



Full wwPDB X-ray Structure Validation Report ⓘ

Sep 6, 2023 – 09:42 PM EDT

PDB ID : 4FFA
Title : Sulfatase from Mycobacterium tuberculosis
Authors : Sogi, K.M.; Gartner, Z.J.; Breidenbach, M.A.; Bertozzi, C.R.
Deposited on : 2012-05-31
Resolution : 2.50 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

MolProbity : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtrriage (Phenix) : 1.13
EDS : 2.35
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) : 2.35

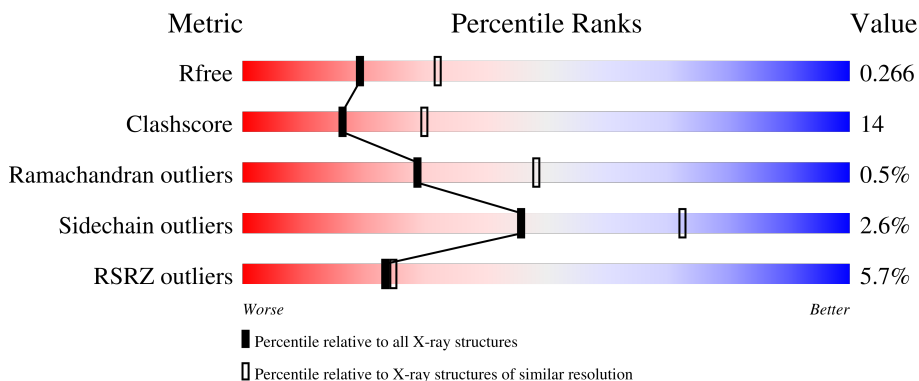
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.50 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	4661 (2.50-2.50)
Clashscore	141614	5346 (2.50-2.50)
Ramachandran outliers	138981	5231 (2.50-2.50)
Sidechain outliers	138945	5233 (2.50-2.50)
RSRZ outliers	127900	4559 (2.50-2.50)

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

Mol	Chain	Length	Quality of chain
1	A	298	<div style="display: flex; align-items: center;"> <div style="width: 2%; height: 10px; background-color: red; margin-right: 2px;"></div> <div style="width: 58%; height: 10px; background-color: green; margin-right: 2px;"></div> <div style="width: 19%; height: 10px; background-color: yellow; margin-right: 2px;"></div> <div style="width: 21%; height: 10px; background-color: grey;"></div> </div> <p style="margin-left: 20px;">2% 60% 21% 19%</p>
1	B	298	<div style="display: flex; align-items: center;"> <div style="width: 6%; height: 10px; background-color: red; margin-right: 2px;"></div> <div style="width: 54%; height: 10px; background-color: green; margin-right: 2px;"></div> <div style="width: 18%; height: 10px; background-color: yellow; margin-right: 2px;"></div> <div style="width: 2%; height: 10px; background-color: orange; margin-right: 2px;"></div> <div style="width: 19%; height: 10px; background-color: grey;"></div> </div> <p style="margin-left: 20px;">6% 60% 18% • 19%</p>
1	C	298	<div style="display: flex; align-items: center;"> <div style="width: 7%; height: 10px; background-color: red; margin-right: 2px;"></div> <div style="width: 45%; height: 10px; background-color: green; margin-right: 2px;"></div> <div style="width: 26%; height: 10px; background-color: yellow; margin-right: 2px;"></div> <div style="width: 2%; height: 10px; background-color: orange; margin-right: 2px;"></div> <div style="width: 21%; height: 10px; background-color: grey;"></div> </div> <p style="margin-left: 20px;">7% 52% 26% • 21%</p>
1	D	298	<div style="display: flex; align-items: center;"> <div style="width: 3%; height: 10px; background-color: red; margin-right: 2px;"></div> <div style="width: 50%; height: 10px; background-color: green; margin-right: 2px;"></div> <div style="width: 24%; height: 10px; background-color: yellow; margin-right: 2px;"></div> <div style="width: 23%; height: 10px; background-color: grey;"></div> </div> <p style="margin-left: 20px;">3% 53% 24% 23%</p>

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 7490 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 Rv3406 alkyl sulfatase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	242	Total 1900	C 1199	N 349	O 347	S 5	0	0	0
1	B	240	Total 1880	C 1186	N 347	O 343	S 4	0	0	0
1	C	234	Total 1840	C 1164	N 338	O 334	S 4	0	0	0
1	D	230	Total 1809	C 1141	N 334	O 330	S 4	0	0	0

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-3	GLY	-	expression tag	UNP P65075
A	-2	SER	-	expression tag	UNP P65075
A	-1	HIS	-	expression tag	UNP P65075
B	-3	GLY	-	expression tag	UNP P65075
B	-2	SER	-	expression tag	UNP P65075
B	-1	HIS	-	expression tag	UNP P65075
C	-3	GLY	-	expression tag	UNP P65075
C	-2	SER	-	expression tag	UNP P65075
C	-1	HIS	-	expression tag	UNP P65075
D	-3	GLY	-	expression tag	UNP P65075
D	-2	SER	-	expression tag	UNP P65075
D	-1	HIS	-	expression tag	UNP P65075

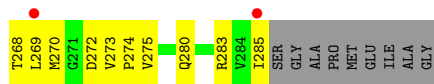
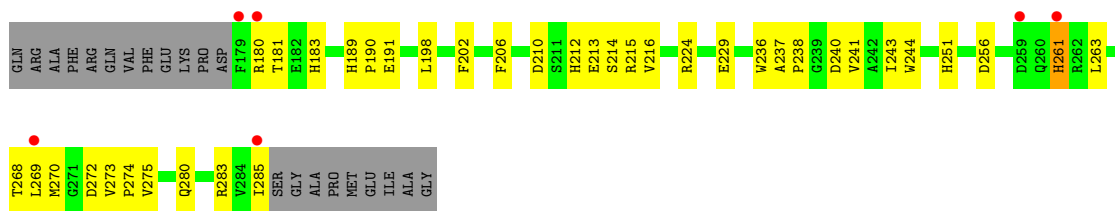
- Molecule 2 is NITRATE ION (three-letter code: NO3) (formula: NO₃).



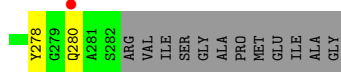
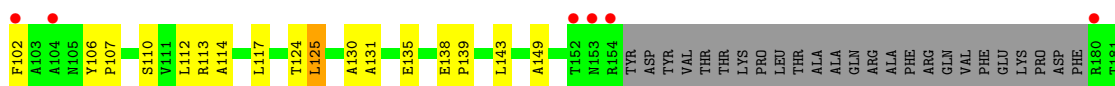
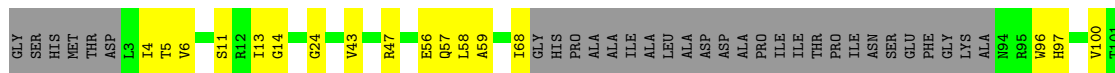
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	N O	0	0
			4	1 3		

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	15	Total	O	0	0
			15	15		
3	B	18	Total	O	0	0
			18	18		
3	C	9	Total	O	0	0
			9	9		
3	D	15	Total	O	0	0
			15	15		



● Molecule 1: Rv3406 alkyl sulfatase



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	64.75Å 128.47Å 139.33Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	45.60 – 2.50 45.60 – 2.49	Depositor EDS
% Data completeness (in resolution range)	(Not available) (45.60-2.50) 98.2 (45.60-2.49)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.70 (at 2.48Å)	Xtrriage
Refinement program	PHENIX (phenix.refine: 1.5_2)	Depositor
R, R_{free}	0.217 , 0.272 0.213 , 0.266	Depositor DCC
R_{free} test set	2040 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å ²)	49.4	Xtrriage
Anisotropy	1.075	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 56.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	7490	wwPDB-VP
Average B, all atoms (Å ²)	67.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.60% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

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

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: NO3

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	0.38	0/1945	0.56	0/2649
1	B	0.40	0/1925	0.55	0/2623
1	C	0.37	0/1883	0.53	0/2566
1	D	0.37	0/1851	0.57	0/2522
All	All	0.38	0/7604	0.55	0/10360

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	1900	0	1861	51	0
1	B	1880	0	1841	55	0
1	C	1840	0	1806	62	0
1	D	1809	0	1773	58	0
2	A	4	0	0	0	0
3	A	15	0	0	0	0
3	B	18	0	0	0	0
3	C	9	0	0	0	0
3	D	15	0	0	0	0
All	All	7490	0	7281	211	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 14.

All (211) 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:222:GLN:HE22	1:D:250:GLN:HE22	1.09	0.90
1:A:94:ASN:HD22	1:A:253:ALA:H	1.21	0.87
1:D:215:ARG:O	1:D:219:GLU:HG2	1.76	0.86
1:D:114:ALA:HB1	1:D:117:LEU:HD21	1.59	0.84
1:B:210:ASP:OD1	1:B:213:GLU:HG3	1.82	0.79
1:B:216:VAL:CG1	1:D:216:VAL:HG13	2.11	0.79
1:C:261:HIS:CE1	1:C:263:LEU:HB2	2.18	0.79
1:C:53:ASP:H	1:C:56:GLU:HB2	1.50	0.75
1:C:261:HIS:HE1	1:C:263:LEU:HD22	1.51	0.73
1:A:216:VAL:HG13	1:C:216:VAL:CG1	2.19	0.72
1:B:100:VAL:O	1:B:100:VAL:HG23	1.90	0.72
1:C:106:TYR:HB2	1:C:107:PRO:HD2	1.72	0.72
1:C:116:SER:HB3	1:C:261:HIS:NE2	2.06	0.71
1:A:266:ARG:HG2	1:A:266:ARG:HH11	1.55	0.71
1:B:119:SER:H	1:B:260:GLN:NE2	1.90	0.69
1:C:61:ALA:HB1	1:C:269:LEU:HD21	1.75	0.69
1:D:114:ALA:CB	1:D:117:LEU:HD21	2.23	0.68
1:D:57:GLN:NE2	1:D:265:HIS:HD2	1.92	0.67
1:C:152:THR:HG22	1:C:180:ARG:HG2	1.76	0.67
1:C:39:LEU:O	1:C:42:LYS:HE3	1.95	0.66
1:A:115:VAL:HG22	1:A:263:LEU:O	1.95	0.66
1:A:210:ASP:OD1	1:A:213:GLU:HG3	1.97	0.65
1:B:47:ARG:HG3	1:B:240:ASP:OD1	1.97	0.65
1:B:216:VAL:HG13	1:D:216:VAL:HG13	1.79	0.65
1:B:119:SER:H	1:B:260:GLN:HE22	1.44	0.64
1:A:57:GLN:NE2	1:A:265:HIS:HD2	1.95	0.64
1:B:127:ALA:HB2	1:B:231:THR:HG22	1.80	0.63
1:A:288:ALA:HB1	1:A:289:PRO:HD2	1.80	0.63
1:B:100:VAL:HG22	1:B:107:PRO:HD2	1.81	0.63
1:C:106:TYR:HB2	1:C:107:PRO:CD	2.31	0.61
1:D:278:TYR:HB2	1:D:280:GLN:OE1	2.01	0.61
1:D:68:ILE:HD11	1:D:270:MET:SD	2.40	0.60
1:A:57:GLN:NE2	1:A:113:ARG:HE	1.99	0.60
1:A:227:MET:O	1:A:231:THR:HG23	2.01	0.59
1:D:112:LEU:CD1	1:D:266:ARG:HB2	2.33	0.59
1:A:99:ASP:CG	1:A:251:HIS:HE1	2.05	0.59
1:B:58:LEU:C	1:B:58:LEU:HD13	2.24	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:51:GLN:HG2	1:C:52:LEU:N	2.18	0.58
1:B:53:ASP:HA	1:B:113:ARG:HH12	1.68	0.58
1:B:224:ARG:HD2	1:D:213:GLU:OE2	2.03	0.58
1:A:99:ASP:OD1	1:A:251:HIS:HE1	1.85	0.58
1:D:211:SER:O	1:D:215:ARG:HG2	2.03	0.58
1:B:99:ASP:CG	1:B:251:HIS:HE1	2.07	0.57
1:B:216:VAL:CG1	1:D:216:VAL:CG1	2.80	0.57
1:C:256:ASP:O	1:D:11:SER:HB3	2.05	0.57
1:B:68:ILE:HG12	1:B:268:THR:HB	1.86	0.56
1:B:153:ASN:ND2	1:B:179:PHE:HD2	2.03	0.56
1:C:275:VAL:HA	1:C:280:GLN:O	2.05	0.56
1:C:100:VAL:O	1:C:106:TYR:HB3	2.06	0.56
1:C:273:VAL:HG13	1:C:274:PRO:HD2	1.88	0.55
1:D:47:ARG:NH1	1:D:240:ASP:OD2	2.39	0.55
1:B:12:ARG:HD3	1:B:229:GLU:O	2.06	0.55
1:B:237:ALA:O	1:B:240:ASP:HB2	2.06	0.55
1:B:68:ILE:HD12	1:B:68:ILE:C	2.27	0.55
1:D:275:VAL:HA	1:D:280:GLN:O	2.07	0.55
1:C:237:ALA:O	1:C:240:ASP:HB2	2.07	0.55
1:C:59:ALA:O	1:C:63:LEU:HD13	2.08	0.54
1:C:117:LEU:HD12	1:C:238:PRO:HD3	1.89	0.54
1:A:7:LYS:HD2	1:A:8:LYS:H	1.72	0.54
1:A:130:ALA:HB2	1:A:196:THR:HG22	1.89	0.54
1:C:151:HIS:ND1	1:C:183:HIS:HD2	2.06	0.54
1:A:54:ASP:OD1	1:A:113:ARG:NH2	2.41	0.53
1:C:212:HIS:O	1:C:216:VAL:HG23	2.08	0.53
1:A:6:VAL:HG13	1:A:6:VAL:O	2.09	0.53
1:C:60:PHE:O	1:C:63:LEU:HB2	2.08	0.53
1:C:206:PHE:HD2	1:C:214:SER:HA	1.74	0.52
1:D:125:LEU:HD13	1:D:254:ILE:HD11	1.90	0.52
1:B:21:ARG:N	1:B:21:ARG:HD2	2.24	0.52
1:A:8:LYS:HE3	1:A:11:SER:HA	1.90	0.52
1:A:99:ASP:OD1	1:A:251:HIS:CE1	2.63	0.52
1:D:4:ILE:HG13	1:D:5:THR:N	2.23	0.52
1:A:7:LYS:HD2	1:A:8:LYS:N	2.25	0.52
1:C:102:PHE:CD2	1:C:153:ASN:HB3	2.46	0.51
1:B:46:PHE:HE2	1:B:243:ILE:HD12	1.76	0.51
1:B:53:ASP:O	1:B:54:ASP:C	2.47	0.51
1:C:215:ARG:NH1	1:C:215:ARG:HG2	2.26	0.51
1:A:137:PRO:HD2	1:A:140:LEU:HD12	1.93	0.50
1:A:285:ILE:N	1:A:285:ILE:HD12	2.27	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:125:LEU:CD1	1:D:233:ARG:HG3	2.42	0.50
1:A:106:TYR:HB2	1:A:107:PRO:HD2	1.94	0.50
1:A:288:ALA:HB1	1:A:289:PRO:CD	2.41	0.50
1:D:106:TYR:HB2	1:D:107:PRO:HD2	1.94	0.49
1:A:27:ASP:OD1	1:A:28:PRO:HD2	2.13	0.49
1:B:100:VAL:CG2	1:B:107:PRO:CD	2.90	0.49
1:C:58:LEU:HD13	1:C:58:LEU:C	2.33	0.49
1:C:105:ASN:HB3	1:C:273:VAL:HG23	1.95	0.49
1:D:189:HIS:CE1	1:D:191:GLU:HB2	2.47	0.49
1:D:125:LEU:CD1	1:D:254:ILE:HD11	2.43	0.49
1:B:106:TYR:HB2	1:B:107:PRO:HD2	1.95	0.48
1:D:47:ARG:HD2	1:D:240:ASP:OD1	2.13	0.48
1:A:57:GLN:HE21	1:A:113:ARG:HE	1.59	0.48
1:D:131:ALA:O	1:D:135:GLU:HG2	2.14	0.48
1:A:111:VAL:HG22	1:A:243:ILE:HG12	1.94	0.48
1:A:213:GLU:OE2	1:C:224:ARG:HD2	2.14	0.48
1:A:210:ASP:OD1	1:A:210:ASP:C	2.53	0.47
1:C:96:TRP:CH2	1:C:125:LEU:HB3	2.49	0.47
1:C:6:VAL:HG23	1:C:6:VAL:O	2.13	0.47
1:C:215:ARG:HG2	1:C:215:ARG:HH11	1.79	0.47
1:A:187:ARG:NH1	1:A:247:ARG:HG2	2.29	0.47
1:C:181:THR:HG23	1:C:283:ARG:O	2.14	0.47
1:C:99:ASP:CG	1:C:251:HIS:HE1	2.17	0.47
1:B:215:ARG:NE	1:B:215:ARG:HA	2.30	0.47
1:D:97:HIS:NE2	1:D:251:HIS:CE1	2.82	0.47
1:A:210:ASP:CG	1:A:213:GLU:HG3	2.35	0.47
1:A:223:ARG:O	1:A:227:MET:HE2	2.15	0.47
1:D:206:PHE:HD2	1:D:214:SER:HA	1.80	0.47
1:D:6:VAL:O	1:D:6:VAL:HG23	2.15	0.47
1:D:57:GLN:NE2	1:D:113:ARG:HE	2.13	0.47
1:A:68:ILE:HD13	1:A:290:MET:CE	2.45	0.47
1:C:110:SER:HB2	1:C:244:TRP:CZ2	2.50	0.47
1:A:47:ARG:NH1	1:A:240:ASP:OD2	2.48	0.46
1:D:57:GLN:HE21	1:D:113:ARG:HE	1.63	0.46
1:D:112:LEU:HD12	1:D:266:ARG:HB2	1.98	0.46
1:B:111:VAL:HG22	1:B:243:ILE:HG12	1.97	0.46
1:C:52:LEU:HD12	1:C:241:VAL:HG21	1.97	0.46
1:B:101:THR:OG1	1:B:151:HIS:HD2	1.99	0.46
1:B:216:VAL:HG11	1:D:216:VAL:HG13	1.95	0.46
1:B:284:VAL:O	1:B:285:ILE:HD13	2.16	0.46
1:C:68:ILE:HD11	1:C:270:MET:HA	1.97	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:99:ASP:OD1	1:C:251:HIS:HE1	1.98	0.46
1:B:232:ILE:HG13	1:B:233:ARG:N	2.31	0.46
1:C:122:GLY:O	1:C:236:TRP:HD1	1.99	0.46
1:C:180:ARG:HH11	1:C:285:ILE:HG22	1.80	0.46
1:D:24:GLY:HA3	1:D:59:ALA:HB1	1.97	0.46
1:A:43:VAL:HG23	1:A:244:TRP:HB3	1.97	0.46
1:A:216:VAL:HG13	1:C:216:VAL:HG11	1.96	0.45
1:C:102:PHE:CE2	1:C:153:ASN:HB3	2.51	0.45
1:B:51:GLN:H	1:B:51:GLN:NE2	2.14	0.45
1:A:68:ILE:HD13	1:A:290:MET:HE2	1.98	0.45
1:D:112:LEU:HD13	1:D:266:ARG:HB2	1.98	0.45
1:B:60:PHE:O	1:B:60:PHE:CG	2.70	0.45
1:C:54:ASP:OD1	1:C:113:ARG:NH2	2.50	0.45
1:D:130:ALA:HB2	1:D:196:THR:HG22	1.97	0.45
1:A:266:ARG:HG2	1:A:266:ARG:NH1	2.25	0.45
1:B:51:GLN:H	1:B:51:GLN:CD	2.20	0.45
1:C:12:ARG:NH1	1:C:229:GLU:HB3	2.32	0.45
1:D:110:SER:HB2	1:D:244:TRP:CZ2	2.52	0.44
1:B:276:ASP:OD1	1:B:276:ASP:C	2.55	0.44
1:B:47:ARG:HD2	1:B:240:ASP:OD1	2.16	0.44
1:A:98:THR:HB	1:A:101:THR:HG21	1.98	0.44
1:B:99:ASP:OD1	1:B:251:HIS:HE1	2.00	0.44
1:C:58:LEU:HD13	1:C:58:LEU:O	2.17	0.44
1:C:263:LEU:HD12	1:C:263:LEU:HA	1.84	0.44
1:B:112:LEU:CD1	1:B:266:ARG:HB2	2.48	0.44
1:D:227:MET:O	1:D:231:THR:HG23	2.18	0.44
1:A:100:VAL:HG12	1:A:100:VAL:O	2.18	0.44
1:D:56:GLU:HA	1:D:56:GLU:OE1	2.18	0.44
1:D:96:TRP:O	1:D:201:ASP:HB2	2.18	0.44
1:B:4:ILE:HG12	1:B:33:GLU:OE1	2.18	0.43
1:C:210:ASP:OD1	1:C:213:GLU:HB2	2.18	0.43
1:C:102:PHE:HE2	1:C:202:PHE:CE1	2.36	0.43
1:D:189:HIS:CG	1:D:192:THR:HG1	2.36	0.43
1:B:147:LEU:HD23	1:B:185:VAL:HG21	2.01	0.43
1:D:124:THR:HG22	1:D:125:LEU:N	2.34	0.43
1:A:189:HIS:HB3	1:A:192:THR:OG1	2.17	0.43
1:C:43:VAL:HG23	1:C:244:TRP:HB3	2.00	0.43
1:D:275:VAL:HG23	1:D:280:GLN:O	2.18	0.43
1:A:143:LEU:HB2	1:C:143:LEU:HB2	2.00	0.43
1:A:189:HIS:HA	1:A:190:PRO:HD3	1.90	0.43
1:C:67:PRO:C	1:C:68:ILE:HG13	2.39	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:216:VAL:HG13	1:C:216:VAL:HG12	1.99	0.43
1:D:107:PRO:HB3	1:D:268:THR:CG2	2.48	0.43
1:C:183:HIS:HB3	1:C:198:LEU:HD23	2.01	0.43
1:C:47:ARG:HD3	1:C:240:ASP:OD1	2.19	0.43
1:B:100:VAL:O	1:B:100:VAL:CG2	2.63	0.42
1:C:107:PRO:HB3	1:C:268:THR:CG2	2.49	0.42
1:A:224:ARG:HD2	1:C:213:GLU:OE1	2.19	0.42
1:B:100:VAL:CG2	1:B:107:PRO:HD2	2.47	0.42
1:C:180:ARG:NH1	1:C:285:ILE:HG22	2.34	0.42
1:D:217:LEU:HD23	1:D:217:LEU:HA	1.85	0.42
1:D:222:GLN:NE2	1:D:250:GLN:HE22	1.94	0.42
1:D:107:PRO:O	1:D:246:ASN:HB3	2.19	0.42
1:B:216:VAL:HG13	1:D:216:VAL:CG1	2.45	0.42
1:C:31:VAL:HG21	1:C:63:LEU:HB3	2.00	0.42
1:A:13:ILE:HG12	1:A:14:GLY:N	2.35	0.42
1:A:130:ALA:CB	1:A:196:THR:HG22	2.50	0.42
1:D:13:ILE:HG12	1:D:14:GLY:N	2.35	0.42
1:B:110:SER:HB2	1:B:244:TRP:CZ2	2.55	0.42
1:D:100:VAL:HG12	1:D:102:PHE:CE2	2.54	0.42
1:B:7:LYS:HZ3	1:B:8:LYS:H	1.67	0.41
1:B:53:ASP:OD1	1:B:54:ASP:N	2.53	0.41
1:B:100:VAL:HG22	1:B:107:PRO:CD	2.44	0.41
1:D:125:LEU:HD11	1:D:233:ARG:HD2	2.01	0.41
1:C:111:VAL:HG22	1:C:243:ILE:HG12	2.03	0.41
1:C:189:HIS:HA	1:C:190:PRO:HD3	1.86	0.41
1:D:187:ARG:NH1	1:D:274:PRO:HG3	2.35	0.41
1:B:44:VAL:HG23	1:B:243:ILE:HB	2.01	0.41
1:D:97:HIS:NE2	1:D:251:HIS:NE2	2.68	0.41
1:A:57:GLN:HE22	1:A:113:ARG:HB3	1.86	0.41
1:A:95:ARG:HD3	1:A:201:ASP:OD1	2.20	0.41
1:B:107:PRO:HB3	1:B:268:THR:CG2	2.50	0.41
1:D:58:LEU:O	1:D:59:ALA:C	2.59	0.41
1:A:52:LEU:HD12	1:A:241:VAL:HG21	2.02	0.41
1:B:9:LEU:HD23	1:B:9:LEU:HA	1.94	0.41
1:B:108:ALA:HA	1:B:247:ARG:HG3	2.03	0.41
1:C:35:ARG:O	1:C:39:LEU:HG	2.20	0.41
1:C:189:HIS:HE1	1:C:191:GLU:HB2	1.86	0.41
1:D:149:ALA:O	1:D:182:GLU:HA	2.21	0.41
1:D:186:VAL:HG22	1:D:197:LEU:HD23	2.02	0.41
1:A:264:MET:HE3	1:A:264:MET:HB3	1.93	0.40
1:B:93:ALA:O	1:B:253:ALA:N	2.46	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:6:VAL:O	1:B:6:VAL:HG23	2.21	0.40
1:B:101:THR:OG1	1:B:151:HIS:CD2	2.74	0.40
1:D:57:GLN:HE22	1:D:113:ARG:HG2	1.85	0.40
1:D:138:GLU:HB3	1:D:139:PRO:HD3	2.04	0.40
1:D:14:GLY:HA2	1:D:43:VAL:O	2.22	0.40
1:A:216:VAL:CG1	1:C:216:VAL:CG1	2.96	0.40
1:B:30:ALA:O	1:B:34:ILE:HG13	2.22	0.40
1:B:143:LEU:HB2	1:D:143:LEU:HB2	2.02	0.40
1:A:257:TYR:CD2	1:A:257:TYR:N	2.89	0.40
1:C:27:ASP:OD1	1:C:28:PRO:HD2	2.22	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	236/298 (79%)	223 (94%)	11 (5%)	2 (1%)	19	35
1	B	234/298 (78%)	220 (94%)	12 (5%)	2 (1%)	17	31
1	C	228/298 (76%)	210 (92%)	17 (8%)	1 (0%)	34	54
1	D	224/298 (75%)	209 (93%)	15 (7%)	0	100	100
All	All	922/1192 (77%)	862 (94%)	55 (6%)	5 (0%)	29	48

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	260	GLN
1	B	54	ASP
1	A	199	ALA
1	B	260	GLN
1	C	52	LEU

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	198/240 (82%)	193 (98%)	5 (2%)	47	73
1	B	195/240 (81%)	188 (96%)	7 (4%)	35	61
1	C	191/240 (80%)	187 (98%)	4 (2%)	53	78
1	D	188/240 (78%)	184 (98%)	4 (2%)	53	78
All	All	772/960 (80%)	752 (97%)	20 (3%)	46	72

All (20) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	5	THR
1	A	116	SER
1	A	180	ARG
1	A	211	SER
1	A	257	TYR
1	B	21	ARG
1	B	47	ARG
1	B	51	GLN
1	B	53	ASP
1	B	214	SER
1	B	232	ILE
1	B	260	GLN
1	C	142	CYS
1	C	153	ASN
1	C	261	HIS
1	C	272	ASP
1	D	125	LEU
1	D	205	SER
1	D	210	ASP
1	D	261	HIS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (15) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	57	GLN
1	A	94	ASN
1	A	251	HIS
1	A	265	HIS
1	B	151	HIS
1	B	251	HIS
1	B	260	GLN
1	C	57	GLN
1	C	151	HIS
1	C	251	HIS
1	C	261	HIS
1	C	265	HIS
1	D	57	GLN
1	D	222	GLN
1	D	265	HIS

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 monosaccharides in this entry.

5.6 Ligand geometry [i](#)

1 ligand 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
2	NO3	A	301	-	1,3,3	3.47	1 (100%)	0,3,3	-	-

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	301	NO3	O1-N	3.47	1.40	1.24

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, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	242/298 (81%)	0.32	7 (2%) 51 55	46, 63, 84, 102	0
1	B	240/298 (80%)	0.69	17 (7%) 16 16	46, 62, 87, 104	0
1	C	234/298 (78%)	0.71	20 (8%) 10 10	50, 70, 94, 111	0
1	D	230/298 (77%)	0.42	10 (4%) 35 38	51, 67, 86, 113	0
All	All	946/1192 (79%)	0.53	54 (5%) 23 25	46, 65, 90, 113	0

All (54) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	259	ASP	5.7
1	C	179	PHE	5.6
1	C	285	ILE	4.9
1	A	177	PRO	4.9
1	C	64	LEU	4.7
1	B	93	ALA	4.4
1	C	23	GLY	4.3
1	D	180	ARG	4.2
1	C	31	VAL	4.2
1	D	152	THR	4.2
1	C	25	ASP	4.0
1	D	204	ARG	3.9
1	D	154	ARG	3.9
1	D	270	MET	3.7
1	D	188	VAL	3.7
1	B	259	ASP	3.6
1	B	179	PHE	3.5
1	B	263	LEU	3.5
1	B	288	ALA	3.4
1	C	28	PRO	3.4
1	B	261	HIS	3.3

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Mol	Chain	Res	Type	RSRZ
1	C	261	HIS	3.2
1	B	120	TYR	3.2
1	C	24	GLY	3.1
1	C	180	ARG	3.0
1	D	153	ASN	2.9
1	B	283	ARG	2.9
1	B	121	GLY	2.8
1	A	21	ARG	2.8
1	D	280	GLN	2.7
1	C	4	ILE	2.6
1	B	129	THR	2.6
1	B	262	ARG	2.6
1	A	6	VAL	2.5
1	C	150	LEU	2.5
1	A	4	ILE	2.4
1	C	29	ALA	2.4
1	B	287	GLY	2.3
1	C	22	LEU	2.3
1	A	154	ARG	2.3
1	A	39	LEU	2.3
1	B	265	HIS	2.3
1	B	216	VAL	2.2
1	B	117	LEU	2.2
1	C	26	LEU	2.2
1	D	102	PHE	2.2
1	B	257	TYR	2.2
1	B	118	PRO	2.2
1	C	269	LEU	2.1
1	C	58	LEU	2.0
1	D	104	ALA	2.0
1	C	34	ILE	2.0
1	A	179	PHE	2.0
1	C	56	GLU	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 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, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	NO3	A	301	4/4	0.89	0.15	72,74,78,79	0

6.5 Other polymers [i](#)

There are no such residues in this entry.