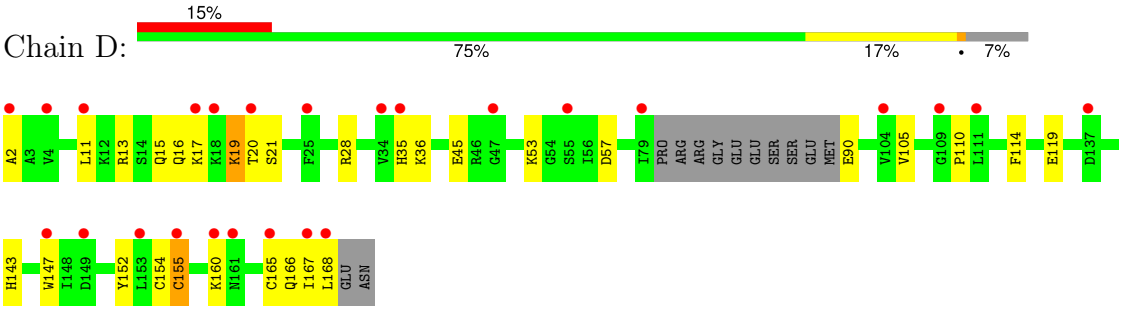
• Molecule 1: Tyrosine-protein kinase BTK

Chain C:



• Molecule 1: Tyrosine-protein kinase BTK

Chain D:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	68.98Å 66.56Å 79.46Å 90.00° 101.69° 90.00°	Depositor
Resolution (Å)	30.12 – 2.07 30.12 – 2.07	Depositor EDS
% Data completeness (in resolution range)	99.3 (30.12-2.07) 99.3 (30.12-2.07)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.10 (at 2.07Å)	Xtriage
Refinement program	BUSTER 2.10.4 (10-JUL-2024)	Depositor
R, R_{free}	0.249 , 0.303 0.248 , 0.304	Depositor DCC
R_{free} test set	2147 reflections (4.97%)	wwPDB-VP
Wilson B-factor (Å^2)	44.3	Xtriage
Anisotropy	0.359	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.35 , 44.5	EDS
L-test for twinning[2]	$< \|L\| > = 0.51$, $< L^2 > = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.94	EDS
Total number of atoms	5634	wwPDB-VP
Average B, all atoms (Å^2)	58.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.03% 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: MG, A1B6Q, ZN

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	0.78	1/1422 (0.1%)	1.07	6/1917 (0.3%)
1	B	0.79	0/1377	1.03	1/1857 (0.1%)
1	C	0.64	0/1312	0.99	4/1770 (0.2%)
1	D	0.61	0/1351	0.93	1/1822 (0.1%)
All	All	0.71	1/5462 (0.0%)	1.01	12/7366 (0.2%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	165	CYS	CA-C	5.30	1.59	1.52

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	165	CYS	CB-CA-C	-6.88	99.43	110.84
1	C	164	GLY	CA-C-N	6.38	129.35	120.29
1	C	164	GLY	C-N-CA	6.38	129.35	120.29
1	A	164	GLY	CA-C-N	6.04	128.65	120.38
1	A	164	GLY	C-N-CA	6.04	128.65	120.38
1	C	102	PHE	CA-CB-CG	5.79	119.59	113.80
1	A	102	PHE	CA-CB-CG	5.61	119.41	113.80
1	D	36	LYS	N-CA-C	5.54	118.26	109.50
1	A	166	GLN	N-CA-C	5.51	117.78	109.23
1	C	130	ASN	CA-CB-CG	5.36	117.96	112.60
1	A	91	GLN	CA-C-N	5.17	129.09	120.62
1	A	91	GLN	C-N-CA	5.17	129.09	120.62

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	1388	0	1396	8	0
1	B	1343	0	1347	11	0
1	C	1281	0	1286	14	0
1	D	1318	0	1328	17	0
2	A	22	0	0	3	0
2	B	22	0	0	1	0
2	C	22	0	0	0	0
2	D	22	0	0	0	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
3	C	1	0	0	3	0
3	D	1	0	0	0	0
4	A	1	0	0	0	0
4	C	1	0	0	0	0
4	D	1	0	0	0	0
5	A	69	0	0	0	0
5	B	70	0	0	0	0
5	C	41	0	0	0	0
5	D	29	0	0	0	0
All	All	5634	0	5357	50	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 (50) 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:B:155:CYS:HB3	1:B:165:CYS:SG	1.88	1.11
1:D:155:CYS:SG	1:D:165:CYS:SG	2.65	0.95
1:D:2:ALA:HB2	1:D:35[B]:HIS:CD2	2.11	0.86
1:C:155:CYS:SG	3:C:202:ZN:ZN	1.62	0.86
1:C:154:CYS:SG	3:C:202:ZN:ZN	1.63	0.86
1:C:165:CYS:SG	3:C:202:ZN:ZN	1.66	0.84
1:D:143:HIS:HB3	1:D:154:CYS:SG	2.21	0.80
1:D:155:CYS:SG	1:D:165:CYS:HB3	2.21	0.80

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:154:CYS:HB2	1:D:165:CYS:SG	2.27	0.75
1:D:155:CYS:SG	1:D:165:CYS:CB	2.81	0.68
1:D:167:ILE:HG22	1:D:168:LEU:HG	1.76	0.67
1:C:143:HIS:ND1	1:C:165:CYS:SG	2.69	0.66
1:A:15:GLN:HA	2:A:201:A1B6Q:C10	2.27	0.64
1:B:154:CYS:HB2	1:B:165:CYS:SG	2.36	0.64
1:B:155:CYS:CB	1:B:165:CYS:SG	2.65	0.64
1:C:167:ILE:HG22	1:C:168:LEU:HG	1.82	0.61
1:B:165:CYS:HB3	1:B:166:GLN:HE21	1.64	0.61
1:C:36:LYS:HD3	1:C:57:ASP:HA	1.83	0.60
1:D:147:TRP:NE1	1:D:160:LYS:HE3	2.20	0.56
1:C:12:LYS:HE2	1:C:39:TYR:CE1	2.41	0.56
1:D:147:TRP:HE1	1:D:160:LYS:HE3	1.70	0.55
1:D:152:TYR:HB3	1:D:154:CYS:SG	2.48	0.54
1:B:155:CYS:SG	1:B:157:GLN:HG3	2.47	0.53
1:D:11:LEU:HB3	1:D:114:PHE:HB2	1.90	0.53
1:B:13:ARG:HD2	1:B:23:LEU:HG	1.92	0.51
1:A:35:HIS:CD2	1:A:36:LYS:NZ	2.78	0.51
1:C:52:LYS:HE2	1:C:55:SER:HB2	1.92	0.49
1:A:15:GLN:HB2	2:A:201:A1B6Q:C18	2.43	0.48
1:B:165:CYS:HB3	1:B:166:GLN:NE2	2.27	0.48
1:C:155:CYS:HB3	1:C:165:CYS:HB3	1.67	0.48
1:D:154:CYS:SG	1:D:155:CYS:SG	3.10	0.48
1:B:154:CYS:CB	1:B:165:CYS:SG	2.98	0.47
1:B:92:ILE:O	1:B:96:GLU:HG3	2.15	0.46
1:D:19:LYS:HE2	1:D:20:THR:HG23	1.96	0.46
1:C:12:LYS:HD2	1:C:111:LEU:HD11	1.98	0.45
1:D:147:TRP:CE2	1:D:160:LYS:HG3	2.51	0.45
1:D:105:VAL:HG22	1:D:110:PRO:HB3	1.99	0.45
1:C:116:PRO:HD2	1:C:120:LEU:HD23	2.00	0.44
1:A:35:HIS:CD2	1:A:36:LYS:HZ3	2.37	0.43
1:A:167:ILE:HG22	1:A:168:LEU:HG	2.00	0.43
1:B:12:LYS:NZ	2:B:201:A1B6Q:O1	2.51	0.43
1:C:147:TRP:NE1	1:C:160:LYS:HE2	2.33	0.43
1:A:12:LYS:HZ3	2:A:201:A1B6Q:C1	2.28	0.43
1:A:143:HIS:CD2	1:A:164:GLY:HA2	2.54	0.42
1:B:164:GLY:O	1:B:165:CYS:C	2.62	0.41
1:C:64:VAL:HG21	1:C:128:LEU:HB3	2.03	0.41
1:D:16:GLN:HG2	1:D:21:SER:HB3	2.03	0.41
1:C:63:CYS:HB3	1:C:105:VAL:HB	2.03	0.41
1:D:28:ARG:NE	1:D:53:LYS:HG3	2.35	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:64:VAL:HG21	1:A:128:LEU:HB3	2.03	0.41

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	165/169 (98%)	154 (93%)	11 (7%)	0	100 100
1	B	157/169 (93%)	150 (96%)	5 (3%)	2 (1%)	9 3
1	C	148/169 (88%)	142 (96%)	6 (4%)	0	100 100
1	D	154/169 (91%)	148 (96%)	6 (4%)	0	100 100
All	All	624/676 (92%)	594 (95%)	28 (4%)	2 (0%)	36 30

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	15	GLN
1	B	19	LYS

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	156/158 (99%)	142 (91%)	14 (9%)	9 3

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	B	151/158 (96%)	139 (92%)	12 (8%)	11 5
1	C	144/158 (91%)	133 (92%)	11 (8%)	12 6
1	D	148/158 (94%)	138 (93%)	10 (7%)	14 8
All	All	599/632 (95%)	552 (92%)	47 (8%)	11 5

All (47) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	18	LYS
1	A	23	LEU
1	A	45	GLU
1	A	72	ASN
1	A	82	ARG
1	A	84	GLU
1	A	92	ILE
1	A	94	ILE
1	A	118	GLU
1	A	122	LYS
1	A	137	ASP
1	A	140	GLN
1	A	149	ASP
1	A	166	GLN
1	B	12	LYS
1	B	17	LYS
1	B	23	LEU
1	B	38	SER
1	B	45	GLU
1	B	46	ARG
1	B	119	GLU
1	B	137	ASP
1	B	154	CYS
1	B	166	GLN
1	B	169	GLU
1	B	170	ASN
1	C	20	THR
1	C	24	ASN
1	C	45	GLU
1	C	48	ARG
1	C	59	GLU
1	C	60	LYS
1	C	76	GLU

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Mol	Chain	Res	Type
1	C	90	GLU
1	C	119	GLU
1	C	130	ASN
1	C	165	CYS
1	D	13	ARG
1	D	15	GLN
1	D	17	LYS
1	D	19	LYS
1	D	45	GLU
1	D	57	ASP
1	D	90	GLU
1	D	119	GLU
1	D	155	CYS
1	D	166	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (10) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	16	GLN
1	A	35	HIS
1	A	91	GLN
1	A	166	GLN
1	B	161	ASN
1	B	166	GLN
1	B	170	ASN
1	C	140	GLN
1	D	72	ASN
1	D	140	GLN

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)

Of 11 ligands modelled in this entry, 7 are monoatomic - leaving 4 for Mogul analysis.

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	A1B6Q	B	201	1	24,24,24	1.21	3 (12%)	27,34,34	1.54	6 (22%)
2	A1B6Q	D	201	1	24,24,24	1.30	3 (12%)	27,34,34	1.65	5 (18%)
2	A1B6Q	C	201	1	24,24,24	1.11	3 (12%)	27,34,34	1.43	5 (18%)
2	A1B6Q	A	201	1	24,24,24	1.37	3 (12%)	27,34,34	1.48	5 (18%)

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	A1B6Q	B	201	1	-	2/12/21/21	0/3/3/3
2	A1B6Q	D	201	1	-	10/12/21/21	0/3/3/3
2	A1B6Q	C	201	1	-	5/12/21/21	0/3/3/3
2	A1B6Q	A	201	1	-	3/12/21/21	0/3/3/3

All (12) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	201	A1B6Q	C6-C5	-4.47	1.43	1.51
2	D	201	A1B6Q	C6-C5	-4.20	1.43	1.51
2	B	201	A1B6Q	C6-C5	-3.57	1.44	1.51
2	C	201	A1B6Q	O1-C1	-3.53	1.20	1.30
2	A	201	A1B6Q	O1-C1	-3.53	1.21	1.30
2	B	201	A1B6Q	O1-C1	-3.53	1.21	1.30
2	D	201	A1B6Q	O1-C1	-3.26	1.21	1.30
2	C	201	A1B6Q	C6-C5	-2.64	1.46	1.51
2	A	201	A1B6Q	C2-C1	-2.35	1.45	1.48
2	D	201	A1B6Q	C2-C1	-2.34	1.45	1.48

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	201	A1B6Q	C2-C1	-2.22	1.45	1.48
2	B	201	A1B6Q	C2-C1	-2.10	1.45	1.48

All (21) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	D	201	A1B6Q	O3-C4-C18	4.89	124.70	119.88
2	A	201	A1B6Q	O3-C4-C18	4.05	123.88	119.88
2	C	201	A1B6Q	O3-C4-C18	3.94	123.77	119.88
2	B	201	A1B6Q	O3-C4-C18	3.90	123.73	119.88
2	A	201	A1B6Q	C6-C5-C4	-3.49	118.54	122.47
2	B	201	A1B6Q	C7-C6-C5	3.10	118.52	111.38
2	B	201	A1B6Q	C6-C5-C4	-3.09	118.99	122.47
2	D	201	A1B6Q	C6-C5-C4	-2.98	119.11	122.47
2	C	201	A1B6Q	C6-C5-C4	-2.80	119.32	122.47
2	D	201	A1B6Q	C6-C7-C8	-2.68	106.89	111.86
2	C	201	A1B6Q	C7-C6-C5	2.58	117.32	111.38
2	A	201	A1B6Q	C7-C6-C5	2.50	117.13	111.38
2	B	201	A1B6Q	O1-C1-C2	2.44	121.41	115.69
2	D	201	A1B6Q	C7-C6-C5	2.44	117.00	111.38
2	C	201	A1B6Q	O1-C1-C2	2.42	121.35	115.69
2	D	201	A1B6Q	C14-C9-C8	2.33	123.99	120.41
2	B	201	A1B6Q	O2-C1-C2	-2.33	117.85	122.67
2	C	201	A1B6Q	O2-C1-C2	-2.27	117.96	122.67
2	A	201	A1B6Q	O1-C1-C2	2.24	120.94	115.69
2	A	201	A1B6Q	O2-C1-C2	-2.20	118.11	122.67
2	B	201	A1B6Q	C7-C8-C9	-2.01	108.37	112.25

There are no chirality outliers.

All (20) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	D	201	A1B6Q	O1-C1-C2-C3
2	D	201	A1B6Q	O2-C1-C2-C3
2	D	201	A1B6Q	O1-C1-C2-C5
2	D	201	A1B6Q	O2-C1-C2-C5
2	C	201	A1B6Q	C18-C8-C9-C10
2	D	201	A1B6Q	C18-C8-C9-C10
2	D	201	A1B6Q	C9-C14-O4-C15
2	C	201	A1B6Q	C7-C8-C9-C10
2	D	201	A1B6Q	C7-C8-C9-C10
2	B	201	A1B6Q	C9-C14-O4-C15

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Mol	Chain	Res	Type	Atoms
2	A	201	A1B6Q	C13-C14-O4-C15
2	D	201	A1B6Q	C7-C8-C9-C14
2	D	201	A1B6Q	C18-C8-C9-C14
2	A	201	A1B6Q	C9-C14-O4-C15
2	B	201	A1B6Q	C13-C14-O4-C15
2	D	201	A1B6Q	C13-C14-O4-C15
2	C	201	A1B6Q	C9-C14-O4-C15
2	C	201	A1B6Q	C13-C14-O4-C15
2	C	201	A1B6Q	C18-C8-C9-C14
2	A	201	A1B6Q	O1-C1-C2-C3

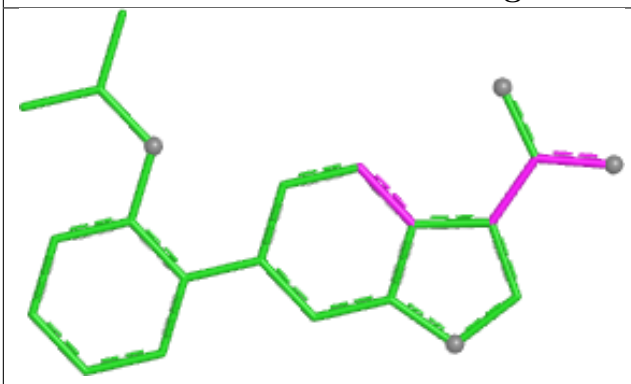
There are no ring outliers.

2 monomers are involved in 4 short contacts:

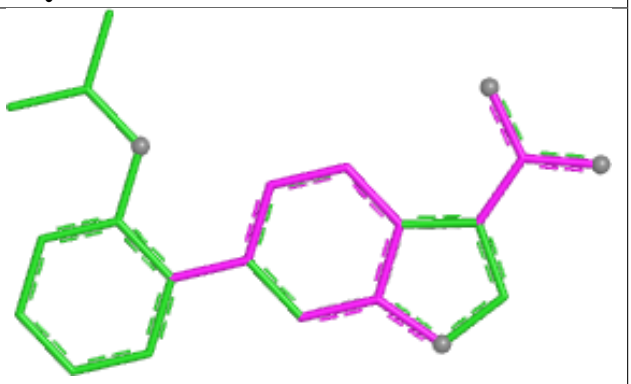
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	201	A1B6Q	1	0
2	A	201	A1B6Q	3	0

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.

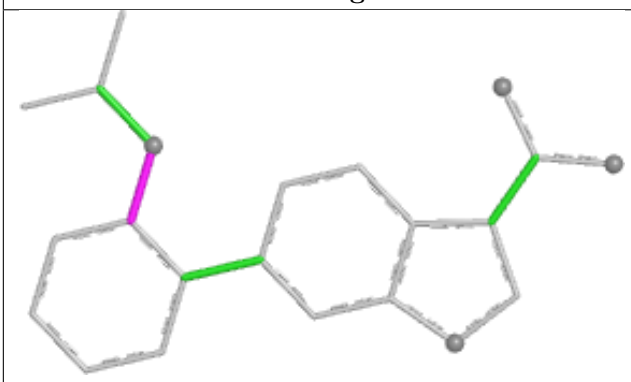
Ligand A1B6Q B 201



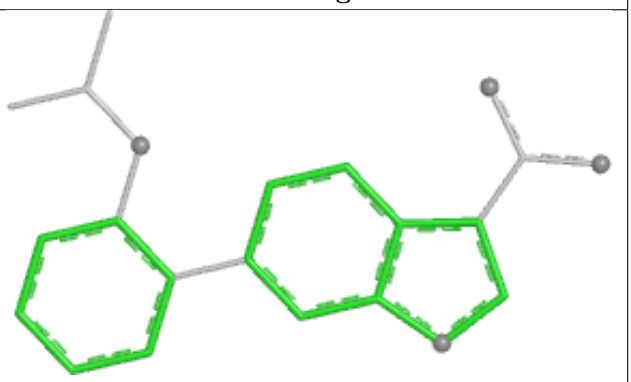
Bond lengths



Bond angles

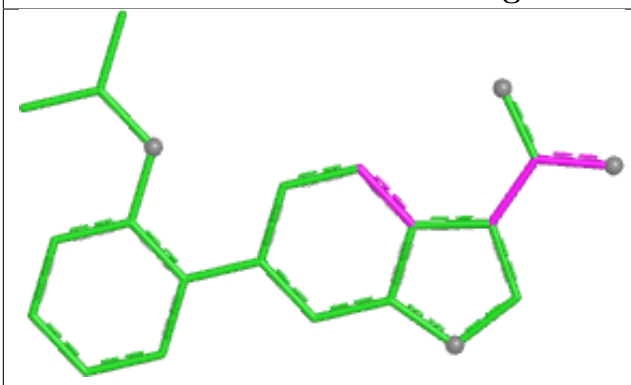


Torsions

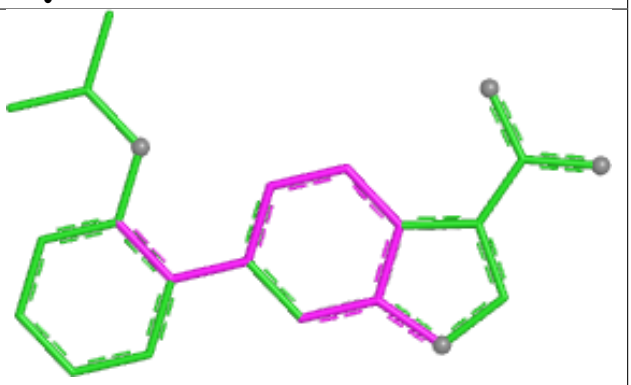


Rings

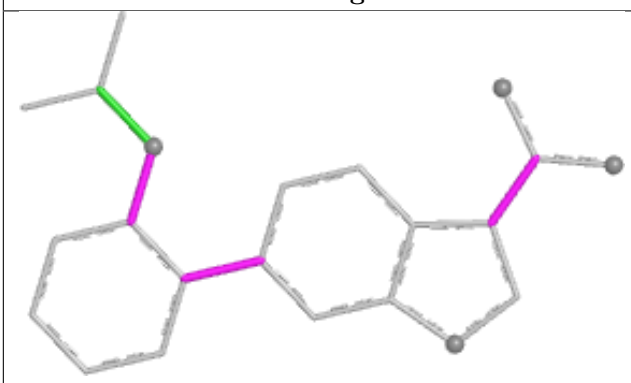
Ligand A1B6Q D 201



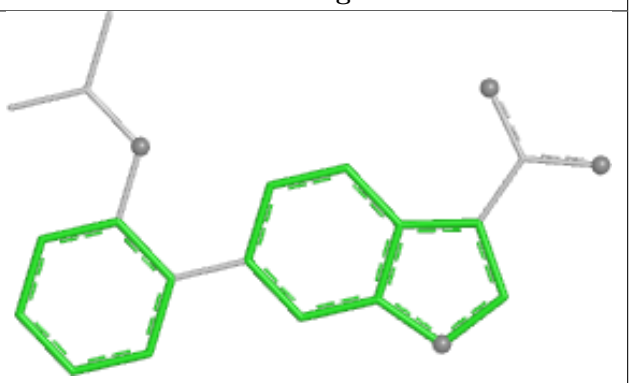
Bond lengths



Bond angles

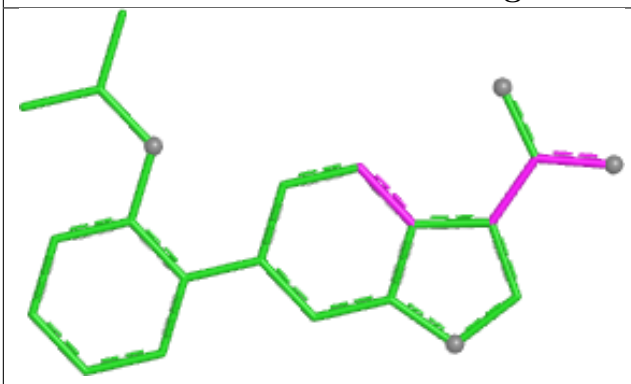


Torsions

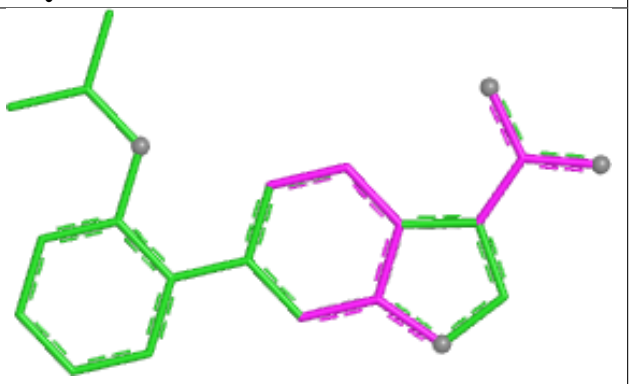


Rings

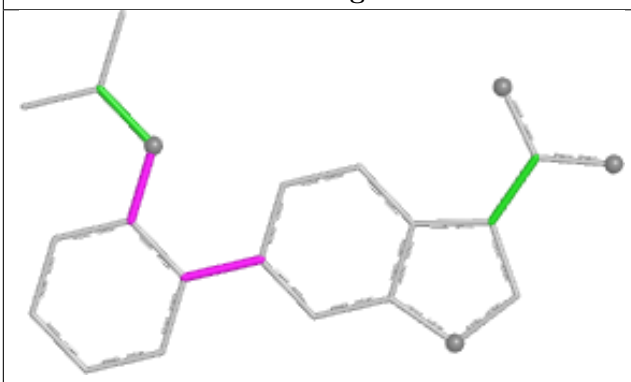
Ligand A1B6Q C 201



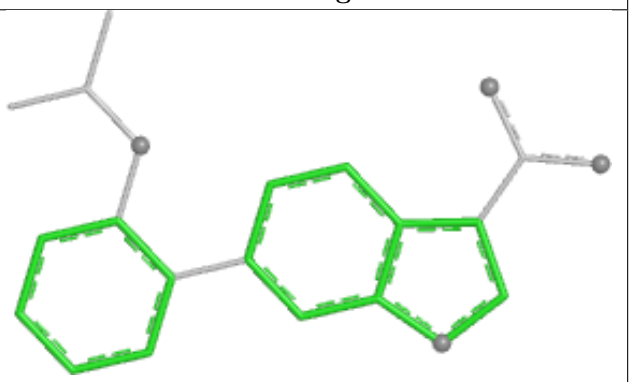
Bond lengths



Bond angles

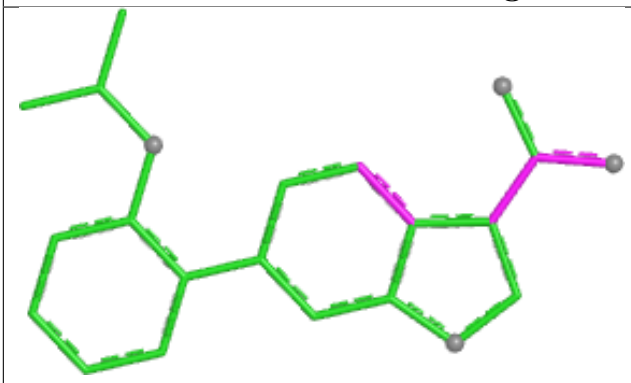


Torsions

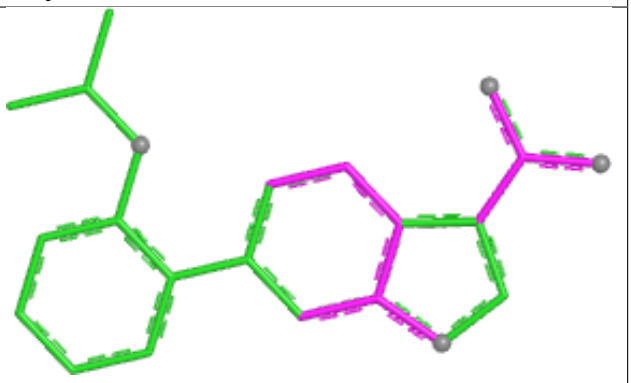


Rings

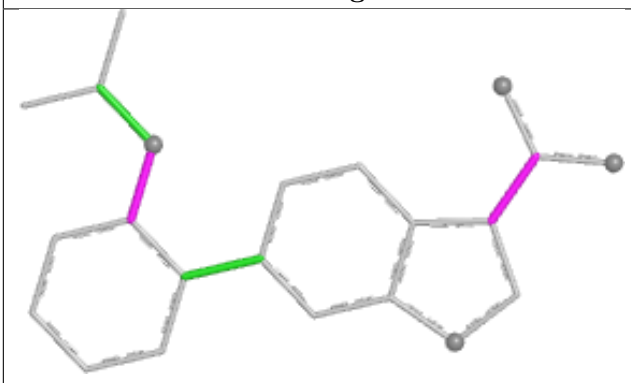
Ligand A1B6Q A 201



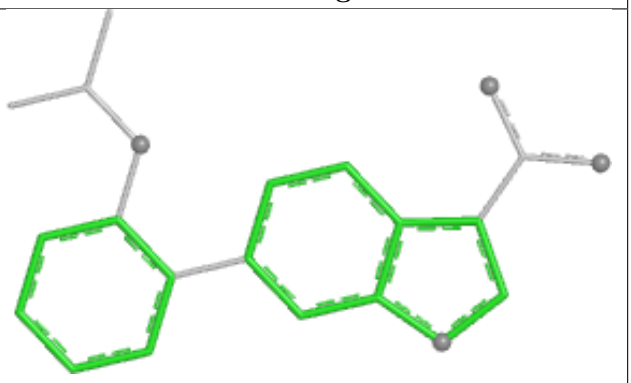
Bond lengths



Bond angles



Torsions



Rings

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	167/169 (98%)	0.71	13 (7%)	19	19	35, 51, 75, 99	0
1	B	160/169 (94%)	0.40	11 (6%)	23	22	22, 44, 75, 95	1 (0%)
1	C	154/169 (91%)	1.09	18 (11%)	9	9	48, 66, 84, 108	0
1	D	157/169 (92%)	1.22	25 (15%)	5	5	32, 70, 89, 102	1 (0%)
All	All	638/676 (94%)	0.85	67 (10%)	11	11	22, 58, 85, 108	2 (0%)

All (67) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	20	THR	5.5
1	A	81	ARG	4.7
1	D	168	LEU	4.7
1	A	19	LYS	4.3
1	A	23	LEU	4.0
1	A	168	LEU	4.0
1	C	22	PRO	3.9
1	A	165	CYS	3.6
1	D	35[A]	HIS	3.6
1	B	165	CYS	3.6
1	B	23	LEU	3.5
1	D	155	CYS	3.5
1	D	2	ALA	3.4
1	B	35[A]	HIS	3.4
1	B	22	PRO	3.2
1	C	79	ILE	3.2
1	D	161	ASN	3.2
1	D	20	THR	3.2
1	C	21	SER	3.1
1	C	167	ILE	3.1
1	C	19	LYS	3.1

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Mol	Chain	Res	Type	RSRZ
1	B	167	ILE	3.0
1	D	79	ILE	3.0
1	A	22	PRO	2.8
1	D	167	ILE	2.7
1	B	21	SER	2.6
1	D	109	GLY	2.6
1	C	168	LEU	2.6
1	A	15	GLN	2.6
1	A	17	LYS	2.6
1	C	23	LEU	2.6
1	A	109	GLY	2.5
1	B	20	THR	2.5
1	D	55	SER	2.5
1	D	153	LEU	2.5
1	D	160	LYS	2.5
1	C	134	TYR	2.4
1	A	21	SER	2.4
1	D	137	ASP	2.4
1	D	165	CYS	2.4
1	C	165	CYS	2.4
1	D	147	TRP	2.4
1	C	120	LEU	2.3
1	A	149	ASP	2.3
1	B	80	PRO	2.3
1	B	16	GLN	2.3
1	C	148	ILE	2.3
1	C	159	ALA	2.3
1	C	94	ILE	2.2
1	D	4	VAL	2.2
1	D	17	LYS	2.2
1	D	47	GLY	2.2
1	D	11	LEU	2.2
1	A	148	ILE	2.2
1	C	20	THR	2.2
1	C	11	LEU	2.2
1	B	148	ILE	2.2
1	D	111	LEU	2.1
1	C	161	ASN	2.1
1	C	76	GLU	2.1
1	D	149	ASP	2.1
1	D	25	PHE	2.1
1	B	166	GLN	2.1

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Mol	Chain	Res	Type	RSRZ
1	D	104	VAL	2.1
1	D	18	LYS	2.0
1	D	34	VAL	2.0
1	C	154	CYS	2.0

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)

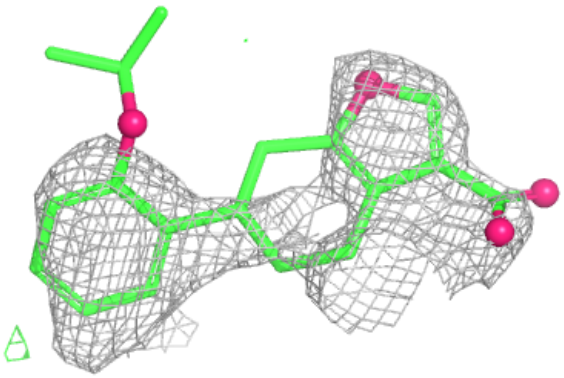
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9'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

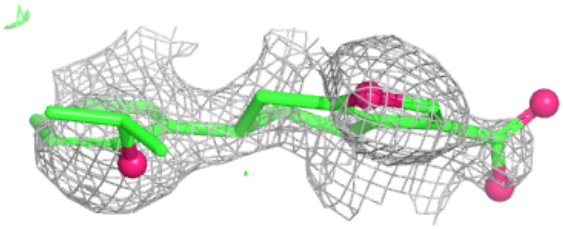
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	ZN	A	202	1/1	0.46	0.47	53,53,53,53	0
2	A1B6Q	D	201	22/22	0.61	0.17	98,99,100,100	0
2	A1B6Q	A	201	22/22	0.68	0.15	61,67,71,71	0
2	A1B6Q	C	201	22/22	0.74	0.16	81,82,82,82	0
3	ZN	C	202	1/1	0.80	0.23	65,65,65,65	0
3	ZN	B	202	1/1	0.82	0.14	51,51,51,51	0
2	A1B6Q	B	201	22/22	0.82	0.13	53,56,61,62	0
3	ZN	D	202	1/1	-	-	71,71,71,71	1
4	MG	C	203	1/1	0.87	0.13	71,71,71,71	0
4	MG	A	203	1/1	0.94	0.21	52,52,52,52	0
4	MG	D	203	1/1	-	-	74,74,74,74	1

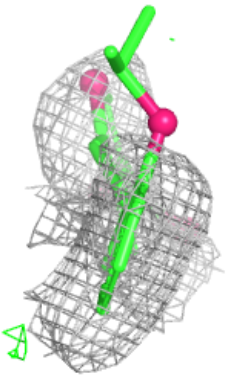
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around A1B6Q D 201:

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

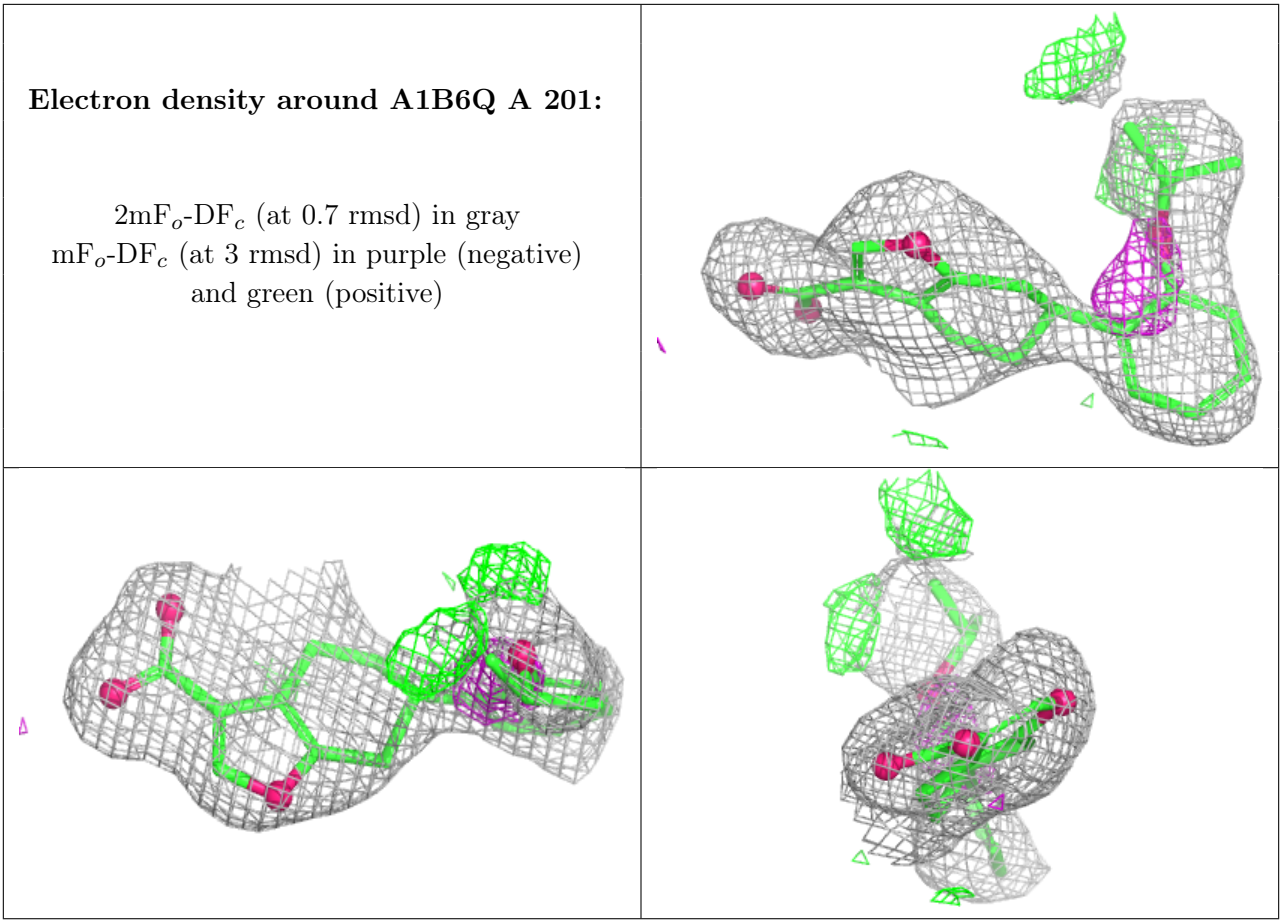






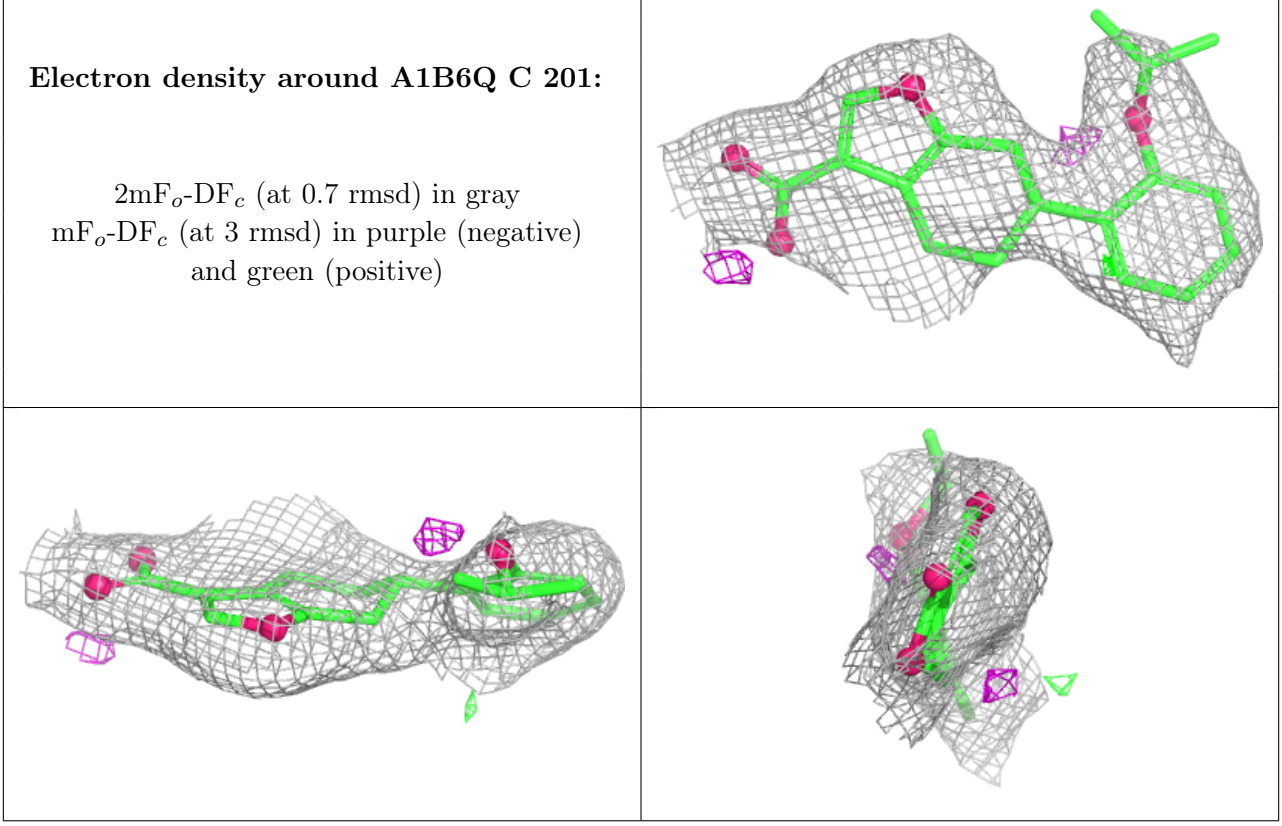
Electron density around A1B6Q A 201:

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



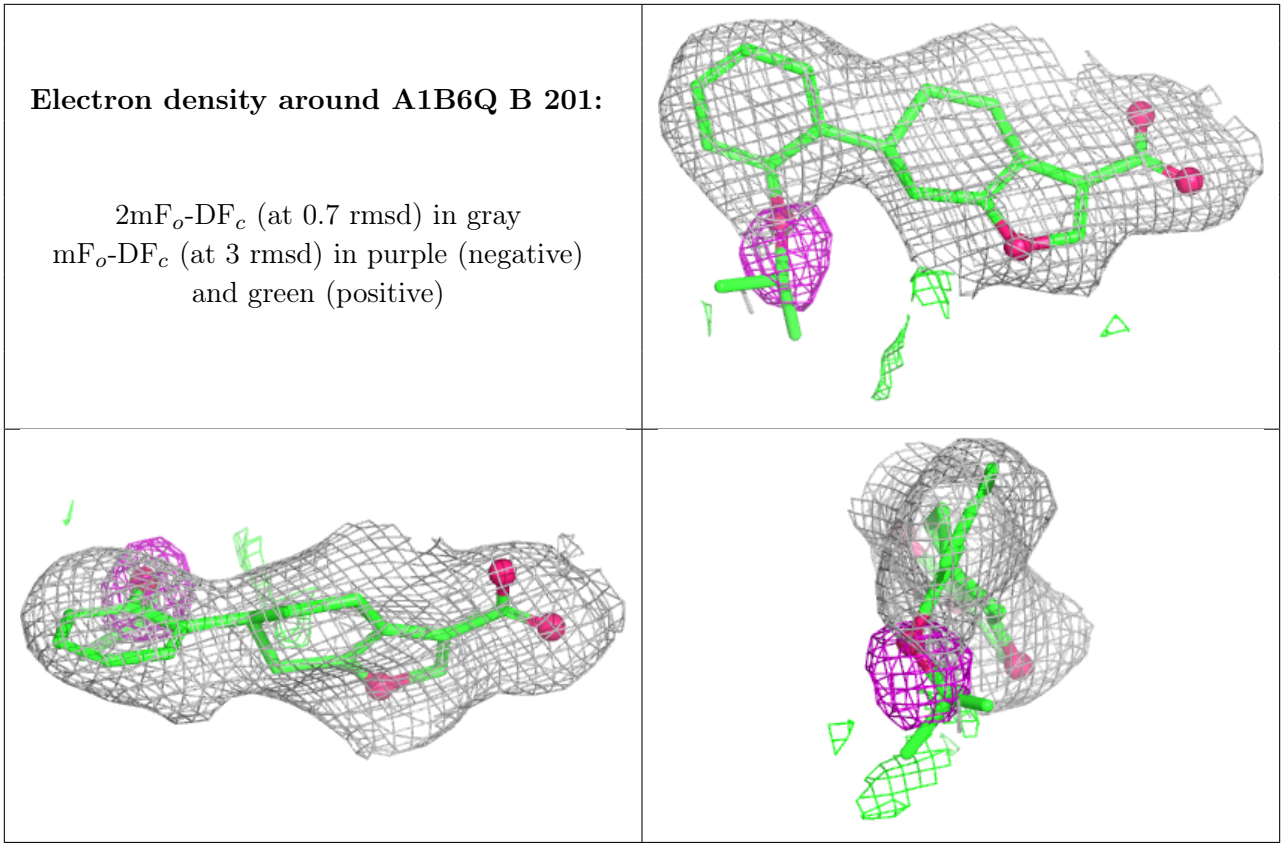
Electron density around A1B6Q C 201:

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



Electron density around A1B6Q B 201:

$2mF_o$-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.