



# Full wwPDB X-ray Structure Validation Report ⓘ

Nov 17, 2024 – 04:03 AM EST

PDB ID : 4Q9R  
Title : Crystal structure of an RNA aptamer bound to trifluoroethyl-ligand analog in complex with Fab  
Authors : Huang, H.; Suslov, N.B.; Li, N.-S.; Shelke, S.A.; Evans, M.E.; Koldobskaya, Y.; Rice, P.A.; Piccirilli, J.A.  
Deposited on : 2014-05-01  
Resolution : 3.12 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 : 2022.3.0, CSD as543be (2022)  
Xtriage (Phenix) : 1.20.1  
EDS : 3.0  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)  
CCP4 : 9.0.003 (Gargrove)  
Density-Fitness : 1.0.11  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.39

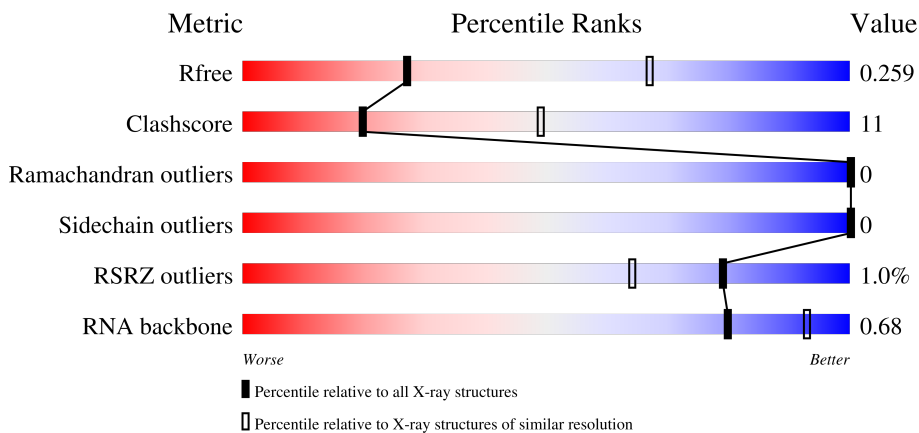
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

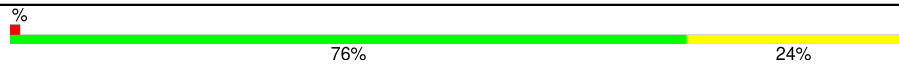


The reported resolution of this entry is 3.12 Å.

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))
$R_{free}$	164625	1668 (3.14-3.10)
Clashscore	180529	1788 (3.14-3.10)
Ramachandran outliers	177936	1696 (3.14-3.10)
Sidechain outliers	177891	1696 (3.14-3.10)
RSRZ outliers	164620	1668 (3.14-3.10)
RNA backbone	3690	1012 (3.38-2.86)

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  $\geq 3$ , 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	H	223	 76% 24%
2	L	214	 76% 24%
3	R	84	 4% 62% 30% 8%

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:

<b>Mol</b>	<b>Type</b>	<b>Chain</b>	<b>Res</b>	<b>Chirality</b>	<b>Geometry</b>	<b>Clashes</b>	<b>Electron density</b>
5	2ZY	R	102	-	X	-	-

## 2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 5174 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 Fab BL3-6, HEAVY CHAIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	H	223	1666	1049	285	327	5	0	0	0

- Molecule 2 is a protein called Fab BL3-6, LIGHT CHAIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	L	214	1637	1022	274	336	5	0	0	0

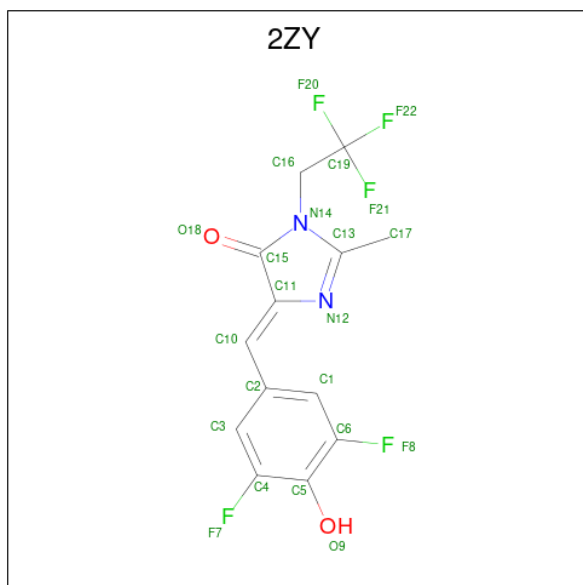
- Molecule 3 is a RNA chain called Spinach RNA aptamer.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
3	R	84	1815	806	337	587	85	0	0	0

- Molecule 4 is POTASSIUM ION (three-letter code: K) (formula: K).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	R	1	Total K 1 1	0	0

- Molecule 5 is (5Z)-5-(3,5-difluoro-4-hydroxybenzylidene)-2-methyl-3-(2,2,2-trifluoroethyl)-3,5-dihydro-4H-imidazol-4-one (three-letter code: 2ZY) (formula: C<sub>13</sub>H<sub>9</sub>F<sub>5</sub>N<sub>2</sub>O<sub>2</sub>).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	F	N	O		
5	R	1	22	13	5	2	2	0	0

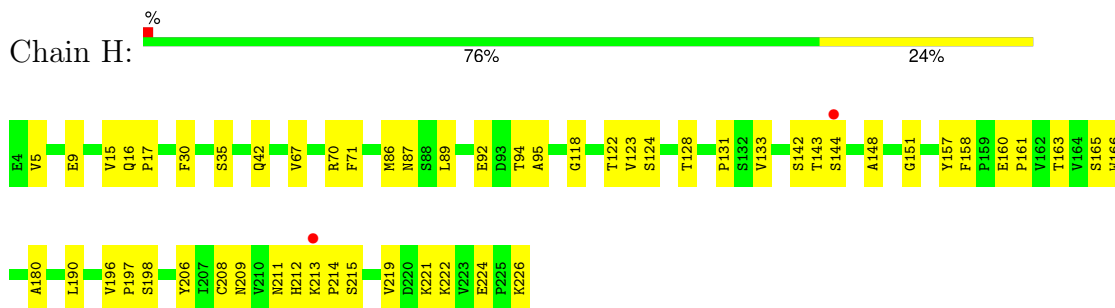
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	H	11	Total	O	0	0
			11	11		
6	L	14	Total	O	0	0
			14	14		
6	R	8	Total	O	0	0
			8	8		

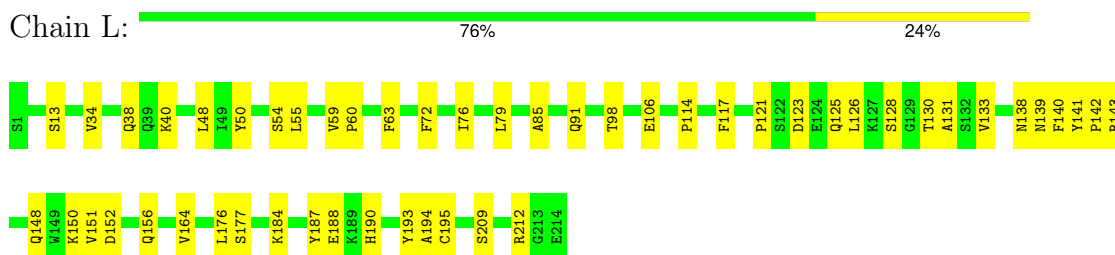
### 3 Residue-property plots [i](#)

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.

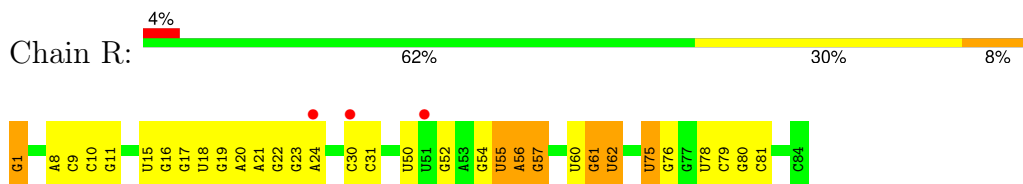
- Molecule 1: Fab BL3-6, HEAVY CHAIN



- Molecule 2: Fab BL3-6, LIGHT CHAIN



- Molecule 3: Spinach RNA aptamer



## 4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	147.51Å 78.99Å 94.36Å 90.00° 112.42° 90.00°	Depositor
Resolution (Å)	67.68 – 3.12 67.68 – 3.12	Depositor EDS
% Data completeness (in resolution range)	98.1 (67.68-3.12) 87.0 (67.68-3.12)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.45 (at 3.13Å)	Xtrriage
Refinement program	PHENIX (phenix.refine: 1.9_1678)	Depositor
R, $R_{free}$	0.203 , 0.253 0.216 , 0.259	Depositor DCC
$R_{free}$ test set	882 reflections (4.97%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	55.9	Xtrriage
Anisotropy	0.516	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.33 , 75.5	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.47$ , $\langle L^2 \rangle = 0.30$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.92	EDS
Total number of atoms	5174	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	87.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.31% 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: K, GDP, 2ZY

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	H	0.26	0/1707	0.41	0/2323
2	L	0.24	0/1672	0.42	0/2269
3	R	0.17	0/2001	0.67	0/3121
All	All	0.23	0/5380	0.53	0/7713

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	H	1666	0	1628	43	0
2	L	1637	0	1590	35	0
3	R	1815	0	910	27	0
4	R	1	0	0	0	0
5	R	22	0	8	0	0
6	H	11	0	0	1	0
6	L	14	0	0	0	0
6	R	8	0	0	0	0
All	All	5174	0	4136	102	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 11.

All (102) 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)
3:R:56:A:H3'	3:R:57:G:H4'	1.36	1.05
1:H:131:PRO:HB3	1:H:157:TYR:HB3	1.53	0.89
2:L:194:ALA:HA	2:L:209:SER:OG	1.75	0.86
1:H:86:MET:HB3	1:H:89:LEU:HD21	1.63	0.81
3:R:22:G:H1'	3:R:23:G:C8	2.16	0.81
1:H:211:ASN:HD21	1:H:213:LYS:HE3	1.54	0.73
3:R:15:U:H2'	3:R:16:G:H8	1.55	0.72
3:R:15:U:H2'	3:R:16:G:C8	2.24	0.72
2:L:121:PRO:HD3	2:L:133:VAL:HG22	1.73	0.69
2:L:38:GLN:HB2	2:L:48:LEU:HD11	1.75	0.69
3:R:56:A:H3'	3:R:57:G:C4'	2.17	0.68
1:H:196:VAL:HB	1:H:197:PRO:HD2	1.79	0.65
1:H:211:ASN:ND2	1:H:213:LYS:HE3	2.14	0.61
1:H:144:SER:HB3	2:L:117:PHE:CE2	2.35	0.61
2:L:76:ILE:HG21	2:L:79:LEU:HD23	1.84	0.60
3:R:75:U:C2'	3:R:76:G:H5'	2.32	0.59
2:L:151:VAL:HG13	2:L:156:GLN:NE2	2.17	0.59
3:R:75:U:H2'	3:R:76:G:H5'	1.82	0.58
2:L:152:ASP:OD2	2:L:190:HIS:HB3	2.03	0.58
3:R:52:G:H4'	3:R:52:G:OP2	2.03	0.58
3:R:54:G:H3'	3:R:54:G:N3	2.18	0.58
1:H:67:VAL:HB	1:H:71:PHE:CD2	2.41	0.56
1:H:211:ASN:OD1	1:H:213:LYS:HE3	2.07	0.55
2:L:60:PRO:HG2	2:L:63:PHE:CD2	2.42	0.55
1:H:131:PRO:CB	1:H:157:TYR:HB3	2.32	0.54
1:H:86:MET:CB	1:H:89:LEU:HD21	2.36	0.54
2:L:176:LEU:HD23	2:L:177:SER:N	2.22	0.54
2:L:143:ARG:CZ	2:L:164:VAL:HG11	2.38	0.54
1:H:165:SER:OG	1:H:209:ASN:HB2	2.08	0.53
1:H:15:VAL:HG11	1:H:89:LEU:CD1	2.39	0.53
2:L:114:PRO:HB3	2:L:140:PHE:HB3	1.89	0.53
1:H:144:SER:HB3	2:L:117:PHE:CZ	2.44	0.52
3:R:61:G:H3'	3:R:61:G:N3	2.24	0.52
1:H:5:VAL:HG13	1:H:30:PHE:CD1	2.45	0.52
1:H:94:THR:HG23	1:H:122:THR:HA	1.92	0.52
2:L:150:LYS:HB2	2:L:194:ALA:HB3	1.92	0.51
2:L:60:PRO:HG2	2:L:63:PHE:CE2	2.46	0.50
1:H:70:ARG:HB3	1:H:87:ASN:O	2.11	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:H:160:GLU:OE2	1:H:161:PRO:HA	2.11	0.50
2:L:138:ASN:ND2	2:L:139:ASN:OD1	2.45	0.49
1:H:163:THR:OG1	1:H:211:ASN:HB3	2.12	0.49
1:H:219:VAL:HG11	1:H:221:LYS:HE3	1.93	0.49
2:L:141:TYR:CG	2:L:142:PRO:HA	2.48	0.48
1:H:15:VAL:HG11	1:H:89:LEU:HD13	1.95	0.48
3:R:30:C:O2'	3:R:31:C:H5'	2.14	0.48
3:R:61:G:N3	3:R:62:U:H4'	2.28	0.48
1:H:9:GLU:CD	1:H:118:GLY:H	2.17	0.48
2:L:34:VAL:HG21	2:L:72:PHE:CE2	2.49	0.48
3:R:78:U:H2'	3:R:79:C:C6	2.49	0.48
2:L:188:GLU:OE1	2:L:212:ARG:NH1	2.46	0.48
3:R:80:G:H2'	3:R:81:C:C6	2.49	0.48
1:H:42:GLN:C	1:H:95:ALA:HB1	2.34	0.48
2:L:126:LEU:O	2:L:184:LYS:HD2	2.13	0.47
3:R:19:G:HO2'	3:R:20:A:H8	1.62	0.47
1:H:128:THR:HA	1:H:158:PHE:O	2.14	0.47
2:L:126:LEU:CD2	2:L:131:ALA:HB2	2.44	0.47
3:R:10:C:H2'	3:R:11:G:O4'	2.15	0.47
1:H:166:TRP:CH2	1:H:208:CYS:HB3	2.49	0.47
3:R:21:A:OP2	3:R:55:U:O2'	2.31	0.46
1:H:190:LEU:C	1:H:190:LEU:HD12	2.36	0.46
1:H:148:ALA:HB2	1:H:198:SER:HB3	1.97	0.46
3:R:17:G:O2'	3:R:18:U:H5'	2.16	0.45
2:L:13:SER:HA	2:L:106:GLU:O	2.17	0.45
3:R:22:G:H4'	3:R:23:G:OP1	2.16	0.45
3:R:76:G:H8	3:R:76:G:OP2	1.99	0.45
3:R:50:U:H4'	3:R:52:G:H5''	1.98	0.45
1:H:151:GLY:HA2	1:H:166:TRP:CZ2	2.51	0.45
3:R:56:A:H3'	3:R:57:G:C5'	2.44	0.45
1:H:151:GLY:HA2	1:H:166:TRP:CH2	2.52	0.45
1:H:219:VAL:CG1	1:H:221:LYS:HE2	2.46	0.45
2:L:34:VAL:HG21	2:L:72:PHE:CZ	2.52	0.44
3:R:50:U:C4'	3:R:52:G:H5''	2.47	0.44
2:L:55:LEU:HD11	2:L:59:VAL:CG1	2.47	0.44
2:L:148:GLN:O	2:L:195:CYS:HA	2.17	0.44
2:L:55:LEU:HD11	2:L:59:VAL:HG12	2.00	0.43
1:H:16:GLN:HB3	1:H:17:PRO:HD2	2.00	0.43
3:R:23:G:H4'	3:R:24:A:H5''	2.00	0.43
1:H:211:ASN:CG	1:H:213:LYS:HE3	2.39	0.43
1:H:180:ALA:HA	1:H:190:LEU:HB3	1.99	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:R:8:A:H2'	3:R:9:C:C6	2.54	0.42
3:R:22:G:OP2	3:R:55:U:H5''	2.19	0.42
1:H:35:SER:O	6:H:301:HOH:O	2.22	0.42
2:L:40:LYS:HG2	2:L:85:ALA:HB2	2.01	0.42
2:L:151:VAL:HG22	2:L:151:VAL:O	2.18	0.42
1:H:16:GLN:HA	1:H:124:SER:O	2.20	0.42
1:H:213:LYS:N	1:H:214:PRO:CD	2.82	0.42
2:L:50:TYR:CZ	2:L:54:SER:HB3	2.54	0.42
1:H:196:VAL:HG11	1:H:206:TYR:CE1	2.55	0.41
1:H:92:GLU:OE1	1:H:92:GLU:N	2.52	0.41
2:L:91:GLN:HG3	2:L:98:THR:HB	2.02	0.41
2:L:125:GLN:HG2	2:L:130:THR:O	2.20	0.41
1:H:133:VAL:CG1	1:H:221:LYS:HG3	2.50	0.41
3:R:79:C:H2'	3:R:80:G:C8	2.55	0.41
1:H:226:LYS:HE3	2:L:123:ASP:OD2	2.21	0.41
1:H:222:LYS:HE2	1:H:224:GLU:HG3	2.02	0.41
1:H:212:HIS:CE1	1:H:215:SER:HG	2.29	0.41
2:L:125:GLN:O	2:L:128:SER:HB2	2.21	0.41
2:L:176:LEU:HD23	2:L:176:LEU:C	2.41	0.41
2:L:141:TYR:CD1	2:L:142:PRO:HA	2.55	0.40
1:H:15:VAL:O	1:H:123:VAL:HA	2.22	0.40
2:L:187:TYR:O	2:L:193:TYR:OH	2.37	0.40
1:H:142:SER:OG	1:H:143:THR:N	2.46	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	H	221/223 (99%)	210 (95%)	11 (5%)	0	100	100
2	L	212/214 (99%)	203 (96%)	9 (4%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
All	All	433/437 (99%)	413 (95%)	20 (5%)	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	H	184/184 (100%)	184 (100%)	0	100	100
2	L	189/189 (100%)	189 (100%)	0	100	100
All	All	373/373 (100%)	373 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

### 5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
3	R	83/84 (98%)	7 (8%)	1 (1%)

All (7) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
3	R	55	U
3	R	56	A
3	R	57	G
3	R	60	U
3	R	61	G
3	R	62	U
3	R	75	U

All (1) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
3	R	1	GDP

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

1 non-standard protein/DNA/RNA residue 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	GDP	R	1	3	25,30,30	1.01	1 (4%)	30,47,47	1.07	1 (3%)

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	GDP	R	1	3	-	3/12/32/32	0/3/3/3

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	R	1	GDP	C6-N1	-2.25	1.34	1.37

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	R	1	GDP	C8-N7-C5	2.88	107.45	102.55

There are no chirality outliers.

All (3) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	R	1	GDP	C3'-C4'-C5'-O5'
3	R	1	GDP	C5'-O5'-PA-O3A

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Mol	Chain	Res	Type	Atoms
3	R	1	GDP	O4'-C4'-C5'-O5'

There are no ring outliers.

No monomer is involved in short contacts.

## 5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 2 ligands modelled in this entry, 1 is monoatomic - leaving 1 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
5	2ZY	R	102	-	23,23,23	5.20	11 (47%)	35,35,35	7.27	20 (57%)

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
5	2ZY	R	102	-	-	5/9/25/25	0/2/2/2

All (11) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	R	102	2ZY	C10-C11	16.72	1.51	1.35
5	R	102	2ZY	C5-C6	9.04	1.49	1.39
5	R	102	2ZY	C13-N12	8.40	1.43	1.32
5	R	102	2ZY	C5-C4	6.42	1.46	1.39

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	R	102	2ZY	C11-C15	6.35	1.55	1.48
5	R	102	2ZY	C16-C19	-6.32	1.39	1.50
5	R	102	2ZY	C16-N14	5.18	1.53	1.46
5	R	102	2ZY	C3-C2	-3.32	1.34	1.39
5	R	102	2ZY	O18-C15	3.26	1.29	1.23
5	R	102	2ZY	C13-N14	2.10	1.40	1.37
5	R	102	2ZY	O9-C5	-2.07	1.32	1.36

All (20) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	R	102	2ZY	C15-N14-C13	-16.70	100.34	108.07
5	R	102	2ZY	C10-C11-N12	13.91	147.64	128.76
5	R	102	2ZY	C16-N14-C13	13.80	139.66	127.34
5	R	102	2ZY	C11-C15-N14	13.79	115.08	103.50
5	R	102	2ZY	C2-C10-C11	12.39	144.59	129.87
5	R	102	2ZY	C15-C11-N12	-11.26	100.88	108.95
5	R	102	2ZY	C17-C13-N14	-10.88	110.57	123.73
5	R	102	2ZY	O18-C15-C11	-10.55	124.29	131.02
5	R	102	2ZY	F7-C4-C5	9.99	124.34	117.13
5	R	102	2ZY	C10-C11-C15	-8.98	111.47	122.36
5	R	102	2ZY	C17-C13-N12	8.84	134.00	124.96
5	R	102	2ZY	C3-C4-C5	-8.12	117.43	123.79
5	R	102	2ZY	C3-C2-C1	6.08	127.38	119.11
5	R	102	2ZY	C2-C1-C6	-5.25	115.19	119.27
5	R	102	2ZY	C1-C6-C5	-4.88	119.97	123.79
5	R	102	2ZY	C3-C2-C10	-4.38	104.78	120.79
5	R	102	2ZY	C11-N12-C13	3.10	108.27	105.80
5	R	102	2ZY	F8-C6-C5	3.00	119.29	117.13
5	R	102	2ZY	C2-C3-C4	2.81	121.46	119.27
5	R	102	2ZY	C16-N14-C15	-2.57	119.98	123.82

There are no chirality outliers.

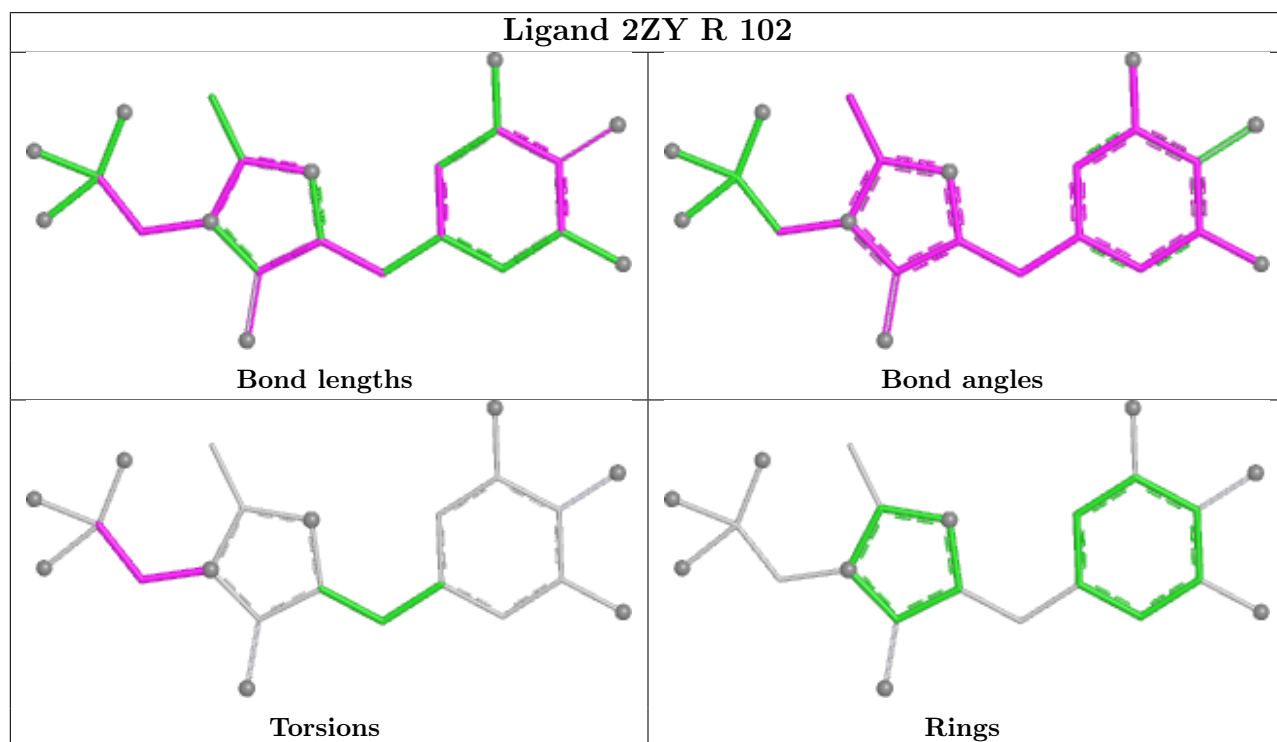
All (5) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	R	102	2ZY	C19-C16-N14-C15
5	R	102	2ZY	C19-C16-N14-C13
5	R	102	2ZY	N14-C16-C19-F20
5	R	102	2ZY	N14-C16-C19-F21
5	R	102	2ZY	N14-C16-C19-F22

There are no ring outliers.

No monomer is involved in short contacts.

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, 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	H	223/223 (100%)	0.09	2 (0%) 81 66	41, 67, 110, 165	0
2	L	214/214 (100%)	-0.13	0 100 100	39, 64, 91, 124	0
3	R	83/84 (98%)	0.69	3 (3%) 46 29	56, 118, 171, 232	0
All	All	520/521 (99%)	0.09	5 (0%) 79 64	39, 68, 146, 232	0

All (5) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	R	24	A	2.9
3	R	51	U	2.5
1	H	144	SER	2.3
1	H	213	LYS	2.2
3	R	30	C	2.0

### 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, 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(Å <sup>2</sup> )	Q<0.9
3	GDP	R	1	28/28	0.62	0.13	146,164,180,219	0

### 6.3 Carbohydrates [i](#)

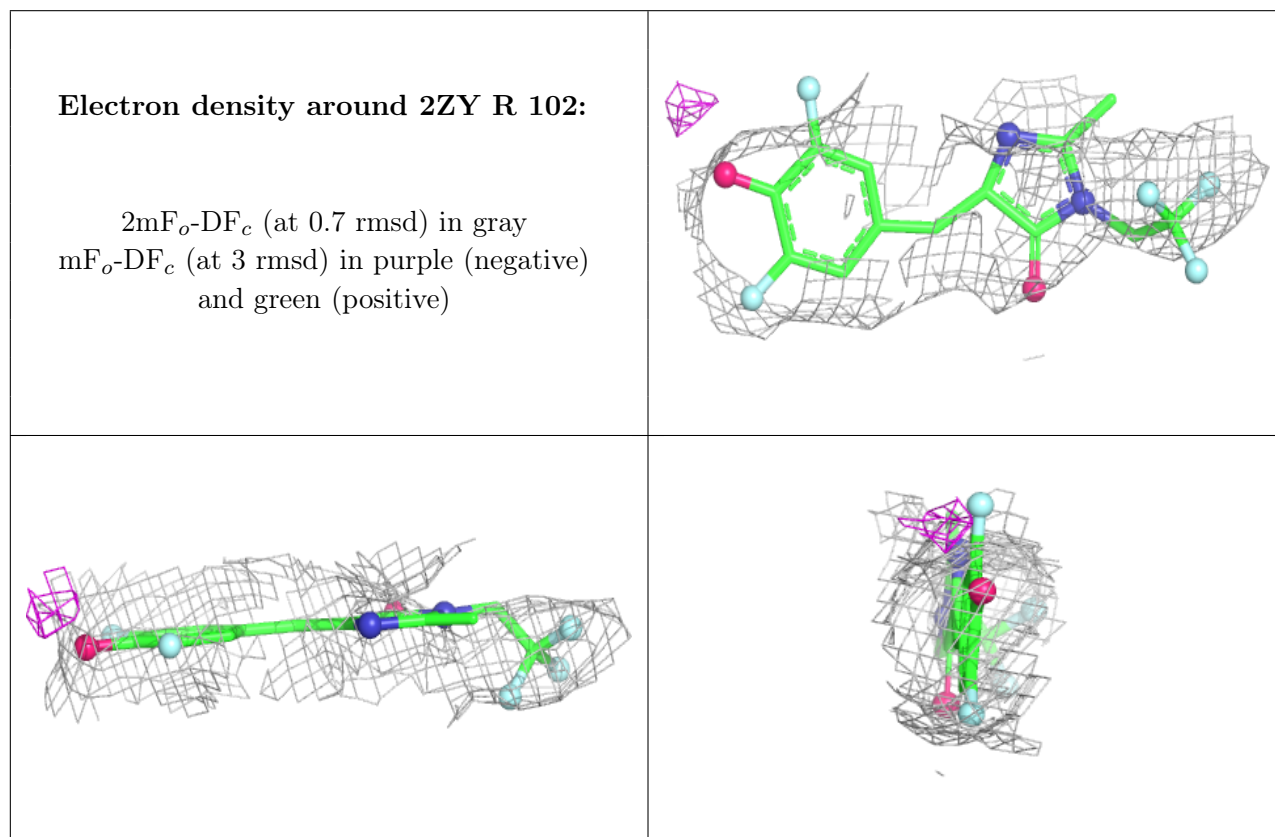
There are no monosaccharides in this entry.

## 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(Å <sup>2</sup> )	Q<0.9
4	K	R	101	1/1	0.75	0.10	151,151,151,151	0
5	2ZY	R	102	22/22	0.84	0.15	129,157,170,177	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.