Full wwPDB X-ray Structure Validation Report (i)

Nov 16, 2026 – 06:04 PM EST

PDB ID	:	9ZBO / pdb_00009zbo
Title	:	Tumor-selective MAPK and growth suppression by a Type 1 RAF inhibitor
Authors	:	Vigers, G.P.A.; Peters, T.L.
Deposited on	:	2025-11-21
Resolution	:	2.85 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 (i) 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 (i)) were used in the production of this report:

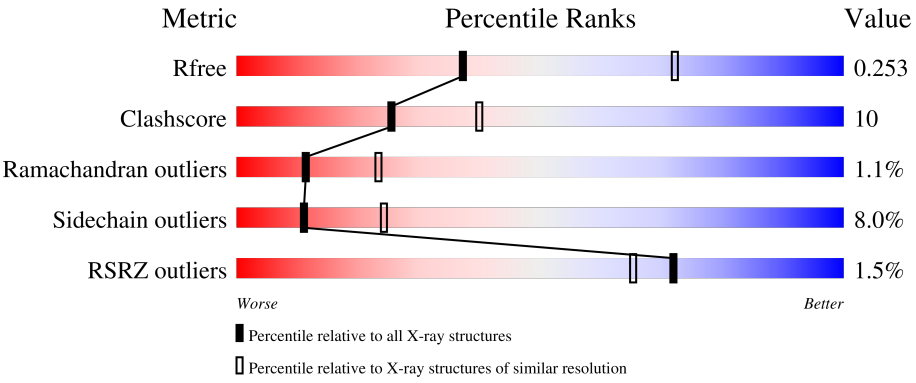
MolProbity	:	4-5-2 with Phenix2.2
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.2
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.015 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.51

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 2.85 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	1520 (2.86-2.82)
Clashscore	190562	1559 (2.86-2.82)
Ramachandran outliers	187476	1517 (2.86-2.82)
Sidechain outliers	187428	1518 (2.86-2.82)
RSRZ outliers	180081	1521 (2.86-2.82)

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	289	% 63% 24% • • 7%
1	B	289	% 60% 26% 7% 7%

2 Entry composition (i)

There are 5 unique types of molecules in this entry. The entry contains 4408 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.

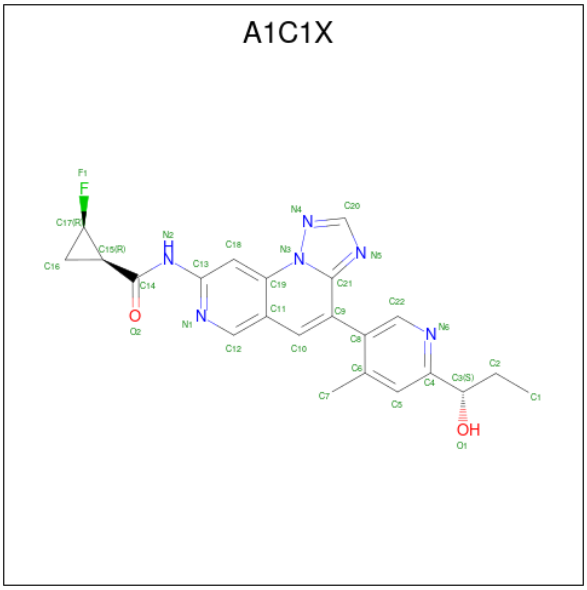
- Molecule 1 is a protein called Serine/threonine-protein kinase B-raf.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	269	Total	C	N	O	S	72	0	0
			2151	1379	373	386	13			
1	B	268	Total	C	N	O	S	66	5	0
			2172	1392	375	392	13			

There are 24 discrepancies between the modelled and reference sequences:

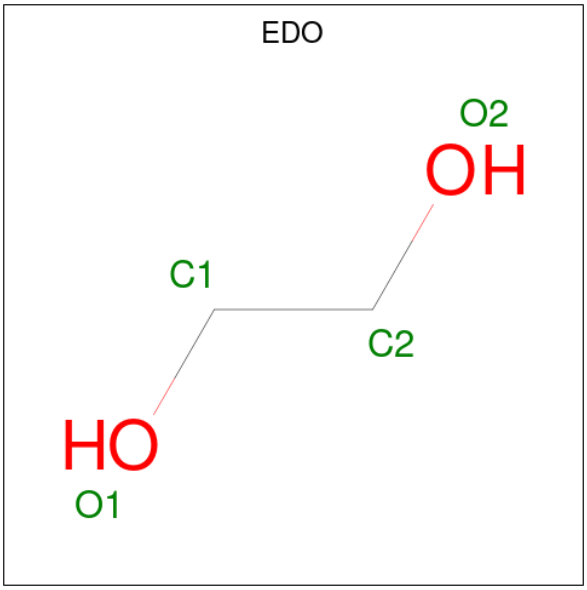
Chain	Residue	Modelled	Actual	Comment	Reference
A	434	MET	-	expression tag	UNP P15056
A	435	ASP	-	expression tag	UNP P15056
A	436	ARG	-	expression tag	UNP P15056
A	437	GLY	-	expression tag	UNP P15056
A	438	SER	-	expression tag	UNP P15056
A	439	HIS	-	expression tag	UNP P15056
A	440	HIS	-	expression tag	UNP P15056
A	441	HIS	-	expression tag	UNP P15056
A	442	HIS	-	expression tag	UNP P15056
A	443	HIS	-	expression tag	UNP P15056
A	444	HIS	-	expression tag	UNP P15056
A	445	GLY	-	expression tag	UNP P15056
B	434	MET	-	expression tag	UNP P15056
B	435	ASP	-	expression tag	UNP P15056
B	436	ARG	-	expression tag	UNP P15056
B	437	GLY	-	expression tag	UNP P15056
B	438	SER	-	expression tag	UNP P15056
B	439	HIS	-	expression tag	UNP P15056
B	440	HIS	-	expression tag	UNP P15056
B	441	HIS	-	expression tag	UNP P15056
B	442	HIS	-	expression tag	UNP P15056
B	443	HIS	-	expression tag	UNP P15056
B	444	HIS	-	expression tag	UNP P15056
B	445	GLY	-	expression tag	UNP P15056

- Molecule 2 is (1R,2R)-2-fluoro-N-[(4P,10R)-4-{6-[(1S)-1-hydroxypropyl]-4-methylpyridin-3-yl}[1,2,4]triazolo[1,5-a][1,6]naphthyridin-8-yl]cyclopropane-1-carboxamide (CCD ID: A1C1X) (formula: $C_{22}H_{21}FN_6O_2$) (labeled as "Ligand of Interest" by depositor).



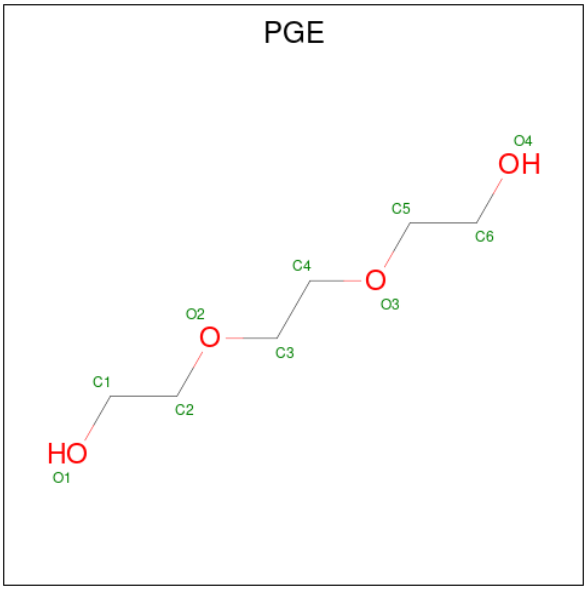
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	F	N	O	0	0
			31	22	1	6	2		
2	B	1	Total	C	F	N	O	0	0
			31	22	1	6	2		

- Molecule 3 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: $C_2H_6O_2$).



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

- Molecule 4 is TRIETHYLENE GLYCOL (CCD ID: PGE) (formula: $C_6H_{14}O_4$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	B	1	Total C O 10 6 4	0	0

- Molecule 5 is water.

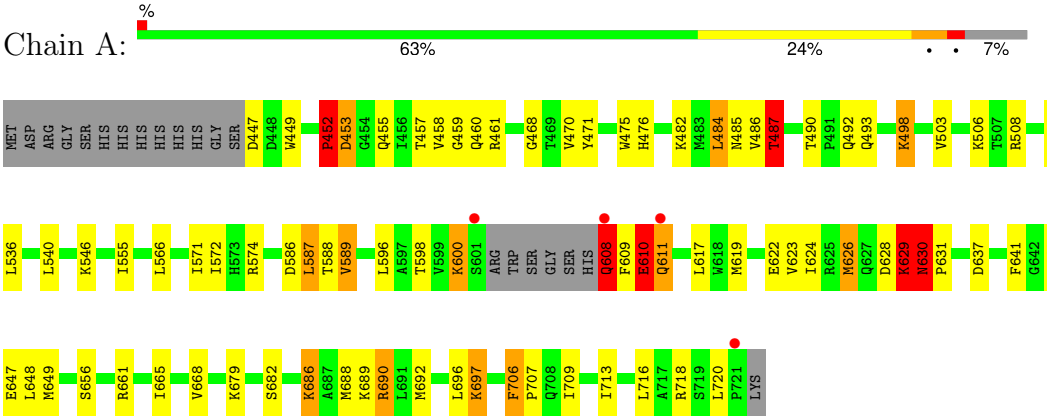
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	3	Total O 3 3	0	0
5	B	2	Total O 2 2	0	0

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.

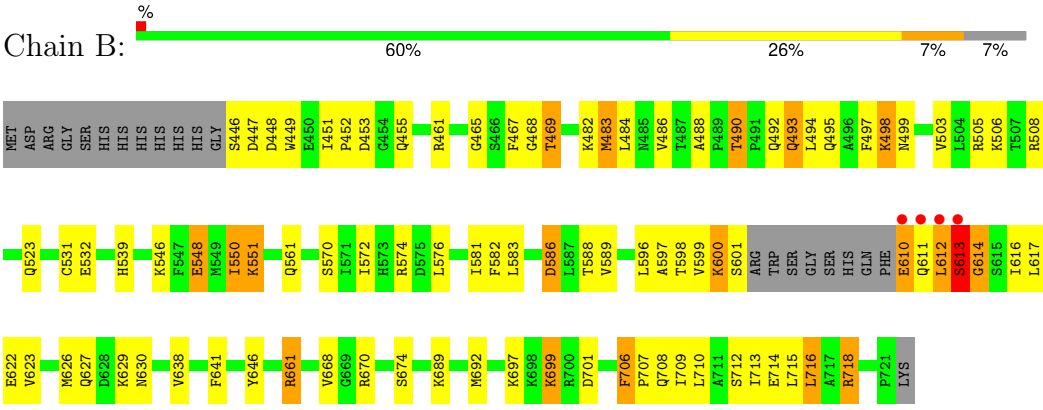
• Molecule 1: Serine/threonine-protein kinase B-raf

Chain A:



• Molecule 1: Serine/threonine-protein kinase B-raf

Chain B:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 41 21 2	Depositor
Cell constants a, b, c, α, β, γ	94.24Å 94.24Å 162.74Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	61.74 – 2.85 61.74 – 2.85	Depositor EDS
% Data completeness (in resolution range)	98.7 (61.74-2.85) 98.7 (61.74-2.85)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.40 (at 2.86Å)	Xtriage
Refinement program	REFMAC 5.8.0431 (refmacat 0.4.105)	Depositor
R, R_{free}	0.181 , 0.254 0.179 , 0.253	Depositor DCC
R_{free} test set	700 reflections (3.84%)	wwPDB-VP
Wilson B-factor (Å^2)	74.4	Xtriage
Anisotropy	0.249	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.32 , 49.0	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	4408	wwPDB-VP
Average B, all atoms (Å^2)	73.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.33% 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 (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: PGE, A1C1X, EDO

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	2.03	17/2197 (0.8%)	1.87	36/2965 (1.2%)
1	B	1.82	18/2221 (0.8%)	1.84	43/2997 (1.4%)
All	All	1.93	35/4418 (0.8%)	1.85	79/5962 (1.3%)

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	2
1	B	0	3
All	All	0	5

All (35) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	487	THR	CB-OG1	49.65	2.23	1.43
1	B	611	GLN	CG-CD	47.40	2.70	1.52
1	A	611	GLN	CG-CD	43.33	2.60	1.52
1	A	487	THR	CB-CG2	37.11	2.75	1.52
1	B	613	SER	CB-OG	35.59	2.13	1.42
1	B	718	ARG	CD-NE	29.66	1.87	1.46
1	B	492	GLN	CG-CD	28.48	2.23	1.52
1	A	498	LYS	CE-NZ	27.79	2.32	1.49
1	B	630	ASN	CB-CG	-22.01	0.97	1.52
1	A	609	PHE	CB-CG	-20.16	1.04	1.50
1	A	546	LYS	CG-CD	19.13	2.09	1.52
1	A	460	GLN	CG-CD	13.32	1.85	1.52
1	A	453	ASP	CB-CG	-13.25	1.19	1.52
1	B	715	LEU	CG-CD1	-13.23	1.08	1.52

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	718	ARG	CD-NE	-12.13	1.29	1.46
1	A	608	GLN	CB-CG	12.01	1.88	1.52
1	B	498	LYS	CG-CD	-10.17	1.22	1.52
1	A	587	LEU	CG-CD2	9.94	1.85	1.52
1	B	600	LYS	CB-CG	9.86	1.82	1.52
1	B	546	LYS	CG-CD	9.78	1.81	1.52
1	B	626	MET	CB-CG	-9.41	1.24	1.52
1	B	697	LYS	CG-CD	-8.57	1.26	1.52
1	A	587	LEU	CG-CD1	8.54	1.80	1.52
1	A	600	LYS	CD-CE	8.37	1.77	1.52
1	A	686	LYS	CB-CG	-8.25	1.27	1.52
1	A	690	ARG	CD-NE	8.15	1.57	1.46
1	B	627	GLN	CB-CG	7.99	1.76	1.52
1	B	699	LYS	CG-CD	-7.71	1.29	1.52
1	A	626	MET	CG-SD	7.65	1.99	1.80
1	A	485	ASN	CB-CG	-7.60	1.33	1.52
1	B	715	LEU	CG-CD2	7.23	1.76	1.52
1	B	506	LYS	CD-CE	-6.68	1.32	1.52
1	B	548	GLU	CG-CD	6.56	1.68	1.52
1	B	551	LYS	CG-CD	-6.56	1.32	1.52
1	B	493	GLN	CG-CD	-6.07	1.36	1.52

All (79) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	611	GLN	CB-CG-CD	-30.30	61.10	112.60
1	B	630	ASN	CA-CB-CG	27.05	139.65	112.60
1	A	487	THR	OG1-CB-CG2	-26.41	56.49	109.30
1	A	487	THR	CA-CB-OG1	-23.95	73.68	109.60
1	B	611	GLN	CB-CG-CD	-23.70	72.31	112.60
1	A	690	ARG	CD-NE-CZ	-23.05	92.12	124.40
1	A	630	ASN	CA-CB-CG	-19.93	92.67	112.60
1	B	629	LYS	CB-CG-CD	18.59	154.05	111.30
1	B	492	GLN	CB-CG-CD	-18.23	81.61	112.60
1	B	718	ARG	CD-NE-CZ	18.14	149.80	124.40
1	B	718	ARG	CG-CD-NE	-17.93	72.56	112.00
1	A	487	THR	CA-CB-CG2	-17.92	80.03	110.50
1	B	699	LYS	CB-CG-CD	15.84	147.74	111.30
1	B	629	LYS	CG-CD-CE	15.14	146.11	111.30
1	B	610	GLU	CB-CG-CD	-14.69	87.64	112.60
1	B	630	ASN	CB-CG-ND2	13.95	137.32	116.40
1	A	610	GLU	CB-CG-CD	-13.47	89.69	112.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	551	LYS	CB-CG-CD	12.78	140.68	111.30
1	A	492	GLN	CB-CG-CD	-12.46	91.41	112.60
1	B	626	MET	CA-CB-CG	12.25	138.59	114.10
1	A	492	GLN	CG-CD-NE2	-12.13	98.20	116.40
1	A	690	ARG	CG-CD-NE	-11.71	86.25	112.00
1	B	550	ILE	CB-CG1-CD1	11.56	138.07	113.80
1	B	613	SER	CA-CB-OG	-11.47	88.15	111.10
1	A	718	ARG	CD-NE-CZ	-11.14	108.80	124.40
1	A	587	LEU	CD1-CG-CD2	-11.13	86.32	110.80
1	B	699	LYS	CG-CD-CE	-11.13	85.71	111.30
1	A	609	PHE	CA-CB-CG	10.54	124.34	113.80
1	B	611	GLN	CG-CD-NE2	-10.52	100.62	116.40
1	B	630	ASN	CB-CG-OD1	-10.48	99.85	120.80
1	B	715	LEU	CB-CG-CD1	10.23	141.40	110.70
1	B	548	GLU	CG-CD-OE1	-9.51	96.53	118.40
1	A	546	LYS	CB-CG-CD	-9.46	89.54	111.30
1	A	492	GLN	CG-CD-OE1	9.46	139.71	120.80
1	B	548	GLU	CG-CD-OE2	9.29	139.78	118.40
1	A	453	ASP	CA-CB-CG	9.13	121.73	112.60
1	A	697	LYS	CB-CA-C	8.71	122.91	109.84
1	A	630	ASN	CB-CA-C	8.58	118.67	110.17
1	B	548	GLU	CB-CG-CD	-8.32	98.45	112.60
1	A	629	LYS	CA-CB-CG	-8.12	97.86	114.10
1	A	689	LYS	CG-CD-CE	-7.93	93.06	111.30
1	B	611	GLN	CG-CD-OE1	7.92	136.65	120.80
1	A	498	LYS	CD-CE-NZ	-7.46	88.03	111.90
1	B	697	LYS	CG-CD-CE	-7.46	94.15	111.30
1	A	611	GLN	CG-CD-NE2	7.43	127.54	116.40
1	A	718	ARG	CG-CD-NE	-7.32	95.90	112.00
1	A	452	PRO	CB-CA-C	7.18	120.68	111.56
1	A	600	LYS	CG-CD-CE	-7.15	94.85	111.30
1	A	706	PHE	N-CA-CB	7.10	120.88	110.30
1	A	484	LEU	N-CA-CB	-7.08	98.95	110.21
1	B	716	LEU	N-CA-CB	-6.92	99.95	110.12
1	B	626	MET	CB-CG-SD	-6.91	91.98	112.70
1	A	453	ASP	CB-CG-OD2	-6.90	102.53	118.40
1	B	706	PHE	N-CA-CB	6.89	118.56	110.42
1	B	610	GLU	CG-CD-OE2	-6.72	102.95	118.40
1	B	588	THR	CA-CB-OG1	-6.62	99.67	109.60
1	B	546	LYS	CB-CG-CD	-6.32	96.77	111.30
1	B	551	LYS	N-CA-CB	6.31	119.50	110.16
1	A	637	ASP	CA-CB-CG	6.21	118.81	112.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	668	VAL	N-CA-CB	6.12	117.71	110.55
1	B	453	ASP	CB-CA-C	6.09	118.97	109.84
1	B	714	GLU	CB-CG-CD	-6.07	102.27	112.60
1	A	457	THR	CA-CB-OG1	-6.07	100.49	109.60
1	B	689	LYS	CB-CA-C	5.92	120.75	110.68
1	B	469	THR	CA-CB-OG1	-5.86	100.81	109.60
1	A	629	LYS	CB-CG-CD	-5.64	98.34	111.30
1	B	586	ASP	CB-CA-C	5.54	120.39	111.36
1	A	611	GLN	CG-CD-OE1	-5.47	109.85	120.80
1	B	668	VAL	N-CA-CB	5.46	116.57	110.51
1	B	699	LYS	CB-CA-C	5.37	119.66	110.81
1	B	520	THR	CA-CB-OG1	-5.29	101.66	109.60
1	A	460	GLN	CB-CG-CD	-5.21	103.74	112.60
1	A	453	ASP	CB-CG-OD1	5.18	130.31	118.40
1	B	708	GLN	CB-CA-C	5.14	119.03	110.90
1	A	574	ARG	CG-CD-NE	5.13	123.30	112.00
1	B	646	TYR	CB-CA-C	5.12	118.85	110.96
1	B	546	LYS	CG-CD-CE	-5.11	99.54	111.30
1	B	715	LEU	CB-CG-CD2	-5.11	95.38	110.70
1	B	467	PHE	CA-CB-CG	5.02	118.82	113.80

There are no chirality outliers.

All (5) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	452	PRO	Peptide
1	A	690	ARG	Sidechain
1	B	610	GLU	Sidechain
1	B	670	ARG	Sidechain
1	B	718	ARG	Sidechain

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	2151	0	2187	42	0
1	B	2172	0	2207	41	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	A	31	0	0	1	0
2	B	31	0	0	1	0
3	A	4	0	6	0	0
3	B	4	0	6	0	0
4	B	10	0	14	2	0
5	A	3	0	0	0	0
5	B	2	0	0	0	0
All	All	4408	0	4420	81	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 10.

All (81) 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:619:MET:HE2	1:A:624:ILE:HG12	1.58	0.85
1:B:661:ARG:HG3	4:B:803:PGE:H3	1.59	0.84
1:A:619:MET:HE3	1:A:623:VAL:HG12	1.59	0.82
1:B:574:ARG:O	1:B:612:LEU:HD21	1.81	0.80
1:B:712:SER:O	1:B:716:LEU:HB2	1.88	0.73
1:B:452:PRO:HG2	1:B:455:GLN:NE2	2.09	0.68
1:A:688:MET:HE2	1:A:716:LEU:HD21	1.78	0.66
1:A:490:THR:HG23	1:A:493:GLN:NE2	2.11	0.65
1:B:706:PHE:N	1:B:707:PRO:HD2	2.15	0.62
1:B:612:LEU:O	1:B:614:GLY:N	2.33	0.61
1:A:506:LYS:HE3	1:B:446:SER:O	2.00	0.61
1:A:449:TRP:CH2	1:B:508:ARG:HD2	2.36	0.60
1:A:449:TRP:CZ3	1:B:508:ARG:HD2	2.37	0.59
1:A:688:MET:HE2	1:A:716:LEU:CD2	2.32	0.59
1:A:586:ASP:O	1:A:587:LEU:HB2	2.03	0.58
1:A:661:ARG:O	1:A:665:ILE:HG13	2.05	0.57
1:B:661:ARG:CG	4:B:803:PGE:H3	2.34	0.56
1:A:622:GLU:HG2	1:A:623:VAL:N	2.20	0.56
1:B:532[B]:GLU:O	1:B:582[B]:PHE:HE1	1.88	0.56
1:B:600:LYS:O	1:B:601:SER:HB3	2.06	0.56
1:A:586:ASP:HB3	1:A:588:THR:OG1	2.07	0.55
1:B:616:ILE:HG13	1:B:617:LEU:N	2.22	0.53
1:A:641:PHE:CZ	1:A:645:LEU:HD21	2.44	0.53
1:B:468:GLY:HA3	1:B:483:MET:O	2.09	0.52
1:B:490:THR:HG23	1:B:493:GLN:HG3	1.92	0.52
1:B:583[A]:LEU:HG	1:B:586:ASP:HA	1.92	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:713:ILE:O	1:B:716:LEU:HB3	2.11	0.51
1:A:503:VAL:HG13	1:A:571:ILE:HD13	1.92	0.50
1:A:586:ASP:O	1:A:587:LEU:CB	2.59	0.50
1:A:475:TRP:O	1:A:476:HIS:HB2	2.11	0.50
1:A:617:LEU:O	1:A:643:ILE:HG13	2.13	0.49
1:A:608:GLN:C	1:A:610:GLU:H	2.20	0.49
1:A:470:VAL:HG22	1:A:482:LYS:HG3	1.95	0.48
1:B:576:LEU:HD11	1:B:581:ILE:HD11	1.96	0.48
1:A:692:MET:HE3	1:A:692:MET:HB2	1.73	0.48
1:A:468:GLY:HA3	1:A:484:LEU:HA	1.95	0.48
1:B:614:GLY:HA2	1:B:661:ARG:HH12	1.80	0.47
1:A:649:MET:HE3	1:A:688:MET:HG2	1.96	0.47
1:A:696:LEU:O	1:A:697:LYS:C	2.58	0.47
1:B:539:HIS:CD2	1:B:583[B]:LEU:HD12	2.50	0.47
1:B:638:VAL:HG13	1:B:709:ILE:HD11	1.97	0.47
1:A:713:ILE:O	1:A:716:LEU:HB3	2.14	0.47
1:B:692:MET:HE3	1:B:692:MET:HB2	1.65	0.47
1:A:508:ARG:HH12	1:B:447:ASP:HB3	1.79	0.47
1:B:570:SER:O	1:B:599:VAL:HA	2.15	0.46
1:A:630:ASN:HA	1:A:631:PRO:HD2	1.86	0.46
1:B:484:LEU:O	1:B:523:GLN:NE2	2.48	0.46
1:B:499:ASN:O	1:B:503:VAL:HG23	2.15	0.46
1:B:531:CYS:HB3	1:B:582[B]:PHE:CE1	2.51	0.45
1:A:709:ILE:O	1:A:713:ILE:HG13	2.16	0.45
1:A:572:ILE:HD11	1:A:600:LYS:HD3	1.97	0.45
1:A:706:PHE:N	1:A:707:PRO:HD2	2.32	0.45
2:A:801:A1C1X:O2	2:A:801:A1C1X:C18	2.65	0.45
1:A:619:MET:HG2	1:A:623:VAL:HG11	1.98	0.44
1:A:555:ILE:HG23	1:A:589:VAL:HG21	1.99	0.44
1:B:449:TRP:CZ2	1:B:505:ARG:HB3	2.52	0.44
1:A:461:ARG:HA	1:A:471:TYR:CD2	2.53	0.43
1:B:581:ILE:HG23	1:B:589:VAL:HG13	1.99	0.43
1:B:497:PHE:O	1:B:498:LYS:C	2.62	0.43
1:A:482:LYS:O	1:A:525:ALA:HA	2.18	0.43
1:B:451:ILE:HG23	1:B:452:PRO:HD2	1.99	0.43
1:A:458:VAL:CG1	1:A:459:GLY:N	2.82	0.43
1:B:465:GLY:HA3	1:B:482:LYS:HE2	2.00	0.43
1:A:447:ASP:OD1	1:A:447:ASP:C	2.62	0.42
1:A:452:PRO:HB2	1:A:455:GLN:NE2	2.33	0.42
1:B:638:VAL:O	1:B:641:PHE:HB3	2.19	0.42
1:A:679:LYS:HB3	1:A:679:LYS:HE2	1.71	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:511:ASN:HA	1:B:589:VAL:O	2.20	0.42
1:A:458:VAL:HG12	1:A:459:GLY:N	2.34	0.42
1:B:572:ILE:O	1:B:597:ALA:HA	2.19	0.42
1:B:709:ILE:O	1:B:713:ILE:HG13	2.20	0.41
2:B:801:A1C1X:O2	2:B:801:A1C1X:C18	2.69	0.41
1:B:621:PRO:O	1:B:622:GLU:C	2.63	0.41
1:B:710:LEU:HD12	1:B:710:LEU:HA	1.87	0.41
1:B:483:MET:HE2	1:B:483:MET:HB3	1.90	0.41
1:B:619:MET:HE3	1:B:623:VAL:HG12	2.03	0.41
1:A:643:ILE:O	1:A:647:GLU:HG3	2.20	0.41
1:A:566:LEU:HD23	1:A:566:LEU:HA	1.84	0.40
1:A:536:LEU:HD21	1:A:648:LEU:HD21	2.02	0.40
1:B:461:ARG:HG3	1:B:469:THR:CG2	2.50	0.40
1:A:643:ILE:O	1:A:646:TYR:HB3	2.21	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	265/289 (92%)	242 (91%)	21 (8%)	2 (1%)	16 31
1	B	269/289 (93%)	249 (93%)	16 (6%)	4 (2%)	8 17
All	All	534/578 (92%)	491 (92%)	37 (7%)	6 (1%)	11 23

All (6) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	629	LYS
1	B	613	SER
1	A	487	THR
1	B	448	ASP

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Mol	Chain	Res	Type
1	B	614	GLY
1	B	488	ALA

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	237/254 (93%)	217 (92%)	20 (8%)	10	22
1	B	240/254 (94%)	222 (92%)	18 (8%)	12	27
All	All	477/508 (94%)	439 (92%)	38 (8%)	11	24

All (38) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	453	ASP
1	A	486	VAL
1	A	487	THR
1	A	498	LYS
1	A	522	PRO
1	A	540	LEU
1	A	589	VAL
1	A	596	LEU
1	A	598	THR
1	A	608	GLN
1	A	610	GLU
1	A	611	GLN
1	A	626	MET
1	A	628	ASP
1	A	629	LYS
1	A	630	ASN
1	A	656	SER
1	A	682	SER
1	A	686	LYS
1	A	720	LEU
1	B	483	MET

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Mol	Chain	Res	Type
1	B	486	VAL
1	B	490	THR
1	B	494	LEU
1	B	495	GLN
1	B	520	THR
1	B	548	GLU
1	B	550	ILE
1	B	551	LYS
1	B	561	GLN
1	B	596	LEU
1	B	598	THR
1	B	612	LEU
1	B	613	SER
1	B	661	ARG
1	B	674	SER
1	B	699	LYS
1	B	701	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	493	GLN
1	A	561	GLN
1	B	511	ASN
1	B	523	GLN
1	B	539	HIS
1	B	584	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 oligosaccharides in this entry.

5.6 Ligand geometry (i)

5 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	$\#\|Z\| > 2$
4	PGE	B	803	-	9,9,9	0.21	0	8,8,8	0.21	0
2	A1C1X	B	801	-	34,35,35	0.97	2 (5%)	37,52,52	1.45	5 (13%)
3	EDO	B	802	-	3,3,3	0.10	0	2,2,2	0.11	0
3	EDO	A	802	-	3,3,3	0.39	0	2,2,2	0.75	0
2	A1C1X	A	801	-	34,35,35	0.76	1 (2%)	37,52,52	1.76	7 (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
4	PGE	B	803	-	-	5/7/7/7	-
2	A1C1X	B	801	-	-	3/18/23/23	0/5/5/5
3	EDO	B	802	-	-	1/1/1/1	-
3	EDO	A	802	-	-	1/1/1/1	-
2	A1C1X	A	801	-	-	3/18/23/23	0/5/5/5

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	801	A1C1X	C15-C14	-2.58	1.47	1.51
2	B	801	A1C1X	F1-C17	-2.39	1.35	1.40
2	A	801	A1C1X	F1-C17	-2.29	1.35	1.40

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	801	A1C1X	C22-C8-C9	-5.42	113.83	120.77
2	A	801	A1C1X	C6-C8-C9	4.99	126.95	121.63

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	801	A1C1X	C22-C8-C9	-4.14	115.47	120.77
2	B	801	A1C1X	C6-C8-C9	3.87	125.75	121.63
2	A	801	A1C1X	C20-N5-C21	3.71	105.13	101.80
2	B	801	A1C1X	C20-N5-C21	3.71	105.13	101.80
2	A	801	A1C1X	C13-N2-C14	-2.85	123.47	127.52
2	B	801	A1C1X	C12-N1-C13	2.36	120.04	117.83
2	A	801	A1C1X	C16-C15-C14	2.09	121.45	117.83
2	A	801	A1C1X	C12-N1-C13	2.08	119.78	117.83
2	B	801	A1C1X	N4-C20-N5	-2.04	113.55	116.78
2	A	801	A1C1X	N4-C20-N5	-2.02	113.57	116.78

There are no chirality outliers.

All (13) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	801	A1C1X	O1-C3-C4-N6
4	B	803	PGE	O1-C1-C2-O2
2	A	801	A1C1X	O1-C3-C4-C5
2	B	801	A1C1X	O1-C3-C4-C5
2	A	801	A1C1X	C6-C8-C9-C21
3	A	802	EDO	O1-C1-C2-O2
4	B	803	PGE	C1-C2-O2-C3
2	A	801	A1C1X	C1-C2-C3-C4
3	B	802	EDO	O1-C1-C2-O2
2	B	801	A1C1X	C6-C8-C9-C21
4	B	803	PGE	C6-C5-O3-C4
4	B	803	PGE	O2-C3-C4-O3
4	B	803	PGE	C3-C4-O3-C5

There are no ring outliers.

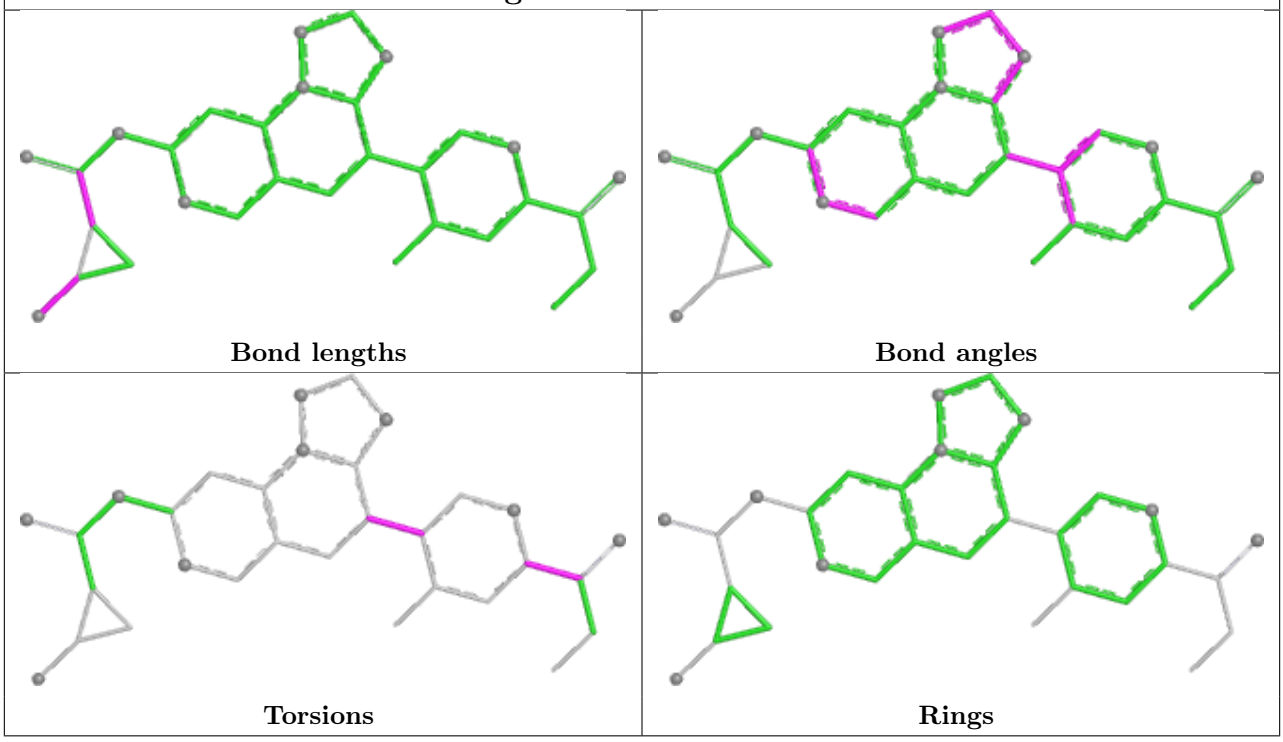
3 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	803	PGE	2	0
2	B	801	A1C1X	1	0
2	A	801	A1C1X	1	0

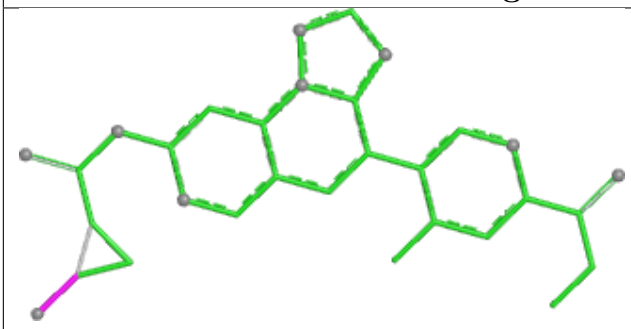
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

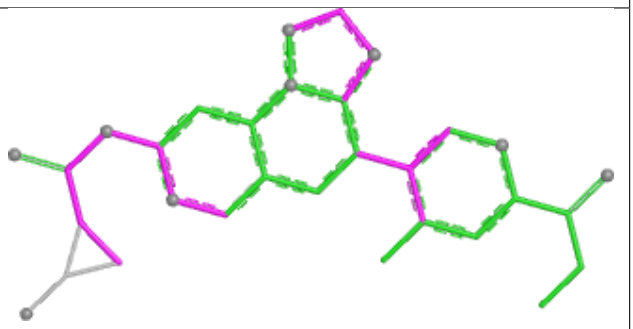
Ligand A1C1X B 801



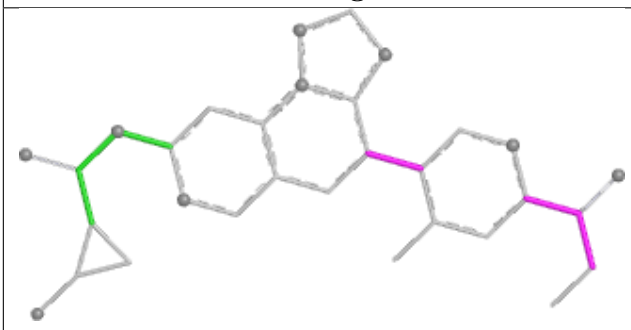
Ligand A1C1X A 801



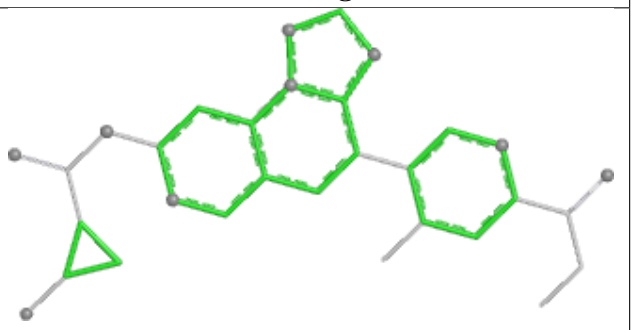
Bond lengths



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(Å^2)	Q<0.9
1	A	269/289 (93%)	-0.37	4 (1%)	72	65	44, 65, 108, 124	24 (8%)
1	B	268/289 (92%)	-0.41	4 (1%)	72	65	27, 64, 112, 154	29 (10%)
All	All	537/578 (92%)	-0.39	8 (1%)	72	65	27, 65, 110, 154	53 (9%)

All (8) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	613	SER	4.0
1	B	610	GLU	3.9
1	A	721	PRO	2.7
1	B	611	GLN	2.5
1	A	601	SER	2.5
1	A	611	GLN	2.2
1	A	608	GLN	2.1
1	B	612	LEU	2.0

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 oligosaccharides 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,

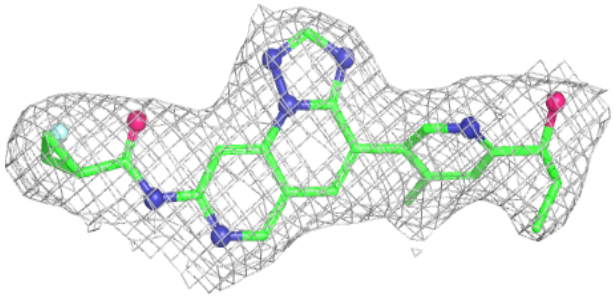
median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

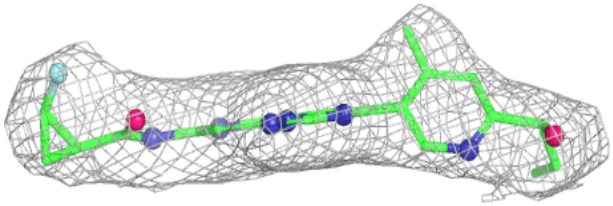
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	EDO	A	802	4/4	0.80	0.18	72,84,92,93	0
3	EDO	B	802	4/4	0.85	0.16	85,92,97,97	0
4	PGE	B	803	10/10	0.89	0.15	65,100,109,121	0
2	A1C1X	A	801	31/31	0.96	0.06	53,63,76,88	0
2	A1C1X	B	801	31/31	0.98	0.05	47,52,62,63	0

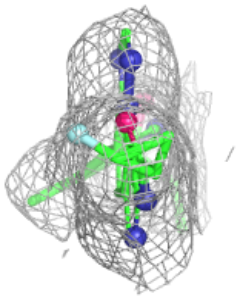
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around A1C1X 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)

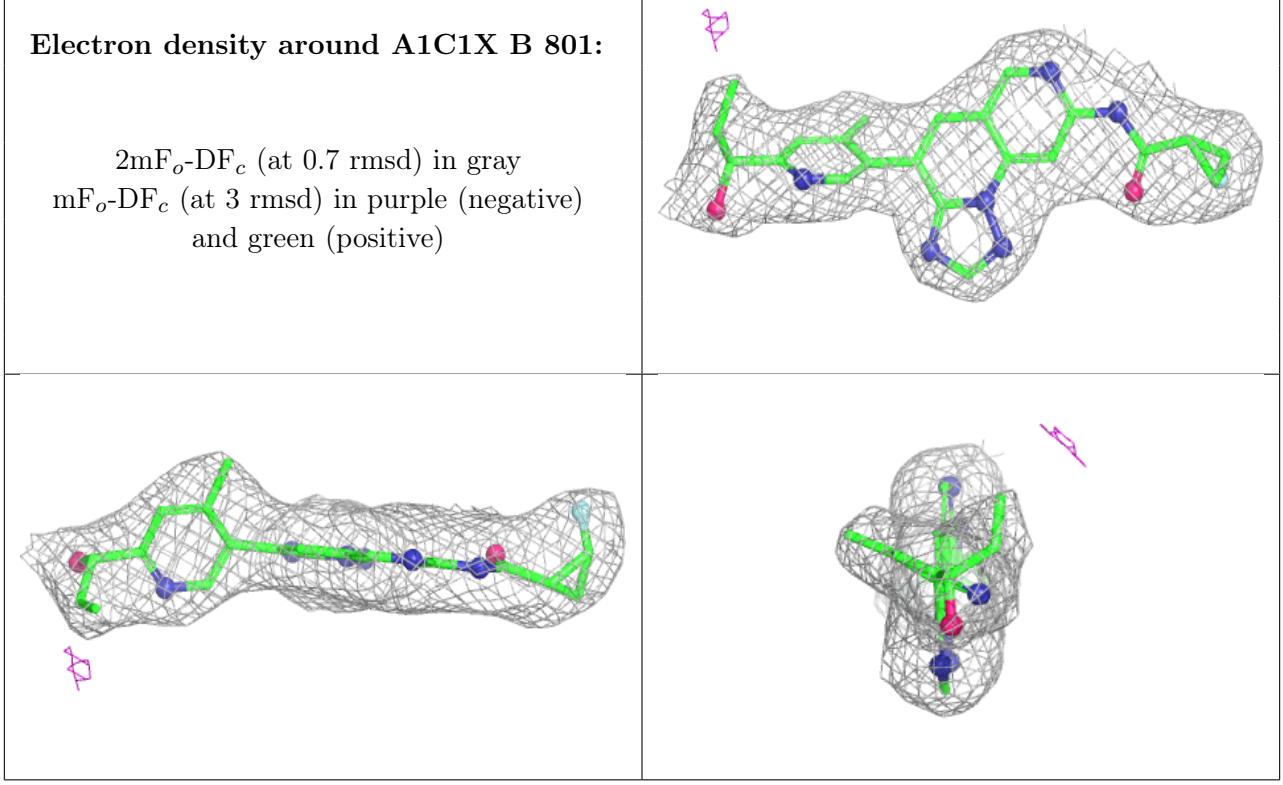






Electron density around A1C1X B 801:

$2mF_o$-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 (i)

There are no such residues in this entry.