Full wwPDB X-ray Structure Validation Report ⓘ

May 29, 2020 – 10:55 am BST

PDB ID	:	6B31
Title	:	Structure of RORgt in complex with a novel inverse agonist 2
Authors	:	Skene, R.J.; Hoffman, I.
Deposited on	:	2017-09-20
Resolution	:	3.18 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 following versions of software and data (see references ⓘ) were used in the production of this report:

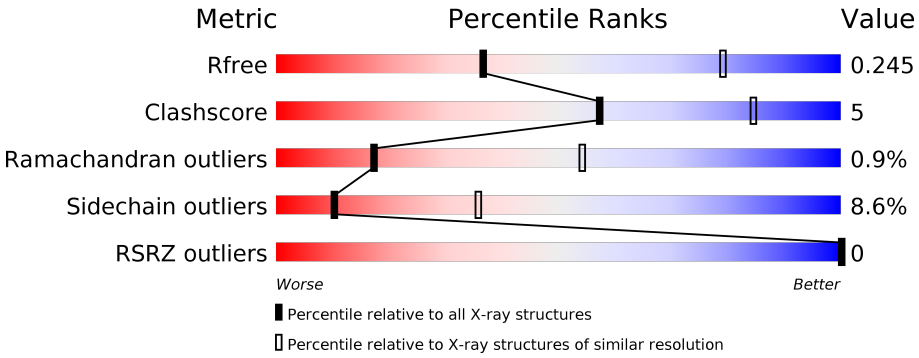
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.11
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.11

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 3.18 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}	130704	1467 (3.20-3.16)
Clashscore	141614	1599 (3.20-3.16)
Ramachandran outliers	138981	1574 (3.20-3.16)
Sidechain outliers	138945	1573 (3.20-3.16)
RSRZ outliers	127900	1423 (3.20-3.16)

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 on 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	228	77% 22%
1	B	228	80% 19%

2 Entry composition

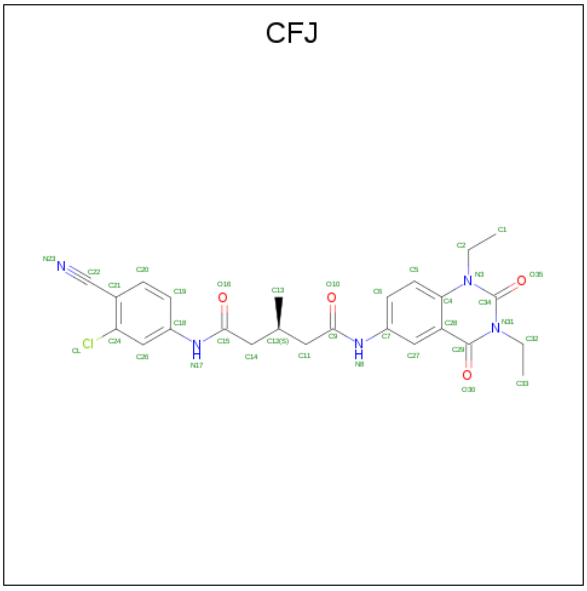
There are 3 unique types of molecules in this entry. The entry contains 3807 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Nuclear receptor ROR-gamma.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	228	Total	C	N	O	S	0	0	0
			1865	1182	338	331	14			
1	B	227	Total	C	N	O	S	0	0	0
			1857	1176	337	330	14			

- Molecule 2 is (3S)-N 1 -(3-chloro-4-cyanophenyl)-N 5 -(1,3-diethyl-2,4-dioxo-1,2,3,4-tetrahydroquinazolin-6-yl)-3-methylpentanediamide (three-letter code: CFJ) (formula: $C_{25}H_{26}ClN_5O_4$) (labeled as "Ligand of Interest" by author).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	Cl	N	O	0	0
			35	25	1	5	4		
2	B	1	Total	C	Cl	N	O	0	0
			35	25	1	5	4		

- Molecule 3 is water.

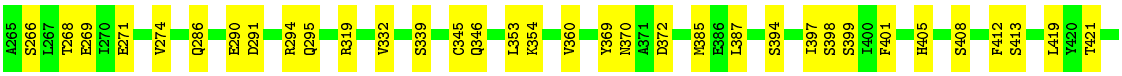
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	8	Total O 8 8	0	0
3	B	7	Total O 7 7	0	0

3 Residue-property plots (i)

These plots are drawn for all protein, RNA and DNA 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.

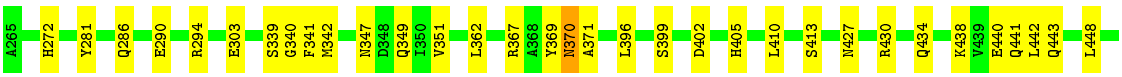
- Molecule 1: Nuclear receptor ROR-gamma

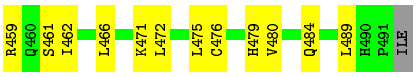
Chain A:



- Molecule 1: Nuclear receptor ROR-gamma

Chain B:





4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 61	Depositor
Cell constants a, b, c, α, β, γ	96.43Å 96.43Å 130.85Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	50.00 – 3.18 41.75 – 3.18	Depositor EDS
% Data completeness (in resolution range)	99.7 (50.00-3.18) 99.8 (41.75-3.18)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.57 (at 3.19Å)	Xtriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.161 , 0.245 0.162 , 0.245	Depositor DCC
R_{free} test set	555 reflections (4.78%)	wwPDB-VP
Wilson B-factor (Å^2)	93.8	Xtriage
Anisotropy	0.111	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.33 , 62.0	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	0.061 for h,-h-k,-l	Xtriage
F_o,F_c correlation	0.97	EDS
Total number of atoms	3807	wwPDB-VP
Average B, all atoms (Å^2)	96.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.82% 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: CFJ

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	0.53	0/1903	0.80	0/2560
1	B	0.53	0/1895	0.79	2/2549 (0.1%)
All	All	0.53	0/3798	0.79	2/5109 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	489	LEU	CA-CB-CG	5.57	128.11	115.30
1	B	410	LEU	CA-CB-CG	5.50	127.96	115.30

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1865	0	1867	16	0
1	B	1857	0	1856	19	0
2	A	35	0	0	1	0
2	B	35	0	0	1	0
3	A	8	0	0	0	0
3	B	7	0	0	0	0
All	All	3807	0	3723	37	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 (37) 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:394:SER:HA	1:A:397:ILE:HD12	1.79	0.63
1:A:370:ASN:HD21	1:A:372:ASP:HB2	1.65	0.62
1:B:370:ASN:C	1:B:370:ASN:HD22	2.03	0.60
1:B:399:SER:HA	1:B:402:ASP:HB2	1.85	0.58
1:B:303:GLU:CD	1:B:303:GLU:H	2.09	0.56
1:B:281:TYR:OH	1:B:367:ARG:HD2	2.06	0.55
1:B:370:ASN:C	1:B:370:ASN:ND2	2.63	0.53
1:B:369:TYR:OH	1:B:405:HIS:HD2	1.91	0.53
1:A:427:ASN:O	1:A:430:ARG:HG2	2.10	0.52
1:B:459:ARG:O	1:B:462:ILE:HG12	2.10	0.51
1:A:457:THR:O	1:A:459:ARG:HG2	2.09	0.51
1:B:438:LYS:O	1:B:441:GLN:HB3	2.11	0.51
1:B:303:GLU:CD	1:B:303:GLU:N	2.65	0.50
1:A:470:GLY:HA2	1:A:473:ARG:H	1.77	0.49
1:B:339:SER:O	1:B:341:PHE:N	2.44	0.49
1:A:291:ASP:HA	1:A:294:ARG:HH11	1.77	0.49
1:B:462:ILE:O	1:B:466:LEU:HG	2.13	0.49
1:A:274:VAL:HG13	1:A:419:LEU:HD11	1.95	0.49
1:B:362:LEU:HD23	1:B:472:LEU:HD12	1.94	0.48
1:B:427:ASN:O	1:B:430:ARG:HG2	2.15	0.47
1:B:396:LEU:HD21	1:B:479:HIS:HA	1.98	0.46
1:A:360:VAL:HG13	1:A:421:THR:HB	1.98	0.46
1:A:483:LEU:HD22	1:A:487:GLN:HB2	1.97	0.46
1:A:490:HIS:O	1:A:492:ILE:N	2.49	0.45
1:B:347:ASN:O	1:B:351:VAL:HG23	2.18	0.43
1:A:398:SER:HA	1:A:401:PHE:HB2	2.00	0.43
1:A:369:TYR:CE2	1:A:405:HIS:HA	2.54	0.42
1:A:490:HIS:CD2	1:A:491:PRO:HD2	2.54	0.42
1:B:342:MET:HA	1:B:349:GLN:NE2	2.35	0.41
1:A:459:ARG:O	1:A:462:ILE:HG12	2.21	0.41
1:B:369:TYR:CE2	1:B:371:ALA:HA	2.55	0.41
2:A:600:CFJ:C27	2:A:600:CFJ:O10	2.69	0.41
1:B:471:LYS:O	1:B:475:LEU:HB2	2.21	0.41
1:B:476:CYS:O	1:B:480:VAL:HG23	2.21	0.40
2:B:600:CFJ:O16	2:B:600:CFJ:C26	2.68	0.40
1:A:294:ARG:HG3	1:A:295:GLN:HG2	2.03	0.40
1:A:332:VAL:HG22	1:A:353:LEU:HD22	2.03	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	226/228 (99%)	206 (91%)	18 (8%)	2 (1%)	17 54
1	B	225/228 (99%)	206 (92%)	17 (8%)	2 (1%)	17 54
All	All	451/456 (99%)	412 (91%)	35 (8%)	4 (1%)	17 54

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	491	PRO
1	B	286	GLN
1	A	286	GLN
1	B	340	GLY

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	204/204 (100%)	181 (89%)	23 (11%)	6 23
1	B	203/204 (100%)	191 (94%)	12 (6%)	19 52
All	All	407/408 (100%)	372 (91%)	35 (9%)	10 36

All (35) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	266	SER
1	A	268	THR
1	A	269	GLU
1	A	271	GLU
1	A	290	GLU
1	A	319	ARG
1	A	339	SER
1	A	345	CYS
1	A	346	GLN
1	A	354	LYS
1	A	385	MET
1	A	387	LEU
1	A	399	SER
1	A	408	SER
1	A	412	PHE
1	A	413	SER
1	A	425	LEU
1	A	437	ARG
1	A	442	LEU
1	A	469	LYS
1	A	471	LYS
1	A	475	LEU
1	A	483	LEU
1	B	272	HIS
1	B	290	GLU
1	B	294	ARG
1	B	370	ASN
1	B	413	SER
1	B	434	GLN
1	B	440	GLU
1	B	442	LEU
1	B	443	GLN
1	B	448	LEU
1	B	461	SER
1	B	484	GLN

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (12) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	346	GLN
1	A	370	ASN
1	A	405	HIS
1	A	478	GLN

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Mol	Chain	Res	Type
1	A	490	HIS
1	B	329	GLN
1	B	370	ASN
1	B	405	HIS
1	B	427	ASN
1	B	443	GLN
1	B	445	ASN
1	B	488	HIS

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 carbohydrates 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	CFJ	A	600	-	34,37,37	1.17	1 (2%)	40,52,52	1.92	13 (32%)
2	CFJ	B	600	-	34,37,37	1.07	2 (5%)	40,52,52	2.03	9 (22%)

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	CFJ	A	600	-	-	3/22/22/22	0/3/3/3
2	CFJ	B	600	-	-	2/22/22/22	0/3/3/3

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	600	CFJ	C29-C28	4.47	1.49	1.41
2	B	600	CFJ	C29-C28	4.37	1.49	1.41
2	B	600	CFJ	C28-C4	2.10	1.43	1.41

All (22) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	600	CFJ	C24-C21-C22	-6.13	114.62	121.13
2	B	600	CFJ	C14-C15-N17	5.55	122.11	114.50
2	A	600	CFJ	C24-C21-C22	-4.74	116.10	121.13
2	B	600	CFJ	C12-C11-C9	-4.54	106.02	113.11
2	A	600	CFJ	C11-C9-N8	4.20	120.26	114.50
2	B	600	CFJ	O16-C15-C14	-4.18	115.37	121.50
2	A	600	CFJ	C12-C11-C9	-3.37	107.84	113.11
2	A	600	CFJ	C12-C14-C15	-3.32	107.93	113.11
2	A	600	CFJ	C20-C21-C24	3.30	121.46	118.40
2	B	600	CFJ	C20-C21-C22	3.17	124.93	119.40
2	A	600	CFJ	C2-N3-C4	3.15	120.62	118.23
2	A	600	CFJ	C14-C15-N17	3.02	118.65	114.50
2	B	600	CFJ	C21-C24-CL	-2.81	116.84	119.42
2	A	600	CFJ	C28-C29-N31	2.77	118.04	116.15
2	A	600	CFJ	C26-C24-CL	2.68	122.81	118.49
2	B	600	CFJ	C26-C24-CL	2.64	122.75	118.49
2	B	600	CFJ	C2-N3-C34	2.55	122.29	119.20
2	A	600	CFJ	O16-C15-C14	-2.43	117.94	121.50
2	B	600	CFJ	C20-C21-C24	2.22	120.45	118.40
2	A	600	CFJ	C13-C12-C11	2.11	115.99	110.00
2	A	600	CFJ	C5-C4-N3	2.07	123.40	121.36
2	A	600	CFJ	C1-C2-N3	-2.01	108.09	111.49

There are no chirality outliers.

All (5) torsion outliers are listed below:

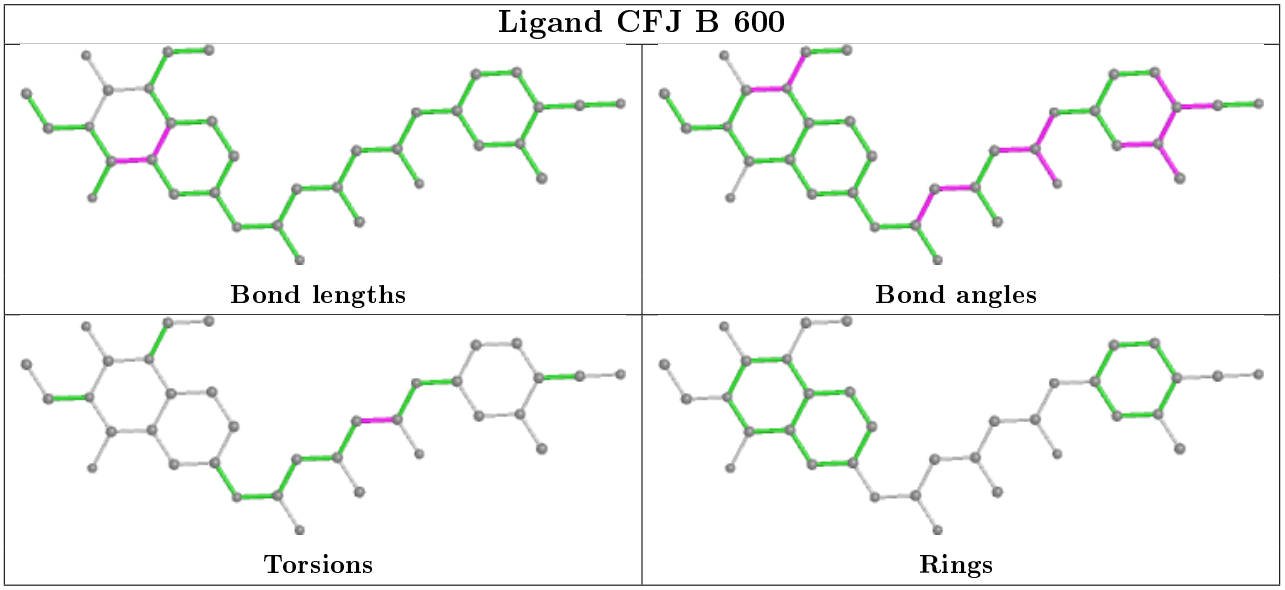
Mol	Chain	Res	Type	Atoms
2	B	600	CFJ	C12-C14-C15-O16
2	B	600	CFJ	C12-C14-C15-N17
2	A	600	CFJ	C12-C14-C15-N17
2	A	600	CFJ	C12-C14-C15-O16
2	A	600	CFJ	C33-C32-N31-C34

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	600	CFJ	1	0
2	B	600	CFJ	1	0

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



5.7 Other polymers

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

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	228/228 (100%)	-0.22	0	100	100	70, 92, 131, 161	0
1	B	227/228 (99%)	-0.32	0	100	100	71, 93, 127, 146	0
All	All	455/456 (99%)	-0.27	0	100	100	70, 93, 130, 161	0

There are no RSRZ outliers to report.

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 carbohydrates in this entry.

6.4 Ligands

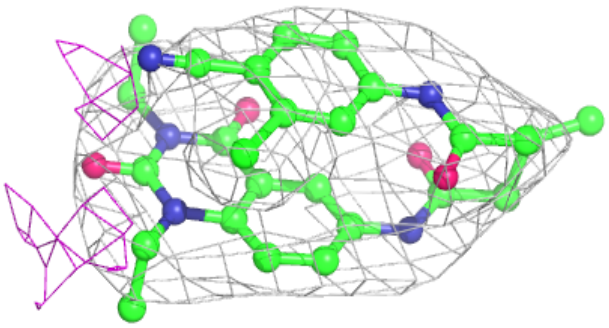
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9'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

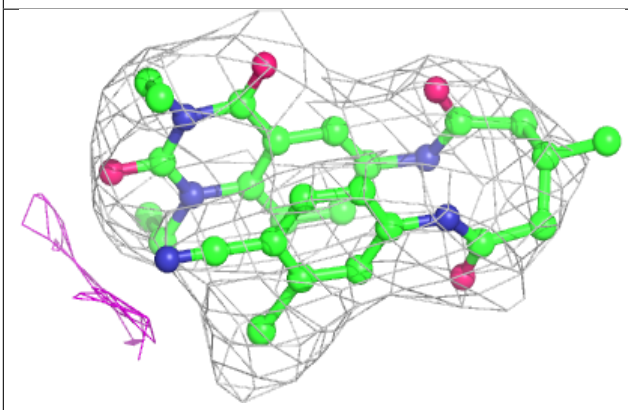
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
2	CFJ	A	600	35/35	0.98	0.18	58,72,87,92	0
2	CFJ	B	600	35/35	0.99	0.21	57,76,89,97	0

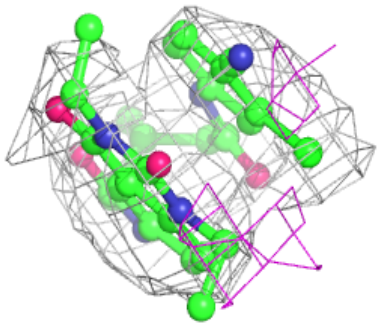
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around CFJ A 600:

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

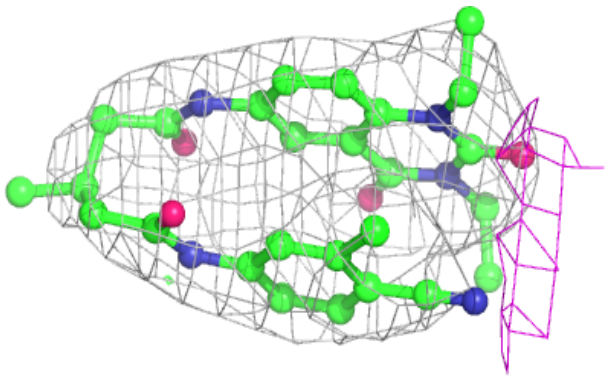


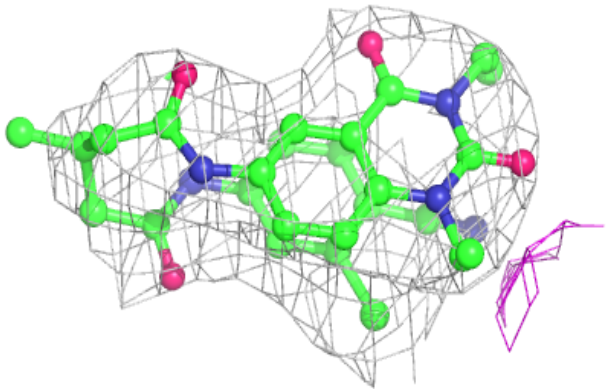


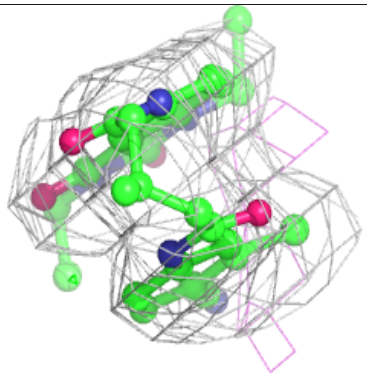


Electron density around CFJ B 600:

$2mF_o$-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.