



# Full wwPDB X-ray Structure Validation Report ⓘ

Sep 10, 2023 – 08:20 PM EDT

PDB ID : 4KKO  
Title : Crystal Structure of HIV-1 Reverse Transcriptase in Complex with 4-((4-methoxy-6-(2-morpholinoethoxy)-1,3,5-triazin-2-yl)amino)-2-((3-methylbut-2-en-1-yl)oxy)benzotrile (JLJ513), a non-nucleoside inhibitor  
Authors : Frey, K.M.; Anderson, K.S.  
Deposited on : 2013-05-06  
Resolution : 2.89 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](mailto: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>.

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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)  
Xtrriage (Phenix) : 1.13  
EDS : 2.35.1  
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) : 2.35.1

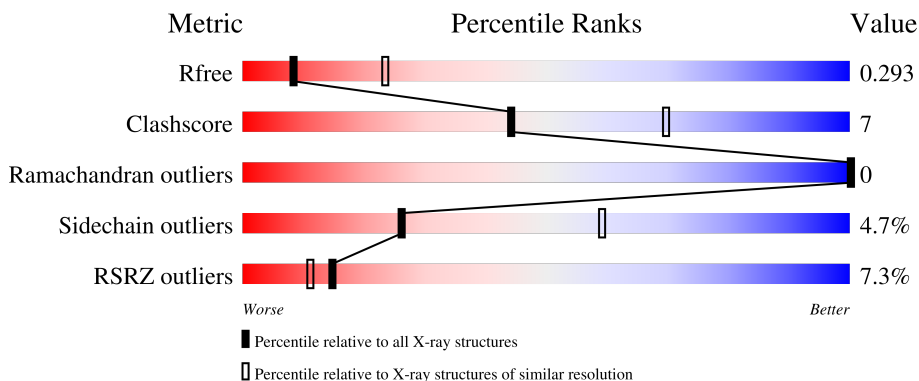
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*



The reported resolution of this entry is 2.89 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	130704	1957 (2.90-2.90)
Clashscore	141614	2172 (2.90-2.90)
Ramachandran outliers	138981	2115 (2.90-2.90)
Sidechain outliers	138945	2117 (2.90-2.90)
RSRZ outliers	127900	1906 (2.90-2.90)

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  $\geq 3$ , 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	557	 7% 78% 21% ..
2	B	428	 7% 80% 15% ..

## 2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 7950 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 HIV-1 reverse transcriptase, p66 subunit.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	554	4505	2917	748	832	8	0	0	0

There are 5 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-1	MET	-	expression tag	UNP P03366
A	0	VAL	-	expression tag	UNP P03366
A	172	ALA	LYS	engineered mutation	UNP P03366
A	173	ALA	LYS	engineered mutation	UNP P03366
A	280	SER	CYS	engineered mutation	UNP P03366

- Molecule 2 is a protein called HIV-1 reverse transcriptase, p51 subunit.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	412	3413	2225	564	617	7	0	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	280	SER	CYS	engineered mutation	UNP P03366

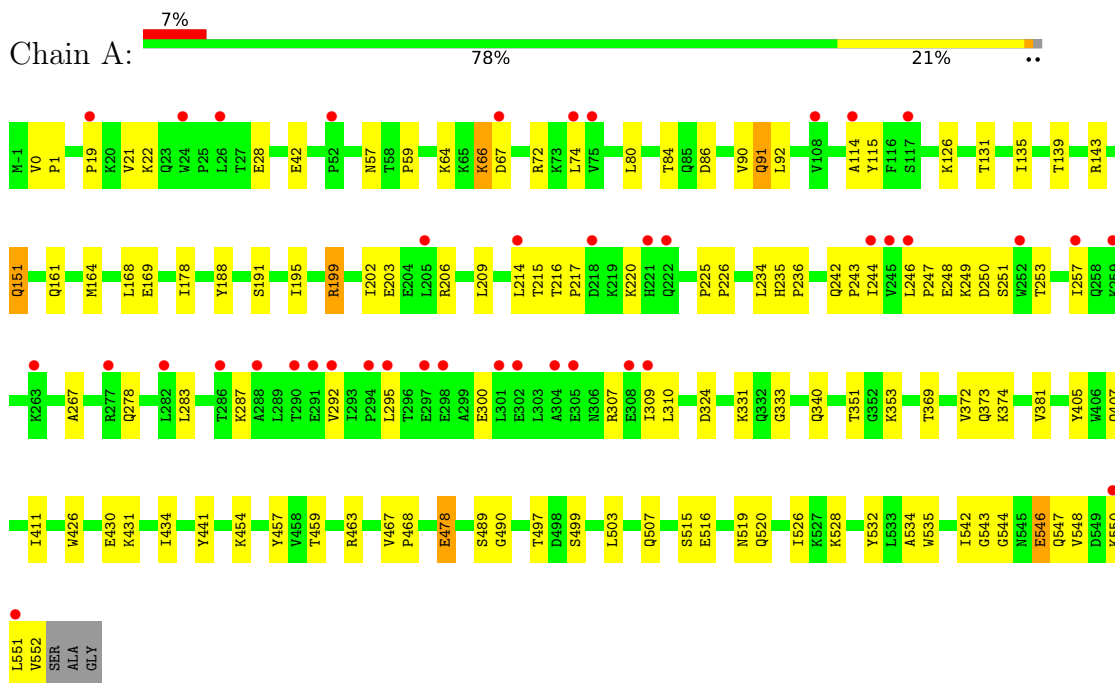
- Molecule 3 is 4-({4-methoxy-6-[2-(morpholin-4-yl)ethoxy]-1,3,5-triazin-2-yl}amino)-2-(3-methylbutoxy)benzotrile (three-letter code: 1RE) (formula: C<sub>22</sub>H<sub>30</sub>N<sub>6</sub>O<sub>4</sub>).



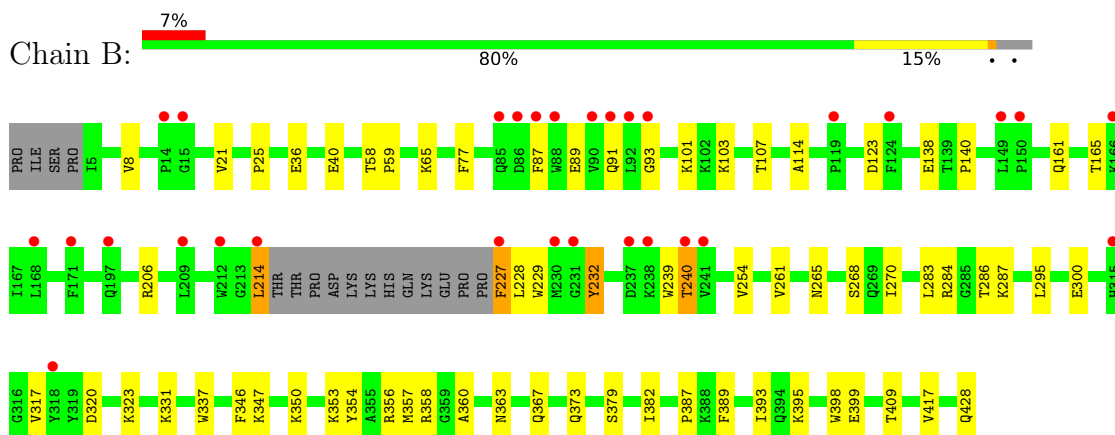
### 3 Residue-property plots [i](#)

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: HIV-1 reverse transcriptase, p66 subunit



- Molecule 2: HIV-1 reverse transcriptase, p51 subunit



## 4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	162.58Å 73.89Å 109.42Å 90.00° 100.16° 90.00°	Depositor
Resolution (Å)	48.84 – 2.89 48.84 – 2.89	Depositor EDS
% Data completeness (in resolution range)	99.3 (48.84-2.89) 99.3 (48.84-2.89)	Depositor EDS
$R_{merge}$	0.19	Depositor
$R_{sym}$	0.19	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.49 (at 2.91Å)	Xtrriage
Refinement program	PHENIX 1.8.1_1168	Depositor
R, $R_{free}$	0.246 , 0.289 0.249 , 0.293	Depositor DCC
$R_{free}$ test set	2000 reflections (6.97%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	81.0	Xtrriage
Anisotropy	0.325	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.26 , 31.1	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.92	EDS
Total number of atoms	7950	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	58.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.06% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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: 1RE

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	0.23	0/4623	0.43	0/6284
2	B	0.22	0/3511	0.44	0/4768
All	All	0.23	0/8134	0.43	0/11052

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	4505	0	4562	71	0
2	B	3413	0	3443	41	0
3	A	32	0	29	5	0
All	All	7950	0	8034	106	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 7.

All (106) 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:28:GLU:HG3	1:A:135:ILE:HD12	1.71	0.73
1:A:544:GLY:HA2	2:B:286:THR:HG22	1.72	0.72
2:B:91:GLN:HG3	2:B:93:GLY:H	1.58	0.68
2:B:89:GLU:HB2	2:B:91:GLN:HG2	1.80	0.64
1:A:234:LEU:HD22	3:A:601:1RE:H2	1.80	0.63
2:B:295:LEU:HB3	2:B:300:GLU:HG3	1.81	0.62
1:A:490:GLY:O	1:A:528:LYS:NZ	2.28	0.62
1:A:244:ILE:HG13	1:A:267:ALA:HB2	1.81	0.61
1:A:478:GLU:HG2	1:A:499:SER:HB2	1.81	0.61
1:A:131:THR:OG1	1:A:143:ARG:NH1	2.32	0.61
1:A:91:GLN:O	1:A:91:GLN:NE2	2.25	0.60
2:B:114:ALA:HB2	2:B:214:LEU:HD13	1.85	0.59
2:B:270:ILE:HG12	2:B:346:PHE:HB3	1.84	0.58
1:A:90:VAL:HG21	2:B:140:PRO:HB3	1.84	0.58
1:A:253:THR:HG22	1:A:292:VAL:HG22	1.86	0.57
2:B:101:LYS:HD3	2:B:382:ILE:HG23	1.87	0.57
1:A:546:GLU:HG3	1:A:548:VAL:HG22	1.87	0.56
1:A:19:PRO:HG3	1:A:80:LEU:HB2	1.87	0.55
2:B:91:GLN:OE1	2:B:161:GLN:NE2	2.34	0.55
1:A:405:TYR:CE2	1:A:407:GLN:HB2	2.41	0.54
1:A:209:LEU:HD22	1:A:214:LEU:HD12	1.89	0.54
1:A:151:GLN:H	1:A:151:GLN:HE21	1.55	0.54
2:B:206:ARG:NH1	2:B:229:TRP:O	2.42	0.53
1:A:547:GLN:HG3	1:A:551:LEU:HG	1.90	0.52
3:A:601:1RE:H22	2:B:138:GLU:OE1	2.11	0.51
1:A:114:ALA:HB2	1:A:214:LEU:HB3	1.92	0.50
2:B:89:GLU:OE1	2:B:89:GLU:N	2.38	0.50
1:A:131:THR:HG1	1:A:143:ARG:NH1	2.08	0.49
1:A:369:THR:O	1:A:373:GLN:HG2	2.12	0.49
1:A:249:LYS:NZ	1:A:251:SER:O	2.45	0.49
1:A:515:SER:O	1:A:519:ASN:ND2	2.46	0.49
1:A:542:ILE:HD11	2:B:261:VAL:HG11	1.95	0.49
1:A:226:PRO:HB3	1:A:235:HIS:ND1	2.28	0.48
1:A:253:THR:HA	1:A:292:VAL:HA	1.95	0.48
1:A:246:LEU:HD12	1:A:307:ARG:HG3	1.94	0.48
1:A:503:LEU:O	1:A:507:GLN:HG2	2.13	0.48
1:A:206:ARG:HE	1:A:216:THR:HB	1.78	0.48
1:A:257:ILE:HB	1:A:283:LEU:HD21	1.95	0.48
1:A:441:TYR:OH	2:B:287:LYS:O	2.30	0.47
1:A:516:GLU:HA	1:A:519:ASN:HD22	1.80	0.47
2:B:393:ILE:HD13	2:B:398:TRP:HB2	1.96	0.47
2:B:360:ALA:HB1	2:B:367:GLN:HG2	1.97	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:209:LEU:HB3	1:A:214:LEU:HB2	1.97	0.47
2:B:107:THR:HA	2:B:232:TYR:O	2.15	0.47
1:A:226:PRO:HB3	1:A:235:HIS:CE1	2.50	0.47
2:B:353:LYS:NZ	2:B:428:GLN:HE22	2.13	0.47
1:A:457:TYR:HE1	1:A:463:ARG:HG2	1.79	0.47
1:A:532:TYR:CE2	1:A:534:ALA:HB2	2.50	0.47
2:B:354:TYR:CZ	2:B:356:ARG:HB2	2.49	0.46
1:A:80:LEU:O	1:A:84:THR:OG1	2.21	0.46
2:B:363:ASN:O	2:B:367:GLN:HG3	2.16	0.46
1:A:340:GLN:HG3	1:A:351:THR:HG22	1.97	0.46
1:A:72:ARG:HA	1:A:72:ARG:HD2	1.74	0.46
1:A:225:PRO:HB3	1:A:236:PRO:HD3	1.98	0.46
1:A:426:TRP:HB3	1:A:526:ILE:HG12	1.99	0.45
2:B:265:ASN:O	2:B:268:SER:OG	2.28	0.45
2:B:286:THR:O	2:B:286:THR:OG1	2.28	0.45
1:A:309:ILE:HG22	1:A:310:LEU:HD23	1.99	0.44
1:A:21:VAL:O	1:A:57:ASN:ND2	2.41	0.44
1:A:353:LYS:O	1:A:374:LYS:NZ	2.48	0.44
1:A:199:ARG:HE	1:A:199:ARG:HB2	1.41	0.44
1:A:203:GLU:OE2	1:A:206:ARG:NH1	2.51	0.44
2:B:21:VAL:HB	2:B:59:PRO:HD3	2.00	0.44
2:B:58:THR:HG21	2:B:77:PHE:CD2	2.53	0.43
1:A:164:MET:O	1:A:168:LEU:HG	2.18	0.43
1:A:489:SER:O	1:A:528:LYS:NZ	2.51	0.43
1:A:543:GLY:HA3	2:B:283:LEU:C	2.38	0.43
1:A:195:ILE:O	1:A:199:ARG:HG3	2.17	0.43
1:A:331:LYS:HG2	1:A:333:GLY:H	1.83	0.43
1:A:431:LYS:HB3	1:A:431:LYS:HE2	1.79	0.43
2:B:387:PRO:HG2	2:B:389:PHE:CE1	2.54	0.43
2:B:395:LYS:O	2:B:399:GLU:HB2	2.19	0.42
2:B:214:LEU:HD12	2:B:228:LEU:HD22	2.00	0.42
1:A:0:VAL:HA	1:A:1:PRO:HD3	1.87	0.42
1:A:454:LYS:NZ	1:A:552:VAL:HB	2.35	0.42
1:A:202:ILE:O	1:A:206:ARG:HG3	2.19	0.42
1:A:543:GLY:HA3	2:B:283:LEU:O	2.20	0.42
1:A:64:LYS:HD3	1:A:67:ASP:HA	2.01	0.41
2:B:317:VAL:HG13	2:B:347:LYS:HB3	2.02	0.41
2:B:320:ASP:OD2	2:B:323:LYS:NZ	2.33	0.41
2:B:357:MET:SD	2:B:357:MET:N	2.91	0.41
1:A:503:LEU:HD22	1:A:535:TRP:HB2	2.01	0.41
2:B:65:LYS:HD2	2:B:227:PHE:CE1	2.55	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:331:LYS:HB2	2:B:337:TRP:CZ3	2.55	0.41
1:A:178:ILE:HG22	1:A:191:SER:HB3	2.01	0.41
1:A:247:PRO:O	1:A:307:ARG:NH2	2.39	0.41
1:A:430:GLU:HG3	1:A:434:ILE:HD11	2.01	0.41
2:B:36:GLU:O	2:B:40:GLU:HG2	2.20	0.41
2:B:379:SER:CB	2:B:387:PRO:HD3	2.50	0.41
1:A:372:VAL:HG11	1:A:411:ILE:HG23	2.02	0.41
1:A:246:LEU:HA	1:A:247:PRO:HD3	1.87	0.41
2:B:337:TRP:NE1	2:B:367:GLN:OE1	2.38	0.41
1:A:21:VAL:HB	1:A:59:PRO:HD3	2.03	0.41
1:A:188:TYR:CD2	3:A:601:1RE:H10	2.56	0.41
1:A:278:GLN:H	1:A:278:GLN:HG2	1.69	0.41
3:A:601:1RE:H14	3:A:601:1RE:NAQ	2.36	0.41
1:A:188:TYR:HD2	3:A:601:1RE:H10	1.86	0.41
2:B:103:LYS:HA	2:B:103:LYS:HD3	1.86	0.40
1:A:66:LYS:HA	1:A:66:LYS:HD3	1.82	0.40
1:A:242:GLN:HA	1:A:243:PRO:HD3	1.90	0.40
1:A:22:LYS:HB3	1:A:22:LYS:HE2	1.80	0.40
1:A:216:THR:HB	1:A:217:PRO:HD2	2.04	0.40
1:A:381:VAL:HG22	2:B:25:PRO:HG3	2.03	0.40
1:A:467:VAL:HA	1:A:468:PRO:HD3	1.84	0.40
2:B:240:THR:O	2:B:350:LYS:NZ	2.43	0.40
2:B:254:VAL:HG13	2:B:283:LEU:HD22	2.03	0.40

There are no symmetry-related clashes.

## 5.3 Torsion angles [i](#)

### 5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	552/557 (99%)	538 (98%)	14 (2%)	0	100	100
2	B	408/428 (95%)	399 (98%)	9 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
All	All	960/985 (98%)	937 (98%)	23 (2%)	0	100	100

There are no Ramachandran outliers to report.

### 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	494/495 (100%)	467 (94%)	27 (6%)	21	53
2	B	374/390 (96%)	360 (96%)	14 (4%)	34	68
All	All	868/885 (98%)	827 (95%)	41 (5%)	26	59

All (41) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	42	GLU
1	A	66	LYS
1	A	74	LEU
1	A	86	ASP
1	A	91	GLN
1	A	92	LEU
1	A	115	TYR
1	A	126	LYS
1	A	139	THR
1	A	151	GLN
1	A	161	GLN
1	A	169	GLU
1	A	199	ARG
1	A	215	THR
1	A	220	LYS
1	A	248	GLU
1	A	250	ASP
1	A	287	LYS
1	A	295	LEU
1	A	300	GLU

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Mol	Chain	Res	Type
1	A	324	ASP
1	A	459	THR
1	A	478	GLU
1	A	497	THR
1	A	520	GLN
1	A	546	GLU
1	A	550	LYS
2	B	8	VAL
2	B	87	PHE
2	B	123	ASP
2	B	165	THR
2	B	214	LEU
2	B	227	PHE
2	B	232	TYR
2	B	239	TRP
2	B	240	THR
2	B	284	ARG
2	B	358	ARG
2	B	373	GLN
2	B	409	THR
2	B	417	VAL

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	54	ASN
1	A	151	GLN
1	A	161	GLN
1	A	340	GLN
2	B	174	GLN
2	B	428	GLN

### 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](#)

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
3	1RE	A	601	-	34,34,34	1.39	6 (17%)	44,44,44	2.06	12 (27%)

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	1RE	A	601	-	-	7/20/28/28	0/3/3/3

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	601	1RE	OAX-CBD	4.15	1.38	1.34
3	A	601	1RE	CAI-CBE	2.86	1.44	1.38
3	A	601	1RE	CAI-CBA	2.63	1.43	1.39
3	A	601	1RE	CAF-CAY	-2.28	1.36	1.51
3	A	601	1RE	CBB-NAT	2.26	1.41	1.36
3	A	601	1RE	OAU-CBC	2.03	1.38	1.33

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	601	1RE	CBC-NAQ-CBB	7.58	118.94	112.86
3	A	601	1RE	CBD-NAR-CBB	5.06	116.92	112.86
3	A	601	1RE	CAM-OAX-CBD	4.93	124.33	117.83

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	601	1RE	NAQ-CBB-NAR	-3.06	121.39	126.23
3	A	601	1RE	OAX-CBD-NAR	2.76	124.96	116.13
3	A	601	1RE	CAJ-OAW-CBE	2.64	124.14	117.69
3	A	601	1RE	NAS-CBC-NAQ	-2.55	122.72	127.63
3	A	601	1RE	CBD-NAS-CBC	2.45	116.93	112.42
3	A	601	1RE	NAS-CBD-NAR	-2.35	123.10	127.63
3	A	601	1RE	CBA-CAI-CBE	2.25	122.49	119.45
3	A	601	1RE	CAB-CAY-CAC	2.25	120.88	110.51
3	A	601	1RE	CAH-CBA-CAI	-2.07	117.19	119.65

There are no chirality outliers.

All (7) torsion outliers are listed below:

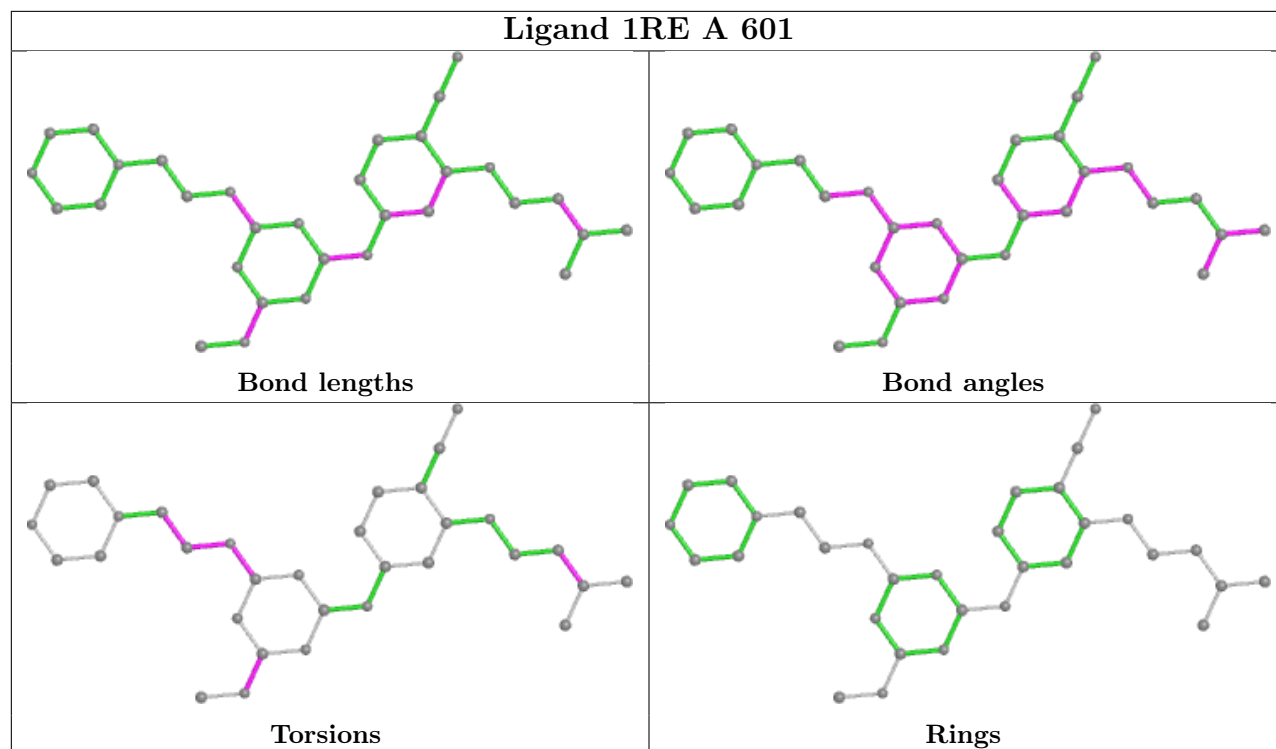
Mol	Chain	Res	Type	Atoms
3	A	601	1RE	NAR-CBD-OAX-CAM
3	A	601	1RE	NAS-CBD-OAX-CAM
3	A	601	1RE	OAX-CAM-CAP-NBF
3	A	601	1RE	NAS-CBC-OAU-CAA
3	A	601	1RE	CAJ-CAF-CAY-CAC
3	A	601	1RE	NAQ-CBC-OAU-CAA
3	A	601	1RE	CAP-CAM-OAX-CBD

There are no ring outliers.

1 monomer is involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	601	1RE	5	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.

## 6 Fit of model and data

### 6.1 Protein, DNA and RNA chains

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	554/557 (99%)	0.25	41 (7%) 14 11	11, 60, 126, 158	0
2	B	412/428 (96%)	0.34	30 (7%) 15 11	12, 50, 110, 127	0
All	All	966/985 (98%)	0.29	71 (7%) 15 11	11, 54, 116, 158	0

All (71) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	290	THR	13.7
1	A	286	THR	8.7
2	B	227	PHE	7.5
1	A	52	PRO	6.7
2	B	93	GLY	5.1
2	B	168	LEU	5.1
1	A	257	ILE	5.1
2	B	90	VAL	5.0
2	B	171	PHE	4.9
1	A	309	ILE	4.8
1	A	297	GLU	4.8
1	A	298	GLU	4.8
2	B	149	LEU	4.7
1	A	295	LEU	4.6
1	A	252	TRP	4.5
2	B	88	TRP	4.5
1	A	19	PRO	4.4
1	A	74	LEU	4.4
1	A	282	LEU	4.4
1	A	221	HIS	4.3
2	B	92	LEU	4.3
2	B	85	GLN	3.8
1	A	294	PRO	3.5
1	A	263	LYS	3.5

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
2	B	166	LYS	3.4
1	A	24	TRP	3.4
2	B	14	PRO	3.3
2	B	91	GLN	3.2
1	A	305	GLU	3.2
1	A	26	LEU	3.2
2	B	237	ASP	3.1
1	A	288	ALA	3.1
1	A	114	ALA	3.1
1	A	550	LYS	3.0
1	A	292	VAL	3.0
1	A	218	ASP	3.0
1	A	246	LEU	2.9
2	B	318	TYR	2.8
1	A	245	VAL	2.8
2	B	86	ASP	2.7
1	A	277	ARG	2.7
2	B	230	MET	2.6
1	A	301	LEU	2.6
2	B	209	LEU	2.6
1	A	244	ILE	2.6
2	B	15	GLY	2.6
2	B	197	GLN	2.5
1	A	291	GLU	2.5
1	A	222	GLN	2.5
1	A	67	ASP	2.5
2	B	240	THR	2.5
1	A	205	LEU	2.5
1	A	308	GLU	2.4
2	B	87	PHE	2.4
1	A	117	SER	2.4
1	A	302	GLU	2.4
2	B	150	PRO	2.3
1	A	304	ALA	2.3
1	A	551	LEU	2.3
2	B	315	HIS	2.3
2	B	238	LYS	2.3
1	A	259	LYS	2.3
2	B	231	GLY	2.2
2	B	119	PRO	2.2
1	A	214	LEU	2.2
2	B	212	TRP	2.2

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Mol	Chain	Res	Type	RSRZ
2	B	214	LEU	2.2
1	A	108	VAL	2.1
1	A	75	VAL	2.1
2	B	241	VAL	2.1
2	B	124	PHE	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](#)

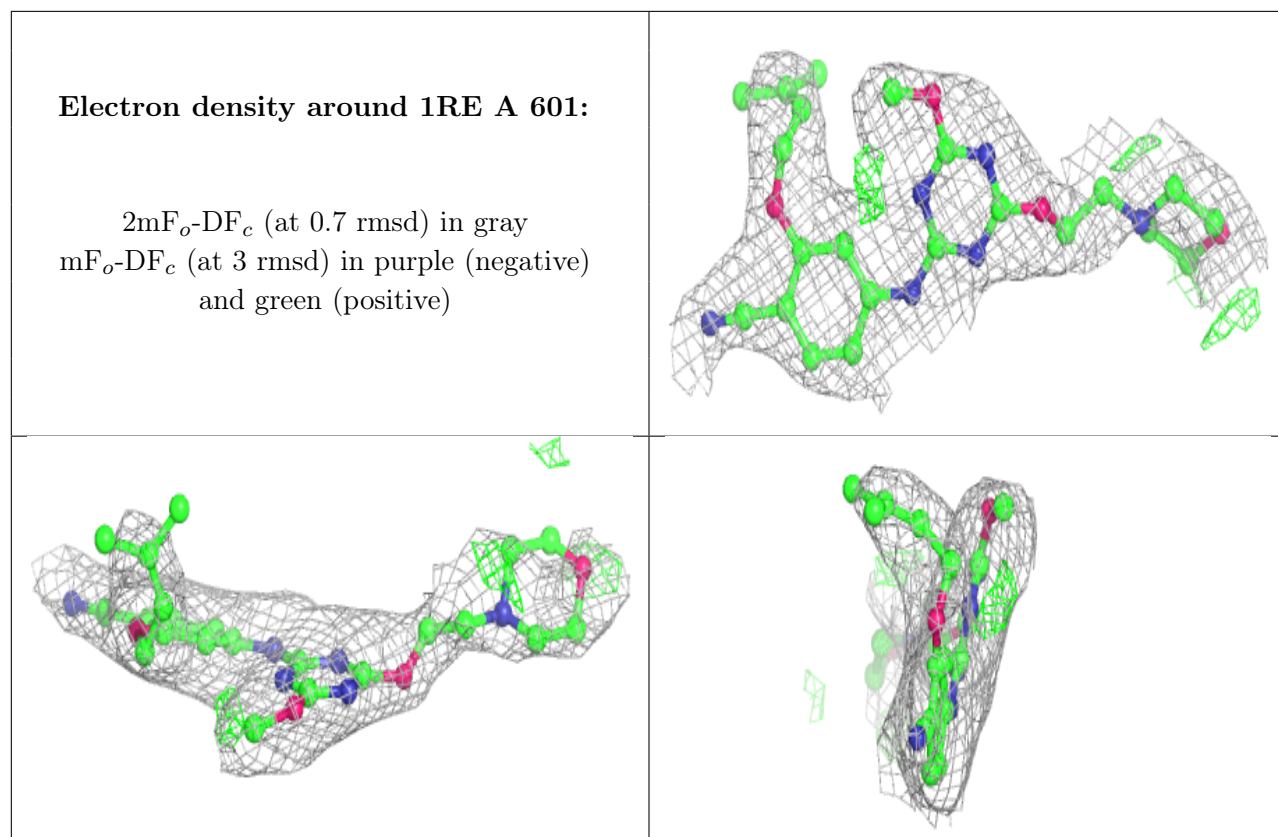
There are no monosaccharides in this entry.

## 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, 95<sup>th</sup> 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( $\text{\AA}^2$ )	Q<0.9
3	1RE	A	601	32/32	0.89	0.25	37,48,73,79	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.



## 6.5 Other polymers [i](#)

There are no such residues in this entry.