



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 12, 2017 – 11:10 pm GMT

PDB ID : 1PPF  
Title : X-RAY CRYSTAL STRUCTURE OF THE COMPLEX OF HUMAN LEUKOCYTE ELASTASE (PMN ELASTASE) AND THE THIRD DOMAIN OF THE TURKEY OVOMUCOID INHIBITOR  
Authors : Bode, W.; Wei, A-Z.  
Deposited on : 1991-10-24  
Resolution : 1.80 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

<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 : 1.7.2 (RC1), CSD as538be (2017)  
Xtriage (Phenix) : **NOT EXECUTED**  
EDS : **NOT EXECUTED**  
Percentile statistics : 20161228.v01 (using entries in the PDB archive December 28th 2016)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : recalc28949

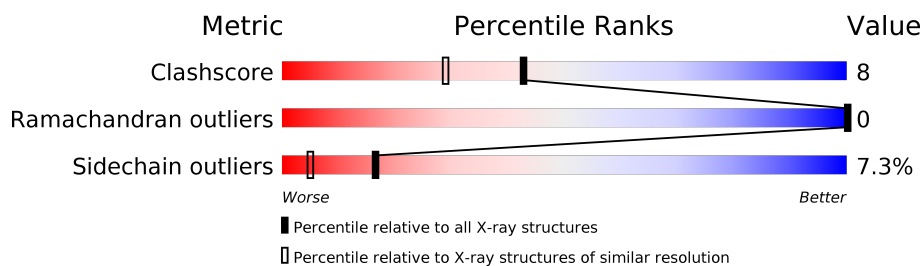
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.80 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	112137	5742 (1.80-1.80)
Ramachandran outliers	110173	5676 (1.80-1.80)
Sidechain outliers	110143	5675 (1.80-1.80)

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.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	E	218	
2	I	56	

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	E	416	X	-	-	-
4	GLC	E	417	X	-	-	-

## 2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 2518 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 HUMAN LEUKOCYTE ELASTASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	E	218	Total	C	N	O	S	20	0	0
			1636	1026	316	283	11			

- Molecule 2 is a protein called TURKEY OVOMUCOID INHIBITOR (OMTKY3).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	I	56	Total	C	N	O	S	4	0	0
			418	258	70	84	6			

- Molecule 3 is a polymer of unknown type called SUGAR (8-MER).

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	E	8	Total	C	N	O	50	0
			96	54	3	39		

- Molecule 4 is a polymer of unknown type called SUGAR (8-MER).

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	E	8	Total	C	N	O	50	0
			96	54	3	39		

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	E	210	Total	O	0	0
			210	210		
5	I	62	Total	O	0	0
			62	62		



## 4 Data and refinement statistics

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

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	73.05Å 72.55Å 52.45Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	8.00 – 1.80	Depositor
% Data completeness (in resolution range)	(Not available) (8.00-1.80)	Depositor
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
Refinement program	EREF	Depositor
R, $R_{free}$	0.166 , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	2518	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	14.0	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: BMA, NAG, GLC, GAL, FUC, 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	E	1.31	8/1666 (0.5%)	1.88	34/2263 (1.5%)
2	I	1.10	0/426	1.61	7/576 (1.2%)
All	All	1.27	8/2092 (0.4%)	1.83	41/2839 (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
1	E	1	12
2	I	0	4
4	E	3	0
All	All	4	16

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	E	27	TRP	NE1-CE2	-8.11	1.27	1.37
1	E	141	TRP	NE1-CE2	-6.83	1.28	1.37
1	E	20	ARG	CZ-NH2	6.41	1.41	1.33
1	E	146	ARG	CZ-NH1	6.37	1.41	1.33
1	E	87	ARG	NE-CZ	6.13	1.41	1.33
1	E	57	HIS	CE1-NE2	6.04	1.46	1.32
1	E	237	TRP	NE1-CE2	-5.48	1.30	1.37
1	E	146	ARG	NE-CZ	5.40	1.40	1.33

All (41) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	E	217	ARG	NE-CZ-NH1	21.18	130.89	120.30
1	E	217	ARG	NE-CZ-NH2	-16.74	111.93	120.30
1	E	128	ARG	NE-CZ-NH1	14.83	127.71	120.30
1	E	146	ARG	NE-CZ-NH2	-14.35	113.12	120.30
1	E	146	ARG	NE-CZ-NH1	13.88	127.24	120.30
1	E	186(B)	ARG	NE-CZ-NH1	12.30	126.45	120.30
1	E	217	ARG	CD-NE-CZ	12.25	140.75	123.60
2	I	21	ARG	NE-CZ-NH1	11.37	125.98	120.30
1	E	65	ARG	NE-CZ-NH1	9.91	125.26	120.30
1	E	243	GLN	N-CA-CB	9.90	128.42	110.60
1	E	75	ARG	NE-CZ-NH1	8.42	124.51	120.30
1	E	95	ASP	CB-CG-OD1	8.36	125.83	118.30
1	E	65	ARG	NE-CZ-NH2	-7.70	116.45	120.30
2	I	21	ARG	NE-CZ-NH2	-7.63	116.48	120.30
1	E	186(B)	ARG	NE-CZ-NH2	-7.59	116.50	120.30
1	E	36	ARG	NE-CZ-NH2	-7.49	116.56	120.30
1	E	224	TYR	CB-CG-CD2	-7.30	116.62	121.00
1	E	146	ARG	CD-NE-CZ	7.30	133.82	123.60
1	E	201	CYS	CA-CB-SG	6.94	126.50	114.00
2	I	5	SER	CB-CA-C	-6.68	97.40	110.10
1	E	128	ARG	NE-CZ-NH2	-6.58	117.01	120.30
1	E	65	ARG	CA-CB-CG	-6.52	99.06	113.40
1	E	186	ARG	NE-CZ-NH2	6.40	123.50	120.30
1	E	90	GLU	N-CA-CB	-6.28	99.30	110.60
1	E	120	VAL	CA-CB-CG1	6.23	120.25	110.90
1	E	20	ARG	NE-CZ-NH2	6.13	123.36	120.30
1	E	68	LEU	CB-CG-CD2	6.10	121.38	111.00
1	E	163	VAL	CA-CB-CG2	6.07	120.00	110.90
2	I	28	ASN	CB-CA-C	-6.02	98.36	110.40
2	I	55	LYS	CB-CA-C	-5.94	98.51	110.40
1	E	87	ARG	NE-CZ-NH1	5.91	123.25	120.30
2	I	27	ASP	CB-CG-OD1	5.77	123.49	118.30
1	E	226	ASP	CB-CG-OD1	5.58	123.32	118.30
2	I	28	ASN	OD1-CG-ND2	5.25	133.98	121.90
1	E	177	ARG	CG-CD-NE	-5.18	100.93	111.80
1	E	21	ARG	N-CA-CB	5.16	119.89	110.60
1	E	36	ARG	NH1-CZ-NH2	5.13	125.04	119.40
1	E	82	VAL	CA-CB-CG2	5.13	118.59	110.90
1	E	182	CYS	N-CA-CB	5.07	119.72	110.60
1	E	44	ALA	N-CA-CB	5.05	117.17	110.10
1	E	21	ARG	NE-CZ-NH2	-5.00	117.80	120.30

All (4) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
1	E	243	GLN	CA
4	E	416	NAG	C5,C3
4	E	417	GLC	C3

All (16) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	E	132	ASN	Mainchain
1	E	137	LEU	Mainchain
1	E	146	ARG	Mainchain
1	E	185	VAL	Mainchain
1	E	217	ARG	Mainchain
1	E	220	CYS	Mainchain
1	E	224	TYR	Mainchain
1	E	228	PHE	Mainchain
1	E	240	SER	Mainchain
1	E	58	CYS	Mainchain
1	E	64	VAL	Mainchain
1	E	93	GLY	Mainchain
2	I	15	ALA	Mainchain
2	I	5	SER	Mainchain
2	I	53	PHE	Mainchain
2	I	55	LYS	Mainchain

## 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	E	1636	0	1650	30	8
2	I	418	0	396	3	2
3	E	96	0	82	2	0
4	E	96	0	82	1	4
5	E	210	0	0	5	13
5	I	62	0	0	1	6
All	All	2518	0	2210	33	17

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 8.

All (33) 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:E:80:ARG:HD2	5:E:955:HOH:O	1.90	0.70
1:E:200:VAL:HG22	3:E:402:FUC:H62	1.76	0.65
1:E:131:GLY:O	1:E:134:VAL:HG23	2.01	0.61
1:E:200:VAL:CG2	3:E:402:FUC:H62	2.31	0.61
1:E:144:LEU:HD21	1:E:152:ALA:HB2	1.83	0.60
1:E:88:ILE:HG22	1:E:106:LEU:HD23	1.83	0.60
1:E:88:ILE:HG22	1:E:106:LEU:CD2	2.33	0.58
1:E:128:ARG:HG2	5:E:762:HOH:O	2.04	0.57
1:E:164:THR:HA	5:E:967:HOH:O	2.04	0.57
1:E:182:CYS:HB3	1:E:225:PRO:HB2	1.87	0.55
1:E:115:ASN:HD22	1:E:117:ASN:H	1.56	0.53
1:E:164:THR:HG22	5:E:967:HOH:O	2.08	0.53
1:E:95:ASP:HB3	1:E:100:LEU:HB2	1.91	0.52
2:I:27:ASP:O	2:I:28:ASN:HB2	2.09	0.52
1:E:115:ASN:ND2	1:E:117:ASN:H	2.08	0.51
1:E:132:ASN:HD22	1:E:164:THR:H	1.59	0.51
1:E:130:LEU:HD11	1:E:210:HIS:CG	2.49	0.47
1:E:47:ILE:HD11	1:E:105:ILE:HD12	1.95	0.47
1:E:115:ASN:HD22	1:E:115:ASN:C	2.18	0.46
1:E:140:GLY:HA3	1:E:194:ASP:OD1	2.15	0.46
1:E:115:ASN:HD22	1:E:117:ASN:N	2.13	0.46
1:E:211:GLY:HA2	1:E:229:ALA:O	2.16	0.46
2:I:5:SER:HA	5:I:764:HOH:O	2.16	0.45
1:E:109:ASN:HD22	4:E:411:NAG:H83	1.82	0.45
1:E:132:ASN:ND2	1:E:164:THR:H	2.14	0.45
1:E:23:ARG:HD2	5:E:1168:HOH:O	2.17	0.44
1:E:68:LEU:HD12	1:E:83:PHE:HE2	1.84	0.43
1:E:166:LEU:HA	1:E:166:LEU:HD12	1.81	0.42
1:E:190:VAL:HG22	1:E:226:ASP:CG	2.39	0.42
1:E:67:VAL:CG1	1:E:80:ARG:HD3	2.49	0.41
2:I:1:LEU:HD13	2:I:1:LEU:HA	1.81	0.41
1:E:72:ASN:HA	1:E:153:SER:O	2.21	0.40
1:E:95:ASP:OD1	1:E:97:VAL:HB	2.21	0.40

All (17) 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:E:21:ARG:CG	5:E:956:HOH:O[4_565]	1.20	1.00

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:21:ARG:CB	5:E:956:HOH:O[4_565]	1.33	0.87
1:E:187:GLN:CG	5:E:883:HOH:O[3_645]	1.35	0.85
4:E:416:NAG:O7	5:I:894:HOH:O[3_655]	1.66	0.54
4:E:417:GLC:O6	5:E:1165:HOH:O[3_654]	1.78	0.42
5:E:988:HOH:O	5:I:634:HOH:O[3_645]	2.02	0.18
1:E:187:GLN:CD	5:E:883:HOH:O[3_645]	2.03	0.17
5:E:937:HOH:O	5:I:767:HOH:O[2_574]	2.04	0.16
1:E:87:ARG:CD	5:I:1017:HOH:O[2_574]	2.05	0.15
5:E:620:HOH:O	5:I:1142:HOH:O[3_645]	2.05	0.15
2:I:45:ASN:N	4:E:417:GLC:C2[3_645]	2.07	0.13
2:I:44:SER:CA	4:E:416:NAG:O3[3_645]	2.08	0.12
1:E:63(B):ARG:NH2	5:E:907:HOH:O[2_575]	2.09	0.11
1:E:187:GLN:OE1	5:E:883:HOH:O[3_645]	2.11	0.09
1:E:21:ARG:CD	5:E:956:HOH:O[4_565]	2.16	0.04
5:E:561:HOH:O	5:E:901:HOH:O[2_575]	2.18	0.02
5:E:1090:HOH:O	5:I:1019:HOH:O[2_574]	2.19	0.01

### 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	E	216/218 (99%)	206 (95%)	10 (5%)	0	100	100
2	I	54/56 (96%)	53 (98%)	1 (2%)	0	100	100
All	All	270/274 (98%)	259 (96%)	11 (4%)	0	100	100

There are no Ramachandran outliers to report.

#### 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	E	172/172 (100%)	157 (91%)	15 (9%)	12	3
2	I	48/48 (100%)	47 (98%)	1 (2%)	59	46
All	All	220/220 (100%)	204 (93%)	16 (7%)	16	5

All (16) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	E	36	ARG
1	E	75	ARG
1	E	76	ARG
1	E	86	GLN
1	E	104	VAL
1	E	114	ILE
1	E	115	ASN
1	E	128	ARG
1	E	146	ARG
1	E	147	ASN
1	E	151	ILE
1	E	166	LEU
1	E	178	ARG
1	E	208	LEU
1	E	243	GLN
2	I	1	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	E	61	ASN
1	E	115	ASN
1	E	119	GLN
1	E	132	ASN
1	E	135	GLN
2	I	36	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 ⓘ

16 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$
3	NAG	E	401	1,3	14,14,15	1.08	0	15,19,21	1.86	4 (26%)
3	FUC	E	402	3	9,10,11	1.17	1 (11%)	13,14,16	1.50	2 (15%)
3	NAG	E	403	3	14,14,15	1.44	2 (14%)	15,19,21	2.25	5 (33%)
3	BMA	E	404	3	11,11,12	2.93	8 (72%)	13,15,17	2.31	4 (30%)
3	MAN	E	405	3,4	11,11,12	0.47	0	13,15,17	1.91	2 (15%)
3	NAG	E	406	1,3	14,14,15	0.64	0	15,19,21	1.46	1 (6%)
3	GAL	E	407	3	11,11,12	0.59	0	13,15,17	1.48	1 (7%)
3	MAN	E	408	3	11,11,12	0.60	0	13,15,17	2.14	1 (7%)
4	NAG	E	411	1,4	14,14,15	1.23	2 (14%)	15,19,21	1.48	3 (20%)
4	FUC	E	412	4	9,10,11	1.25	1 (11%)	13,14,16	1.77	3 (23%)
4	NAG	E	413	4	14,14,15	1.21	1 (7%)	15,19,21	2.40	4 (26%)
4	BMA	E	414	4	11,11,12	1.68	3 (27%)	13,15,17	1.73	3 (23%)
4	MAN	E	415	3,4	11,11,12	0.77	1 (9%)	13,15,17	2.10	2 (15%)
4	NAG	E	416	2,4	14,14,15	0.68	0	15,19,21	1.77	3 (20%)
4	GLC	E	417	2,4	11,11,12	0.63	0	13,15,17	1.48	1 (7%)
4	MAN	E	418	2,4	11,11,12	0.59	0	13,15,17	1.55	1 (7%)

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	E	401	1,3	-	0/6/23/26	0/1/1/1
3	FUC	E	402	3	-	0/0/17/20	0/1/1/1
3	NAG	E	403	3	-	0/6/23/26	0/1/1/1
3	BMA	E	404	3	-	0/2/19/22	0/1/1/1
3	MAN	E	405	3,4	-	0/2/19/22	0/1/1/1
3	NAG	E	406	1,3	-	0/6/23/26	0/1/1/1
3	GAL	E	407	3	-	0/2/19/22	0/1/1/1
3	MAN	E	408	3	-	0/2/19/22	0/1/1/1
4	NAG	E	411	1,4	-	0/6/23/26	0/1/1/1
4	FUC	E	412	4	-	0/0/17/20	0/1/1/1
4	NAG	E	413	4	-	0/6/23/26	0/1/1/1
4	BMA	E	414	4	-	0/2/19/22	0/1/1/1
4	MAN	E	415	3,4	-	0/2/19/22	0/1/1/1
4	NAG	E	416	2,4	2/2/5/7	0/6/23/26	0/1/1/1
4	GLC	E	417	2,4	1/1/4/5	0/2/19/22	0/1/1/1
4	MAN	E	418	2,4	-	0/2/19/22	0/1/1/1

All (19) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	E	415	MAN	C2-C3	2.02	1.55	1.52
4	E	413	NAG	C3-C2	2.02	1.56	1.52
3	E	404	BMA	O3-C3	2.07	1.47	1.43
4	E	414	BMA	C2-C3	2.14	1.55	1.52
3	E	404	BMA	O5-C5	2.15	1.48	1.43
4	E	412	FUC	C2-C3	2.27	1.55	1.52
4	E	411	NAG	C2-N2	2.33	1.50	1.46
4	E	414	BMA	C4-C5	2.54	1.58	1.53
4	E	414	BMA	C1-C2	2.59	1.58	1.52
3	E	403	NAG	C3-C2	2.60	1.58	1.52
4	E	411	NAG	C1-C2	2.69	1.56	1.52
3	E	404	BMA	C4-C3	2.81	1.59	1.52
3	E	402	FUC	C2-C3	3.08	1.56	1.52
3	E	404	BMA	O5-C1	3.14	1.48	1.43
3	E	404	BMA	C1-C2	3.19	1.59	1.52
3	E	403	NAG	O3-C3	3.35	1.50	1.43
3	E	404	BMA	C4-C5	3.57	1.60	1.53
3	E	404	BMA	O2-C2	3.99	1.52	1.43
3	E	404	BMA	C2-C3	5.31	1.59	1.52

All (40) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	E	413	NAG	C1-C2-N2	-4.97	101.99	110.49
4	E	416	NAG	O5-C1-C2	-3.50	106.60	111.47
4	E	412	FUC	O4-C4-C3	-3.28	103.22	110.36
3	E	403	NAG	O5-C1-C2	-3.18	107.05	111.47
3	E	401	NAG	C8-C7-N2	-2.86	110.95	116.11
3	E	405	MAN	O5-C1-C2	-2.68	106.59	110.79
3	E	401	NAG	O5-C1-C2	-2.66	107.77	111.47
4	E	414	BMA	O3-C3-C2	-2.46	105.56	110.02
4	E	411	NAG	C1-O5-C5	-2.45	108.78	112.17
4	E	412	FUC	C2-C3-C4	-2.24	106.98	110.88
3	E	402	FUC	O2-C2-C1	-2.14	104.82	109.18
3	E	403	NAG	C8-C7-N2	-2.05	112.41	116.11
4	E	411	NAG	O4-C4-C3	-2.01	105.98	110.36
4	E	411	NAG	C8-C7-N2	2.05	119.81	116.11
4	E	416	NAG	C3-C4-C5	2.09	113.91	110.22
3	E	401	NAG	C4-C3-C2	2.58	114.80	111.02
3	E	403	NAG	O7-C7-N2	2.61	126.94	121.92
4	E	413	NAG	C2-N2-C7	2.71	126.89	122.94
4	E	414	BMA	C1-C2-C3	2.82	113.22	109.65
3	E	404	BMA	O3-C3-C2	3.07	115.60	110.02
4	E	412	FUC	C1-O5-C5	3.32	119.73	112.39
3	E	404	BMA	C1-O5-C5	3.46	116.93	112.17
3	E	402	FUC	C1-O5-C5	3.81	120.81	112.39
3	E	401	NAG	C1-O5-C5	3.83	117.44	112.17
4	E	413	NAG	C4-C3-C2	3.88	116.71	111.02
4	E	414	BMA	C1-O5-C5	4.07	117.78	112.17
4	E	415	MAN	O2-C2-C3	4.32	118.66	110.17
3	E	403	NAG	C3-C4-C5	4.39	117.96	110.22
3	E	404	BMA	C3-C4-C5	4.39	117.96	110.22
3	E	404	BMA	O2-C2-C3	4.41	118.84	110.17
4	E	416	NAG	C1-O5-C5	4.79	118.77	112.17
4	E	415	MAN	C1-O5-C5	4.83	118.83	112.17
3	E	406	NAG	C1-O5-C5	4.89	118.90	112.17
3	E	407	GAL	C1-O5-C5	4.97	119.02	112.17
4	E	418	MAN	C1-O5-C5	5.01	119.07	112.17
3	E	403	NAG	C1-O5-C5	5.06	119.14	112.17
4	E	417	GLC	C1-O5-C5	5.08	119.17	112.17
3	E	405	MAN	C1-O5-C5	5.59	119.87	112.17
4	E	413	NAG	C1-O5-C5	5.85	120.23	112.17
3	E	408	MAN	C1-O5-C5	7.09	121.94	112.17

All (3) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
4	E	416	NAG	C5
4	E	416	NAG	C3
4	E	417	GLC	C3

There are no torsion outliers.

There are no ring outliers.

4 monomers are involved in 7 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	E	402	FUC	2	0
4	E	411	NAG	1	0
4	E	416	NAG	0	2
4	E	417	GLC	0	2

## 5.6 Ligand geometry [i](#)

There are no ligands in this entry.

## 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.