



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 14, 2017 – 02:50 am GMT

PDB ID : 3BR2  
Title : Crystal Structure of the Complex of Dequalinium Bound to QacR(E120Q), a Mutant of a Multidrug Binding Transcriptional Repressor  
Authors : Brooks, B.E.  
Deposited on : 2007-12-20  
Resolution : 2.90 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

<http://wwpdb.org/validation/2016/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 : 1.7.2 (RC1), CSD as538be (2017)  
Xtriage (Phenix) : 1.9-1692  
EDS : trunk28620  
Percentile statistics : 20161228.v01 (using entries in the PDB archive December 28th 2016)  
Refmac : 5.8.0135  
CCP4 : 6.5.0  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : recalc28949

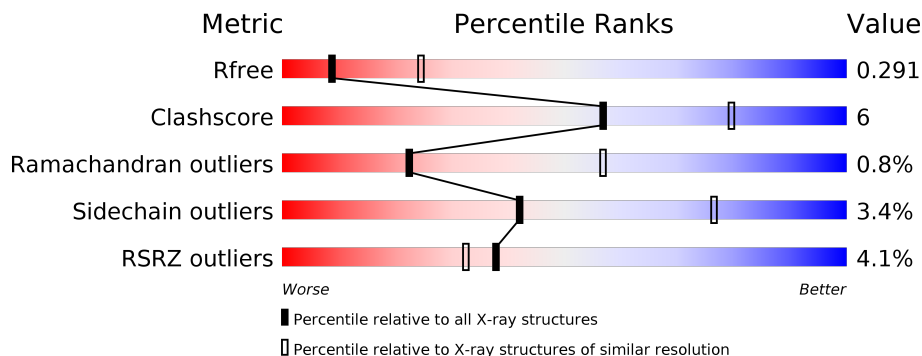
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.90 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))
$R_{free}$	100719	1586 (2.90-2.90)
Clashscore	112137	1807 (2.90-2.90)
Ramachandran outliers	110173	1768 (2.90-2.90)
Sidechain outliers	110143	1770 (2.90-2.90)
RSRZ outliers	101464	1596 (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 on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria. 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 style="width: 100%; height: 10px; background: linear-gradient(to right, red 1%, orange 1%, yellow 12%, green 82%, grey 15%);"></div> <div style="display: flex; justify-content: space-between; margin-top: 2px;"> <span>%</span> <span>82%</span> <span>12%</span> <span>• •</span> </div> </div>
1	B	194	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 5%, orange 1%, yellow 12%, green 77%, grey 5%);"></div> <div style="display: flex; justify-content: space-between; margin-top: 2px;"> <span>5%</span> <span>77%</span> <span>12%</span> <span>• • 9%</span> </div> </div>
1	D	194	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 4%, orange 1%, yellow 12%, green 81%, grey 4%);"></div> <div style="display: flex; justify-content: space-between; margin-top: 2px;"> <span>4%</span> <span>81%</span> <span>12%</span> <span>• 5%</span> </div> </div>
1	E	194	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 6%, orange 1%, yellow 13%, green 82%, grey 4%);"></div> <div style="display: flex; justify-content: space-between; margin-top: 2px;"> <span>6%</span> <span>82%</span> <span>13%</span> <span>• •</span> </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 crite-

ria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	SO4	A	505	-	-	-	X
2	SO4	A	506	-	-	-	X
2	SO4	A	520	-	-	-	X
2	SO4	B	511	-	-	-	X
2	SO4	B	521	-	-	-	X
2	SO4	D	514	-	-	-	X
2	SO4	D	516	-	-	-	X
2	SO4	E	503	-	-	-	X
2	SO4	E	532	-	-	-	X
3	DEQ	A	201	-	-	-	X

## 2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 6030 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	177	Total	C	N	O	S	0	0	0
			1336	857	222	256	1			
1	D	184	Total	C	N	O	S	0	1	0
			1484	958	240	284	2			
1	A	186	Total	C	N	O	S	0	0	0
			1507	973	246	286	2			
1	E	187	Total	C	N	O	S	0	1	0
			1514	978	248	286	2			

There are 36 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	72	ALA	CYS	ENGINEERED	UNP P0A0N3
B	120	GLN	GLU	ENGINEERED	UNP P0A0N3
B	141	SER	CYS	ENGINEERED	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	72	ALA	CYS	ENGINEERED	UNP P0A0N3
D	120	GLN	GLU	ENGINEERED	UNP P0A0N3
D	141	SER	CYS	ENGINEERED	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	72	ALA	CYS	ENGINEERED	UNP P0A0N3
A	120	GLN	GLU	ENGINEERED	UNP P0A0N3
A	141	SER	CYS	ENGINEERED	UNP P0A0N3

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Chain	Residue	Modelled	Actual	Comment	Reference
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	72	ALA	CYS	ENGINEERED	UNP P0A0N3
E	120	GLN	GLU	ENGINEERED	UNP P0A0N3
E	141	SER	CYS	ENGINEERED	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: SO<sub>4</sub>) (formula: O<sub>4</sub>S).



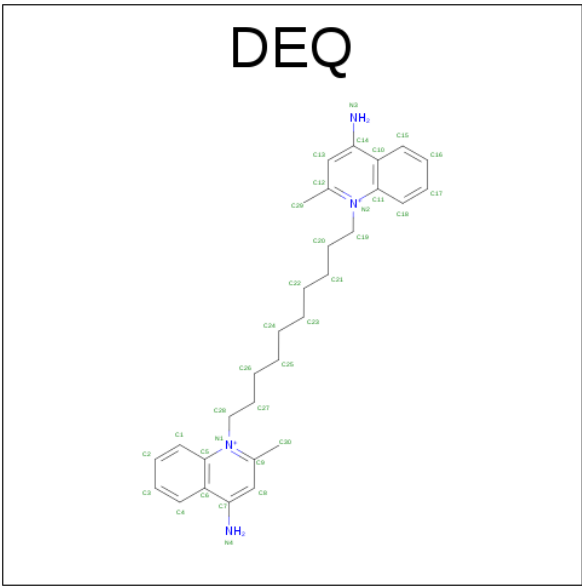
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	B	1	Total	O	S	0	0
			5	4	1		
2	B	1	Total	O	S	0	0
			5	4	1		
2	B	1	Total	O	S	0	0
			5	4	1		
2	D	1	Total	O	S	0	0
			5	4	1		

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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	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	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		

- Molecule 3 is DEQUALINIUM (three-letter code: DEQ) (formula: C<sub>30</sub>H<sub>40</sub>N<sub>4</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	N	0	0
			34	30	4		

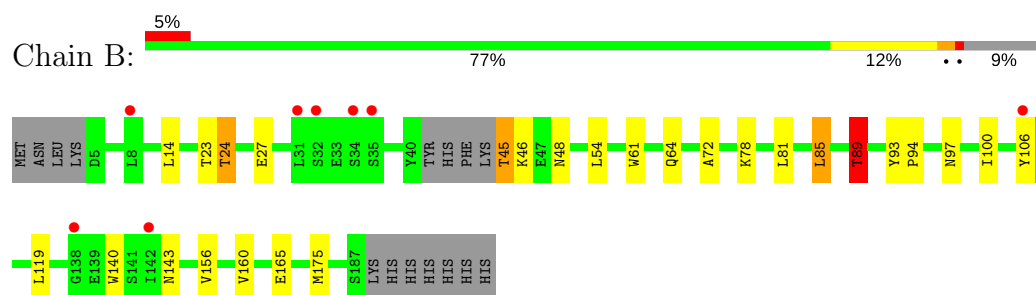
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	B	9	Total	O	0	0
			9	9		
4	D	7	Total	O	0	0
			7	7		
4	A	10	Total	O	0	0
			10	10		
4	E	4	Total	O	0	0
			4	4		

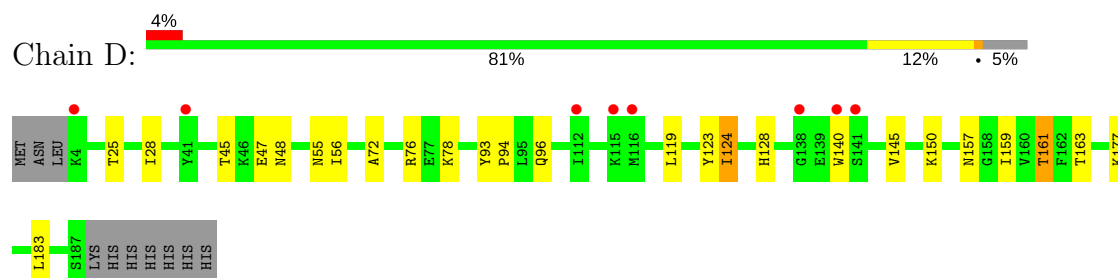
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA 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.

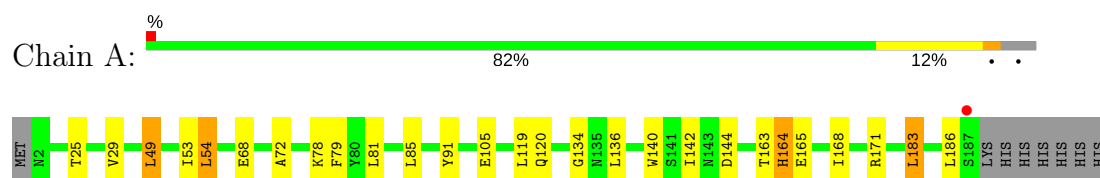
- Molecule 1: HTH-type transcriptional regulator qacR



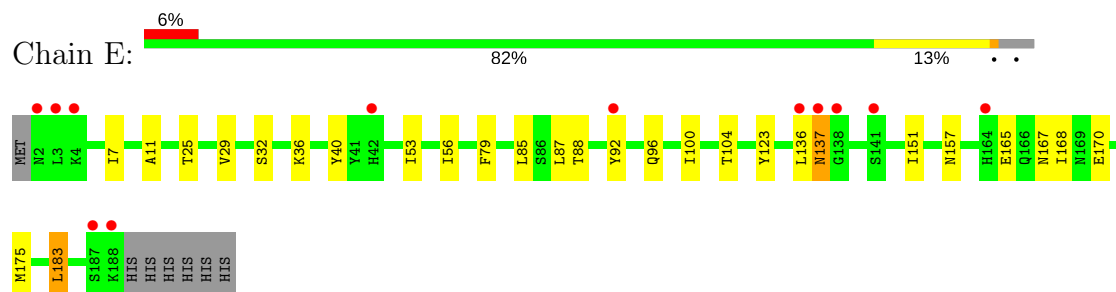
- Molecule 1: HTH-type transcriptional regulator qacR



- 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 4 <sub>2</sub> 2 <sub>1</sub> 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	171.60Å 171.60Å 94.33Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	43.98 – 2.90 43.96 – 2.90	Depositor EDS
% Data completeness (in resolution range)	99.7 (43.98-2.90) 99.7 (43.96-2.90)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.07	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.79 (at 2.90Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, $R_{free}$	0.247 , 0.293 0.246 , 0.291	Depositor DCC
$R_{free}$ test set	1597 reflections (5.31%)	DCC
Wilson B-factor (Å <sup>2</sup> )	83.5	Xtriage
Anisotropy	0.019	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.32 , 52.1	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.52$ , $\langle L^2 \rangle = 0.35$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	6030	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	80.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.11% 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: DEQ, SO4

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	0.41	0/1537	0.50	0/2079
1	B	0.38	0/1358	0.45	0/1845
1	D	0.38	0/1516	0.46	0/2056
1	E	0.36	0/1545	0.47	0/2090
All	All	0.38	0/5956	0.47	0/8070

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	1507	0	1457	19	0
1	B	1336	0	1182	18	0
1	D	1484	0	1393	15	0
1	E	1514	0	1457	15	0
2	A	45	0	0	1	0
2	B	15	0	0	0	0
2	D	40	0	0	1	0
2	E	25	0	0	1	0
3	A	34	0	40	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	A	10	0	0	0	0
4	B	9	0	0	0	0
4	D	7	0	0	0	0
4	E	4	0	0	0	0
All	All	6030	0	5529	66	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 6.

All (66) 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	1.46	1.12
1:B:45:THR:HG23	1:B:48:ASN:HB2	1.63	0.80
1:A:68:GLU:HG2	1:A:85:LEU:HD21	1.68	0.74
1:D:157:ASN:O	1:D:161:THR:HG23	1.89	0.72
1:A:163:THR:O	1:A:165:GLU:N	2.25	0.70
1:E:7:ILE:HD13	1:E:32:SER:OG	1.95	0.66
1:A:54:LEU:HB3	1:A:119:LEU:HD21	1.80	0.64
1:E:96:GLN:HG3	1:E:157:ASN:HD21	1.65	0.61
1:E:92:TYR:CD2	1:E:123[A]:TYR:CZ	2.88	0.61
1:D:159:ILE:O	1:D:163:THR:CG2	2.37	0.59
1:A:81:LEU:HD12	1:A:85:LEU:HD13	1.85	0.58
1:B:81:LEU:HG	1:B:85:LEU:HD22	1.86	0.57
1:E:100:ILE:O	1:E:104:THR:HG23	2.05	0.56
1:A:142:ILE:HD11	1:A:186:LEU:HD13	1.88	0.55
1:B:54:LEU:HB3	1:B:119:LEU:HD11	1.88	0.55
1:E:88:THR:HG22	1:E:168:ILE:HD11	1.88	0.55
1:A:53:ILE:HG23	2:A:520:SO4:O4	2.08	0.54
1:E:136:LEU:O	1:E:136:LEU:HD12	2.12	0.50
1:E:25:THR:HG21	1:E:40:TYR:OH	2.11	0.50
1:E:87:LEU:HD11	1:E:175:MET:HB2	1.95	0.48
1:B:61:TRP:CE3	1:B:89:THR:HG21	2.48	0.48
1:E:29:VAL:HG21	1:E:36:LYS:N	2.28	0.48
1:D:56:ILE:HG21	2:D:516:SO4:O2	2.15	0.47
1:B:14:LEU:C	1:B:23:THR:HG21	2.35	0.47
1:D:76:ARG:HG3	1:D:183:LEU:HD13	1.96	0.47
1:A:134:GLY:HA3	1:A:140:TRP:CZ2	2.50	0.47
1:A:91:TYR:CD1	1:A:168:ILE:HD13	2.49	0.47
1:B:54:LEU:CB	1:B:119:LEU:HD11	2.45	0.46
1:B:93:TYR:N	1:B:94:PRO:CD	2.78	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:24:THR:HG23	1:B:27:GLU:CB	2.45	0.46
1:B:97:ASN:HA	1:B:100:ILE:HD12	1.97	0.46
1:D:128:HIS:ND1	1:D:145:VAL:HG12	2.31	0.45
1:A:79:PHE:CE2	1:A:183:LEU:HD13	2.51	0.45
1:A:68:GLU:CG	1:A:85:LEU:HD21	2.42	0.45
1:B:24:THR:HG23	1:B:27:GLU:H	1.81	0.45
1:B:156:VAL:O	1:B:160:VAL:HG23	2.16	0.45
1:A:72:ALA:HB3	1:A:78:LYS:HG2	1.98	0.45
1:B:64:GLN:OE1	1:B:89:THR:HG23	2.17	0.45
1:E:79:PHE:CD2	1:E:183:LEU:HD13	2.53	0.44
1:A:25:THR:O	1:A:29:VAL:HG23	2.17	0.44
1:D:93:TYR:N	1:D:94:PRO:CD	2.81	0.44
1:E:79:PHE:CE2	1:E:183:LEU:HD13	2.53	0.44
1:A:134:GLY:HA3	1:A:140:TRP:CE2	2.53	0.44
1:D:163:THR:O	1:D:163:THR:HG23	2.18	0.44
1:B:156:VAL:HG13	1:B:175:MET:CE	2.48	0.44
1:B:23:THR:O	1:B:46:LYS:NZ	2.43	0.43
1:B:45:THR:CG2	1:B:48:ASN:HB2	2.40	0.43
1:D:72:ALA:HB3	1:D:78:LYS:HG2	1.99	0.43
1:A:81:LEU:CD1	1:A:85:LEU:HD13	2.48	0.43
1:E:11:ALA:HB3	1:E:53:ILE:HD11	2.01	0.43
1:D:55:ASN:OD1	1:D:119:LEU:HD21	2.18	0.43
1:D:124:ILE:HD12	1:D:150:LYS:HG2	2.00	0.43
1:D:96:GLN:HG3	1:D:161:THR:HG21	2.01	0.43
1:B:72:ALA:HB3	1:B:78:LYS:HG2	2.01	0.42
1:A:144:ASP:N	1:A:144:ASP:OD1	2.52	0.42
1:D:177:LYS:HB3	1:E:151:ILE:HD11	2.02	0.42
1:E:56:ILE:HG21	2:E:503:SO4:O3	2.20	0.41
1:A:120:GLN:OE1	3:A:201:DEQ:H303	2.20	0.41
1:A:164:HIS:HA	1:A:171:ARG:NH1	2.35	0.41
1:A:183:LEU:HA	1:A:183:LEU:HD12	1.90	0.41
1:B:119:LEU:O	1:B:119:LEU:HD23	2.20	0.41
1:A:49:LEU:O	1:A:49:LEU:HD23	2.21	0.40
1:D:45:THR:HG23	1:D:48:ASN:H	1.86	0.40
1:E:92:TYR:CE2	1:E:123[A]:TYR:CE1	3.09	0.40
1:D:25:THR:HA	1:D:28:ILE:HD12	2.02	0.40
1:B:106:TYR:CE2	1:B:109:THR:HG21	2.55	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	184/194 (95%)	175 (95%)	7 (4%)	2 (1%)	17	48
1	B	171/194 (88%)	158 (92%)	11 (6%)	2 (1%)	15	46
1	D	183/194 (94%)	171 (93%)	12 (7%)	0	100	100
1	E	186/194 (96%)	172 (92%)	12 (6%)	2 (1%)	17	48
All	All	724/776 (93%)	676 (93%)	42 (6%)	6 (1%)	22	57

All (6) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	164	HIS
1	E	137	ASN
1	E	165	GLU
1	A	105	GLU
1	B	89	THR
1	B	165	GLU

### 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	159/177 (90%)	155 (98%)	4 (2%)	53	83
1	B	120/177 (68%)	114 (95%)	6 (5%)	28	62
1	D	151/177 (85%)	145 (96%)	6 (4%)	36	71
1	E	157/177 (89%)	152 (97%)	5 (3%)	44	78

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
All	All	587/708 (83%)	566 (96%)	21 (4%)	42 75

All (21) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	24	THR
1	B	45	THR
1	B	85	LEU
1	B	89	THR
1	B	140	TRP
1	B	143	ASN
1	D	47	GLU
1	D	123[A]	TYR
1	D	123[B]	TYR
1	D	124	ILE
1	D	140	TRP
1	D	161	THR
1	A	49	LEU
1	A	54	LEU
1	A	136	LEU
1	A	183	LEU
1	E	85	LEU
1	E	137	ASN
1	E	167	ASN
1	E	170	GLU
1	E	183	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	113	ASN
1	E	96	GLN
1	E	184	ASN

### 5.3.3 RNA ⓘ

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 carbohydrates in this entry.

## 5.6 Ligand geometry [i](#)

26 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	$\# Z  > 2$
3	DEQ	A	201	-	37,37,37	0.92	2 (5%)	38,50,50	1.23	5 (13%)
2	SO4	A	500	-	4,4,4	0.13	0	6,6,6	0.11	0
2	SO4	A	501	-	4,4,4	0.16	0	6,6,6	0.11	0
2	SO4	A	504	-	4,4,4	0.15	0	6,6,6	0.08	0
2	SO4	A	505	-	4,4,4	0.15	0	6,6,6	0.10	0
2	SO4	A	506	-	4,4,4	0.13	0	6,6,6	0.09	0
2	SO4	A	508	-	4,4,4	0.15	0	6,6,6	0.07	0
2	SO4	A	518	-	4,4,4	0.14	0	6,6,6	0.06	0
2	SO4	A	520	-	4,4,4	0.16	0	6,6,6	0.22	0
2	SO4	A	536	-	4,4,4	0.15	0	6,6,6	0.09	0
2	SO4	B	511	-	4,4,4	0.15	0	6,6,6	0.22	0
2	SO4	B	521	-	4,4,4	0.13	0	6,6,6	0.13	0
2	SO4	B	531	-	4,4,4	0.15	0	6,6,6	0.07	0
2	SO4	D	512	-	4,4,4	0.14	0	6,6,6	0.09	0
2	SO4	D	513	-	4,4,4	0.15	0	6,6,6	0.07	0
2	SO4	D	514	-	4,4,4	0.16	0	6,6,6	0.08	0
2	SO4	D	515	-	4,4,4	0.15	0	6,6,6	0.08	0
2	SO4	D	516	-	4,4,4	0.16	0	6,6,6	0.10	0
2	SO4	D	533	-	4,4,4	0.16	0	6,6,6	0.11	0
2	SO4	D	535	-	4,4,4	0.16	0	6,6,6	0.06	0
2	SO4	D	537	-	4,4,4	0.14	0	6,6,6	0.08	0
2	SO4	E	503	-	4,4,4	0.14	0	6,6,6	0.09	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
2	SO4	E	509	-	4,4,4	0.15	0	6,6,6	0.21	0
2	SO4	E	519	-	4,4,4	0.15	0	6,6,6	0.08	0
2	SO4	E	532	-	4,4,4	0.16	0	6,6,6	0.12	0
2	SO4	E	534	-	4,4,4	0.15	0	6,6,6	0.11	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	DEQ	A	201	-	-	0/13/13/13	0/4/4/4
2	SO4	A	500	-	-	0/0/0/0	0/0/0/0
2	SO4	A	501	-	-	0/0/0/0	0/0/0/0
2	SO4	A	504	-	-	0/0/0/0	0/0/0/0
2	SO4	A	505	-	-	0/0/0/0	0/0/0/0
2	SO4	A	506	-	-	0/0/0/0	0/0/0/0
2	SO4	A	508	-	-	0/0/0/0	0/0/0/0
2	SO4	A	518	-	-	0/0/0/0	0/0/0/0
2	SO4	A	520	-	-	0/0/0/0	0/0/0/0
2	SO4	A	536	-	-	0/0/0/0	0/0/0/0
2	SO4	B	511	-	-	0/0/0/0	0/0/0/0
2	SO4	B	521	-	-	0/0/0/0	0/0/0/0
2	SO4	B	531	-	-	0/0/0/0	0/0/0/0
2	SO4	D	512	-	-	0/0/0/0	0/0/0/0
2	SO4	D	513	-	-	0/0/0/0	0/0/0/0
2	SO4	D	514	-	-	0/0/0/0	0/0/0/0
2	SO4	D	515	-	-	0/0/0/0	0/0/0/0
2	SO4	D	516	-	-	0/0/0/0	0/0/0/0
2	SO4	D	533	-	-	0/0/0/0	0/0/0/0
2	SO4	D	535	-	-	0/0/0/0	0/0/0/0
2	SO4	D	537	-	-	0/0/0/0	0/0/0/0
2	SO4	E	503	-	-	0/0/0/0	0/0/0/0
2	SO4	E	509	-	-	0/0/0/0	0/0/0/0
2	SO4	E	519	-	-	0/0/0/0	0/0/0/0
2	SO4	E	532	-	-	0/0/0/0	0/0/0/0
2	SO4	E	534	-	-	0/0/0/0	0/0/0/0

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	201	DEQ	C5-N1	-2.91	1.36	1.40

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	201	DEQ	C11-N2	-2.34	1.37	1.40

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	201	DEQ	C29-C12-C13	-2.12	116.80	121.61
3	A	201	DEQ	C9-N1-C5	-2.09	120.22	122.23
3	A	201	DEQ	C30-C9-C8	-2.05	116.95	121.61
3	A	201	DEQ	C28-N1-C5	2.14	121.02	119.02
3	A	201	DEQ	C19-N2-C11	2.70	121.54	119.02

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

4 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	201	DEQ	1	0
2	A	520	SO4	1	0
2	D	516	SO4	1	0
2	E	503	SO4	1	0

## 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(Å²)	Q<0.9	
1	A	186/194 (95%)	-0.10	1 (0%)	90	90	50, 67, 97, 105	0
1	B	177/194 (91%)	0.18	9 (5%)	29	24	50, 82, 134, 140	0
1	D	184/194 (94%)	0.21	8 (4%)	36	31	62, 82, 101, 107	0
1	E	187/194 (96%)	0.19	12 (6%)	20	15	60, 77, 98, 104	0
All	All	734/776 (94%)	0.12	30 (4%)	38	32	50, 76, 107, 140	0

All (30) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	142	ILE	4.2
1	A	187	SER	4.2
1	B	35	SER	4.1
1	E	2	ASN	3.7
1	D	140	TRP	3.4
1	B	34	SER	3.4
1	D	116	MET	3.3
1	E	4	LYS	3.1
1	D	112	ILE	3.1
1	E	141	SER	3.0
1	B	31	LEU	2.6
1	E	92	TYR	2.6
1	B	8	LEU	2.5
1	B	106	TYR	2.5
1	D	4	LYS	2.5
1	E	42	HIS	2.5
1	E	138	GLY	2.4
1	E	137	ASN	2.4
1	E	136	LEU	2.4
1	E	164	HIS	2.3
1	B	112	ILE	2.2

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Mol	Chain	Res	Type	RSRZ
1	E	187	SER	2.2
1	D	138	GLY	2.2
1	B	138	GLY	2.2
1	E	188	LYS	2.2
1	B	32	SER	2.1
1	E	3	LEU	2.1
1	D	115	LYS	2.1
1	D	41	TYR	2.1
1	D	141	SER	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 carbohydrates 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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. 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	LLDF	B-factors(Å <sup>2</sup> )	Q<0.9
2	SO4	D	516	5/5	0.83	0.68	9.84	146,147,147,147	0
2	SO4	A	520	5/5	0.93	0.56	9.13	116,116,117,117	0
2	SO4	A	505	5/5	0.75	0.48	8.14	145,145,146,146	0
2	SO4	B	521	5/5	0.65	0.58	7.57	210,210,210,210	0
3	DEQ	A	201	34/34	0.84	0.39	6.47	111,117,124,124	0
2	SO4	A	506	5/5	0.71	0.41	6.02	179,179,179,179	0
2	SO4	B	511	5/5	0.77	0.35	5.63	121,122,122,122	0
2	SO4	E	503	5/5	0.92	0.39	4.54	147,147,148,148	0
2	SO4	D	514	5/5	0.69	0.39	4.35	152,152,152,152	0
2	SO4	E	532	5/5	0.70	0.31	2.48	142,143,143,144	0
2	SO4	A	501	5/5	0.60	0.33	1.87	151,152,152,152	0
2	SO4	A	504	5/5	0.89	0.16	-0.43	138,138,138,139	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors( $\text{\AA}^2$ )	Q<0.9
2	SO4	D	533	5/5	0.84	0.18	-0.92	142,142,142,142	0
2	SO4	E	509	5/5	0.89	0.12	-	121,121,122,122	0
2	SO4	D	512	5/5	0.66	0.34	-	164,164,164,164	0
2	SO4	E	519	5/5	0.80	0.25	-	148,148,148,148	0
2	SO4	E	534	5/5	0.76	0.35	-	154,154,155,155	0
2	SO4	D	513	5/5	0.86	0.17	-	128,129,129,130	0
2	SO4	B	531	5/5	0.78	0.33	-	173,173,173,174	0
2	SO4	A	536	5/5	0.66	0.32	-	172,173,173,173	0
2	SO4	A	518	5/5	0.71	0.43	-	181,182,182,182	0
2	SO4	A	508	5/5	0.90	0.28	-	124,124,124,125	0
2	SO4	D	535	5/5	0.73	0.28	-	159,159,159,159	0
2	SO4	A	500	5/5	0.68	0.28	-	151,151,151,151	0
2	SO4	D	515	5/5	0.79	0.23	-	153,154,154,154	0
2	SO4	D	537	5/5	0.55	0.44	-	171,171,171,171	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.