Full wwPDB X-ray Structure Validation Report (i)

Oct 15, 2025 – 04:14 am BST

PDB ID	:	9QHC / pdb_00009qhc
Title	:	Crystal structure of 8-repeat CTPR protein with eliminated coordination sites
Authors	:	Liutkus, M.; Rojas, A.L.; Cortajarena, A.L.
Deposited on	:	2025-03-14
Resolution	:	2.88 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:

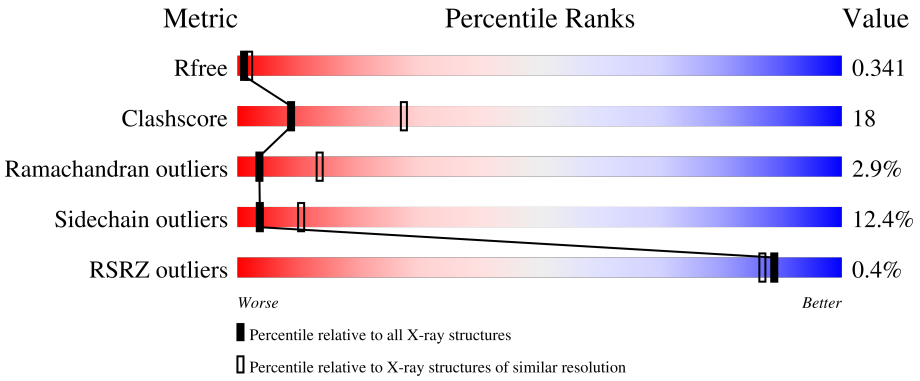
MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.46

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 2.88 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}	164625	3316 (2.90-2.86)
Clashscore	180529	3609 (2.90-2.86)
Ramachandran outliers	177936	3529 (2.90-2.86)
Sidechain outliers	177891	3532 (2.90-2.86)
RSRZ outliers	164620	3319 (2.90-2.86)

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	292	54% 35% 6%
1	B	292	50% 36% 8% 7%

2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 4654 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.

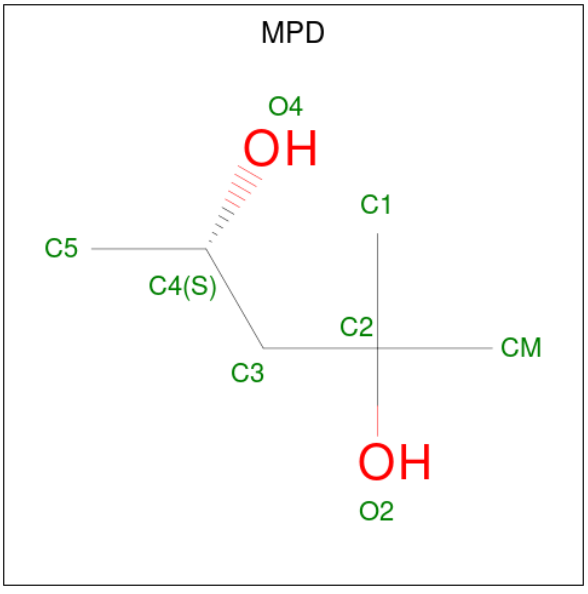
- Molecule 1 is a protein called Engineered tetratricopeptide repeat protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	279	Total	C	N	O	S	0	0	0
			2342	1511	364	466	1			
1	B	273	Total	C	N	O	S	0	0	0
			2297	1485	354	457	1			

- Molecule 2 is CALCIUM ION (CCD ID: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	Ca	0	0
			1	1		
2	B	1	Total	Ca	0	0
			1	1		

- Molecule 3 is (4S)-2-METHYL-2,4-PENTANEDIOL (CCD ID: MPD) (formula: $C_6H_{14}O_2$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total C O 8 6 2	0	0

- Molecule 4 is water.

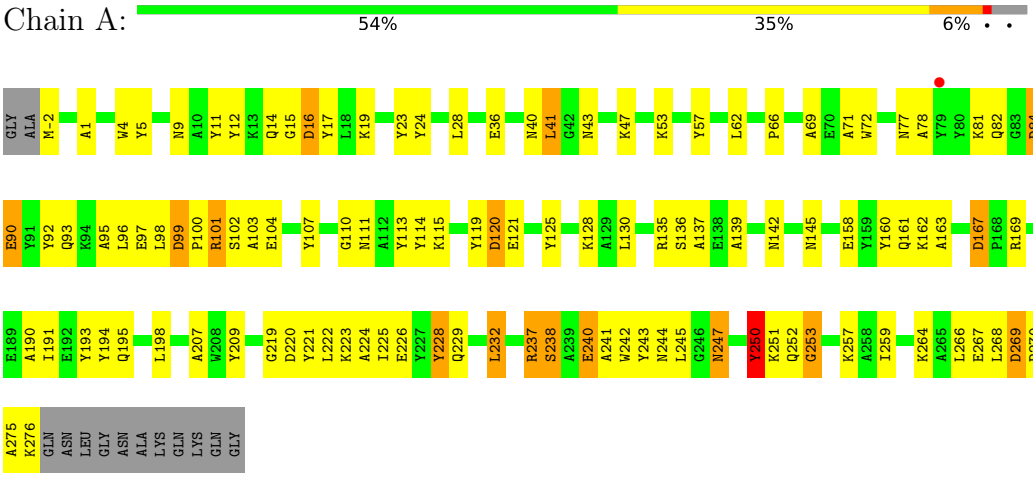
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	B	5	Total O 5 5	0	0

3 Residue-property plots (i)

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.

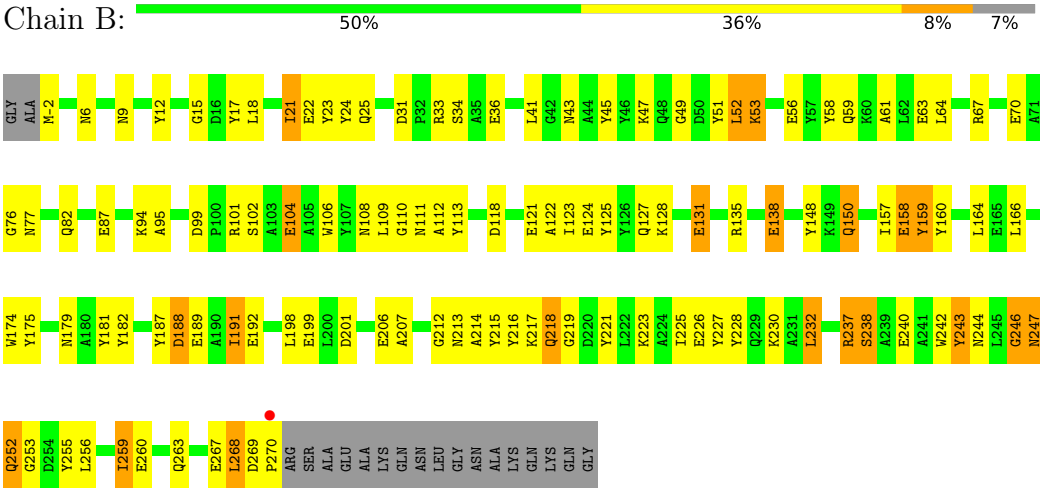
• Molecule 1: Engineered tetratricopeptide repeat protein

Chain A:



• Molecule 1: Engineered tetratricopeptide repeat protein

Chain B:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, α, β, γ	79.26Å 134.19Å 78.10Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	67.18 – 2.88 67.18 – 2.88	Depositor EDS
% Data completeness (in resolution range)	54.9 (67.18-2.88) 54.9 (67.18-2.88)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.29 (at 2.86Å)	Xtriage
Refinement program	REFMAC 5.8.0425	Depositor
R, R_{free}	0.206 , 0.338 0.213 , 0.341	Depositor DCC
R_{free} test set	520 reflections (2.67%)	wwPDB-VP
Wilson B-factor (Å^2)	100.8	Xtriage
Anisotropy	0.179	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.27 , 64.6	EDS
L-test for twinning[2]	$< \|L\| > = 0.45$, $< L^2 > = 0.28$	Xtriage
Estimated twinning fraction	0.042 for l,-k,h	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	4654	wwPDB-VP
Average B, all atoms (Å^2)	102.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 18.70% of the height of the origin peak. No significant pseudotranslation is detected.*

[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: CA, MPD

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	0.49	0/2413	1.16	8/3277 (0.2%)
1	B	0.53	0/2368	1.22	9/3218 (0.3%)
All	All	0.51	0/4781	1.19	17/6495 (0.3%)

There are no bond length outliers.

All (17) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	188	ASP	CA-CB-CG	8.18	120.78	112.60
1	A	84	ASP	CA-CB-CG	6.49	119.09	112.60
1	A	86	ASP	CA-CB-CG	6.13	118.73	112.60
1	A	250	TYR	CB-CA-C	6.05	121.61	110.11
1	B	138	GLU	CB-CG-CD	5.94	122.70	112.60
1	A	99	ASP	CA-CB-CG	5.39	117.99	112.60
1	B	189	GLU	CB-CG-CD	5.37	121.73	112.60
1	A	228	TYR	CB-CA-C	-5.35	100.40	110.67
1	A	120	ASP	CA-CB-CG	5.22	117.82	112.60
1	B	159	TYR	CB-CA-C	5.21	119.14	110.90
1	B	6	ASN	CA-CB-CG	-5.15	107.45	112.60
1	B	237	ARG	N-CA-C	-5.12	106.72	113.12
1	A	228	TYR	N-CA-CB	5.08	118.16	110.28
1	B	131	GLU	CB-CG-CD	5.05	121.19	112.60
1	A	167	ASP	CA-CB-CG	5.05	117.65	112.60
1	B	150	GLN	CB-CA-C	5.03	118.41	109.65
1	B	199	GLU	CB-CG-CD	5.01	121.11	112.60

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	2342	0	2136	82	0
1	B	2297	0	2089	81	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
3	A	8	0	14	0	0
4	B	5	0	0	1	0
All	All	4654	0	4239	163	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 18.

All (163) 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:9:ASN:OD1	1:A:24:TYR:OH	1.78	1.01
1:A:238:SER:HB3	1:A:241:ALA:HB2	1.60	0.83
1:A:62:LEU:HD21	1:A:71:ALA:HB1	1.66	0.78
1:B:269:ASP:N	1:B:270:PRO:HD3	2.00	0.76
1:B:188:ASP:OD1	1:B:218:GLN:OE1	2.06	0.74
1:B:104:GLU:N	1:B:104:GLU:OE2	2.21	0.73
1:B:252:GLN:NE2	1:B:252:GLN:HA	2.02	0.72
1:B:221:TYR:CE2	1:B:251:LYS:HB3	2.25	0.72
1:A:226:GLU:HA	1:A:229:GLN:OE1	1.90	0.70
1:A:145:ASN:OD1	1:A:160:TYR:OH	2.11	0.69
1:A:130:LEU:HD21	1:A:139:ALA:HB3	1.77	0.66
1:B:99:ASP:OD1	1:B:101:ARG:NE	2.28	0.66
1:A:274:GLU:O	1:A:276:LYS:N	2.30	0.65
1:A:228:TYR:CE1	1:A:244:ASN:ND2	2.67	0.62
1:A:107:TYR:HE2	1:A:111:ASN:HD21	1.48	0.62
1:A:12:TYR:OH	1:A:43:ASN:O	2.15	0.62
1:A:269:ASP:H	1:A:270:PRO:CD	2.14	0.61
1:B:263:GLN:NE2	4:B:401:HOH:O	2.36	0.59
1:B:191:ILE:CD1	1:B:214:ALA:HB1	2.33	0.58
1:B:169:ARG:CZ	1:B:169:ARG:HB3	2.33	0.58
1:A:232:LEU:HD11	1:A:241:ALA:HB1	1.86	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:157:ILE:O	1:B:158:GLU:C	2.46	0.58
1:B:191:ILE:HD11	1:B:214:ALA:HB1	1.86	0.58
1:A:267:GLU:O	1:A:267:GLU:HG3	2.03	0.58
1:B:21:ILE:HD13	1:B:45:TYR:CZ	2.38	0.57
1:A:17:TYR:CE1	1:A:47:LYS:HD2	2.40	0.57
1:B:109:LEU:O	1:B:112:ALA:HB3	2.04	0.57
1:A:228:TYR:HB2	1:A:245:LEU:HD13	1.86	0.57
1:B:12:TYR:OH	1:B:43:ASN:HB3	2.04	0.57
1:A:69:ALA:O	1:A:72:TRP:N	2.39	0.56
1:B:123:ILE:O	1:B:124:GLU:C	2.47	0.56
1:B:108:ASN:HA	1:B:111:ASN:HD22	1.70	0.56
1:B:268:LEU:C	1:B:270:PRO:HD3	2.31	0.56
1:B:118:ASP:CG	1:B:121:GLU:HG2	2.31	0.55
1:B:187:TYR:O	1:B:191:ILE:HD12	2.06	0.55
1:A:15:GLY:O	1:A:16:ASP:C	2.50	0.55
1:B:227:TYR:O	1:B:230:LYS:N	2.40	0.55
1:A:77:ASN:O	1:A:78:ALA:C	2.50	0.54
1:A:16:ASP:OD1	1:A:19:LYS:HG2	2.08	0.53
1:B:259:ILE:O	1:B:260:GLU:C	2.51	0.53
1:A:85:TYR:CE1	1:A:115:LYS:HB3	2.44	0.52
1:B:59:GLN:O	1:B:63:GLU:HG2	2.09	0.52
1:B:223:LYS:O	1:B:226:GLU:HB3	2.08	0.52
1:B:269:ASP:N	1:B:270:PRO:CD	2.70	0.52
1:B:216:TYR:HE2	1:B:247:ASN:OD1	1.91	0.52
1:A:266:LEU:O	1:A:270:PRO:HD3	2.10	0.52
1:B:49:GLY:HA2	1:B:51:TYR:CE1	2.45	0.52
1:B:72:TRP:HB2	1:B:95:ALA:HB2	1.91	0.52
1:A:12:TYR:OH	1:A:43:ASN:HB3	2.10	0.52
1:B:221:TYR:CD2	1:B:251:LYS:HB3	2.44	0.52
1:A:224:ALA:O	1:A:225:ILE:C	2.53	0.52
1:B:15:GLY:HA2	1:B:17:TYR:CZ	2.45	0.51
1:B:9:ASN:OD1	1:B:24:TYR:OH	2.19	0.51
1:A:244:ASN:ND2	1:A:244:ASN:C	2.69	0.51
1:A:237:ARG:O	1:A:238:SER:C	2.53	0.51
1:B:61:ALA:O	1:B:64:LEU:HB2	2.10	0.51
1:B:215:TYR:CE2	1:B:227:TYR:HE2	2.28	0.51
1:A:191:ILE:HG22	1:A:195:GLN:HE21	1.76	0.50
1:B:72:TRP:CB	1:B:95:ALA:HB2	2.41	0.50
1:B:201:ASP:OD1	1:B:201:ASP:C	2.55	0.50
1:A:268:LEU:O	1:A:269:ASP:OD1	2.30	0.50
1:B:216:TYR:C	1:B:216:TYR:CD1	2.90	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:113:TYR:CD2	1:A:125:TYR:CE2	2.99	0.50
1:A:232:LEU:CD1	1:A:241:ALA:HB1	2.42	0.50
1:B:73:TYR:O	1:B:76:GLY:N	2.45	0.49
1:B:15:GLY:HA2	1:B:17:TYR:CE1	2.47	0.49
1:A:242:TRP:O	1:A:243:TYR:C	2.55	0.49
1:A:209:TYR:C	1:A:209:TYR:CD2	2.91	0.49
1:A:250:TYR:C	1:A:250:TYR:CD1	2.91	0.48
1:A:99:ASP:OD1	1:A:101:ARG:NH1	2.45	0.48
1:A:62:LEU:CD2	1:A:71:ALA:HB1	2.40	0.48
1:B:52:LEU:HG	1:B:82:GLN:HE22	1.79	0.47
1:B:181:TYR:O	1:B:182:TYR:C	2.57	0.47
1:B:198:LEU:HD21	1:B:207:ALA:HB3	1.97	0.47
1:B:223:LYS:O	1:B:226:GLU:N	2.48	0.47
1:A:5:TYR:HE1	1:A:36:GLU:O	1.98	0.47
1:A:113:TYR:CD2	1:A:125:TYR:HE2	2.32	0.47
1:A:85:TYR:O	1:A:86:ASP:C	2.58	0.47
1:A:268:LEU:O	1:A:272:SER:OG	2.33	0.47
1:A:41:LEU:HD13	1:A:57:TYR:CD2	2.49	0.46
1:B:127:GLN:O	1:B:131:GLU:HG2	2.16	0.46
1:B:108:ASN:O	1:B:112:ALA:N	2.42	0.46
1:B:187:TYR:O	1:B:188:ASP:C	2.58	0.46
1:B:250:TYR:O	1:B:250:TYR:CD1	2.69	0.46
1:A:72:TRP:CB	1:A:95:ALA:HB2	2.46	0.46
1:A:136:SER:O	1:A:137:ALA:C	2.58	0.46
1:B:148:TYR:OH	1:B:179:ASN:HB3	2.15	0.46
1:B:219:GLY:O	1:B:221:TYR:CD1	2.69	0.46
1:A:167:ASP:C	1:A:169:ARG:H	2.23	0.46
1:A:11:TYR:CE2	1:A:23:TYR:HE2	2.34	0.45
1:A:104:GLU:CD	1:A:104:GLU:H	2.24	0.45
1:A:92:TYR:O	1:A:95:ALA:N	2.48	0.45
1:B:216:TYR:CE2	1:B:247:ASN:OD1	2.69	0.45
1:A:89:ILE:O	1:A:92:TYR:N	2.50	0.45
1:A:228:TYR:CZ	1:A:244:ASN:ND2	2.85	0.45
1:B:102:SER:O	1:B:106:TRP:CD1	2.69	0.45
1:B:110:GLY:O	1:B:113:TYR:N	2.50	0.45
1:A:158:GLU:HA	1:A:161:GLN:OE1	2.17	0.45
1:B:252:GLN:NE2	1:B:252:GLN:CA	2.77	0.45
1:A:102:SER:O	1:A:103:ALA:C	2.59	0.45
1:A:232:LEU:HD21	1:A:241:ALA:HB1	1.98	0.45
1:A:181:TYR:CE2	1:A:193:TYR:HE2	2.35	0.45
1:B:22:GLU:O	1:B:25:GLN:HB2	2.16	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:72:TRP:O	1:B:75:LEU:HB3	2.17	0.45
1:A:198:LEU:HD21	1:A:207:ALA:HB3	1.99	0.45
1:A:244:ASN:C	1:A:244:ASN:HD22	2.24	0.45
1:B:187:TYR:CE2	1:B:217:LYS:HB3	2.51	0.45
1:B:157:ILE:O	1:B:159:TYR:N	2.51	0.44
1:A:92:TYR:O	1:A:93:GLN:C	2.61	0.44
1:A:89:ILE:O	1:A:90:GLU:C	2.60	0.44
1:A:110:GLY:O	1:A:114:TYR:N	2.37	0.44
1:A:182:TYR:C	1:A:182:TYR:CD1	2.95	0.44
1:A:190:ALA:O	1:A:194:TYR:CD2	2.70	0.44
1:A:228:TYR:CB	1:A:245:LEU:HD13	2.46	0.44
1:B:225:ILE:HG13	1:B:248:ALA:HB1	2.00	0.44
1:A:1:ALA:O	1:A:4:TRP:HB2	2.18	0.44
1:B:240:GLU:HA	1:B:243:TYR:HB2	1.99	0.44
1:B:121:GLU:O	1:B:122:ALA:C	2.61	0.44
1:A:40:ASN:HA	1:A:43:ASN:HB2	1.99	0.44
1:A:221:TYR:CE1	1:A:251:LYS:HG2	2.53	0.44
1:A:240:GLU:N	1:A:240:GLU:CD	2.76	0.43
1:A:269:ASP:H	1:A:270:PRO:HD2	1.83	0.43
1:A:250:TYR:CD1	1:A:250:TYR:O	2.71	0.43
1:A:5:TYR:HE1	1:A:36:GLU:C	2.27	0.43
1:B:232:LEU:HD11	1:B:242:TRP:CD2	2.54	0.43
1:A:160:TYR:O	1:A:161:GLN:C	2.62	0.43
1:B:246:GLY:O	1:B:247:ASN:C	2.61	0.43
1:B:237:ARG:O	1:B:238:SER:C	2.61	0.43
1:A:220:ASP:O	1:A:222:LEU:N	2.52	0.43
1:A:220:ASP:HB3	1:A:223:LYS:HD3	2.00	0.43
1:A:162:LYS:O	1:A:163:ALA:C	2.61	0.43
1:B:9:ASN:OD1	1:B:24:TYR:CZ	2.71	0.43
1:B:31:ASP:OD1	1:B:33:ARG:HB2	2.19	0.43
1:B:58:TYR:CZ	1:B:74:ASN:HB3	2.54	0.42
1:A:93:GLN:O	1:A:97:GLU:HG3	2.19	0.42
1:B:227:TYR:O	1:B:228:TYR:C	2.63	0.42
1:B:252:GLN:HA	1:B:252:GLN:HE21	1.82	0.42
1:A:92:TYR:O	1:A:96:LEU:HD12	2.19	0.42
1:A:114:TYR:CD1	1:A:114:TYR:C	2.98	0.42
1:A:270:PRO:HG2	1:A:271:ARG:HD2	2.02	0.42
1:A:5:TYR:CE2	1:A:9:ASN:ND2	2.87	0.42
1:B:23:TYR:N	1:B:23:TYR:CD1	2.87	0.41
1:B:43:ASN:O	1:B:47:LYS:HG2	2.20	0.41
1:A:219:GLY:HA2	1:A:221:TYR:CE2	2.55	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:17:TYR:O	1:B:21:ILE:HG13	2.20	0.41
1:A:252:GLN:O	1:A:253:GLY:C	2.63	0.41
1:A:232:LEU:CD2	1:A:241:ALA:HB1	2.49	0.41
1:B:164:LEU:HD21	1:B:173:ALA:HB3	2.02	0.41
1:B:102:SER:O	1:B:106:TRP:HD1	2.04	0.41
1:A:247:ASN:O	1:A:251:LYS:HB2	2.21	0.41
1:B:74:ASN:HA	1:B:77:ASN:HD22	1.85	0.41
1:B:160:TYR:O	1:B:164:LEU:N	2.51	0.41
1:B:252:GLN:O	1:B:256:LEU:N	2.42	0.41
1:A:62:LEU:CD1	1:A:66:PRO:HA	2.50	0.40
1:B:173:ALA:O	1:B:174:TRP:C	2.64	0.40
1:A:270:PRO:HD2	1:A:271:ARG:HD2	2.03	0.40
1:B:113:TYR:CE2	1:B:125:TYR:CE2	3.09	0.40
1:B:21:ILE:HD13	1:B:45:TYR:CE2	2.56	0.40
1:B:53:LYS:HD3	1:B:53:LYS:HA	1.86	0.40
1:B:212:GLY:O	1:B:213:ASN:C	2.63	0.40
1:A:119:TYR:O	1:A:120:ASP:C	2.64	0.40
1:B:21:ILE:O	1:B:25:GLN:HG2	2.22	0.40
1:B:253:GLY:C	1:B:255:TYR:N	2.79	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	277/292 (95%)	220 (79%)	50 (18%)	7 (2%)	4 16
1	B	271/292 (93%)	227 (84%)	35 (13%)	9 (3%)	3 11
All	All	548/584 (94%)	447 (82%)	85 (16%)	16 (3%)	3 13

All (16) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	16	ASP
1	A	269	ASP
1	B	172	GLU
1	B	267	GLU
1	A	89	ILE
1	B	247	ASN
1	B	259	ILE
1	B	238	SER
1	A	84	ASP
1	B	158	GLU
1	A	275	ALA
1	B	56	GLU
1	B	175	TYR
1	A	100	PRO
1	A	253	GLY
1	B	246	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	220/228 (96%)	194 (88%)	26 (12%)	4 12
1	B	216/228 (95%)	188 (87%)	28 (13%)	3 9
All	All	436/456 (96%)	382 (88%)	54 (12%)	4 10

All (54) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	-2	MET
1	A	14	GLN
1	A	28	LEU
1	A	41	LEU
1	A	53	LYS
1	A	81	LYS
1	A	82	GLN
1	A	86	ASP

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Mol	Chain	Res	Type
1	A	90	GLU
1	A	98	LEU
1	A	101	ARG
1	A	121	GLU
1	A	128	LYS
1	A	135	ARG
1	A	142	ASN
1	A	188	ASP
1	A	232	LEU
1	A	237	ARG
1	A	238	SER
1	A	240	GLU
1	A	247	ASN
1	A	250	TYR
1	A	257	LYS
1	A	259	ILE
1	A	264	LYS
1	A	271	ARG
1	B	-2	MET
1	B	18	LEU
1	B	21	ILE
1	B	34	SER
1	B	36	GLU
1	B	41	LEU
1	B	52	LEU
1	B	53	LYS
1	B	67	ARG
1	B	70	GLU
1	B	87	GLU
1	B	94	LYS
1	B	104	GLU
1	B	128	LYS
1	B	135	ARG
1	B	138	GLU
1	B	150	GLN
1	B	166	LEU
1	B	169	ARG
1	B	191	ILE
1	B	192	GLU
1	B	206	GLU
1	B	218	GLN
1	B	232	LEU

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Mol	Chain	Res	Type
1	B	243	TYR
1	B	244	ASN
1	B	252	GLN
1	B	268	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (13) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	48	GLN
1	A	59	GLN
1	A	176	ASN
1	A	195	GLN
1	A	218	GLN
1	A	244	ASN
1	B	59	GLN
1	B	74	ASN
1	B	82	GLN
1	B	213	ASN
1	B	218	GLN
1	B	229	GLN
1	B	252	GLN

5.3.3 RNA (i)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates (i)

There are no oligosaccharides in this entry.

5.6 Ligand geometry (i)

Of 3 ligands modelled in this entry, 2 are monoatomic - leaving 1 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	$\#\|Z\| > 2$
3	MPD	A	302	-	7,7,7	0.18	0	9,10,10	0.43	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	MPD	A	302	-	-	0/5/5/5	-

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 (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95^{th} 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	279/292 (95%)	-0.36	1 (0%)	89	87	58, 118, 169, 193	0
1	B	273/292 (93%)	-0.57	1 (0%)	89	87	45, 81, 125, 152	0
All	All	552/584 (94%)	-0.47	2 (0%)	89	87	45, 98, 155, 193	0

All (2) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	270	PRO	2.3
1	A	79	TYR	2.2

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 oligosaccharides 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, 95^{th} 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	MPD	A	302	8/8	0.82	0.15	69,90,94,94	0
2	CA	B	301	1/1	0.95	0.06	82,82,82,82	0
2	CA	A	301	1/1	0.96	0.03	92,92,92,92	0

6.5 Other polymers (i)

There are no such residues in this entry.