



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 09:14 AM UTC

PDB ID : 7L1P / pdb_0000711p
Title : HIV Integrase Core domain (IN) in complex with dimer-spanning ligand
Authors : Gorman, M.A.; Parker, M.W.
Deposited on : 2020-12-15
Resolution : 1.85 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 ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

MolProbity : 4-5-2 with Phenix2.0
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0
EDS : 3.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

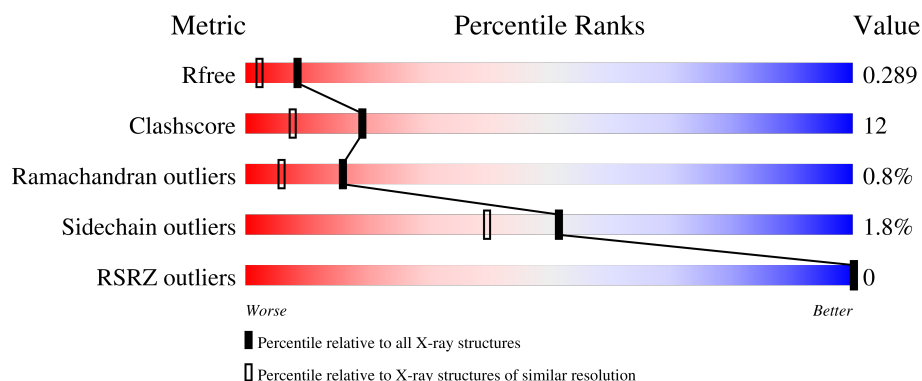
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.85 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	3428 (1.86-1.86)
Clashscore	190562	3579 (1.86-1.86)
Ramachandran outliers	187476	3553 (1.86-1.86)
Sidechain outliers	187428	3553 (1.86-1.86)
RSRZ outliers	180081	3429 (1.86-1.86)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	163	 69% 13% • 17%
1	B	163	 67% 15% • 15%

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
3	IOD	A	302	-	-	X	-
3	IOD	A	304	-	-	X	-
3	IOD	B	301	-	-	X	-
3	IOD	B	302	-	-	X	-
4	SO4	B	305	-	-	X	-

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 4434 atoms, of which 2157 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.

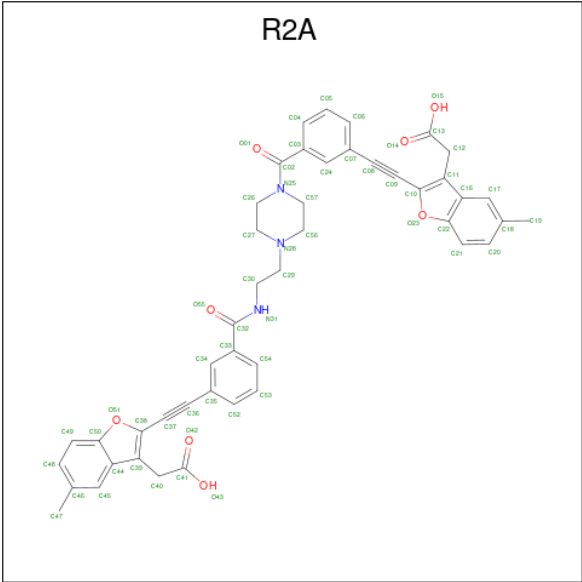
- Molecule 1 is a protein called Integrase.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	136	Total	C	H	N	O	S	0	0	0
			2123	673	1067	182	197	4			
1	B	138	Total	C	H	N	O	S	0	0	0
			2116	676	1053	185	198	4			

There are 10 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	53	GLU	GLN	conflict	UNP Q76353
A	56	SER	CYS	conflict	UNP Q76353
A	131	GLU	TRP	conflict	UNP Q76353
A	185	LYS	PHE	conflict	UNP Q76353
A	209	GLU	GLN	conflict	UNP Q76353
B	53	GLU	GLN	conflict	UNP Q76353
B	56	SER	CYS	conflict	UNP Q76353
B	131	GLU	TRP	conflict	UNP Q76353
B	185	LYS	PHE	conflict	UNP Q76353
B	209	GLU	GLN	conflict	UNP Q76353

- Molecule 2 is (2-{[3-(4-{2-[(3-{[3-(carboxymethyl)-5-methyl-1-benzofuran-2-yl]ethynyl}benzene-1-carbonyl)amino]ethyl}piperazine-1-carbonyl)phenyl]ethynyl}-5-methyl-1-benzofuran-3-yl)acetic acid (CCD ID: R2A) (formula: C₄₆H₃₉N₃O₈) (labeled as "Ligand of Interest" by depositor).

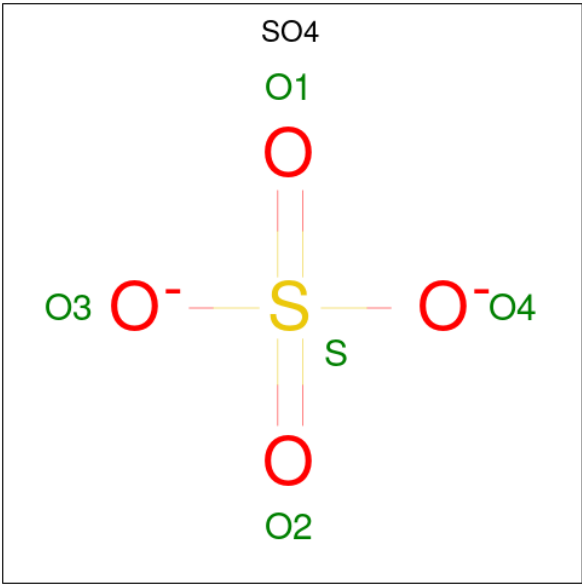


Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	H	N	O	0	0
			94	46	37	3	8		

- Molecule 3 is IODIDE ION (CCD ID: IOD) (formula: I).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	3	Total I	0	0
			3 3		
3	B	3	Total I	0	0
			3 3		

- Molecule 4 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	O	S	0	0
			5	4	1		
4	A	1	Total	O	S	0	0
			5	4	1		
4	A	1	Total	O	S	0	0
			5	4	1		
4	B	1	Total	O	S	0	0
			5	4	1		
4	B	1	Total	O	S	0	0
			5	4	1		
4	B	1	Total	O	S	0	0
			5	4	1		
4	B	1	Total	O	S	0	0
			5	4	1		

- Molecule 5 is water.

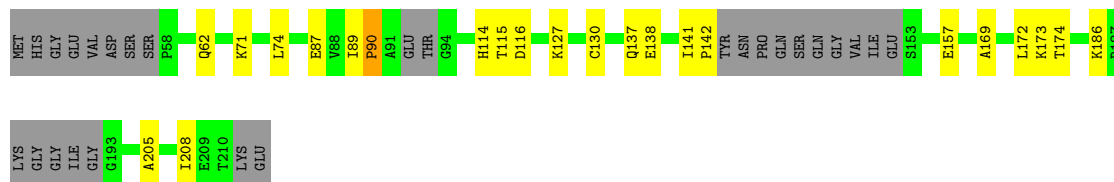
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	33	Total	O	0	0
			33	33		
5	B	27	Total	O	0	0
			27	27		

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.

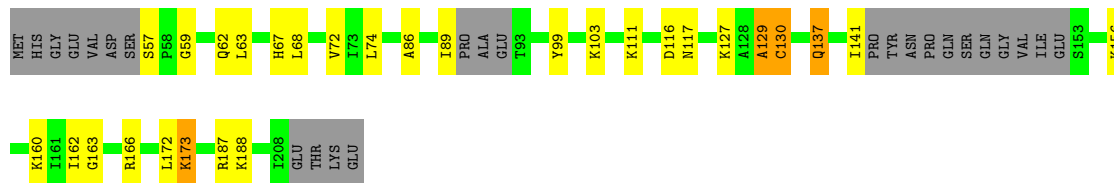
• Molecule 1: Integrase

Chain A: 



• Molecule 1: Integrase

Chain B: 



4 Data and refinement statistics

Property	Value	Source
Space group	P 43	Depositor
Cell constants a, b, c, α , β , γ	46.28Å 46.28Å 139.00Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	34.75 – 1.85 34.75 – 1.85	Depositor EDS
% Data completeness (in resolution range)	97.2 (34.75-1.85) 92.3 (34.75-1.85)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	0.89 (at 1.86Å)	Xtriage
Refinement program	PHENIX (1.18.2_3874: ???)	Depositor
R, R_{free}	0.238 , 0.284 0.249 , 0.289	Depositor DCC
R_{free} test set	2012 reflections (8.16%)	wwPDB-VP
Wilson B-factor (Å ²)	22.8	Xtriage
Anisotropy	0.058	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.40 , 31.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	0.480 for h,-k,-l	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	4434	wwPDB-VP
Average B, all atoms (Å ²)	39.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 8.67% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: R2A, CSD, IOD, SO4, CSO

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	0.48	0/1058	0.86	0/1426
1	B	0.51	0/1064	0.97	5/1432 (0.3%)
All	All	0.50	0/2122	0.92	5/2858 (0.2%)

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	B	0	2

There are no bond length outliers.

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	173	LYS	CG-CD-CE	8.42	130.67	111.30
1	B	173	LYS	CD-CE-NZ	7.42	135.64	111.90
1	B	160	LYS	CG-CD-CE	7.33	128.16	111.30
1	B	173	LYS	CB-CG-CD	-7.16	94.82	111.30
1	B	160	LYS	CD-CE-NZ	5.62	129.87	111.90

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	129	ALA	Mainchain,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	1056	1067	1064	29	0
1	B	1063	1053	1076	25	0
2	A	57	37	0	0	0
3	A	3	0	0	5	0
3	B	3	0	0	4	0
4	A	15	0	0	1	0
4	B	20	0	0	3	0
5	A	33	0	0	0	0
5	B	27	0	0	0	0
All	All	2277	2157	2140	51	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.

All (51) 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:B:137:GLN:NE2	3:B:302:IOD:I	2.40	1.24
1:A:137:GLN:OE1	3:A:304:IOD:I	2.50	0.98
1:B:137:GLN:CD	3:B:302:IOD:I	2.90	0.84
1:B:173:LYS:HD2	3:B:301:IOD:I	2.49	0.83
1:A:157:GLU:OE2	1:A:186:LYS:NZ	2.18	0.76
1:B:59:GLY:HA3	1:B:111:LYS:HG2	1.81	0.63
1:A:71:LYS:HE3	3:A:302:IOD:I	2.69	0.62
1:A:173:LYS:HG2	1:B:99:TYR:CE1	2.35	0.61
1:A:173:LYS:HG2	1:B:99:TYR:CZ	2.38	0.59
1:B:67:HIS:CD2	1:B:72:VAL:HG22	2.37	0.59
1:A:74:LEU:HD21	1:A:89:ILE:CD1	2.33	0.58
1:A:141:ILE:HG23	1:A:141:ILE:O	2.02	0.58
1:B:62:GLN:HE21	1:B:141:ILE:HD12	1.68	0.58
1:A:116:ASP:HB3	1:A:141:ILE:CG2	2.35	0.57
1:A:173:LYS:HB2	3:A:302:IOD:I	2.76	0.56
1:A:173:LYS:HE2	3:A:302:IOD:I	2.75	0.56
1:A:142:PRO:HD2	4:A:307:SO4:O4	2.07	0.55
1:A:137:GLN:CD	3:A:304:IOD:I	3.21	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:169:ALA:HB1	1:A:174:THR:HB	1.90	0.54
1:B:116:ASP:HB3	1:B:141:ILE:HG12	1.90	0.54
1:B:68:LEU:HD23	1:B:172:LEU:HD11	1.90	0.53
1:A:62:GLN:HG2	1:A:141:ILE:HD11	1.91	0.53
1:A:74:LEU:HD21	1:A:89:ILE:HD11	1.89	0.53
1:A:62:GLN:OE1	1:A:141:ILE:HG12	2.09	0.53
1:A:62:GLN:HG3	1:A:141:ILE:CG1	2.39	0.52
1:A:89:ILE:HB	1:A:90:PRO:HD2	1.91	0.52
1:B:173:LYS:HB3	3:B:301:IOD:I	2.80	0.51
1:A:62:GLN:HG3	1:A:141:ILE:HG13	1.92	0.51
1:A:115:THR:HA	1:A:141:ILE:HD12	1.93	0.50
1:A:87:GLU:OE1	1:B:103:LYS:HE3	2.13	0.47
1:B:163:GLY:HA2	4:B:305:SO4:O4	2.14	0.47
1:B:74:LEU:HD23	1:B:89:ILE:HD13	1.97	0.46
1:A:114:HIS:HE1	1:A:138:GLU:OE2	1.99	0.46
1:B:127:LYS:O	1:B:130:CSD:HB3	2.15	0.46
1:B:62:GLN:NE2	1:B:141:ILE:HG23	2.31	0.45
1:B:116:ASP:HB3	1:B:141:ILE:CG1	2.46	0.45
1:B:57:SER:OG	1:B:111:LYS:HD2	2.16	0.45
1:B:63:LEU:HD11	1:B:74:LEU:HD12	1.99	0.45
1:A:141:ILE:N	1:A:142:PRO:HD3	2.32	0.45
1:A:205:ALA:HA	1:A:208:ILE:HG12	1.99	0.44
1:A:74:LEU:HD21	1:A:89:ILE:HD13	2.00	0.44
1:B:62:GLN:NE2	1:B:141:ILE:CG2	2.81	0.44
1:B:68:LEU:HD21	1:B:162:ILE:HG21	2.01	0.43
1:A:71:LYS:HD2	1:A:172:LEU:HD23	2.01	0.42
1:A:116:ASP:HB3	1:A:141:ILE:HB	2.01	0.42
1:B:74:LEU:O	1:B:86:ALA:HA	2.19	0.42
1:B:166:ARG:HB2	4:B:305:SO4:O4	2.19	0.42
1:B:156:LYS:NZ	4:B:304:SO4:O1	2.52	0.42
1:A:89:ILE:HB	1:A:90:PRO:CD	2.50	0.41
1:B:117:ASN:OD1	1:B:117:ASN:C	2.64	0.41
1:A:173:LYS:HB2	1:A:173:LYS:HE2	1.93	0.40

There are no symmetry-related clashes.

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	126/163 (77%)	122 (97%)	3 (2%)	1 (1%)	16	6
1	B	130/163 (80%)	128 (98%)	1 (1%)	1 (1%)	16	6
All	All	256/326 (78%)	250 (98%)	4 (2%)	2 (1%)	16	6

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	90	PRO
1	B	129	ALA

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	109/131 (83%)	108 (99%)	1 (1%)	70	64
1	B	109/131 (83%)	106 (97%)	3 (3%)	38	23
All	All	218/262 (83%)	214 (98%)	4 (2%)	51	40

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	127	LYS
1	B	137	GLN
1	B	187	ARG
1	B	188	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	114	HIS
1	B	62	GLN
1	B	137	GLN
1	B	168	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

4 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	CSO	A	65	1	3,6,7	0.60	0	1,6,8	1.62	0
1	CSO	B	65	1	3,6,7	0.73	0	1,6,8	1.74	0
1	CSD	A	130	1	4,7,8	1.68	1 (25%)	1,8,10	7.02	1 (100%)
1	CSD	B	130	1	4,7,8	0.92	0	1,8,10	8.88	1 (100%)

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	CSO	A	65	1	-	1/1/5/7	-
1	CSO	B	65	1	-	0/1/5/7	-
1	CSD	A	130	1	-	1/2/6/8	-
1	CSD	B	130	1	-	1/2/6/8	-

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	130	CSD	OD1-SG	-2.99	1.45	1.47

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	130	CSD	OD1-SG-CB	8.88	121.96	105.60
1	A	130	CSD	OD1-SG-CB	7.02	118.54	105.60

There are no chirality outliers.

All (3) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	65	CSO	N-CA-CB-SG
1	A	130	CSD	CA-CB-SG-OD1
1	B	130	CSD	CA-CB-SG-OD1

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	B	130	CSD	1	0

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 14 ligands modelled in this entry, 6 are monoatomic - leaving 8 for Mogul analysis.

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	SO4	A	305	-	4,4,4	0.24	0	6,6,6	0.18	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	SO4	B	307	-	4,4,4	0.27	0	6,6,6	0.15	0
4	SO4	B	305	-	4,4,4	0.29	0	6,6,6	0.13	0
4	SO4	A	306	-	4,4,4	0.26	0	6,6,6	0.13	0
4	SO4	B	304	-	4,4,4	0.25	0	6,6,6	0.12	0
2	R2A	A	301	-	61,63,63	4.32	33 (54%)	81,89,89	2.32	26 (32%)
4	SO4	B	306	-	4,4,4	0.24	0	6,6,6	0.11	0
4	SO4	A	307	-	4,4,4	0.23	0	6,6,6	0.29	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	R2A	A	301	-	-	10/32/46/46	0/7/7/7

All (33) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	301	R2A	C54-C33	9.76	1.54	1.39
2	A	301	R2A	C53-C52	9.31	1.54	1.38
2	A	301	R2A	C04-C03	9.27	1.53	1.39
2	A	301	R2A	C09-C10	9.25	1.56	1.42
2	A	301	R2A	C34-C35	8.53	1.54	1.39
2	A	301	R2A	C05-C06	8.39	1.53	1.38
2	A	301	R2A	C37-C38	8.30	1.55	1.42
2	A	301	R2A	C02-N25	8.17	1.52	1.34
2	A	301	R2A	C24-C07	7.79	1.53	1.39
2	A	301	R2A	C29-N28	-6.77	1.32	1.47
2	A	301	R2A	O23-C22	6.69	1.49	1.38
2	A	301	R2A	C32-N31	6.38	1.47	1.33
2	A	301	R2A	C16-C11	-5.73	1.33	1.44
2	A	301	R2A	C35-C36	4.89	1.56	1.44
2	A	301	R2A	C07-C08	4.85	1.56	1.44
2	A	301	R2A	C34-C33	-4.67	1.32	1.39
2	A	301	R2A	C05-C04	-4.39	1.31	1.38
2	A	301	R2A	C56-N28	-4.11	1.35	1.46
2	A	301	R2A	C33-C32	3.98	1.59	1.50
2	A	301	R2A	C06-C07	-3.73	1.31	1.39
2	A	301	R2A	C03-C02	3.55	1.56	1.50
2	A	301	R2A	O51-C50	3.53	1.44	1.38
2	A	301	R2A	C52-C35	-3.39	1.32	1.39

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	301	R2A	C17-C18	2.96	1.43	1.39
2	A	301	R2A	C21-C22	-2.70	1.34	1.39
2	A	301	R2A	C45-C46	2.69	1.43	1.39
2	A	301	R2A	C27-N28	-2.65	1.39	1.46
2	A	301	R2A	C24-C03	-2.64	1.35	1.39
2	A	301	R2A	C53-C54	-2.51	1.34	1.38
2	A	301	R2A	C44-C39	-2.43	1.39	1.44
2	A	301	R2A	O55-C32	-2.36	1.17	1.23
2	A	301	R2A	C17-C16	2.35	1.43	1.39
2	A	301	R2A	O01-C02	-2.19	1.18	1.22

All (26) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	301	R2A	C03-C02-N25	7.93	128.56	118.66
2	A	301	R2A	C17-C16-C11	6.18	143.17	132.81
2	A	301	R2A	C22-C16-C11	-5.23	102.28	106.30
2	A	301	R2A	C56-N28-C27	4.85	119.28	108.84
2	A	301	R2A	C17-C16-C22	-4.81	114.56	119.28
2	A	301	R2A	C06-C07-C08	-4.45	112.90	120.78
2	A	301	R2A	C45-C44-C39	4.27	139.97	132.81
2	A	301	R2A	O23-C22-C16	-4.16	106.76	110.84
2	A	301	R2A	C24-C07-C08	3.90	127.25	120.22
2	A	301	R2A	O01-C02-C03	-3.53	113.29	120.29
2	A	301	R2A	C34-C35-C36	-3.48	113.94	120.22
2	A	301	R2A	C29-N28-C27	3.42	120.35	111.24
2	A	301	R2A	C45-C44-C50	-3.38	115.95	119.28
2	A	301	R2A	C52-C35-C36	3.26	126.54	120.78
2	A	301	R2A	C33-C32-N31	3.12	123.60	117.12
2	A	301	R2A	C50-C44-C39	-2.89	104.08	106.30
2	A	301	R2A	O01-C02-N25	-2.69	118.11	122.35
2	A	301	R2A	C33-C34-C35	2.53	123.41	120.37
2	A	301	R2A	O15-C13-C12	2.39	121.91	114.51
2	A	301	R2A	C09-C10-C11	2.35	136.77	124.89
2	A	301	R2A	O55-C32-N31	-2.34	118.04	122.59
2	A	301	R2A	C12-C11-C16	-2.28	120.88	124.80
2	A	301	R2A	C26-C27-N28	2.22	115.13	110.65
2	A	301	R2A	O51-C50-C44	-2.17	108.71	110.84
2	A	301	R2A	C57-C56-N28	2.08	114.85	110.65
2	A	301	R2A	C21-C22-C16	2.03	125.92	123.58

There are no chirality outliers.

All (10) torsion outliers are listed below:

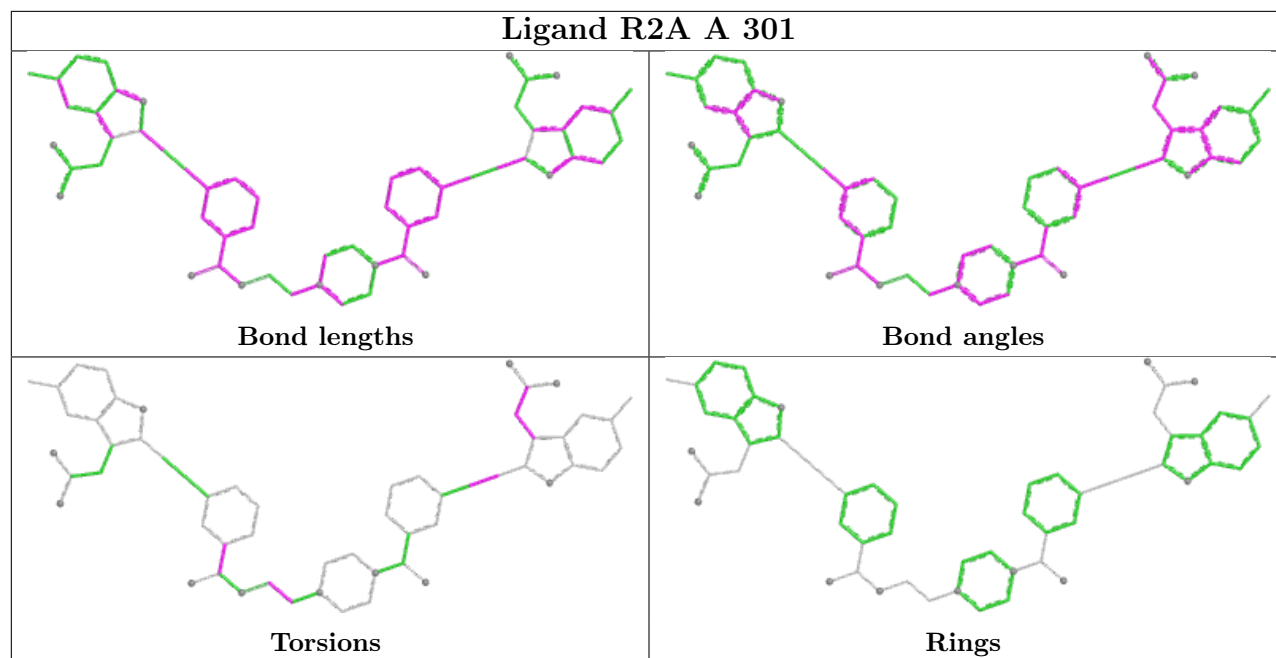
Mol	Chain	Res	Type	Atoms
2	A	301	R2A	N28-C29-C30-N31
2	A	301	R2A	C10-C11-C12-C13
2	A	301	R2A	N31-C32-C33-C34
2	A	301	R2A	C16-C11-C12-C13
2	A	301	R2A	O55-C32-C33-C34
2	A	301	R2A	N31-C32-C33-C54
2	A	301	R2A	C07-C08-C09-C10
2	A	301	R2A	O55-C32-C33-C54
2	A	301	R2A	C11-C12-C13-O14
2	A	301	R2A	C11-C12-C13-O15

There are no ring outliers.

3 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	305	SO4	2	0
4	B	304	SO4	1	0
4	A	307	SO4	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 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 [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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	134/163 (82%)	-0.85	0 100 100	19, 37, 64, 87	0
1	B	136/163 (83%)	-0.89	0 100 100	18, 36, 61, 77	0
All	All	270/326 (82%)	-0.87	0 100 100	18, 36, 64, 87	0

There are no RSRZ outliers to report.

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

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q< 0.9’ lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
1	CSO	A	65	7/8	0.98	0.06	35,42,60,71	0
1	CSO	B	65	7/8	0.98	0.05	33,40,61,68	0
1	CSD	B	130	8/9	0.99	0.04	24,32,44,53	0
1	CSD	A	130	8/9	1.00	0.04	23,28,39,48	0

6.3 Carbohydrates [i](#)

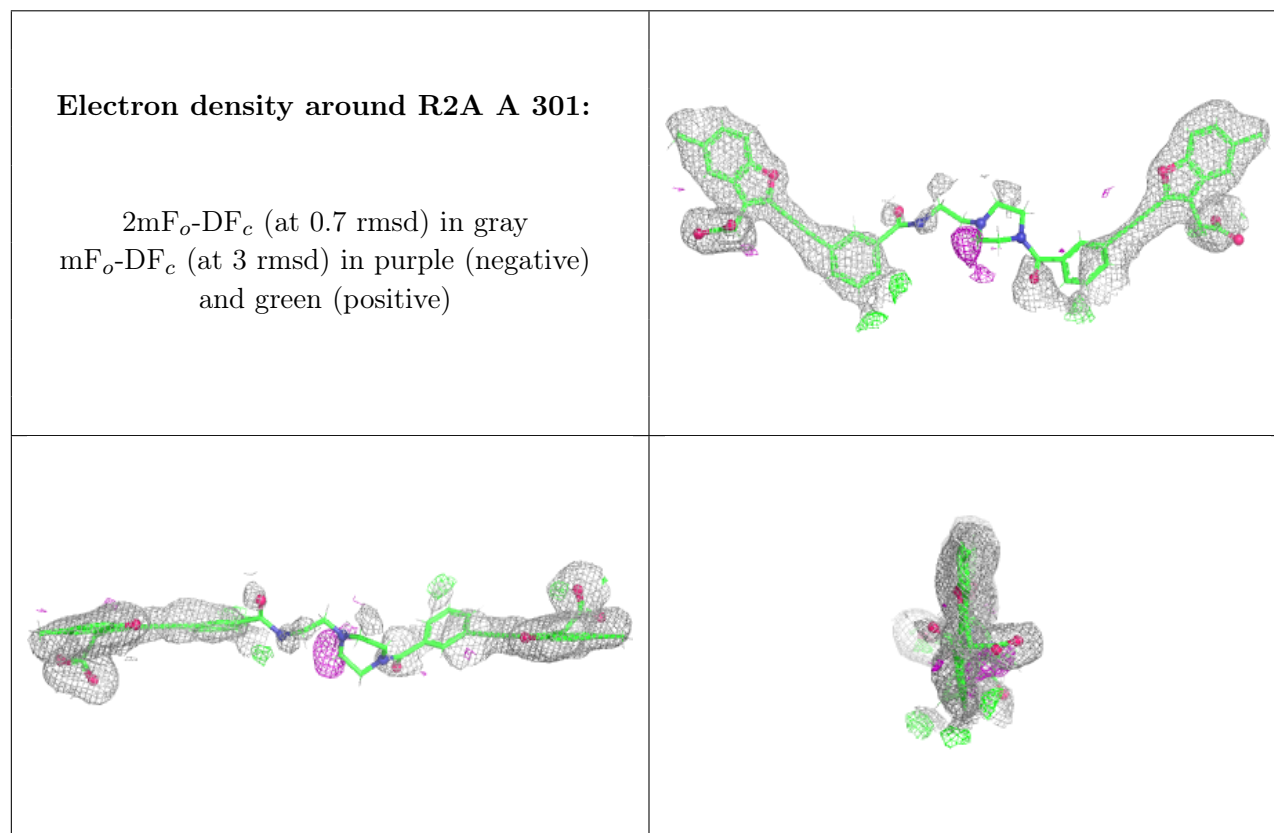
There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q< 0.9’ lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
4	SO4	A	305	5/5	0.97	0.07	45,53,55,76	0
4	SO4	A	307	5/5	0.97	0.09	65,76,79,83	0
4	SO4	B	304	5/5	0.97	0.06	49,62,67,75	0
4	SO4	B	305	5/5	0.97	0.10	60,63,77,109	0
4	SO4	A	306	5/5	0.98	0.04	46,47,54,57	0
2	R2A	A	301	57/57	0.98	0.08	19,42,127,137	0
4	SO4	B	306	5/5	0.98	0.05	45,50,54,56	0
3	IOD	A	303	1/1	0.99	0.05	42,42,42,42	0
3	IOD	A	304	1/1	0.99	0.09	75,75,75,75	0
3	IOD	B	301	1/1	0.99	0.07	66,66,66,66	0
3	IOD	B	303	1/1	0.99	0.05	44,44,44,44	0
3	IOD	A	302	1/1	0.99	0.08	62,62,62,62	0
4	SO4	B	307	5/5	0.99	0.07	29,79,85,89	0
3	IOD	B	302	1/1	1.00	0.03	32,32,32,32	1

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.