



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 09:15 AM UTC

PDB ID : 3SE9 / pdb_00003se9
Title : Crystal structure of broadly and potently neutralizing antibody VRC-PG04 in complex with HIV-1 gp120
Authors : Kwong, P.D.; Zhou, T.
Deposited on : 2011-06-10
Resolution : 2.00 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

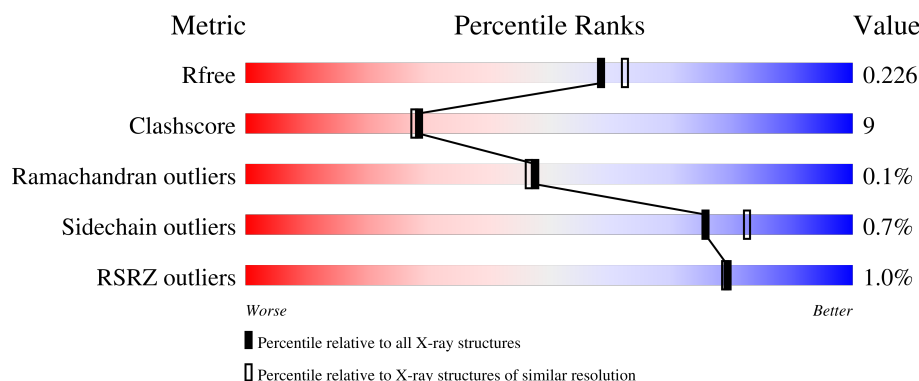
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.00 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	10052 (2.00-2.00)
Clashscore	190562	11152 (2.00-2.00)
Ramachandran outliers	187476	11031 (2.00-2.00)
Sidechain outliers	187428	11029 (2.00-2.00)
RSRZ outliers	180081	10067 (2.00-2.00)

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	G	353	% 84% 13% •
2	H	228	% 80% 18% •
3	L	208	 86% 14%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
7	CL	G	1015	-	-	X	-
7	CL	H	1023	-	-	-	X
8	BU3	G	1030	-	-	X	-

2 Entry composition [i](#)

There are 10 unique types of molecules in this entry. The entry contains 12712 atoms, of which 5909 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 HIV-1 Clade AE strain 93TH057 gp120.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
1	G	344	5321	1687	2632	468	511	23	0	0	0

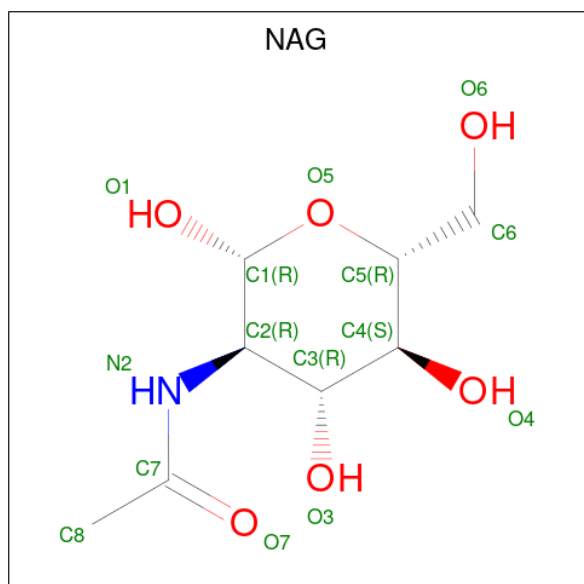
- Molecule 2 is a protein called Heavy chain of antibody VRC-PG04.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
2	H	225	3402	1090	1685	298	324	5	0	0	0

- Molecule 3 is a protein called Light chain of antibody VRC-PG04.

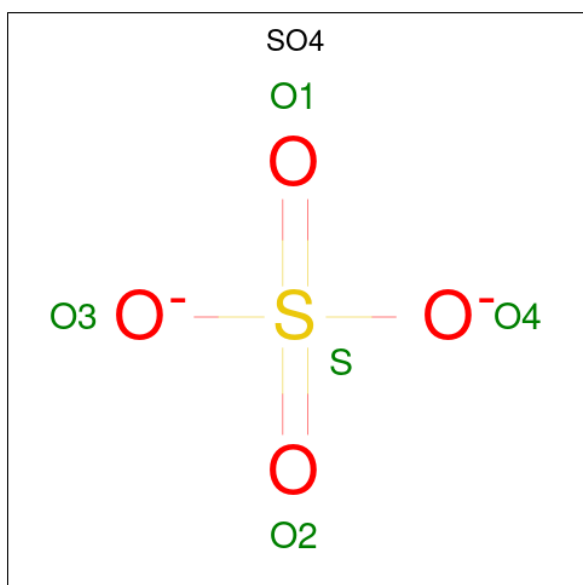
Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
3	L	208	3205	1019	1584	275	320	7	0	0	0

- Molecule 4 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: $C_8H_{15}NO_6$).



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

- Molecule 5 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



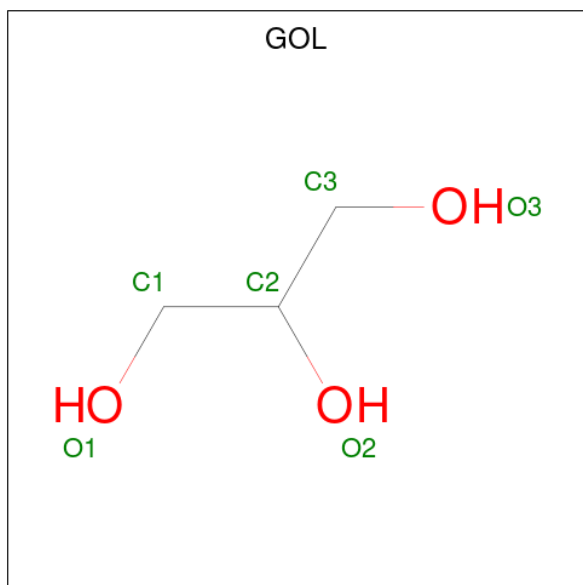
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	G	1	Total O S 5 4 1	0	0
5	G	1	Total O S 5 4 1	0	0

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	G	1	Total	O	S	0	0
			5	4	1		
5	L	1	Total	O	S	0	0
			5	4	1		
5	L	1	Total	O	S	0	0
			5	4	1		

- Molecule 6 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
6	G	1	Total	C	H	O	0	0
			14	3	8	3		
6	G	1	Total	C	O		0	0
			6	3	3			
6	G	1	Total	C	O		0	0
			6	3	3			
6	G	1	Total	C	O		0	0
			6	3	3			

- Molecule 7 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

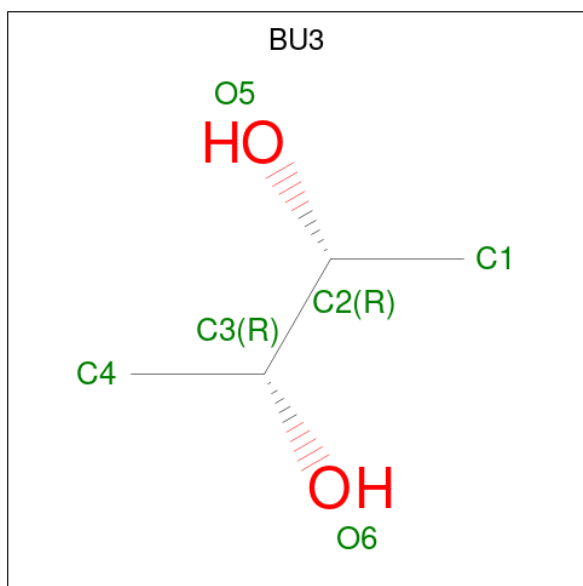
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	G	9	Total	Cl	0	0
			9	9		
7	H	4	Total	Cl	0	0
			4	4		

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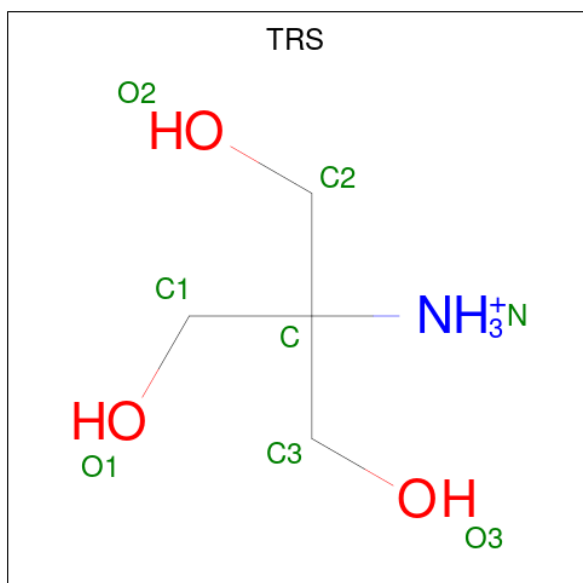
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	L	5	Total	Cl	0	0
			5	5		

- Molecule 8 is (R,R)-2,3-BUTANEDIOL (CCD ID: BU3) (formula: $C_4H_{10}O_2$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
8	G	1	Total	C	O	0	0
			6	4	2		

- Molecule 9 is 2-AMINO-2-HYDROXYMETHYL-PROPANE-1,3-DIOL (CCD ID: TRS) (formula: $C_4H_{12}NO_3$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
9	H	1	Total	C	N	O	0	0
			8	4	1	3		

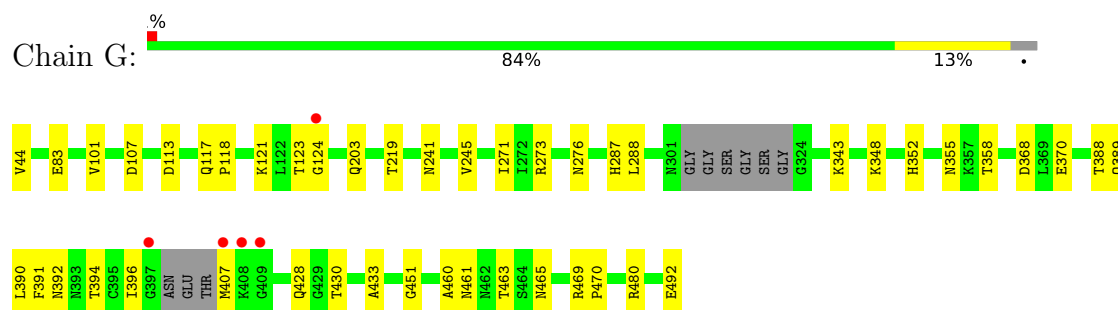
- Molecule 10 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
10	G	273	Total	O	0	0
			273	273		
10	H	143	Total	O	0	0
			143	143		
10	L	139	Total	O	0	0
			139	139		

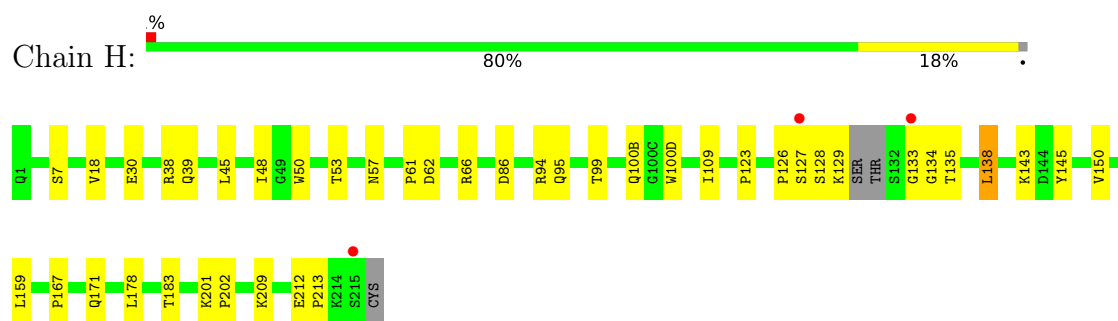
3 Residue-property plots [i](#)

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.

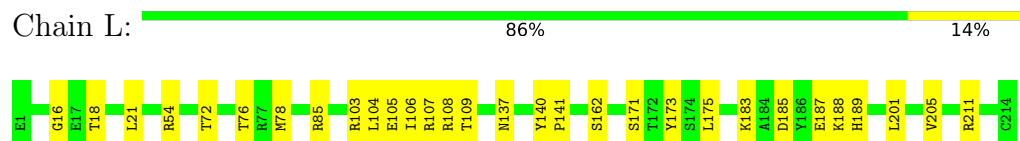
- Molecule 1: HIV-1 Clade AE strain 93TH057 gp120



- Molecule 2: Heavy chain of antibody VRC-PG04



- Molecule 3: Light chain of antibody VRC-PG04



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	61.80Å 66.48Å 237.31Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	23.73 – 2.00 23.73 – 2.00	Depositor EDS
% Data completeness (in resolution range)	88.3 (23.73-2.00) 88.2 (23.73-2.00)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.44 (at 1.99Å)	Xtriage
Refinement program	PHENIX (phenix.refine: dev_755)	Depositor
R, R_{free}	0.190 , 0.233 0.183 , 0.226	Depositor DCC
R_{free} test set	3002 reflections (4.47%)	wwPDB-VP
Wilson B-factor (Å ²)	30.9	Xtriage
Anisotropy	0.563	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 41.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	12712	wwPDB-VP
Average B, all atoms (Å ²)	48.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.62% 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, NAG, TRS, GOL, BU3, CL

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	G	0.37	0/2745	0.69	0/3724
2	H	0.37	0/1761	0.68	0/2396
3	L	0.37	0/1658	0.66	0/2246
All	All	0.37	0/6164	0.68	0/8366

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	G	2689	2632	2623	49	0
2	H	1717	1685	1690	30	0
3	L	1621	1584	1583	26	0
4	G	140	0	130	7	0
5	G	15	0	0	0	1
5	L	10	0	0	1	0
6	G	24	8	32	7	1
7	G	9	0	0	6	0
7	H	4	0	0	1	0
7	L	5	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
8	G	6	0	10	4	0
9	H	8	0	12	2	0
10	G	273	0	0	12	0
10	H	143	0	0	4	0
10	L	139	0	0	6	0
All	All	6803	5909	6080	109	1

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 9.

All (109) 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:G:276:ASN:HD22	6:G:1007:GOL:H12	1.15	1.07
1:G:348:LYS:NZ	10:G:540:HOH:O	2.05	0.89
1:G:276:ASN:ND2	6:G:1007:GOL:H12	1.88	0.87
6:G:1007:GOL:H32	7:G:1015:CL:CL	2.13	0.85
1:G:273:ARG:CZ	10:G:600:HOH:O	2.24	0.84
3:L:189:HIS:O	3:L:211:ARG:NH1	2.14	0.80
2:H:127:SER:O	10:H:462:HOH:O	2.03	0.77
1:G:273:ARG:NE	10:G:600:HOH:O	2.17	0.76
9:H:1040:TRS:H12	3:L:162:SER:CB	2.15	0.76
4:G:734:NAG:H83	7:G:1015:CL:CL	2.23	0.74
9:H:1040:TRS:H12	3:L:162:SER:HB2	1.69	0.73
3:L:18:THR:HG22	3:L:76:THR:HA	1.72	0.72
3:L:85:ARG:NH1	5:L:1004:SO4:O3	2.24	0.69
1:G:392:ASN:HD22	4:G:892:NAG:H83	1.58	0.68
3:L:183:LYS:O	3:L:187:GLU:HG2	1.93	0.68
6:G:1005:GOL:O1	10:G:623:HOH:O	1.93	0.68
8:G:1030:BU3:H3	2:H:53:THR:HG22	1.76	0.67
1:G:124:GLY:O	10:G:571:HOH:O	2.14	0.66
2:H:30:GLU:OE1	10:H:235:HOH:O	2.14	0.65
2:H:99:THR:O	2:H:100(B):GLN:HG2	1.98	0.64
1:G:123:THR:HG22	1:G:430:THR:O	1.98	0.63
1:G:460:ALA:O	1:G:463:THR:HG22	2.00	0.61
2:H:183:THR:HG21	10:L:555:HOH:O	2.01	0.61
1:G:273:ARG:NH2	10:G:600:HOH:O	2.31	0.61
1:G:273:ARG:NH1	1:G:287:HIS:HB2	2.15	0.61
1:G:389:GLN:HG2	4:G:892:NAG:H81	1.83	0.60
4:G:948:NAG:N2	10:G:543:HOH:O	2.30	0.59
3:L:16:GLY:O	10:L:470:HOH:O	2.16	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:L:108:ARG:HD2	3:L:171:SER:HB2	1.84	0.59
1:G:355:ASN:ND2	10:G:684:HOH:O	2.36	0.58
1:G:107:ASP:OD1	6:G:1005:GOL:H2	2.04	0.58
1:G:113:ASP:O	1:G:117:GLN:NE2	2.35	0.58
2:H:128:SER:O	2:H:129:LYS:C	2.48	0.56
7:G:1014:CL:CL	10:G:605:HOH:O	2.55	0.55
2:H:145:TYR:CE2	2:H:150:VAL:HG13	2.41	0.55
3:L:54:ARG:NH2	10:L:243:HOH:O	2.39	0.55
1:G:118:PRO:HB3	1:G:433:ALA:HB1	1.88	0.55
2:H:66:ARG:NH2	2:H:86:ASP:OD2	2.37	0.55
1:G:388:THR:OG1	7:G:1013:CL:CL	2.59	0.54
2:H:133:GLY:C	2:H:135:THR:H	2.16	0.54
2:H:18:VAL:HG11	2:H:109:ILE:HD13	1.90	0.53
3:L:78:MET:HE1	3:L:104:LEU:HD22	1.91	0.53
1:G:288:LEU:HD13	1:G:451:GLY:HA2	1.90	0.53
1:G:358:THR:HB	1:G:465:ASN:HB3	1.91	0.53
1:G:44:VAL:HG13	1:G:492:GLU:HB3	1.92	0.52
2:H:133:GLY:O	2:H:135:THR:N	2.44	0.51
1:G:271:ILE:CD1	6:G:1006:GOL:H11	2.40	0.51
1:G:273:ARG:NH1	1:G:287:HIS:CB	2.74	0.50
1:G:370:GLU:HB2	8:G:1030:BU3:H42	1.94	0.50
3:L:78:MET:HE1	3:L:104:LEU:CD2	2.41	0.49
1:G:391:PHE:CE1	1:G:470:PRO:HG3	2.48	0.49
1:G:368:ASP:HB2	8:G:1030:BU3:H41	1.93	0.49
2:H:167:PRO:HD2	3:L:162:SER:OG	2.13	0.49
1:G:463:THR:HG23	1:G:465:ASN:H	1.77	0.48
2:H:95:GLN:OE1	2:H:99:THR:HG21	2.13	0.48
2:H:129:LYS:HG3	2:H:129:LYS:O	2.13	0.48
3:L:108:ARG:NH1	3:L:109:THR:O	2.47	0.48
1:G:469:ARG:NH2	10:G:693:HOH:O	2.39	0.48
3:L:185:ASP:HA	3:L:188:LYS:HD3	1.95	0.47
3:L:187:GLU:O	3:L:211:ARG:NH1	2.46	0.47
3:L:21:LEU:HD12	3:L:21:LEU:N	2.29	0.47
2:H:50:TRP:CZ2	2:H:57:ASN:HB2	2.50	0.47
2:H:62:ASP:OD1	2:H:66:ARG:HD3	2.15	0.46
2:H:178:LEU:C	2:H:178:LEU:HD23	2.40	0.46
1:G:271:ILE:HD11	6:G:1006:GOL:H11	1.98	0.46
2:H:143:LYS:NZ	2:H:171:GLN:OE1	2.48	0.46
1:G:343:LYS:HD3	1:G:396:ILE:HG23	1.98	0.46
1:G:428:GLN:HG2	7:G:1016:CL:CL	2.53	0.46
1:G:101:VAL:HG21	1:G:480:ARG:HG2	1.97	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:L:103:ARG:NH2	3:L:173:TYR:OH	2.48	0.45
1:G:271:ILE:HB	1:G:273:ARG:HH12	1.80	0.45
1:G:288:LEU:HD12	1:G:288:LEU:N	2.31	0.45
2:H:95:GLN:HG2	10:H:373:HOH:O	2.17	0.45
2:H:159:LEU:HD23	2:H:159:LEU:C	2.41	0.45
1:G:343:LYS:HD3	1:G:396:ILE:CG2	2.47	0.45
2:H:38:ARG:HB3	2:H:48:ILE:HD11	1.99	0.45
1:G:394:THR:HG22	1:G:407:MET:SD	2.57	0.44
3:L:106:ILE:HD12	10:L:443:HOH:O	2.17	0.43
1:G:117:GLN:HG3	1:G:203:GLN:NE2	2.33	0.43
2:H:95:GLN:HE22	2:H:100(D):TRP:HA	1.81	0.43
1:G:460:ALA:O	1:G:461:ASN:C	2.61	0.43
3:L:201:LEU:HD13	3:L:205:VAL:HG23	2.00	0.43
3:L:108:ARG:HD2	3:L:171:SER:CB	2.47	0.43
1:G:288:LEU:HD13	1:G:451:GLY:CA	2.48	0.43
3:L:21:LEU:O	3:L:72:THR:HG23	2.19	0.43
2:H:123:PRO:HD3	2:H:209:LYS:HE2	2.01	0.42
2:H:126:PRO:HD3	2:H:138:LEU:HB3	2.01	0.42
1:G:460:ALA:HB1	1:G:463:THR:CG2	2.50	0.42
1:G:121:LYS:HG2	1:G:123:THR:HG23	2.00	0.42
3:L:18:THR:HG23	10:L:470:HOH:O	2.19	0.42
4:G:948:NAG:H82	10:G:543:HOH:O	2.20	0.42
1:G:389:GLN:HA	4:G:892:NAG:H81	2.01	0.42
2:H:201:LYS:N	2:H:202:PRO:CD	2.82	0.42
2:H:183:THR:CG2	3:L:137:ASN:ND2	2.83	0.42
3:L:175:LEU:C	3:L:175:LEU:HD23	2.45	0.42
1:G:83:GLU:CB	1:G:245:VAL:HG12	2.50	0.41
2:H:212:GLU:HB2	2:H:213:PRO:HD2	2.02	0.41
1:G:241:ASN:ND2	4:G:741:NAG:C7	2.83	0.41
1:G:288:LEU:HB3	10:G:586:HOH:O	2.21	0.41
1:G:368:ASP:HB2	8:G:1030:BU3:C4	2.51	0.41
1:G:83:GLU:HB3	1:G:245:VAL:HG12	2.02	0.41
2:H:61:PRO:HD2	7:H:1010:CL:CL	2.58	0.41
2:H:127:SER:N	10:H:558:HOH:O	2.53	0.41
1:G:390:LEU:HD12	1:G:390:LEU:HA	1.93	0.40
3:L:107:ARG:HD3	10:L:269:HOH:O	2.20	0.40
3:L:140:TYR:CG	3:L:141:PRO:HA	2.56	0.40
1:G:118:PRO:CB	1:G:433:ALA:HB1	2.51	0.40
2:H:39:GLN:HB2	2:H:45:LEU:HD23	2.03	0.40
1:G:352:HIS:NE2	7:G:1027:CL:CL	2.81	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the sym-

metry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:G:1001:SO4:O4	6:G:1005:GOL:O3[3_554]	2.09	0.11

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	G	338/353 (96%)	325 (96%)	13 (4%)	0	100	100
2	H	221/228 (97%)	217 (98%)	3 (1%)	1 (0%)	24	21
3	L	206/208 (99%)	202 (98%)	4 (2%)	0	100	100
All	All	765/789 (97%)	744 (97%)	20 (3%)	1 (0%)	48	46

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	H	134	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	G	306/311 (98%)	305 (100%)	1 (0%)	86	91
2	H	190/193 (98%)	187 (98%)	3 (2%)	55	62
3	L	182/182 (100%)	181 (100%)	1 (0%)	81	87
All	All	678/686 (99%)	673 (99%)	5 (1%)	76	82

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	G	219	THR
2	H	7	SER
2	H	94	ARG
2	H	138	LEU
3	L	105	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	G	203	GLN
1	G	229	ASN
1	G	425	ASN
1	G	432	GLN
1	G	444	ASN
1	G	461	ASN
3	L	66	GLN
3	L	160	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 39 ligands modelled in this entry, 18 are monoatomic - leaving 21 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	$\# Z > 2$
5	SO4	G	1002	-	4,4,4	0.24	0	6,6,6	0.07	0
4	NAG	G	948	1	14,14,15	0.54	0	17,19,21	0.62	0
6	GOL	G	1007	-	5,5,5	0.38	0	5,5,5	0.30	0
4	NAG	G	834	1	14,14,15	0.47	0	17,19,21	0.77	0
4	NAG	G	734	1	14,14,15	0.51	0	17,19,21	0.67	0
4	NAG	G	795	1	14,14,15	0.56	0	17,19,21	0.72	0
4	NAG	G	886	1	14,14,15	0.58	0	17,19,21	1.00	2 (11%)
6	GOL	G	1006	-	5,5,5	0.36	0	5,5,5	0.40	0
4	NAG	G	892	1	14,14,15	0.51	0	17,19,21	0.59	0
6	GOL	G	1005	-	5,5,5	0.42	0	5,5,5	0.39	0
4	NAG	G	776	1	14,14,15	0.59	0	17,19,21	0.96	1 (5%)
4	NAG	G	741	1	14,14,15	0.58	0	17,19,21	0.56	0
5	SO4	L	1003	-	4,4,4	0.26	0	6,6,6	0.05	0
4	NAG	G	762	1	14,14,15	0.40	0	17,19,21	1.43	3 (17%)
5	SO4	G	1000	-	4,4,4	0.24	0	6,6,6	0.10	0
4	NAG	G	789	1	14,14,15	0.56	0	17,19,21	0.91	1 (5%)
8	BU3	G	1030	-	4,5,5	1.44	0	6,6,6	0.45	0
5	SO4	L	1004	-	4,4,4	0.24	0	6,6,6	0.10	0
5	SO4	G	1001	-	4,4,4	0.25	0	6,6,6	0.16	0
6	GOL	G	1008	-	5,5,5	0.33	0	5,5,5	0.44	0
9	TRS	H	1040	-	7,7,7	0.37	0	9,9,9	0.65	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
4	NAG	G	892	1	-	2/6/23/26	0/1/1/1
4	NAG	G	948	1	-	0/6/23/26	0/1/1/1
9	TRS	H	1040	-	-	3/9/9/9	-
4	NAG	G	741	1	-	2/6/23/26	0/1/1/1
6	GOL	G	1007	-	-	2/4/4/4	-
4	NAG	G	834	1	-	2/6/23/26	0/1/1/1
4	NAG	G	734	1	-	0/6/23/26	0/1/1/1
4	NAG	G	795	1	-	0/6/23/26	0/1/1/1
4	NAG	G	886	1	-	0/6/23/26	0/1/1/1
6	GOL	G	1008	-	-	2/4/4/4	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	NAG	G	762	1	-	0/6/23/26	0/1/1/1
6	GOL	G	1006	-	-	0/4/4/4	-
6	GOL	G	1005	-	-	1/4/4/4	-
4	NAG	G	776	1	-	0/6/23/26	0/1/1/1
4	NAG	G	789	1	-	0/6/23/26	0/1/1/1
8	BU3	G	1030	-	-	4/4/4/4	-

There are no bond length outliers.

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	G	762	NAG	C1-O5-C5	3.82	117.31	112.19
4	G	776	NAG	C1-O5-C5	2.94	116.13	112.19
4	G	789	NAG	C1-O5-C5	2.75	115.87	112.19
4	G	886	NAG	C2-N2-C7	-2.56	119.46	122.90
4	G	762	NAG	C6-C5-C4	-2.35	107.26	113.02
4	G	762	NAG	C4-C3-C2	-2.26	107.71	111.02
4	G	886	NAG	O5-C1-C2	-2.08	108.08	111.29

There are no chirality outliers.

All (18) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	G	1008	GOL	O1-C1-C2-C3
8	G	1030	BU3	O5-C2-C3-O6
4	G	741	NAG	C8-C7-N2-C2
4	G	741	NAG	O7-C7-N2-C2
4	G	834	NAG	C8-C7-N2-C2
4	G	834	NAG	O7-C7-N2-C2
4	G	892	NAG	C8-C7-N2-C2
4	G	892	NAG	O7-C7-N2-C2
6	G	1007	GOL	O1-C1-C2-C3
6	G	1007	GOL	O1-C1-C2-O2
6	G	1008	GOL	O1-C1-C2-O2
8	G	1030	BU3	C1-C2-C3-O6
8	G	1030	BU3	O5-C2-C3-C4
6	G	1005	GOL	O2-C2-C3-O3
8	G	1030	BU3	C1-C2-C3-C4
9	H	1040	TRS	C2-C-C1-O1
9	H	1040	TRS	C3-C-C2-O2
9	H	1040	TRS	N-C-C2-O2

There are no ring outliers.

11 monomers are involved in 22 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	G	948	NAG	2	0
6	G	1007	GOL	3	0
4	G	734	NAG	1	0
6	G	1006	GOL	2	0
4	G	892	NAG	3	0
6	G	1005	GOL	2	1
4	G	741	NAG	1	0
8	G	1030	BU3	4	0
5	L	1004	SO4	1	0
5	G	1001	SO4	0	1
9	H	1040	TRS	2	0

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data [i](#)

6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	G	344/353 (97%)	-0.28	5 (1%) 72 71	28, 44, 79, 167	0
2	H	225/228 (98%)	-0.26	3 (1%) 75 74	28, 44, 84, 140	0
3	L	208/208 (100%)	-0.18	0 100 100	31, 48, 73, 148	0
All	All	777/789 (98%)	-0.25	8 (1%) 79 79	28, 45, 81, 167	0

All (8) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	G	409	GLY	3.4
2	H	215	SER	3.3
1	G	407	MET	3.1
1	G	397	GLY	2.7
2	H	133	GLY	2.6
1	G	124	GLY	2.5
2	H	127	SER	2.4
1	G	408	LYS	2.1

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(Å ²)	Q<0.9
7	CL	H	1023	1/1	0.45	0.44	111,111,111,111	0
4	NAG	G	948	14/15	0.59	0.16	86,102,108,110	0
4	NAG	G	892	14/15	0.63	0.14	78,96,100,100	0
7	CL	H	1021	1/1	0.73	0.23	89,89,89,89	0
6	GOL	G	1008	6/6	0.77	0.20	64,65,67,67	0
4	NAG	G	741	14/15	0.78	0.17	62,84,103,105	0
4	NAG	G	834	14/15	0.78	0.14	61,73,86,91	0
5	SO4	L	1004	5/5	0.78	0.09	67,81,94,96	0
4	NAG	G	776	14/15	0.80	0.13	44,61,66,67	0
9	TRS	H	1040	8/8	0.81	0.15	43,60,64,65	0
7	CL	L	1024	1/1	0.82	0.19	94,94,94,94	0
5	SO4	L	1003	5/5	0.82	0.10	67,71,87,94	0
6	GOL	G	1007	6/6	0.83	0.14	55,70,77,90	0
7	CL	G	1016	1/1	0.83	0.19	83,83,83,83	0
5	SO4	G	1002	5/5	0.85	0.08	79,87,93,94	0
7	CL	G	1019	1/1	0.85	0.22	77,77,77,77	0
4	NAG	G	795	14/15	0.87	0.10	40,52,60,60	0
7	CL	G	1022	1/1	0.89	0.09	78,78,78,78	0
7	CL	L	1020	1/1	0.89	0.35	76,76,76,76	0
7	CL	G	1027	1/1	0.90	0.19	70,70,70,70	0
4	NAG	G	734	14/15	0.90	0.09	37,45,57,59	0
7	CL	H	1026	1/1	0.91	0.10	67,67,67,67	0
4	NAG	G	886	14/15	0.91	0.09	38,50,56,58	0
4	NAG	G	789	14/15	0.91	0.09	49,59,65,71	0
7	CL	G	1014	1/1	0.91	0.11	69,69,69,69	0
5	SO4	G	1000	5/5	0.92	0.10	47,48,51,52	0
7	CL	G	1015	1/1	0.92	0.18	76,76,76,76	0
4	NAG	G	762	14/15	0.92	0.09	22,31,44,55	0
7	CL	G	1028	1/1	0.93	0.16	59,59,59,59	0
7	CL	L	1012	1/1	0.94	0.17	58,58,58,58	0
6	GOL	G	1005	6/6	0.94	0.10	20,32,40,46	0
6	GOL	G	1006	6/6	0.94	0.09	50,57,59,61	0
7	CL	L	1011	1/1	0.94	0.08	61,61,61,61	0
7	CL	H	1010	1/1	0.95	0.14	65,65,65,65	0
7	CL	G	1013	1/1	0.95	0.13	65,65,65,65	0
8	BU3	G	1030	6/6	0.95	0.13	26,43,50,58	0
7	CL	G	1017	1/1	0.95	0.09	68,68,68,68	0
5	SO4	G	1001	5/5	0.96	0.06	24,27,35,41	0
7	CL	L	1018	1/1	0.96	0.17	67,67,67,67	0

6.5 Other polymers [i](#)

There are no such residues in this entry.