



Full wwPDB X-ray Structure Validation Report ⓘ

Jun 11, 2024 – 09:45 PM EDT

PDB ID : 2Q6T
Title : Crystal structure of the Thermus aquaticus DnaB monomer
Authors : Bailey, S.; Eliason, W.K.; Steitz, T.A.
Deposited on : 2007-06-05
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

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 : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 1.20.1
EDS : 2.36.2
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) : 2.36.2

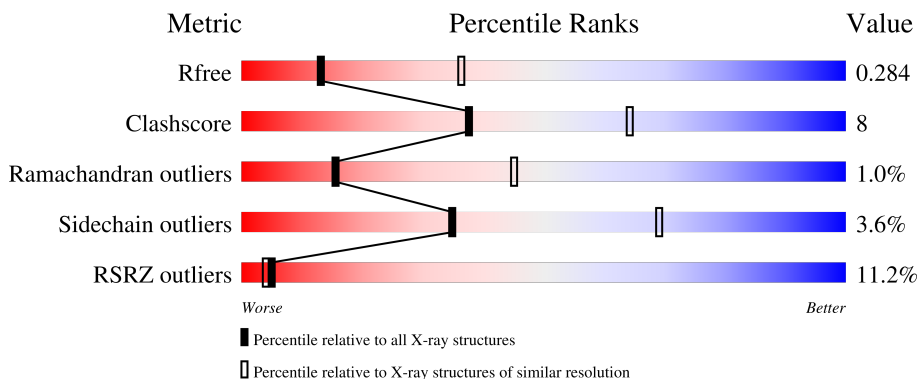
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 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}	130704	1957 (2.90-2.90)
Clashscore	141614	2172 (2.90-2.90)
Ramachandran outliers	138981	2115 (2.90-2.90)
Sidechain outliers	138945	2117 (2.90-2.90)
RSRZ outliers	127900	1906 (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 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	444	 8% 74% 19% • 6%
1	B	444	 9% 75% 18% • 7%
1	C	444	 11% 75% 16% • 9%
1	D	444	 13% 76% 13% • 9%

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 12746 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 DnaB replication fork helicase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	419	Total 3247	C 2032	N 578	O 623	S 14	0	0	0
1	B	414	Total 3207	C 2010	N 571	O 612	S 14	0	0	0
1	C	406	Total 3138	C 1968	N 552	O 604	S 14	0	0	0
1	D	402	Total 3109	C 1955	N 547	O 594	S 13	0	0	0

- Molecule 2 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



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

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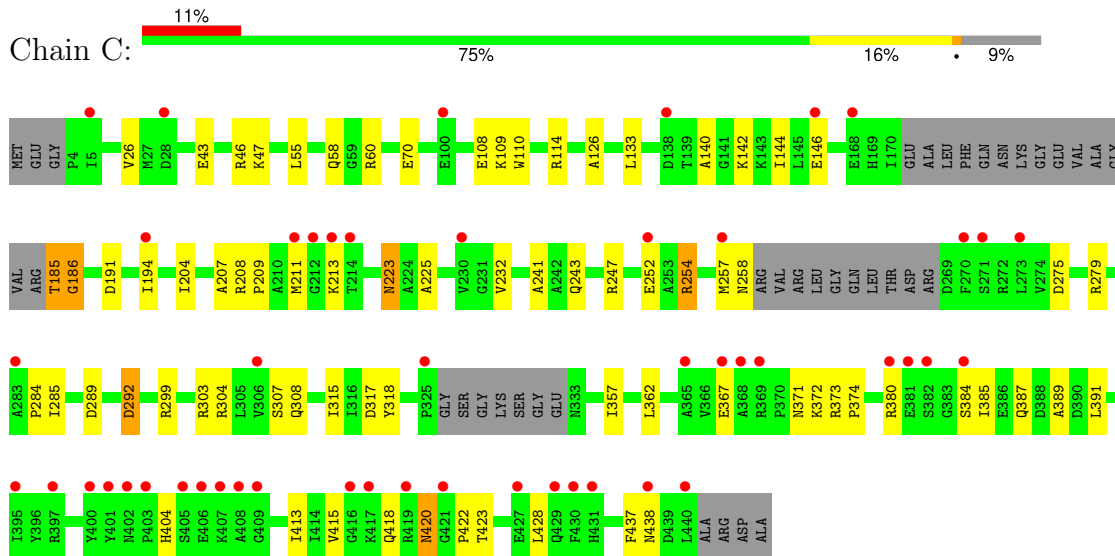
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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	C	1	Total	O	S	0	0
			5	4	1		
2	D	1	Total	O	S	0	0
			5	4	1		

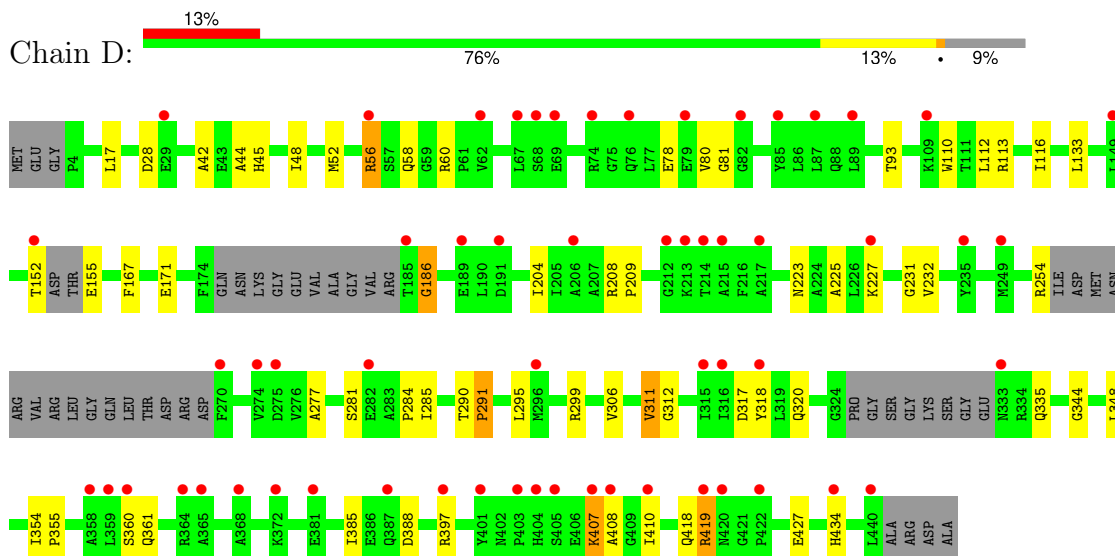
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	11	Total	O	0	0
			11	11		
3	B	5	Total	O	0	0
			5	5		
3	C	6	Total	O	0	0
			6	6		
3	D	3	Total	O	0	0
			3	3		

● Molecule 1: DnaB replication fork helicase



● Molecule 1: DnaB replication fork helicase



4 Data and refinement statistics

Property	Value	Source
Space group	P 31 2 1	Depositor
Cell constants a, b, c, α , β , γ	104.71Å 104.71Å 363.26Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	20.00 – 2.90 29.85 – 2.90	Depositor EDS
% Data completeness (in resolution range)	99.2 (20.00-2.90) 99.1 (29.85-2.90)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.31 (at 2.90Å)	Xtrriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.241 , 0.285 0.238 , 0.284	Depositor DCC
R_{free} test set	2646 reflections (5.10%)	wwPDB-VP
Wilson B-factor (Å ²)	83.6	Xtrriage
Anisotropy	0.489	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.30 , 106.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	0.015 for -h,-k,l	Xtrriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	12746	wwPDB-VP
Average B, all atoms (Å ²)	104.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.98% 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: 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	0.35	0/3292	0.61	0/4450
1	B	0.33	0/3251	0.60	0/4392
1	C	0.35	0/3183	0.56	0/4303
1	D	0.34	0/3153	0.56	0/4259
All	All	0.34	0/12879	0.58	0/17404

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	3247	0	3290	61	0
1	B	3207	0	3249	54	0
1	C	3138	0	3172	52	0
1	D	3109	0	3150	43	0
2	A	5	0	0	0	0
2	B	5	0	0	0	0
2	C	5	0	0	1	0
2	D	5	0	0	0	0
3	A	11	0	0	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	5	0	0	0	0
3	C	6	0	0	0	0
3	D	3	0	0	0	0
All	All	12746	0	12861	197	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 (197) 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:56:ARG:HH21	1:D:56:ARG:HG2	1.24	1.01
1:A:419:ARG:HG3	1:A:419:ARG:HH11	1.26	0.99
1:A:184:ARG:HH11	1:A:184:ARG:HG3	1.32	0.91
1:B:237:LEU:HD21	1:B:293:LEU:HD12	1.51	0.89
1:A:29:GLU:HG2	1:A:100:GLU:HG3	1.55	0.89
1:A:184:ARG:HH11	1:A:184:ARG:CG	1.90	0.85
1:D:254:ARG:C	1:D:434:HIS:CE1	2.50	0.83
1:B:160:ARG:HH11	1:B:160:ARG:CG	1.93	0.82
1:B:160:ARG:HH11	1:B:160:ARG:HG3	1.45	0.80
1:A:48:ILE:HD11	1:A:80:VAL:HB	1.64	0.79
1:D:225:ALA:HB1	1:D:284:PRO:HD2	1.66	0.78
1:B:295:LEU:HD21	1:B:344:GLY:HA3	1.65	0.77
1:C:371:ASN:HD21	1:C:373:ARG:HD2	1.54	0.73
1:A:419:ARG:HH11	1:A:419:ARG:CG	2.03	0.72
1:D:320:GLN:HE21	1:D:361:GLN:H	1.39	0.70
1:A:184:ARG:HG3	1:A:184:ARG:NH1	2.04	0.69
1:D:44:ALA:O	1:D:48:ILE:HG22	1.93	0.69
1:B:407:LYS:HB3	1:B:410:ILE:HB	1.76	0.68
1:A:197:LEU:HD13	1:A:357:ILE:HD11	1.77	0.67
1:A:377:SER:O	1:A:380:ARG:HG2	1.95	0.67
1:C:418:GLN:NE2	1:C:422:PRO:O	2.29	0.66
1:D:208:ARG:CD	1:D:209:PRO:HD2	2.26	0.66
1:B:254:ARG:HG3	1:B:434:HIS:CE1	2.32	0.64
1:A:5:ILE:N	1:A:6:PRO:CD	2.60	0.64
1:C:225:ALA:HB1	1:C:284:PRO:HD2	1.79	0.64
1:A:320:GLN:HE21	1:A:361:GLN:H	1.47	0.63
1:C:43:GLU:HG3	1:C:47:LYS:HE2	1.80	0.63
1:C:304:ARG:O	1:C:308:GLN:HG2	1.99	0.63
1:D:56:ARG:HH21	1:D:56:ARG:CG	2.06	0.62
1:A:320:GLN:NE2	1:A:361:GLN:H	1.98	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:208:ARG:HD2	1:D:209:PRO:HD2	1.83	0.61
1:A:211:MET:HE1	1:A:397:ARG:N	2.17	0.60
1:C:204:ILE:HD13	1:C:385:ILE:HG22	1.84	0.60
1:C:420:ASN:HD22	1:C:420:ASN:H	1.50	0.59
1:D:56:ARG:HG2	1:D:56:ARG:NH2	2.03	0.59
1:A:27:MET:HG2	1:A:56:ARG:HD2	1.86	0.58
1:D:312:GLY:O	1:D:355:PRO:HD2	2.04	0.58
1:A:195:GLY:CA	1:B:261:ARG:HB2	2.34	0.58
1:C:110:TRP:CE2	1:C:114:ARG:HD3	2.39	0.58
1:B:116:ILE:HD11	1:C:126:ALA:HB3	1.85	0.58
1:A:54:ALA:HA	1:A:57:SER:HB3	1.86	0.57
1:A:44:ALA:O	1:A:48:ILE:HD12	2.04	0.57
1:B:320:GLN:NE2	1:B:360:SER:HA	2.18	0.57
1:B:194:ILE:HA	1:B:418:GLN:NE2	2.20	0.57
1:A:415:VAL:O	1:A:423:THR:HG23	2.04	0.57
1:B:23:ASP:O	1:B:26:VAL:HG22	2.05	0.56
1:C:207:ALA:HB3	1:C:213:LYS:HG3	1.86	0.56
1:C:275:ASP:O	1:C:279:ARG:HB2	2.05	0.56
1:C:241:ALA:N	1:C:289:ASP:OD1	2.38	0.56
1:A:367:GLU:HA	1:A:372:LYS:HG2	1.87	0.55
1:C:185:THR:OG1	1:C:186:GLY:N	2.39	0.55
1:C:367:GLU:HA	1:C:372:LYS:HG2	1.89	0.55
1:D:418:GLN:HG2	1:D:419:ARG:H	1.71	0.55
1:C:58:GLN:HE21	1:C:60:ARG:HE	1.53	0.55
1:B:129:GLU:OE1	1:C:109:LYS:NZ	2.35	0.54
1:D:204:ILE:HD13	1:D:385:ILE:CG2	2.38	0.54
1:A:295:LEU:HD21	1:A:344:GLY:HA3	1.89	0.54
1:C:420:ASN:H	1:C:420:ASN:ND2	2.04	0.54
1:A:244:LEU:HD23	1:A:287:ILE:HD13	1.88	0.54
1:A:402:ASN:HB3	1:A:405:SER:HB2	1.90	0.53
1:D:277:ALA:O	1:D:281:SER:HB2	2.08	0.53
1:A:48:ILE:O	1:A:52:MET:HG3	2.08	0.53
1:A:192:GLN:O	1:B:261:ARG:NH1	2.40	0.53
1:C:415:VAL:O	1:C:423:THR:HG23	2.08	0.53
1:D:295:LEU:HD21	1:D:344:GLY:HA3	1.91	0.53
1:D:299:ARG:HG3	1:D:348:LEU:HD13	1.91	0.53
1:A:203:ASN:HB2	1:A:357:ILE:HD13	1.91	0.52
1:D:42:ALA:HB3	1:D:45:HIS:HD2	1.74	0.52
1:D:306:VAL:HA	1:D:311:VAL:HG22	1.92	0.52
1:B:13:GLU:HB3	1:B:45:HIS:HD2	1.75	0.52
1:C:299:ARG:HB3	1:C:303:ARG:NH1	2.25	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:28:ASP:HA	1:D:56:ARG:HH12	1.75	0.51
1:C:232:VAL:HG22	1:C:285:ILE:HG12	1.92	0.51
1:B:49:TYR:HA	1:B:52:MET:HE2	1.92	0.51
1:C:208:ARG:HD2	1:C:209:PRO:HD2	1.93	0.51
1:D:48:ILE:O	1:D:52:MET:HG3	2.11	0.51
1:C:207:ALA:O	1:C:213:LYS:HE3	2.11	0.51
1:A:419:ARG:HG3	1:A:419:ARG:NH1	2.06	0.51
1:B:160:ARG:CG	1:B:160:ARG:NH1	2.62	0.51
1:B:303:ARG:HG2	1:B:352:LEU:HD21	1.93	0.50
1:B:7:PRO:O	1:B:113:ARG:HD3	2.11	0.50
1:B:257:MET:O	1:B:261:ARG:HG2	2.11	0.50
1:C:204:ILE:HD12	1:C:389:ALA:HB2	1.93	0.50
1:B:72:SER:HB2	1:B:77:LEU:HD12	1.93	0.50
1:A:195:GLY:HA3	1:B:261:ARG:HB2	1.94	0.49
1:A:270:PHE:O	1:A:273:LEU:HD23	2.12	0.49
1:B:133:LEU:HD22	1:C:108:GLU:HG2	1.96	0.48
1:C:371:ASN:HD21	1:C:373:ARG:CD	2.24	0.48
1:A:211:MET:HE1	1:A:397:ARG:HG3	1.96	0.48
1:D:223:ASN:O	1:D:227:LYS:CB	2.62	0.48
1:D:290:THR:HA	1:D:291:PRO:HD3	1.73	0.48
1:C:315:ILE:HG13	1:C:357:ILE:HB	1.94	0.48
1:A:252:GLU:HB3	1:A:276:VAL:HG11	1.94	0.48
1:D:419:ARG:NE	1:D:419:ARG:HA	2.29	0.48
1:C:55:LEU:HG	1:C:70:GLU:HG3	1.96	0.48
1:C:43:GLU:OE1	1:C:46:ARG:NH1	2.44	0.48
1:C:208:ARG:CD	1:C:209:PRO:HD2	2.44	0.48
1:A:27:MET:HG2	1:A:56:ARG:CD	2.44	0.47
1:A:95:THR:HG22	1:A:96:ALA:H	1.78	0.47
1:A:376:LEU:HD11	1:A:417:LYS:HB2	1.96	0.47
1:A:29:GLU:CG	1:A:100:GLU:HG3	2.36	0.47
1:C:185:THR:HG23	1:C:191:ASP:CG	2.35	0.47
1:C:384:SER:HB3	1:C:387:GLN:HB2	1.96	0.47
1:A:47:LYS:HD3	1:A:76:GLN:HG2	1.97	0.47
1:B:95:THR:O	1:B:96:ALA:HB3	2.15	0.47
1:B:317:ASP:HA	1:B:318:TYR:HA	1.63	0.47
1:B:39:ALA:HA	1:B:110:TRP:CG	2.50	0.46
1:D:186:GLY:HA3	1:D:223:ASN:ND2	2.30	0.46
1:B:119:ALA:HA	1:B:144:ILE:HD11	1.98	0.46
1:A:19:SER:HB2	1:A:96:ALA:HA	1.97	0.46
1:A:35:PRO:HD2	3:A:452:HOH:O	2.14	0.46
1:B:116:ILE:CD1	1:C:126:ALA:HB3	2.44	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:431:HIS:CE1	1:B:438:ASN:HD21	2.33	0.46
1:C:243:GLN:O	1:C:247:ARG:HB2	2.15	0.46
1:A:413:ILE:HD11	1:A:428:LEU:HD12	1.98	0.46
1:B:208:ARG:NH1	1:B:362:LEU:O	2.49	0.46
1:C:194:ILE:HD12	1:C:391:LEU:HD11	1.97	0.46
1:C:213:LYS:NZ	2:C:445:SO4:O2	2.47	0.46
1:A:423:THR:HG22	1:A:424:GLY:N	2.31	0.45
1:B:394:PHE:HB2	1:B:414:ILE:HB	1.98	0.45
1:C:204:ILE:HD13	1:C:385:ILE:CG2	2.46	0.45
1:D:17:LEU:HD13	1:D:48:ILE:HD13	1.98	0.45
1:D:42:ALA:HB3	1:D:45:HIS:CD2	2.51	0.45
1:A:167:PHE:HA	1:A:170:ILE:HG12	1.97	0.45
1:B:272:ARG:O	1:B:276:VAL:HG23	2.16	0.45
1:D:167:PHE:O	1:D:171:GLU:HG2	2.17	0.45
1:D:231:GLY:HA2	1:D:284:PRO:HB2	1.99	0.45
1:A:312:GLY:O	1:A:355:PRO:HD2	2.17	0.45
1:B:52:MET:HG2	1:B:67:LEU:HD13	1.97	0.45
1:B:108:GLU:HG2	1:C:133:LEU:HD12	1.99	0.45
1:C:194:ILE:HD11	1:C:415:VAL:HG21	1.98	0.45
1:A:250:CYS:HB3	1:A:255:ILE:O	2.17	0.45
1:C:428:LEU:HD23	1:C:437:PHE:HD2	1.82	0.45
1:C:142:LYS:O	1:C:146:GLU:HG3	2.17	0.45
1:A:295:LEU:HD22	1:A:341:ILE:HA	1.99	0.44
1:B:160:ARG:HG3	1:B:160:ARG:NH1	2.24	0.44
1:C:304:ARG:HA	1:C:307:SER:HB3	1.98	0.44
1:A:108:GLU:HG2	1:D:133:LEU:HD22	1.99	0.44
1:A:142:LYS:HE2	1:A:146:GLU:OE2	2.17	0.44
1:A:301:ARG:NH1	1:D:155:GLU:HG3	2.32	0.44
1:B:343:ARG:NH1	1:C:289:ASP:O	2.50	0.44
1:B:320:GLN:NE2	1:B:361:GLN:H	2.16	0.44
1:B:266:THR:HG22	1:B:268:ARG:H	1.83	0.44
1:C:428:LEU:HG	1:C:438:ASN:O	2.18	0.44
1:D:407:LYS:HB2	1:D:410:ILE:HD12	2.00	0.44
1:B:382:SER:HB3	1:B:385:ILE:HD12	1.99	0.44
1:B:413:ILE:HD11	1:B:428:LEU:CD1	2.48	0.44
1:D:223:ASN:O	1:D:227:LYS:HB3	2.18	0.44
1:C:373:ARG:HA	1:C:374:PRO:HD3	1.88	0.44
1:D:419:ARG:HA	1:D:419:ARG:HE	1.80	0.44
1:A:213:LYS:NZ	1:A:361:GLN:OE1	2.46	0.43
1:B:232:VAL:HG22	1:B:285:ILE:HG12	2.00	0.43
1:D:110:TRP:HD1	1:D:113:ARG:NH2	2.16	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:56:ARG:CG	1:D:56:ARG:NH2	2.72	0.43
1:C:252:GLU:O	1:C:254:ARG:NE	2.48	0.43
1:C:140:ALA:O	1:C:144:ILE:HG12	2.19	0.43
1:D:232:VAL:HG22	1:D:285:ILE:HG12	2.00	0.43
1:A:197:LEU:CD1	1:A:357:ILE:HD11	2.46	0.43
1:C:110:TRP:O	1:C:114:ARG:HG3	2.19	0.43
1:A:170:ILE:HD12	1:B:273:LEU:HD21	2.00	0.43
1:C:223:ASN:HD22	1:C:223:ASN:C	2.22	0.43
1:B:144:ILE:HG21	1:C:144:ILE:HG13	2.02	0.42
1:C:208:ARG:NH1	1:C:362:LEU:O	2.52	0.42
1:A:6:PRO:HA	1:A:7:PRO:HD3	1.79	0.42
1:B:48:ILE:O	1:B:52:MET:HG3	2.19	0.42
1:B:295:LEU:HD22	1:B:341:ILE:HA	2.00	0.42
1:B:211:MET:HA	1:B:211:MET:CE	2.50	0.42
1:D:44:ALA:HB1	1:D:80:VAL:HG13	2.02	0.42
1:D:317:ASP:HA	1:D:318:TYR:HA	1.63	0.42
1:A:17:LEU:HD12	1:A:45:HIS:CD2	2.55	0.42
1:A:223:ASN:O	1:A:227:LYS:HB2	2.20	0.42
1:B:6:PRO:HA	1:B:7:PRO:HD3	1.90	0.42
1:D:58:GLN:HG3	1:D:60:ARG:HG2	2.02	0.42
1:A:26:VAL:HG11	1:A:96:ALA:HB1	2.02	0.41
1:B:320:GLN:HE22	1:B:360:SER:HA	1.81	0.41
1:A:114:ARG:NH2	1:A:150:THR:O	2.49	0.41
1:B:112:LEU:O	1:B:116:ILE:HG12	2.20	0.41
1:A:37:PRO:O	1:A:46:ARG:HG3	2.20	0.41
1:B:88:GLN:HE21	1:B:88:GLN:HB3	1.70	0.41
1:B:206:ALA:O	1:B:394:PHE:HA	2.20	0.41
1:C:317:ASP:HA	1:C:318:TYR:HA	1.80	0.41
1:D:311:VAL:HG23	1:D:312:GLY:H	1.85	0.41
1:D:112:LEU:O	1:D:116:ILE:HG12	2.21	0.41
1:D:320:GLN:HE21	1:D:361:GLN:N	2.11	0.41
1:A:257:MET:H	1:A:257:MET:CE	2.34	0.41
1:B:205:ILE:HG12	1:B:393:MET:HE2	2.03	0.41
1:C:413:ILE:HD11	1:C:428:LEU:HD22	2.03	0.41
1:B:397:ARG:HB3	1:B:411:ALA:HA	2.02	0.41
1:D:418:GLN:HG2	1:D:419:ARG:N	2.36	0.41
1:A:399:GLU:HG3	1:A:408:ALA:HA	2.03	0.40
1:D:320:GLN:NE2	1:D:360:SER:OG	2.54	0.40
1:A:157:ARG:HA	1:A:158:PRO:HD3	1.91	0.40
1:A:189:GLU:HA	1:A:192:GLN:HE21	1.86	0.40
1:A:121:GLU:HG2	1:A:143:LYS:HE3	2.03	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:188:LYS:HB3	1:B:188:LYS:HE2	1.51	0.40
1:A:205:ILE:HG22	1:A:213:LYS:HG2	2.02	0.40
1:B:373:ARG:HA	1:B:374:PRO:HD3	1.85	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	413/444 (93%)	396 (96%)	13 (3%)	4 (1%)	15	45
1	B	404/444 (91%)	385 (95%)	15 (4%)	4 (1%)	15	45
1	C	398/444 (90%)	376 (94%)	19 (5%)	3 (1%)	19	51
1	D	392/444 (88%)	370 (94%)	17 (4%)	5 (1%)	12	37
All	All	1607/1776 (90%)	1527 (95%)	64 (4%)	16 (1%)	15	45

All (16) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	406	GLU
1	A	408	ALA
1	D	291	PRO
1	D	408	ALA
1	A	405	SER
1	B	35	PRO
1	B	408	ALA
1	C	257	MET
1	C	292	ASP
1	D	186	GLY
1	B	291	PRO
1	D	81	GLY

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Mol	Chain	Res	Type
1	B	435	VAL
1	A	435	VAL
1	D	311	VAL
1	C	186	GLY

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	343/359 (96%)	327 (95%)	16 (5%)	26	59
1	B	338/359 (94%)	327 (97%)	11 (3%)	38	72
1	C	332/359 (92%)	322 (97%)	10 (3%)	41	75
1	D	327/359 (91%)	316 (97%)	11 (3%)	37	71
All	All	1340/1436 (93%)	1292 (96%)	48 (4%)	35	69

All (48) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	5	ILE
1	A	60	ARG
1	A	69	GLU
1	A	95	THR
1	A	166	THR
1	A	184	ARG
1	A	230	VAL
1	A	257	MET
1	A	266	THR
1	A	267	ASP
1	A	273	LEU
1	A	334	ARG
1	A	388	ASP
1	A	406	GLU
1	A	419	ARG
1	A	439	ASP
1	B	56	ARG

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Mol	Chain	Res	Type
1	B	69	GLU
1	B	71	LEU
1	B	77	LEU
1	B	79	GLU
1	B	88	GLN
1	B	124	ARG
1	B	160	ARG
1	B	227	LYS
1	B	293	LEU
1	B	320	GLN
1	C	26	VAL
1	C	185	THR
1	C	211	MET
1	C	223	ASN
1	C	254	ARG
1	C	258	ASN
1	C	292	ASP
1	C	380	ARG
1	C	404	HIS
1	C	420	ASN
1	D	56	ARG
1	D	78	GLU
1	D	93	THR
1	D	152	THR
1	D	335	GLN
1	D	354	ILE
1	D	388	ASP
1	D	397	ARG
1	D	407	LYS
1	D	419	ARG
1	D	427	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (24) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	88	GLN
1	A	192	GLN
1	A	222	GLN
1	A	320	GLN
1	B	45	HIS
1	B	88	GLN
1	B	320	GLN

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Mol	Chain	Res	Type
1	B	336	GLN
1	B	361	GLN
1	B	418	GLN
1	B	429	GLN
1	B	438	ASN
1	C	58	GLN
1	C	223	ASN
1	C	308	GLN
1	C	320	GLN
1	C	371	ASN
1	C	420	ASN
1	D	45	HIS
1	D	320	GLN
1	D	336	GLN
1	D	371	ASN
1	D	418	GLN
1	D	434	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](#)

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
2	SO4	D	445	-	4,4,4	0.20	0	6,6,6	0.28	0
2	SO4	B	445	-	4,4,4	0.22	0	6,6,6	0.24	0
2	SO4	A	445	-	4,4,4	0.22	0	6,6,6	0.21	0
2	SO4	C	445	-	4,4,4	0.26	0	6,6,6	0.16	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.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	445	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, 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	419/444 (94%)	0.55	35 (8%) 11 8	91, 103, 118, 128	0
1	B	414/444 (93%)	0.63	41 (9%) 7 5	91, 104, 115, 130	0
1	C	406/444 (91%)	0.73	49 (12%) 4 3	91, 104, 115, 124	0
1	D	402/444 (90%)	0.86	59 (14%) 2 1	93, 105, 116, 118	0
All	All	1641/1776 (92%)	0.69	184 (11%) 5 4	91, 104, 116, 130	0

All (184) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	270	PHE	8.5
1	C	283	ALA	7.1
1	B	62	VAL	7.1
1	D	85	TYR	6.7
1	C	381	GLU	6.7
1	D	387	GLN	6.6
1	C	368	ALA	6.5
1	C	365	ALA	6.3
1	B	61	PRO	5.7
1	C	401	TYR	5.6
1	C	400	TYR	5.4
1	C	403	PRO	5.4
1	B	325	PRO	5.4
1	D	87	LEU	5.2
1	D	29	GLU	5.1
1	B	2	GLU	5.1
1	D	420	ASN	5.1
1	B	366	VAL	5.0
1	D	408	ALA	5.0
1	D	407	LYS	5.0
1	A	384	SER	4.8

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Mol	Chain	Res	Type	RSRZ
1	D	404	HIS	4.7
1	D	359	LEU	4.5
1	D	69	GLU	4.5
1	B	58	GLN	4.4
1	C	438	ASN	4.4
1	C	367	GLU	4.4
1	C	440	LEU	4.3
1	D	189	GLU	4.3
1	B	402	ASN	4.3
1	A	100	GLU	4.2
1	A	336	GLN	4.1
1	C	325	PRO	4.1
1	C	380	ARG	4.0
1	B	266	THR	4.0
1	D	152	THR	4.0
1	C	252	GLU	3.9
1	C	270	PHE	3.9
1	B	85	TYR	3.9
1	D	358	ALA	3.9
1	C	273	LEU	3.8
1	A	252	GLU	3.8
1	C	408	ALA	3.8
1	C	168	GLU	3.7
1	B	381	GLU	3.7
1	D	215	ALA	3.6
1	D	191	ASP	3.6
1	C	384	SER	3.6
1	A	212	GLY	3.6
1	D	401	TYR	3.6
1	C	214	THR	3.6
1	C	405	SER	3.5
1	B	408	ALA	3.5
1	C	5	ILE	3.5
1	D	360	SER	3.5
1	B	167	PHE	3.5
1	B	368	ALA	3.5
1	D	89	LEU	3.5
1	C	369	ARG	3.5
1	B	33	LEU	3.4
1	B	26	VAL	3.4
1	D	405	SER	3.3
1	D	275	ASP	3.3

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Mol	Chain	Res	Type	RSRZ
1	D	56	ARG	3.3
1	C	430	PHE	3.3
1	D	282	GLU	3.3
1	D	82	GLY	3.2
1	B	365	ALA	3.2
1	D	76	GLN	3.2
1	A	335	GLN	3.2
1	A	171	GLU	3.2
1	D	74	ARG	3.2
1	D	315	ILE	3.2
1	B	21	LEU	3.2
1	A	381	GLU	3.2
1	D	440	LEU	3.1
1	D	109	LYS	3.1
1	B	312	GLY	3.1
1	C	397	ARG	3.1
1	B	382	SER	3.1
1	A	93	THR	3.1
1	B	405	SER	3.0
1	D	212	GLY	3.0
1	A	214	THR	3.0
1	B	214	THR	3.0
1	D	274	VAL	3.0
1	A	215	ALA	3.0
1	A	262	LEU	3.0
1	D	67	LEU	3.0
1	D	316	ILE	3.0
1	A	76	GLN	3.0
1	A	170	ILE	3.0
1	C	28	ASP	3.0
1	C	257	MET	3.0
1	A	403	PRO	2.9
1	D	368	ALA	2.9
1	C	211	MET	2.9
1	A	99	ALA	2.9
1	C	431	HIS	2.9
1	D	62	VAL	2.8
1	D	422	PRO	2.8
1	B	184	ARG	2.8
1	A	217	ALA	2.8
1	C	212	GLY	2.8
1	C	427	GLU	2.7

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Mol	Chain	Res	Type	RSRZ
1	A	310	GLN	2.7
1	B	254	ARG	2.7
1	D	397	ARG	2.7
1	D	365	ALA	2.7
1	B	170	ILE	2.7
1	A	440	LEU	2.7
1	C	230	VAL	2.7
1	C	146	GLU	2.6
1	A	213	LYS	2.6
1	D	372	LYS	2.6
1	D	364	ARG	2.6
1	D	214	THR	2.6
1	C	421	GLY	2.6
1	D	79	GLU	2.6
1	D	296	MET	2.6
1	A	265	LEU	2.5
1	A	279	ARG	2.5
1	D	333	ASN	2.5
1	A	269	ASP	2.5
1	B	63	ASP	2.5
1	D	434	HIS	2.5
1	C	395	ILE	2.5
1	A	388	ASP	2.5
1	A	315	ILE	2.5
1	C	382	SER	2.4
1	A	436	ARG	2.4
1	B	217	ALA	2.4
1	D	206	ALA	2.4
1	B	403	PRO	2.4
1	D	213	LYS	2.4
1	B	380	ARG	2.4
1	A	62	VAL	2.4
1	A	410	ILE	2.3
1	D	410	ILE	2.3
1	B	335	GLN	2.3
1	A	94	PRO	2.3
1	D	249	MET	2.3
1	A	90	SER	2.3
1	D	318	TYR	2.3
1	B	39	ALA	2.3
1	A	104	ARG	2.3
1	B	361	GLN	2.3

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Mol	Chain	Res	Type	RSRZ
1	D	217	ALA	2.3
1	C	271	SER	2.2
1	D	68	SER	2.2
1	B	206	ALA	2.2
1	A	316	ILE	2.2
1	B	219	THR	2.2
1	C	100	GLU	2.2
1	B	255	ILE	2.2
1	B	275	ASP	2.2
1	C	409	GLY	2.2
1	C	416	GLY	2.2
1	D	149	LEU	2.2
1	B	156	ALA	2.2
1	D	185	THR	2.2
1	B	323	SER	2.2
1	D	381	GLU	2.1
1	C	213	LYS	2.1
1	D	227	LYS	2.1
1	B	31	GLU	2.1
1	A	433	SER	2.1
1	B	281	SER	2.1
1	C	194	ILE	2.1
1	C	138	ASP	2.1
1	A	188	LYS	2.1
1	D	403	PRO	2.1
1	C	406	GLU	2.0
1	C	402	ASN	2.0
1	C	407	LYS	2.0
1	C	417	LYS	2.0
1	D	235	TYR	2.0
1	A	247	ARG	2.0
1	C	419	ARG	2.0
1	D	419	ARG	2.0
1	B	372	LYS	2.0
1	B	399	GLU	2.0
1	C	429	GLN	2.0
1	C	306	VAL	2.0

6.2 Non-standard residues in protein, DNA, RNA chains

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

6.3 Carbohydrates [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(\AA^2)	Q<0.9
2	SO4	D	445	5/5	0.91	0.23	106,108,109,110	0
2	SO4	C	445	5/5	0.92	0.16	107,108,109,110	0
2	SO4	A	445	5/5	0.95	0.19	77,77,78,80	0
2	SO4	B	445	5/5	0.97	0.14	86,87,90,91	0

6.5 Other polymers [i](#)

There are no such residues in this entry.