



# wwPDB X-ray Structure Validation Summary Report ⓘ

Jan 31, 2016 – 11:32 PM GMT

PDB ID : 1XMN  
Title : Crystal structure of thrombin bound to heparin  
Authors : Carter, W.J.; Cama, E.; Huntington, J.A.  
Deposited on : 2004-10-04  
Resolution : 1.85 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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  
<http://wwpdb.org/validation/2016/XrayValidationReportHelp>  
with specific help available everywhere you see the ⓘ symbol.

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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 : 1.7 (RC4), CSD as536be (2015)  
Xtriage (Phenix) : 1.9-1692  
EDS : rb-20026688  
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)  
Refmac : 5.8.0135  
CCP4 : 6.5.0  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : trunk26865

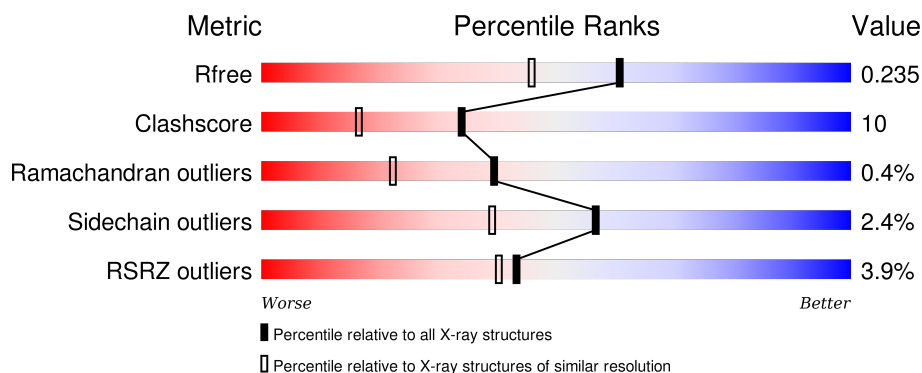
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 1.85 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))
$R_{free}$	91344	1745 (1.86-1.86)
Clashscore	102246	1898 (1.86-1.86)
Ramachandran outliers	100387	1875 (1.86-1.86)
Sidechain outliers	100360	1875 (1.86-1.86)
RSRZ outliers	91569	1747 (1.86-1.86)

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 on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria. 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	36	<div> <div>8%</div> <div>72% 14% 14%</div> </div>
1	C	36	<div> <div>17%</div> <div>78% 11% 11%</div> </div>
1	E	36	<div> <div>6%</div> <div>75% 6% 19%</div> </div>
1	G	36	<div> <div>11%</div> <div>83% • 14%</div> </div>
2	B	259	<div> <div>2%</div> <div>81% 16% ..</div> </div>

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Mol	Chain	Length	Quality of chain
2	D	259	
2	F	259	
2	H	259	

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	SGN	B	4	-	-	-	X
4	IDS	B	5	-	-	-	X
4	SGN	B	6	-	-	-	X
7	GOL	D	1004	-	-	-	X
8	IDS	D	3	-	-	-	X
8	SGN	D	4	-	-	-	X
8	SGN	D	6	-	-	-	X

## 2 Entry composition

There are 11 unique types of molecules in this entry. The entry contains 10416 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.

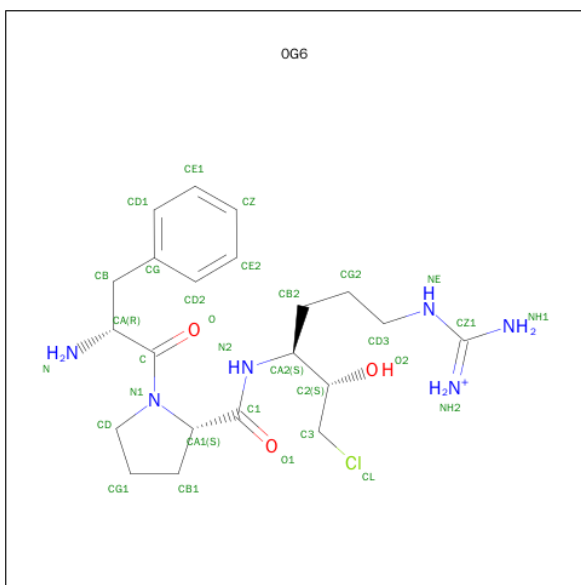
- Molecule 1 is a protein called Thrombin light chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	31	Total	C	N	O	S	0	0	0
			249	154	40	54	1			
1	C	32	Total	C	N	O	S	0	0	0
			248	154	41	52	1			
1	E	29	Total	C	N	O	S	0	0	0
			236	148	38	49	1			
1	G	31	Total	C	N	O	S	0	0	0
			247	153	40	53	1			

- Molecule 2 is a protein called Thrombin heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	256	Total	C	N	O	S	0	0	0
			2053	1310	360	369	14			
2	D	254	Total	C	N	O	S	0	0	0
			2048	1307	360	367	14			
2	F	254	Total	C	N	O	S	0	0	0
			2039	1302	354	369	14			
2	H	253	Total	C	N	O	S	0	0	0
			2035	1300	356	365	14			

- Molecule 3 is D-PHENYLALANYL-N-[(2S,3S)-6-{[AMINO(IMINIO)METHYL]AMINO}-1-CHLORO-2-HYDROXYHEXAN-3-YL]-L-PROLINAMIDE (three-letter code: 0G6) (formula: C<sub>21</sub>H<sub>34</sub>ClN<sub>6</sub>O<sub>3</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	B	1	Total	C	N	O	0	0
			30	21	6	3		
3	D	1	Total	C	N	O	0	0
			30	21	6	3		
3	F	1	Total	C	N	O	0	0
			30	21	6	3		
3	H	1	Total	C	N	O	0	0
			30	21	6	3		

- Molecule 4 is a polymer of unknown type called SUGAR (6-MER).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	B	6	Total	C	N	O	S	0	0
			105	36	3	57	9		

- Molecule 5 is a polymer of unknown type called SUGAR (2-MER).

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	B	2	Total	C	N	O	0	0
			28	16	2	10		

- Molecule 6 is SODIUM ION (three-letter code: NA) (formula: Na).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	H	1	Total	Na	0	0
			1	1		

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	B	1	Total	Na	0	0
			1	1		
6	D	1	Total	Na	0	0
			1	1		
6	F	1	Total	Na	0	0
			1	1		

- Molecule 7 is GLYCEROL (three-letter code: GOL) (formula:  $C_3H_8O_3$ ).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	B	1	Total	C	O	0	0
			6	3	3		
7	B	1	Total	C	O	0	0
			6	3	3		
7	D	1	Total	C	O	0	0
			6	3	3		
7	D	1	Total	C	O	0	0
			6	3	3		
7	F	1	Total	C	O	0	0
			6	3	3		
7	F	1	Total	C	O	0	0
			6	3	3		
7	F	1	Total	C	O	0	0
			6	3	3		
7	H	1	Total	C	O	0	0
			6	3	3		

- Molecule 8 is a polymer of unknown type called SUGAR (5-MER).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
8	D	5	Total	C	N	O	S	0	0
			89	30	3	48	8		

- Molecule 9 is a polymer of unknown type called SUGAR (2-MER).

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
9	D	2	Total	C	N	O	0	0
			28	16	2	10		
9	F	2	Total	C	N	O	0	0
			28	16	2	10		

- Molecule 10 is a polymer of unknown type called SUGAR (5-MER).

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
10	H	5	Total	C	N	O	0	0
			61	34	2	25		

- Molecule 11 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
11	A	18	Total	O	0	0
			18	18		
11	B	188	Total	O	0	0
			188	188		
11	C	20	Total	O	0	0
			20	20		
11	D	199	Total	O	0	0
			199	199		
11	E	20	Total	O	0	0
			20	20		
11	F	133	Total	O	0	0
			133	133		
11	G	18	Total	O	0	0
			18	18		
11	H	154	Total	O	0	0
			154	154		

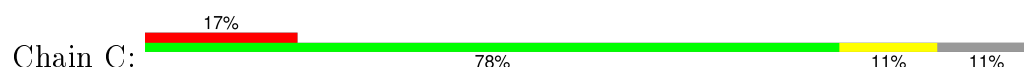
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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.

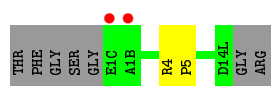
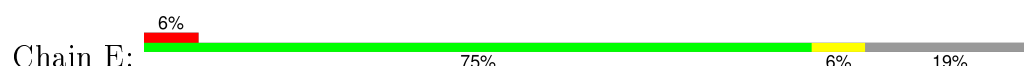
- Molecule 1: Thrombin light chain



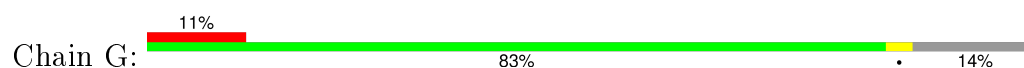
- Molecule 1: Thrombin light chain



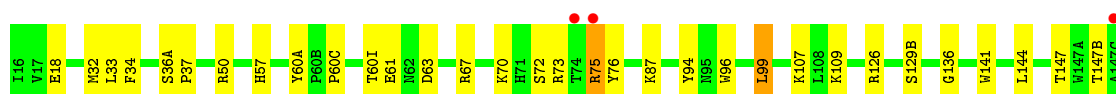
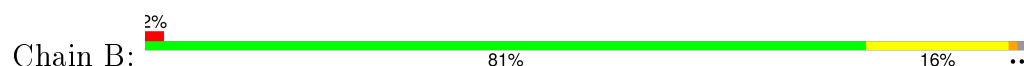
- Molecule 1: Thrombin light chain



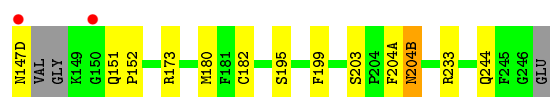
- Molecule 1: Thrombin light chain



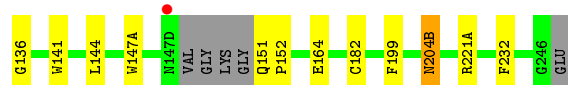
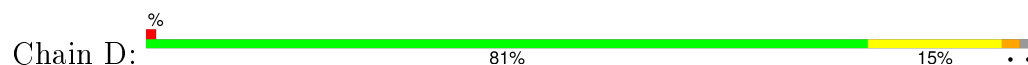
- Molecule 2: Thrombin heavy chain



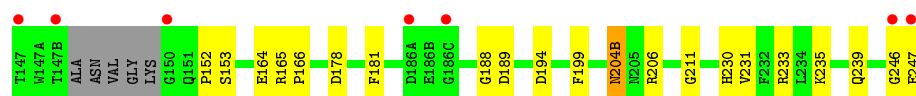
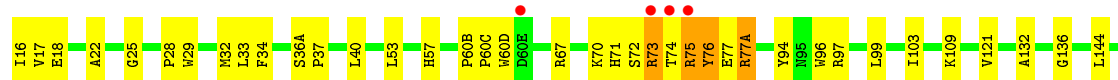
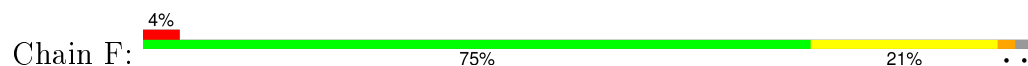




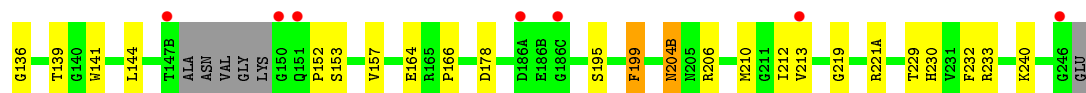
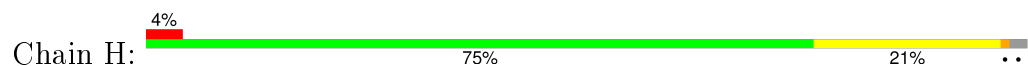
• Molecule 2: Thrombin heavy chain



• Molecule 2: Thrombin heavy chain



• Molecule 2: Thrombin heavy chain



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	80.91Å 80.84Å 114.14Å 90.00° 101.05° 90.00°	Depositor
Resolution (Å)	36.60 – 1.85 36.60 – 1.85	Depositor EDS
% Data completeness (in resolution range)	96.1 (36.60-1.85) 96.1 (36.60-1.85)	Depositor EDS
$R_{merge}$	0.09	Depositor
$R_{sym}$	0.09	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.92 (at 1.85Å)	Xtriage
Refinement program	CNS 1.0	Depositor
R, $R_{free}$	0.209 , 0.234 0.211 , 0.235	Depositor DCC
$R_{free}$ test set	2411 reflections (2.03%)	DCC
Wilson B-factor (Å <sup>2</sup> )	25.0	Xtriage
Anisotropy	0.089	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.37 , 50.2	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.47$ , $\langle L^2 \rangle = 0.30$	Xtriage
Outliers	0 of 118505 reflections	Xtriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	10416	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	31.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.04% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.375 respectively for untwinned datasets, and 0.333, 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: GOL, BMA, NAG, NA, IDS, NDG, 0G6, SGN, MAN

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	0.32	0/251	0.60	0/334
1	C	0.34	0/250	0.61	0/333
1	E	0.32	0/238	0.62	0/317
1	G	0.35	0/249	0.60	0/331
2	B	0.35	0/2107	0.66	2/2853 (0.1%)
2	D	0.36	0/2102	0.65	0/2846
2	F	0.33	0/2093	0.63	0/2833
2	H	0.35	0/2089	0.67	2/2828 (0.1%)
All	All	0.35	0/9379	0.65	4/12675 (0.0%)

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	B	0	1
2	D	0	1
2	F	0	1
2	H	0	1
All	All	0	4

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	195	SER	O-C-N	5.48	132.51	123.20
2	B	195	SER	CA-C-N	-5.22	105.76	116.20
2	H	199	PHE	N-CA-C	-5.22	96.90	111.00
2	H	73	ARG	NE-CZ-NH1	-5.05	117.77	120.30

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	B	57	HIS	Mainchain
2	D	57	HIS	Mainchain
2	F	57	HIS	Mainchain
2	H	57	HIS	Mainchain

## 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	A	249	0	243	3	0
1	C	248	0	239	2	0
1	E	236	0	233	1	0
1	G	247	0	241	1	0
2	B	2053	0	1994	40	0
2	D	2048	0	1993	37	0
2	F	2039	0	1975	52	0
2	H	2035	0	1981	56	0
3	B	30	0	31	1	0
3	D	30	0	31	1	0
3	F	30	0	31	2	0
3	H	30	0	31	1	0
4	B	105	0	40	0	0
5	B	28	0	25	0	0
6	B	1	0	0	0	0
6	D	1	0	0	0	0
6	F	1	0	0	0	0
6	H	1	0	0	0	0
7	B	12	0	16	1	0
7	D	12	0	16	1	0
7	F	18	0	24	1	0
7	H	6	0	8	0	0
8	D	89	0	35	0	0
9	D	28	0	25	0	0
9	F	28	0	25	0	0
10	H	61	0	52	5	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
11	A	18	0	0	0	0
11	B	188	0	0	1	0
11	C	20	0	0	0	0
11	D	199	0	0	3	0
11	E	20	0	0	0	0
11	F	133	0	0	3	0
11	G	18	0	0	0	0
11	H	154	0	0	6	0
All	All	10416	0	9289	192	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 10.

The worst 5 of 192 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:F:40:LEU:HB2	2:F:73:ARG:HH21	1.19	1.05
10:H:9:BMA:H2	10:H:10:MAN:H2	1.40	1.03
2:H:73:ARG:HB2	2:H:141:TRP:CD1	2.08	0.89
2:H:73:ARG:HG3	11:H:3115:HOH:O	1.78	0.82
2:H:139:THR:HG22	2:H:157:VAL:HG22	1.60	0.81

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	29/36 (81%)	26 (90%)	3 (10%)	0	100	100
1	C	30/36 (83%)	27 (90%)	3 (10%)	0	100	100
1	E	27/36 (75%)	26 (96%)	1 (4%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	G	29/36 (81%)	27 (93%)	2 (7%)	0	100	100
2	B	252/259 (97%)	245 (97%)	7 (3%)	0	100	100
2	D	250/259 (96%)	246 (98%)	4 (2%)	0	100	100
2	F	250/259 (96%)	234 (94%)	13 (5%)	3 (1%)	16	4
2	H	249/259 (96%)	241 (97%)	6 (2%)	2 (1%)	24	9
All	All	1116/1180 (95%)	1072 (96%)	39 (4%)	5 (0%)	39	22

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	F	76	TYR
2	F	77(A)	ARG
2	H	73	ARG
2	H	76	TYR
2	F	73	ARG

### 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	28/31 (90%)	28 (100%)	0	100	100
1	C	26/31 (84%)	26 (100%)	0	100	100
1	E	26/31 (84%)	26 (100%)	0	100	100
1	G	27/31 (87%)	27 (100%)	0	100	100
2	B	218/225 (97%)	211 (97%)	7 (3%)	46	27
2	D	218/225 (97%)	212 (97%)	6 (3%)	51	33
2	F	217/225 (96%)	213 (98%)	4 (2%)	66	52
2	H	217/225 (96%)	211 (97%)	6 (3%)	51	33
All	All	977/1024 (95%)	954 (98%)	23 (2%)	57	39

5 of 23 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	D	99	LEU
2	D	204(B)	ASN
2	H	153	SER
2	D	182	CYS
2	F	33	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 20 such sidechains are listed below:

Mol	Chain	Res	Type
2	F	143	ASN
2	F	151	GLN
2	H	71	HIS
2	F	38	GLN
2	F	71	HIS

### 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 ⓘ

22 carbohydrates 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	$\# Z  > 2$
4	SGN	B	2	4	16,19,20	1.16	1 (6%)	15,29,31	1.27	2 (13%)
5	NDG	B	248	2,5	14,14,15	0.65	0	15,19,21	0.85	1 (6%)
5	NAG	B	249	5	14,14,15	0.63	0	15,19,21	1.02	2 (13%)
4	IDS	B	3	4	12,16,17	1.13	1 (8%)	14,24,26	1.60	1 (7%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
4	SGN	B	4	4	16,19,20	1.23	1 (6%)	15,29,31	1.28	2 (13%)
4	IDS	B	5	4	12,16,17	1.08	0	14,24,26	1.72	2 (14%)
4	SGN	B	6	4	16,19,20	1.30	1 (6%)	15,29,31	1.27	2 (13%)
4	IDS	B	7	4	12,16,17	1.28	2 (16%)	14,24,26	2.05	1 (7%)
8	SGN	D	2	8	16,19,20	1.13	1 (6%)	15,29,31	1.26	1 (6%)
9	NDG	D	248	9,2	14,14,15	0.56	0	15,19,21	0.82	1 (6%)
9	NDG	D	249	9	14,14,15	0.59	0	15,19,21	0.66	0
8	IDS	D	3	8	12,16,17	1.04	0	14,24,26	1.65	1 (7%)
8	SGN	D	4	8	16,19,20	1.18	1 (6%)	15,29,31	1.31	1 (6%)
8	IDS	D	5	8	12,16,17	1.13	0	14,24,26	1.75	2 (14%)
8	SGN	D	6	8	16,19,20	1.20	1 (6%)	15,29,31	1.28	2 (13%)
9	NDG	F	5	9,2	14,14,15	0.68	0	15,19,21	0.81	1 (6%)
9	NDG	F	6	9	14,14,15	0.64	0	15,19,21	0.81	1 (6%)
10	MAN	H	10	10	11,11,12	0.58	0	14,15,17	0.67	0
10	MAN	H	11	10	11,11,12	0.53	0	14,15,17	0.86	1 (7%)
10	NDG	H	7	10,2	14,14,15	0.54	0	15,19,21	0.92	1 (6%)
10	NAG	H	8	10	14,14,15	0.52	0	15,19,21	0.84	1 (6%)
10	BMA	H	9	10	11,11,12	0.54	0	14,15,17	0.40	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	SGN	B	2	4	-	0/11/27/31	0/1/1/1
5	NDG	B	248	2,5	-	0/6/23/26	0/1/1/1
5	NAG	B	249	5	-	0/6/23/26	0/1/1/1
4	IDS	B	3	4	-	0/5/25/29	0/1/1/1
4	SGN	B	4	4	-	0/11/27/31	0/1/1/1
4	IDS	B	5	4	-	0/5/25/29	0/1/1/1
4	SGN	B	6	4	-	0/11/27/31	0/1/1/1
4	IDS	B	7	4	-	1/5/25/29	1/1/1/1
8	SGN	D	2	8	-	0/11/27/31	0/1/1/1
9	NDG	D	248	9,2	-	0/6/23/26	0/1/1/1
9	NDG	D	249	9	-	0/6/23/26	0/1/1/1
8	IDS	D	3	8	-	0/5/25/29	0/1/1/1
8	SGN	D	4	8	-	0/11/27/31	0/1/1/1
8	IDS	D	5	8	-	0/5/25/29	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
8	SGN	D	6	8	-	0/11/27/31	0/1/1/1
9	NDG	F	5	9,2	-	0/6/23/26	0/1/1/1
9	NDG	F	6	9	-	0/6/23/26	0/1/1/1
10	MAN	H	10	10	-	0/2/19/22	1/1/1/1
10	MAN	H	11	10	-	0/2/19/22	1/1/1/1
10	NDG	H	7	10,2	-	0/6/23/26	0/1/1/1
10	NAG	H	8	10	-	0/6/23/26	0/1/1/1
10	BMA	H	9	10	-	0/2/19/22	0/1/1/1

The worst 5 of 9 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	3	IDS	O2-C2	-2.34	1.41	1.46
8	D	6	SGN	C4-C3	2.10	1.56	1.52
8	D	2	SGN	C1-C2	2.25	1.55	1.53
8	D	4	SGN	C1-C2	2.36	1.55	1.53
4	B	2	SGN	C1-C2	2.38	1.55	1.53

The worst 5 of 26 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
8	D	4	SGN	C4-C3-C2	-3.47	107.61	111.47
8	D	2	SGN	C4-C3-C2	-3.29	107.81	111.47
4	B	2	SGN	C4-C3-C2	-3.24	107.87	111.47
4	B	6	SGN	C4-C3-C2	-3.22	107.88	111.47
4	B	4	SGN	C4-C3-C2	-3.14	107.98	111.47

There are no chirality outliers.

All (1) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	B	7	IDS	S-O2-C2-C3

All (3) ring outliers are listed below:

Mol	Chain	Res	Type	Atoms
10	H	10	MAN	C1-C2-C3-C4-C5-O5
4	B	7	IDS	C1-C2-C3-C4-C5-O5
10	H	11	MAN	C1-C2-C3-C4-C5-O5

4 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
10	H	10	MAN	4	0
10	H	11	MAN	1	0
10	H	8	NAG	1	0
10	H	9	BMA	4	0

## 5.6 Ligand geometry [i](#)

Of 16 ligands modelled in this entry, 4 are monoatomic - leaving 12 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	$\# Z  > 2$
3	0G6	B	1	2	27,31,32	1.05	1 (3%)	35,41,42	1.03	3 (8%)
7	GOL	B	1001	-	5,5,5	0.65	0	5,5,5	0.45	0
7	GOL	B	1008	-	5,5,5	0.67	0	5,5,5	0.49	0
3	0G6	D	1	2	27,31,32	1.04	1 (3%)	35,41,42	1.05	3 (8%)
7	GOL	D	1002	-	5,5,5	0.64	0	5,5,5	0.49	0
7	GOL	D	1004	-	5,5,5	0.68	0	5,5,5	0.44	0
3	0G6	F	1	2	27,31,32	1.08	2 (7%)	35,41,42	1.08	3 (8%)
7	GOL	F	1003	-	5,5,5	0.69	0	5,5,5	0.44	0
7	GOL	F	1006	-	5,5,5	0.71	0	5,5,5	0.44	0
7	GOL	F	1007	-	5,5,5	0.63	0	5,5,5	0.42	0
3	0G6	H	1	2	27,31,32	1.06	1 (3%)	35,41,42	1.05	3 (8%)
7	GOL	H	1005	-	5,5,5	0.68	0	5,5,5	0.49	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
3	0G6	B	1	2	-	0/29/41/43	0/2/2/2
7	GOL	B	1001	-	-	0/4/4/4	0/0/0/0
7	GOL	B	1008	-	-	0/4/4/4	0/0/0/0
3	0G6	D	1	2	-	0/29/41/43	0/2/2/2
7	GOL	D	1002	-	-	0/4/4/4	0/0/0/0

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
7	GOL	D	1004	-	-	0/4/4/4	0/0/0/0
3	0G6	F	1	2	-	0/29/41/43	0/2/2/2
7	GOL	F	1003	-	-	0/4/4/4	0/0/0/0
7	GOL	F	1006	-	-	0/4/4/4	0/0/0/0
7	GOL	F	1007	-	-	0/4/4/4	0/0/0/0
3	0G6	H	1	2	-	0/29/41/43	0/2/2/2
7	GOL	H	1005	-	-	0/4/4/4	0/0/0/0

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	F	1	0G6	CB1-CA1	-2.00	1.49	1.53
3	B	1	0G6	O-C	2.06	1.26	1.22
3	D	1	0G6	C3-C2	2.13	1.57	1.51
3	F	1	0G6	C3-C2	2.19	1.57	1.51
3	H	1	0G6	C3-C2	2.31	1.57	1.51

The worst 5 of 12 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	1	0G6	O-C-CA	-2.41	114.97	119.58
3	F	1	0G6	O-C-CA	-2.32	115.15	119.58
3	H	1	0G6	O-C-CA	-2.25	115.28	119.58
3	B	1	0G6	O-C-CA	-2.25	115.29	119.58
3	H	1	0G6	CB1-CA1-C1	2.04	115.01	111.26

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

7 monomers are involved in 8 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	1	0G6	1	0
7	B	1008	GOL	1	0
3	D	1	0G6	1	0
7	D	1004	GOL	1	0
3	F	1	0G6	2	0
7	F	1007	GOL	1	0
3	H	1	0G6	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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	31/36 (86%)	0.22	3 (9%) 10 9	21, 28, 60, 64	0
1	C	32/36 (88%)	0.41	6 (18%) 2 1	20, 30, 53, 56	0
1	E	29/36 (80%)	0.08	2 (6%) 20 18	24, 32, 44, 55	0
1	G	31/36 (86%)	0.35	4 (12%) 5 5	20, 28, 51, 57	0
2	B	256/259 (98%)	-0.10	5 (1%) 68 67	14, 24, 41, 65	0
2	D	254/259 (98%)	-0.09	2 (0%) 87 87	14, 24, 41, 60	0
2	F	254/259 (98%)	0.06	11 (4%) 39 36	16, 30, 49, 65	0
2	H	253/259 (97%)	0.15	11 (4%) 39 36	14, 28, 47, 62	0
All	All	1140/1180 (96%)	0.04	44 (3%) 43 40	14, 27, 47, 65	0

The worst 5 of 44 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	F	74	THR	5.4
2	H	150	GLY	4.8
1	A	1(D)	GLY	4.4
2	F	150	GLY	4.3
1	C	1(D)	GLY	4.3

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

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

### 6.3 Carbohydrates ⓘ

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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains.

The B-factors column lists the minimum, median, 95<sup>th</sup> 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	LLDF	B-factors(Å <sup>2</sup> )	Q<0.9
8	SGN	D	4	19/20	0.35	0.35	6.44	99,100,102,103	0
4	SGN	B	4	19/20	0.56	0.30	4.69	96,98,101,101	0
4	SGN	B	6	19/20	0.55	0.24	3.57	94,97,101,101	0
8	SGN	D	6	19/20	0.48	0.32	3.34	109,110,116,116	0
4	IDS	B	5	16/17	0.56	0.28	3.18	97,98,101,101	0
8	IDS	D	3	16/17	0.69	0.25	2.82	97,98,98,98	0
4	IDS	B	3	16/17	0.62	0.31	-	99,100,102,102	0
10	BMA	H	9	11/12	0.69	0.53	-	100,103,106,108	0
10	NDG	H	7	14/15	0.78	0.36	-	63,68,71,77	0
10	NAG	H	8	14/15	0.77	0.48	-	83,87,90,94	0
5	NAG	B	249	14/15	0.72	0.44	-	69,72,75,75	0
8	SGN	D	2	19/20	0.65	0.38	-	100,101,103,104	0
9	NDG	D	249	14/15	0.62	0.44	-	65,68,69,69	0
10	MAN	H	11	11/12	0.54	0.68	-	110,112,112,112	0
9	NDG	F	5	14/15	0.79	0.33	-	54,58,64,65	0
10	MAN	H	10	11/12	0.45	0.53	-	106,107,108,108	0
8	IDS	D	5	16/17	0.60	0.35	-	102,104,105,105	0
9	NDG	F	6	14/15	0.71	0.42	-	68,70,70,72	0
9	NDG	D	248	14/15	0.82	0.22	-	49,53,59,61	0
4	SGN	B	2	19/20	0.50	0.34	-	102,103,105,105	0
5	NDG	B	248	14/15	0.77	0.23	-	51,54,58,64	0
4	IDS	B	7	16/17	0.72	0.34	-	99,100,103,104	0

## 6.4 Ligands ⓘ

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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. The B-factors column lists the minimum, median, 95<sup>th</sup> 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	LLDF	B-factors(Å <sup>2</sup> )	Q<0.9
7	GOL	D	1004	6/6	0.34	0.34	14.30	66,67,68,68	0
7	GOL	B	1008	6/6	0.84	0.15	1.94	58,58,59,59	0
6	NA	F	3002	1/1	0.92	0.11	1.66	37,37,37,37	0
7	GOL	F	1003	6/6	0.82	0.17	1.57	38,40,42,43	0
7	GOL	F	1007	6/6	0.77	0.16	1.53	50,53,54,55	0
7	GOL	B	1001	6/6	0.87	0.14	1.29	29,32,34,35	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors( $\text{\AA}^2$ )	Q<0.9
7	GOL	H	1005	6/6	0.89	0.16	1.21	37,41,41,44	0
7	GOL	D	1002	6/6	0.91	0.14	1.02	27,32,33,34	0
3	0G6	F	1	30/31	0.92	0.12	0.93	25,28,30,31	0
6	NA	B	3004	1/1	0.95	0.10	0.62	28,28,28,28	0
3	0G6	D	1	30/31	0.96	0.11	0.37	14,19,21,22	0
3	0G6	H	1	30/31	0.94	0.12	0.36	20,22,26,26	0
6	NA	H	3003	1/1	0.96	0.09	0.35	30,30,30,30	0
6	NA	D	3001	1/1	0.98	0.09	0.33	26,26,26,26	0
3	0G6	B	1	30/31	0.96	0.10	0.33	17,19,24,24	0
7	GOL	F	1006	6/6	0.59	0.23	-	55,57,58,59	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.