WORLDWIDE PDB
PROTEIN DATA BANK

Full wwPDB X-ray Structure Validation Report (i)

Oct 23, 2024 – 01:04 PM EDT

PDB ID	:	1QQC
Title	:	CRYSTAL STRUCTURE OF AN ARCHAEBACTERIAL DNA POLY-MERASE D.TOK
Authors	:	Zhao, Y.; Jeruzalmi, D.; Leighton, L.; Lasken, R.; Kuriyan, J.
Deposited on	:	1999-06-02
Resolution	:	2.60 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.

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 (i)) were used in the production of this report:

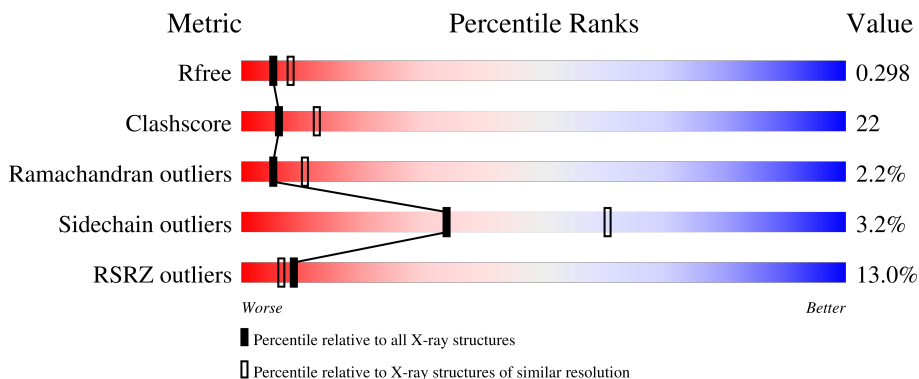|		
MolProbity	:	4.02b-467
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.20.1
EDS	:	3.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.003 (Gargrove)
Density-Fitness	:	1.0.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.39

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 2.60 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		0.298
Clashscore		22
Ramachandran outliers		2.2%
Sidechain outliers		3.2%
RSRZ outliers		13.0%

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$_{free}$	164625	3775 (2.60-2.60)
Clashscore	180529	4181 (2.60-2.60)
Ramachandran outliers	177936	4129 (2.60-2.60)
Sidechain outliers	177891	4129 (2.60-2.60)
RSRZ outliers	164620	3775 (2.60-2.60)

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 <=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	773	12% / 62% / 31%

2 Entry composition ⓘ

There are 4 unique types of molecules in this entry. The entry contains 6167 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 DNA POLYMERASE II.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	740	Total 6029	C 3870	N 1032	O 1112	S 15	0	0	0

- Molecule 2 is SULFATE ION (three-letter code: SO4) (formula: O_4S).

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

- Molecule 3 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	2	Total 2	Mg 2	0	0

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	116	Total 116	O 116	0	0

3 Residue-property plots ⓘ

These plots are drawn for all protein, RNA, DNA and oligosaccharide 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: DNA POLYMERASE II
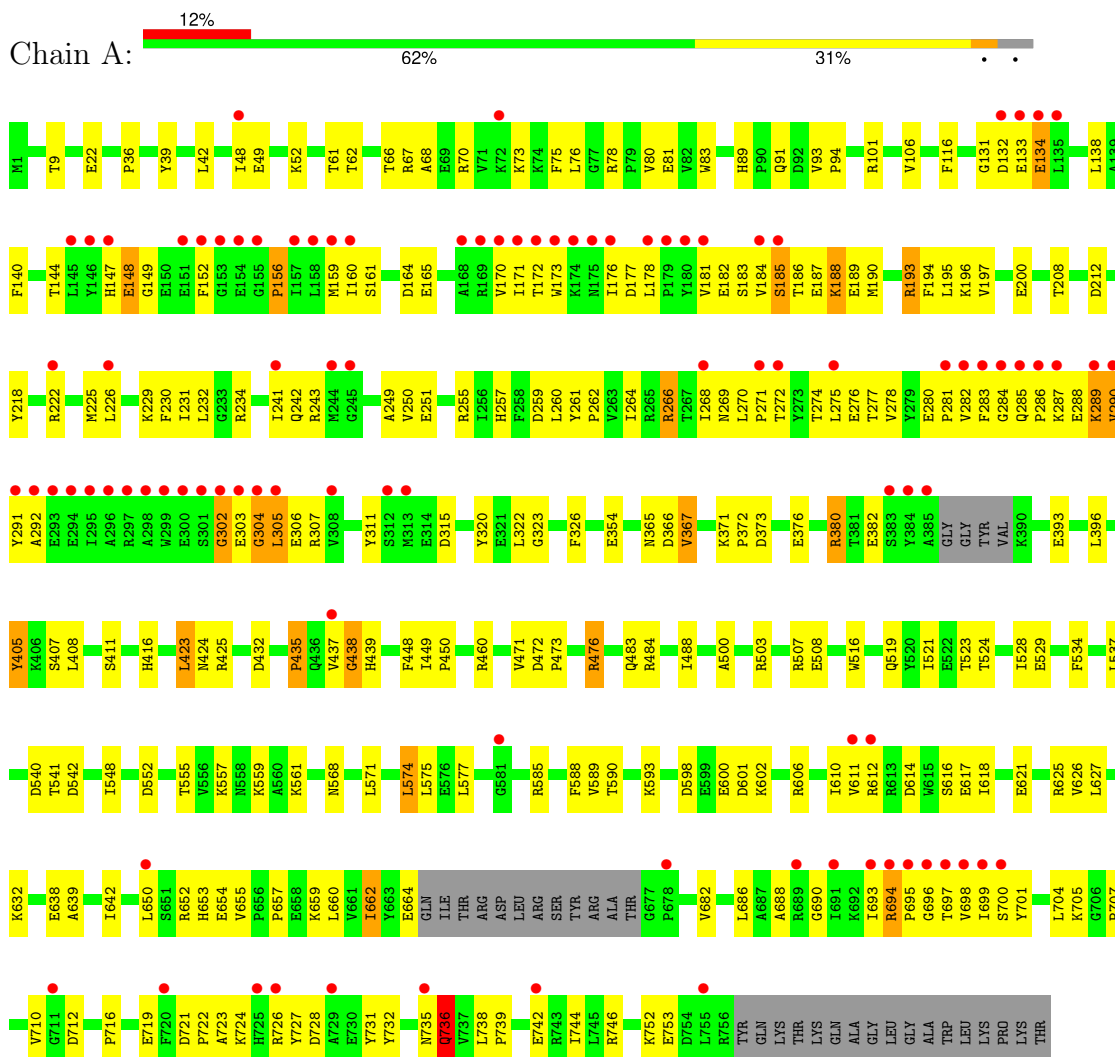
4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	66.10Å 107.60Å 155.90Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	50.00 – 2.60 50.00 – 2.60	Depositor EDS
% Data completeness (in resolution range)	90.3 (50.00-2.60) 92.1 (50.00-2.60)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	7.47 (at 2.61Å)	Xtriage
Refinement program	CNS	Depositor
R, R_{free}	0.244 , 0.295 0.248 , 0.298	Depositor DCC
R_{free} test set	3212 reflections (9.98%)	wwPDB-VP
Wilson B-factor (Å²)	50.1	Xtriage
Anisotropy	0.560	Xtriage
Bulk solvent k_{sol}(e/Å³), B_{sol}(Å²)	0.32 , 58.4	EDS
L-test for twinning[2]	$< |L| > = 0.49$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.92	EDS
Total number of atoms	6167	wwPDB-VP
Average B, all atoms (Å²)	59.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.25% 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 ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: MG, 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	0.42	0/6164	0.74	6/8324 (0.1%)

There are no bond length outliers.

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	304	GLY	N-CA-C	-8.33	92.28	113.10
1	A	284	GLY	N-CA-C	6.36	129.01	113.10
1	A	736	GLN	N-CA-C	6.11	127.51	111.00
1	A	292	ALA	N-CA-C	-5.47	96.22	111.00
1	A	438	GLY	N-CA-C	5.07	125.78	113.10
1	A	289	LYS	N-CA-C	5.04	124.60	111.00

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts ⓘ

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	6029	0	5991	265	0
2	A	20	0	0	0	0
3	A	2	0	0	0	0
4	A	116	0	0	5	0
All	All	6167	0	5991	265	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 22.

All (265) 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:176:ILE:HG12	1:A:305:LEU:HD21	1.42	1.00
1:A:290:VAL:HG11	1:A:697:THR:HA	1.48	0.94
1:A:694:ARG:HB3	1:A:695:PRO:HD2	1.48	0.92
1:A:159:MET:HG2	1:A:172:THR:CG2	2.01	0.91
1:A:437:VAL:HG13	1:A:439:HIS:CD2	2.05	0.91
1:A:460:ARG:HH21	1:A:483:GLN:NE2	1.69	0.90
1:A:460:ARG:HE	1:A:483:GLN:HE21	1.23	0.87
1:A:75:PHE:HD1	1:A:367:VAL:HG12	1.39	0.85
1:A:476:ARG:HB2	1:A:476:ARG:HH11	1.42	0.84
1:A:697:THR:HG22	1:A:698:VAL:H	1.40	0.84
1:A:159:MET:HG2	1:A:172:THR:HG22	1.59	0.83
1:A:161:SER:HB3	1:A:170:VAL:HG22	1.59	0.83
1:A:196:LYS:O	1:A:200:GLU:HG3	1.80	0.81
1:A:460:ARG:HH21	1:A:483:GLN:HE22	1.26	0.81
1:A:188:LYS:HE2	1:A:226:LEU:HG	1.62	0.80
1:A:303:GLU:C	1:A:305:LEU:H	1.84	0.80
1:A:75:PHE:CD1	1:A:367:VAL:HG12	2.17	0.79
1:A:521:ILE:HD11	1:A:541:THR:O	1.83	0.79
1:A:697:THR:HG22	1:A:698:VAL:N	1.98	0.78
1:A:264:ILE:HD13	1:A:278:VAL:HG11	1.65	0.78
1:A:285:GLN:HB2	1:A:286:PRO:HD2	1.65	0.77
1:A:571:LEU:HD22	1:A:575:LEU:HD11	1.68	0.76
1:A:627:LEU:HD21	1:A:744:ILE:HD13	1.66	0.75
1:A:148:GLU:CB	1:A:694:ARG:HH12	2.00	0.75
1:A:612:ARG:NH2	1:A:735:ASN:OD1	2.20	0.74
1:A:305:LEU:HD23	1:A:306:GLU:N	2.03	0.74
1:A:290:VAL:CG1	1:A:697:THR:HA	2.18	0.73
1:A:78:ARG:HG2	1:A:425:ARG:HH22	1.54	0.72
1:A:22:GLU:HA	1:A:133:GLU:OE2	1.90	0.71
1:A:694:ARG:HB3	1:A:695:PRO:CD	2.20	0.71
1:A:186:THR:HG22	1:A:189:GLU:HG2	1.73	0.70
1:A:303:GLU:HG2	1:A:306:GLU:HB2	1.74	0.70
1:A:73:LYS:HD3	1:A:367:VAL:HG23	1.73	0.70
1:A:697:THR:CG2	1:A:698:VAL:H	2.05	0.69
1:A:574:LEU:HD12	1:A:574:LEU:H	1.57	0.69
1:A:303:GLU:C	1:A:305:LEU:N	2.44	0.69
1:A:291:TYR:HE1	1:A:311:TYR:CG	2.09	0.69

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:460:ARG:NE	1:A:483:GLN:HE21	1.90	0.69
1:A:187:GLU:HG3	1:A:226:LEU:HD21	1.73	0.68
1:A:476:ARG:HB2	1:A:476:ARG:NH1	2.07	0.68
1:A:36:PRO:HG3	1:A:116:PHE:CE1	2.28	0.68
1:A:159:MET:HG2	1:A:172:THR:HG21	1.75	0.68
1:A:260:LEU:HD21	1:A:323:GLY:HA2	1.76	0.68
1:A:291:TYR:HE1	1:A:311:TYR:CD1	2.11	0.67
1:A:290:VAL:HB	1:A:698:VAL:HG23	1.77	0.67
1:A:437:VAL:CG1	1:A:439:HIS:CD2	2.77	0.67
1:A:78:ARG:NE	1:A:425:ARG:NH2	2.43	0.67
1:A:271:PRO:HG2	1:A:272:THR:H	1.59	0.67
1:A:274:THR:HG22	1:A:276:GLU:OE2	1.94	0.67
1:A:705:LYS:N	4:A:2084:HOH:O	2.27	0.66
1:A:289:LYS:CG	1:A:290:VAL:H	2.08	0.66
1:A:181:VAL:HG12	1:A:182:GLU:N	2.11	0.66
1:A:277:THR:O	1:A:281:PRO:HD2	1.94	0.66
1:A:184:VAL:HG12	1:A:185:SER:N	2.11	0.65
1:A:372:PRO:HG3	1:A:380:ARG:NH1	2.11	0.65
1:A:261:TYR:HB3	1:A:262:PRO:HD3	1.78	0.65
1:A:93:VAL:HB	1:A:94:PRO:HD3	1.79	0.64
1:A:652:ARG:O	1:A:654:GLU:HG3	1.98	0.64
1:A:664:GLU:HG2	1:A:699:ILE:HG22	1.79	0.64
1:A:188:LYS:H	1:A:188:LYS:HD2	1.63	0.64
1:A:39:TYR:CE2	1:A:73:LYS:HE3	2.33	0.63
1:A:160:ILE:HG23	1:A:171:ILE:CG2	2.29	0.63
1:A:160:ILE:HG23	1:A:171:ILE:HG23	1.80	0.63
1:A:460:ARG:NH2	1:A:483:GLN:NE2	2.45	0.63
1:A:39:TYR:CZ	1:A:73:LYS:HE3	2.33	0.63
1:A:195:LEU:HD21	1:A:230:PHE:CD1	2.34	0.63
1:A:91:GLN:O	1:A:94:PRO:HD2	1.98	0.62
1:A:280:GLU:N	1:A:281:PRO:HD2	2.14	0.62
1:A:437:VAL:CG1	1:A:439:HIS:HD2	2.12	0.62
1:A:571:LEU:HD13	1:A:575:LEU:CD1	2.29	0.62
1:A:552:ASP:HB3	1:A:555:THR:OG1	1.99	0.62
1:A:416:HIS:HD2	1:A:432:ASP:OD1	1.83	0.62
1:A:574:LEU:HD12	1:A:574:LEU:N	2.15	0.61
1:A:618:ILE:HD12	1:A:655:VAL:HG11	1.82	0.61
1:A:287:LYS:HG2	1:A:288:GLU:N	2.15	0.61
1:A:176:ILE:CG1	1:A:305:LEU:HD21	2.26	0.61
1:A:616:SER:CB	1:A:736:GLN:NE2	2.64	0.61
1:A:638:GLU:O	1:A:642:ILE:HG13	2.00	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:437:VAL:O	1:A:439:HIS:N	2.32	0.61
1:A:285:GLN:CB	1:A:286:PRO:HD2	2.28	0.60
1:A:101:ARG:NH1	4:A:2009:HOH:O	2.33	0.60
1:A:259:ASP:O	1:A:262:PRO:HD2	2.00	0.60
1:A:752:LYS:HG3	1:A:753:GLU:HG3	1.84	0.60
1:A:287:LYS:HG2	1:A:288:GLU:H	1.66	0.60
1:A:302:GLY:O	1:A:303:GLU:HG3	2.02	0.59
1:A:616:SER:HB3	1:A:736:GLN:NE2	2.18	0.59
1:A:234:ARG:HG3	1:A:255:ARG:NH1	2.17	0.59
1:A:598:ASP:OD1	1:A:602:LYS:HB3	2.03	0.59
1:A:738:LEU:O	1:A:742:GLU:HG3	2.03	0.59
1:A:188:LYS:HG3	1:A:226:LEU:HB3	1.83	0.58
1:A:519:GLN:O	1:A:523:THR:HG23	2.03	0.58
1:A:78:ARG:NH2	4:A:2054:HOH:O	2.35	0.58
1:A:664:GLU:HA	1:A:699:ILE:CG2	2.33	0.58
1:A:78:ARG:NE	1:A:425:ARG:HH21	2.01	0.58
1:A:186:THR:CG2	1:A:189:GLU:HG2	2.33	0.58
1:A:76:LEU:O	1:A:78:ARG:HG3	2.04	0.58
1:A:144:THR:HG23	1:A:156:PRO:O	2.04	0.57
1:A:704:LEU:HD22	1:A:726:ARG:O	2.04	0.57
1:A:731:TYR:CZ	1:A:735:ASN:ND2	2.67	0.57
1:A:282:VAL:HG21	1:A:322:LEU:HD22	1.86	0.56
1:A:688:ALA:C	1:A:690:GLY:H	2.08	0.56
1:A:132:ASP:OD1	1:A:132:ASP:O	2.23	0.56
1:A:172:THR:O	1:A:183:SER:HA	2.06	0.56
1:A:78:ARG:HE	1:A:425:ARG:NH2	2.04	0.56
1:A:289:LYS:HD3	1:A:290:VAL:N	2.21	0.56
1:A:290:VAL:HG11	1:A:697:THR:CA	2.29	0.55
1:A:752:LYS:HG3	1:A:753:GLU:H	1.72	0.55
1:A:746:ARG:HD3	1:A:746:ARG:O	2.07	0.55
1:A:148:GLU:CB	1:A:694:ARG:NH1	2.70	0.55
1:A:188:LYS:H	1:A:188:LYS:CD	2.20	0.55
1:A:448:PHE:CD2	1:A:449:ILE:HD12	2.42	0.54
1:A:724:LYS:HE2	4:A:2083:HOH:O	2.06	0.54
1:A:593:LYS:HA	1:A:606:ARG:O	2.06	0.54
1:A:241:ILE:HG12	1:A:250:VAL:HG22	1.90	0.54
1:A:508:GLU:OE2	1:A:508:GLU:N	2.39	0.54
1:A:589:VAL:HG12	1:A:590:THR:HG23	1.89	0.54
1:A:188:LYS:HD2	1:A:188:LYS:N	2.22	0.54
1:A:650:LEU:HD21	1:A:732:TYR:HB3	1.90	0.54
1:A:188:LYS:HG3	1:A:226:LEU:CG	2.38	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:437:VAL:HG13	1:A:437:VAL:O	2.08	0.54
1:A:181:VAL:CG1	1:A:182:GLU:N	2.70	0.54
1:A:289:LYS:CD	1:A:290:VAL:H	2.21	0.54
1:A:396:LEU:HD11	1:A:585:ARG:HD3	1.89	0.53
1:A:287:LYS:NZ	1:A:315:ASP:OD2	2.42	0.53
1:A:571:LEU:HB3	1:A:575:LEU:HD11	1.89	0.53
1:A:282:VAL:HG12	1:A:283:PHE:CD2	2.43	0.53
1:A:524:THR:HG21	1:A:577:LEU:HD11	1.89	0.53
1:A:627:LEU:HD21	1:A:744:ILE:CD1	2.37	0.53
1:A:222:ARG:O	1:A:226:LEU:HD13	2.09	0.53
1:A:484:ARG:HG2	1:A:484:ARG:HH11	1.74	0.53
1:A:752:LYS:HG3	1:A:753:GLU:N	2.24	0.52
1:A:305:LEU:HD23	1:A:305:LEU:C	2.30	0.52
1:A:699:ILE:HG23	1:A:699:ILE:O	2.09	0.52
1:A:528:ILE:HG12	1:A:534:PHE:HB2	1.91	0.52
1:A:611:VAL:HG12	1:A:611:VAL:O	2.10	0.52
1:A:165:GLU:HG2	1:A:320:TYR:OH	2.09	0.52
1:A:187:GLU:O	1:A:190:MET:HB3	2.09	0.52
1:A:614:ASP:HB3	1:A:662:ILE:HD11	1.90	0.52
1:A:148:GLU:CA	1:A:694:ARG:HH12	2.22	0.52
1:A:80:VAL:HG22	1:A:81:GLU:N	2.25	0.51
1:A:571:LEU:HD13	1:A:575:LEU:HD12	1.92	0.51
1:A:660:LEU:HD22	1:A:732:TYR:CD2	2.45	0.51
1:A:289:LYS:HG2	1:A:290:VAL:H	1.73	0.51
1:A:521:ILE:CD1	1:A:541:THR:O	2.56	0.51
1:A:548:ILE:HD11	1:A:559:LYS:HG2	1.93	0.51
1:A:48:ILE:HG13	1:A:49:GLU:N	2.26	0.50
1:A:140:PHE:HA	1:A:161:SER:O	2.11	0.50
1:A:278:VAL:O	1:A:282:VAL:HG23	2.11	0.50
1:A:291:TYR:CE1	1:A:311:TYR:CD1	2.96	0.50
1:A:382:GLU:O	1:A:507:ARG:NH2	2.43	0.50
1:A:275:LEU:HD13	1:A:275:LEU:O	2.11	0.50
1:A:48:ILE:HD13	1:A:83:TRP:CH2	2.47	0.50
1:A:627:LEU:CD2	1:A:744:ILE:HD13	2.37	0.50
1:A:9:THR:OG1	1:A:89:HIS:HE1	1.94	0.50
1:A:290:VAL:HG13	1:A:696:GLY:O	2.11	0.50
1:A:524:THR:CG2	1:A:577:LEU:HD11	2.42	0.50
1:A:277:THR:O	1:A:281:PRO:CD	2.59	0.49
1:A:285:GLN:HB2	1:A:286:PRO:CD	2.39	0.49
1:A:698:VAL:HG12	1:A:698:VAL:O	2.11	0.49
1:A:289:LYS:CG	1:A:290:VAL:N	2.75	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:484:ARG:O	1:A:488:ILE:HD12	2.12	0.49
1:A:177:ASP:O	1:A:306:GLU:OE2	2.30	0.49
1:A:393:GLU:HG3	1:A:537:LEU:HD23	1.94	0.49
1:A:89:HIS:CD2	1:A:91:GLN:H	2.31	0.48
1:A:144:THR:HG21	1:A:218:TYR:OH	2.13	0.48
1:A:571:LEU:HB3	1:A:575:LEU:CD1	2.42	0.48
1:A:716:PRO:HD2	1:A:719:GLU:OE1	2.12	0.48
1:A:731:TYR:OH	1:A:735:ASN:ND2	2.46	0.48
1:A:423:LEU:CD2	1:A:424:ASN:ND2	2.76	0.48
1:A:612:ARG:HH22	1:A:735:ASN:CG	2.15	0.48
1:A:662:ILE:O	1:A:700:SER:HA	2.14	0.48
1:A:557:LYS:O	1:A:561:LYS:HG2	2.14	0.48
1:A:193:ARG:O	1:A:197:VAL:HG23	2.13	0.48
1:A:164:ASP:OD1	1:A:165:GLU:N	2.47	0.48
1:A:184:VAL:CG1	1:A:185:SER:N	2.75	0.48
1:A:197:VAL:HA	1:A:200:GLU:OE1	2.14	0.48
1:A:138:LEU:C	1:A:138:LEU:HD23	2.34	0.47
1:A:616:SER:CB	1:A:736:GLN:HE21	2.26	0.47
1:A:735:ASN:O	1:A:739:PRO:HG3	2.13	0.47
1:A:148:GLU:HA	1:A:694:ARG:NH1	2.29	0.47
1:A:372:PRO:HG2	1:A:500:ALA:O	2.14	0.47
1:A:610:ILE:CG2	1:A:612:ARG:HB2	2.44	0.47
1:A:184:VAL:HG12	1:A:185:SER:H	1.77	0.47
1:A:188:LYS:HG3	1:A:226:LEU:CB	2.44	0.47
1:A:710:VAL:HG12	1:A:710:VAL:O	2.14	0.47
1:A:147:HIS:O	1:A:148:GLU:C	2.52	0.47
1:A:371:LYS:HG3	1:A:503:ARG:NH1	2.30	0.47
1:A:686:LEU:C	1:A:688:ALA:H	2.18	0.47
1:A:616:SER:OG	1:A:736:GLN:NE2	2.47	0.47
1:A:70:ARG:HE	1:A:81:GLU:CD	2.19	0.46
1:A:660:LEU:HB3	1:A:732:TYR:CE2	2.50	0.46
1:A:601:ASP:OD2	1:A:632:LYS:HE3	2.15	0.46
1:A:408:LEU:O	1:A:411:SER:HB3	2.15	0.46
1:A:448:PHE:HD2	1:A:449:ILE:HD12	1.80	0.46
1:A:160:ILE:CG2	1:A:171:ILE:HG23	2.44	0.46
1:A:232:LEU:O	1:A:255:ARG:NH1	2.49	0.46
1:A:484:ARG:HG2	1:A:484:ARG:NH1	2.31	0.46
1:A:568:ASN:HD22	1:A:571:LEU:HD12	1.80	0.46
1:A:437:VAL:CG1	1:A:437:VAL:O	2.63	0.46
1:A:617:GLU:HB3	1:A:659:LYS:O	2.16	0.46
1:A:66:THR:HG22	1:A:67:ARG:HG3	1.96	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:160:ILE:HD11	1:A:194:PHE:CE1	2.52	0.45
1:A:305:LEU:CD2	1:A:306:GLU:N	2.78	0.45
1:A:721:ASP:C	1:A:723:ALA:H	2.19	0.45
1:A:173:TRP:HA	1:A:184:VAL:O	2.17	0.45
1:A:405:TYR:HD1	1:A:542:ASP:O	2.00	0.45
1:A:148:GLU:CA	1:A:694:ARG:NH1	2.79	0.45
1:A:638:GLU:OE2	1:A:638:GLU:HA	2.16	0.45
1:A:694:ARG:CB	1:A:695:PRO:HD2	2.33	0.45
1:A:91:GLN:C	1:A:94:PRO:HD2	2.37	0.44
1:A:626:VAL:HG13	1:A:639:ALA:HB1	1.99	0.44
1:A:42:LEU:N	1:A:42:LEU:HD12	2.32	0.44
1:A:472:ASP:HA	1:A:473:PRO:HD2	1.82	0.44
1:A:304:GLY:O	1:A:307:ARG:HB3	2.17	0.44
1:A:529:GLU:HG2	1:A:534:PHE:O	2.18	0.44
1:A:588:PHE:CD1	1:A:588:PHE:N	2.85	0.44
1:A:682:VAL:O	1:A:686:LEU:HB2	2.18	0.44
1:A:688:ALA:C	1:A:690:GLY:N	2.70	0.44
1:A:187:GLU:HG3	1:A:226:LEU:CD2	2.44	0.44
1:A:188:LYS:HA	1:A:226:LEU:HD23	2.00	0.43
1:A:303:GLU:HB3	1:A:304:GLY:H	1.68	0.43
1:A:621:GLU:O	1:A:625:ARG:HG3	2.18	0.43
1:A:52:LYS:HE2	1:A:68:ALA:HB3	2.01	0.43
1:A:274:THR:CG2	1:A:276:GLU:OE2	2.65	0.43
1:A:289:LYS:CD	1:A:290:VAL:N	2.81	0.43
1:A:178:LEU:HD12	1:A:181:VAL:HG21	2.00	0.43
1:A:208:THR:OG1	1:A:257:HIS:HE1	2.02	0.43
1:A:275:LEU:HD13	1:A:275:LEU:C	2.39	0.43
1:A:268:ILE:HG22	1:A:270:LEU:HG	2.00	0.43
1:A:699:ILE:HG12	1:A:701:TYR:HD2	1.83	0.43
1:A:373:ASP:OD2	1:A:376:GLU:HG3	2.19	0.42
1:A:449:ILE:HB	1:A:450:PRO:HD3	2.01	0.42
1:A:187:GLU:CG	1:A:226:LEU:HD21	2.45	0.42
1:A:229:LYS:O	1:A:231:ILE:HG12	2.19	0.42
1:A:600:GLU:O	1:A:601:ASP:HB2	2.19	0.42
1:A:134:GLU:H	1:A:134:GLU:HG3	1.50	0.42
1:A:184:VAL:CG1	1:A:185:SER:H	2.31	0.42
1:A:264:ILE:C	1:A:266:ARG:H	2.23	0.42
1:A:269:ASN:O	1:A:270:LEU:HD23	2.20	0.42
1:A:280:GLU:N	1:A:281:PRO:CD	2.83	0.42
1:A:80:VAL:CG2	1:A:81:GLU:N	2.83	0.42
1:A:181:VAL:CG1	1:A:182:GLU:H	2.33	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:195:LEU:HD21	1:A:230:PHE:HD1	1.80	0.42
1:A:612:ARG:HH22	1:A:735:ASN:ND2	2.17	0.42
1:A:693:ILE:HG23	1:A:693:ILE:O	2.20	0.41
1:A:101:ARG:HA	1:A:106:VAL:HG11	2.02	0.41
1:A:614:ASP:HB3	1:A:662:ILE:CD1	2.51	0.41
1:A:73:LYS:HG2	1:A:365:ASN:OD1	2.21	0.41
1:A:161:SER:CB	1:A:170:VAL:HG22	2.42	0.41
1:A:322:LEU:O	1:A:326:PHE:HD1	2.03	0.41
1:A:735:ASN:OD1	1:A:735:ASN:O	2.39	0.41
1:A:686:LEU:HD12	1:A:686:LEU:HA	1.94	0.41
1:A:61:THR:HG22	1:A:62:THR:N	2.35	0.41
1:A:407:SER:O	1:A:411:SER:CB	2.69	0.41
1:A:460:ARG:CZ	1:A:483:GLN:HE21	2.34	0.41
1:A:650:LEU:HD21	1:A:732:TYR:CB	2.51	0.41
1:A:89:HIS:HD2	1:A:91:GLN:H	1.69	0.41
1:A:276:GLU:OE1	1:A:289:LYS:HB2	2.21	0.41
1:A:212:ASP:HB3	1:A:249:ALA:HA	2.02	0.40
1:A:242:GLN:NE2	1:A:251:GLU:OE1	2.54	0.40
1:A:704:LEU:HA	4:A:2084:HOH:O	2.20	0.40
1:A:225:MET:H	1:A:225:MET:HG2	1.75	0.40
1:A:616:SER:HB3	1:A:736:GLN:HE22	1.85	0.40
1:A:460:ARG:HE	1:A:483:GLN:NE2	2.04	0.40
1:A:653:HIS:HA	1:A:727:TYR:CZ	2.57	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	734/773 (95%)	652 (89%)	66 (9%)	16 (2%)	5	10

All (16) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	148	GLU
1	A	152	PHE
1	A	185	SER
1	A	435	PRO
1	A	438	GLY
1	A	131	GLY
1	A	290	VAL
1	A	380	ARG
1	A	728	ASP
1	A	156	PRO
1	A	694	ARG
1	A	707	PRO
1	A	722	PRO
1	A	657	PRO
1	A	302	GLY
1	A	149	GLY

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	630/670 (94%)	610 (97%)	20 (3%)	34	60

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

Mol	Chain	Res	Type
1	A	134	GLU
1	A	188	LYS
1	A	193	ARG
1	A	243	ARG
1	A	266	ARG
1	A	305	LEU
1	A	354	GLU
1	A	366	ASP
1	A	367	VAL
1	A	405	TYR
1	A	423	LEU

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Mol	Chain	Res	Type
1	A	435	PRO
1	A	471	VAL
1	A	476	ARG
1	A	516	TRP
1	A	540	ASP
1	A	574	LEU
1	A	662	ILE
1	A	712	ASP
1	A	736	GLN

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

Mol	Chain	Res	Type
1	A	89	HIS
1	A	242	GLN
1	A	257	HIS
1	A	416	HIS
1	A	424	ASN
1	A	439	HIS
1	A	483	GLN
1	A	558	ASN
1	A	568	ASN
1	A	653	HIS
1	A	736	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 6 ligands modelled in this entry, 2 are monoatomic - leaving 4 for Mogul analysis.

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	1606	-	4,4,4	0.23	0	6,6,6	0.12	0
2	SO4	A	1091	-	4,4,4	0.23	0	6,6,6	0.15	0
2	SO4	A	1487	-	4,4,4	0.21	0	6,6,6	0.10	0
2	SO4	A	1130	-	4,4,4	0.19	0	6,6,6	0.11	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.

No monomer is involved in short contacts.

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

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(Å²)	Q<0.9
1	A	740/773 (95%)	0.65	96 (12%)	9	6	22, 54, 111, 137	0

All (96) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	294	GLU	6.2
1	A	292	ALA	5.8
1	A	699	ILE	5.5
1	A	698	VAL	5.0
1	A	385	ALA	4.8
1	A	282	VAL	4.8
1	A	159	MET	4.6
1	A	132	ASP	4.5
1	A	384	TYR	4.5
1	A	697	THR	4.5
1	A	696	GLY	4.4
1	A	293	GLU	4.4
1	A	290	VAL	4.4
1	A	291	TYR	4.3
1	A	174	LYS	4.2
1	A	304	GLY	4.0
1	A	151	GLU	3.9
1	A	700	SER	3.9
1	A	299	TRP	3.8
1	A	155	GLY	3.7
1	A	296	ALA	3.6
1	A	153	GLY	3.6
1	A	383	SER	3.5
1	A	295	ILE	3.5
1	A	134	GLU	3.5
1	A	735	ASN	3.5
1	A	173	TRP	3.3

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Mol	Chain	Res	Type	RSRZ
1	A	171	ILE	3.3
1	A	281	PRO	3.2
1	A	695	PRO	3.2
1	A	146	TYR	3.1
1	A	179	PRO	3.1
1	A	184	VAL	3.1
1	A	298	ALA	3.1
1	A	160	ILE	3.1
1	A	283	PHE	3.1
1	A	711	GLY	3.0
1	A	755	LEU	3.0
1	A	168	ALA	3.0
1	A	611	VAL	3.0
1	A	154	GLU	2.9
1	A	300	GLU	2.9
1	A	691	ILE	2.9
1	A	289	LYS	2.9
1	A	286	PRO	2.9
1	A	181	VAL	2.8
1	A	158	LEU	2.8
1	A	244	MET	2.8
1	A	693	ILE	2.8
1	A	720	PHE	2.8
1	A	178	LEU	2.8
1	A	284	GLY	2.8
1	A	308	VAL	2.7
1	A	152	PHE	2.7
1	A	180	TYR	2.7
1	A	650	LEU	2.7
1	A	694	ARG	2.7
1	A	176	ILE	2.7
1	A	287	LYS	2.7
1	A	275	LEU	2.7
1	A	285	GLN	2.6
1	A	305	LEU	2.6
1	A	301	SER	2.6
1	A	742	GLU	2.6
1	A	48	ILE	2.6
1	A	726	ARG	2.6
1	A	226	LEU	2.5
1	A	268	ILE	2.5
1	A	271	PRO	2.5

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Mol	Chain	Res	Type	RSRZ
1	A	297	ARG	2.5
1	A	302	GLY	2.5
1	A	157	ILE	2.4
1	A	313	MET	2.4
1	A	241	ILE	2.4
1	A	170	VAL	2.3
1	A	185	SER	2.3
1	A	303	GLU	2.3
1	A	312	SER	2.3
1	A	133	GLU	2.2
1	A	272	THR	2.2
1	A	581	GLY	2.2
1	A	725	HIS	2.2
1	A	437	VAL	2.2
1	A	222	ARG	2.2
1	A	172	THR	2.2
1	A	147	HIS	2.2
1	A	145	LEU	2.2
1	A	72	LYS	2.1
1	A	612	ARG	2.1
1	A	678	PRO	2.1
1	A	175	ASN	2.1
1	A	729	ALA	2.1
1	A	135	LEU	2.0
1	A	169	ARG	2.0
1	A	245	GLY	2.0
1	A	689	ARG	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 ⓘ

There are no monosaccharides in this entry.

6.4 Ligands ⓘ

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	MG	A	3031	1/1	0.58	0.35	111,111,111,111	0
3	MG	A	3030	1/1	0.64	0.27	100,100,100,100	0
2	SO4	A	1487	5/5	0.70	0.15	115,116,116,116	0
2	SO4	A	1606	5/5	0.78	0.18	118,119,119,120	0
2	SO4	A	1130	5/5	0.91	0.10	60,61,62,62	0
2	SO4	A	1091	5/5	0.96	0.07	45,46,49,51	0

6.5 Other polymers ⓘ

There are no such residues in this entry.