



wwPDB EM Validation Summary Report ⓘ

Jul 18, 2024 – 06:08 PM JST

PDB ID : 8JU5
EMDB ID : EMD-36659
Title : Structure of human TRPV4 with antagonist A1
Authors : Fan, J.; Lei, X.
Deposited on : 2023-06-24
Resolution : 3.74 Å(reported)

This is a wwPDB EM Validation Summary Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/EMValidationReportHelp>

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:

EMDB validation analysis : **FAILED**
Mogul : 1.8.5 (274361), CSD as541be (2020)
MolProbity : 4.02b-467
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ : **FAILED**
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.37.1

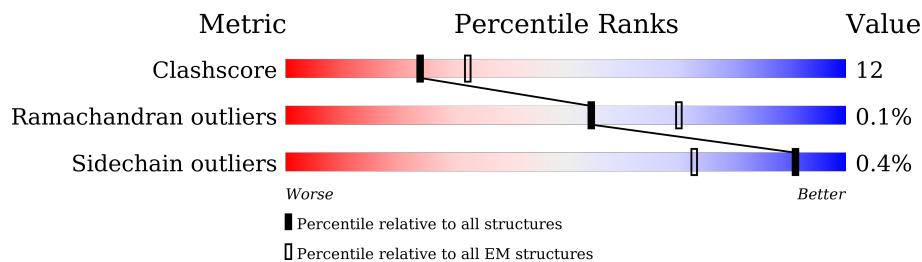
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.74 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)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the 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 $\leq 5\%$

Mol	Chain	Length	Quality of chain			
1	A	1144		39%	12%	48%
1	B	1144		40%	14%	46%
1	C	1144		37%	14%	48%
1	D	1144		37%	17%	46%

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
2	F3L	B	1201	-	-	X	-
2	F3L	D	1201	-	-	X	-

2 Entry composition [i](#)

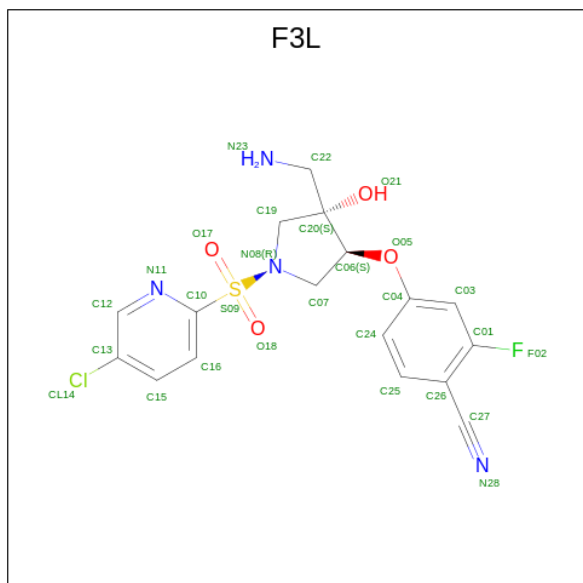
There are 2 unique types of molecules in this entry. The entry contains 19567 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, 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 Transient receptor potential cation channel subfamily V member 4,3C-GFP.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	595	Total 4762	C 3099	N 791	O 848	S 24	0	0
1	D	622	Total 4986	C 3248	N 825	O 887	S 26	0	0
1	C	595	Total 4765	C 3105	N 790	O 847	S 23	0	0
1	B	623	Total 4998	C 3254	N 829	O 888	S 27	0	0

- Molecule 2 is 4-[(3 {S},4 {S})-4-(aminomethyl)-1-(5-chloranylpyridin-2-yl)sulfonyl-4-oxidanyl-pyrrolidin-3-yl]oxy-2-fluoranyl-benzenecarbonitrile (three-letter code: F3L) (formula: C₁₇H₁₆ClFN₄O₄S) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms						AltConf	
			Total	C	Cl	F	N	O		S
2	D	1	Total 28	C 17	Cl 1	F 1	N 4	O 4	S 1	0

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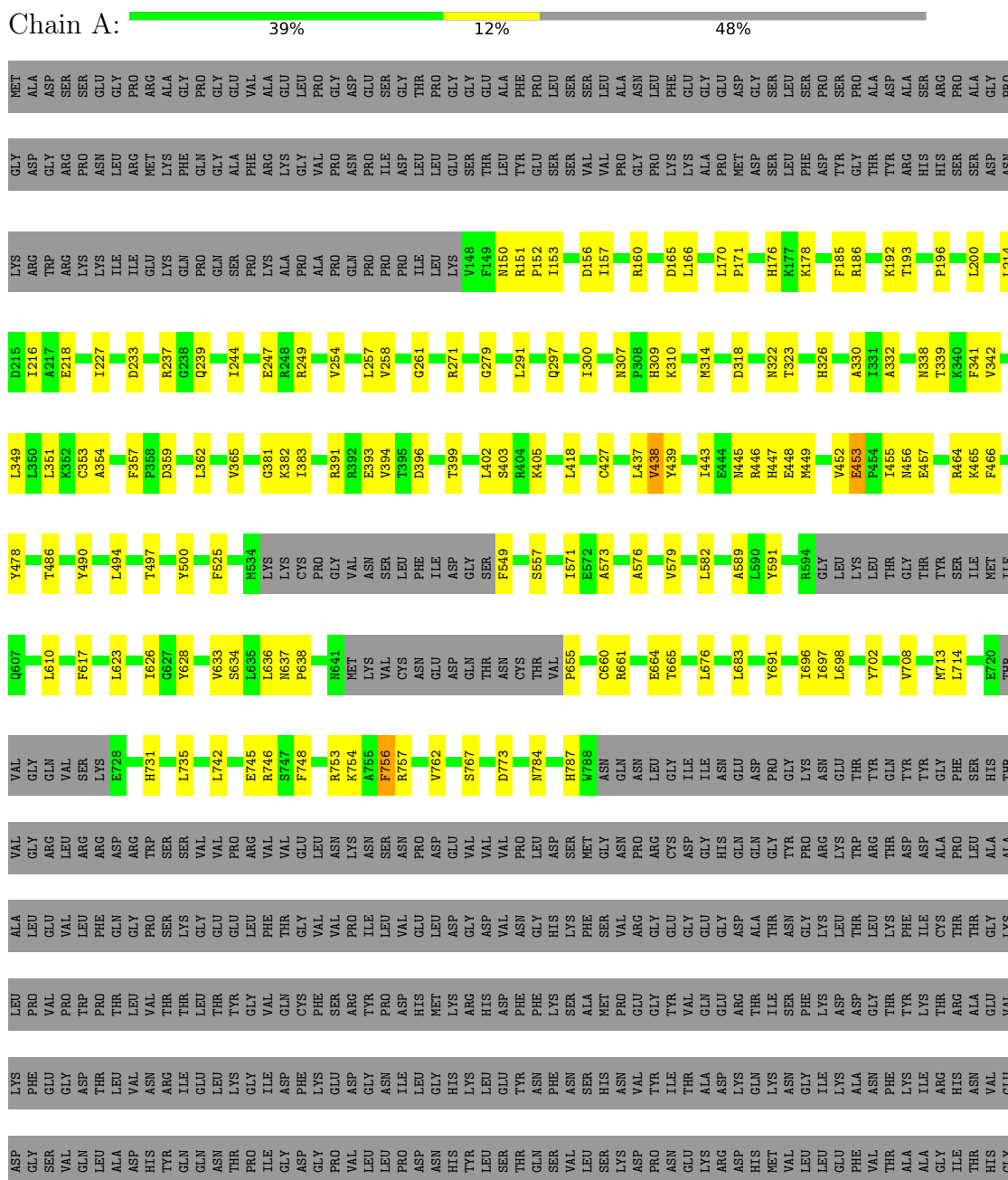
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Mol	Chain	Residues	Atoms						AltConf	
			Total	C	Cl	F	N	O		S
2	B	1	28	17	1	1	4	4	1	0

3 Residue-property plots

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded 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. 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: Transient receptor potential cation channel subfamily V member 4,3C-GFP



GLY	LYS	S229	K376	D507	L635	I741	VAL	THR	GLN	ASP	GLY	GLY
ASP	ARG	F386	F386	Y508	C639	L742	GLU	GLY	CYS	PHE	ASP	ASP
GLY	TRP	F231	Q387	L509	ALA	E745	LEU	VAL	PHE	LYS	GLY	SER
ARG	ARG	F231	L509	R510	ASN	R753	ASN	VAL	ARG	GLY	VAL	GLY
PRO	LYS	Y236	H388	R510	ASN	R753	ASN	LEU	TYR	ASP	ASP	ASP
ASN	LYS	Y236	H388	E514	MET	R753	SER	LEU	PRO	ASN	LEU	ALA
LEU	ILE	T240	I389	E514	LYS	R757	ASN	VAL	ASP	ILE	PRO	TRP
ARG	ILE	T240	I389	L518	VAL	R757	PRO	GLU	HIS	ASP	ASP	SER
MET	GLU	H243	D398	M534	CYS	E760	ASP	LEU	GLY	GLY	HIS	HIS
GLY	LYS	H243	D398	K535	ASN	E760	GLY	LEU	LYS	ASP	LYS	ASP
PHE	GLN	K251	F406	K535	GLU	V761	VAL	VAL	ARG	GLY	ARG	TYR
GLY	PRO	K251	F406	K536	ASP	V762	VAL	VAL	GLY	ASP	HIS	LEU
ALA	GLN	Y253	D408	C537	GLN	V762	VAL	VAL	HIS	ASP	GLY	GLY
PHE	SER	V254	D408	P538	THR	R779	PRO	VAL	ASP	GLY	SER	THR
ARG	PRO	E278	Y411	P538	ASN	V780	ASN	THR	PHE	ASN	THR	GLN
LYS	ALA	E278	Y411	F544	ASN	V781	LEU	LEU	LYS	PHE	SER	ASN
GLY	PRO	E278	Y411	F544	CYS	D781	ASP	LEU	HIS	ASP	LYS	VAL
VAL	ALA	I300	S417	Y553	THR	V788	MET	THR	ALA	SER	ALA	LEU
PRO	PRO	I300	S417	Y553	THR	V788	GLY	SER	MET	HIS	VAL	SER
ASN	GLN	N307	L418	L559	C660	ASN	ASN	VAL	ASN	ASN	LYS	SER
PRO	PRO	N307	L418	L559	R661	GLN	ASN	VAL	PRO	ASN	LYS	ASP
ILE	PRO	K310	L424	V562	D662	LEU	ARG	GLY	GLY	TYR	GLY	ASP
ASP	PRO	D313	D426	L566	S663	GLY	CYS	GLY	TYR	ILE	THR	GLY
LEU	ILE	D313	C427	L566	L670	ILE	ASP	GLY	VAL	THR	THR	LYS
LEU	LEU	Q317	S432	I571	L671	ASN	GLY	GLY	GLN	ASP	ASP	ARG
GLU	LYS	D318	V433	E572	L671	ASN	HIS	GLY	GLY	ASP	ASP	GLY
THR	THR	S319	L434	E572	F674	GLU	GLN	ASP	GLN	GLN	THR	ASP
TYR	LEU	R151	L434	L575	F674	THR	ALA	THR	THR	THR	THR	THR
GLU	SER	P152	R320	A576	L683	PRO	GLY	LEU	LEU	LEU	LEU	LEU
SER	SER	I153	G321	A576	L683	PRO	GLY	LEU	LEU	LEU	LEU	LEU
VAL	VAL	L154	N322	F580	F695	LYS	TYR	THR	THR	THR	THR	THR
PRO	PRO	L170	A332	A581	F695	ASN	ARG	ASP	ARG	ARG	ARG	ARG
GLY	GLY	T181	D333	L443	Y702	ASN	PRO	ASP	LYS	LYS	LYS	LYS
PRO	LYS	T181	D333	L443	Y702	ASN	PRO	ASP	LYS	LYS	LYS	LYS
LYS	LYS	L195	N338	E457	L710	THR	ALA	ALA	THR	THR	THR	THR
ALA	ALA	P196	N338	E457	L710	THR	ALA	ALA	THR	THR	THR	THR
PRO	PRO	K197	F341	F592	L714	LEU	LEU	LEU	LEU	LEU	LEU	LEU
MET	MET	L202	V342	L596	L715	HIS	ALA	ALA	ALA	ALA	ALA	ALA
ASP	ASP	L202	V342	L596	L715	HIS	ALA	ALA	ALA	ALA	ALA	ALA
SER	SER	G205	K344	K397	L717	VAL	VAL	VAL	VAL	VAL	VAL	VAL
PHE	PHE	R206	M945	R397	L717	VAL	VAL	VAL	VAL	VAL	VAL	VAL
ASP	ASP	N207	Y346	THR	G723	GLY	GLY	GLY	GLY	GLY	GLY	GLY
TYR	TYR	D215	L362	THR	Q724	ARG	ARG	ARG	ARG	ARG	ARG	ARG
GLY	GLY	D215	L362	THR	S726	ARG	ARG	ARG	ARG	ARG	ARG	ARG
THR	THR	I216	V365	Q607	S726	ASP	ASP	ASP	ASP	ASP	ASP	ASP
TYR	TYR	A217	L366	Q607	S729	ASP	ASP	ASP	ASP	ASP	ASP	ASP
ARG	ARG	E218	L366	Q607	S729	ASP	ASP	ASP	ASP	ASP	ASP	ASP
R219	R219	R219	N367	F617	H730	TRP	TRP	TRP	TRP	TRP	TRP	TRP
HIS	HIS	M222	N367	F617	H731	TRP	TRP	TRP	TRP	TRP	TRP	TRP
SER	SER	E225	D369	L622	I732	SER	SER	SER	SER	SER	SER	SER
ASP	ASP	F226	G370	M625	W733	SER	SER	SER	SER	SER	SER	SER
ASN	ASN	F226	G370	M625	W733	SER	SER	SER	SER	SER	SER	SER
			L571	S372	K734	VAL	VAL	VAL	VAL	VAL	VAL	VAL
			L571	S372	K734	VAL	VAL	VAL	VAL	VAL	VAL	VAL
			S372	M625	L735	PRO	PRO	PRO	PRO	PRO	PRO	PRO
			S372	M625	L735	PRO	PRO	PRO	PRO	PRO	PRO	PRO
			M375	Y628	W737	VAL	PHE	VAL	ILE	ILE	ILE	ILE
			M375	Y628	W737	VAL	PHE	VAL	ILE	ILE	ILE	ILE

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	102087	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	60	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	Not provided	
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor

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: F3L

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	0.26	0/4871	0.51	1/6608 (0.0%)
1	B	0.25	0/5115	0.49	0/6936
1	C	0.25	0/4874	0.51	1/6610 (0.0%)
1	D	0.25	0/5103	0.50	0/6921
All	All	0.25	0/19963	0.50	2/27075 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
1	C	655	PRO	N-CA-CB	5.92	110.40	103.30
1	A	655	PRO	N-CA-CB	5.92	110.40	103.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	453	GLU	Peptide

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	4762	0	4780	102	0
1	B	4998	0	5052	116	0
1	C	4765	0	4781	141	0
1	D	4986	0	5036	144	0
2	B	28	0	0	11	0
2	D	28	0	0	12	0
All	All	19567	0	19649	472	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 12.

The worst 5 of 472 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:502:TYR:CE1	1:C:511:LEU:HD22	1.64	1.32
1:C:502:TYR:CE2	1:C:511:LEU:HD21	1.75	1.19
1:C:502:TYR:CZ	1:C:511:LEU:HD22	1.86	1.10
1:D:550:GLN:HG2	2:D:1201:F3L:O18	1.51	1.10
1:C:502:TYR:CZ	1:C:511:LEU:CD2	2.37	1.08

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 PDB entries followed by that with respect to all EM entries.

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	585/1144 (51%)	545 (93%)	39 (7%)	1 (0%)	47 78

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	617/1144 (54%)	571 (92%)	45 (7%)	1 (0%)	47	78
1	C	583/1144 (51%)	543 (93%)	40 (7%)	0	100	100
1	D	616/1144 (54%)	568 (92%)	48 (8%)	0	100	100
All	All	2401/4576 (52%)	2227 (93%)	172 (7%)	2 (0%)	54	83

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	438	VAL
1	B	730	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 PDB entries followed by that with respect to all EM entries.

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	515/991 (52%)	513 (100%)	2 (0%)	91	95
1	B	546/991 (55%)	545 (100%)	1 (0%)	93	97
1	C	514/991 (52%)	510 (99%)	4 (1%)	81	89
1	D	544/991 (55%)	543 (100%)	1 (0%)	93	97
All	All	2119/3964 (54%)	2111 (100%)	8 (0%)	91	95

5 of 8 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	391	ARG
1	C	754	LYS
1	C	510	ARG
1	C	509	LEU
1	C	511	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	239	GLN
1	D	474	ASN
1	B	474	ASN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no monosaccharides 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	F3L	D	1201	-	29,30,30	7.18	24 (82%)	33,45,45	2.97	14 (42%)
2	F3L	B	1201	-	29,30,30	7.19	24 (82%)	33,45,45	3.13	14 (42%)

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	F3L	D	1201	-	-	3/18/36/36	0/3/3/3

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	F3L	B	1201	-	-	3/18/36/36	0/3/3/3

The worst 5 of 48 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	1201	F3L	C07-N08	-14.07	1.33	1.48
2	D	1201	F3L	C07-N08	-14.05	1.33	1.48
2	B	1201	F3L	C19-N08	13.55	1.64	1.48
2	D	1201	F3L	C19-N08	13.32	1.64	1.48
2	B	1201	F3L	C10-N11	10.37	1.49	1.33

The worst 5 of 28 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	1201	F3L	O18-S09-O17	-11.30	101.20	119.52
2	D	1201	F3L	O18-S09-O17	-10.84	101.95	119.52
2	D	1201	F3L	O17-S09-N08	5.44	111.64	106.69
2	B	1201	F3L	O17-S09-N08	5.40	111.61	106.69
2	D	1201	F3L	O18-S09-N08	5.28	111.50	106.69

There are no chirality outliers.

5 of 6 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	D	1201	F3L	C07-N08-S09-O18
2	D	1201	F3L	C19-N08-S09-O18
2	D	1201	F3L	C07-N08-S09-C10
2	B	1201	F3L	C01-C26-C27-N28
2	B	1201	F3L	C24-C04-O05-C06

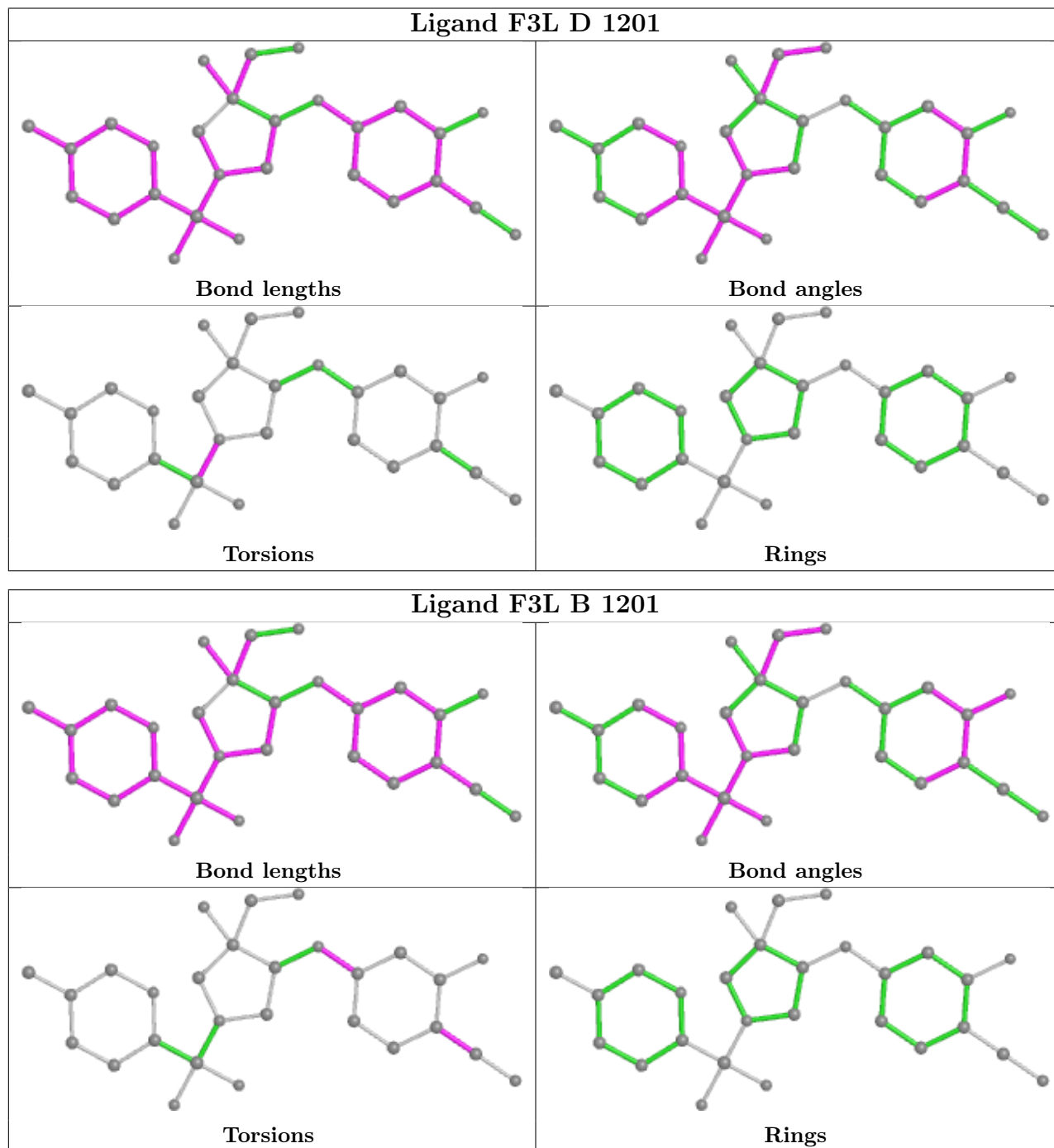
There are no ring outliers.

2 monomers are involved in 23 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	D	1201	F3L	12	0
2	B	1201	F3L	11	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is

within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.