



Full wwPDB X-ray Structure Validation Report ⓘ

Apr 26, 2026 – 09:29 AM EDT

PDB ID : 7WMQ / pdb_00007wmq
Title : Crystal Structure of the second bromodomain of human BRD2 in complex with the inhibitor Y13157
Authors : Li, J.; Zhang, C.; Xu, H.; Zhuang, X.; Wu, X.; Zhang, Y.; Xu, Y.
Deposited on : 2022-01-16
Resolution : 2.37 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

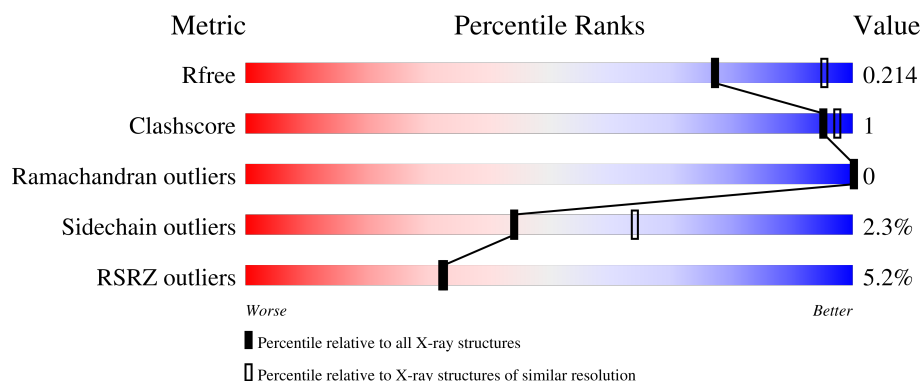
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.37 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	7164 (2.40-2.36)
Clashscore	190562	7722 (2.40-2.36)
Ramachandran outliers	187476	7626 (2.40-2.36)
Sidechain outliers	187428	7627 (2.40-2.36)
RSRZ outliers	180081	7170 (2.40-2.36)

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	A	136	4% 79% 19%
1	B	136	4% 79% 18%
1	C	136	4% 78% 19%
1	D	136	4% 74% 7% 19%

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 4130 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 Isoform 4 of Bromodomain-containing protein 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	110	Total	C	N	O	S	0	2	0
			922	591	161	163	7			
1	B	111	Total	C	N	O	S	0	1	0
			928	594	163	164	7			
1	C	110	Total	C	N	O	S	0	0	0
			910	582	159	162	7			
1	D	110	Total	C	N	O	S	0	1	0
			919	589	163	160	7			

There are 96 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	320	GLU	-	expression tag	UNP P25440
A	321	GLY	-	expression tag	UNP P25440
A	322	ASP	-	expression tag	UNP P25440
A	323	ILE	-	expression tag	UNP P25440
A	324	HIS	-	expression tag	UNP P25440
A	325	MET	-	expression tag	UNP P25440
A	326	LYS	-	expression tag	UNP P25440
A	327	LYS	-	expression tag	UNP P25440
A	328	GLY	-	expression tag	UNP P25440
A	329	HIS	-	expression tag	UNP P25440
A	330	HIS	-	expression tag	UNP P25440
A	331	HIS	-	expression tag	UNP P25440
A	332	HIS	-	expression tag	UNP P25440
A	333	HIS	-	expression tag	UNP P25440
A	334	HIS	-	expression tag	UNP P25440
A	335	GLU	-	expression tag	UNP P25440
A	336	ASN	-	expression tag	UNP P25440
A	337	LEU	-	expression tag	UNP P25440
A	338	TYR	-	expression tag	UNP P25440
A	339	PHE	-	expression tag	UNP P25440
A	340	GLN	-	expression tag	UNP P25440

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Chain	Residue	Modelled	Actual	Comment	Reference
A	341	GLY	-	expression tag	UNP P25440
A	342	GLY	-	expression tag	UNP P25440
A	343	SER	-	expression tag	UNP P25440
B	320	GLU	-	expression tag	UNP P25440
B	321	GLY	-	expression tag	UNP P25440
B	322	ASP	-	expression tag	UNP P25440
B	323	ILE	-	expression tag	UNP P25440
B	324	HIS	-	expression tag	UNP P25440
B	325	MET	-	expression tag	UNP P25440
B	326	LYS	-	expression tag	UNP P25440
B	327	LYS	-	expression tag	UNP P25440
B	328	GLY	-	expression tag	UNP P25440
B	329	HIS	-	expression tag	UNP P25440
B	330	HIS	-	expression tag	UNP P25440
B	331	HIS	-	expression tag	UNP P25440
B	332	HIS	-	expression tag	UNP P25440
B	333	HIS	-	expression tag	UNP P25440
B	334	HIS	-	expression tag	UNP P25440
B	335	GLU	-	expression tag	UNP P25440
B	336	ASN	-	expression tag	UNP P25440
B	337	LEU	-	expression tag	UNP P25440
B	338	TYR	-	expression tag	UNP P25440
B	339	PHE	-	expression tag	UNP P25440
B	340	GLN	-	expression tag	UNP P25440
B	341	GLY	-	expression tag	UNP P25440
B	342	GLY	-	expression tag	UNP P25440
B	343	SER	-	expression tag	UNP P25440
C	320	GLU	-	expression tag	UNP P25440
C	321	GLY	-	expression tag	UNP P25440
C	322	ASP	-	expression tag	UNP P25440
C	323	ILE	-	expression tag	UNP P25440
C	324	HIS	-	expression tag	UNP P25440
C	325	MET	-	expression tag	UNP P25440
C	326	LYS	-	expression tag	UNP P25440
C	327	LYS	-	expression tag	UNP P25440
C	328	GLY	-	expression tag	UNP P25440
C	329	HIS	-	expression tag	UNP P25440
C	330	HIS	-	expression tag	UNP P25440
C	331	HIS	-	expression tag	UNP P25440
C	332	HIS	-	expression tag	UNP P25440
C	333	HIS	-	expression tag	UNP P25440
C	334	HIS	-	expression tag	UNP P25440

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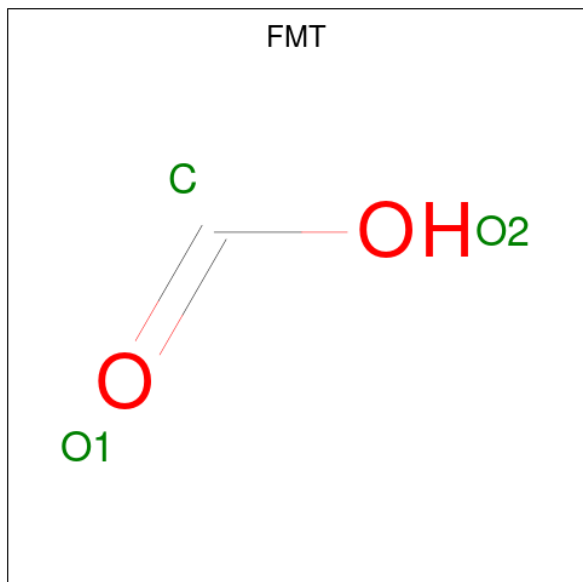
Chain	Residue	Modelled	Actual	Comment	Reference
C	335	GLU	-	expression tag	UNP P25440
C	336	ASN	-	expression tag	UNP P25440
C	337	LEU	-	expression tag	UNP P25440
C	338	TYR	-	expression tag	UNP P25440
C	339	PHE	-	expression tag	UNP P25440
C	340	GLN	-	expression tag	UNP P25440
C	341	GLY	-	expression tag	UNP P25440
C	342	GLY	-	expression tag	UNP P25440
C	343	SER	-	expression tag	UNP P25440
D	320	GLU	-	expression tag	UNP P25440
D	321	GLY	-	expression tag	UNP P25440
D	322	ASP	-	expression tag	UNP P25440
D	323	ILE	-	expression tag	UNP P25440
D	324	HIS	-	expression tag	UNP P25440
D	325	MET	-	expression tag	UNP P25440
D	326	LYS	-	expression tag	UNP P25440
D	327	LYS	-	expression tag	UNP P25440
D	328	GLY	-	expression tag	UNP P25440
D	329	HIS	-	expression tag	UNP P25440
D	330	HIS	-	expression tag	UNP P25440
D	331	HIS	-	expression tag	UNP P25440
D	332	HIS	-	expression tag	UNP P25440
D	333	HIS	-	expression tag	UNP P25440
D	334	HIS	-	expression tag	UNP P25440
D	335	GLU	-	expression tag	UNP P25440
D	336	ASN	-	expression tag	UNP P25440
D	337	LEU	-	expression tag	UNP P25440
D	338	TYR	-	expression tag	UNP P25440
D	339	PHE	-	expression tag	UNP P25440
D	340	GLN	-	expression tag	UNP P25440
D	341	GLY	-	expression tag	UNP P25440
D	342	GLY	-	expression tag	UNP P25440
D	343	SER	-	expression tag	UNP P25440

- Molecule 2 is 2-(2-cyclobutyl-1 {H}-imidazol-5-yl)-7-[2-(4-fluoranyl-2,6-dimethyl-phenoxy)-5-(2-oxidanylpropan-2-yl)phenyl]-5-methyl-furo[3,2-c]pyridin-4-one (CCD ID: JFL) (formula: C₃₂H₃₂FN₃O₄) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			6	3	3		
3	B	1	Total	C	O	0	0
			6	3	3		
3	B	1	Total	C	O	0	0
			6	3	3		
3	C	1	Total	C	O	0	0
			6	3	3		
3	D	1	Total	C	O	0	0
			6	3	3		
3	D	1	Total	C	O	0	0
			6	3	3		

- Molecule 4 is FORMIC ACID (CCD ID: FMT) (formula: CH_2O_2).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			3	1	2		
4	A	1	Total	C	O	0	0
			3	1	2		
4	A	1	Total	C	O	0	0
			3	1	2		
4	A	1	Total	C	O	0	0
			3	1	2		
4	A	1	Total	C	O	0	0
			3	1	2		
4	B	1	Total	C	O	0	0
			3	1	2		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	B	1	Total	C	O	0	0
			3	1	2		
4	B	1	Total	C	O	0	0
			3	1	2		
4	B	1	Total	C	O	0	0
			3	1	2		
4	C	1	Total	C	O	0	0
			3	1	2		
4	C	1	Total	C	O	0	0
			3	1	2		
4	C	1	Total	C	O	0	0
			3	1	2		
4	C	1	Total	C	O	0	0
			3	1	2		
4	D	1	Total	C	O	0	0
			3	1	2		
4	D	1	Total	C	O	0	0
			3	1	2		

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	53	Total	O	0	0
			53	53		
5	B	56	Total	O	0	0
			56	56		
5	C	55	Total	O	0	0
			55	55		
5	D	46	Total	O	0	0
			46	46		

4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	90.08Å 95.08Å 110.40Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	72.04 – 2.37 72.04 – 2.37	Depositor EDS
% Data completeness (in resolution range)	95.8 (72.04-2.37) 95.8 (72.04-2.37)	Depositor EDS
R_{merge}	0.19	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.44 (at 2.37Å)	Xtriage
Refinement program	REFMAC 5.8.0189	Depositor
R, R_{free}	0.187 , 0.211 0.192 , 0.214	Depositor DCC
R_{free} test set	1827 reflections (4.66%)	wwPDB-VP
Wilson B-factor (Å ²)	27.0	Xtriage
Anisotropy	0.488	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 32.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	4130	wwPDB-VP
Average B, all atoms (Å ²)	29.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 10.35% 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 [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: FMT, GOL, JFL

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	0.61	0/954	0.80	0/1285
1	B	0.59	0/953	0.81	0/1282
1	C	0.61	0/935	0.84	0/1260
1	D	0.60	0/947	0.85	0/1274
All	All	0.60	0/3789	0.83	0/5101

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 [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	922	0	902	1	0
1	B	928	0	914	3	0
1	C	910	0	889	3	0
1	D	919	0	911	2	0
2	A	40	0	0	0	0
2	B	40	0	0	0	0
2	C	40	0	0	0	0
2	D	40	0	0	0	0
3	A	6	0	8	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	12	0	16	2	0
3	C	6	0	8	2	0
3	D	12	0	16	0	0
4	A	15	0	5	0	0
4	B	12	0	4	0	0
4	C	12	0	4	0	0
4	D	6	0	2	0	0
5	A	53	0	0	0	0
5	B	56	0	0	0	0
5	C	55	0	0	0	0
5	D	46	0	0	1	0
All	All	4130	0	3679	9	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 1.

All (9) 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:C:401:ARG:HE	3:C:502:GOL:H31	1.74	0.52
1:D:449[A]:ARG:NH2	5:D:601:HOH:O	2.42	0.50
1:C:353:CYS:SG	1:C:453:MET:HE1	2.52	0.50
1:B:375:PRO:HB3	3:B:502:GOL:H11	1.95	0.48
1:B:450:TYR:CE1	1:B:453:MET:HE1	2.48	0.48
1:B:375:PRO:HB3	3:B:502:GOL:C1	2.44	0.47
1:C:401:ARG:HE	3:C:502:GOL:C3	2.30	0.44
1:A:357:LEU:HD21	1:A:400:LYS:HA	2.01	0.43
1:D:357:LEU:HD21	1:D:400:LYS:HA	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	110/136 (81%)	110 (100%)	0	0	100	100
1	B	110/136 (81%)	110 (100%)	0	0	100	100
1	C	108/136 (79%)	107 (99%)	1 (1%)	0	100	100
1	D	109/136 (80%)	107 (98%)	2 (2%)	0	100	100
All	All	437/544 (80%)	434 (99%)	3 (1%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

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	98/118 (83%)	97 (99%)	1 (1%)	68	82
1	B	99/118 (84%)	98 (99%)	1 (1%)	68	82
1	C	97/118 (82%)	96 (99%)	1 (1%)	68	82
1	D	98/118 (83%)	92 (94%)	6 (6%)	17	27
All	All	392/472 (83%)	383 (98%)	9 (2%)	44	64

All (9) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	449	ARG
1	B	345	LYS
1	C	364	LYS
1	D	345	LYS
1	D	358	LYS
1	D	359	GLU
1	D	364	LYS
1	D	379	SER
1	D	406	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	392	HIS
1	C	412	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

25 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	$\# Z > 2$
3	GOL	D	502	-	5,5,5	0.46	0	5,5,5	0.37	0
4	FMT	D	504	-	2,2,2	0.69	0	1,1,1	0.69	0
3	GOL	D	503	-	5,5,5	0.38	0	5,5,5	0.25	0
4	FMT	A	505	-	2,2,2	0.78	0	1,1,1	0.61	0
4	FMT	B	507	-	2,2,2	0.67	0	1,1,1	0.69	0
3	GOL	A	502	-	5,5,5	0.49	0	5,5,5	0.35	0
4	FMT	C	506	-	2,2,2	0.75	0	1,1,1	0.66	0
2	JFL	A	501	-	44,45,45	3.11	13 (29%)	50,69,69	1.52	8 (16%)
4	FMT	D	505	-	2,2,2	0.64	0	1,1,1	0.75	0
2	JFL	B	501	-	44,45,45	3.57	13 (29%)	50,69,69	1.60	12 (24%)
4	FMT	A	503	-	2,2,2	0.77	0	1,1,1	0.64	0
4	FMT	C	505	-	2,2,2	0.72	0	1,1,1	0.66	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	FMT	C	504	-	2,2,2	0.74	0	1,1,1	0.56	0
2	JFL	D	501	-	44,45,45	3.36	14 (31%)	50,69,69	1.44	9 (18%)
4	FMT	B	505	-	2,2,2	0.72	0	1,1,1	0.64	0
4	FMT	C	503	-	2,2,2	0.68	0	1,1,1	0.60	0
3	GOL	C	502	-	5,5,5	0.55	0	5,5,5	0.65	0
2	JFL	C	501	-	44,45,45	3.55	14 (31%)	50,69,69	1.48	9 (18%)
4	FMT	B	506	-	2,2,2	0.68	0	1,1,1	0.73	0
4	FMT	B	504	-	2,2,2	0.79	0	1,1,1	0.59	0
4	FMT	A	506	-	2,2,2	0.65	0	1,1,1	0.61	0
4	FMT	A	507	-	2,2,2	0.60	0	1,1,1	0.77	0
3	GOL	B	502	-	5,5,5	0.67	0	5,5,5	1.10	0
3	GOL	B	503	-	5,5,5	0.43	0	5,5,5	0.43	0
4	FMT	A	504	-	2,2,2	0.68	0	1,1,1	0.73	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
3	GOL	D	502	-	-	2/4/4/4	-
2	JFL	D	501	-	-	0/18/28/28	0/6/6/6
3	GOL	B	502	-	-	1/4/4/4	-
3	GOL	D	503	-	-	2/4/4/4	-
3	GOL	C	502	-	-	4/4/4/4	-
2	JFL	B	501	-	-	3/18/28/28	0/6/6/6
3	GOL	B	503	-	-	0/4/4/4	-
3	GOL	A	502	-	-	2/4/4/4	-
2	JFL	C	501	-	-	1/18/28/28	0/6/6/6
2	JFL	A	501	-	-	1/18/28/28	0/6/6/6

All (54) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	501	JFL	CBK-CAO	-15.68	1.42	1.53
2	C	501	JFL	CBK-CAO	-15.44	1.43	1.53
2	D	501	JFL	CBK-CAO	-13.27	1.44	1.53
2	A	501	JFL	CBK-CAO	-12.13	1.45	1.53
2	B	501	JFL	CAF-CAA	-8.81	1.33	1.43
2	D	501	JFL	CAF-CAA	-8.33	1.34	1.43
2	A	501	JFL	CAF-CAA	-8.03	1.34	1.43

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	501	JFL	CAF-CAA	-7.32	1.35	1.43
2	D	501	JFL	CAJ-CAF	-6.61	1.41	1.49
2	D	501	JFL	CBE-CAY	-6.55	1.38	1.51
2	B	501	JFL	CAJ-CAF	-6.13	1.41	1.49
2	C	501	JFL	FBD-CBA	-6.03	1.21	1.36
2	C	501	JFL	CAJ-CAF	-5.90	1.42	1.49
2	C	501	JFL	CBE-CAY	-5.90	1.40	1.51
2	A	501	JFL	CBF-CBC	-5.85	1.40	1.51
2	D	501	JFL	CBF-CBC	-5.83	1.40	1.51
2	B	501	JFL	CBF-CBC	-5.81	1.40	1.51
2	A	501	JFL	CBE-CAY	-5.73	1.40	1.51
2	C	501	JFL	CBF-CBC	-5.73	1.40	1.51
2	A	501	JFL	CAJ-CAF	-5.55	1.42	1.49
2	B	501	JFL	CBE-CAY	-5.48	1.40	1.51
2	B	501	JFL	CAK-CAH	-5.30	1.34	1.43
2	A	501	JFL	CAK-CAH	-4.99	1.34	1.43
2	C	501	JFL	CAK-CAH	-4.86	1.35	1.43
2	C	501	JFL	CBG-CAU	4.61	1.58	1.49
2	B	501	JFL	CAB-CAC	-4.02	1.35	1.45
2	D	501	JFL	CAK-CAH	-3.96	1.36	1.43
2	B	501	JFL	OAG-CAA	-3.72	1.29	1.38
2	B	501	JFL	CAI-CAB	-3.68	1.34	1.42
2	D	501	JFL	CAB-CAC	-3.66	1.36	1.45
2	D	501	JFL	CBG-CAU	3.66	1.56	1.49
2	A	501	JFL	CAB-CAC	-3.60	1.36	1.45
2	D	501	JFL	CAI-CAB	-3.52	1.34	1.42
2	B	501	JFL	CBG-CAU	3.46	1.55	1.49
2	C	501	JFL	CAI-CAB	-3.40	1.34	1.42
2	C	501	JFL	CAB-CAC	-3.34	1.37	1.45
2	A	501	JFL	FBD-CBA	-3.30	1.28	1.36
2	C	501	JFL	OAG-CAH	-3.28	1.33	1.38
2	D	501	JFL	CAC-NAD	-3.25	1.35	1.39
2	D	501	JFL	OAG-CAH	-3.24	1.33	1.38
2	D	501	JFL	OAG-CAA	-3.19	1.30	1.38
2	D	501	JFL	CBH-CBG	-3.07	1.48	1.54
2	B	501	JFL	CAC-NAD	-2.99	1.35	1.39
2	A	501	JFL	CBG-CAU	2.97	1.55	1.49
2	A	501	JFL	CAC-NAD	-2.85	1.35	1.39
2	D	501	JFL	FBD-CBA	-2.77	1.29	1.36
2	A	501	JFL	CAI-CAB	-2.75	1.36	1.42
2	A	501	JFL	CAK-NAV	-2.54	1.33	1.37
2	C	501	JFL	CAK-NAV	-2.51	1.33	1.37

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	501	JFL	CBH-CBG	-2.30	1.49	1.54
2	C	501	JFL	OAG-CAA	-2.25	1.33	1.38
2	B	501	JFL	CAK-NAV	-2.24	1.34	1.37
2	C	501	JFL	CAC-NAD	-2.20	1.36	1.39
2	B	501	JFL	CBL-CBK	-2.11	1.50	1.52

All (38) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	501	JFL	CAH-CAK-NAV	4.07	128.46	121.70
2	A	501	JFL	CBI-CBH-CBG	3.86	91.78	88.48
2	B	501	JFL	CBM-CBK-CBL	-3.70	106.02	110.53
2	B	501	JFL	CAN-CAO-CBK	3.52	124.86	120.52
2	C	501	JFL	CAL-NAD-CAC	3.34	121.72	117.14
2	C	501	JFL	CBI-CBH-CBG	3.27	91.29	88.48
2	D	501	JFL	CAH-OAG-CAA	3.26	109.38	106.34
2	B	501	JFL	CAL-NAD-CAC	3.26	121.60	117.14
2	B	501	JFL	CAH-CAK-NAV	3.15	126.94	121.70
2	D	501	JFL	CAH-CAK-NAV	3.11	126.87	121.70
2	C	501	JFL	CBI-CBJ-CBG	3.07	91.12	88.48
2	D	501	JFL	CAF-CAE-NAD	-2.86	119.38	122.91
2	C	501	JFL	CAB-CAC-NAD	2.86	119.99	114.95
2	D	501	JFL	OBN-CBK-CAO	2.84	113.73	109.23
2	C	501	JFL	CAH-CAK-NAV	2.83	126.40	121.70
2	D	501	JFL	CAL-NAD-CAC	2.74	120.89	117.14
2	B	501	JFL	CAP-CAO-CBK	-2.72	117.55	121.33
2	A	501	JFL	CBI-CBJ-CBG	2.71	90.81	88.48
2	C	501	JFL	CAF-CAE-NAD	-2.56	119.75	122.91
2	D	501	JFL	CAN-CAO-CBK	2.56	123.67	120.52
2	A	501	JFL	CAL-NAD-CAC	2.55	120.64	117.14
2	D	501	JFL	CAB-CAC-NAD	2.54	119.43	114.95
2	C	501	JFL	CAR-OAW-CAX	2.50	123.31	117.94
2	B	501	JFL	CAF-CAE-NAD	-2.50	119.83	122.91
2	A	501	JFL	CAF-CAE-NAD	-2.48	119.85	122.91
2	B	501	JFL	CAB-CAC-NAD	2.43	119.24	114.95
2	B	501	JFL	CAR-OAW-CAX	2.40	123.10	117.94
2	A	501	JFL	CAR-OAW-CAX	2.39	123.08	117.94
2	C	501	JFL	OBN-CBK-CAO	2.37	112.98	109.23
2	B	501	JFL	CBJ-CBG-CBH	-2.37	84.88	88.40
2	A	501	JFL	CAB-CAC-NAD	2.35	119.10	114.95
2	A	501	JFL	OBN-CBK-CAO	2.29	112.85	109.23
2	B	501	JFL	CBF-CBC-CAX	2.27	124.44	120.80

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	501	JFL	CAR-OAW-CAX	2.18	122.63	117.94
2	D	501	JFL	CBB-CBA-CAZ	-2.17	120.86	123.50
2	B	501	JFL	CAR-CAJ-CAF	2.08	124.31	121.56
2	C	501	JFL	CAH-OAG-CAA	2.05	108.25	106.34
2	B	501	JFL	CBJ-CBI-CBH	-2.04	83.54	88.56

There are no chirality outliers.

All (16) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	D	502	GOL	O1-C1-C2-C3
3	D	503	GOL	O1-C1-C2-C3
3	A	502	GOL	O1-C1-C2-C3
3	C	502	GOL	O1-C1-C2-C3
3	C	502	GOL	C1-C2-C3-O3
3	C	502	GOL	O1-C1-C2-O2
3	C	502	GOL	O2-C2-C3-O3
3	D	502	GOL	O1-C1-C2-O2
3	D	503	GOL	O1-C1-C2-O2
2	B	501	JFL	CAP-CAO-CBK-CBL
3	A	502	GOL	O1-C1-C2-O2
2	B	501	JFL	CAN-CAO-CBK-CBL
3	B	502	GOL	C1-C2-C3-O3
2	A	501	JFL	OAG-CAH-CAK-NAV
2	C	501	JFL	OAG-CAH-CAK-NAV
2	B	501	JFL	CAP-CAO-CBK-OBN

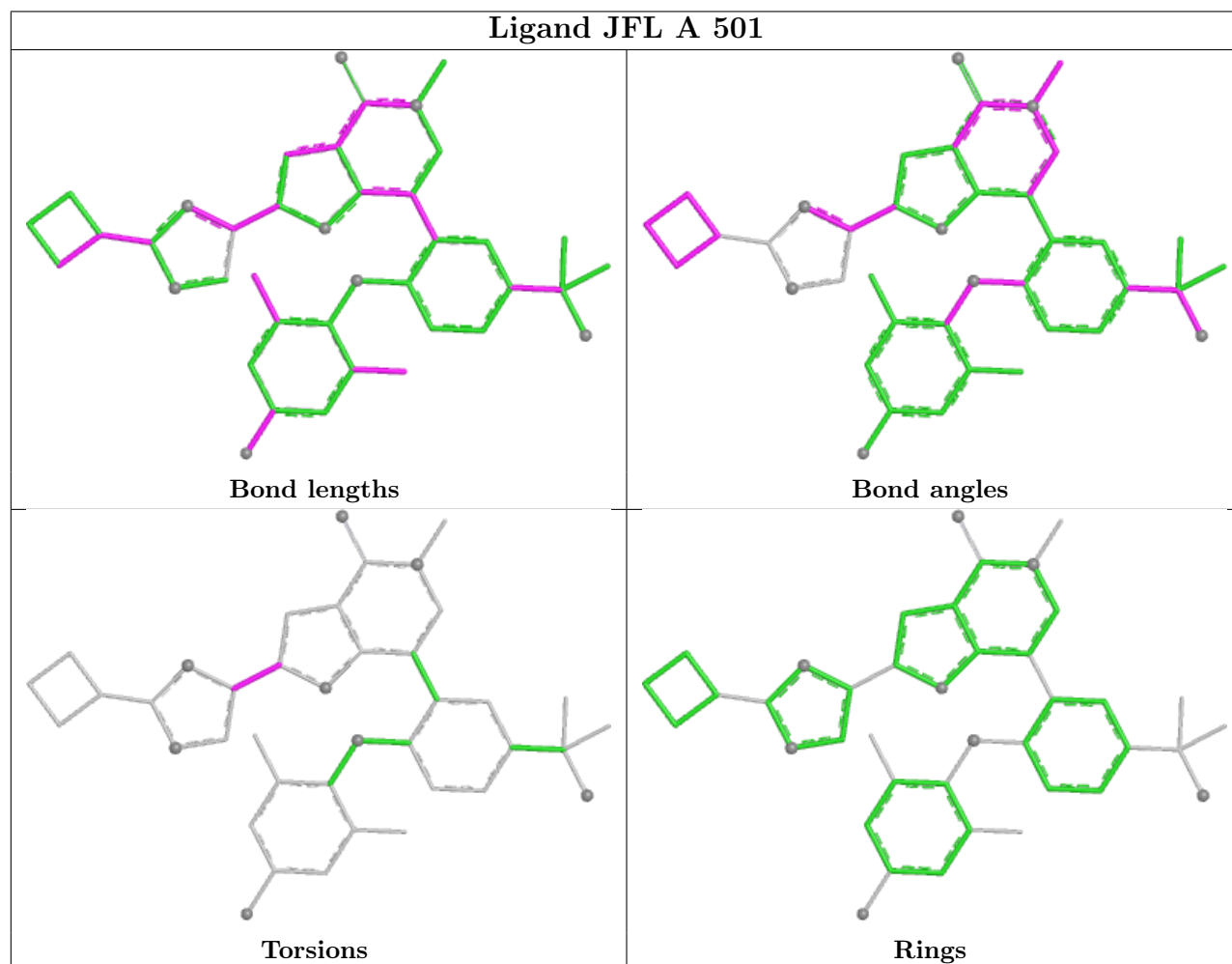
There are no ring outliers.

2 monomers are involved in 4 short contacts:

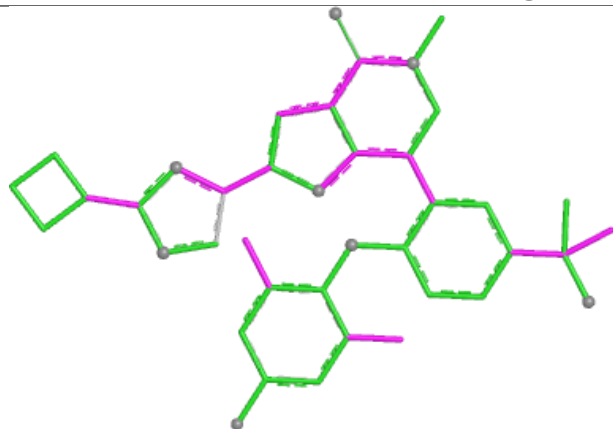
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	C	502	GOL	2	0
3	B	502	GOL	2	0

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

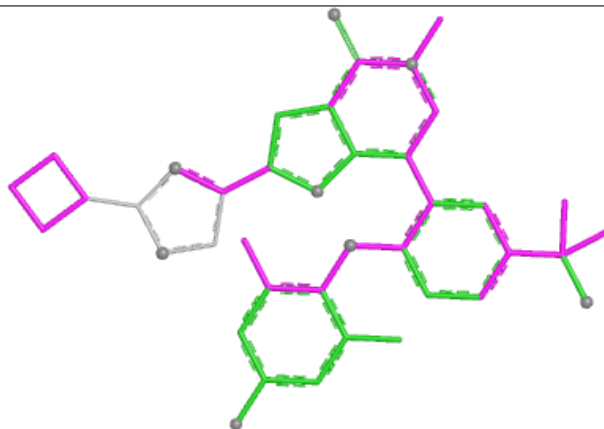
average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



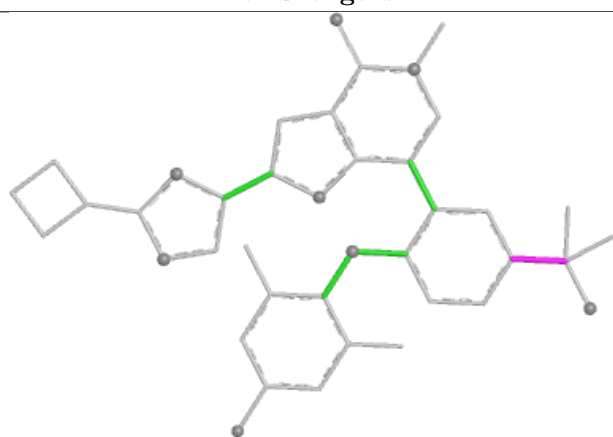
Ligand JFL B 501



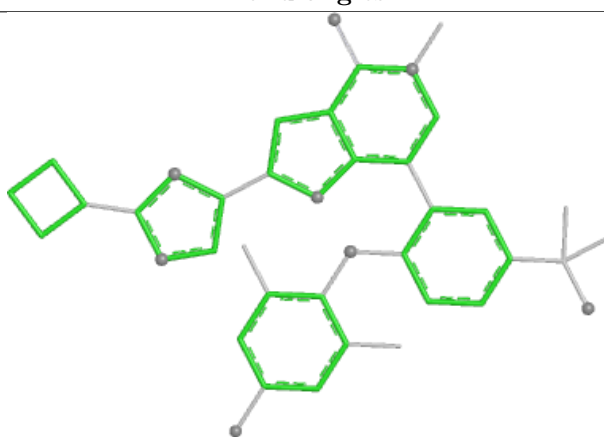
Bond lengths



Bond angles

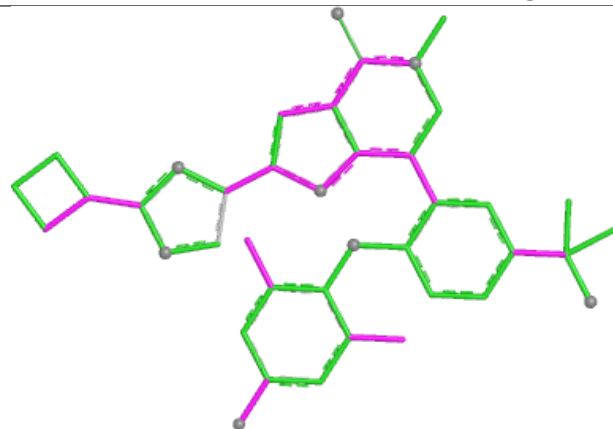


Torsions

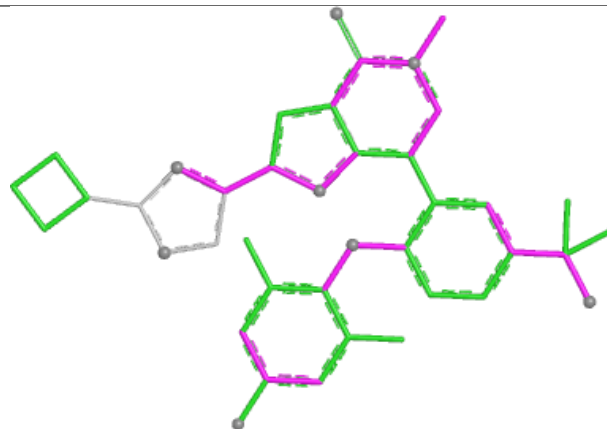


Rings

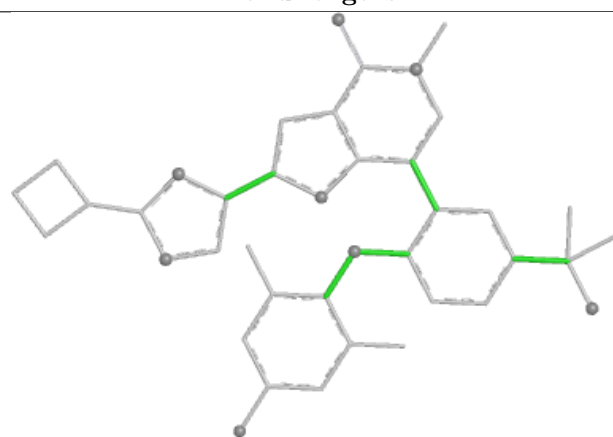
Ligand JFL D 501



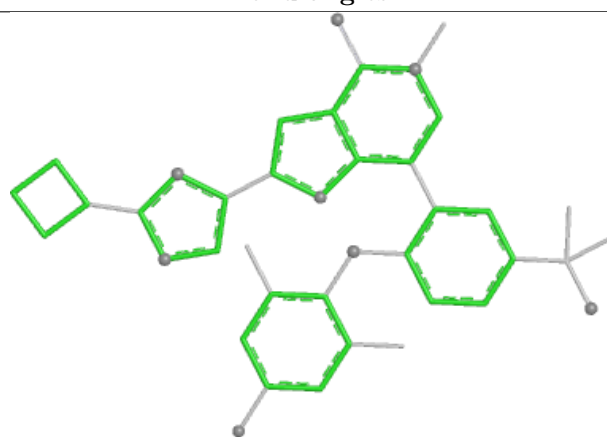
Bond lengths



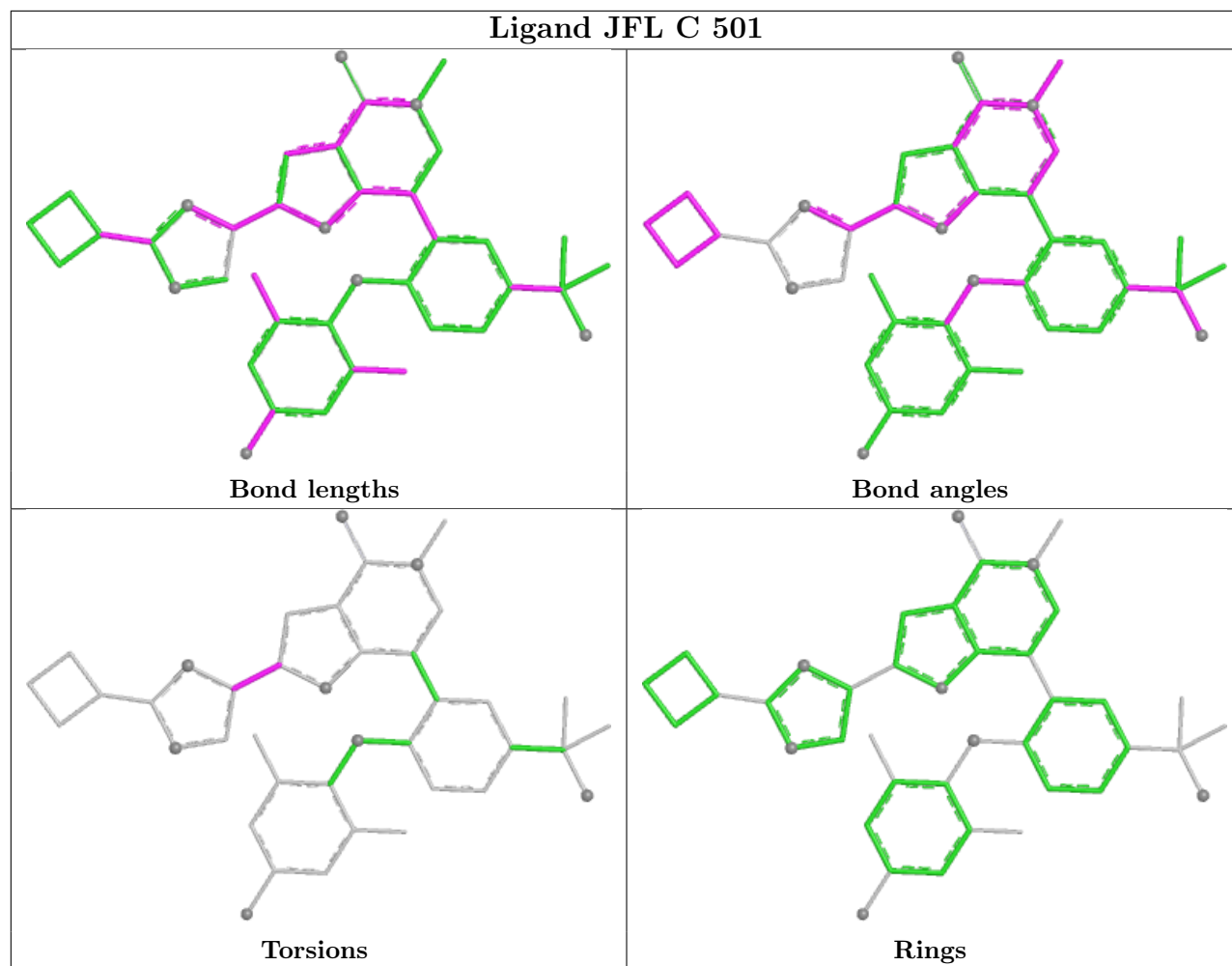
Bond angles



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, 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	A	110/136 (80%)	0.11	6 (5%)	30 30	17, 24, 48, 81	2 (1%)
1	B	111/136 (81%)	0.01	5 (4%)	38 37	10, 24, 49, 80	1 (0%)
1	C	110/136 (80%)	0.17	6 (5%)	30 30	19, 28, 53, 84	0
1	D	110/136 (80%)	0.10	6 (5%)	30 30	16, 25, 50, 86	1 (0%)
All	All	441/544 (81%)	0.10	23 (5%)	33 32	10, 25, 51, 86	4 (0%)

All (23) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	346	LEU	10.7
1	A	346	LEU	10.5
1	B	345	LYS	6.6
1	D	345	LYS	6.2
1	C	455	ASP	5.7
1	B	455	ASP	5.1
1	A	455	ASP	4.3
1	A	454	PRO	3.6
1	D	346	LEU	3.1
1	A	384	HIS	3.0
1	A	347	SER	3.0
1	A	409	ARG	2.9
1	D	409	ARG	2.8
1	B	373	TYR	2.7
1	C	348	GLU	2.6
1	D	454	PRO	2.6
1	B	346	LEU	2.5
1	C	454	PRO	2.5
1	C	347	SER	2.4
1	C	380	ALA	2.2
1	D	384	HIS	2.1

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Mol	Chain	Res	Type	RSRZ
1	D	348	GLU	2.0
1	B	348	GLU	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, 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(Å ²)	Q<0.9
4	FMT	D	505	3/3	0.71	0.34	65,65,66,68	0
3	GOL	B	503	6/6	0.77	0.27	65,73,74,75	0
3	GOL	A	502	6/6	0.78	0.28	59,63,64,66	0
4	FMT	B	507	3/3	0.80	0.23	58,58,62,62	0
3	GOL	C	502	6/6	0.80	0.28	59,66,67,67	0
3	GOL	D	502	6/6	0.82	0.22	45,47,48,50	0
4	FMT	A	505	3/3	0.82	0.20	48,48,51,52	0
4	FMT	C	506	3/3	0.83	0.22	58,58,61,62	0
4	FMT	C	505	3/3	0.85	0.19	58,58,59,61	0
4	FMT	B	506	3/3	0.86	0.16	56,56,57,58	0
4	FMT	D	504	3/3	0.88	0.19	57,57,57,59	0
4	FMT	A	507	3/3	0.88	0.20	60,60,61,61	0
3	GOL	D	503	6/6	0.89	0.15	46,54,57,59	0
4	FMT	C	504	3/3	0.89	0.17	50,50,52,52	0
3	GOL	B	502	6/6	0.89	0.22	33,35,37,38	0
4	FMT	A	504	3/3	0.90	0.15	52,52,52,53	0
4	FMT	C	503	3/3	0.91	0.15	45,45,49,51	0
4	FMT	A	503	3/3	0.91	0.16	55,55,58,59	0
4	FMT	B	504	3/3	0.92	0.12	41,41,44,44	0
4	FMT	A	506	3/3	0.93	0.10	38,38,40,43	0
2	JFL	D	501	40/40	0.96	0.07	18,19,28,30	0

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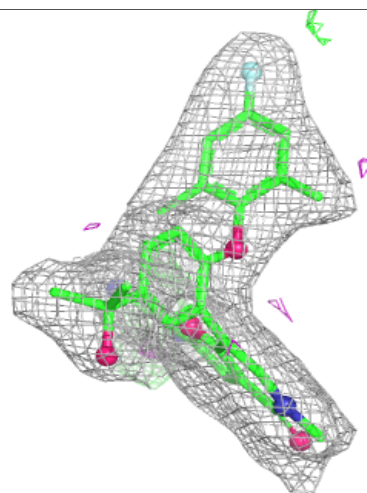
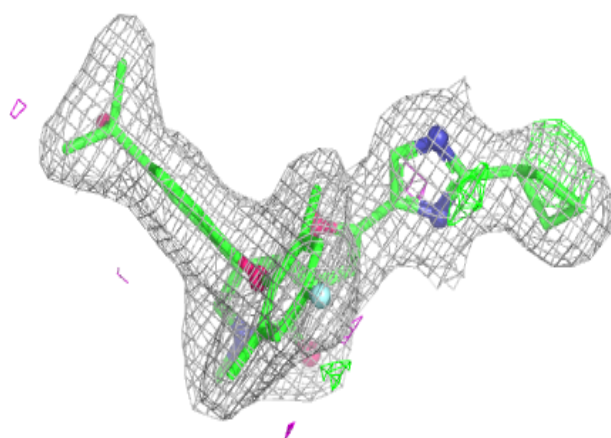
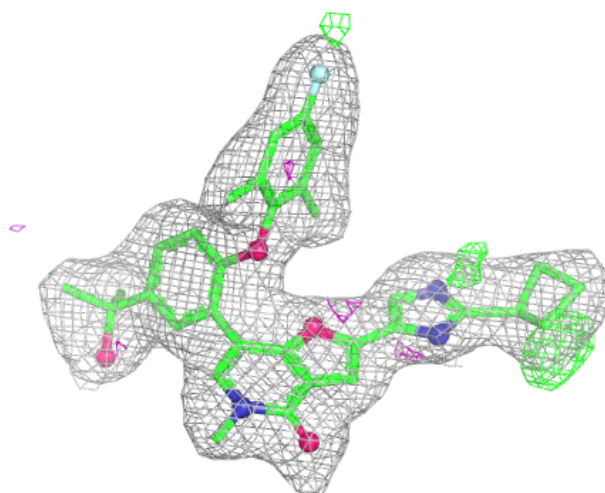
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
4	FMT	B	505	3/3	0.96	0.10	30,30,30,31	0
2	JFL	A	501	40/40	0.96	0.07	16,18,28,29	0
2	JFL	B	501	40/40	0.96	0.07	18,21,31,32	0
2	JFL	C	501	40/40	0.96	0.07	22,26,34,34	0

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.

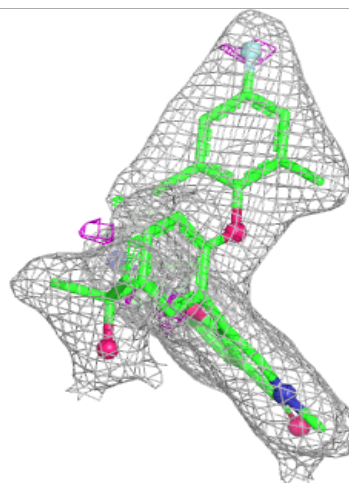
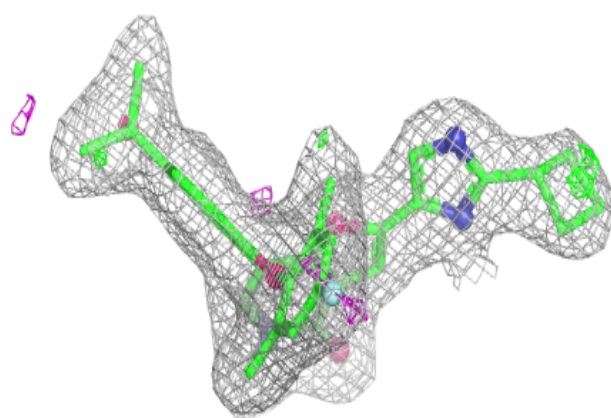
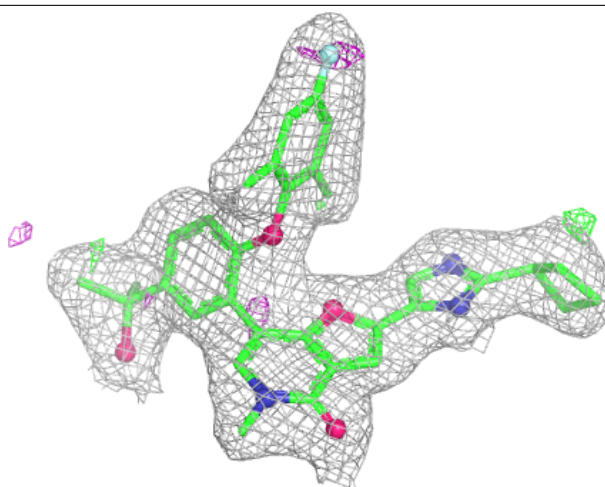
Electron density around JFL D 501:

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



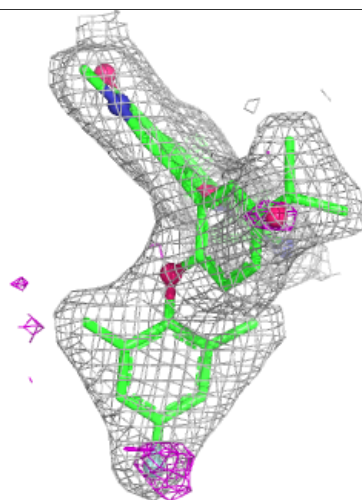
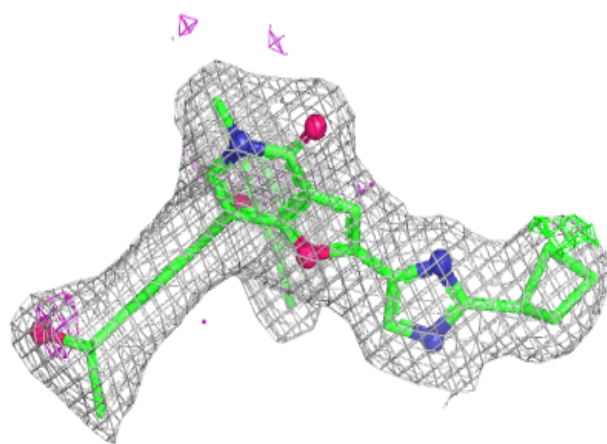
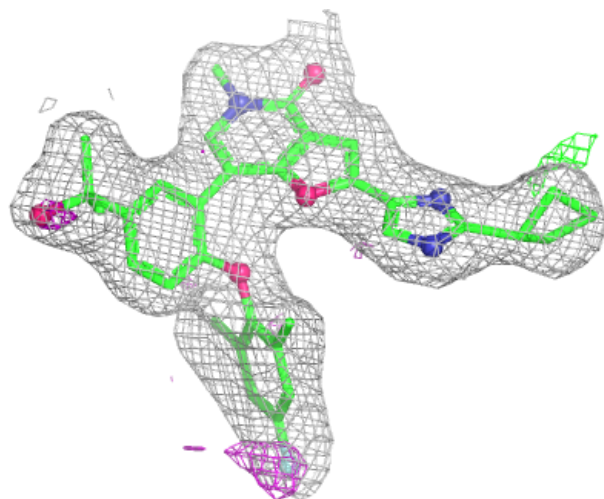
Electron density around JFL A 501:

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



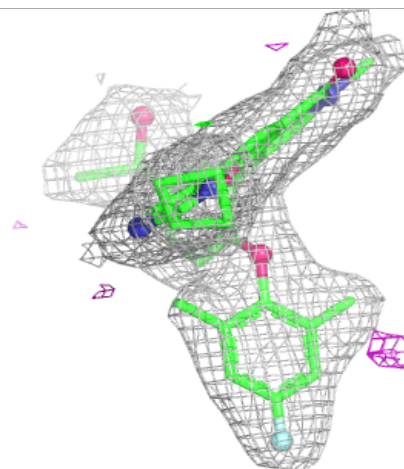
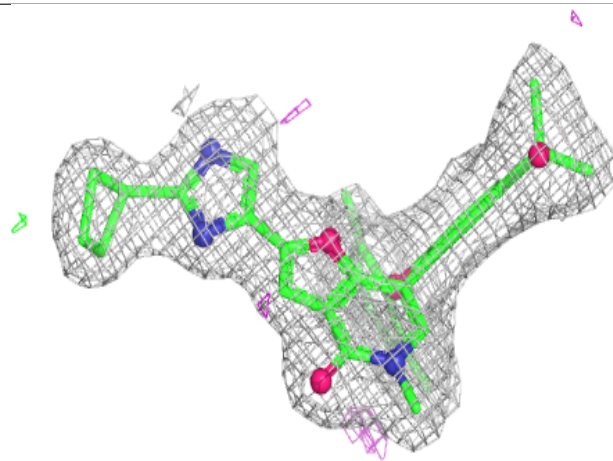
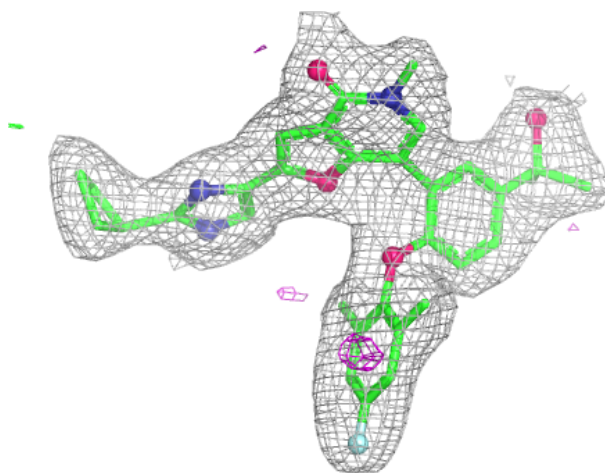
Electron density around JFL B 501:

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



Electron density around JFL C 501:

$2mF_o-DF_c$ (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.