



# Full wwPDB X-ray Structure Validation Report ⓘ

May 15, 2020 – 01:09 am BST

PDB ID : 1EEP  
Title : 2.4 Å RESOLUTION CRYSTAL STRUCTURE OF BORRELIA BURGDORFERI INOSINE 5'-MONOPHOSPHATE DEHYDROGENASE IN COMPLEX WITH A SULFATE ION  
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Deposited on : 2000-02-01  
Resolution : 2.40 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 : 2.11  
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) : 2.11

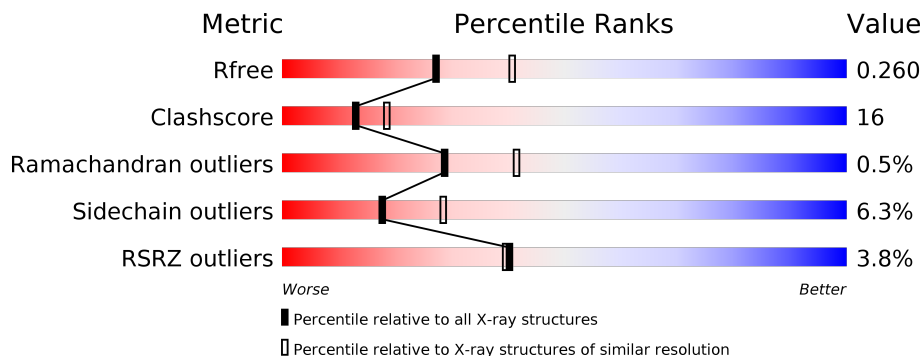
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.40 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	3907 (2.40-2.40)
Clashscore	141614	4398 (2.40-2.40)
Ramachandran outliers	138981	4318 (2.40-2.40)
Sidechain outliers	138945	4319 (2.40-2.40)
RSRZ outliers	127900	3811 (2.40-2.40)

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 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	404	<p>2% 54% 20% • 22%</p>
1	B	404	<p>3% 53% 22% • 22%</p>

## 2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 4681 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 INOSINE 5'-MONOPHOSPHATE DEHYDROGENASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	314	Total 2282	C 1447	N 389	O 434	S 12	0	0	0
1	B	314	Total 2282	C 1447	N 384	O 438	S 13	0	0	0

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



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

- Molecule 3 is water.

<b>Mol</b>	<b>Chain</b>	<b>Residues</b>	<b>Atoms</b>		<b>ZeroOcc</b>	<b>AltConf</b>
3	A	57	Total 57	O 57	0	0
3	B	50	Total 50	O 50	0	0



1387  
5388  
R389  
SER  
SER  
LEU  
LYS  
GLU  
SER  
HIS  
PRO  
HIS  
ASP  
VAL  
PHE  
SER  
ILE  
THR

## 4 Data and refinement statistics

Property	Value	Source
Space group	I 4	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	123.28Å 123.28Å 130.11Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	8.00 – 2.40 29.83 – 2.40	Depositor EDS
% Data completeness (in resolution range)	99.6 (8.00-2.40) 99.8 (29.83-2.40)	Depositor EDS
$R_{merge}$	0.13	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.49 (at 2.39Å)	Xtrriage
Refinement program	CNS	Depositor
R, $R_{free}$	0.214 , 0.262 0.214 , 0.260	Depositor DCC
$R_{free}$ test set	3838 reflections (10.14%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	29.3	Xtrriage
Anisotropy	0.670	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.36 , 57.0	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	0.028 for -h,k,-l	Xtrriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	4681	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	35.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.89% 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

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	0.36	0/2304	0.67	1/3110 (0.0%)
1	B	0.33	0/2305	0.66	2/3116 (0.1%)
All	All	0.34	0/4609	0.66	3/6226 (0.0%)

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	180	ARG	NE-CZ-NH2	7.32	123.96	120.30
1	B	46	LEU	CA-CB-CG	6.86	131.07	115.30
1	B	235	ALA	N-CA-C	-5.23	96.88	111.00

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	2282	0	2361	71	9
1	B	2282	0	2344	81	0
2	A	5	0	0	0	0
2	B	5	0	0	0	0
3	A	57	0	0	2	1
3	B	50	0	0	4	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
All	All	4681	0	4705	152	9

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 16.

All (152) 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:296:SER:HB2	1:B:307:LYS:HG3	1.40	1.02
1:B:241:GLN:HA	1:B:241:GLN:HE21	1.34	0.90
1:A:70:ILE:HD13	1:A:170:VAL:HG21	1.56	0.88
1:A:180:ARG:HG3	3:A:783:HOH:O	1.74	0.85
1:A:241:GLN:HE21	1:A:241:GLN:HA	1.42	0.84
1:B:9:ALA:HB1	1:B:243:THR:HG21	1.63	0.81
1:A:31:LEU:HD22	1:A:363:LEU:HD13	1.64	0.79
1:A:300:ILE:HD13	1:A:305:LYS:HG3	1.65	0.77
1:A:224:GLY:N	1:A:225:PRO:HD3	2.03	0.73
1:B:296:SER:CB	1:B:307:LYS:HG3	2.19	0.73
1:A:148:VAL:HG23	1:A:157:ARG:HD2	1.72	0.72
1:B:291:THR:O	1:B:307:LYS:HE3	1.88	0.72
1:A:81:ARG:HD2	1:A:160:GLU:HG3	1.70	0.72
1:B:15:VAL:HG22	1:B:384:PHE:HB3	1.69	0.72
1:A:387:ILE:HG22	1:A:389:HIS:H	1.55	0.70
1:B:48:SER:O	1:B:54:THR:HG22	1.93	0.68
1:A:50:MET:HB2	1:A:53:VAL:HG13	1.76	0.68
1:B:143:ARG:HG2	1:B:167:ASP:OD2	1.94	0.68
1:A:73:LYS:HE2	1:A:149:SER:HB3	1.76	0.67
1:B:20:ARG:CZ	1:B:381:ASN:HB3	2.25	0.66
1:A:199:ALA:O	1:A:200:GLY:O	2.14	0.66
1:B:241:GLN:HE21	1:B:241:GLN:CA	2.09	0.66
1:B:376:SER:O	1:B:380:ILE:HG12	1.96	0.65
1:B:199:ALA:O	1:B:200:GLY:O	2.15	0.65
1:B:9:ALA:CB	1:B:243:THR:HG21	2.27	0.64
1:B:48:SER:O	1:B:54:THR:CG2	2.45	0.64
1:B:231:THR:HG22	3:B:795:HOH:O	1.96	0.64
1:A:224:GLY:N	1:A:225:PRO:CD	2.61	0.63
1:A:300:ILE:CD1	1:A:305:LYS:HG3	2.28	0.63
1:A:356:LEU:O	1:A:360:LYS:HG2	1.99	0.63
1:A:51:ASP:HA	1:A:72:HIS:CD2	2.36	0.61
1:A:189:LYS:HE3	1:A:197:LEU:HG	1.82	0.61
1:A:261:ALA:HB3	1:A:282:VAL:HG23	1.83	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:11:THR:HG22	1:B:240:PRO:HB3	1.84	0.59
1:B:130:ASP:CG	1:B:131:PHE:H	2.06	0.59
1:B:382:SER:O	1:B:383:LYS:HD2	2.03	0.59
1:A:70:ILE:HD12	1:A:283:MET:CE	2.33	0.59
1:B:356:LEU:O	1:B:360:LYS:HG3	2.03	0.59
1:B:10:LEU:H	1:B:243:THR:CG2	2.17	0.58
1:B:53:VAL:HG22	1:B:54:THR:HG22	1.85	0.58
1:B:297:GLU:H	1:B:308:SER:HB3	1.68	0.58
1:B:346:VAL:HG23	1:B:347:PRO:HD2	1.85	0.58
1:B:224:GLY:N	1:B:225:PRO:HD3	2.18	0.57
1:A:205:LYS:HG3	1:A:251:ALA:HB2	1.85	0.57
1:B:155:ILE:HG13	1:B:187:LYS:HE3	1.85	0.57
1:A:380:ILE:HG13	1:A:381:ASN:N	2.20	0.56
1:B:225:PRO:HG3	3:B:796:HOH:O	2.06	0.56
1:A:18:ILE:HD11	1:A:385:VAL:HG13	1.86	0.56
1:A:189:LYS:HE2	1:A:195:LEU:O	2.06	0.56
1:B:154:THR:HG23	1:B:155:ILE:H	1.71	0.55
1:B:154:THR:HG23	1:B:155:ILE:N	2.22	0.55
1:B:88:LYS:O	1:B:141:LYS:HD2	2.08	0.55
1:A:73:LYS:HG2	3:A:786:HOH:O	2.07	0.54
1:B:53:VAL:CG2	1:B:54:THR:HG22	2.36	0.54
1:B:54:THR:HB	1:B:58:MET:HG2	1.89	0.54
1:A:150:ILE:HD11	1:A:181:ILE:HD12	1.90	0.54
1:B:293:GLU:N	1:B:293:GLU:OE1	2.36	0.54
1:A:150:ILE:CD1	1:A:181:ILE:HD12	2.38	0.53
1:B:60:ILE:HG13	1:B:87:VAL:HG22	1.91	0.53
1:A:346:VAL:HG23	1:A:347:PRO:HD2	1.89	0.53
1:B:182:ILE:HG23	1:B:214:VAL:HG11	1.91	0.53
1:A:241:GLN:CA	1:A:241:GLN:HE21	2.18	0.53
1:A:387:ILE:C	1:A:389:HIS:H	2.12	0.53
1:B:9:ALA:CB	1:B:240:PRO:HD2	2.39	0.53
1:A:81:ARG:HG3	1:A:164:ALA:HB2	1.91	0.52
1:B:212:ILE:HD13	1:B:257:ILE:HG13	1.91	0.52
1:A:15:VAL:HG13	1:A:384:PHE:CD2	2.44	0.52
1:A:55:GLU:HB2	1:A:295:PRO:HG3	1.92	0.52
1:B:253:ASN:O	1:B:254:ASN:HB2	2.10	0.51
1:A:212:ILE:HD11	1:A:252:CYS:SG	2.50	0.51
1:B:228:ILE:HD13	1:B:228:ILE:H	1.73	0.51
1:B:382:SER:C	1:B:383:LYS:HD2	2.30	0.51
1:A:305:LYS:HD3	1:A:348:TYR:CG	2.45	0.51
1:A:387:ILE:HG22	1:A:389:HIS:N	2.25	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:240:PRO:O	1:B:243:THR:HG23	2.11	0.51
1:B:10:LEU:H	1:B:243:THR:HG22	1.74	0.51
1:B:50:MET:HB2	1:B:53:VAL:HG13	1.91	0.51
1:B:241:GLN:HA	1:B:241:GLN:NE2	2.15	0.49
1:B:81:ARG:O	1:B:85:GLU:HG3	2.13	0.49
1:A:17:LEU:CD1	1:A:272:VAL:HG12	2.42	0.48
1:B:297:GLU:O	1:B:308:SER:N	2.41	0.48
1:B:9:ALA:HB1	1:B:240:PRO:HD2	1.95	0.48
1:A:253:ASN:HD22	1:A:254:ASN:H	1.60	0.48
1:A:9:ALA:CB	1:A:240:PRO:HD2	2.43	0.48
1:B:87:VAL:HB	1:B:144:VAL:HG21	1.95	0.48
1:B:282:VAL:HG12	1:B:284:ILE:HG13	1.96	0.48
1:A:292:LYS:HB2	1:A:348:TYR:OH	2.13	0.48
1:B:61:ALA:HB2	1:B:293:GLU:HG2	1.96	0.47
1:A:218:CYS:SG	1:A:260:ILE:HG13	2.54	0.47
1:B:387:ILE:HG22	1:B:388:SER:N	2.29	0.47
1:B:81:ARG:NH2	1:B:85:GLU:OE2	2.47	0.47
1:A:249:TYR:C	1:A:251:ALA:H	2.19	0.46
1:A:206:GLU:H	1:A:206:GLU:CD	2.19	0.46
1:A:52:THR:CG2	1:A:53:VAL:HG12	2.45	0.46
1:B:151:ASP:O	1:B:154:THR:HG22	2.15	0.46
1:B:31:LEU:O	1:B:44:PRO:HD3	2.16	0.46
1:A:223:ILE:C	1:A:225:PRO:HD3	2.36	0.46
1:A:31:LEU:CD2	1:A:363:LEU:HD13	2.41	0.46
1:B:199:ALA:HB1	1:B:211:LEU:HD13	1.97	0.46
1:A:189:LYS:HD3	1:A:189:LYS:HA	1.82	0.46
1:B:375:ILE:O	1:B:379:LYS:HG3	2.15	0.45
1:B:231:THR:O	1:B:235:ALA:O	2.35	0.45
1:A:73:LYS:HE2	1:A:149:SER:CB	2.44	0.45
1:B:182:ILE:CG2	1:B:214:VAL:HG11	2.46	0.45
1:A:348:TYR:CE2	1:A:350:GLY:HA2	2.51	0.45
1:A:88:LYS:NZ	1:A:137:ASP:OD2	2.46	0.44
1:A:61:ALA:HB2	1:A:293:GLU:HG2	1.98	0.44
1:B:228:ILE:H	1:B:228:ILE:CD1	2.29	0.44
1:A:11:THR:HG22	1:A:240:PRO:HB3	2.00	0.44
1:A:292:LYS:HD2	1:A:351:LYS:HD2	2.00	0.44
1:A:183:GLU:O	1:A:187:LYS:HG3	2.18	0.44
1:B:11:THR:CG2	1:B:240:PRO:HB3	2.47	0.44
1:B:43:ILE:HG21	1:B:360:LYS:HD3	1.99	0.44
1:A:87:VAL:HG11	1:A:144:VAL:HB	2.00	0.44
1:A:205:LYS:HB3	1:A:205:LYS:HE2	1.78	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:48:SER:O	1:B:53:VAL:HG22	2.17	0.44
1:B:72:HIS:HD2	1:B:74:ASN:HB2	1.83	0.44
1:B:18:ILE:HD11	1:B:385:VAL:HG13	1.99	0.43
1:A:148:VAL:HG22	1:A:154:THR:HG23	1.99	0.43
1:A:70:ILE:HD12	1:A:283:MET:HE3	2.00	0.43
1:B:387:ILE:C	1:B:389:HIS:H	2.21	0.43
1:B:72:HIS:CD2	1:B:74:ASN:HB2	2.53	0.43
1:B:308:SER:O	1:B:309:TYR:CD2	2.71	0.43
1:A:154:THR:O	1:A:158:VAL:HG23	2.18	0.43
1:A:232:ARG:O	1:A:236:GLY:HA2	2.19	0.43
1:A:52:THR:HG23	1:A:53:VAL:HG12	2.01	0.43
1:B:189:LYS:HD2	1:B:189:LYS:HA	1.84	0.43
1:B:308:SER:OG	1:B:309:TYR:N	2.51	0.43
1:B:34:GLN:HG3	1:B:36:THR:O	2.19	0.42
1:B:33:THR:HB	1:B:375:ILE:HD12	2.01	0.42
1:A:81:ARG:NH2	1:A:160:GLU:OE2	2.52	0.42
1:B:177:HIS:HE1	1:B:210:ASP:OD2	2.02	0.42
1:A:88:LYS:HE3	1:A:165:HIS:O	2.20	0.42
1:B:201:ASN:HA	1:B:220:LYS:O	2.19	0.42
1:B:9:ALA:CA	1:B:243:THR:HG21	2.49	0.41
1:A:201:ASN:HA	1:A:220:LYS:O	2.20	0.41
1:A:20:ARG:CZ	1:A:381:ASN:HB3	2.51	0.41
1:A:70:ILE:HD13	1:A:170:VAL:CG2	2.37	0.41
1:A:84:ILE:HD11	1:A:146:ALA:HB2	2.03	0.41
1:A:253:ASN:HD22	1:A:254:ASN:N	2.19	0.41
1:A:31:LEU:O	1:A:44:PRO:HD3	2.19	0.41
1:A:25:LEU:HD22	1:A:25:LEU:N	2.36	0.41
1:B:178:SER:HB3	3:B:774:HOH:O	2.20	0.41
1:B:181:ILE:O	1:B:185:ILE:HG13	2.20	0.41
1:B:252:CYS:HA	3:B:704:HOH:O	2.21	0.41
1:B:300:ILE:N	1:B:300:ILE:HD12	2.36	0.41
1:B:307:LYS:HD2	1:B:307:LYS:HA	1.84	0.41
1:A:353:LYS:HB3	1:A:353:LYS:HE2	1.89	0.40
1:B:159:GLU:HA	1:B:192:TYR:OH	2.20	0.40
1:B:47:SER:OG	1:B:69:GLY:HA2	2.21	0.40
1:B:8:GLU:O	1:B:8:GLU:HG3	2.20	0.40
1:A:133:ASN:O	1:A:134:ALA:C	2.60	0.40

All (9) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:25:LEU:CD2	1:A:180:ARG:NH2[3_655]	1.07	1.13
1:A:25:LEU:CD1	1:A:180:ARG:NH1[3_655]	1.20	1.00
1:A:25:LEU:CD2	1:A:180:ARG:CZ[3_655]	1.38	0.82
1:A:25:LEU:CG	1:A:180:ARG:NH1[3_655]	1.61	0.59
1:A:25:LEU:CG	1:A:180:ARG:NH2[3_655]	1.65	0.55
1:A:25:LEU:CG	1:A:180:ARG:CZ[3_655]	1.72	0.48
1:A:25:LEU:CD1	1:A:180:ARG:CZ[3_655]	2.10	0.10
1:A:390:SER:O	3:A:711:HOH:O[3_655]	2.12	0.08
1:A:25:LEU:CD2	1:A:180:ARG:NE[3_655]	2.14	0.06

### 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	308/404 (76%)	289 (94%)	18 (6%)	1 (0%)	41	55
1	B	308/404 (76%)	288 (94%)	18 (6%)	2 (1%)	25	36
All	All	616/808 (76%)	577 (94%)	36 (6%)	3 (0%)	29	41

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	200	GLY
1	B	200	GLY
1	B	308	SER

#### 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	244/343 (71%)	229 (94%)	15 (6%)	18	30
1	B	245/343 (71%)	229 (94%)	16 (6%)	17	27
All	All	489/686 (71%)	458 (94%)	31 (6%)	18	28

All (31) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	15	VAL
1	A	25	LEU
1	A	52	THR
1	A	140	ASN
1	A	151	ASP
1	A	160	GLU
1	A	184	LEU
1	A	195	LEU
1	A	241	GLN
1	A	253	ASN
1	A	282	VAL
1	A	308	SER
1	A	351	LYS
1	A	360	LYS
1	A	363	LEU
1	B	15	VAL
1	B	31	LEU
1	B	46	LEU
1	B	54	THR
1	B	144	VAL
1	B	148	VAL
1	B	161	LEU
1	B	172	ASP
1	B	184	LEU
1	B	195	LEU
1	B	209	LEU
1	B	228	ILE
1	B	241	GLN
1	B	243	THR
1	B	302	ASN
1	B	380	ILE

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	57	GLN
1	A	140	ASN
1	A	194	ASN
1	A	241	GLN
1	A	253	ASN
1	B	72	HIS
1	B	74	ASN
1	B	177	HIS
1	B	241	GLN
1	B	302	ASN
1	B	358	GLN

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

### 5.5 Carbohydrates [i](#)

There are no carbohydrates in this entry.

### 5.6 Ligand geometry [i](#)

2 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	A	600	-	4,4,4	1.24	1 (25%)	6,6,6	0.75	0
2	SO4	B	601	-	4,4,4	1.24	1 (25%)	6,6,6	0.81	0

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	600	SO4	O4-S	2.19	1.65	1.47
2	B	601	SO4	O4-S	2.13	1.65	1.47

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

## 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	314/404 (77%)	-0.18	10 (3%) 47 46	12, 30, 75, 100	0
1	B	314/404 (77%)	-0.06	14 (4%) 33 31	14, 31, 72, 97	0
All	All	628/808 (77%)	-0.12	24 (3%) 40 39	12, 30, 74, 100	0

All (24) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	344	GLY	6.5
1	B	309	TYR	5.4
1	B	308	SER	5.3
1	A	390	SER	4.9
1	A	91	LYS	4.1
1	A	25	LEU	3.9
1	B	6	THR	3.7
1	B	200	GLY	3.6
1	A	180	ARG	3.6
1	B	254	ASN	3.6
1	B	345	MET	3.5
1	A	6	THR	3.4
1	A	308	SER	3.3
1	B	130	ASP	3.0
1	B	389	HIS	2.9
1	A	200	GLY	2.6
1	B	131	PHE	2.3
1	B	3	ASN	2.3
1	A	228	ILE	2.2
1	B	228	ILE	2.2
1	B	253	ASN	2.1
1	B	299	ILE	2.1
1	A	131	PHE	2.0
1	A	261	ALA	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. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
2	SO4	B	601	5/5	0.96	0.19	31,31,53,55	0
2	SO4	A	600	5/5	0.97	0.18	16,33,47,57	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.