



# Full wwPDB X-ray Structure Validation Report ⓘ

Jul 31, 2023 – 10:56 PM EDT

PDB ID : 4THN  
Title : THE CRYSTAL STRUCTURE OF ALPHA-THROMBIN-HIRUNORM IV COMPLEX REVEALS A NOVEL SPECIFICITY SITE RECOGNITION MODE.  
Authors : Lombardi, A.; De Simone, G.; Nastri, F.; Galdiero, S.; Della Morte, R.; Staiano, N.; Pedone, C.; Bolognesi, M.; Pavone, V.  
Deposited on : 1998-09-18  
Resolution : 2.50 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](mailto: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>.

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The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtrriage (Phenix) : **NOT EXECUTED**  
EDS : **NOT EXECUTED**  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.34

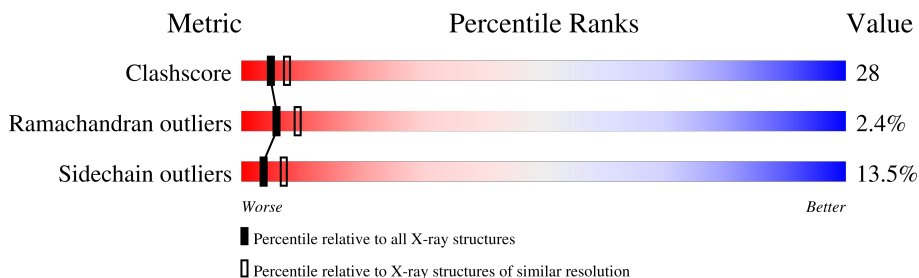
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.50 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	141614	5346 (2.50-2.50)
Ramachandran outliers	138981	5231 (2.50-2.50)
Sidechain outliers	138945	5233 (2.50-2.50)

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  $\geq 3$ , 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	L	36	
2	H	259	
3	I	26	

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
4	NAG	H	400	X	-	-	-

## 2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 2566 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 ALPHA-THROMBIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	L	36	287	177	48	61	1	86	0	0

- Molecule 2 is a protein called ALPHA-THROMBIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	H	253	2053	1310	362	367	14	120	0	0

- Molecule 3 is a protein called HIRUNORM IV.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
3	I	14	134	92	17	25	43	0	0

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



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

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	L	9	Total	O	0	0
			9	9		
5	H	67	Total	O	0	0
			67	67		
5	I	2	Total	O	0	0
			2	2		



## 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, $\alpha$ , $\beta$ , $\gamma$	72.30Å 72.70Å 73.60Å 90.00° 100.00° 90.00°	Depositor
Resolution (Å)	20.00 – 2.50	Depositor
% Data completeness (in resolution range)	96.0 (20.00-2.50)	Depositor
$R_{merge}$	0.10	Depositor
$R_{sym}$	(Not available)	Depositor
Refinement program	TNT 5E	Depositor
R, $R_{free}$	0.173 , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	2566	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	47.0	wwPDB-VP

## 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: ALC, NAL, NAG, CHG, AIB, DGL

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	L	1.24	5/290 (1.7%)	1.45	5/384 (1.3%)
2	H	1.09	13/2107 (0.6%)	1.47	38/2846 (1.3%)
3	I	1.44	2/77 (2.6%)	1.84	3/102 (2.9%)
All	All	1.12	20/2474 (0.8%)	1.48	46/3332 (1.4%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
2	H	0	1

All (20) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	H	18	GLU	CD-OE2	9.60	1.36	1.25
2	H	217	GLU	CD-OE2	9.47	1.36	1.25
1	L	14(H)	GLU	CD-OE2	8.23	1.34	1.25
2	H	192	GLU	CD-OE2	7.81	1.34	1.25
2	H	77	GLU	CD-OE2	7.57	1.33	1.25
2	H	164	GLU	CD-OE1	7.29	1.33	1.25
1	L	14(C)	GLU	CD-OE2	7.16	1.33	1.25
2	H	97(A)	GLU	CD-OE2	6.71	1.33	1.25
2	H	39	GLU	CD-OE2	6.69	1.33	1.25
3	I	18	GLU	CD-OE2	6.36	1.32	1.25
2	H	23	GLU	CD-OE2	6.21	1.32	1.25
1	L	14(E)	GLU	CD-OE2	5.77	1.31	1.25
2	H	186(B)	GLU	CD-OE2	5.76	1.31	1.25
2	H	146	GLU	CD-OE2	5.66	1.31	1.25
3	I	19	GLU	CD-OE2	5.34	1.31	1.25

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	H	247	GLU	CD-OE2	5.31	1.31	1.25
2	H	86	GLU	CD-OE2	5.30	1.31	1.25
1	L	1(C)	GLU	CD-OE2	5.22	1.31	1.25
1	L	13	GLU	CD-OE2	5.12	1.31	1.25
2	H	127	GLU	CD-OE2	5.04	1.31	1.25

All (46) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	H	116	ASP	CB-CG-OD1	8.74	126.17	118.30
2	H	221	ASP	CB-CG-OD2	-8.73	110.44	118.30
2	H	137	ARG	NE-CZ-NH1	8.47	124.54	120.30
3	I	2	ARG	NE-CZ-NH1	8.30	124.45	120.30
2	H	49	ASP	CB-CG-OD2	-8.07	111.03	118.30
2	H	63	ASP	CB-CG-OD1	-7.96	111.13	118.30
2	H	221	ASP	CB-CG-OD1	7.62	125.16	118.30
2	H	97	ARG	NE-CZ-NH1	7.34	123.97	120.30
2	H	93	ARG	NE-CZ-NH1	7.28	123.94	120.30
2	H	97	ARG	NE-CZ-NH2	-7.27	116.66	120.30
2	H	75	ARG	NE-CZ-NH1	7.20	123.90	120.30
2	H	100	ASP	CB-CG-OD2	-7.18	111.84	118.30
3	I	16	ASP	CB-CG-OD2	-7.06	111.95	118.30
2	H	21	ASP	CB-CG-OD2	-7.04	111.97	118.30
1	L	1(A)	ASP	CB-CG-OD2	-7.02	111.98	118.30
2	H	102	ASP	CB-CG-OD2	-7.02	111.98	118.30
2	H	116	ASP	CB-CG-OD2	-6.78	112.19	118.30
2	H	178	ASP	CB-CG-OD2	-6.68	112.29	118.30
2	H	178	ASP	CB-CG-OD1	6.59	124.23	118.30
2	H	102	ASP	CB-CG-OD1	6.49	124.14	118.30
1	L	14	ASP	CB-CG-OD2	-6.45	112.49	118.30
3	I	16	ASP	CB-CG-OD1	6.43	124.09	118.30
2	H	21	ASP	CB-CG-OD1	6.41	124.07	118.30
2	H	60(D)	TRP	CA-CB-CG	-6.39	101.55	113.70
2	H	243	ASP	CB-CG-OD2	-6.30	112.63	118.30
2	H	60(E)	ASP	CB-CG-OD1	-6.22	112.70	118.30
2	H	186(A)	ASP	CB-CG-OD2	6.20	123.88	118.30
2	H	222	ASP	CB-CG-OD1	-6.13	112.78	118.30
1	L	14	ASP	CB-CG-OD1	6.04	123.74	118.30
1	L	14(L)	ASP	CB-CG-OD2	-5.90	112.99	118.30
2	H	137	ARG	NE-CZ-NH2	-5.90	117.35	120.30
2	H	170	ASP	CB-CG-OD2	-5.77	113.11	118.30
2	H	243	ASP	CB-CG-OD1	5.70	123.43	118.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	H	125	ASP	CB-CG-OD2	-5.59	113.27	118.30
2	H	49	ASP	CB-CG-OD1	5.57	123.32	118.30
2	H	189	ASP	CB-CG-OD1	5.56	123.30	118.30
2	H	186(A)	ASP	CB-CG-OD1	-5.46	113.39	118.30
2	H	77(A)	ARG	NE-CZ-NH2	-5.39	117.60	120.30
1	L	14(L)	ASP	CB-CG-OD1	5.31	123.08	118.30
2	H	212	ILE	CB-CA-C	-5.29	101.01	111.60
2	H	208	TYR	CB-CG-CD2	-5.23	117.86	121.00
2	H	125	ASP	CB-CG-OD1	5.22	123.00	118.30
2	H	100	ASP	CB-CG-OD1	5.19	122.97	118.30
2	H	101	ARG	NE-CZ-NH2	-5.07	117.77	120.30
2	H	60(E)	ASP	CB-CG-OD2	5.05	122.85	118.30
2	H	170	ASP	CB-CG-OD1	5.01	122.81	118.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	H	75	ARG	Sidechain

## 5.2 Too-close contacts

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	L	287	0	278	13	3
2	H	2053	0	2019	107	3
3	I	134	0	123	8	0
4	H	14	0	11	0	0
5	H	67	0	0	5	0
5	I	2	0	0	0	0
5	L	9	0	0	0	0
All	All	2566	0	2431	120	3

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 28.

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)
1:L:14(D):ARG:O	1:L:14(H):GLU:HG3	1.69	0.92
2:H:32:MET:HE3	2:H:70:LYS:HD3	1.52	0.91
2:H:32:MET:HG3	2:H:40:LEU:HD13	1.61	0.82
2:H:64:LEU:HD12	2:H:85:LEU:HD11	1.62	0.81
2:H:233:ARG:C	2:H:234:LEU:HD23	2.01	0.81
2:H:146:GLU:OE1	2:H:221(A):ARG:NE	2.14	0.80
2:H:57:HIS:NE2	5:H:470:HOH:O	2.15	0.79
2:H:32:MET:CG	2:H:40:LEU:HD13	2.14	0.78
1:L:14(C):GLU:O	1:L:14(G):LEU:HD23	1.86	0.76
2:H:234:LEU:HD23	2:H:234:LEU:N	2.00	0.75
5:H:470:HOH:O	3:I:1:CHG:N	2.17	0.75
2:H:32:MET:CE	2:H:70:LYS:HD3	2.17	0.74
2:H:70:LYS:HE3	2:H:72:SER:O	1.87	0.74
2:H:31:VAL:HG22	2:H:68:ILE:HG23	1.70	0.73
2:H:60(C):PRO:O	2:H:60(D):TRP:HD1	1.72	0.72
2:H:33:LEU:O	2:H:40:LEU:HD12	1.90	0.72
2:H:165:ARG:HB2	2:H:166:PRO:HD3	1.70	0.71
2:H:146:GLU:CD	2:H:221(A):ARG:HE	1.95	0.69
2:H:70:LYS:NZ	2:H:80:GLU:OE2	2.27	0.67
2:H:36(A):SER:HA	2:H:37:PRO:C	2.16	0.67
2:H:60(C):PRO:C	2:H:60(D):TRP:HD1	1.98	0.66
1:L:14(G):LEU:HD22	1:L:14(G):LEU:N	2.12	0.65
2:H:60(C):PRO:C	2:H:60(D):TRP:CD1	2.70	0.65
2:H:64:LEU:HD12	2:H:85:LEU:CD1	2.29	0.63
2:H:75:ARG:NH2	3:I:18:GLU:OE1	2.32	0.63
2:H:35:ARG:O	2:H:38:GLN:HA	1.99	0.63
2:H:240:LYS:O	2:H:243:ASP:N	2.32	0.62
2:H:53:LEU:HD12	2:H:104:ALA:O	2.00	0.62
2:H:64:LEU:CD1	2:H:85:LEU:HD11	2.29	0.61
2:H:22:ALA:O	2:H:71:HIS:HE1	1.83	0.61
1:L:14(G):LEU:HD22	1:L:14(G):LEU:H	1.66	0.61
2:H:165:ARG:HB2	2:H:166:PRO:CD	2.30	0.61
2:H:60(D):TRP:O	2:H:60(E):ASP:HB2	2.01	0.60
3:I:1:CHG:H3	3:I:3:NAL:C4A	2.32	0.59
2:H:204(B):ASN:C	2:H:204(B):ASN:HD22	2.04	0.59
2:H:60(D):TRP:CD1	2:H:60(D):TRP:N	2.64	0.58
2:H:204(B):ASN:HD22	2:H:205:ASN:N	2.02	0.58
2:H:32:MET:HG3	2:H:40:LEU:CD1	2.32	0.57
2:H:174:ILE:HD13	2:H:174:ILE:N	2.18	0.56
2:H:184(A):TYR:HD1	2:H:186(B):GLU:OE1	1.88	0.56
2:H:125:ASP:OD1	2:H:128:THR:OG1	2.11	0.56
2:H:91:HIS:CE1	2:H:93:ARG:HB2	2.40	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:H:32:MET:CG	2:H:40:LEU:CD1	2.84	0.54
2:H:78:ASN:N	2:H:78:ASN:HD22	2.04	0.54
2:H:73:ARG:HH11	2:H:73:ARG:HG2	1.73	0.54
1:L:14(G):LEU:H	1:L:14(G):LEU:CD2	2.21	0.53
2:H:60(F):LYS:HE2	5:H:466:HOH:O	2.08	0.53
2:H:192:GLU:OE2	3:I:2:ARG:HB2	2.09	0.52
2:H:129:ALA:O	2:H:130:LEU:HB2	2.10	0.52
2:H:197:GLY:O	2:H:213:VAL:HG23	2.10	0.51
2:H:65:LEU:HD12	2:H:66:VAL:H	1.76	0.50
2:H:40:LEU:HG	2:H:41:LEU:N	2.26	0.50
2:H:123:LEU:HB3	2:H:124:PRO:HD2	1.93	0.50
1:L:14:ASP:HB2	2:H:23:GLU:OE2	2.12	0.49
2:H:122:CYS:HB2	2:H:208:TYR:CD1	2.48	0.49
2:H:94:TYR:CZ	2:H:96:TRP:HB3	2.48	0.48
2:H:64:LEU:CD1	2:H:85:LEU:CD1	2.91	0.48
2:H:73:ARG:HG2	2:H:73:ARG:NH1	2.28	0.48
2:H:84:MET:O	2:H:109:LYS:N	2.26	0.48
2:H:77(A):ARG:CG	2:H:78:ASN:ND2	2.77	0.48
2:H:70:LYS:HZ2	2:H:77:GLU:HG3	1.79	0.47
2:H:165:ARG:CB	2:H:166:PRO:CD	2.92	0.47
2:H:204(B):ASN:ND2	2:H:206:ARG:H	2.13	0.47
2:H:75:ARG:N	2:H:75:ARG:HD2	2.25	0.47
2:H:204(B):ASN:C	2:H:204(B):ASN:ND2	2.68	0.47
2:H:17:VAL:O	2:H:188:GLY:HA2	2.15	0.47
2:H:223:GLY:O	2:H:224:LYS:HG2	2.14	0.47
2:H:60(B):PRO:HG2	2:H:96:TRP:CE2	2.50	0.46
2:H:183:ALA:HB3	2:H:228:TYR:CE1	2.50	0.46
2:H:240:LYS:O	2:H:242:ILE:N	2.49	0.46
2:H:33:LEU:HD23	2:H:33:LEU:HA	1.60	0.46
1:L:1:CYS:O	2:H:206:ARG:HD3	2.15	0.45
1:L:14(G):LEU:N	1:L:14(G):LEU:CD2	2.77	0.45
2:H:240:LYS:O	2:H:241:VAL:C	2.53	0.45
2:H:46:LEU:HD22	2:H:48:SER:O	2.17	0.45
2:H:181:PHE:HB2	5:H:413:HOH:O	2.16	0.45
2:H:60(C):PRO:HD3	2:H:96:TRP:CE3	2.51	0.45
1:L:6:LEU:HD12	1:L:6:LEU:HA	1.76	0.45
2:H:146:GLU:OE2	2:H:221(A):ARG:NH2	2.35	0.45
2:H:29:TRP:O	2:H:31:VAL:HG23	2.17	0.45
2:H:77(A):ARG:HG3	2:H:78:ASN:ND2	2.32	0.45
2:H:75:ARG:HD2	2:H:75:ARG:HA	1.79	0.45
2:H:182:CYS:HA	2:H:226:GLY:O	2.16	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:H:30:GLN:HG3	2:H:31:VAL:N	2.33	0.44
2:H:22:ALA:O	2:H:71:HIS:CE1	2.68	0.44
2:H:105:LEU:HA	2:H:105:LEU:HD23	1.61	0.44
2:H:77:GLU:O	2:H:80:GLU:HG2	2.18	0.43
2:H:74:THR:O	3:I:18:GLU:HB3	2.19	0.43
2:H:77(A):ARG:HG2	2:H:78:ASN:ND2	2.34	0.43
1:L:14(C):GLU:O	1:L:14(G):LEU:CD2	2.63	0.43
2:H:60(B):PRO:C	2:H:60(D):TRP:N	2.70	0.43
2:H:33:LEU:HD12	2:H:42:CYS:HB2	2.01	0.43
2:H:197:GLY:HA2	2:H:198:PRO:HD3	1.59	0.43
1:L:14(B):THR:O	1:L:14(E):GLU:HB2	2.19	0.43
2:H:78:ASN:N	2:H:78:ASN:ND2	2.66	0.43
3:I:22:AIB:O	3:I:23:AIB:C	2.56	0.43
2:H:41:LEU:HD12	2:H:41:LEU:HA	1.74	0.42
2:H:75:ARG:N	2:H:75:ARG:CD	2.82	0.42
2:H:91:HIS:O	2:H:94:TYR:HB3	2.18	0.42
1:L:14(G):LEU:HD13	1:L:14(G):LEU:HA	1.77	0.42
2:H:60(A):TYR:CZ	3:I:1:CHG:H4	2.55	0.42
2:H:161:PRO:HG3	2:H:184(A):TYR:CE1	2.55	0.41
2:H:60(B):PRO:O	2:H:60(C):PRO:C	2.57	0.41
2:H:58:CYS:O	2:H:60(F):LYS:HD3	2.20	0.41
2:H:131:GLN:O	2:H:134:TYR:HB2	2.20	0.41
2:H:129(C):LEU:HD23	2:H:129(C):LEU:HA	1.71	0.41
2:H:146:GLU:HB2	2:H:220:CYS:HB2	2.01	0.41
2:H:33:LEU:HB2	2:H:42:CYS:O	2.21	0.41
2:H:46:LEU:HA	2:H:46:LEU:HD23	1.56	0.41
2:H:48:SER:OG	2:H:49:ASP:N	2.54	0.41
2:H:65:LEU:HD13	2:H:65:LEU:HA	1.61	0.41
2:H:60(F):LYS:CE	5:H:466:HOH:O	2.67	0.41
2:H:203:SER:HB3	2:H:204(B):ASN:HD21	1.86	0.41
2:H:99:LEU:HD11	3:I:1:CHG:H3A	2.03	0.41
2:H:91:HIS:HA	2:H:92:PRO:HD2	1.59	0.40
2:H:172:THR:OG1	2:H:173:ARG:N	2.54	0.40
1:L:2:GLY:O	2:H:207:TRP:HD1	2.04	0.40
2:H:60(B):PRO:HG2	2:H:96:TRP:CD2	2.57	0.40
2:H:65:LEU:HD12	2:H:66:VAL:N	2.37	0.40
2:H:163:VAL:HG12	2:H:164:GLU:N	2.37	0.40

All (3) 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)
1:L:14(L):ASP:O	2:H:173:ARG:NH2[4_556]	1.22	0.98
1:L:14(L):ASP:C	2:H:173:ARG:NH2[4_556]	2.05	0.15
1:L:14(L):ASP:O	2:H:173:ARG:CZ[4_556]	2.13	0.07

### 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	L	34/36 (94%)	27 (79%)	3 (9%)	4 (12%)	0	0
2	H	249/259 (96%)	226 (91%)	20 (8%)	3 (1%)	13	24
3	I	7/26 (27%)	7 (100%)	0	0	100	100
All	All	290/321 (90%)	260 (90%)	23 (8%)	7 (2%)	6	9

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	H	240	LYS
1	L	1(D)	GLY
1	L	1(G)	PHE
1	L	14(K)	ILE
1	L	14(L)	ASP
2	H	130	LEU
2	H	241	VAL

#### 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	L	31/31 (100%)	26 (84%)	5 (16%)	2	4
2	H	221/225 (98%)	193 (87%)	28 (13%)	4	8
3	I	8/14 (57%)	6 (75%)	2 (25%)	0	1
All	All	260/270 (96%)	225 (86%)	35 (14%)	4	7

All (35) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	L	1(C)	GLU
1	L	6	LEU
1	L	14(F)	LEU
1	L	14(K)	ILE
1	L	14(L)	ASP
2	H	27	SER
2	H	33	LEU
2	H	41	LEU
2	H	46	LEU
2	H	48	SER
2	H	61	GLU
2	H	63	ASP
2	H	64	LEU
2	H	65	LEU
2	H	68	ILE
2	H	75	ARG
2	H	110	LYS
2	H	125	ASP
2	H	127	GLU
2	H	130	LEU
2	H	145	LYS
2	H	147	THR
2	H	153	SER
2	H	158	VAL
2	H	173	ARG
2	H	174	ILE
2	H	187	ARG
2	H	195	SER
2	H	204(B)	ASN
2	H	217	GLU
2	H	234	LEU
2	H	241	VAL
2	H	242	ILE
3	I	16	ASP

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Mol	Chain	Res	Type
3	I	19	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
2	H	71	HIS
2	H	78	ASN
2	H	143	ASN
2	H	204(B)	ASN

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

6 non-standard protein/DNA/RNA residues 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	AIB	I	23	3	1,5,6	1.10	0	2,7,9	0.09	0
3	CHG	I	1	3	9,10,11	1.18	1 (11%)	7,12,14	1.31	1 (14%)
3	ALC	I	25	3	9,11,12	0.51	0	10,13,15	1.25	1 (10%)
3	AIB	I	22	3	1,5,6	1.69	0	2,7,9	0.04	0
3	NAL	I	3	3	15,16,17	1.21	1 (6%)	18,21,23	1.02	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. '2' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	AIB	I	23	3	-	2/2/3/6	-
3	CHG	I	1	3	-	4/5/14/16	0/1/1/1
3	ALC	I	25	3	-	1/5/14/16	0/1/1/1
3	AIB	I	22	3	-	0/2/3/6	-
3	NAL	I	3	3	-	0/5/6/8	0/2/2/2

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	I	1	CHG	C1-CA	3.21	1.59	1.53
3	I	3	NAL	C9-CA	-2.51	1.48	1.53

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	I	25	ALC	CG-CB-CA	-2.36	111.35	114.52
3	I	1	CHG	C5-C6-C1	-2.18	108.21	111.93
3	I	3	NAL	C9-CA-C	-2.01	107.71	111.47

There are no chirality outliers.

All (7) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	I	23	AIB	O-C-CA-CB1
3	I	1	CHG	C2-C1-CA-N
3	I	1	CHG	C6-C1-CA-N
3	I	1	CHG	C6-C1-CA-C
3	I	1	CHG	C2-C1-CA-C
3	I	23	AIB	O-C-CA-CB2
3	I	25	ALC	CA-CB-CG-CD2

There are no ring outliers.

4 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	I	23	AIB	1	0
3	I	1	CHG	4	0
3	I	22	AIB	1	0
3	I	3	NAL	1	0



## 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

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
4	NAG	H	400	2	14,14,15	1.08	1 (7%)	17,19,21	4.42	12 (70%)

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	H	400	2	2/2/5/7	4/6/23/26	0/1/1/1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	H	400	NAG	C2-N2	2.68	1.50	1.46

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	H	400	NAG	O5-C5-C6	9.24	121.69	107.20
4	H	400	NAG	O7-C7-N2	-6.39	110.20	121.95
4	H	400	NAG	C3-C4-C5	5.98	120.90	110.24
4	H	400	NAG	O3-C3-C2	5.87	121.62	109.47
4	H	400	NAG	O7-C7-C8	-5.65	111.56	122.06
4	H	400	NAG	C2-N2-C7	4.50	129.31	122.90
4	H	400	NAG	C1-C2-N2	4.26	117.76	110.49
4	H	400	NAG	O4-C4-C5	3.85	118.87	109.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	H	400	NAG	O4-C4-C3	3.75	119.01	110.35
4	H	400	NAG	O6-C6-C5	3.38	122.87	111.29
4	H	400	NAG	O5-C1-C2	2.89	115.85	111.29
4	H	400	NAG	O3-C3-C4	2.61	116.39	110.35

All (2) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
4	H	400	NAG	C4
4	H	400	NAG	C2

All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	H	400	NAG	C3-C2-N2-C7
4	H	400	NAG	C8-C7-N2-C2
4	H	400	NAG	O7-C7-N2-C2
4	H	400	NAG	O5-C5-C6-O6

There are no ring outliers.

No monomer is involved in short contacts.

## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

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

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

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

### 6.3 Carbohydrates [i](#)

EDS was not executed - this section is therefore empty.

### 6.4 Ligands [i](#)

EDS was not executed - this section is therefore empty.

### 6.5 Other polymers [i](#)

EDS was not executed - this section is therefore empty.