Full wwPDB X-ray Structure Validation Report (i)

May 22, 2020 – 05:07 am BST

PDB ID	:	3WFS
Title	:	tRNA processing enzyme complex 3
Authors	:	Yamashita, S.; Takeshita, D.; Tomita, K.
Deposited on	:	2013-07-23
Resolution	:	3.31 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 (i) symbol.
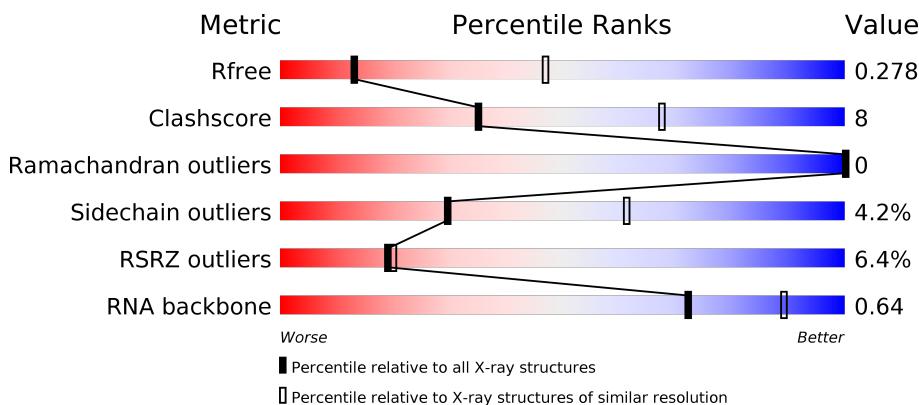
1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 3.31 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	Percentile Ranks	Value
Rfree		0.278
Clashscore		8
Ramachandran outliers		0
Sidechain outliers		4.2%
RSRZ outliers		6.4%
RNA backbone		0.64

Worse ... *Better*

■ Percentile relative to all X-ray structures
▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R$_{free}$	130704	1089 (3.36-3.28)
Clashscore	141614	1137 (3.36-3.28)
Ramachandran outliers	138981	1115 (3.36-3.28)
Sidechain outliers	138945	1114 (3.36-3.28)
RSRZ outliers	127900	1059 (3.36-3.28)
RNA backbone	3102	1125 (3.74-2.90)

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 >=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 <=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	74	20% / 66% / 30% / •
1	B	74	19% / 69% / 26% / 5%
2	C	512	3% / 67% / 17% / • / 15%
2	D	512	4% / 66% / 19% / • / 13%

2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 10171 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.
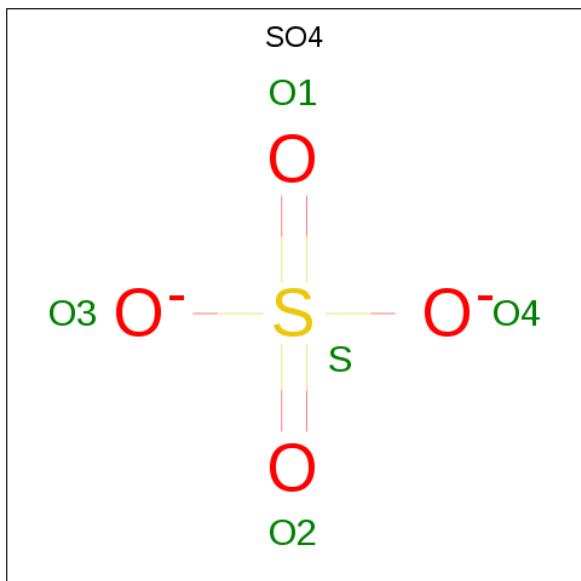
- Molecule 1 is a RNA chain called RNA (74-MER).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	74	Total	C	N	O	P	0	0	0
			1565	696	279	516	74			
1	B	74	Total	C	N	O	P	0	0	0
			1565	696	279	516	74			

- Molecule 2 is a protein called Poly A polymerase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	C	436	Total	C	N	O	S	0	0	0
			3470	2234	595	634	7			
2	D	445	Total	C	N	O	S	0	0	0
			3551	2290	612	642	7			

- Molecule 3 is SULFATE ION (three-letter code: SO4) (formula: O_4S).

SO4

O1

O

O3 O⁻ — S — O⁻ O4

S

O

O2
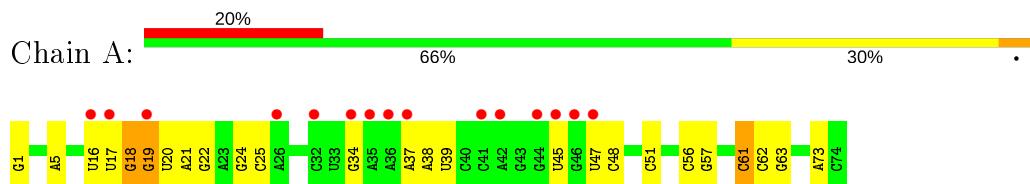
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	C	1	Total 5	O 4	S 1	0	0
3	C	1	Total 5	O 4	S 1	0	0
3	D	1	Total 5	O 4	S 1	0	0
3	D	1	Total 5	O 4	S 1	0	0
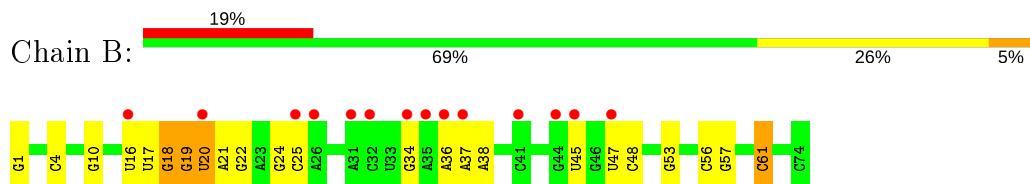
3 Residue-property plots ⓘ

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.
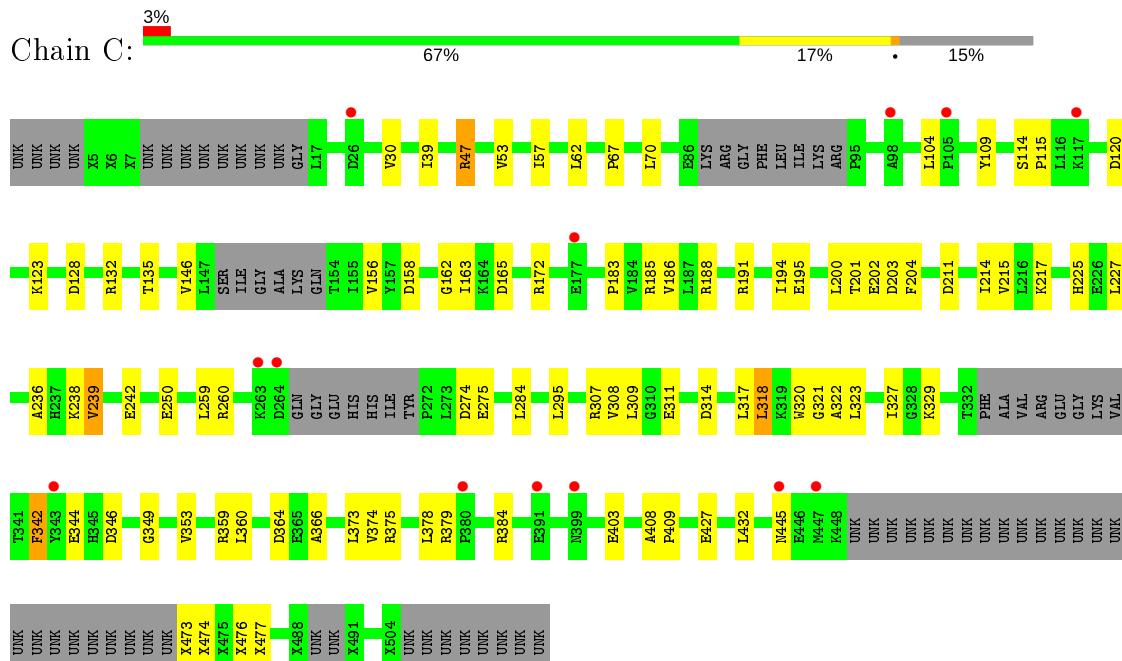
• Molecule 1: RNA (74-MER)

Chain A:

• Molecule 1: RNA (74-MER)

Chain B:

• Molecule 2: Poly A polymerase

Chain C:
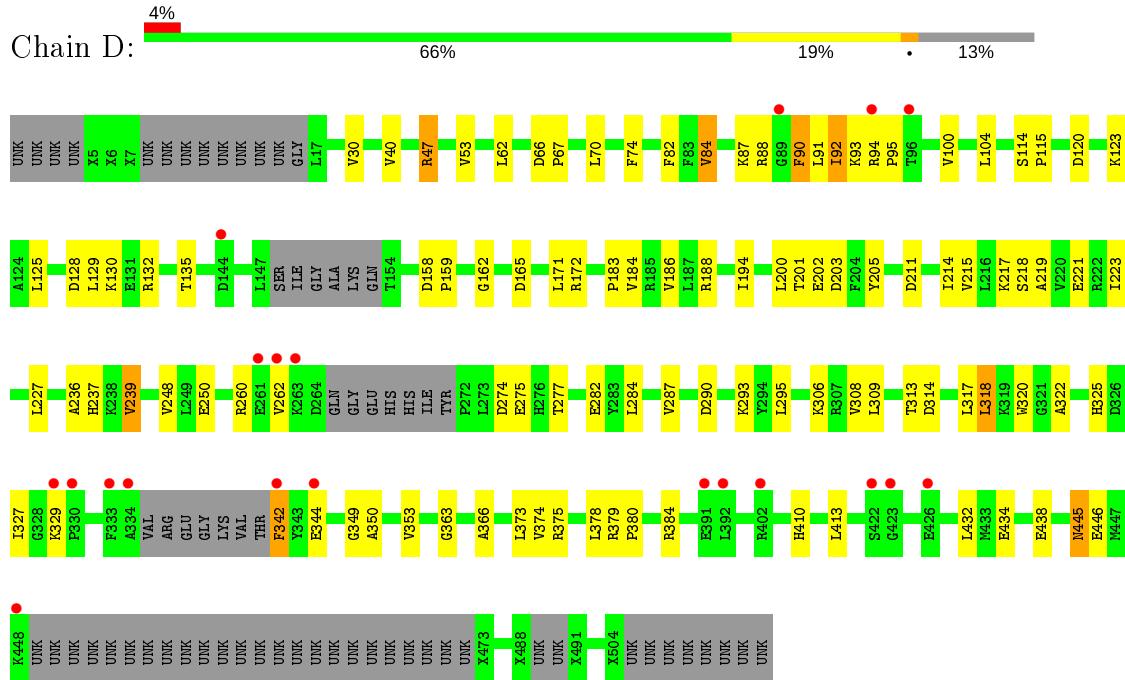
• Molecule 2: Poly A polymerase

4 Data and refinement statistics (i)

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	177.21Å　　148.11Å　　92.25Å 90.00°　　98.54°　　90.00°	Depositor
Resolution (Å)	19.86　–　3.31 45.61　–　3.31	Depositor EDS
% Data completeness (in resolution range)	77.8 (19.86-3.31) 77.6 (45.61-3.31)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$<I/\sigma(I)>$ [1]	4.08 (at 3.32Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.8.2_1309)	Depositor
R, R_{free}	0.229　,　0.276 0.230　,　0.278	Depositor DCC
R_{free} test set	1367 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å^2)	62.8	Xtriage
Anisotropy	0.023	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.30 , 82.1	EDS
L-test for twinning[2]	$<|L|> = 0.43, <L^2> = 0.25$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.84	EDS
Total number of atoms	10171	wwPDB-VP
Average B, all atoms (Å^2)	113.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 8.20% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1]Intensities estimated from amplitudes.
[2]Theoretical values of $<|L|>$, $<L^2>$ 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	0.30	1/1748 (0.1%)	0.71	0/2722
1	B	0.29	1/1748 (0.1%)	0.71	0/2722
2	C	0.23	0/3375	0.40	0/4546
2	D	0.23	0/3458	0.42	0/4656
All	All	0.25	2/10329 (0.0%)	0.54	0/14646

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	1	G	OP3-P	-10.56	1.48	1.61
1	B	1	G	OP3-P	-10.46	1.48	1.61

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	1565	0	792	17	0
1	B	1565	0	792	18	0
2	C	3470	0	3358	57	0
2	D	3551	0	3452	73	0
3	C	10	0	0	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	D	10	0	0	1	0
All	All	10171	0	8394	152	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 (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:A:56:C:C4	2:C:476:UNK:CB	2.35	1.09
2:D:308:VAL:HG12	2:D:309:LEU:HD13	1.47	0.97
2:D:93:LYS:HB3	2:D:95:PRO:HD3	1.50	0.92
1:B:37:A:H3'	1:B:38:A:C8	2.11	0.85
1:A:56:C:C5	2:C:476:UNK:CB	2.65	0.80
2:C:183:PRO:HG3	2:C:217:LYS:HB2	1.67	0.76
2:D:308:VAL:HG12	2:D:309:LEU:CD1	2.15	0.76
2:C:135:THR:HB	2:C:162:GLY:HA2	1.69	0.74
2:C:194:ILE:HG13	2:C:239:VAL:HG22	1.71	0.73
1:A:18:G:O2'	1:A:57:G:N2	2.22	0.72
2:D:88:ARG:HH12	2:D:219:ALA:HB2	1.53	0.72
2:C:225:HIS:NE2	2:C:311:GLU:OE2	2.23	0.70
1:B:37:A:H3'	1:B:38:A:H8	1.57	0.69
1:A:19:G:C2	2:C:473:UNK:O	2.46	0.68
2:C:284:LEU:HD22	2:C:322:ALA:HB2	1.76	0.68
1:B:19:G:N2	1:B:57:G:H1'	2.09	0.67
2:D:93:LYS:N	2:D:94:ARG:HA	2.09	0.67
1:A:73:A:H61	2:C:185:ARG:HH21	1.43	0.66
2:D:94:ARG:HD3	2:D:95:PRO:HD2	1.78	0.66
2:D:128:ASP:OD1	2:D:132:ARG:NH1	2.28	0.66
1:B:37:A:C3'	1:B:38:A:C8	2.79	0.66
2:D:87:LYS:HB2	2:D:94:ARG:HG2	1.77	0.65
1:A:38:A:O2'	1:A:39:U:H5'	1.97	0.65
2:C:308:VAL:HG21	2:C:317:LEU:HD11	1.80	0.64
2:D:183:PRO:HG3	2:D:217:LYS:HB3	1.80	0.64
2:C:165:ASP:OD1	2:C:172:ARG:NH2	2.31	0.63
2:D:308:VAL:HG11	2:D:366:ALA:HB2	1.80	0.63
2:C:318:LEU:HD23	2:C:373:LEU:HD21	1.79	0.63
2:C:353:VAL:HG21	2:C:374:VAL:HG21	1.80	0.62
2:D:384:ARG:HD3	2:D:432:LEU:HB2	1.81	0.62
2:D:250:GLU:OE2	2:D:260:ARG:NH2	2.32	0.61
2:D:308:VAL:HG21	2:D:317:LEU:HD11	1.81	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:318:LEU:HG	2:D:410:HIS:HB3	1.81	0.61
1:B:18:G:O2'	1:B:57:G:N2	2.27	0.61
2:C:128:ASP:OD1	2:C:132:ARG:NH1	2.34	0.61
2:D:194:ILE:HG13	2:D:239:VAL:HG22	1.83	0.61
2:C:183:PRO:HB3	2:C:214:ILE:HG13	1.84	0.60
2:D:314:ASP:N	2:D:314:ASP:OD1	2.35	0.59
2:D:87:LYS:O	2:D:88:ARG:HG2	2.02	0.58
2:D:135:THR:HB	2:D:162:GLY:HA2	1.85	0.58
2:D:308:VAL:CG1	2:D:309:LEU:HD13	2.28	0.58
2:D:74:PHE:HD2	2:D:100:VAL:HG21	1.68	0.58
2:D:308:VAL:CG1	2:D:366:ALA:HB2	2.34	0.58
2:C:191:ARG:NH1	2:C:195:GLU:OE1	2.37	0.58
2:D:67:PRO:HG2	2:D:115:PRO:HG3	1.84	0.58
1:B:37:A:H2'	1:B:38:A:C8	2.39	0.57
2:C:327:ILE:HG22	2:C:349:GLY:HA2	1.86	0.57
2:D:184:VAL:HG23	2:D:223:ILE:HD13	1.86	0.56
2:D:130:LYS:HD3	2:D:159:PRO:HB2	1.87	0.56
1:B:37:A:C3'	1:B:38:A:H8	2.15	0.56
2:C:62:LEU:HD23	2:C:114:SER:HB2	1.89	0.55
2:D:183:PRO:HB3	2:D:214:ILE:HG13	1.87	0.55
2:C:183:PRO:HB2	2:C:215:VAL:HA	1.89	0.55
2:C:67:PRO:HG2	2:C:115:PRO:HG3	1.89	0.54
2:C:274:ASP:OD1	2:C:275:GLU:N	2.40	0.54
2:D:274:ASP:OD1	2:D:275:GLU:N	2.40	0.54
2:D:120:ASP:HB3	2:D:123:LYS:HE3	1.89	0.54
2:D:284:LEU:HD22	2:D:322:ALA:HB2	1.89	0.54
2:D:95:PRO:HB2	2:D:115:PRO:HG2	1.89	0.54
2:D:171:LEU:HB3	2:D:200:LEU:HD23	1.90	0.53
2:C:57:ILE:HD12	2:C:109:TYR:CE2	2.44	0.53
2:D:308:VAL:CG1	2:D:309:LEU:CD1	2.86	0.53
2:C:188:ARG:NH2	3:C:1001:SO4:O3	2.42	0.52
2:D:201:THR:OG1	2:D:202:GLU:N	2.42	0.52
2:C:156:VAL:HG21	2:C:163:ILE:HD11	1.92	0.51
1:B:37:A:C2'	1:B:38:A:C8	2.94	0.51
2:C:314:ASP:OD1	2:C:314:ASP:N	2.35	0.51
1:A:19:G:O6	2:C:477:UNK:CB	2.59	0.51
2:D:183:PRO:HG2	2:D:218:SER:HB3	1.93	0.51
1:A:51:C:H42	1:A:63:G:H1	1.59	0.51
1:A:5:A:OP1	2:C:364:ASP:HB2	2.10	0.51
2:D:62:LEU:HD23	2:D:114:SER:HB2	1.93	0.51
2:D:353:VAL:HG21	2:D:374:VAL:HG21	1.93	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:56:C:N4	2:C:476:UNK:CB	2.71	0.50
2:C:346:ASP:OD2	2:C:375:ARG:NH1	2.44	0.50
2:D:215:VAL:HG21	2:D:248:VAL:HG13	1.94	0.49
2:D:30:VAL:HG12	2:D:70:LEU:HD12	1.95	0.49
1:B:37:A:N7	1:B:38:A:C6	2.81	0.49
2:D:327:ILE:HG22	2:D:349:GLY:HA2	1.93	0.49
2:D:203:ASP:N	2:D:203:ASP:OD1	2.45	0.49
2:C:321:GLY:HA3	2:C:373:LEU:HD23	1.95	0.49
2:C:250:GLU:OE2	2:C:260:ARG:NH2	2.33	0.49
1:B:37:A:C8	1:B:38:A:N7	2.81	0.48
2:C:308:VAL:HG12	2:C:309:LEU:HD13	1.96	0.48
1:A:37:A:C8	1:A:38:A:N7	2.82	0.48
2:C:120:ASP:HB3	2:C:123:LYS:HE3	1.95	0.48
2:D:188:ARG:NH2	3:D:1001:SO4:O4	2.46	0.47
2:C:201:THR:OG1	2:C:202:GLU:N	2.48	0.47
2:C:308:VAL:CG1	2:C:366:ALA:HB2	2.44	0.47
1:B:19:G:O6	1:B:56:C:N4	2.37	0.47
2:C:47:ARG:HD3	2:C:47:ARG:HA	1.62	0.47
2:D:91:LEU:O	2:D:94:ARG:HB2	2.15	0.46
2:C:379:ARG:NH1	2:C:403:GLU:OE1	2.45	0.46
2:D:158:ASP:OD1	2:D:158:ASP:N	2.49	0.46
2:D:277:THR:HG22	2:D:325:HIS:CE1	2.50	0.46
2:C:200:LEU:HD13	2:C:204:PHE:CE2	2.50	0.46
2:C:329:LYS:HE3	2:C:342:PHE:CE1	2.50	0.46
2:D:445:ASN:OD1	2:D:446:GLU:HG3	2.16	0.46
2:D:434:GLU:O	2:D:438:GLU:HG2	2.15	0.45
1:A:19:G:N2	2:C:473:UNK:O	2.50	0.45
2:D:114:SER:HA	2:D:115:PRO:HD3	1.80	0.45
2:D:306:LYS:O	2:D:313:THR:HA	2.17	0.44
2:D:30:VAL:HG21	2:D:74:PHE:HA	1.99	0.44
2:C:203:ASP:N	2:C:203:ASP:OD1	2.47	0.44
2:C:39:ILE:HD12	2:C:146:VAL:HG21	2.00	0.44
1:B:20:U:OP1	1:B:20:U:C6	2.70	0.44
2:D:350:ALA:HB2	2:D:375:ARG:HB2	2.00	0.44
2:D:82:PHE:CE1	2:D:84:VAL:HG13	2.53	0.44
1:B:24:G:H2'	1:B:25:C:C6	2.53	0.43
2:C:158:ASP:N	2:C:158:ASP:OD1	2.51	0.43
1:B:10:G:H1	1:B:25:C:H42	1.65	0.43
2:C:384:ARG:HD3	2:C:432:LEU:HB2	2.00	0.43
2:D:290:ASP:HB3	2:D:293:LYS:HE3	2.00	0.43
2:C:227:LEU:HB3	2:C:320:TRP:HZ2	1.82	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:40:VAL:HG21	2:D:62:LEU:HD12	1.99	0.43
2:D:92:ILE:HG13	2:D:93:LYS:N	2.28	0.43
2:D:227:LEU:HB3	2:D:320:TRP:HZ2	1.83	0.43
2:D:91:LEU:HG	2:D:94:ARG:HH21	1.83	0.43
2:D:237:HIS:CE1	2:D:282:GLU:HG3	2.55	0.42
2:D:47:ARG:HA	2:D:47:ARG:HD3	1.66	0.42
2:C:238:LYS:O	2:C:242:GLU:HG2	2.19	0.42
2:D:165:ASP:OD1	2:D:172:ARG:NH2	2.52	0.42
2:C:30:VAL:HG12	2:C:70:LEU:HD12	2.02	0.42
1:B:4:C:H5"	2:D:363:GLY:HA2	2.01	0.42
2:D:318:LEU:HD23	2:D:373:LEU:HD21	2.02	0.42
2:C:183:PRO:O	2:C:186:VAL:HB	2.19	0.41
2:C:114:SER:HA	2:C:115:PRO:HD3	1.80	0.41
2:C:259:LEU:HD21	2:C:327:ILE:HD12	2.02	0.41
1:B:53:G:H1	1:B:61:C:H42	1.69	0.41
1:A:19:G:N1	2:C:474:UNK:HA	2.34	0.41
1:A:24:G:H2'	1:A:25:C:C6	2.55	0.41
2:C:359:ARG:HD2	2:D:90:PHE:HA	2.02	0.41
2:D:125:LEU:O	2:D:129:LEU:HG	2.21	0.41
1:A:61:C:H2'	1:A:62:C:C6	2.56	0.41
1:B:36:A:H2'	1:B:37:A:C8	2.56	0.41
2:D:309:LEU:HD12	2:D:309:LEU:N	2.35	0.41
2:D:329:LYS:HE3	2:D:342:PHE:CE1	2.55	0.41
2:D:211:ASP:N	2:D:211:ASP:OD1	2.54	0.41
2:D:88:ARG:NH1	2:D:219:ALA:HB2	2.29	0.41
2:D:66:ASP:HA	2:D:67:PRO:HD3	1.90	0.41
2:C:211:ASP:N	2:C:211:ASP:OD1	2.54	0.41
2:D:287:VAL:HG12	2:D:413:LEU:HD22	2.03	0.41
1:A:73:A:N6	2:C:185:ARG:HH21	2.14	0.41
2:C:408:ALA:HB3	2:C:409:PRO:HD3	2.04	0.40
2:D:290:ASP:O	2:D:293:LYS:HG2	2.21	0.40
1:B:19:G:H1'	1:B:20:U:OP2	2.22	0.40
2:C:236:ALA:HA	2:C:239:VAL:HG23	2.03	0.40
1:A:56:C:N3	2:C:476:UNK:CB	2.80	0.40
2:D:236:ALA:HA	2:D:239:VAL:HG23	2.03	0.40
2:D:379:ARG:HB3	2:D:380:PRO:HD3	2.03	0.40
2:D:200:LEU:HB2	2:D:205:TYR:CZ	2.57	0.40
2:D:93:LYS:H	2:D:94:ARG:HA	1.84	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	
2	C	393/512 (77%)	390 (99%)	3 (1%)	0	100	100
2	D	404/512 (79%)	399 (99%)	5 (1%)	0	100	100
All	All	797/1024 (78%)	789 (99%)	8 (1%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains (i)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	C	352/375 (94%)	338 (96%)	14 (4%)	31	62
2	D	359/375 (96%)	343 (96%)	16 (4%)	27	60
All	All	711/750 (95%)	681 (96%)	30 (4%)	30	61

All (30) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	C	47	ARG
2	C	53	VAL
2	C	104	LEU
2	C	239	VAL
2	C	295	LEU
2	C	307	ARG
2	C	318	LEU
2	C	323	LEU

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Mol	Chain	Res	Type
2	C	342	PHE
2	C	344	GLU
2	C	360	LEU
2	C	378	LEU
2	C	427	GLU
2	C	445	ASN
2	D	47	ARG
2	D	53	VAL
2	D	84	VAL
2	D	90	PHE
2	D	92	ILE
2	D	104	LEU
2	D	186	VAL
2	D	221	GLU
2	D	239	VAL
2	D	262	VAL
2	D	295	LEU
2	D	318	LEU
2	D	342	PHE
2	D	344	GLU
2	D	378	LEU
2	D	445	ASN

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

5.3.3 RNA (i)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	A	73/74 (98%)	12 (16%)	0
1	B	73/74 (98%)	12 (16%)	1 (1%)
All	All	146/148 (98%)	24 (16%)	1 (0%)

All (24) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	A	16	U
1	A	17	U
1	A	18	G
1	A	19	G
1	A	20	U

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Mol	Chain	Res	Type
1	A	21	A
1	A	22	G
1	A	34	G
1	A	45	U
1	A	47	U
1	A	48	C
1	A	61	C
1	B	16	U
1	B	17	U
1	B	18	G
1	B	19	G
1	B	20	U
1	B	21	A
1	B	22	G
1	B	34	G
1	B	45	U
1	B	47	U
1	B	48	C
1	B	61	C

All (1) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
1	B	19	G

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)

4 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	SO4	D	1002	-	4,4,4	0.14	0	6,6,6	0.06	0
3	SO4	D	1001	-	4,4,4	0.14	0	6,6,6	0.08	0
3	SO4	C	1001	-	4,4,4	0.14	0	6,6,6	0.05	0
3	SO4	C	1002	-	4,4,4	0.14	0	6,6,6	0.08	0

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	D	1001	SO4	1	0
3	C	1001	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 (i)

6.1 Protein, DNA and RNA chains (i)

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 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	74/74 (100%)	1.01	15 (20%)	1	0	69, 137, 264, 311	0
1	B	74/74 (100%)	0.99	14 (18%)	1	1	54, 137, 268, 303	0
2	C	403/512 (78%)	0.17	13 (3%)	47	46	35, 90, 150, 220	0
2	D	412/512 (80%)	0.19	20 (4%)	29	29	29, 91, 159, 220	0
All	All	963/1172 (82%)	0.31	62 (6%)	19	20	29, 95, 180, 311	0

All (62) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	C	264	ASP	8.9
2	C	343	TYR	5.5
1	A	34	G	5.3
1	A	36	A	5.2
2	D	333	PHE	4.9
1	A	37	A	4.6
2	D	334	ALA	4.5
1	B	36	A	4.3
2	D	263	LYS	4.3
1	B	44	G	4.2
2	C	117	LYS	4.1
2	D	330	PRO	4.1
2	D	392	LEU	4.0
1	A	35	A	3.8
2	D	262	VAL	3.8
2	D	89	GLY	3.7
1	B	35	A	3.7
1	B	45	U	3.2
1	B	34	G	3.2
2	D	448	LYS	3.1
1	A	47	U	3.0

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Mol	Chain	Res	Type	RSRZ
1	A	32	C	2.9
2	D	261	GLU	2.9
1	A	44	G	2.9
1	B	20	U	2.8
2	C	391	GLU	2.8
2	C	399	ASN	2.8
2	C	263	LYS	2.8
1	B	25	C	2.7
2	D	342	PHE	2.7
1	A	16	U	2.6
1	B	32	C	2.6
1	A	45	U	2.6
1	B	16	U	2.5
2	D	96	THR	2.5
2	C	445	ASN	2.5
1	B	47	U	2.5
2	C	26	ASP	2.5
1	A	26	A	2.4
1	A	42	A	2.4
2	C	447	MET	2.3
1	B	26	A	2.3
2	D	422	SER	2.3
2	D	391	GLU	2.3
2	D	402	ARG	2.2
1	B	41	C	2.2
2	D	94	ARG	2.2
2	C	177	GLU	2.2
2	D	329	LYS	2.2
1	A	17	U	2.1
2	D	426	GLU	2.1
2	D	344	GLU	2.1
1	B	31	A	2.1
2	C	105	PRO	2.1
2	D	144	ASP	2.1
1	A	19	G	2.1
1	B	37	A	2.1
1	A	41	C	2.1
2	D	423	GLY	2.1
2	C	380	PRO	2.1
2	C	98	ALA	2.0
1	A	46	G	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, 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
3	SO4	C	1002	5/5	0.94	0.20	92,97,103,109	0
3	SO4	C	1001	5/5	0.95	0.20	103,105,108,108	0
3	SO4	D	1002	5/5	0.97	0.15	86,87,91,95	0
3	SO4	D	1001	5/5	0.98	0.18	64,75,77,81	0

6.5 Other polymers (i)

There are no such residues in this entry.