



Full wwPDB X-ray Structure Validation Report ⓘ

Feb 1, 2016 – 02:33 PM GMT

PDB ID : 3ZS1
Title : Human Myeloperoxidase inactivated by TX5
Authors : Tiden, A.K.; Sjogren, T.; Svensson, M.; Bernlind, A.; Senthilmohan, R.; Auchere, F.; Norman, H.; Markgren, P.O.; Gustavsson, S.; Schmidt, S.; Lundquist, S.; Forbes, L.V.; Magon, N.J.; Jameson, G.N.; Eriksson, H.; Kettle, A.J.
Deposited on : 2011-06-21
Resolution : 2.60 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
<http://wwpdb.org/validation/2016/XrayValidationReportHelp>
with specific help available everywhere you see the ⓘ symbol.

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

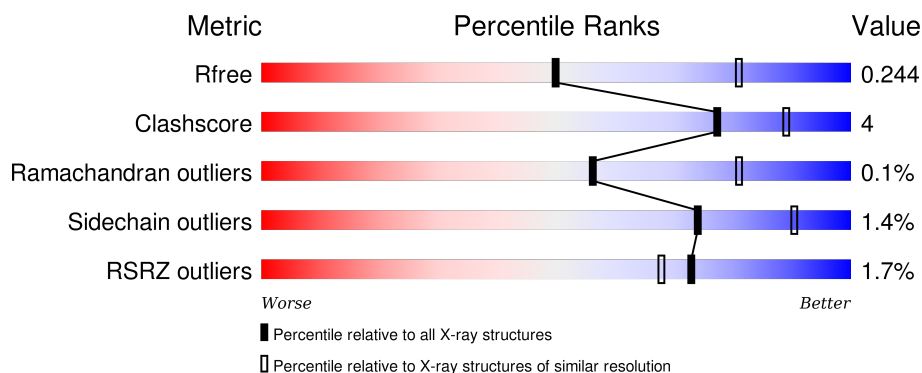
1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.60 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	2328 (2.60-2.60)
Clashscore	102246	2679 (2.60-2.60)
Ramachandran outliers	100387	2635 (2.60-2.60)
Sidechain outliers	100360	2635 (2.60-2.60)
RSRZ outliers	91569	2334 (2.60-2.60)

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 ≥ 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	114	<div> <div>3%</div> <div>86%</div> <div>5%</div> <div>9%</div> </div>
1	B	114	<div> <div>%</div> <div>84%</div> <div>6%</div> <div>9%</div> </div>
2	C	467	<div> <div>%</div> <div>93%</div> <div>7%</div> </div>
2	D	467	<div> <div>2%</div> <div>90%</div> <div>9%</div> </div>

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
10	BMA	C	1642	-	-	-	X
11	BMA	D	2642	-	-	-	X
4	PVW	A	606	-	-	X	-
4	PVW	B	606	-	-	X	X
8	ACT	D	1582	-	-	-	X

2 Entry composition [i](#)

There are 12 unique types of molecules in this entry. The entry contains 9700 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 MYELOPEROXIDASE LIGHT CHAIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	104	Total	C	N	O	S	0	0	0
			837	529	148	155	5			
1	B	104	Total	C	N	O	S	0	0	0
			837	529	148	155	5			

- Molecule 2 is a protein called MYELOPEROXIDASE HEAVY CHAIN.

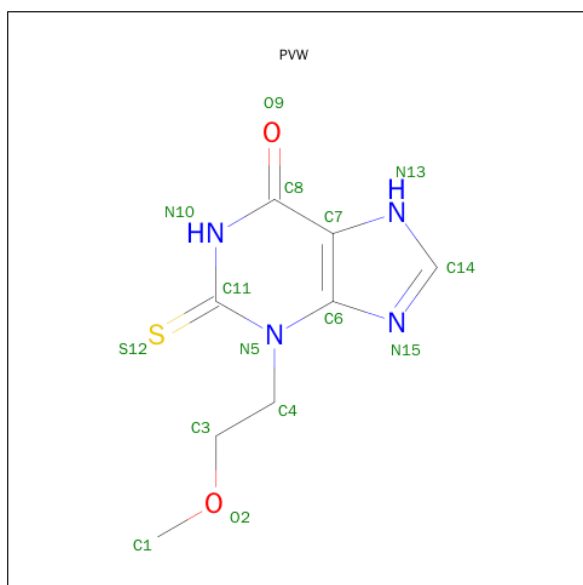
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	C	466	Total	C	N	O	S	0	0	0
			3732	2351	687	667	27			
2	D	466	Total	C	N	O	S	0	0	0
			3732	2351	687	667	27			

- Molecule 3 is PROTOPORPHYRIN IX CONTAINING FE (three-letter code: HEM) (formula: $C_{34}H_{32}FeN_4O_4$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
3	B	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		

- Molecule 4 is 3-(2-METHOXYETHYL)-2-THIOXO-1,2,3,7-TETRAHYDRO-6H-PURIN-6-ONE (three-letter code: PVW) (formula: C₈H₁₀N₄O₂S).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total	C	N	O	S	0	0
			15	8	4	2	1		
4	B	1	Total	C	N	O	S	0	0
			15	8	4	2	1		

- Molecule 5 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	C	1	Total	O	S	0	0
			5	4	1		
5	C	1	Total	O	S	0	0
			5	4	1		
5	D	1	Total	O	S	0	0
			5	4	1		

- Molecule 6 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	D	1	Total	Ca	0	0
			1	1		
6	C	1	Total	Ca	0	0
			1	1		

- Molecule 7 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	D	1	Total	Cl	0	0
			1	1		
7	C	1	Total	Cl	0	0
			1	1		

- Molecule 8 is ACETATE ION (three-letter code: ACT) (formula: C₂H₃O₂).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
8	C	1	Total	C	O	0	0
			4	2	2		
8	C	1	Total	C	O	0	0
			4	2	2		
8	C	1	Total	C	O	0	0
			4	2	2		
8	D	1	Total	C	O	0	0
			4	2	2		
8	D	1	Total	C	O	0	0
			4	2	2		
8	D	1	Total	C	O	0	0
			4	2	2		

- Molecule 9 is SUGAR (N-ACETYL-D-GLUCOSAMINE) (three-letter code: NAG) (formula: C₈H₁₅NO₆).



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

- Molecule 10 is a polymer of unknown type called SUGAR (4-MER).

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
10	C	4	Total	C	N	O	0	0
			49	28	2	19		

- Molecule 11 is a polymer of unknown type called SUGAR (3-MER).

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
11	D	3	Total	C	N	O	0	0
			39	22	2	15		

- Molecule 12 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
12	A	47	Total	O	0	0
			47	47		

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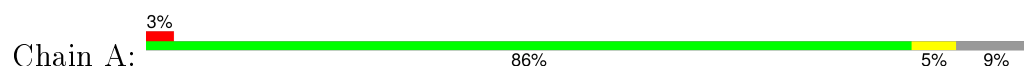
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
12	B	43	Total 43	O 43	0	0
12	C	100	Total 100	O 100	0	0
12	D	69	Total 69	O 69	0	0

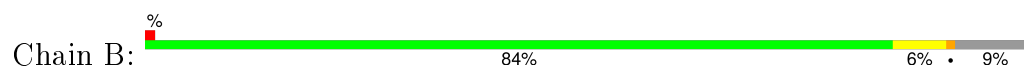
3 Residue-property plots [i](#)

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.

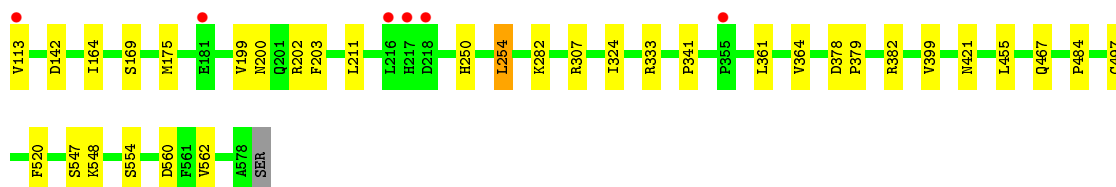
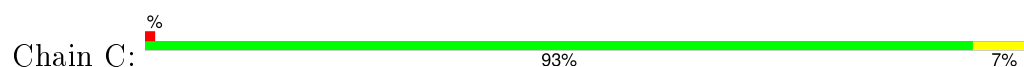
• Molecule 1: MYELOPEROXIDASE LIGHT CHAIN



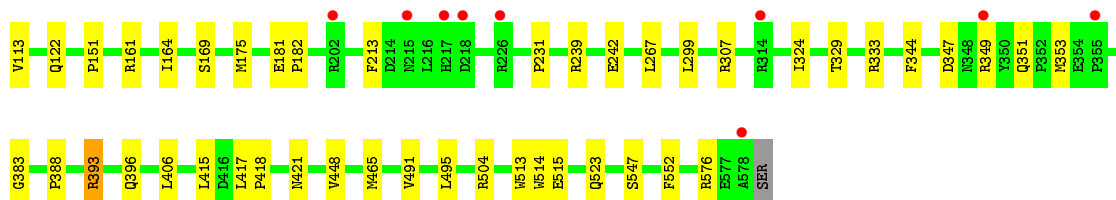
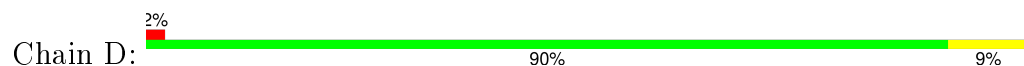
• Molecule 1: MYELOPEROXIDASE LIGHT CHAIN



• Molecule 2: MYELOPEROXIDASE HEAVY CHAIN



• Molecule 2: MYELOPEROXIDASE HEAVY CHAIN



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	93.13Å 63.79Å 111.35Å 90.00° 97.32° 90.00°	Depositor
Resolution (Å)	110.43 – 2.60 30.79 – 2.60	Depositor EDS
% Data completeness (in resolution range)	99.8 (110.43-2.60) 99.9 (30.79-2.60)	Depositor EDS
R_{merge}	0.14	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.25 (at 2.61Å)	Xtriage
Refinement program	REFMAC 5.5.0109	Depositor
R, R_{free}	0.187 , 0.244 0.189 , 0.244	Depositor DCC
R_{free} test set	2015 reflections (5.27%)	DCC
Wilson B-factor (Å ²)	16.0	Xtriage
Anisotropy	0.729	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 29.2	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Outliers	0 of 40233 reflections	Xtriage
F_o, F_c correlation	0.92	EDS
Total number of atoms	9700	wwPDB-VP
Average B, all atoms (Å ²)	13.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.63% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.375 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: CSO, BMA, NAG, PVW, CL, CA, FUC, ACT, HEM, SO4

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	0.47	0/862	0.65	0/1174
1	B	0.47	0/862	0.64	0/1174
2	C	0.45	0/3810	0.58	0/5168
2	D	0.46	0/3810	0.57	0/5168
All	All	0.46	0/9344	0.59	0/12684

There are no bond length outliers.

There are no bond angle outliers.

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	837	0	798	3	0
1	B	837	0	798	5	0
2	C	3732	0	3725	22	0
2	D	3732	0	3725	27	0
3	A	43	0	30	8	0
3	B	43	0	30	12	0
4	A	15	0	10	8	0
4	B	15	0	10	8	0
5	C	10	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	D	5	0	0	0	0
6	C	1	0	0	0	0
6	D	1	0	0	0	0
7	C	1	0	0	0	0
7	D	1	0	0	0	0
8	C	12	0	9	1	0
8	D	12	0	9	1	0
9	C	28	0	26	0	0
9	D	28	0	26	0	0
10	C	49	0	43	0	0
11	D	39	0	34	0	0
12	A	47	0	0	0	0
12	B	43	0	0	0	0
12	C	100	0	0	2	0
12	D	69	0	0	0	0
All	All	9700	0	9273	69	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 4.

All (69) 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)
3:A:605:HEM:CMA	4:A:606:PVW:S12	2.06	1.42
3:B:605:HEM:HMA3	4:B:606:PVW:S12	1.59	1.40
3:A:605:HEM:HMA3	4:A:606:PVW:S12	1.67	1.34
3:A:605:HEM:HMA2	4:A:606:PVW:S12	1.82	1.07
3:B:605:HEM:HMA2	4:B:606:PVW:S12	1.81	1.07
1:B:6:LYS:H	1:B:6:LYS:HE3	1.40	0.87
2:C:333:ARG:HH11	2:C:421:ASN:HD22	1.23	0.84
2:C:333:ARG:HH11	2:C:421:ASN:ND2	1.81	0.77
3:A:605:HEM:C3A	4:A:606:PVW:S12	2.80	0.74
3:A:605:HEM:HAA2	4:A:606:PVW:S12	2.39	0.62
3:B:605:HEM:HMA3	4:B:606:PVW:C11	2.30	0.59
2:C:554:SER:HB3	2:C:560:ASP:HB3	1.84	0.58
2:D:307:ARG:HH12	8:D:1584:ACT:H2	1.69	0.58
2:C:200:ASN:HD22	2:C:203:PHE:H	1.51	0.58
2:D:169:SER:HB2	2:D:324:ILE:HG12	1.90	0.54
3:B:605:HEM:C3A	4:B:606:PVW:S12	2.95	0.54
2:C:333:ARG:NH1	2:C:421:ASN:HD22	1.98	0.53
2:D:349:ARG:HG3	2:D:351:GLN:HG2	1.92	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:19:SER:HB3	1:B:22:LEU:HG	1.93	0.51
2:D:417:LEU:HB3	2:D:418:PRO:HD3	1.92	0.50
2:C:382:ARG:NH2	12:C:2069:HOH:O	2.43	0.50
2:C:199:VAL:HG12	2:C:254:LEU:HD21	1.94	0.49
2:D:406:LEU:HB3	2:D:415:LEU:HB2	1.93	0.49
2:C:211:LEU:HD11	2:C:250:HIS:HB3	1.94	0.49
2:C:200:ASN:HD22	2:C:202:ARG:H	1.61	0.48
2:C:361:LEU:O	2:C:364:VAL:HG22	2.14	0.48
3:A:605:HEM:CAA	4:A:606:PVW:S12	3.02	0.47
2:D:393:ARG:HB2	2:D:396:GLN:HB2	1.96	0.47
2:C:282:LYS:HG2	2:C:520:PHE:CZ	2.51	0.46
2:C:333:ARG:HD3	2:C:421:ASN:ND2	2.30	0.46
1:A:101:PRO:HD2	2:C:164:ILE:O	2.16	0.46
2:D:181:GLU:N	2:D:182:PRO:HD2	2.30	0.46
2:C:307:ARG:HH12	8:C:1585:ACT:H2	1.80	0.45
1:B:16:ASN:O	1:B:20:PRO:HA	2.17	0.45
4:A:606:PVW:H14	12:C:2043:HOH:O	2.17	0.45
2:D:333:ARG:HH11	2:D:421:ASN:HD22	1.64	0.45
2:D:514:TRP:CE2	2:D:515:GLU:HG3	2.51	0.45
1:B:79:ASP:O	2:D:388:PRO:HB3	2.17	0.45
2:D:299:LEU:HD22	2:D:552:PHE:HB2	1.98	0.45
2:D:347:ASP:HB3	2:D:353:MET:HG3	1.99	0.44
2:C:200:ASN:ND2	2:C:202:ARG:H	2.16	0.44
2:D:267:LEU:HD12	2:D:576:ARG:HB2	1.98	0.44
3:B:605:HEM:HAA2	4:B:606:PVW:S12	2.57	0.44
3:A:605:HEM:HMA3	4:A:606:PVW:C11	2.40	0.44
2:C:169:SER:HB2	2:C:324:ILE:HG12	2.00	0.43
2:D:344:PHE:O	2:D:383:GLY:HA3	2.18	0.43
1:B:101:PRO:HD2	2:D:164:ILE:O	2.18	0.43
2:C:341:PRO:HG3	2:C:399:VAL:HG11	2.00	0.43
2:C:548:LYS:HG2	2:C:562:VAL:HG13	2.01	0.42
2:D:347:ASP:OD1	2:D:349:ARG:HG2	2.19	0.42
3:A:605:HEM:HAD1	2:C:333:ARG:HH21	1.85	0.42
2:C:455:LEU:HA	2:C:484:PRO:HD3	2.01	0.42
2:D:491:VAL:HB	2:D:495:LEU:HB2	2.01	0.42
2:D:213:PHE:CG	2:D:231:PRO:HG2	2.55	0.42
1:A:67:GLU:HG3	2:C:467:GLN:NE2	2.36	0.41
3:B:605:HEM:HMA1	2:D:406:LEU:HD21	2.02	0.41
3:B:605:HEM:HMC1	3:B:605:HEM:HBC2	2.02	0.41
4:B:606:PVW:H13	2:D:239:ARG:HG2	1.85	0.41
2:C:378:ASP:HB2	2:C:379:PRO:HD3	2.02	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:B:605:HEM:HAD2	2:D:329:THR:O	2.21	0.41
2:D:448:VAL:HB	2:D:465:MET:HG3	2.03	0.41
2:D:113:VAL:HG21	2:D:122:GLN:HB2	2.03	0.41
2:D:151:PRO:HG3	2:D:161:ARG:NH2	2.36	0.41
2:D:513:TRP:CD1	2:D:515:GLU:HB2	2.56	0.41
3:B:605:HEM:HMA3	4:B:606:PVW:N10	2.36	0.41
3:B:605:HEM:HAD1	2:D:333:ARG:NH2	2.36	0.40
3:B:605:HEM:HMA3	4:B:606:PVW:H10	1.87	0.40
1:A:83:SER:O	1:A:86:PHE:HB3	2.21	0.40
3:B:605:HEM:HBB2	2:D:242:GLU:OE1	2.21	0.40

There are no symmetry-related clashes.

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	102/114 (90%)	98 (96%)	4 (4%)	0	100	100
1	B	102/114 (90%)	98 (96%)	4 (4%)	0	100	100
2	C	463/467 (99%)	446 (96%)	16 (4%)	1 (0%)	52	77
2	D	463/467 (99%)	450 (97%)	13 (3%)	0	100	100
All	All	1130/1162 (97%)	1092 (97%)	37 (3%)	1 (0%)	56	81

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	C	142	ASP

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	90/97 (93%)	88 (98%)	2 (2%)	60	83
1	B	90/97 (93%)	88 (98%)	2 (2%)	60	83
2	C	410/411 (100%)	405 (99%)	5 (1%)	78	92
2	D	410/411 (100%)	405 (99%)	5 (1%)	78	92
All	All	1000/1016 (98%)	986 (99%)	14 (1%)	74	90

All (14) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	4	GLN
1	A	17	ARG
1	B	6	LYS
1	B	54	ASN
2	C	113	VAL
2	C	175	MET
2	C	254	LEU
2	C	497	CYS
2	C	547	SER
2	D	175	MET
2	D	393	ARG
2	D	504	ARG
2	D	523	GLN
2	D	547	SER

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	54	ASN
1	B	54	ASN
2	C	200	ASN
2	C	421	ASN
2	C	467	GLN

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Mol	Chain	Res	Type
2	C	549	ASN
2	D	421	ASN
2	D	523	GLN
2	D	549	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

2 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	$\# Z > 2$
2	CSO	C	150	2	3,6,7	0.43	0	1,6,8	1.95	0
2	CSO	D	150	2	3,6,7	0.56	0	1,6,8	2.05	1 (100%)

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
2	CSO	C	150	2	-	0/1/5/7	0/0/0/0
2	CSO	D	150	2	-	0/1/5/7	0/0/0/0

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	150	CSO	O-C-CA	-2.05	120.16	125.49

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates

7 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	$\# Z > 2$
10	NAG	C	1640	10,2	14,14,15	0.62	0	15,19,21	1.32	2 (13%)
10	NAG	C	1641	10	14,14,15	0.66	0	15,19,21	1.18	1 (6%)
10	BMA	C	1642	10	11,11,12	0.76	0	14,15,17	1.78	3 (21%)
10	FUC	C	1645	10	10,10,11	0.67	0	14,14,16	1.38	2 (14%)
11	NAG	D	2640	11,2	14,14,15	0.51	0	15,19,21	2.26	3 (20%)
11	NAG	D	2641	11	14,14,15	0.52	0	15,19,21	1.17	1 (6%)
11	BMA	D	2642	11	11,11,12	0.75	0	14,15,17	2.00	3 (21%)

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
10	NAG	C	1640	10,2	-	0/6/23/26	0/1/1/1
10	NAG	C	1641	10	-	0/6/23/26	0/1/1/1
10	BMA	C	1642	10	-	0/2/19/22	0/1/1/1
10	FUC	C	1645	10	-	0/0/17/20	0/1/1/1
11	NAG	D	2640	11,2	-	0/6/23/26	0/1/1/1
11	NAG	D	2641	11	-	0/6/23/26	0/1/1/1
11	BMA	D	2642	11	-	0/2/19/22	0/1/1/1

There are no bond length outliers.

All (15) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
11	D	2642	BMA	O3-C3-C2	-4.04	102.71	110.00
10	C	1642	BMA	O3-C3-C4	-3.62	102.19	110.34
11	D	2640	NAG	C3-C4-C5	-2.66	105.55	110.20
11	D	2642	BMA	C2-C3-C4	2.11	114.63	111.04
11	D	2640	NAG	O3-C3-C2	2.29	113.64	109.11
10	C	1645	FUC	O5-C5-C4	2.31	113.53	109.53
10	C	1640	NAG	C3-C4-C5	2.34	114.28	110.20
10	C	1645	FUC	O5-C5-C6	2.40	110.10	106.13
10	C	1642	BMA	C1-C2-C3	2.71	112.75	109.54
10	C	1642	BMA	C1-O5-C5	3.20	116.30	112.25
10	C	1640	NAG	C1-O5-C5	3.32	116.46	112.25
11	D	2641	NAG	C1-O5-C5	3.48	116.67	112.25
10	C	1641	NAG	C1-O5-C5	3.67	116.91	112.25
11	D	2642	BMA	C1-C2-C3	4.51	114.88	109.54
11	D	2640	NAG	C1-O5-C5	7.38	121.61	112.25

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.6 Ligand geometry ⓘ

Of 21 ligands modelled in this entry, 4 are monoatomic - leaving 17 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	HEM	A	605	1,2	30,50,50	2.41	15 (50%)	24,82,82	2.82	9 (37%)
4	PVW	A	606	-	10,16,16	1.10	1 (10%)	9,22,22	5.18	5 (55%)
3	HEM	B	605	1,2,4	30,50,50	2.51	14 (46%)	24,82,82	2.83	10 (41%)
4	PVW	B	606	3	10,16,16	1.13	1 (10%)	9,22,22	5.26	5 (55%)
5	SO4	C	1579	-	4,4,4	0.20	0	6,6,6	0.45	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
5	SO4	C	1582	-	4,4,4	0.08	0	6,6,6	0.12	0
8	ACT	C	1583	-	1,3,3	1.49	0	0,3,3	0.00	-
8	ACT	C	1584	-	1,3,3	1.18	0	0,3,3	0.00	-
8	ACT	C	1585	-	1,3,3	1.26	0	0,3,3	0.00	-
9	NAG	C	1620	2	14,14,15	0.59	0	15,19,21	1.24	2 (13%)
9	NAG	C	1630	2	14,14,15	0.48	0	15,19,21	1.00	0
5	SO4	D	1579	-	4,4,4	0.24	0	6,6,6	0.24	0
8	ACT	D	1582	-	1,3,3	2.00	0	0,3,3	0.00	-
8	ACT	D	1583	-	1,3,3	1.47	0	0,3,3	0.00	-
8	ACT	D	1584	-	1,3,3	1.41	0	0,3,3	0.00	-
9	NAG	D	2620	2	14,14,15	0.52	0	15,19,21	1.19	1 (6%)
9	NAG	D	2630	2	14,14,15	0.51	0	15,19,21	0.98	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	HEM	A	605	1,2	-	0/10/54/54	0/0/8/8
4	PVW	A	606	-	-	0/4/4/4	0/2/2/2
3	HEM	B	605	1,2,4	-	0/10/54/54	0/0/8/8
4	PVW	B	606	3	-	0/4/4/4	0/2/2/2
5	SO4	C	1579	-	-	0/0/0/0	0/0/0/0
5	SO4	C	1582	-	-	0/0/0/0	0/0/0/0
8	ACT	C	1583	-	-	0/0/0/0	0/0/0/0
8	ACT	C	1584	-	-	0/0/0/0	0/0/0/0
8	ACT	C	1585	-	-	0/0/0/0	0/0/0/0
9	NAG	C	1620	2	-	0/6/23/26	0/1/1/1
9	NAG	C	1630	2	-	0/6/23/26	0/1/1/1
5	SO4	D	1579	-	-	0/0/0/0	0/0/0/0
8	ACT	D	1582	-	-	0/0/0/0	0/0/0/0
8	ACT	D	1583	-	-	0/0/0/0	0/0/0/0
8	ACT	D	1584	-	-	0/0/0/0	0/0/0/0
9	NAG	D	2620	2	-	0/6/23/26	0/1/1/1
9	NAG	D	2630	2	-	0/6/23/26	0/1/1/1

All (31) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	605	HEM	C2D-C3D	-5.51	1.38	1.54
3	A	605	HEM	C2D-C3D	-5.41	1.38	1.54

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	605	HEM	C3B-C4B	-4.43	1.47	1.51
3	B	605	HEM	C3B-C4B	-4.32	1.48	1.51
3	A	605	HEM	C3D-C4D	-2.90	1.47	1.51
3	B	605	HEM	C3D-C4D	-2.85	1.47	1.51
3	A	605	HEM	C4C-NC	-2.66	1.32	1.36
3	B	605	HEM	C4C-NC	-2.29	1.33	1.36
3	A	605	HEM	C4A-CHB	2.14	1.45	1.39
3	A	605	HEM	FE-ND	2.16	2.08	1.97
3	B	605	HEM	FE-ND	2.17	2.09	1.97
3	A	605	HEM	C1A-CHA	2.18	1.45	1.39
3	A	605	HEM	FE-NB	2.27	2.09	1.97
3	B	605	HEM	FE-NB	2.35	2.09	1.97
3	A	605	HEM	CHD-C1D	2.50	1.45	1.38
3	B	605	HEM	C1A-CHA	2.57	1.46	1.39
3	B	605	HEM	CHC-C4B	2.58	1.46	1.38
4	B	606	PVW	C8-N10	2.66	1.38	1.33
3	A	605	HEM	CHC-C4B	2.68	1.46	1.38
3	B	605	HEM	CHD-C1D	2.80	1.46	1.38
4	A	606	PVW	C8-N10	2.85	1.38	1.33
3	A	605	HEM	CBC-CAC	3.36	1.48	1.29
3	B	605	HEM	CBB-CAB	3.41	1.49	1.29
3	A	605	HEM	CHC-C1C	3.44	1.44	1.36
3	A	605	HEM	CHD-C4C	3.45	1.44	1.36
3	B	605	HEM	CBC-CAC	3.53	1.49	1.29
3	A	605	HEM	CBB-CAB	3.61	1.50	1.29
3	A	605	HEM	FE-NC	3.67	2.10	1.95
3	B	605	HEM	CHD-C4C	3.72	1.45	1.36
3	B	605	HEM	FE-NC	3.76	2.10	1.95
3	B	605	HEM	CHC-C1C	4.22	1.46	1.36

All (32) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	606	PVW	C7-C8-N10	-9.86	110.11	123.59
4	A	606	PVW	C7-C8-N10	-9.58	110.49	123.59
4	B	606	PVW	C6-C7-N13	-5.70	104.23	109.48
3	B	605	HEM	CBD-CAD-C3D	-4.88	99.36	113.55
4	A	606	PVW	C6-C7-N13	-4.74	105.12	109.48
3	A	605	HEM	CBD-CAD-C3D	-4.56	100.27	113.55
3	B	605	HEM	CBA-CAA-C2A	-3.08	107.02	112.53
3	A	605	HEM	CMA-C3A-C4A	-2.86	123.63	128.36
3	A	605	HEM	CBA-CAA-C2A	-2.19	108.60	112.53

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	605	HEM	CMA-C3A-C4A	-2.03	125.01	128.36
3	B	605	HEM	CMA-C3A-C2A	2.06	129.55	125.24
3	B	605	HEM	C2D-C3D-C4D	2.41	105.58	101.50
3	A	605	HEM	CMA-C3A-C2A	2.60	130.68	125.24
9	C	1620	NAG	O4-C4-C5	2.65	116.25	109.24
4	B	606	PVW	C4-N5-C6	3.15	122.25	119.15
9	C	1620	NAG	C1-O5-C5	3.27	116.40	112.25
9	D	2620	NAG	C1-O5-C5	3.30	116.44	112.25
3	B	605	HEM	CAD-C3D-C4D	3.43	124.56	112.47
3	A	605	HEM	CAD-C3D-C4D	3.46	124.68	112.47
3	A	605	HEM	CMD-C2D-C3D	3.71	130.74	114.35
3	B	605	HEM	CMD-C2D-C3D	3.76	130.96	114.35
4	A	606	PVW	C8-C7-C6	3.88	125.53	120.90
4	B	606	PVW	C8-C7-C6	4.15	125.86	120.90
4	A	606	PVW	C4-N5-C6	4.36	123.44	119.15
3	B	605	HEM	CAD-C3D-C2D	5.49	129.01	113.22
3	B	605	HEM	CMC-C2C-C3C	5.70	130.76	116.53
3	A	605	HEM	CAD-C3D-C2D	5.76	129.76	113.22
3	A	605	HEM	CMC-C2C-C3C	5.89	131.23	116.53
3	A	605	HEM	CMB-C2B-C3B	6.59	132.97	116.53
3	B	605	HEM	CMB-C2B-C3B	6.68	133.21	116.53
4	B	606	PVW	C11-N10-C8	9.49	126.36	115.95
4	A	606	PVW	C11-N10-C8	9.50	126.37	115.95

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

6 monomers are involved in 24 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	605	HEM	8	0
4	A	606	PVW	8	0
3	B	605	HEM	12	0
4	B	606	PVW	8	0
8	C	1585	ACT	1	0
8	D	1584	ACT	1	0

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	104/114 (91%)	-0.51	3 (2%) 55 48	2, 6, 20, 40	0
1	B	104/114 (91%)	-0.37	1 (0%) 84 81	5, 12, 24, 29	0
2	C	465/467 (99%)	-0.51	6 (1%) 79 75	2, 8, 21, 38	0
2	D	465/467 (99%)	-0.26	9 (1%) 70 64	2, 16, 33, 45	0
All	All	1138/1162 (97%)	-0.39	19 (1%) 73 68	2, 11, 29, 45	0

All (19) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	C	217	HIS	4.8
1	A	3	GLU	4.2
2	D	217	HIS	4.1
1	A	4	GLN	3.5
2	C	355	PRO	3.2
2	C	218	ASP	3.0
2	D	578	ALA	2.9
1	A	104	ALA	2.8
2	D	218	ASP	2.8
2	D	355	PRO	2.7
2	D	349	ARG	2.6
2	D	314	ARG	2.4
1	B	104	ALA	2.4
2	C	181	GLU	2.4
2	D	215	ASN	2.3
2	C	216	LEU	2.3
2	D	226	ARG	2.3
2	D	202	ARG	2.2
2	C	113	VAL	2.1

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

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. 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, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors(Å ²)	Q<0.9
2	CSO	C	150	7/8	0.98	0.07	-	6,7,10,10	0
2	CSO	D	150	7/8	0.98	0.07	-	8,9,10,11	0

6.3 Carbohydrates [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. 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, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors(Å ²)	Q<0.9
10	BMA	C	1642	11/12	0.75	0.25	5.60	32,35,38,42	0
11	BMA	D	2642	11/12	0.86	0.21	2.61	31,35,36,40	0
10	NAG	C	1641	14/15	0.95	0.13	1.47	12,17,21,26	0
11	NAG	D	2641	14/15	0.96	0.12	0.72	13,15,19,24	0
10	NAG	C	1640	14/15	0.96	0.13	-	10,13,17,21	0
10	FUC	C	1645	10/11	0.88	0.27	-	28,31,32,33	0
11	NAG	D	2640	14/15	0.93	0.15	-	13,15,19,20	0

6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. 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, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors(Å ²)	Q<0.9
4	PVW	B	606	15/15	0.87	0.19	3.05	37,40,44,45	0
8	ACT	D	1582	4/4	0.92	0.24	2.31	38,38,38,39	0
4	PVW	A	606	15/15	0.89	0.19	1.40	33,35,36,36	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors(\AA^2)	Q<0.9
9	NAG	D	2630	14/15	0.82	0.25	0.90	35,36,37,37	0
9	NAG	D	2620	14/15	0.91	0.22	0.78	24,26,27,27	0
3	HEM	A	605	43/43	0.96	0.15	0.18	2,2,4,8	0
7	CL	D	1581	1/1	0.98	0.13	0.03	12,12,12,12	0
3	HEM	B	605	43/43	0.97	0.15	-0.02	8,9,11,14	0
9	NAG	C	1620	14/15	0.93	0.14	-0.41	15,18,20,21	0
7	CL	C	1581	1/1	0.99	0.10	-0.94	3,3,3,3	0
6	CA	C	1580	1/1	0.99	0.08	-1.85	5,5,5,5	0
6	CA	D	1580	1/1	0.99	0.09	-1.93	7,7,7,7	0
5	SO4	D	1579	5/5	0.95	0.19	-	41,41,42,43	0
5	SO4	C	1582	5/5	0.96	0.24	-	51,52,52,52	0
8	ACT	C	1585	4/4	0.96	0.30	-	25,26,26,26	0
8	ACT	C	1583	4/4	0.92	0.15	-	43,43,43,43	0
8	ACT	C	1584	4/4	0.88	0.29	-	35,36,36,36	0
5	SO4	C	1579	5/5	0.91	0.24	-	39,39,40,41	0
8	ACT	D	1583	4/4	0.89	0.22	-	54,54,54,54	0
8	ACT	D	1584	4/4	0.92	0.29	-	35,35,35,35	0
9	NAG	C	1630	14/15	0.93	0.18	-	22,23,25,25	0

6.5 Other polymers [i](#)

There are no such residues in this entry.