



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 01:40 PM UTC

PDB ID : 8W86 / pdb_00008w86
Title : HLA-DQ2.5-B/C hordein peptide in complex with DQN0385AE02
Authors : Irie, M.; Tsushima, T.; Teranishi-Ikawa, Y.; Takahashi, N.; Ishii, S.; Okura, Y.; Fukami, T.A.; Torizawa, T.
Deposited on : 2023-08-31
Resolution : 2.24 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

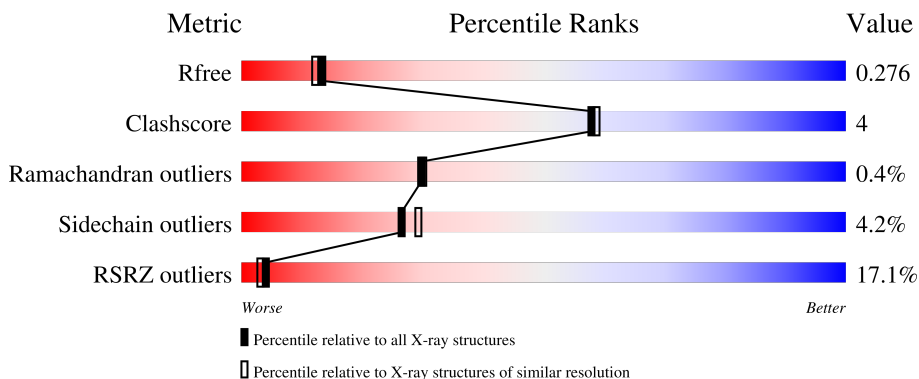
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.24 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.



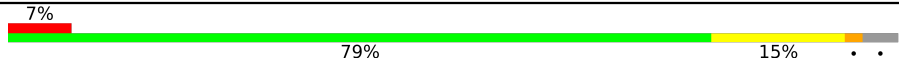


Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	3416 (2.26-2.22)
Clashscore	190562	3556 (2.26-2.22)
Ramachandran outliers	187476	3500 (2.26-2.22)
Sidechain outliers	187428	3501 (2.26-2.22)
RSRZ outliers	180081	3415 (2.26-2.22)

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	223	
1	E	223	
2	B	213	
2	F	213	
3	C	189	

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Mol	Chain	Length	Quality of chain
3	G	189	
4	D	230	
4	H	230	

2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 11188 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 DQN0385AE02 Fab heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	211	1538	976	250	306	6	0	0	0
1	E	116	872	557	146	165	4	0	0	0

- Molecule 2 is a protein called DQN0385AE02 Fab light chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	211	1595	1002	261	327	5	0	0	0
2	F	106	807	513	128	163	3	0	0	0

- Molecule 3 is a protein called HLA class II histocompatibility antigen, DQ alpha 1 chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	C	181	1440	927	235	276	2	0	0	0
3	G	181	1422	916	234	270	2	0	0	0

There are 14 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	47	SER	CYS	engineered mutation	UNP P01909
C	184	LEU	-	expression tag	UNP P01909
C	185	GLU	-	expression tag	UNP P01909
C	186	VAL	-	expression tag	UNP P01909
C	187	LEU	-	expression tag	UNP P01909
C	188	PHE	-	expression tag	UNP P01909
C	189	GLN	-	expression tag	UNP P01909
G	47	SER	CYS	engineered mutation	UNP P01909

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Chain	Residue	Modelled	Actual	Comment	Reference
G	184	LEU	-	expression tag	UNP P01909
G	185	GLU	-	expression tag	UNP P01909
G	186	VAL	-	expression tag	UNP P01909
G	187	LEU	-	expression tag	UNP P01909
G	188	PHE	-	expression tag	UNP P01909
G	189	GLN	-	expression tag	UNP P01909

- Molecule 4 is a protein called MHC class II HLA-DQ-beta-1 - B/C hordein peptide chimeric protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
4	D	197	Total 1605	C 1015	N 283	O 300	S 7	0	0	0
4	H	192	Total 1529	C 975	N 265	O 282	S 7	0	0	0

There are 46 discrepancies between the modelled and reference sequences:

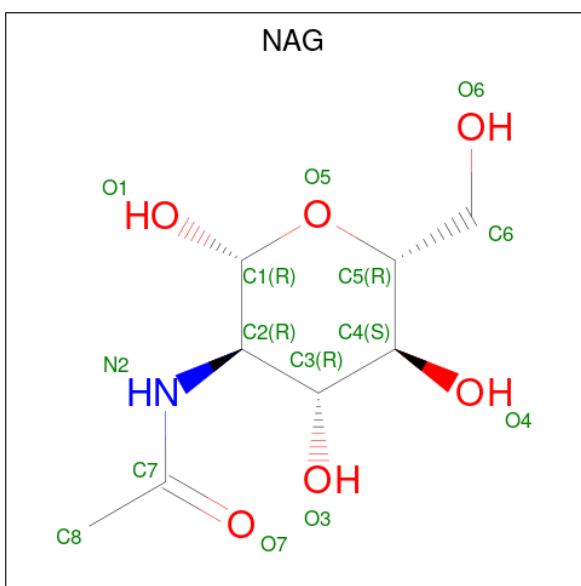
Chain	Residue	Modelled	Actual	Comment	Reference
D	984	GLY	-	linker	PDB ?
D	985	SER	-	linker	PDB ?
D	986	GLY	-	linker	PDB ?
D	987	GLY	-	linker	PDB ?
D	988	GLY	-	linker	PDB ?
D	989	GLY	-	linker	PDB ?
D	990	SER	-	linker	PDB ?
D	991	ILE	-	linker	PDB ?
D	992	GLU	-	linker	PDB ?
D	993	GLY	-	linker	PDB ?
D	994	ARG	-	linker	PDB ?
D	995	GLY	-	linker	PDB ?
D	996	SER	-	linker	PDB ?
D	997	GLY	-	linker	PDB ?
D	998	GLY	-	linker	PDB ?
D	999	GLY	-	linker	PDB ?
D	1000	SER	-	linker	PDB ?
D	1191	LEU	-	expression tag	UNP O19712
D	1192	GLU	-	expression tag	UNP O19712
D	1193	VAL	-	expression tag	UNP O19712
D	1194	LEU	-	expression tag	UNP O19712
D	1195	PHE	-	expression tag	UNP O19712
D	1196	GLN	-	expression tag	UNP O19712

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Chain	Residue	Modelled	Actual	Comment	Reference
H	984	GLY	-	linker	PDB ?
H	985	SER	-	linker	PDB ?
H	986	GLY	-	linker	PDB ?
H	987	GLY	-	linker	PDB ?
H	988	GLY	-	linker	PDB ?
H	989	GLY	-	linker	PDB ?
H	990	SER	-	linker	PDB ?
H	991	ILE	-	linker	PDB ?
H	992	GLU	-	linker	PDB ?
H	993	GLY	-	linker	PDB ?
H	994	ARG	-	linker	PDB ?
H	995	GLY	-	linker	PDB ?
H	996	SER	-	linker	PDB ?
H	997	GLY	-	linker	PDB ?
H	998	GLY	-	linker	PDB ?
H	999	GLY	-	linker	PDB ?
H	1000	SER	-	linker	PDB ?
H	1191	LEU	-	expression tag	UNP O19712
H	1192	GLU	-	expression tag	UNP O19712
H	1193	VAL	-	expression tag	UNP O19712
H	1194	LEU	-	expression tag	UNP O19712
H	1195	PHE	-	expression tag	UNP O19712
H	1196	GLN	-	expression tag	UNP O19712

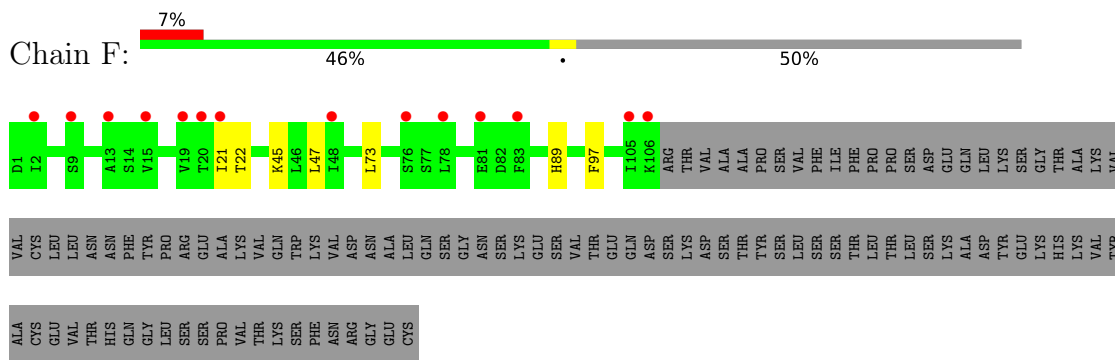
- Molecule 5 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: $C_8H_{15}NO_6$).



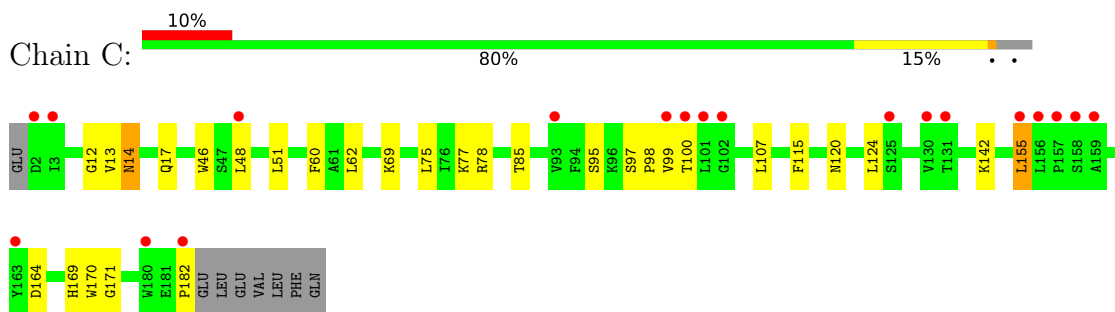
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	C	1	Total	C	N	O	0	0
			14	8	1	5		
5	G	1	Total	C	N	O	0	0
			14	8	1	5		

- Molecule 6 is water.

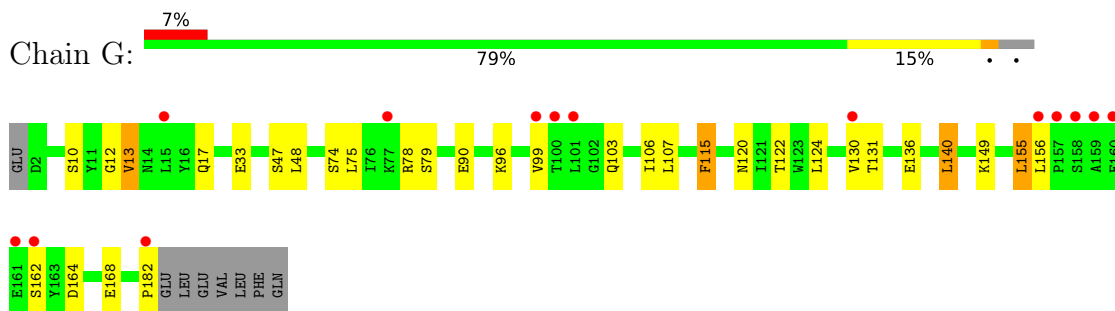
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	34	Total	O	0	0
			34	34		
6	B	52	Total	O	0	0
			52	52		
6	C	54	Total	O	0	0
			54	54		
6	D	54	Total	O	0	0
			54	54		
6	E	15	Total	O	0	0
			15	15		
6	F	25	Total	O	0	0
			25	25		
6	G	60	Total	O	0	0
			60	60		
6	H	58	Total	O	0	0
			58	58		



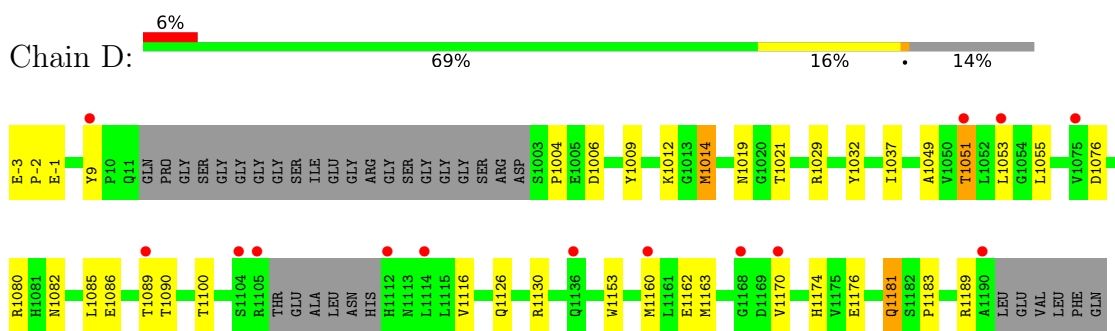
• Molecule 3: HLA class II histocompatibility antigen, DQ alpha 1 chain



• Molecule 3: HLA class II histocompatibility antigen, DQ alpha 1 chain

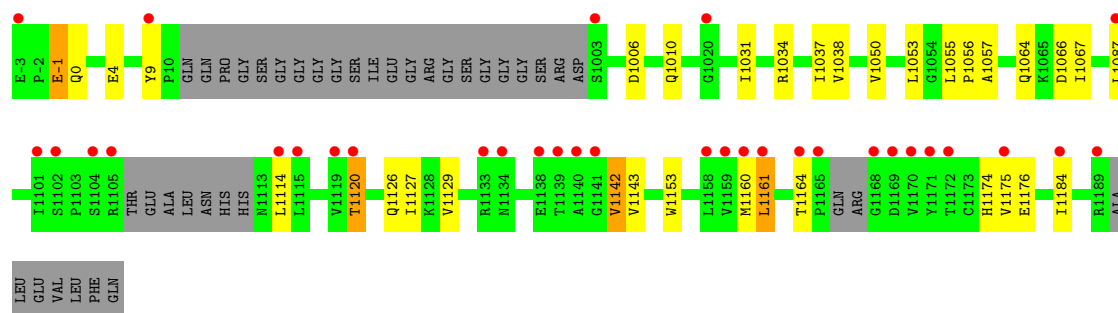


• Molecule 4: MHC class II HLA-DQ-beta-1 - B/C hordein peptide chimeric protein



• Molecule 4: MHC class II HLA-DQ-beta-1 - B/C hordein peptide chimeric protein





4 Data and refinement statistics i

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	73.70Å 127.19Å 130.37Å 90.00° 104.45° 90.00°	Depositor
Resolution (Å)	126.22 – 2.24 126.22 – 2.24	Depositor EDS
% Data completeness (in resolution range)	69.1 (126.22-2.24) 69.1 (126.22-2.24)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.50 (at 2.22Å)	Xtrriage
Refinement program	BUSTER 2.11.8	Depositor
R, R_{free}	0.241 , 0.280 0.234 , 0.276	Depositor DCC
R_{free} test set	4001 reflections (5.16%)	wwPDB-VP
Wilson B-factor (Å ²)	51.4	Xtrriage
Anisotropy	0.021	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 37.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	0.014 for h,-k,-h-l	Xtrriage
F_o, F_c correlation	0.92	EDS
Total number of atoms	11188	wwPDB-VP
Average B, all atoms (Å ²)	54.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.14% 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	0.69	0/1578	1.03	2/2165 (0.1%)
1	E	0.71	0/894	0.98	0/1218
2	B	0.82	1/1631 (0.1%)	0.97	1/2224 (0.0%)
2	F	0.79	0/826	1.00	1/1122 (0.1%)
3	C	0.75	0/1482	1.10	5/2026 (0.2%)
3	G	0.76	0/1464	1.09	3/2004 (0.1%)
4	D	0.72	1/1645 (0.1%)	1.06	0/2242
4	H	0.76	0/1567	1.08	4/2139 (0.2%)
All	All	0.75	2/11087 (0.0%)	1.04	16/15140 (0.1%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	4	MET	SD-CE	-13.28	1.46	1.79
4	D	1014	MET	SD-CE	-5.40	1.66	1.79

All (16) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	F	97	PHE	CA-CB-CG	6.20	120.00	113.80
3	C	142	LYS	CA-C-N	6.15	129.35	120.38
3	C	142	LYS	C-N-CA	6.15	129.35	120.38
3	G	13	VAL	N-CA-C	-6.06	98.25	106.85
3	C	115	PHE	CA-CB-CG	-6.00	107.81	113.80
3	G	115	PHE	CA-CB-CG	-5.80	108.00	113.80
3	C	13	VAL	N-CA-CB	5.67	117.78	111.89
4	H	1120	THR	N-CA-CB	-5.63	101.03	110.83
3	C	60	PHE	N-CA-C	-5.62	105.07	111.14
3	G	13	VAL	N-CA-CB	5.53	118.63	111.83
1	A	152	PRO	CA-C-N	5.51	129.12	120.97

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	152	PRO	C-N-CA	5.51	129.12	120.97
4	H	1184	ILE	N-CA-CB	5.24	116.98	111.00
4	H	1164	THR	CB-CA-C	5.16	117.05	110.34
4	H	1050	VAL	N-CA-C	-5.06	107.46	111.81
2	B	113	SER	N-CA-C	-5.01	100.91	108.67

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	1538	0	1414	20	0
1	E	872	0	808	10	0
2	B	1595	0	1506	5	0
2	F	807	0	781	2	0
3	C	1440	0	1382	18	0
3	G	1422	0	1352	16	0
4	D	1605	0	1544	26	0
4	H	1529	0	1461	18	0
5	C	14	0	13	1	0
5	G	14	0	13	0	0
6	A	34	0	0	0	0
6	B	52	0	0	0	0
6	C	54	0	0	0	0
6	D	54	0	0	0	0
6	E	15	0	0	0	0
6	F	25	0	0	0	0
6	G	60	0	0	1	0
6	H	58	0	0	0	0
All	All	11188	0	10274	95	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 4.

All (95) 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:200:ILE:HA	1:A:215:ARG:HA	1.62	0.79
3:C:75:LEU:HD23	4:D:1032:TYR:HB2	1.65	0.79
4:D:1085:LEU:O	4:D:1089:THR:HG22	1.85	0.76
4:D:1116:VAL:HG22	4:D:1160:MET:HG2	1.74	0.70
1:A:113:LEU:HD23	1:A:154:PRO:HD3	1.75	0.69
3:C:75:LEU:HD21	4:D:1037:ILE:HD13	1.77	0.65
1:A:129:LEU:HD11	1:A:146:LEU:HD13	1.77	0.65
2:B:119:PRO:HD3	2:B:131:VAL:HG22	1.79	0.64
1:A:159:TRP:HA	1:A:201:CYS:HA	1.80	0.61
1:A:155:VAL:HG12	1:A:205:HIS:CD2	2.35	0.60
1:E:5:VAL:HG13	1:E:23:ALA:HB3	1.84	0.60
3:C:99:VAL:HG11	3:C:182:PRO:HB3	1.83	0.59
4:D:1170:VAL:HG22	4:D:1189:ARG:HG2	1.84	0.59
3:G:107:LEU:HD22	3:G:155:LEU:HD21	1.85	0.58
3:C:120:ASN:HD21	5:C:1000:NAG:C1	2.16	0.58
3:G:120:ASN:HB2	3:G:168:GLU:HB2	1.86	0.58
1:A:92:THR:HG23	1:A:115:THR:HA	1.87	0.56
2:B:4:MET:HE1	2:B:89:HIS:HA	1.88	0.56
1:A:35:MET:HB3	1:A:80:LEU:HD22	1.89	0.55
3:G:124:LEU:HB2	3:G:164:ASP:HB2	1.89	0.55
3:G:99:VAL:HG11	3:G:182:PRO:HB3	1.88	0.54
1:A:155:VAL:HG12	1:A:205:HIS:HD2	1.72	0.54
1:E:101:ILE:HG22	2:F:89:HIS:CE1	2.43	0.53
1:E:33:TYR:CE2	1:E:99:ARG:NH1	2.76	0.53
4:H:1174:HIS:HE1	4:H:1176:GLU:OE2	1.93	0.52
4:D:1049:ALA:HB3	4:H:1143:VAL:HG22	1.92	0.51
4:D:1014:MET:HE3	4:D:1029:ARG:HE	1.76	0.51
3:C:17:GLN:OE1	4:D:1006:ASP:OD2	2.28	0.51
3:C:124:LEU:HB2	3:C:164:ASP:HB2	1.92	0.51
4:H:-1:GLU:HG3	4:H:0:GLN:H	1.76	0.51
3:G:107:LEU:HD13	3:G:155:LEU:HD21	1.93	0.50
3:C:97:SER:HB2	3:C:98:PRO:HD2	1.94	0.49
1:E:33:TYR:HE2	1:E:99:ARG:NH1	2.09	0.49
4:H:1142:VAL:HG12	4:H:1161:LEU:HD12	1.93	0.49
1:A:48:TRP:CG	2:B:95:VAL:HB	2.47	0.49
1:A:32:TRP:O	3:C:69:LYS:HE2	2.13	0.49
3:C:78:ARG:HD3	4:D:1053:LEU:HD23	1.95	0.49
3:C:48:LEU:HD13	4:D:1153:TRP:CG	2.50	0.47
1:E:20:LEU:HD13	1:E:84:MET:HE2	1.96	0.47
1:E:71:ILE:HD11	1:E:80:LEU:HD11	1.96	0.47
4:H:1129:VAL:HG22	4:H:1175:VAL:HG22	1.97	0.47
1:A:157:VAL:HG22	1:A:203:VAL:HG22	1.95	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:162:VAL:HG22	2:B:174:LEU:HD12	1.95	0.47
1:E:12:VAL:HG11	1:E:18:LEU:HD13	1.96	0.47
4:H:1037:ILE:HG13	4:H:1038:VAL:HG12	1.97	0.47
4:D:1181:GLN:CD	4:D:1181:GLN:H	2.23	0.47
3:C:46:TRP:CE3	3:C:51:LEU:HB3	2.50	0.47
4:D:1176:GLU:HG2	4:D:1183:PRO:HG3	1.96	0.46
4:H:1114:LEU:HD21	4:H:1160:MET:HG2	1.95	0.46
3:G:12:GLY:HA3	6:G:1123:HOH:O	2.15	0.46
4:D:1089:THR:HG23	4:D:1090:THR:H	1.80	0.46
1:A:62:ALA:CB	1:A:64:TRP:NE1	2.79	0.46
2:F:21:ILE:HD12	2:F:73:LEU:HD23	1.98	0.46
4:D:9:TYR:OH	4:D:1053:LEU:O	2.33	0.45
1:E:33:TYR:HE2	1:E:99:ARG:HH11	1.61	0.45
4:D:1014:MET:HE3	4:D:1029:ARG:NE	2.32	0.45
3:G:17:GLN:OE1	4:H:1006:ASP:OD2	2.35	0.45
3:C:170:TRP:CE2	4:D:1004:PRO:HD2	2.51	0.45
1:E:92:THR:HG23	1:E:115:THR:HA	1.98	0.45
3:G:79:SER:HB3	4:H:1053:LEU:HD21	1.99	0.45
1:A:155:VAL:CG1	1:A:205:HIS:CD2	2.99	0.45
1:A:155:VAL:CG1	1:A:205:HIS:HD2	2.28	0.44
3:C:75:LEU:HD22	4:D:1009:TYR:CE2	2.53	0.44
3:G:130:VAL:HG12	3:G:131:THR:H	1.82	0.44
3:G:136:GLU:CD	3:G:149:LYS:HE3	2.43	0.43
4:H:1010:GLN:HB2	4:H:1031:ILE:HB	1.99	0.43
1:A:71:ILE:HD11	1:A:80:LEU:HD11	2.00	0.43
4:D:1055:LEU:HD21	4:H:1143:VAL:HG23	2.00	0.43
4:H:1064:GLN:HB2	4:H:1067:ILE:HD12	2.00	0.43
3:C:14:ASN:HD22	3:C:14:ASN:N	2.17	0.43
1:A:37:TRP:NE1	1:A:80:LEU:HG	2.33	0.43
4:H:-1:GLU:HG3	4:H:0:GLN:N	2.33	0.43
1:E:33:TYR:CD2	1:E:99:ARG:HD2	2.53	0.43
4:D:1076:ASP:HA	4:D:1080:ARG:HB2	2.00	0.43
1:A:19:ARG:NH2	1:A:81:TYR:CE1	2.87	0.43
1:A:32:TRP:CD1	1:A:53:ASP:OD1	2.72	0.42
4:D:1082:ASN:O	4:D:1086:GLU:HG2	2.19	0.42
4:H:9:TYR:CE2	4:H:1057:ALA:HB2	2.54	0.42
1:A:128:PRO:HB3	1:A:216:VAL:HG12	2.02	0.42
1:A:210:THR:HG22	1:A:212:VAL:HG23	2.00	0.42
2:B:148:LYS:HB2	2:B:192:ALA:HB3	2.01	0.42
3:G:10:SER:HB3	3:G:13:VAL:HG23	2.02	0.42
3:C:107:LEU:HD13	3:C:155:LEU:HD13	2.02	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:G:115:PHE:CG	4:H:1034:ARG:HD2	2.55	0.41
3:C:12:GLY:O	4:D:1012:LYS:HA	2.21	0.41
3:C:169:HIS:CD2	3:C:171:GLY:H	2.38	0.41
4:D:1037:ILE:HA	4:D:1051:THR:HB	2.01	0.41
3:G:33:GLU:HB2	3:G:140:LEU:HD11	2.02	0.41
3:G:96:LYS:HD3	3:G:106:ILE:HD12	2.02	0.41
3:G:78:ARG:HE	4:H:1056:PRO:HG2	1.86	0.40
3:G:48:LEU:HD13	4:H:1153:TRP:CG	2.56	0.40
4:D:-3:GLU:N	4:D:-2:PRO:CD	2.85	0.40
3:C:75:LEU:HD11	4:D:9:TYR:CE1	2.57	0.40
4:D:1130:ARG:HB2	4:D:1174:HIS:HB3	2.04	0.40
4:D:1162:GLU:HB2	4:H:1055:LEU:HD13	2.02	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	207/223 (93%)	196 (95%)	9 (4%)	2 (1%)	12	9
1	E	114/223 (51%)	108 (95%)	5 (4%)	1 (1%)	14	11
2	B	209/213 (98%)	198 (95%)	10 (5%)	1 (0%)	24	23
2	F	104/213 (49%)	101 (97%)	3 (3%)	0	100	100
3	C	179/189 (95%)	176 (98%)	3 (2%)	0	100	100
3	G	179/189 (95%)	170 (95%)	9 (5%)	0	100	100
4	D	191/230 (83%)	180 (94%)	10 (5%)	1 (0%)	24	23
4	H	184/230 (80%)	177 (96%)	7 (4%)	0	100	100
All	All	1367/1710 (80%)	1306 (96%)	56 (4%)	5 (0%)	30	30

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	149	ASP
1	A	194	LEU
4	D	1126	GLN
2	B	210	ARG
1	E	32	TRP

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	161/187 (86%)	155 (96%)	6 (4%)	30	35
1	E	86/187 (46%)	82 (95%)	4 (5%)	23	24
2	B	177/188 (94%)	173 (98%)	4 (2%)	44	53
2	F	90/188 (48%)	87 (97%)	3 (3%)	33	39
3	C	164/173 (95%)	157 (96%)	7 (4%)	26	28
3	G	159/173 (92%)	149 (94%)	10 (6%)	16	14
4	D	178/204 (87%)	171 (96%)	7 (4%)	28	33
4	H	166/204 (81%)	157 (95%)	9 (5%)	20	19
All	All	1181/1504 (78%)	1131 (96%)	50 (4%)	26	29

All (50) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	73	ARG
1	A	140	THR
1	A	145	CYS
1	A	146	LEU
1	A	180	LEU
1	A	189	VAL
2	B	1	ASP
2	B	47	LEU
2	B	56	GLU
2	B	146	GLN
3	C	14	ASN

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Mol	Chain	Res	Type
3	C	62	LEU
3	C	77	LYS
3	C	85	THR
3	C	95	SER
3	C	100	THR
3	C	155	LEU
4	D	-1	GLU
4	D	1019	ASN
4	D	1021	THR
4	D	1051	THR
4	D	1100	THR
4	D	1163	MET
4	D	1181	GLN
1	E	5	VAL
1	E	20	LEU
1	E	58	SER
1	E	115	THR
2	F	22	THR
2	F	45	LYS
2	F	47	LEU
3	G	47	SER
3	G	74	SER
3	G	75	LEU
3	G	90	GLU
3	G	103	GLN
3	G	122	THR
3	G	140	LEU
3	G	155	LEU
3	G	156	LEU
3	G	162	SER
4	H	-1	GLU
4	H	4	GLU
4	H	1066	ASP
4	H	1087	LEU
4	H	1120	THR
4	H	1126	GLN
4	H	1127	ILE
4	H	1142	VAL
4	H	1161	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (10) such sidechains are listed below:

Mol	Chain	Res	Type
2	B	209	ASN
3	C	120	ASN
3	C	169	HIS
4	D	1174	HIS
1	E	83	GLN
2	F	37	GLN
3	G	53	GLN
3	G	120	ASN
3	G	179	HIS
4	H	1174	HIS

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

2 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
5	NAG	G	1000	-	14,14,15	0.33	0	17,19,21	1.42	1 (5%)
5	NAG	C	1000	-	14,14,15	0.36	0	17,19,21	1.21	1 (5%)

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	G	1000	-	-	0/6/23/26	0/1/1/1
5	NAG	C	1000	-	-	0/6/23/26	0/1/1/1

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	G	1000	NAG	O5-C1-C2	-5.53	102.74	111.29
5	C	1000	NAG	O5-C1-C2	-4.69	104.04	111.29

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	C	1000	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	211/223 (94%)	2.03	96 (45%) 0 0	33, 69, 102, 115	0
1	E	116/223 (52%)	1.42	23 (19%) 3 2	43, 63, 75, 84	0
2	B	211/213 (99%)	0.92	25 (11%) 9 8	30, 55, 80, 88	0
2	F	106/213 (49%)	1.09	14 (13%) 7 6	39, 54, 69, 82	0
3	C	181/189 (95%)	0.55	19 (10%) 11 10	30, 45, 69, 80	0
3	G	181/189 (95%)	0.60	14 (7%) 19 17	30, 44, 70, 82	0
4	D	197/230 (85%)	0.90	14 (7%) 22 20	34, 51, 70, 83	0
4	H	192/230 (83%)	0.99	33 (17%) 4 3	33, 51, 68, 84	0
All	All	1395/1710 (81%)	1.06	238 (17%) 4 3	30, 54, 82, 115	0

All (238) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	162	GLY	6.6
1	A	212	VAL	6.4
1	A	196	THR	6.4
1	A	218	PRO	6.2
1	A	161	SER	5.8
1	E	32	TRP	5.7
2	F	2	ILE	5.5
1	A	216	VAL	5.4
1	A	194	LEU	5.2
3	G	182	PRO	5.1
1	A	190	PRO	5.0
4	H	1168	GLY	5.0
2	B	211	GLY	4.9
1	A	197	LYS	4.7
1	A	164	LEU	4.7
1	A	2	VAL	4.6

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Mol	Chain	Res	Type	RSRZ
4	D	1105	ARG	4.6
1	A	191	SER	4.6
1	A	200	ILE	4.5
4	H	1105	ARG	4.4
2	B	1	ASP	4.4
1	A	159	TRP	4.4
4	D	1104	SER	4.3
1	A	1	GLN	4.3
1	A	199	TYR	4.2
4	H	-3	GLU	4.2
2	F	105	ILE	4.1
1	A	210	THR	4.0
1	A	198	THR	4.0
1	A	189	VAL	3.9
2	F	106	LYS	3.9
1	E	116	VAL	3.9
3	G	160	GLU	3.9
1	A	107	PHE	3.8
1	E	1	GLN	3.8
1	A	188	THR	3.7
1	A	129	LEU	3.7
1	A	195	GLY	3.7
1	A	153	GLU	3.7
1	A	167	GLY	3.7
1	A	213	ASP	3.6
4	H	1184	ILE	3.5
1	A	45	GLY	3.5
3	C	99	VAL	3.5
1	A	166	SER	3.5
1	A	165	THR	3.5
1	E	3	GLN	3.5
1	A	214	LYS	3.5
3	G	15	LEU	3.4
1	E	107	PHE	3.4
1	A	141	ALA	3.4
4	H	1134	ASN	3.4
1	A	8	GLY	3.4
1	A	202	ASN	3.4
1	A	163	ALA	3.3
1	A	145	CYS	3.3
1	E	90	GLU	3.3
2	B	125	LYS	3.3

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Mol	Chain	Res	Type	RSRZ
3	G	101	LEU	3.3
2	B	117	PHE	3.3
1	A	187	VAL	3.3
2	F	15	VAL	3.3
1	A	193	SER	3.2
1	A	10	GLY	3.2
1	A	154	PRO	3.2
4	H	1170	VAL	3.1
1	E	87	LEU	3.1
1	A	204	ASN	3.1
1	A	11	VAL	3.1
1	A	215	ARG	3.1
1	A	219	LYS	3.1
2	B	123	GLN	3.1
1	A	131	PRO	3.1
1	A	158	SER	3.0
1	A	201	CYS	3.0
1	A	203	VAL	3.0
1	A	81	TYR	3.0
4	H	1104	SER	3.0
1	A	209	ASN	3.0
2	B	124	LEU	3.0
3	G	162	SER	3.0
4	D	1114	LEU	2.9
1	A	217	GLU	2.9
1	A	206	LYS	2.9
3	G	161	GLU	2.9
1	A	3	GLN	2.9
4	H	1139	THR	2.9
4	H	1164	THR	2.9
3	C	93	VAL	2.8
1	A	130	ALA	2.8
1	A	28	THR	2.8
4	H	1133	ARG	2.8
1	E	89	ALA	2.8
1	A	32	TRP	2.8
1	A	37	TRP	2.8
2	B	110	ALA	2.8
1	A	126	VAL	2.8
1	E	11	VAL	2.8
4	H	1160	MET	2.7
4	D	1112	HIS	2.7

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Mol	Chain	Res	Type	RSRZ
2	B	153	LEU	2.7
1	A	140	THR	2.7
1	E	42	PRO	2.7
4	H	1087	LEU	2.7
4	H	1141	GLY	2.7
1	A	146	LEU	2.7
1	A	180	LEU	2.7
4	D	1190	ALA	2.6
2	B	206	LYS	2.6
3	C	155	LEU	2.6
1	E	110	GLU	2.6
2	B	115	PHE	2.6
1	A	114	VAL	2.6
1	A	9	GLY	2.6
1	A	127	PHE	2.6
1	A	152	PRO	2.6
1	E	12	VAL	2.6
1	A	120	SER	2.6
4	H	1171	TYR	2.6
1	A	113	LEU	2.5
2	B	210	ARG	2.5
3	C	131	THR	2.5
3	G	99	VAL	2.5
4	H	1175	VAL	2.5
1	E	14	PRO	2.5
4	H	1138	GLU	2.5
3	G	159	ALA	2.5
1	A	22	CYS	2.5
4	H	9	TYR	2.5
4	H	1161	LEU	2.5
1	A	160	ASN	2.5
1	A	119	ALA	2.5
1	A	168	VAL	2.4
2	F	83	PHE	2.4
2	B	116	ILE	2.4
1	A	18	LEU	2.4
3	G	156	LEU	2.4
4	H	1140	ALA	2.4
3	C	125	SER	2.4
2	F	19	VAL	2.4
3	C	130	VAL	2.4
1	A	151	PHE	2.4

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Mol	Chain	Res	Type	RSRZ
2	F	21	ILE	2.4
1	E	113	LEU	2.4
3	C	156	LEU	2.4
1	A	128	PRO	2.4
1	A	89	ALA	2.4
4	D	1051	THR	2.4
1	E	31	GLU	2.4
3	C	2	ASP	2.3
2	B	127	GLY	2.3
3	C	102	GLY	2.3
2	F	13	ALA	2.3
1	A	121	THR	2.3
1	A	156	THR	2.3
2	F	81	GLU	2.3
2	B	189	LYS	2.3
3	G	157	PRO	2.3
1	A	67	GLY	2.3
4	D	1168	GLY	2.3
4	H	1020	GLY	2.3
4	H	1101	ILE	2.3
4	D	1170	VAL	2.3
1	A	63	GLY	2.3
1	A	144	GLY	2.3
2	B	192	ALA	2.3
1	A	125	SER	2.3
1	E	7	SER	2.3
2	B	207	SER	2.3
2	B	109	VAL	2.3
4	H	1159	VAL	2.3
4	D	1053	LEU	2.3
1	E	9	GLY	2.3
1	A	192	SER	2.3
1	E	13	GLN	2.3
1	A	122	LYS	2.3
3	G	100	THR	2.2
4	H	1120	THR	2.2
3	C	180	TRP	2.2
4	H	1003	SER	2.2
2	B	2	ILE	2.2
3	C	182	PRO	2.2
1	A	148	GLU	2.2
2	B	183	ALA	2.2

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Mol	Chain	Res	Type	RSRZ
1	A	21	SER	2.2
3	C	48	LEU	2.2
4	H	1158	LEU	2.2
1	A	155	VAL	2.2
2	B	118	PRO	2.2
4	D	1089	THR	2.2
1	A	143	LEU	2.2
4	D	1160	MET	2.2
3	G	77	LYS	2.2
1	A	62	ALA	2.2
4	D	9	TYR	2.1
1	A	20	LEU	2.1
1	A	157	VAL	2.1
1	A	186	VAL	2.1
3	C	157	PRO	2.1
1	E	97	CYS	2.1
1	A	182	SER	2.1
3	G	158	SER	2.1
4	H	1189	ARG	2.1
3	C	163	TYR	2.1
1	E	18	LEU	2.1
3	G	130	VAL	2.1
4	H	1119	VAL	2.1
2	B	129	ALA	2.1
2	F	9	SER	2.1
2	F	78	LEU	2.1
3	C	101	LEU	2.1
4	H	1115	LEU	2.1
1	A	149	ASP	2.1
4	H	1165	PRO	2.1
1	E	30	SER	2.1
2	F	20	THR	2.1
3	C	158	SER	2.1
4	H	1114	LEU	2.1
1	A	74	ASP	2.1
4	H	1169	ASP	2.1
2	B	204	VAL	2.1
1	A	27	PHE	2.1
2	F	76	SER	2.0
4	H	1102	SER	2.0
4	D	1136	GLN	2.0
1	A	87	LEU	2.0

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Mol	Chain	Res	Type	RSRZ
2	B	200	LEU	2.0
2	B	80	PRO	2.0
4	D	1075	VAL	2.0
1	E	115	THR	2.0
3	C	100	THR	2.0
4	H	1172	THR	2.0
3	C	159	ALA	2.0
1	E	60	ASP	2.0
1	A	71	ILE	2.0
2	B	119	PRO	2.0
2	F	48	ILE	2.0
3	C	3	ILE	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(Å ²)	Q<0.9
5	NAG	C	1000	14/15	0.71	0.22	81,83,84,84	0
5	NAG	G	1000	14/15	0.82	0.20	87,89,90,90	0

6.5 Other polymers [i](#)

There are no such residues in this entry.