



# Full wwPDB X-ray Structure Validation Report ⓘ

Oct 11, 2021 – 01:17 AM EDT

PDB ID : 3BR6  
Title : Crystal Structure of the Complex of Rhodamine 6G Bound to QacR(E120Q),  
a Mutant of a Multidrug Binding Transcriptional Repressor  
Authors : Brooks, B.E.  
Deposited on : 2007-12-20  
Resolution : 3.20 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.

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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)  
Xtriage (Phenix) : 1.13  
EDS : 2.23.2  
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) : 2.23.2

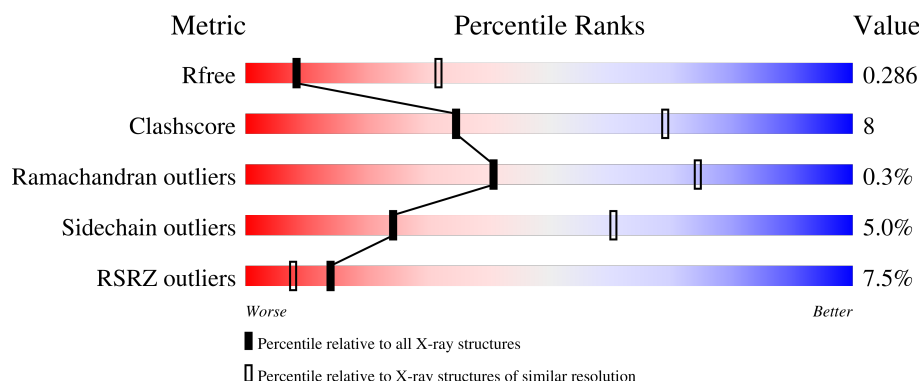
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.20 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	1133 (3.20-3.20)
Clashscore	141614	1253 (3.20-3.20)
Ramachandran outliers	138981	1234 (3.20-3.20)
Sidechain outliers	138945	1233 (3.20-3.20)
RSRZ outliers	127900	1095 (3.20-3.20)

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	194	<div> <div>5%</div> <div> <div>78%</div> <div>15%</div> <div>• 5%</div> </div> </div>
1	B	194	<div> <div>10%</div> <div> <div>77%</div> <div>13%</div> <div>• 7%</div> </div> </div>
1	D	194	<div> <div>4%</div> <div> <div>76%</div> <div>18%</div> <div>• •</div> </div> </div>
1	E	194	<div> <div>10%</div> <div> <div>81%</div> <div>13%</div> <div>• 5%</div> </div> </div>

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
2	SO4	A	501	-	-	-	X
2	SO4	A	502	-	-	-	X
2	SO4	A	503	-	-	-	X
2	SO4	A	504	-	-	-	X
2	SO4	A	512	-	-	-	X
2	SO4	A	513	-	-	-	X
2	SO4	D	507	-	-	-	X
2	SO4	D	508	-	-	-	X
2	SO4	D	509	-	-	-	X
2	SO4	D	510	-	-	-	X
2	SO4	D	512	-	-	-	X
2	SO4	D	513	-	-	-	X
2	SO4	E	500	-	-	-	X
2	SO4	E	513	-	-	-	X
2	SO4	E	514	-	-	-	X
2	SO4	E	515	-	-	-	X
3	RHQ	A	201	-	-	-	X

## 2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 5949 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 HTH-type transcriptional regulator qacR.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	B	181	Total	C	N	O	S	0	0	0
			1389	892	226	269	2			
1	D	186	Total	C	N	O	S	0	0	0
			1437	921	239	276	1			
1	A	185	Total	C	N	O	S	0	1	0
			1522	982	247	291	2			
1	E	185	Total	C	N	O	S	0	0	0
			1470	948	238	282	2			

There are 40 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	67	SER	LYS	engineered mutation	UNP P0A0N3
B	72	ALA	CYS	engineered mutation	UNP P0A0N3
B	120	GLN	GLU	engineered mutation	UNP P0A0N3
B	141	SER	CYS	engineered mutation	UNP P0A0N3
B	189	HIS	-	expression tag	UNP P0A0N3
B	190	HIS	-	expression tag	UNP P0A0N3
B	191	HIS	-	expression tag	UNP P0A0N3
B	192	HIS	-	expression tag	UNP P0A0N3
B	193	HIS	-	expression tag	UNP P0A0N3
B	194	HIS	-	expression tag	UNP P0A0N3
D	67	SER	LYS	engineered mutation	UNP P0A0N3
D	72	ALA	CYS	engineered mutation	UNP P0A0N3
D	120	GLN	GLU	engineered mutation	UNP P0A0N3
D	141	SER	CYS	engineered mutation	UNP P0A0N3
D	189	HIS	-	expression tag	UNP P0A0N3
D	190	HIS	-	expression tag	UNP P0A0N3
D	191	HIS	-	expression tag	UNP P0A0N3
D	192	HIS	-	expression tag	UNP P0A0N3
D	193	HIS	-	expression tag	UNP P0A0N3
D	194	HIS	-	expression tag	UNP P0A0N3
A	67	SER	LYS	engineered mutation	UNP P0A0N3

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Chain	Residue	Modelled	Actual	Comment	Reference
A	72	ALA	CYS	engineered mutation	UNP P0A0N3
A	120	GLN	GLU	engineered mutation	UNP P0A0N3
A	141	SER	CYS	engineered mutation	UNP P0A0N3
A	189	HIS	-	expression tag	UNP P0A0N3
A	190	HIS	-	expression tag	UNP P0A0N3
A	191	HIS	-	expression tag	UNP P0A0N3
A	192	HIS	-	expression tag	UNP P0A0N3
A	193	HIS	-	expression tag	UNP P0A0N3
A	194	HIS	-	expression tag	UNP P0A0N3
E	67	SER	LYS	engineered mutation	UNP P0A0N3
E	72	ALA	CYS	engineered mutation	UNP P0A0N3
E	120	GLN	GLU	engineered mutation	UNP P0A0N3
E	141	SER	CYS	engineered mutation	UNP P0A0N3
E	189	HIS	-	expression tag	UNP P0A0N3
E	190	HIS	-	expression tag	UNP P0A0N3
E	191	HIS	-	expression tag	UNP P0A0N3
E	192	HIS	-	expression tag	UNP P0A0N3
E	193	HIS	-	expression tag	UNP P0A0N3
E	194	HIS	-	expression tag	UNP P0A0N3

- Molecule 2 is SULFATE ION (three-letter code: SO4) (formula: O<sub>4</sub>S).



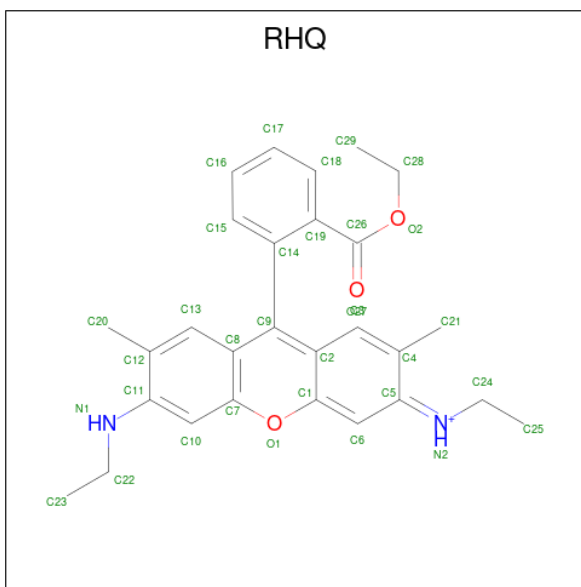
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	D	1	Total	O	S	0	0
			5	4	1		
2	D	1	Total	O	S	0	0
			5	4	1		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	D	1	Total	O	S	0	0
			5	4	1		
2	D	1	Total	O	S	0	0
			5	4	1		
2	D	1	Total	O	S	0	0
			5	4	1		
2	D	1	Total	O	S	0	0
			5	4	1		
2	D	1	Total	O	S	0	0
			5	4	1		
2	A	1	Total	O	S	0	0
			5	4	1		
2	A	1	Total	O	S	0	0
			5	4	1		
2	A	1	Total	O	S	0	0
			5	4	1		
2	A	1	Total	O	S	0	0
			5	4	1		
2	A	1	Total	O	S	0	0
			5	4	1		
2	E	1	Total	O	S	0	0
			5	4	1		
2	E	1	Total	O	S	0	0
			5	4	1		
2	E	1	Total	O	S	0	0
			5	4	1		
2	E	1	Total	O	S	0	0
			5	4	1		
2	E	1	Total	O	S	0	0
			5	4	1		

- Molecule 3 is RHODAMINE 6G (three-letter code: RHQ) (formula:  $C_{28}H_{31}N_2O_3$ ).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	O	0	0
			33	28	2	3		

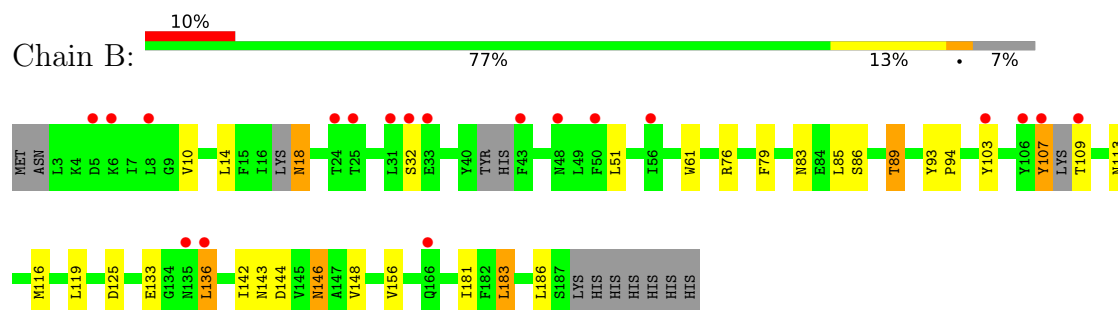
- Molecule 4 is water.

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

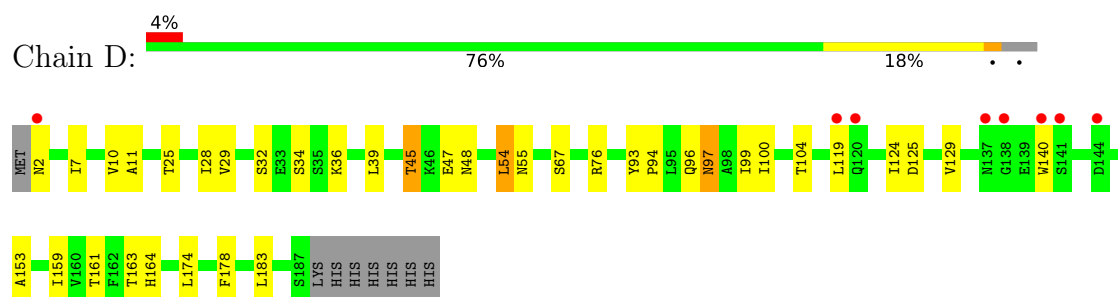
### 3 Residue-property plots [i](#)

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.

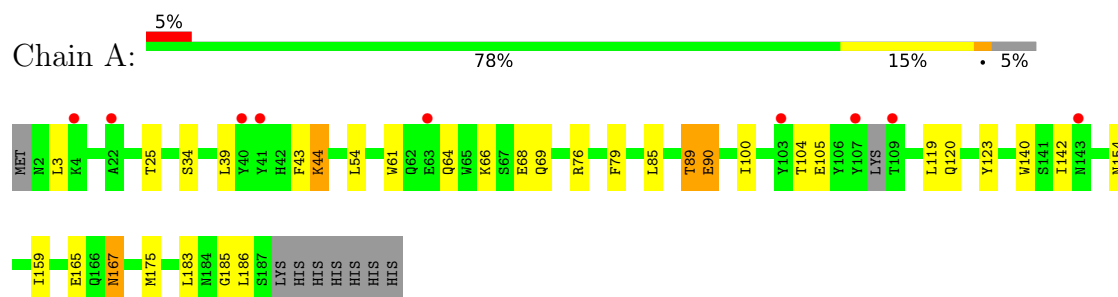
- Molecule 1: HTH-type transcriptional regulator qacR



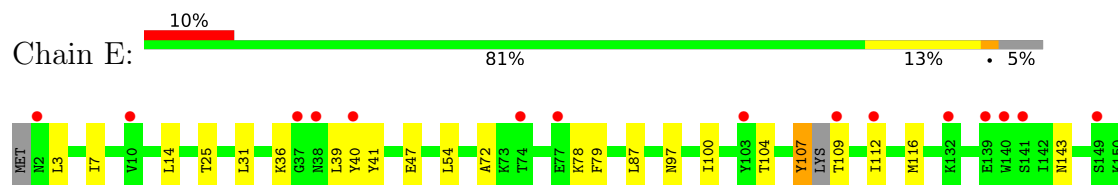
- Molecule 1: HTH-type transcriptional regulator qacR



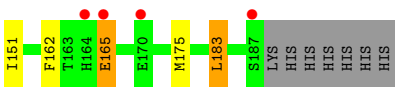
- Molecule 1: HTH-type transcriptional regulator qacR



- Molecule 1: HTH-type transcriptional regulator qacR







## 4 Data and refinement statistics

Property	Value	Source
Space group	P 42 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	173.10Å 173.10Å 95.58Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.00 – 3.20 47.50 – 3.20	Depositor EDS
% Data completeness (in resolution range)	93.3 (48.00-3.20) 93.3 (47.50-3.20)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.06	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.36 (at 3.19Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, $R_{free}$	0.229 , 0.283 0.228 , 0.286	Depositor DCC
$R_{free}$ test set	1152 reflections (5.04%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	98.2	Xtriage
Anisotropy	0.292	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.32 , 145.9	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.51$ , $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.92	EDS
Total number of atoms	5949	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	123.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.67% 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: SO4, RHQ

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	0.40	0/1555	0.49	0/2098
1	B	0.35	0/1414	0.49	0/1918
1	D	0.38	0/1466	0.47	0/1996
1	E	0.36	0/1499	0.45	0/2031
All	All	0.37	0/5934	0.48	0/8043

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	1522	0	1485	24	0
1	B	1389	0	1248	20	0
1	D	1437	0	1318	31	0
1	E	1470	0	1382	23	0
2	A	30	0	0	0	0
2	D	35	0	0	2	0
2	E	30	0	0	0	0
3	A	33	0	31	14	0
4	A	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	B	1	0	0	0	0
4	D	1	0	0	0	0
All	All	5949	0	5464	95	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 8.

All (95) 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:D:159:ILE:O	1:D:163:THR:HG22	1.53	1.08
3:A:201:RHQ:H202	3:A:201:RHQ:H232	1.54	0.89
1:E:109:THR:HG21	1:E:112:ILE:HD13	1.55	0.86
1:D:159:ILE:O	1:D:163:THR:CG2	2.30	0.80
3:A:201:RHQ:C24	3:A:201:RHQ:H211	2.11	0.80
1:B:142:ILE:HD11	1:B:186:LEU:HD13	1.62	0.79
1:B:61:TRP:CE3	1:B:89:THR:HG21	2.19	0.77
1:D:97:ASN:ND2	1:E:100:ILE:HD12	2.03	0.74
3:A:201:RHQ:H211	3:A:201:RHQ:H242	1.71	0.70
1:A:89:THR:HG22	1:A:90:GLU:N	2.06	0.68
1:B:79:PHE:CD2	1:B:183:LEU:HD12	2.29	0.68
1:D:100:ILE:HD11	1:E:162:PHE:CE2	2.28	0.68
1:B:18:ASN:HD22	1:B:18:ASN:N	1.92	0.67
1:D:45:THR:HG23	1:D:48:ASN:HB2	1.80	0.64
1:D:29:VAL:HG23	1:D:39:LEU:HD12	1.84	0.60
1:B:51:LEU:HD11	1:B:116:MET:HB3	1.82	0.60
1:D:54:LEU:HD11	1:D:99:ILE:HD12	1.84	0.60
1:D:100:ILE:O	1:D:104:THR:HG23	2.02	0.59
1:D:97:ASN:HD21	1:E:100:ILE:HD12	1.67	0.59
1:B:61:TRP:HE3	1:B:89:THR:HG21	1.64	0.58
1:A:64:GLN:OE1	3:A:201:RHQ:H242	2.04	0.57
1:D:10:VAL:HG21	1:D:32:SER:HB3	1.88	0.56
1:A:79:PHE:CD2	1:A:183:LEU:HD13	2.42	0.55
1:D:178:PHE:HB2	1:E:151:ILE:HD12	1.89	0.55
3:A:201:RHQ:H202	3:A:201:RHQ:C23	2.32	0.54
1:D:76:ARG:HG3	1:D:183:LEU:HD13	1.89	0.54
1:A:54:LEU:HB3	1:A:119:LEU:HD21	1.90	0.53
1:B:18:ASN:N	1:B:18:ASN:ND2	2.56	0.53
1:D:164:HIS:NE2	1:E:104:THR:HG21	2.23	0.53
1:D:125:ASP:O	1:D:129:VAL:HG23	2.09	0.52
1:A:61:TRP:HB2	3:A:201:RHQ:H213	1.91	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:11:ALA:HA	1:D:28:ILE:HD13	1.91	0.52
1:A:64:GLN:NE2	3:A:201:RHQ:H251	2.25	0.51
1:D:96:GLN:HG3	1:D:161:THR:HG21	1.93	0.51
1:B:76:ARG:HE	1:B:183:LEU:HD22	1.75	0.51
1:A:66:LYS:HA	1:A:69:GLN:HE21	1.76	0.51
1:E:54:LEU:HD23	1:E:116:MET:HE3	1.93	0.51
1:E:72:ALA:HB3	1:E:78:LYS:HG2	1.92	0.50
1:B:107:TYR:HB2	1:B:113:ASN:HD21	1.76	0.50
1:E:39:LEU:C	1:E:39:LEU:HD23	2.32	0.50
1:D:29:VAL:HG21	1:D:36:LYS:HA	1.95	0.49
1:B:51:LEU:HD11	1:B:116:MET:CB	2.41	0.49
1:D:97:ASN:OD1	1:E:97:ASN:ND2	2.46	0.49
1:E:25:THR:HG21	1:E:40:TYR:OH	2.13	0.49
1:D:55:ASN:OD1	1:D:119:LEU:HD21	2.12	0.49
1:E:87:LEU:HD11	1:E:175:MET:HB2	1.95	0.48
1:E:3:LEU:O	1:E:7:ILE:HG12	2.14	0.48
1:A:43:PHE:O	1:A:44:LYS:HB2	2.14	0.48
3:A:201:RHQ:C20	3:A:201:RHQ:C22	2.93	0.47
1:D:93:TYR:N	1:D:94:PRO:CD	2.78	0.47
1:A:167:ASN:HD22	1:A:167:ASN:N	2.12	0.47
3:A:201:RHQ:H203	3:A:201:RHQ:H222	1.97	0.47
1:D:174:LEU:O	1:E:151:ILE:HD11	2.15	0.47
1:E:72:ALA:CB	1:E:78:LYS:HG2	2.45	0.47
1:E:14:LEU:HD11	1:E:31:LEU:HD12	1.97	0.46
1:A:159:ILE:HB	1:A:175:MET:HE1	1.98	0.46
1:D:7:ILE:HD11	1:D:34:SER:CB	2.45	0.46
1:A:100:ILE:O	1:A:104:THR:HG23	2.16	0.46
1:B:93:TYR:N	1:B:94:PRO:CD	2.78	0.46
1:E:25:THR:HG23	1:E:36:LYS:HE2	1.98	0.46
1:A:25:THR:HG23	1:A:39:LEU:CD1	2.47	0.45
1:D:97:ASN:ND2	1:E:100:ILE:CD1	2.76	0.45
1:D:97:ASN:HD21	1:E:100:ILE:CD1	2.29	0.45
1:D:163:THR:HG23	1:D:163:THR:O	2.15	0.45
1:B:107:TYR:O	1:B:109:THR:N	2.49	0.45
1:D:25:THR:N	2:D:507:SO4:O4	2.50	0.45
1:A:68:GLU:HG2	1:A:85:LEU:HD21	1.98	0.45
1:B:133:GLU:HA	1:B:136:LEU:HD22	1.99	0.44
1:A:79:PHE:CE2	1:A:183:LEU:HD13	2.52	0.44
1:B:10:VAL:O	1:B:14:LEU:HD13	2.18	0.44
1:D:124:ILE:HD12	1:D:153:ALA:CB	2.48	0.43
1:B:76:ARG:NE	1:B:183:LEU:HD22	2.33	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:83:ASN:OD1	1:B:156:VAL:HG21	2.17	0.43
3:A:201:RHQ:H211	3:A:201:RHQ:H241	1.95	0.43
1:B:144:ASP:O	1:B:148:VAL:HG23	2.19	0.43
1:D:29:VAL:HG13	1:D:34:SER:C	2.39	0.43
1:A:165:GLU:N	1:A:165:GLU:OE1	2.52	0.43
1:A:25:THR:HG23	1:A:39:LEU:HD13	1.99	0.42
1:A:123:TYR:HA	3:A:201:RHQ:C29	2.48	0.42
1:B:146:ASN:OD1	1:B:146:ASN:N	2.52	0.42
1:A:120:GLN:HE22	1:A:154:ASN:HD21	1.68	0.42
1:A:64:GLN:HE22	3:A:201:RHQ:H251	1.84	0.42
3:A:201:RHQ:C20	3:A:201:RHQ:H222	2.50	0.42
1:B:119:LEU:O	1:B:119:LEU:HD22	2.20	0.41
1:B:181:ILE:HG23	1:A:185:GLY:O	2.20	0.41
1:E:107:TYR:O	1:E:109:THR:N	2.54	0.41
1:D:164:HIS:CE1	1:E:104:THR:HG21	2.55	0.41
1:A:3:LEU:HD11	1:A:34:SER:HB2	2.02	0.41
1:A:61:TRP:CD1	3:A:201:RHQ:H281	2.55	0.41
1:E:79:PHE:CD2	1:E:183:LEU:HD11	2.56	0.41
1:A:76:ARG:HG3	1:A:183:LEU:HD23	2.02	0.40
1:D:29:VAL:CG2	1:D:39:LEU:HD12	2.50	0.40
1:D:163:THR:HA	2:D:513:SO4:O1	2.21	0.40
1:A:142:ILE:HD11	1:A:186:LEU:HD13	2.03	0.40
1:E:143:ASN:OD1	1:E:143:ASN:N	2.53	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	182/194 (94%)	172 (94%)	10 (6%)	0	100	100
1	B	173/194 (89%)	163 (94%)	9 (5%)	1 (1%)	25	64

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	D	184/194 (95%)	177 (96%)	7 (4%)	0	100	100
1	E	181/194 (93%)	167 (92%)	13 (7%)	1 (1%)	25	64
All	All	720/776 (93%)	679 (94%)	39 (5%)	2 (0%)	41	74

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	32	SER
1	E	165	GLU

### 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	163/177 (92%)	157 (96%)	6 (4%)	34	68
1	B	132/177 (75%)	121 (92%)	11 (8%)	11	40
1	D	142/177 (80%)	135 (95%)	7 (5%)	25	61
1	E	149/177 (84%)	144 (97%)	5 (3%)	37	70
All	All	586/708 (83%)	557 (95%)	29 (5%)	24	61

All (29) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	18	ASN
1	B	85	LEU
1	B	86	SER
1	B	89	THR
1	B	103	TYR
1	B	107	TYR
1	B	125	ASP
1	B	136	LEU
1	B	143	ASN
1	B	146	ASN

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Mol	Chain	Res	Type
1	B	183	LEU
1	D	2	ASN
1	D	45	THR
1	D	47	GLU
1	D	54	LEU
1	D	67	SER
1	D	97	ASN
1	D	140	TRP
1	A	44	LYS
1	A	89	THR
1	A	90	GLU
1	A	105	GLU
1	A	140	TRP
1	A	167	ASN
1	E	41	TYR
1	E	47	GLU
1	E	107	TYR
1	E	165	GLU
1	E	183	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (18) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	48	ASN
1	B	69	GLN
1	B	113	ASN
1	D	2	ASN
1	D	96	GLN
1	D	97	ASN
1	D	120	GLN
1	D	137	ASN
1	D	166	GLN
1	A	21	ASN
1	A	69	GLN
1	A	137	ASN
1	A	154	ASN
1	A	167	ASN
1	E	18	ASN
1	E	97	ASN
1	E	154	ASN
1	E	157	ASN



### 5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

There are no non-standard protein/DNA/RNA residues in this entry.

## 5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

## 5.6 Ligand geometry ⓘ

20 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	$\# Z  > 2$
2	SO4	E	514	-	4,4,4	0.13	0	6,6,6	0.09	0
2	SO4	A	513	-	4,4,4	0.12	0	6,6,6	0.14	0
2	SO4	D	511	-	4,4,4	0.12	0	6,6,6	0.13	0
2	SO4	A	502	-	4,4,4	0.15	0	6,6,6	0.10	0
2	SO4	D	508	-	4,4,4	0.13	0	6,6,6	0.11	0
2	SO4	A	512	-	4,4,4	0.16	0	6,6,6	0.09	0
2	SO4	D	509	-	4,4,4	0.15	0	6,6,6	0.05	0
2	SO4	D	513	-	4,4,4	0.13	0	6,6,6	0.13	0
2	SO4	D	512	-	4,4,4	0.14	0	6,6,6	0.06	0
2	SO4	A	503	-	4,4,4	0.14	0	6,6,6	0.08	0
2	SO4	E	515	-	4,4,4	0.12	0	6,6,6	0.19	0
2	SO4	E	500	-	4,4,4	0.14	0	6,6,6	0.08	0
2	SO4	D	510	-	4,4,4	0.15	0	6,6,6	0.10	0
3	RHQ	A	201	-	33,36,36	1.57	3 (9%)	43,51,51	1.69	10 (23%)
2	SO4	D	507	-	4,4,4	0.16	0	6,6,6	0.07	0
2	SO4	E	513	-	4,4,4	0.14	0	6,6,6	0.07	0
2	SO4	A	504	-	4,4,4	0.13	0	6,6,6	0.07	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
2	SO4	E	505	-	4,4,4	0.15	0	6,6,6	0.07	0
2	SO4	E	506	-	4,4,4	0.16	0	6,6,6	0.13	0
2	SO4	A	501	-	4,4,4	0.15	0	6,6,6	0.15	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
3	RHQ	A	201	-	-	4/15/21/21	0/4/4/4

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	201	RHQ	O1-C7	-6.14	1.26	1.36
3	A	201	RHQ	O2-C26	4.63	1.45	1.33
3	A	201	RHQ	C3-C4	2.07	1.40	1.37

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	201	RHQ	C12-C11-N1	5.31	126.12	119.38
3	A	201	RHQ	C10-C11-N1	-3.76	115.66	121.58
3	A	201	RHQ	O2-C26-O27	-3.05	117.47	123.67
3	A	201	RHQ	O2-C26-C19	2.69	117.53	112.21
3	A	201	RHQ	C22-N1-C11	2.66	128.72	123.21
3	A	201	RHQ	C2-C9-C8	-2.56	117.45	119.63
3	A	201	RHQ	C5-C6-C1	2.36	121.70	119.46
3	A	201	RHQ	O1-C7-C10	2.32	118.82	116.11
3	A	201	RHQ	C10-C7-C8	-2.20	120.61	123.05
3	A	201	RHQ	C11-C10-C7	2.03	121.39	119.46

There are no chirality outliers.

All (4) torsion outliers are listed below:

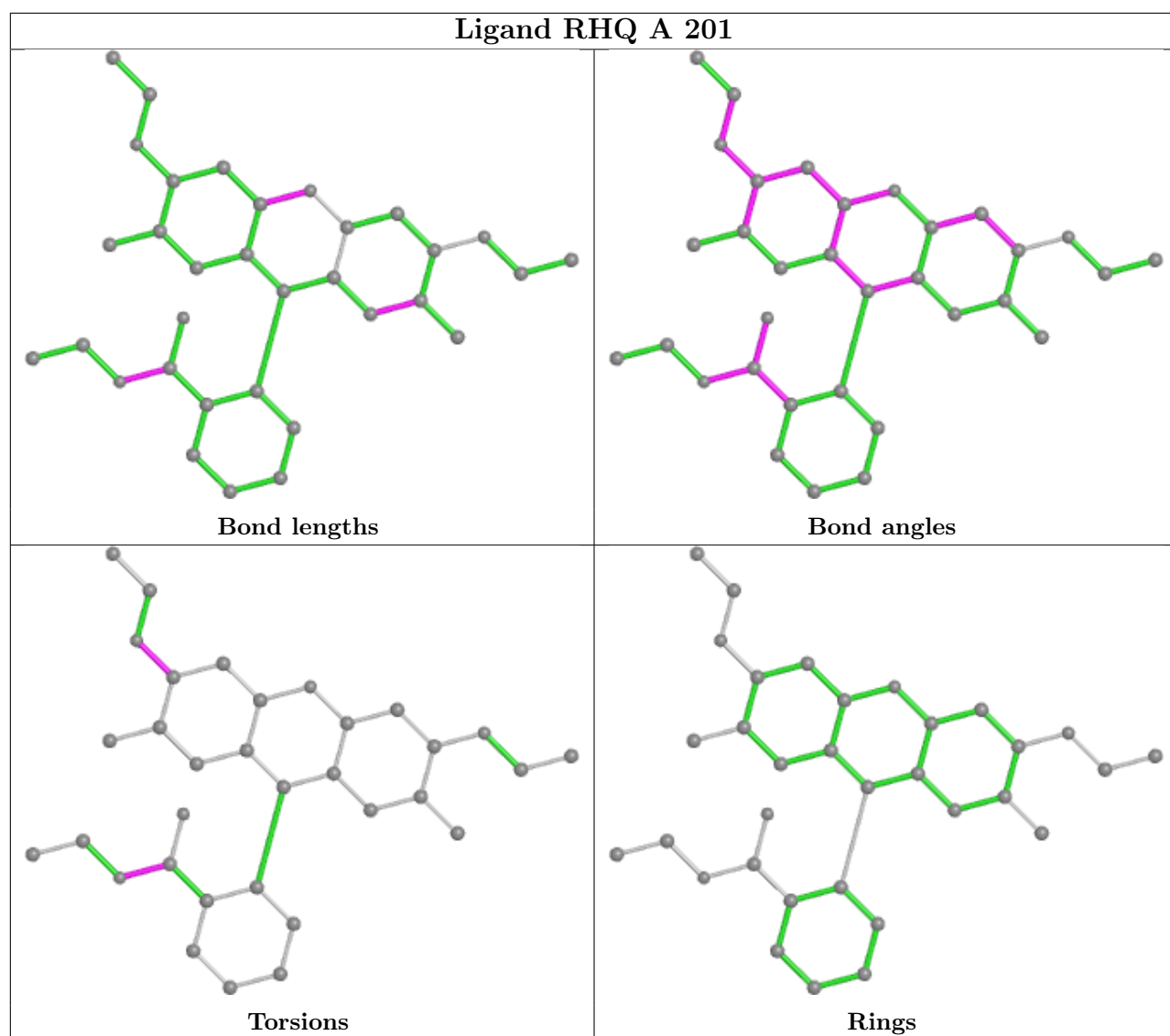
Mol	Chain	Res	Type	Atoms
3	A	201	RHQ	C10-C11-N1-C22
3	A	201	RHQ	C12-C11-N1-C22
3	A	201	RHQ	O27-C26-O2-C28
3	A	201	RHQ	C19-C26-O2-C28

There are no ring outliers.

3 monomers are involved in 16 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	D	513	SO4	1	0
3	A	201	RHQ	14	0
2	D	507	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 ⓘ

### 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	185/194 (95%)	0.45	9 (4%) 29 17	98, 109, 133, 140	0
1	B	181/194 (93%)	0.76	19 (10%) 6 3	111, 131, 162, 163	0
1	D	186/194 (95%)	0.54	8 (4%) 35 22	116, 124, 140, 148	0
1	E	185/194 (95%)	0.65	19 (10%) 6 4	104, 118, 130, 143	0
All	All	737/776 (94%)	0.60	55 (7%) 14 8	98, 121, 157, 163	0

All (55) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	2	ASN	6.1
1	B	109	THR	5.3
1	E	164	HIS	5.0
1	B	33	GLU	4.5
1	B	43	PHE	4.4
1	E	139	GLU	3.7
1	D	141	SER	3.7
1	E	141	SER	3.6
1	E	112	ILE	3.6
1	E	37	GLY	3.5
1	E	140	TRP	3.5
1	D	120	GLN	3.4
1	B	136	LEU	3.4
1	B	5	ASP	3.4
1	B	32	SER	3.3
1	B	24	THR	3.3
1	E	38	ASN	3.2
1	D	138	GLY	3.2
1	E	2	ASN	3.2
1	B	107	TYR	3.1
1	D	119	LEU	3.1

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Mol	Chain	Res	Type	RSRZ
1	B	103	TYR	3.0
1	B	106	TYR	3.0
1	B	56	ILE	2.8
1	A	103	TYR	2.8
1	B	25	THR	2.7
1	E	103	TYR	2.7
1	A	107	TYR	2.7
1	A	109	THR	2.7
1	B	8	LEU	2.6
1	A	143	ASN	2.6
1	E	170	GLU	2.5
1	B	48	ASN	2.5
1	D	140	TRP	2.4
1	D	137	ASN	2.4
1	A	40	TYR	2.4
1	E	149	SER	2.4
1	E	187	SER	2.4
1	A	41	TYR	2.3
1	A	4	LYS	2.3
1	E	132	LYS	2.3
1	E	74	THR	2.2
1	E	40	TYR	2.2
1	B	6	LYS	2.2
1	A	63	GLU	2.2
1	B	31	LEU	2.1
1	A	22	ALA	2.1
1	B	50	PHE	2.1
1	D	144	ASP	2.1
1	E	77	GLU	2.1
1	E	109	THR	2.1
1	B	166	GLN	2.0
1	E	165	GLU	2.0
1	E	10	VAL	2.0
1	B	135	ASN	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 ⓘ

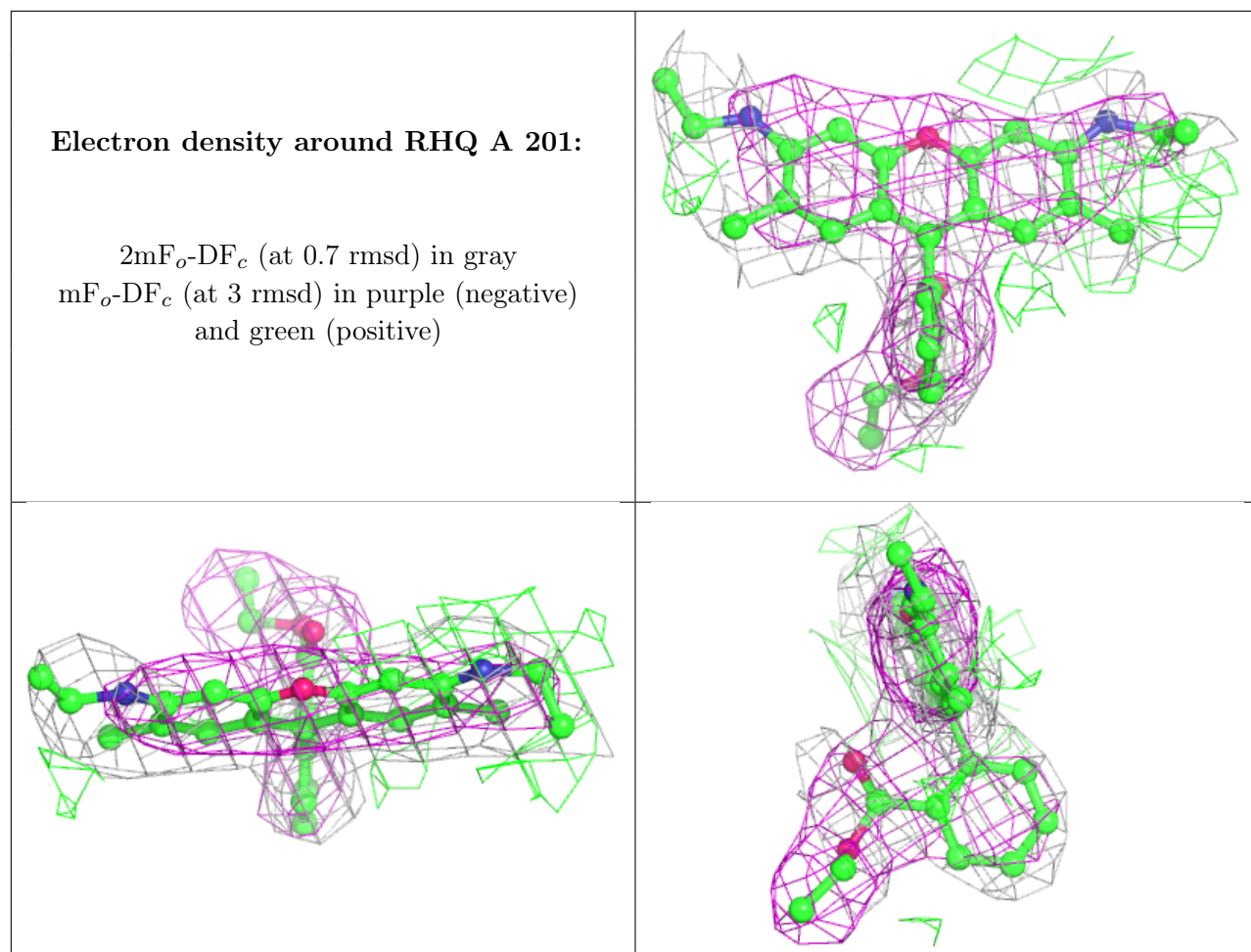
There are no monosaccharides in this entry.

## 6.4 Ligands ⓘ

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 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
2	SO4	D	509	5/5	0.05	0.56	180,180,180,180	0
2	SO4	E	513	5/5	0.23	1.03	194,194,194,194	0
2	SO4	D	507	5/5	0.26	0.61	201,201,201,201	0
2	SO4	D	510	5/5	0.37	0.68	184,184,184,184	0
2	SO4	A	502	5/5	0.45	0.73	158,159,159,159	0
2	SO4	A	503	5/5	0.47	0.48	186,186,186,186	0
2	SO4	A	512	5/5	0.54	0.52	151,151,151,151	0
3	RHQ	A	201	33/33	0.54	0.67	98,99,101,104	0
2	SO4	E	514	5/5	0.56	0.62	156,156,156,156	0
2	SO4	D	512	5/5	0.56	0.62	199,199,199,199	0
2	SO4	E	515	5/5	0.61	0.47	163,163,163,163	0
2	SO4	E	505	5/5	0.63	0.36	229,229,229,229	0
2	SO4	E	500	5/5	0.64	0.44	159,159,160,160	0
2	SO4	A	513	5/5	0.66	0.63	186,186,186,187	0
2	SO4	D	513	5/5	0.67	0.40	150,150,151,151	0
2	SO4	A	501	5/5	0.68	0.56	137,137,138,138	0
2	SO4	D	508	5/5	0.69	0.41	161,161,161,161	0
2	SO4	A	504	5/5	0.70	0.61	152,152,152,152	0
2	SO4	E	506	5/5	0.80	0.41	127,128,128,129	0
2	SO4	D	511	5/5	0.81	0.56	155,155,156,156	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.