



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 7, 2026 – 04:08 AM UTC

PDB ID : 1FNG / pdb_00001fng
Title : HISTOCOMPATIBILITY ANTIGEN
Authors : Miley, M.J.; Nelson, C.A.; Fremont, D.H.
Deposited on : 2000-08-21
Resolution : 1.90 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)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

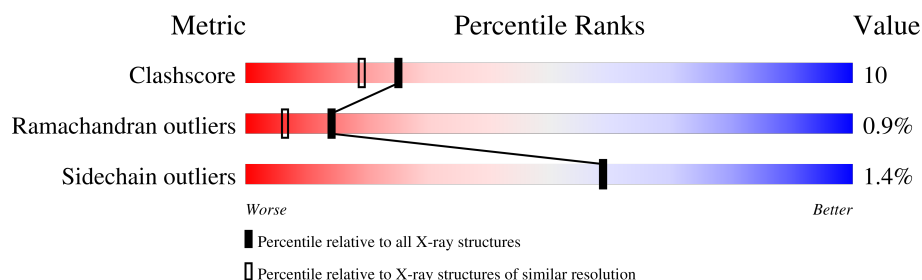
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.90 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))
Clashscore	190562	8410 (1.90-1.90)
Ramachandran outliers	187476	8333 (1.90-1.90)
Sidechain outliers	187428	8333 (1.90-1.90)

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 $\leq 5\%$.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	192	
1	C	192	
2	B	224	
2	D	224	

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 7013 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.

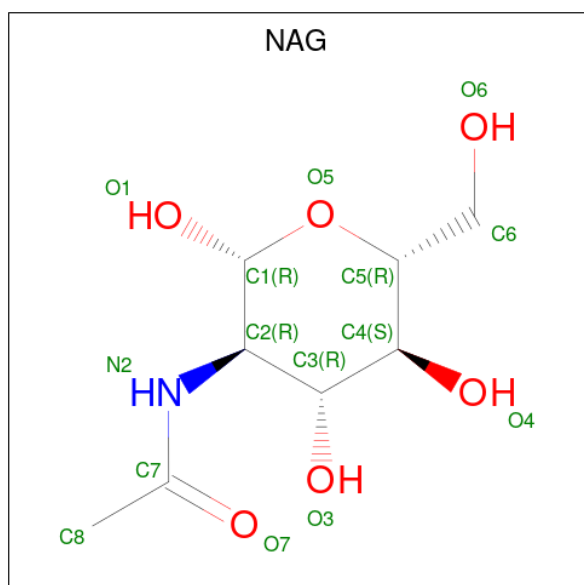
- Molecule 1 is a protein called PROTEIN (MHC CLASS II I-EK, ALPHA CHAIN).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	182	Total	C	N	O	S	0	0	0
			1499	965	245	285	4			
1	C	182	Total	C	N	O	S	0	0	0
			1499	965	245	285	4			

- Molecule 2 is a protein called PROTEIN (MHC CLASS II I-EK, BETA CHAIN).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	213	Total	C	N	O	S	77	0	0
			1712	1084	297	325	6			
2	D	213	Total	C	N	O	S	77	0	0
			1712	1084	297	325	6			

- Molecule 3 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: $C_8H_{15}NO_6$).



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

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	138	Total	O	0	0
			138	138		
4	B	105	Total	O	0	0
			105	105		
4	C	133	Total	O	0	0
			133	133		
4	D	131	Total	O	0	0
			131	131		

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. 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. 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.

Note EDS was not executed.

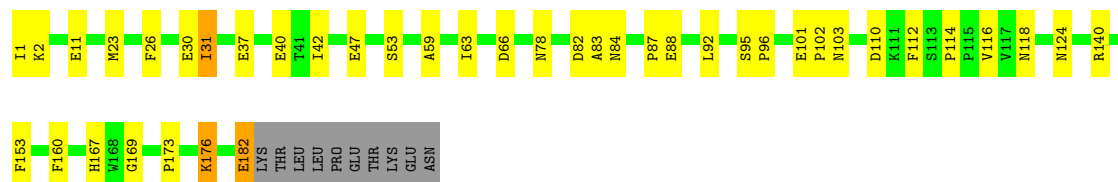
- Molecule 1: PROTEIN (MHC CLASS II I-EK, ALPHA CHAIN)

Chain A: 



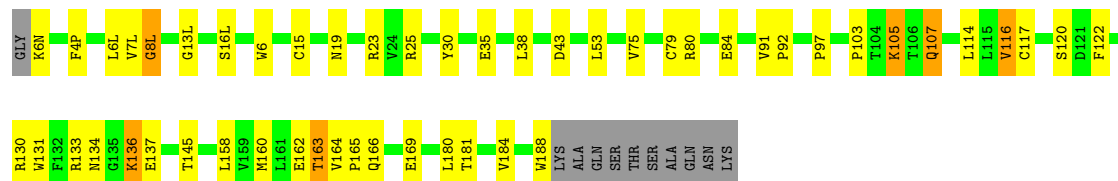
- Molecule 1: PROTEIN (MHC CLASS II I-EK, ALPHA CHAIN)

Chain C: 



- Molecule 2: PROTEIN (MHC CLASS II I-EK, BETA CHAIN)

Chain B: 



- Molecule 2: PROTEIN (MHC CLASS II I-EK, BETA CHAIN)

Chain D: 



	R130	W131	F132	R133	M134	G135	K136	E137		G141		T145		L161	E162	T163	V164		T172		E187	W188	LYS	ALA	GLN	SER	THR	SER	ALA	GLN	ASN	LYS
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4 Data and refinement statistics

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	147.14Å 57.02Å 116.81Å 90.00° 91.97° 90.00°	Depositor
Resolution (Å)	19.78 – 1.90	Depositor
% Data completeness (in resolution range)	95.8 (19.78-1.90)	Depositor
R_{merge}	0.08	Depositor
R_{sym}	0.08	Depositor
Refinement program	CNS	Depositor
R, R_{free}	0.221 , 0.254	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	7013	wwPDB-VP
Average B, all atoms (Å ²)	37.0	wwPDB-VP

5 Model quality

5.1 Standard geometry

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	0.43	0/1542	0.89	4/2096 (0.2%)
1	C	0.43	0/1542	0.88	4/2096 (0.2%)
2	B	0.39	0/1757	0.90	9/2387 (0.4%)
2	D	0.39	0/1757	0.88	8/2387 (0.3%)
All	All	0.41	0/6598	0.89	25/8966 (0.3%)

There are no bond length outliers.

All (25) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	35	GLU	N-CA-C	7.17	120.21	108.52
2	B	181	THR	N-CA-C	-6.81	104.61	113.12
1	C	88	GLU	N-CA-C	-6.78	98.64	109.76
1	A	88	GLU	N-CA-C	-6.47	99.14	109.76
2	D	35	GLU	N-CA-C	6.04	118.36	108.52
2	B	116	VAL	N-CA-C	5.92	116.46	108.17
2	D	145	THR	N-CA-C	-5.83	105.66	112.89
1	C	31	ILE	N-CA-C	-5.67	105.32	110.82
2	D	164	VAL	N-CA-C	-5.61	102.59	108.15
2	B	145	THR	N-CA-C	-5.61	106.44	113.28
2	D	9	GLU	N-CA-C	-5.52	99.53	108.52
2	B	107	GLN	CA-C-N	-5.42	113.06	119.84
2	B	107	GLN	C-N-CA	-5.42	113.06	119.84
1	C	140	ARG	N-CA-C	-5.42	101.89	109.69
1	A	140	ARG	N-CA-C	-5.39	101.93	109.69
1	A	110	ASP	N-CA-C	5.38	117.86	109.52
2	D	116	VAL	N-CA-C	5.19	115.78	108.36
2	D	14	GLU	N-CA-C	5.16	117.38	109.07
2	D	32	TYR	N-CA-C	-5.15	100.02	108.41
2	B	120	SER	N-CA-C	5.14	117.22	109.41

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	31	ILE	N-CA-C	-5.12	106.69	111.45
2	D	36	GLU	N-CA-C	-5.11	101.64	109.76
2	B	164	VAL	CA-C-N	5.10	126.22	119.84
2	B	164	VAL	C-N-CA	5.10	126.22	119.84
1	C	110	ASP	N-CA-C	5.08	117.40	109.52

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	1499	0	1423	31	0
1	C	1499	0	1423	33	0
2	B	1712	0	1631	36	0
2	D	1712	0	1631	31	0
3	A	28	0	26	7	0
3	B	14	0	13	4	0
3	C	28	0	26	5	0
3	D	14	0	13	3	0
4	A	138	0	0	1	0
4	B	105	0	0	1	0
4	C	133	0	0	3	1
4	D	131	0	0	2	0
All	All	7013	0	6186	120	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 10.

All (120) 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)
2:B:19:ASN:HD21	3:B:603:NAG:C1	1.54	1.19
2:D:19:ASN:HD21	3:D:606:NAG:C1	1.65	1.08
1:C:84:ASN:HD22	2:D:16(L):SER:HB3	1.30	0.96

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:19:ASN:ND2	3:B:603:NAG:C1	2.33	0.90
1:A:84:ASN:HD22	2:B:16(L):SER:HB3	1.39	0.87
1:C:78:ASN:HD21	3:C:604:NAG:C1	1.88	0.85
1:C:84:ASN:ND2	2:D:16(L):SER:HB3	1.92	0.82
1:A:118:ASN:HD21	3:A:602:NAG:C1	1.93	0.82
1:C:118:ASN:HD21	3:C:605:NAG:C1	1.93	0.81
2:D:19:ASN:ND2	3:D:606:NAG:C1	2.43	0.80
2:D:23:ARG:HD3	4:D:655:HOH:O	1.83	0.78
1:A:78:ASN:HD21	3:A:601:NAG:H2	1.51	0.76
2:B:114:LEU:HD11	2:B:160:MET:HB3	1.70	0.74
2:D:161:LEU:HG	2:D:163:THR:HG23	1.69	0.74
2:B:162:GLU:O	2:B:163:THR:HG23	1.89	0.73
2:B:133:ARG:HB3	2:B:136:LYS:HZ2	1.53	0.72
1:C:167:HIS:CD2	1:C:169:GLY:H	2.07	0.72
2:B:166:GLN:HB2	2:B:169:GLU:HB3	1.73	0.71
2:B:116:VAL:HG22	2:B:160:MET:HG2	1.74	0.69
2:D:136:LYS:NZ	2:D:136:LYS:HB2	2.09	0.67
1:A:83:ALA:HB2	2:B:13(L):GLY:HA3	1.76	0.66
1:A:84:ASN:ND2	2:B:16(L):SER:HB3	2.10	0.65
2:B:133:ARG:HB3	2:B:136:LYS:NZ	2.11	0.65
1:C:167:HIS:HD2	1:C:169:GLY:H	1.43	0.65
2:B:97:PRO:HB3	2:B:122:PHE:HB3	1.79	0.64
1:A:78:ASN:HD21	3:A:601:NAG:C2	2.11	0.64
1:A:118:ASN:HD21	3:A:602:NAG:C2	2.10	0.63
1:C:84:ASN:HD22	2:D:16(L):SER:CB	2.09	0.63
2:D:141:GLY:O	2:D:162:GLU:HG3	1.99	0.62
1:A:123:ARG:HD3	1:A:161:TYR:CE2	2.34	0.62
1:C:182:GLU:H	1:C:182:GLU:CD	2.07	0.62
2:D:133:ARG:HH22	2:D:163:THR:HG22	1.66	0.60
1:C:78:ASN:ND2	3:C:604:NAG:C1	2.63	0.59
1:A:78:ASN:ND2	3:A:601:NAG:H2	2.18	0.59
2:B:19:ASN:HD21	3:B:603:NAG:C2	2.14	0.58
2:B:136:LYS:NZ	2:B:136:LYS:HB2	2.19	0.58
2:D:114:LEU:HD23	2:D:162:GLU:HA	1.86	0.58
2:D:4(P):PHE:HZ	2:D:15:CYS:SG	2.27	0.58
1:A:167:HIS:CD2	1:A:169:GLY:H	2.22	0.57
2:B:180:LEU:HD13	2:B:184:VAL:HG23	1.87	0.57
2:D:97:PRO:HB3	2:D:122:PHE:HB3	1.87	0.57
2:B:136:LYS:HZ2	2:B:136:LYS:HB2	1.70	0.57
1:A:78:ASN:HD21	3:A:601:NAG:C1	2.18	0.56
2:B:130:ARG:HD3	2:B:137:GLU:CD	2.30	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:26:PHE:HB2	1:C:31:ILE:HD11	1.87	0.56
1:A:40:GLU:HG3	1:A:42:ILE:HD11	1.87	0.56
2:D:132:PHE:CE2	2:D:137:GLU:HG2	2.41	0.56
1:C:37:GLU:HB3	4:C:712:HOH:O	2.06	0.55
2:B:23:ARG:HH11	2:B:23:ARG:HG2	1.72	0.55
2:B:158:LEU:HG	4:B:637:HOH:O	2.06	0.54
1:C:2:LYS:HD2	3:D:606:NAG:H82	1.89	0.54
1:A:26:PHE:HB2	1:A:31:ILE:HD11	1.91	0.53
2:B:80:ARG:O	2:B:84:GLU:HG3	2.08	0.53
1:A:2:LYS:HE3	4:D:713:HOH:O	2.09	0.53
1:A:53:SER:HB3	2:B:6(N):LYS:HE2	1.89	0.53
1:A:177:HIS:HE1	1:A:179:GLU:CD	2.17	0.53
1:A:118:ASN:ND2	3:A:602:NAG:C1	2.69	0.52
2:B:103:PRO:HD3	2:B:188:TRP:NE1	2.25	0.52
1:A:103:ASN:HB3	1:A:153:PHE:CE1	2.45	0.51
1:C:87:PRO:HB3	1:C:112:PHE:HB3	1.93	0.51
1:A:79:ASN:O	1:A:81:PRO:HD3	2.11	0.51
2:B:166:GLN:HB2	2:B:169:GLU:CB	2.40	0.51
1:C:1:ILE:HG12	1:C:2:LYS:N	2.26	0.51
2:B:25:ARG:HD2	2:B:43:ASP:OD2	2.11	0.51
1:C:59:ALA:O	1:C:63:ILE:HG12	2.11	0.50
2:B:163:THR:O	2:B:165:PRO:HD3	2.11	0.50
1:C:173:PRO:HD3	4:C:730:HOH:O	2.10	0.50
1:C:118:ASN:ND2	3:C:605:NAG:C1	2.70	0.50
2:B:7(L):VAL:O	2:B:8(L):GLY:C	2.54	0.50
3:C:604:NAG:O7	3:C:604:NAG:H3	2.11	0.50
1:A:92:LEU:HD23	1:A:92:LEU:N	2.27	0.49
2:D:136:LYS:HB2	2:D:136:LYS:HZ2	1.77	0.49
2:D:5(P):ASN:HD22	2:D:67:PHE:HE1	1.59	0.49
1:C:103:ASN:HB3	1:C:153:PHE:CE1	2.48	0.48
1:C:83:ALA:N	2:D:12(L):GLY:HA3	2.27	0.48
2:B:134:ASN:HD21	2:B:169:GLU:HG3	1.78	0.48
1:C:82:ASP:HB3	2:D:34:LEU:HD12	1.96	0.47
2:D:130:ARG:HD3	2:D:137:GLU:OE1	2.15	0.47
1:A:1:ILE:HG22	1:A:2:LYS:N	2.30	0.47
2:D:75:VAL:O	2:D:79:CYS:HB2	2.14	0.47
1:C:182:GLU:CD	1:C:182:GLU:N	2.71	0.46
2:D:126:ASN:ND2	2:D:126:ASN:H	2.13	0.46
1:C:92:LEU:HD23	1:C:92:LEU:N	2.31	0.46
2:D:114:LEU:HD21	2:D:162:GLU:HG2	1.96	0.46
2:B:165:PRO:O	2:B:166:GLN:HG3	2.16	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:122:LEU:HD23	1:A:127:PRO:HA	1.98	0.46
1:C:114:PRO:HB3	2:D:6:TRP:CE3	2.51	0.46
1:C:176:LYS:HZ2	1:C:176:LYS:HB3	1.80	0.45
1:A:126:ARG:HG3	1:A:126:ARG:NH1	2.30	0.45
2:D:133:ARG:HH22	2:D:163:THR:CG2	2.29	0.45
1:A:87:PRO:HB3	1:A:112:PHE:HB3	1.98	0.45
2:B:6(L):LEU:HD11	2:B:53:LEU:HA	1.99	0.45
1:A:181:GLU:O	1:A:181:GLU:HG3	2.17	0.44
2:D:91:VAL:N	2:D:92:PRO:HD2	2.32	0.44
1:A:114:PRO:O	1:A:167:HIS:HE1	2.01	0.44
1:A:126:ARG:HG3	1:A:126:ARG:HH11	1.82	0.44
2:D:2(P):THR:HG23	2:D:81:HIS:CD2	2.53	0.43
1:C:95:SER:HB2	1:C:96:PRO:HD2	2.00	0.43
2:D:134:ASN:HB2	2:D:136:LYS:HE3	2.00	0.43
2:B:75:VAL:O	2:B:79:CYS:HB2	2.18	0.43
2:B:30:TYR:HB2	2:B:38:LEU:HB3	2.01	0.43
2:B:19:ASN:CG	3:B:603:NAG:C1	2.91	0.42
1:A:114:PRO:HB3	2:B:6:TRP:CE3	2.54	0.42
2:D:172:THR:HG23	2:D:187:GLU:HG2	2.02	0.42
1:C:40:GLU:HG3	1:C:42:ILE:HD11	2.02	0.42
1:C:124:ASN:HA	1:C:160:PHE:CE1	2.55	0.41
1:C:47:GLU:HG2	4:C:646:HOH:O	2.20	0.41
1:C:124:ASN:HA	1:C:160:PHE:CZ	2.54	0.41
2:B:117:CYS:HB2	2:B:131:TRP:CZ2	2.55	0.41
1:A:143:HIS:CD2	1:A:143:HIS:H	2.37	0.41
1:C:23:MET:HE2	1:C:30:GLU:HG3	2.02	0.41
2:B:4(P):PHE:HZ	2:B:15:CYS:SG	2.44	0.41
1:C:101:GLU:HA	1:C:102:PRO:HD3	1.96	0.41
1:A:1:ILE:HG22	1:A:2:LYS:H	1.84	0.41
1:C:11:GLU:OE1	1:C:66:ASP:OD2	2.39	0.41
2:D:117:CYS:HB2	2:D:131:TRP:CZ2	2.55	0.41
1:A:1:ILE:HD12	4:A:711:HOH:O	2.21	0.40
2:B:91:VAL:N	2:B:92:PRO:HD2	2.36	0.40
1:C:53:SER:HB3	2:D:6(N):LYS:HE2	2.03	0.40
2:D:133:ARG:HH11	2:D:133:ARG:CB	2.35	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:C:654:HOH:O	4:C:654:HOH:O[2_655]	1.44	0.76

5.3 Torsion angles

5.3.1 Protein backbone

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	180/192 (94%)	176 (98%)	4 (2%)	0	100	100
1	C	180/192 (94%)	177 (98%)	3 (2%)	0	100	100
2	B	211/224 (94%)	191 (90%)	17 (8%)	3 (1%)	9	3
2	D	211/224 (94%)	198 (94%)	9 (4%)	4 (2%)	6	1
All	All	782/832 (94%)	742 (95%)	33 (4%)	7 (1%)	14	6

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	8(L)	GLY
2	B	107	GLN
2	D	107	GLN
2	B	105	LYS
2	D	8(L)	GLY
2	D	10(L)	GLY
2	D	13(L)	GLY

5.3.2 Protein sidechains

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	165/175 (94%)	165 (100%)	0	100	100
1	C	165/175 (94%)	162 (98%)	3 (2%)	51	50
2	B	188/196 (96%)	185 (98%)	3 (2%)	55	54

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	D	188/196 (96%)	184 (98%)	4 (2%)	47	44
All	All	706/742 (95%)	696 (99%)	10 (1%)	59	59

All (10) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	B	105	LYS
2	B	136	LYS
2	B	163	THR
1	C	116	VAL
1	C	176	LYS
1	C	182	GLU
2	D	105	LYS
2	D	113	ASN
2	D	133	ARG
2	D	136	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (19) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	78	ASN
1	A	118	ASN
1	A	143	HIS
1	A	167	HIS
1	A	177	HIS
2	B	5(P)	ASN
2	B	19	ASN
2	B	64	GLN
2	B	70	GLN
2	B	134	ASN
1	C	57	GLN
1	C	78	ASN
1	C	118	ASN
1	C	167	HIS
2	D	5(P)	ASN
2	D	22	GLN
2	D	37	ASN
2	D	126	ASN
2	D	134	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 ⓘ

6 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	$\# Z > 2$
3	NAG	A	602	-	14,14,15	0.52	0	17,19,21	0.71	1 (5%)
3	NAG	A	601	-	14,14,15	0.48	0	17,19,21	0.75	1 (5%)
3	NAG	C	604	-	14,14,15	0.61	0	17,19,21	0.59	0
3	NAG	C	605	-	14,14,15	0.52	0	17,19,21	0.66	0
3	NAG	B	603	-	14,14,15	0.57	0	17,19,21	0.77	0
3	NAG	D	606	-	14,14,15	0.47	0	17,19,21	0.81	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
3	NAG	A	602	-	-	3/6/23/26	0/1/1/1
3	NAG	A	601	-	-	2/6/23/26	0/1/1/1
3	NAG	C	604	-	-	1/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	NAG	C	605	-	-	4/6/23/26	0/1/1/1
3	NAG	B	603	-	-	0/6/23/26	0/1/1/1
3	NAG	D	606	-	-	2/6/23/26	0/1/1/1

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	601	NAG	C2-N2-C7	-2.34	119.76	122.90
3	A	602	NAG	C2-N2-C7	-2.19	119.96	122.90
3	D	606	NAG	C2-N2-C7	-2.15	120.02	122.90

There are no chirality outliers.

All (12) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	602	NAG	C8-C7-N2-C2
3	A	602	NAG	O7-C7-N2-C2
3	C	605	NAG	C8-C7-N2-C2
3	C	605	NAG	O7-C7-N2-C2
3	A	601	NAG	C8-C7-N2-C2
3	A	602	NAG	O5-C5-C6-O6
3	C	605	NAG	C4-C5-C6-O6
3	C	604	NAG	C3-C2-N2-C7
3	C	605	NAG	O5-C5-C6-O6
3	A	601	NAG	O7-C7-N2-C2
3	D	606	NAG	C8-C7-N2-C2
3	D	606	NAG	O7-C7-N2-C2

There are no ring outliers.

6 monomers are involved in 19 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	602	NAG	3	0
3	A	601	NAG	4	0
3	C	604	NAG	3	0
3	C	605	NAG	2	0
3	B	603	NAG	4	0
3	D	606	NAG	3	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

EDS was not executed - this section is therefore empty.

6.2 Non-standard residues in protein, DNA, RNA chains

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

6.4 Ligands

EDS was not executed - this section is therefore empty.

6.5 Other polymers

EDS was not executed - this section is therefore empty.