WORLDWIDE wwPDB PROTEIN DATA BANK

wwPDB X-ray Structure Validation Summary Report ⓘ

Nov 19, 2023 – 05:57 PM JST

PDB ID	:	6LVM
Title	:	Crystal structure of FGFR3 in complex with pyrimidine derivative
Authors	:	Echizen, Y.; Tateishi, Y.; Amano, Y.
Deposited on	:	2020-02-04
Resolution	:	2.53 Å(reported)

The following versions of software and data (see references ⓘ) were used in the production of this report:

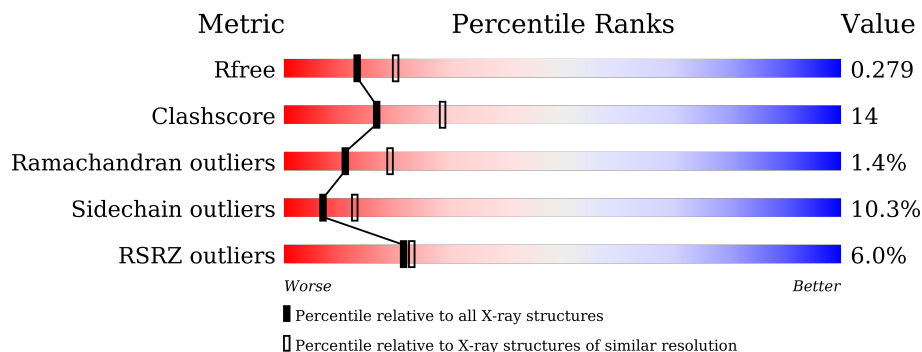|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

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 2.53 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	Percentile Ranks	Value
Rfree		0.279
Clashscore		14
Ramachandran outliers		1.4%
Sidechain outliers		10.3%
RSRZ outliers		6.0%

Worse　　　　　　　　　　　　　　　　　　Better

▮ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	5743 (2.54-2.50)
Clashscore	141614	6463 (2.54-2.50)
Ramachandran outliers	138981	6335 (2.54-2.50)
Sidechain outliers	138945	6337 (2.54-2.50)
RSRZ outliers	127900	5630 (2.54-2.50)

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	313	5%　66%　21%　5%　8%

2 Entry composition ⓘ

There are 3 unique types of molecules in this entry. The entry contains 2380 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 Fibroblast growth factor receptor 3.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	288	Total 2296	C 1460	N 391	O 424	P 3	S 18	0	0	0

There are 25 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	447	GLY	-	expression tag	UNP P22607
A	448	SER	-	expression tag	UNP P22607
A	449	HIS	-	expression tag	UNP P22607
A	450	MET	-	expression tag	UNP P22607
A	451	LEU	-	expression tag	UNP P22607
A	452	ALA	-	expression tag	UNP P22607
A	453	GLY	-	expression tag	UNP P22607
A	454	VAL	-	expression tag	UNP P22607
A	455	SER	-	expression tag	UNP P22607
A	456	GLU	-	expression tag	UNP P22607
A	457	TYR	-	expression tag	UNP P22607
A	458	GLU	-	expression tag	UNP P22607
A	459	LEU	-	expression tag	UNP P22607
A	460	PRO	-	expression tag	UNP P22607
A	461	GLU	-	expression tag	UNP P22607
A	462	ASP	-	expression tag	UNP P22607
A	463	PRO	-	expression tag	UNP P22607
A	464	LYS	-	expression tag	UNP P22607
A	465	TRP	-	expression tag	UNP P22607
A	466	GLU	-	expression tag	UNP P22607
A	467	PHE	-	expression tag	UNP P22607
A	468	PRO	-	expression tag	UNP P22607
A	469	ARG	-	expression tag	UNP P22607
A	470	ASP	-	expression tag	UNP P22607
A	471	LYS	-	expression tag	UNP P22607

- Molecule 2 is 2-[[5-[2-(3,5-dimethoxyphenyl)ethyl]-2-[[3-methoxy-4-[4-(4-methylpipera

zin-1-yl)piperidin-1-yl]phenyl]amino]pyrimidin-4-yl]amino]-N-ethyl-benzenesulfonam
ide (three-letter code: EVR) (formula: $C_{39}H_{52}N_8O_5S$) (labeled as "Ligand of Interest" by
depositor).
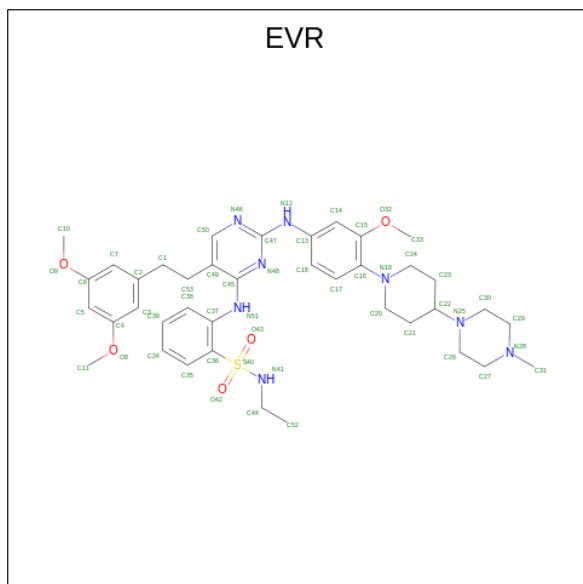
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	S		
2	A	1	53	39	8	5	1	0	0

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
3	A	31	31	31	0	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 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: Fibroblast growth factor receptor 3
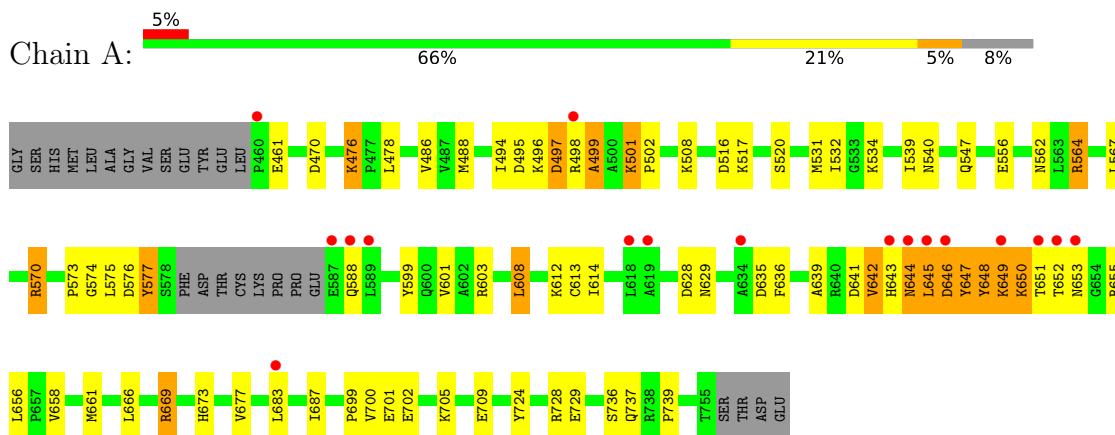
4   Data and refinement statistics   ⓘ

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	48.14Å 61.23Å 59.65Å 90.00° 112.98° 90.00°	Depositor
Resolution (Å)	29.36 – 2.53 29.34 – 2.53	Depositor EDS
% Data completeness (in resolution range)	99.0 (29.36-2.53) 99.0 (29.34-2.53)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	3.45 (at 2.54Å)	Xtriage
Refinement program	REFMAC 5.8.0253	Depositor
R, R_{free}	0.207 , 0.279 0.207 , 0.279	Depositor DCC
R_{free} test set	520 reflections (4.85%)	wwPDB-VP
Wilson B-factor (Å^2)	55.9	Xtriage
Anisotropy	0.295	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.33 , 38.0	EDS
L-test for twinning[2]	$< |L| > = 0.49, < L^2 > = 0.32$	Xtriage
Estimated twinning fraction	0.037 for h,-k,-h-l	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	2380	wwPDB-VP
Average B, all atoms (Å^2)	56.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.75% of the height of the origin peak. No significant pseudotranslation is detected.*

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[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: EVR, PTR

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	0.32	0/2294	0.76	3/3096 (0.1%)

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 (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	564	ARG	CG-CD-NE	5.87	124.14	111.80
1	A	570	ARG	CG-CD-NE	5.75	123.87	111.80
1	A	570	ARG	CB-CA-C	5.30	121.00	110.40

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	574	GLY	Peptide

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	2296	0	2287	63	1
2	A	53	0	0	7	0
3	A	31	0	0	7	0
All	All	2380	0	2287	66	1

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 14.

The worst 5 of 66 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:498:ARG:HA	1:A:499:ALA:CB	1.73	1.15
1:A:498:ARG:HA	1:A:499:ALA:HB2	1.11	1.09
1:A:498:ARG:CA	1:A:499:ALA:HB2	2.01	0.89
1:A:699:PRO:HB2	1:A:701:GLU:OE2	1.73	0.88
1:A:705:LYS:O	1:A:709:GLU:HG3	1.87	0.74

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:577:PTR:O1P	1:A:635:ASP:OD2[2_555]	2.07	0.13

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	281/313 (90%)	261 (93%)	16 (6%)	4 (1%)	11	19

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	497	ASP
1	A	573	PRO
1	A	499	ALA
1	A	588	GLN

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	243/266 (91%)	218 (90%)	25 (10%)	7	13

5 of 25 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	645	LEU
1	A	650	LYS
1	A	737	GLN
1	A	649	LYS
1	A	651	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 8 such sidechains are listed below:

Mol	Chain	Res	Type
1	A	732	HIS
1	A	721	HIS
1	A	653	ASN
1	A	644	ASN
1	A	718	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

3 non-standard protein/DNA/RNA residues 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	#$|Z| > 2$
1	PTR	A	648	1	15,16,17	1.06	1 (6%)	19,22,24	1.13	1 (5%)
1	PTR	A	647	1	15,16,17	1.00	1 (6%)	19,22,24	1.24	1 (5%)
1	PTR	A	577	1	15,16,17	0.99	1 (6%)	19,22,24	1.31	3 (15%)

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
1	PTR	A	648	1	-	2/10/11/13	0/1/1/1
1	PTR	A	647	1	-	0/10/11/13	0/1/1/1
1	PTR	A	577	1	-	0/10/11/13	0/1/1/1

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	648	PTR	P-OH	3.60	1.64	1.59
1	A	647	PTR	P-OH	3.33	1.64	1.59
1	A	577	PTR	P-OH	3.04	1.64	1.59

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	577	PTR	O3P-P-O2P	2.97	119.00	107.64
1	A	577	PTR	CG-CB-CA	-2.75	108.53	114.10
1	A	647	PTR	O2P-P-OH	-2.49	97.45	105.24
1	A	648	PTR	OH-CZ-CE1	2.30	126.07	119.23
1	A	577	PTR	CB-CA-C	-2.23	107.28	111.47

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	648	PTR	O-C-CA-CB
1	A	648	PTR	C-CA-CB-CG

There are no ring outliers.

3 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	A	648	PTR	1	0
1	A	647	PTR	2	0
1	A	577	PTR	0	1

5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry ⓘ

1 ligand is modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#|Z| > 2$	Counts	RMSZ	$\#|Z| > 2$
2	EVR	A	801	-	58,58,58	1.43	5 (8%)	80,81,81	1.94	17 (21%)

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	EVR	A	801	-	-	17/37/57/57	0/6/6/6

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	801	EVR	S40-N41	8.14	1.74	1.61
2	A	801	EVR	C49-C45	-3.02	1.38	1.41
2	A	801	EVR	C45-N51	2.48	1.41	1.36
2	A	801	EVR	O42-S40	2.29	1.46	1.43
2	A	801	EVR	C30-N25	2.03	1.51	1.47

The worst 5 of 17 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	801	EVR	C33-O32-C15	-7.80	105.76	117.53
2	A	801	EVR	C11-O8-C4	-5.71	105.12	117.51
2	A	801	EVR	C36-S40-N41	-5.16	101.12	107.82
2	A	801	EVR	O32-C15-C14	-4.05	117.15	124.12
2	A	801	EVR	C24-N19-C20	3.71	119.70	111.52

There are no chirality outliers.

5 of 17 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	801	EVR	C15-C16-N19-C24
2	A	801	EVR	C16-C15-O32-C33
2	A	801	EVR	C17-C16-N19-C24
2	A	801	EVR	C14-C15-O32-C33
2	A	801	EVR	C35-C36-S40-O42

There are no ring outliers.

1 monomer is involved in 7 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	801	EVR	7	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 EVR A 801

Bond lengths

Bond angles

Torsions

Rings
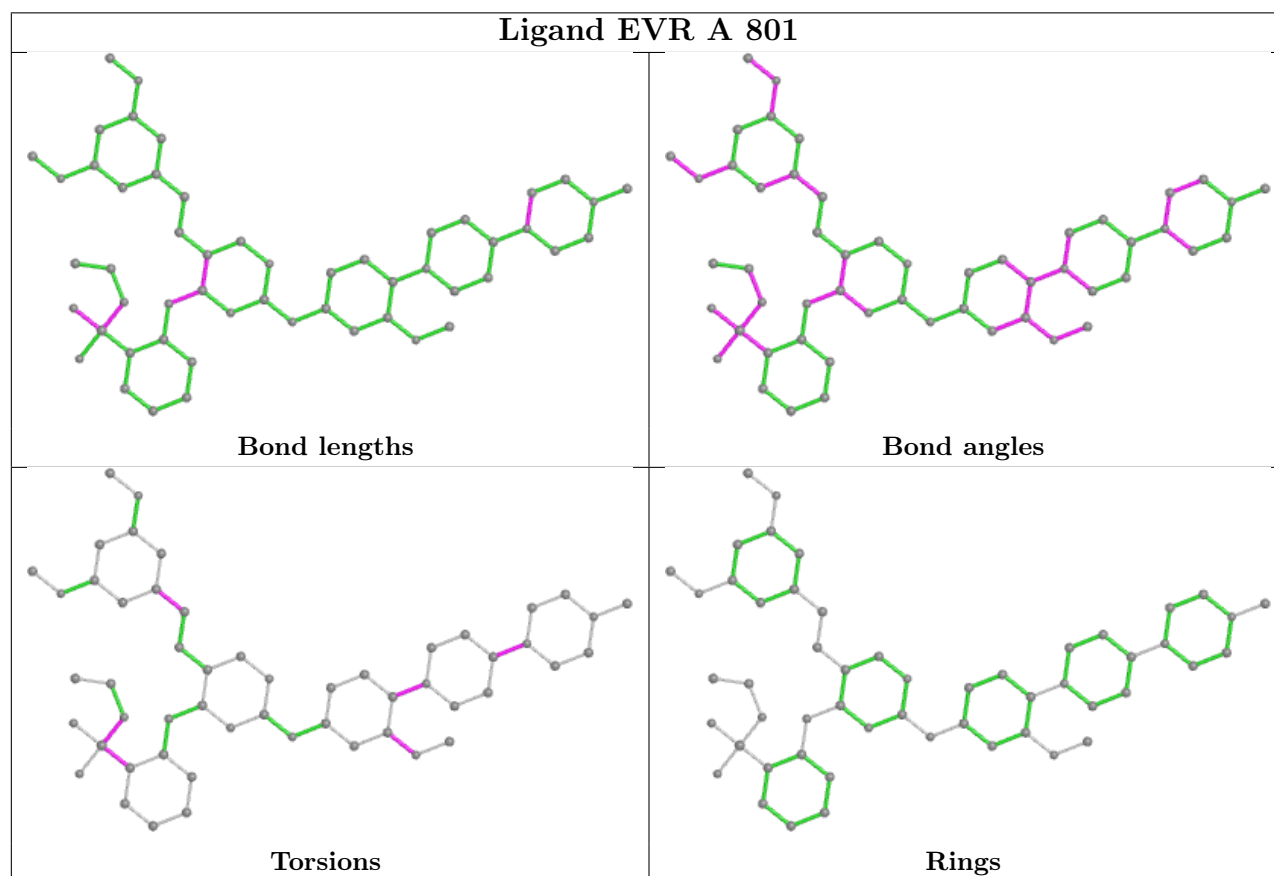
5.7 Other polymers (i)

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(Å²)	Q<0.9
1	A	285/313 (91%)	0.22	17 (5%)	21	23	32, 52, 88, 114	0

The worst 5 of 17 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	652	THR	4.5
1	A	644	ASN	3.8
1	A	653	ASN	3.7
1	A	645	LEU	3.4
1	A	651	THR	3.3

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

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.

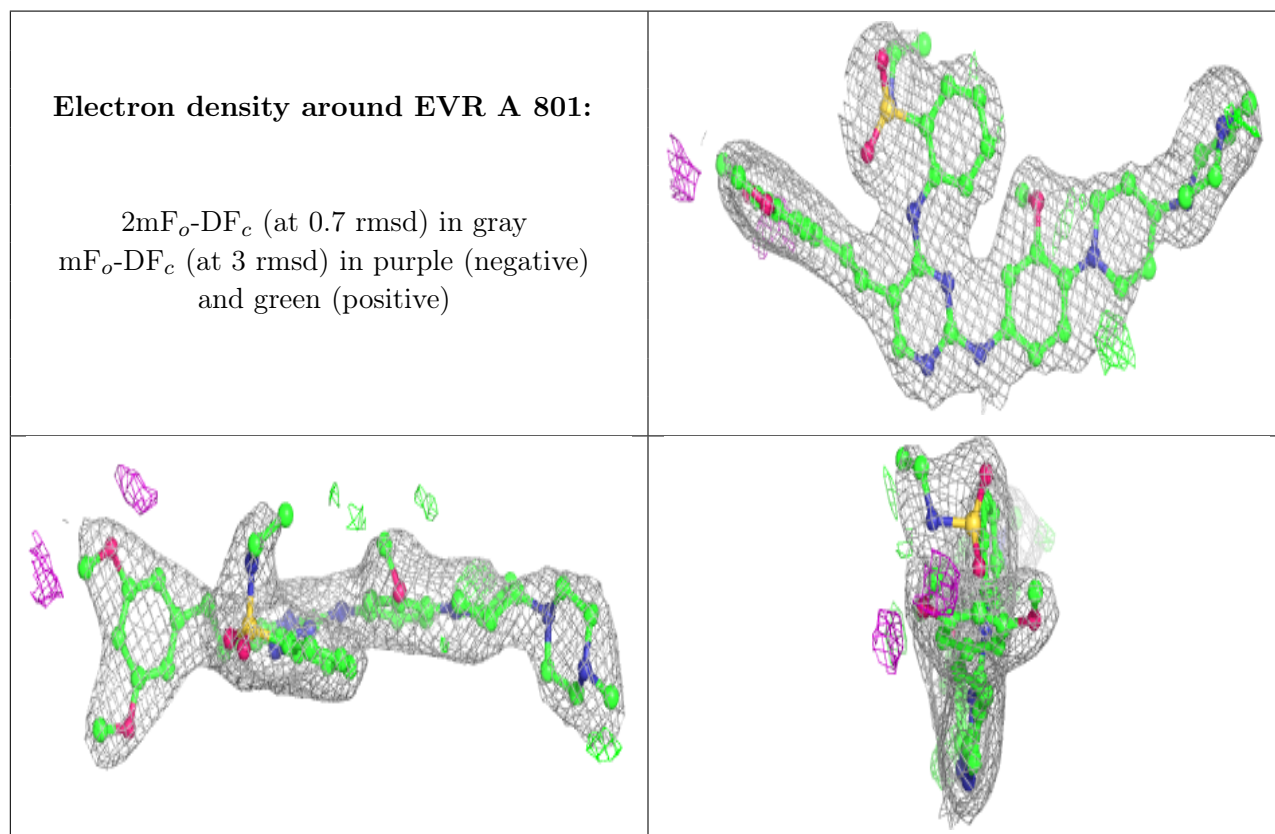| Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å²)	Q<0.9
1	PTR	A	647	16/17	0.87	0.24	59,71,88,94	0
1	PTR	A	577	16/17	0.92	0.15	62,80,109,118	0
1	PTR	A	648	16/17	0.97	0.17	56,61,69,72	0

6.3   Carbohydrates ⓘ

There are no monosaccharides 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, 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
2	EVR	A	801	53/53	0.94	0.17	34,44,82,84	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 EVR A 801:

$2mF_o$-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.