



Full wwPDB X-ray Structure Validation Report ⓘ

Apr 27, 2026 – 06:05 PM EDT

PDB ID : 6WIZ / pdb_00006wiz
Title : Crystal structure of Fab 54-1G05 bound to H1 influenza hemagglutinin
Authors : Wu, N.C.; Wilson, I.A.
Deposited on : 2020-04-11
Resolution : 4.20 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 : 4-5-2 with Phenix2.0
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0
EDS : 3.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
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) : 2.49

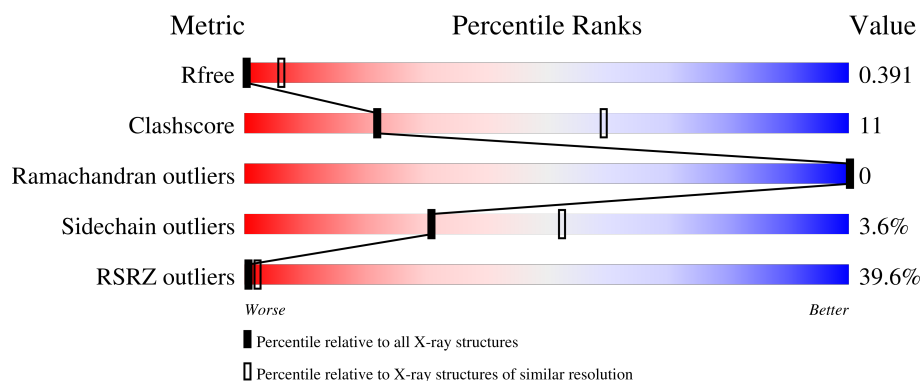
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 4.20 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}	180053	1004 (4.52-3.88)
Clashscore	190562	1019 (4.50-3.90)
Ramachandran outliers	187476	1020 (4.56-3.84)
Sidechain outliers	187428	1006 (4.56-3.84)
RSRZ outliers	180081	1001 (4.52-3.88)

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	327	
2	B	174	
3	H	230	
4	L	217	

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 7442 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 Hemagglutinin HA1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	322	Total	C	N	O	S	0	0	0
			2527	1592	442	482	11			

- Molecule 2 is a protein called Hemagglutinin HA2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	173	Total	C	N	O	S	0	0	0
			1394	874	238	275	7			

- Molecule 3 is a protein called Fab 54-1G05 heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	H	227	Total	C	N	O	S	8	11	0
			1787	1120	304	357	6			

- Molecule 4 is a protein called Fab 54-1G05 light chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	L	216	Total	C	N	O	S	8	9	0
			1720	1077	289	350	4			

- Molecule 5 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: C₈H₁₅NO₆).

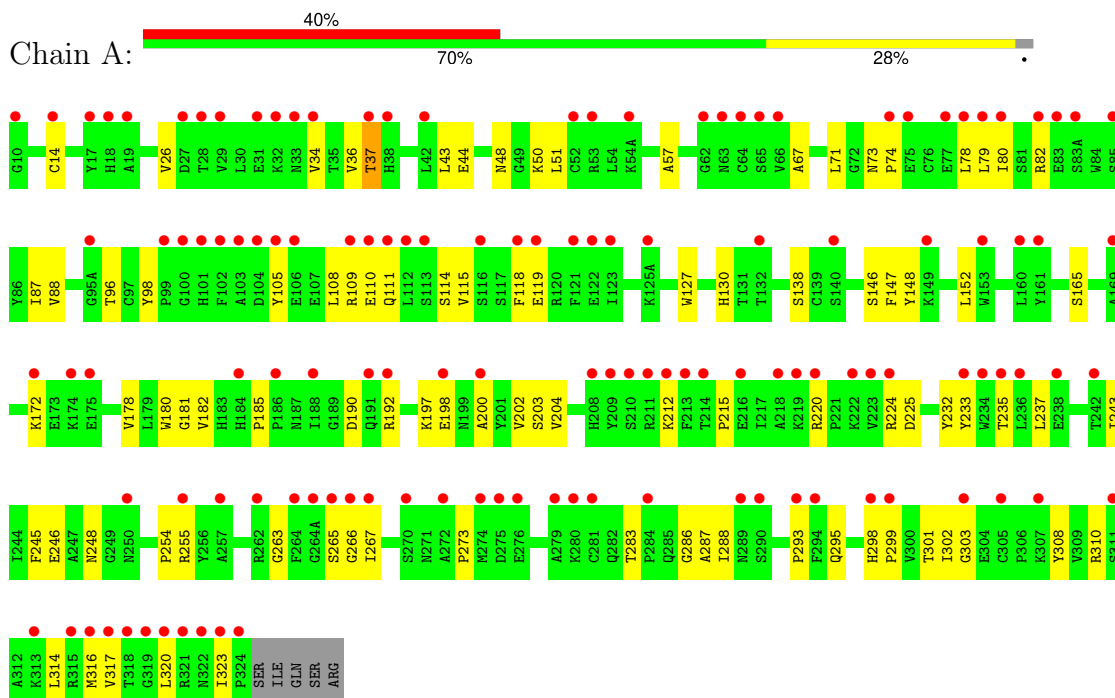


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
5	A	1	14	8	1	5	0	0

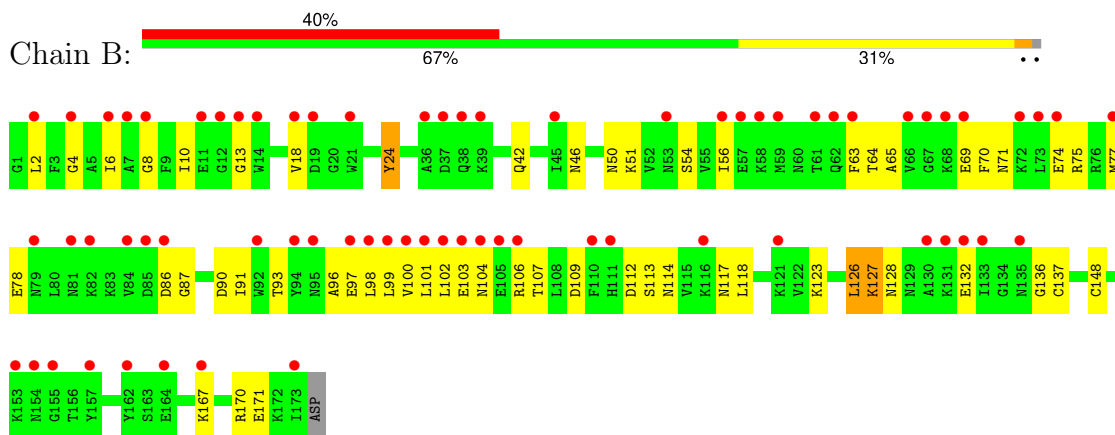
3 Residue-property plots

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.

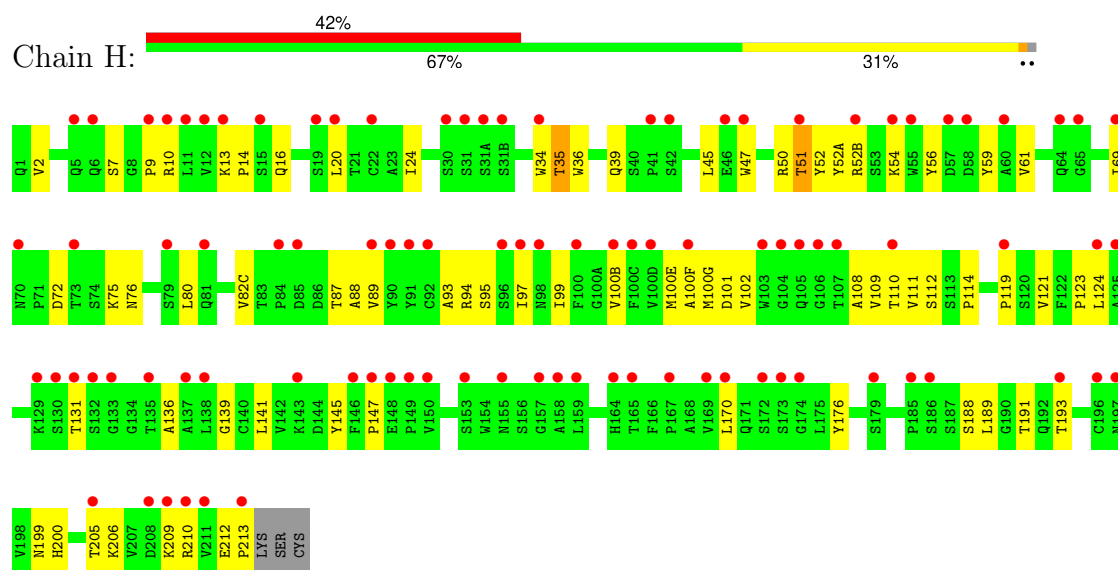
• Molecule 1: Hemagglutinin HA1



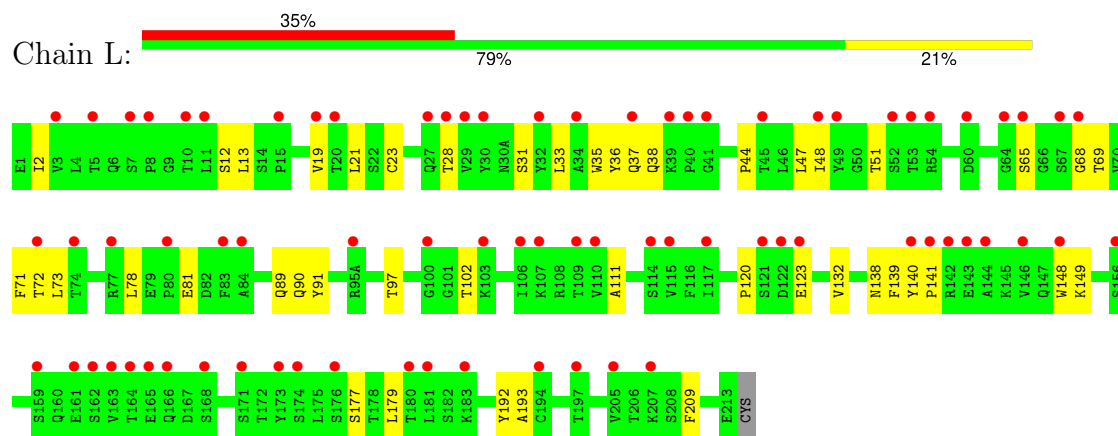
• Molecule 2: Hemagglutinin HA2



• Molecule 3: Fab 54-1G05 heavy chain



• Molecule 4: Fab 54-1G05 light chain



4 Data and refinement statistics

Property	Value	Source
Space group	P 3 2 1	Depositor
Cell constants a, b, c, α , β , γ	187.38Å 187.38Å 132.53Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	46.84 – 4.20 46.84 – 4.20	Depositor EDS
% Data completeness (in resolution range)	99.0 (46.84-4.20) 98.9 (46.84-4.20)	Depositor EDS
R_{merge}	0.40	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.85 (at 4.14Å)	Xtriage
Refinement program	PHENIX 1.16_3549	Depositor
R, R_{free}	0.323 , 0.389 0.326 , 0.391	Depositor DCC
R_{free} test set	929 reflections (4.65%)	wwPDB-VP
Wilson B-factor (Å ²)	116.9	Xtriage
Anisotropy	0.365	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 122.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.030 for -h,-k,l	Xtriage
F_o, F_c correlation	0.82	EDS
Total number of atoms	7442	wwPDB-VP
Average B, all atoms (Å ²)	134.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.97% 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: NAG

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	0.18	0/2593	0.36	0/3527
2	B	0.19	0/1421	0.39	0/1909
3	H	0.16	0/1828	0.37	1/2501 (0.0%)
4	L	0.13	0/1756	0.33	0/2389
All	All	0.17	0/7598	0.36	1/10326 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	H	114	PRO	N-CA-CB	6.34	109.91	103.25

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	2527	0	2439	55	0
2	B	1394	0	1326	35	0
3	H	1787	0	1751	49	0
4	L	1720	0	1675	29	0
5	A	14	0	13	1	0
All	All	7442	0	7204	156	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 11.

All (156) 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:50:LYS:HG2	1:A:273:PRO:HG2	1.60	0.83
3:H:34:TRP:HB2	3:H:51:THR:HG23	1.65	0.77
1:A:310:ARG:NH2	2:B:90:ASP:OD1	2.16	0.74
4:L:21:LEU:HD12	4:L:73:LEU:HD23	1.71	0.72
3:H:87:THR:HG23	3:H:110:THR:HA	1.71	0.72
1:A:323:ILE:O	2:B:13:GLY:N	2.23	0.71
1:A:295:GLN:NE2	1:A:298:HIS:O	2.23	0.70
3:H:93:ALA:HA	3:H:100(G):MET:HE3	1.74	0.70
1:A:87:ILE:HB	1:A:267:ILE:HG12	1.75	0.69
4:L:21:LEU:HD22	4:L:102:THR:HG21	1.76	0.67
1:A:303:GLY:N	2:B:64:THR:O	2.30	0.65
3:H:210:ARG:NH1	3:H:212:GLU:OE2	2.31	0.64
1:A:203:SER:HB3	1:A:246:GLU:HB2	1.81	0.63
4:L:149:LYS:HB2	4:L:193:ALA:HB3	1.80	0.62
1:A:108:LEU:HD12	1:A:111:GLN:HB2	1.82	0.62
3:H:123:PRO:HD3	3:H:209:LYS:HE2	1.83	0.61
2:B:113:SER:O	2:B:117:ASN:N	2.28	0.61
3:H:24:ILE:O	3:H:76:ASN:ND2	2.33	0.61
2:B:103:GLU:O	2:B:107:THR:OG1	2.19	0.61
1:A:237:LEU:HD13	1:A:243:ILE:HB	1.82	0.60
1:A:109:ARG:HB3	1:A:267:ILE:HD12	1.84	0.59
3:H:94:ARG:NH1	3:H:101:ASP:OD2	2.36	0.59
1:A:57:ALA:HB3	1:A:82:ARG:HH22	1.66	0.59
3:H:59:TYR:HE2	3:H:69:ILE:HG13	1.68	0.58
1:A:43:LEU:HB2	1:A:314:LEU:HB2	1.85	0.58
1:A:197:LYS:HE3	1:A:248:ASN:HB2	1.86	0.58
3:H:35[A]:THR:HG21	3:H:100(E):MET:HE1	1.86	0.57
3:H:193[B]:THR:HG22	3:H:210:ARG:HH21	1.69	0.57
2:B:71:ASN:ND2	2:B:74:GLU:OE1	2.38	0.56
1:A:44:GLU:HG2	1:A:288:ILE:HG23	1.86	0.56
2:B:75:ARG:HA	2:B:78:GLU:HB3	1.86	0.56
1:A:43:LEU:HD13	1:A:314:LEU:HD12	1.87	0.56
1:A:48:ASN:HD21	1:A:287:ALA:HB3	1.71	0.55
4:L:13:LEU:HD12	4:L:19:VAL:HG22	1.88	0.55
4:L:120:PRO:HD3	4:L:132:VAL:HG22	1.88	0.55
3:H:52:TYR:HB2	3:H:52(B):ARG:NH2	2.22	0.54
2:B:126:LEU:C	2:B:127:LYS:HG3	2.32	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:303:GLY:HA2	2:B:63:PHE:CD1	2.43	0.54
3:H:112:SER:HA	3:H:147:PRO:HG3	1.89	0.54
2:B:128:ASN:O	2:B:170:ARG:NH1	2.40	0.53
3:H:7:SER:HB3	3:H:10:ARG:NH2	2.24	0.53
1:A:200:ALA:HB3	1:A:215:PRO:HG2	1.90	0.53
1:A:146:SER:OG	1:A:147:PHE:N	2.42	0.52
4:L:35:TRP:CE3	4:L:73:LEU:HD22	2.45	0.52
2:B:114:ASN:HA	2:B:117:ASN:HB2	1.91	0.52
4:L:111:ALA:HB3	4:L:139:PHE:HA	1.91	0.52
3:H:9:PRO:HB3	3:H:108:ALA:HB3	1.92	0.52
3:H:94:ARG:HG2	3:H:95:SER:H	1.74	0.52
1:A:180:TRP:HB3	1:A:254:PRO:HG3	1.92	0.52
1:A:302:ILE:HG13	2:B:65:ALA:HB2	1.92	0.51
1:A:71:LEU:HB3	1:A:148:TYR:CD1	2.46	0.51
3:H:189:LEU:HB3	3:H:213:PRO:HG2	1.92	0.51
4:L:21:LEU:HB2	4:L:73:LEU:HB3	1.92	0.51
2:B:50:ASN:O	2:B:54:SER:OG	2.27	0.51
3:H:124:LEU:HB2	3:H:139:GLY:C	2.36	0.51
1:A:314:LEU:HD21	2:B:97:GLU:HG2	1.93	0.50
1:A:185:PRO:HB3	1:A:190:ASP:HB2	1.94	0.50
2:B:103:GLU:HA	2:B:106:ARG:HB2	1.94	0.50
1:A:265:SER:OG	1:A:266:GLY:N	2.44	0.49
1:A:299:PRO:HG3	1:A:308:TYR:CE2	2.47	0.49
4:L:28:THR:HA	4:L:69:THR:HG22	1.94	0.49
4:L:37:GLN:HB2	4:L:47:LEU:HD22	1.94	0.49
1:A:138:SER:O	1:A:224:ARG:NH1	2.44	0.49
4:L:36:TYR:HH	4:L:89[A]:GLN:CD	2.21	0.49
2:B:167:LYS:O	2:B:171:GLU:HB2	2.13	0.48
1:A:182:VAL:HB	1:A:233:TYR:HE2	1.78	0.48
4:L:65:SER:OG	4:L:72[B]:THR:OG1	2.32	0.48
3:H:119:PRO:HD2	3:H:205:THR:HG21	1.96	0.48
2:B:6:ILE:N	2:B:112:ASP:OD1	2.29	0.48
4:L:138:ASN:O	4:L:138:ASN:ND2	2.47	0.48
1:A:71:LEU:HD12	1:A:96:THR:HG22	1.96	0.48
1:A:74:PRO:HG3	1:A:147:PHE:O	2.14	0.47
1:A:283:THR:OG1	1:A:286:GLY:O	2.24	0.47
3:H:97:ILE:HG13	3:H:100(F):ALA:HB3	1.97	0.47
4:L:28:THR:HG23	4:L:68:GLY:HA2	1.95	0.47
1:A:293:PRO:HG3	2:B:56:ILE:HA	1.95	0.47
4:L:19:VAL:HG21	4:L:78:LEU:HD13	1.96	0.47
3:H:34:TRP:CZ3	3:H:94:ARG:HG3	2.50	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:H:119:PRO:HB3	3:H:145:TYR:HB3	1.96	0.47
4:L:132:VAL:HB	4:L:179:LEU:HB3	1.96	0.47
1:A:317:VAL:HG12	2:B:104:ASN:OD1	2.14	0.47
3:H:2:VAL:HG12	3:H:102:VAL:HG11	1.96	0.47
3:H:94:ARG:HH11	3:H:101:ASP:CG	2.22	0.47
3:H:52:TYR:HB2	3:H:52(B):ARG:HH22	1.80	0.47
4:L:12:SER:OG	4:L:140:TYR:OH	2.28	0.47
1:A:43:LEU:HB2	1:A:314:LEU:HD12	1.98	0.46
1:A:127:TRP:HB3	1:A:130:HIS:HB2	1.96	0.46
3:H:199:ASN:HD22	3:H:206:LYS:HG2	1.80	0.46
1:A:224:ARG:NH2	5:A:401:NAG:O7	2.48	0.46
2:B:42:GLN:NE2	2:B:46:ASN:OD1	2.48	0.46
2:B:86:ASP:O	2:B:90:ASP:N	2.44	0.46
1:A:180:TRP:HZ3	1:A:235:THR:HG22	1.79	0.46
4:L:140:TYR:CG	4:L:141:PRO:HA	2.50	0.46
1:A:119:GLU:OE2	1:A:172:LYS:NZ	2.28	0.46
1:A:115:VAL:HG11	1:A:118:PHE:HB2	1.97	0.46
1:A:316:MET:HB3	2:B:100:VAL:HG13	1.97	0.46
2:B:42:GLN:OE1	4:L:31:SER:N	2.49	0.46
2:B:87:GLY:O	2:B:91:ILE:HG13	2.15	0.46
1:A:34:VAL:O	1:A:36:VAL:HG13	2.16	0.45
2:B:51:LYS:HE2	2:B:103:GLU:HB3	1.98	0.45
3:H:52:TYR:CZ	3:H:56:TYR:HB2	2.51	0.45
3:H:14:PRO:HG3	3:H:112:SER:O	2.17	0.45
4:L:38:GLN:HB2	4:L:44:PRO:HG3	1.98	0.45
3:H:39:GLN:HB2	3:H:45[B]:LEU:HD23	1.98	0.45
1:A:203:SER:O	1:A:246:GLU:N	2.48	0.44
4:L:35:TRP:HB2	4:L:48:ILE:HB	1.98	0.44
2:B:10:ILE:HG12	2:B:136:GLY:HA3	1.98	0.44
2:B:123:LYS:HD2	2:B:132:GLU:OE2	2.17	0.44
3:H:170:LEU:HD13	3:H:176:TYR:CE1	2.52	0.44
2:B:2:LEU:HB2	2:B:109:ASP:CG	2.42	0.44
3:H:7:SER:HB3	3:H:10:ARG:CZ	2.48	0.44
1:A:98:TYR:O	1:A:232:TYR:OH	2.36	0.44
1:A:37:THR:HG23	1:A:320:LEU:O	2.17	0.44
2:B:96:ALA:O	2:B:100:VAL:HG23	2.18	0.44
4:L:192:TYR:HB2	4:L:209:PHE:CE1	2.52	0.44
1:A:67:ALA:HB2	1:A:105:TYR:CE1	2.53	0.44
1:A:180:TRP:CE2	1:A:233:TYR:HB2	2.53	0.44
3:H:35[B]:THR:HB	3:H:93:ALA:HB3	2.00	0.44
1:A:202:VAL:HG12	1:A:204:VAL:HG23	2.00	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:180:TRP:CZ3	1:A:235:THR:HG22	2.53	0.43
2:B:93:THR:O	2:B:97:GLU:HG3	2.19	0.43
3:H:50:ARG:NH2	4:L:91:TYR:OH	2.51	0.43
3:H:39:GLN:O	3:H:88:ALA:HB1	2.18	0.43
3:H:52(A):TYR:C	3:H:52(B):ARG:HH21	2.25	0.43
3:H:131:THR:HG22	3:H:136:ALA:HA	2.00	0.43
3:H:147:PRO:O	3:H:200:HIS:NE2	2.51	0.43
2:B:24:TYR:CE2	2:B:118:LEU:HD21	2.53	0.43
4:L:35:TRP:CZ3	4:L:73:LEU:HB2	2.54	0.43
3:H:13:LYS:HB2	3:H:16:GLN:CD	2.43	0.42
4:L:148:TRP:NE1	4:L:177:SER:OG	2.51	0.42
1:A:14:CYS:HA	2:B:137:CYS:HA	2.00	0.42
3:H:99:ILE:O	3:H:100(B):VAL:N	2.48	0.42
3:H:188:SER:HA	3:H:191:THR:HG22	2.01	0.42
3:H:20:LEU:HD11	3:H:109:VAL:HG21	2.02	0.42
2:B:70:PHE:HE2	2:B:77:MET:SD	2.42	0.41
3:H:36:TRP:CE3	3:H:80:LEU:HD22	2.54	0.41
3:H:35[B]:THR:HG23	3:H:47:TRP:NE1	2.35	0.41
3:H:52(B):ARG:C	3:H:54:LYS:H	2.27	0.41
1:A:152:LEU:HG	1:A:255:ARG:HB2	2.02	0.41
1:A:165:SER:HA	1:A:245:PHE:O	2.20	0.41
2:B:71:ASN:HD21	2:B:74:GLU:CD	2.29	0.41
3:H:36:TRP:CD1	3:H:69:ILE:HD13	2.56	0.41
3:H:35[A]:THR:HA	3:H:50:ARG:HA	2.01	0.41
3:H:121:VAL:HA	3:H:141:LEU:O	2.21	0.41
4:L:81:GLU:H	4:L:81:GLU:CD	2.29	0.41
1:A:192:ARG:NH2	1:A:198:GLU:OE2	2.33	0.40
3:H:35[B]:THR:HG23	3:H:47:TRP:HE1	1.86	0.40
1:A:51:LEU:HD13	1:A:88:VAL:HG21	2.03	0.40
1:A:181:GLY:HA2	1:A:232:TYR:HA	2.03	0.40
3:H:72:ASP:OD2	3:H:75:LYS:NZ	2.43	0.40
1:A:114:SER:HB3	1:A:263:GLY:O	2.20	0.40
4:L:23:CYS:N	4:L:71:PHE:O	2.47	0.40
2:B:4:GLY:O	2:B:8:GLY:HA3	2.21	0.40
3:H:82(C):VAL:HB	3:H:111:VAL:HG21	2.03	0.40
4:L:2:ILE:O	4:L:97:THR:OG1	2.21	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	320/327 (98%)	298 (93%)	22 (7%)	0	100	100
2	B	171/174 (98%)	159 (93%)	12 (7%)	0	100	100
3	H	236/230 (103%)	222 (94%)	14 (6%)	0	100	100
4	L	223/217 (103%)	215 (96%)	8 (4%)	0	100	100
All	All	950/948 (100%)	894 (94%)	56 (6%)	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	
1	A	281/286 (98%)	269 (96%)	12 (4%)	26	48
2	B	149/150 (99%)	139 (93%)	10 (7%)	15	37
3	H	209/202 (104%)	204 (98%)	5 (2%)	43	63
4	L	197/189 (104%)	194 (98%)	3 (2%)	57	70
All	All	836/827 (101%)	806 (96%)	30 (4%)	31	52

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

Mol	Chain	Res	Type
1	A	26	VAL
1	A	37	THR

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Mol	Chain	Res	Type
1	A	73	ASN
1	A	78	LEU
1	A	79	LEU
1	A	80	ILE
1	A	110	GLU
1	A	178	VAL
1	A	212	LYS
1	A	220	ARG
1	A	225	ASP
1	A	301	THR
2	B	18	VAL
2	B	24	TYR
2	B	69	GLU
2	B	98	LEU
2	B	99	LEU
2	B	101	LEU
2	B	102	LEU
2	B	126	LEU
2	B	127	LYS
2	B	148	CYS
3	H	35[A]	THR
3	H	35[B]	THR
3	H	51	THR
3	H	61	VAL
3	H	89	VAL
4	L	33	LEU
4	L	51	THR
4	L	123	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (12) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	18	HIS
1	A	130	HIS
1	A	184	HIS
1	A	196	HIS
1	A	269	ASN
2	B	25	HIS
2	B	30	GLN
3	H	76	ASN
3	H	98	ASN
3	H	171	GLN

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Mol	Chain	Res	Type
3	H	192	GLN
4	L	210	ASN

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 ⓘ

1 ligand is modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# $ Z > 2$	Counts	RMSZ	# $ Z > 2$
5	NAG	A	401	1	14,14,15	0.23	0	17,19,21	0.54	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
5	NAG	A	401	1	-	2/6/23/26	0/1/1/1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	401	NAG	O5-C5-C6-O6
5	A	401	NAG	C4-C5-C6-O6

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	401	NAG	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	322/327 (98%)	2.01	130 (40%) 0 2	79, 126, 175, 219	0
2	B	173/174 (99%)	1.91	69 (39%) 1 2	52, 106, 190, 219	0
3	H	226/230 (98%)	1.98	96 (42%) 0 2	49, 136, 190, 275	10 (4%)
4	L	216/217 (99%)	1.82	76 (35%) 1 3	46, 157, 214, 233	9 (4%)
All	All	937/948 (98%)	1.94	371 (39%) 1 2	46, 131, 196, 275	19 (2%)

All (371) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	67	GLY	13.8
4	L	162	SER	10.3
4	L	163[A]	VAL	10.1
1	A	80	ILE	9.1
1	A	238	GLU	8.1
3	H	106	GLY	7.4
2	B	8	GLY	7.2
1	A	122	GLU	7.1
2	B	37	ASP	6.7
2	B	57	GLU	6.6
1	A	316	MET	6.6
1	A	116	SER	6.4
1	A	28	THR	6.4
4	L	83	PHE	6.2
4	L	174	SER	6.0
2	B	61	THR	5.8
1	A	208	HIS	5.8
4	L	146	VAL	5.7
1	A	313	LYS	5.6
2	B	11	GLU	5.6
3	H	165	THR	5.6

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Mol	Chain	Res	Type	RSRZ
1	A	211	ARG	5.6
4	L	10[A]	THR	5.4
1	A	175	GLU	5.4
1	A	234	TRP	5.3
4	L	65	SER	5.3
3	H	209	LYS	5.0
3	H	157	GLY	5.0
1	A	100	GLY	4.9
2	B	154	ASN	4.9
1	A	118	PHE	4.8
4	L	117	ILE	4.8
1	A	102	PHE	4.8
3	H	6	GLN	4.7
3	H	57	ASP	4.7
4	L	176[A]	SER	4.7
1	A	169	ALA	4.7
1	A	104	ASP	4.7
3	H	153	SER	4.6
3	H	193[A]	THR	4.6
4	L	161	GLU	4.6
4	L	173	TYR	4.6
3	H	52(B)	ARG	4.6
1	A	105	TYR	4.5
2	B	86	ASP	4.5
1	A	66	VAL	4.5
4	L	123	GLU	4.5
1	A	85	SER	4.5
3	H	155	ASN	4.5
3	H	19	SER	4.4
3	H	100(F)	ALA	4.4
4	L	109	THR	4.3
3	H	5	GLN	4.3
4	L	107	LYS	4.3
1	A	223	VAL	4.2
4	L	53	THR	4.2
3	H	169	VAL	4.2
1	A	319	GLY	4.2
2	B	73	LEU	4.2
1	A	307	LYS	4.2
4	L	164	THR	4.2
1	A	174	LYS	4.1
3	H	9	PRO	4.1

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Mol	Chain	Res	Type	RSRZ
2	B	66	VAL	4.1
3	H	172	SER	4.1
4	L	32	TYR	4.1
4	L	41	GLY	4.1
1	A	315	ARG	4.0
1	A	318	THR	4.0
1	A	19	ALA	3.9
4	L	144	ALA	3.9
2	B	97	GLU	3.9
3	H	20	LEU	3.9
3	H	84	PRO	3.9
3	H	97	ILE	3.9
1	A	233	TYR	3.9
3	H	185	PRO	3.9
1	A	83	GLU	3.9
2	B	7	ALA	3.8
3	H	196	CYS	3.8
1	A	83(A)	SER	3.8
3	H	125	ALA	3.8
4	L	52	SER	3.8
2	B	58	LYS	3.8
3	H	46	GLU	3.8
1	A	65	SER	3.7
1	A	210	SER	3.7
4	L	106	ILE	3.7
1	A	212	LYS	3.7
3	H	100(D)	VAL	3.6
4	L	5	THR	3.6
1	A	214	THR	3.6
3	H	69	ILE	3.6
3	H	211	VAL	3.6
1	A	29	VAL	3.6
3	H	130	SER	3.6
1	A	264	PHE	3.6
3	H	135	THR	3.6
3	H	129	LYS	3.6
1	A	10	GLY	3.6
1	A	77	GLU	3.5
4	L	37	GLN	3.5
3	H	85	ASP	3.5
1	A	255	ARG	3.5
2	B	110	PHE	3.5

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Mol	Chain	Res	Type	RSRZ
1	A	125(A)	LYS	3.5
3	H	137	ALA	3.5
4	L	141	PRO	3.5
4	L	7	SER	3.5
3	H	92	CYS	3.5
1	A	18	HIS	3.4
2	B	153	LYS	3.4
1	A	31	GLU	3.4
1	A	99	PRO	3.4
1	A	242	THR	3.4
2	B	132	GLU	3.4
3	H	81	GLN	3.4
1	A	132	THR	3.4
1	A	320	LEU	3.4
2	B	13	GLY	3.4
3	H	148	GLU	3.4
1	A	209	TYR	3.4
3	H	132	SER	3.4
3	H	73	THR	3.4
3	H	149	PRO	3.3
1	A	220	ARG	3.3
3	H	208	ASP	3.3
1	A	63	ASN	3.3
3	H	22	CYS	3.3
3	H	41	PRO	3.3
1	A	222	LYS	3.3
1	A	64	CYS	3.3
1	A	103	ALA	3.3
2	B	94	TYR	3.3
1	A	149	LYS	3.3
2	B	19	ASP	3.2
2	B	21	TRP	3.2
3	H	31	SER	3.2
3	H	131	THR	3.2
2	B	69	GLU	3.2
3	H	104	GLY	3.2
3	H	11	LEU	3.2
4	L	121	SER	3.2
1	A	317	VAL	3.2
2	B	36	ALA	3.2
3	H	143	LYS	3.2
1	A	74	PRO	3.2

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Mol	Chain	Res	Type	RSRZ
3	H	100(C)	PHE	3.2
1	A	262	ARG	3.2
3	H	107	THR	3.2
1	A	123	ILE	3.2
3	H	173	SER	3.2
1	A	311	SER	3.1
3	H	179[A]	SER	3.1
1	A	17	TYR	3.1
2	B	102	LEU	3.1
2	B	106	ARG	3.1
1	A	110	GLU	3.1
2	B	14	TRP	3.1
1	A	79	LEU	3.1
1	A	265	SER	3.1
1	A	198	GLU	3.1
3	H	147	PRO	3.1
4	L	168[A]	SER	3.1
2	B	12	GLY	3.1
4	L	171	SER	3.1
3	H	70	ASN	3.1
3	H	213	PRO	3.0
4	L	165	GLU	3.0
1	A	140	SER	3.0
4	L	122	ASP	3.0
2	B	95	ASN	3.0
1	A	62	GLY	3.0
1	A	266	GLY	3.0
2	B	72	LYS	2.9
4	L	194	CYS	2.9
1	A	95(A)	GLY	2.9
2	B	173	ILE	2.9
3	H	164	HIS	2.9
4	L	95(A)	ARG	2.9
4	L	103	LYS	2.9
2	B	98	LEU	2.9
2	B	56	ILE	2.9
2	B	92	TRP	2.9
2	B	85	ASP	2.9
4	L	205	VAL	2.8
3	H	31(B)	SER	2.8
1	A	275	ASP	2.8
1	A	112	LEU	2.8

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Mol	Chain	Res	Type	RSRZ
1	A	276	GLU	2.8
1	A	305	CYS	2.8
4	L	48	ILE	2.8
1	A	37	THR	2.8
4	L	80	PRO	2.8
2	B	81	ASN	2.8
2	B	68	LYS	2.8
4	L	148	TRP	2.7
1	A	216	GLU	2.7
1	A	186	PRO	2.7
1	A	293	PRO	2.7
3	H	146	PHE	2.7
4	L	166	GLN	2.7
1	A	270	SER	2.7
4	L	27	GLN	2.7
1	A	109	ARG	2.7
1	A	219	LYS	2.7
4	L	142	ARG	2.7
1	A	290	SER	2.7
1	A	78	LEU	2.7
3	H	119	PRO	2.7
1	A	294	PHE	2.7
3	H	103	TRP	2.6
1	A	250	ASN	2.6
4	L	74	THR	2.6
3	H	158	ALA	2.6
4	L	207	LYS	2.6
3	H	58	ASP	2.6
1	A	54(A)	LYS	2.6
2	B	131	LYS	2.6
4	L	49	TYR	2.6
1	A	38	HIS	2.6
1	A	274	MET	2.6
4	L	72[A]	THR	2.6
4	L	181	LEU	2.6
4	L	30	TYR	2.6
1	A	101	HIS	2.5
1	A	184	HIS	2.5
2	B	2	LEU	2.5
2	B	53	ASN	2.5
4	L	39	LYS	2.5
4	L	11	LEU	2.5

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Mol	Chain	Res	Type	RSRZ
1	A	14	CYS	2.5
1	A	213	PHE	2.5
3	H	167	PRO	2.5
3	H	100(B)	VAL	2.5
3	H	60	ALA	2.5
4	L	54	ARG	2.5
3	H	79[A]	SER	2.5
3	H	90	TYR	2.5
3	H	210	ARG	2.5
3	H	96	SER	2.5
2	B	111	HIS	2.5
3	H	64	GLN	2.5
4	L	143	GLU	2.5
1	A	27	ASP	2.5
2	B	18	VAL	2.5
4	L	183	LYS	2.5
1	A	42	LEU	2.4
3	H	138	LEU	2.4
2	B	133	ILE	2.4
1	A	224	ARG	2.4
2	B	116	LYS	2.4
3	H	55	TRP	2.4
2	B	6	ILE	2.4
4	L	20	THR	2.4
1	A	324	PRO	2.4
1	A	272	ALA	2.4
1	A	267	ILE	2.4
3	H	12	VAL	2.4
2	B	77	MET	2.4
4	L	28	THR	2.4
4	L	114[A]	SER	2.4
2	B	63	PHE	2.4
1	A	82	ARG	2.4
1	A	321	ARG	2.4
1	A	235	THR	2.4
1	A	264(A)	GLY	2.4
1	A	52	CYS	2.4
2	B	135	ASN	2.4
2	B	99	LEU	2.4
3	H	124	LEU	2.4
4	L	40	PRO	2.3
3	H	186	SER	2.3

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Mol	Chain	Res	Type	RSRZ
3	H	91	TYR	2.3
1	A	106	GLU	2.3
1	A	111	GLN	2.3
3	H	100	PHE	2.3
4	L	77	ARG	2.3
1	A	322	ASN	2.3
3	H	105	GLN	2.3
3	H	54	LYS	2.3
4	L	15	PRO	2.3
1	A	323	ILE	2.3
3	H	197	ASN	2.3
4	L	68	GLY	2.3
2	B	104	ASN	2.3
1	A	113	SER	2.3
1	A	121	PHE	2.3
1	A	172	LYS	2.3
3	H	170	LEU	2.3
1	A	119	GLU	2.3
2	B	162	TYR	2.2
3	H	150[A]	VAL	2.2
4	L	60	ASP	2.2
2	B	45	ILE	2.2
3	H	47	TRP	2.2
3	H	51	THR	2.2
1	A	200	ALA	2.2
1	A	298	HIS	2.2
3	H	89	VAL	2.2
3	H	30	SER	2.2
2	B	82	LYS	2.2
1	A	153	TRP	2.2
1	A	53	ARG	2.2
1	A	218	ALA	2.2
2	B	155	GLY	2.2
4	L	64	GLY	2.2
3	H	31(A)	SER	2.2
4	L	67	SER	2.2
2	B	105	GLU	2.2
2	B	164	GLU	2.2
4	L	140	TYR	2.2
1	A	34	VAL	2.2
4	L	3	VAL	2.2
2	B	59	MET	2.2

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Mol	Chain	Res	Type	RSRZ
1	A	299	PRO	2.2
1	A	32	LYS	2.2
1	A	160	LEU	2.2
3	H	133	GLY	2.2
1	A	289	ASN	2.2
2	B	62	GLN	2.2
3	H	65	GLY	2.1
4	L	8	PRO	2.1
1	A	188	ILE	2.1
2	B	39	LYS	2.1
4	L	29	VAL	2.1
4	L	100	GLY	2.1
2	B	167	LYS	2.1
1	A	33	ASN	2.1
4	L	45	THR	2.1
3	H	15	SER	2.1
1	A	257	ALA	2.1
2	B	4	GLY	2.1
3	H	34	TRP	2.1
4	L	34	ALA	2.1
1	A	236	LEU	2.1
1	A	279	ALA	2.1
2	B	121	LYS	2.1
3	H	159	LEU	2.1
2	B	100	VAL	2.1
1	A	192	ARG	2.1
4	L	180	THR	2.1
1	A	303	GLY	2.1
2	B	101	LEU	2.1
3	H	174	GLY	2.1
1	A	284	PRO	2.1
2	B	84	VAL	2.1
2	B	79	ASN	2.1
2	B	130	ALA	2.1
3	H	205	THR	2.1
1	A	161	TYR	2.1
1	A	280	LYS	2.1
1	A	281	CYS	2.1
3	H	110	THR	2.1
2	B	103	GLU	2.1
2	B	157	TYR	2.0
4	L	197	THR	2.0

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Mol	Chain	Res	Type	RSRZ
1	A	75	GLU	2.0
2	B	74	GLU	2.0
3	H	42	SER	2.0
4	L	110	VAL	2.0
4	L	156	SER	2.0
3	H	10	ARG	2.0
3	H	13	LYS	2.0
2	B	38	GLN	2.0
3	H	98	ASN	2.0
4	L	19	VAL	2.0
4	L	159	SER	2.0
4	L	84	ALA	2.0
1	A	191	GLN	2.0
4	L	115	VAL	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 oligosaccharides 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($\text{\AA}^2$)	Q<0.9
5	NAG	A	401	14/15	0.72	0.15	92,109,130,135	0

6.5 Other polymers [i](#)

There are no such residues in this entry.