



Full wwPDB X-ray Structure Validation Report ⓘ

Feb 9, 2017 – 10:54 am GMT

PDB ID : 5HO9
Title : Structure of truncated AbnA (domains 1-3), a GH43 arabinanase from *Geobacillus stearothermophilus*, in complex with arabinooctaose
Authors : Lansky, S.; Salama, R.; Azoulai, D.; Shwartstien, O.; Shoham, Y.; Shoham, G.
Deposited on : 2016-01-19
Resolution : 2.85 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	:	1.7.2 (RC1), CSD as538be (2017)
Xtriage (Phenix)	:	1.9-1692
EDS	:	recalc28906
Percentile statistics	:	20161228.v01 (using entries in the PDB archive December 28th 2016)
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)	:	recalc28906

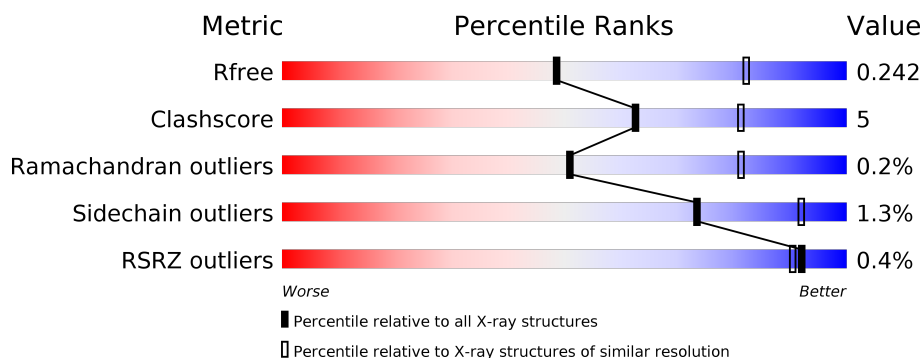
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.85 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}	100719	3466 (2.88-2.80)
Clashscore	112137	3975 (2.88-2.80)
Ramachandran outliers	110173	3902 (2.88-2.80)
Sidechain outliers	110143	3905 (2.88-2.80)
RSRZ outliers	101464	3501 (2.88-2.80)

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 ≥ 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	639	<div> <div style="width: 100%; height: 10px; position: relative;"> <div style="position: absolute; left: 0; top: -10px; width: 5px; height: 10px; background-color: red;"></div> <div style="position: absolute; left: 82%; top: -10px; width: 10px; height: 10px; background-color: yellow;"></div> <div style="position: absolute; left: 90%; top: -10px; width: 10px; height: 10px; background-color: orange;"></div> <div style="position: absolute; left: 95%; top: -10px; width: 10px; height: 10px; background-color: grey;"></div> </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> 82% 10% 7% </div> </div>
1	B	639	<div> <div style="width: 100%; height: 10px; position: relative;"> <div style="position: absolute; left: 85%; top: -10px; width: 10px; height: 10px; background-color: yellow;"></div> <div style="position: absolute; left: 95%; top: -10px; width: 10px; height: 10px; background-color: orange;"></div> <div style="position: absolute; left: 98%; top: -10px; width: 10px; height: 10px; background-color: grey;"></div> </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> 85% 8% 7% </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
3	PEG	A	713	-	-	-	X
3	PEG	A	714	-	-	-	X
3	PEG	A	715	-	-	-	X
3	PEG	B	709	-	-	-	X
3	PEG	B	710	-	-	-	X
3	PEG	B	711	-	-	-	X
3	PEG	B	713	-	-	-	X
4	AHR	A	718	-	-	-	X
4	AHR	A	720	-	-	-	X
4	AHR	A	721	-	-	-	X
4	AHR	A	722	-	-	-	X
4	AHR	A	723	-	-	-	X
4	AHR	A	724	-	-	-	X
4	AHR	B	715	-	-	-	X
4	AHR	B	717	-	-	-	X
4	AHR	B	718	-	-	-	X
4	AHR	B	719	-	-	X	X
4	AHR	B	720	-	-	-	X

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 9874 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 Extracellular arabinanase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	596	Total	C	N	O	S	0	1	0
			4695	2994	785	907	9			
1	B	596	Total	C	N	O	S	0	1	0
			4713	3004	788	912	9			

- Molecule 2 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	O	S	0	0
			5	4	1		
2	A	1	Total	O	S	0	0
			5	4	1		
2	A	1	Total	O	S	0	0
			5	4	1		
2	A	1	Total	O	S	0	0
			5	4	1		

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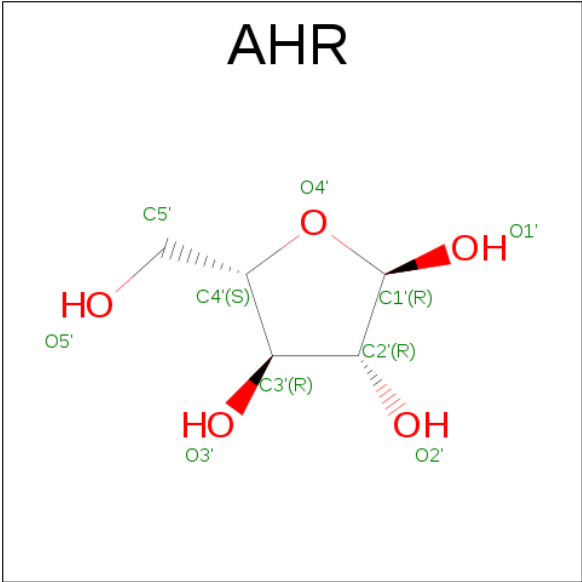
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	O	S	0	0
			5	4	1		
2	A	1	Total	O	S	0	0
			5	4	1		
2	A	1	Total	O	S	0	0
			5	4	1		
2	A	1	Total	O	S	0	0
			5	4	1		
2	A	1	Total	O	S	0	0
			5	4	1		
2	A	1	Total	O	S	0	0
			5	4	1		
2	A	1	Total	O	S	0	0
			5	4	1		
2	B	1	Total	O	S	0	0
			5	4	1		
2	B	1	Total	O	S	0	0
			5	4	1		
2	B	1	Total	O	S	0	0
			5	4	1		
2	B	1	Total	O	S	0	0
			5	4	1		
2	B	1	Total	O	S	0	0
			5	4	1		
2	B	1	Total	O	S	0	0
			5	4	1		
2	B	1	Total	O	S	0	0
			5	4	1		

- Molecule 3 is DI(HYDROXYETHYL)ETHER (three-letter code: PEG) (formula: C₄H₁₀O₃).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			7	4	3		
3	A	1	Total	C	O	0	0
			7	4	3		
3	A	1	Total	C	O	0	0
			7	4	3		
3	A	1	Total	C	O	0	0
			7	4	3		
3	B	1	Total	C	O	0	0
			7	4	3		
3	B	1	Total	C	O	0	0
			7	4	3		
3	B	1	Total	C	O	0	0
			7	4	3		
3	B	1	Total	C	O	0	0
			7	4	3		

- Molecule 4 is ALPHA-L-ARABINOFURANOSE (three-letter code: AHR) (formula: C₅H₁₀O₅).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			9	5	4		
			Total	C	O		
			9	5	4		
			Total	C	O		
4	A	1	Total	C	O	0	0
			9	5	4		
			Total	C	O		
			9	5	4		
			Total	C	O		
4	A	1	Total	C	O	0	0
			9	5	4		
			Total	C	O		
			9	5	4		
			Total	C	O		
4	A	1	Total	C	O	0	0
			10	5	5		
			Total	C	O		
			9	5	4		
			Total	C	O		
4	B	1	Total	C	O	0	0
			9	5	4		
			Total	C	O		
			9	5	4		
			Total	C	O		
4	B	1	Total	C	O	0	0
			9	5	4		
			Total	C	O		
			9	5	4		
			Total	C	O		
4	B	1	Total	C	O	0	0
			9	5	4		
			Total	C	O		
			9	5	4		
			Total	C	O		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	B	1	Total	C	O	0	0
			9	5	4		
4	B	1	Total	C	O	0	0
			10	5	5		

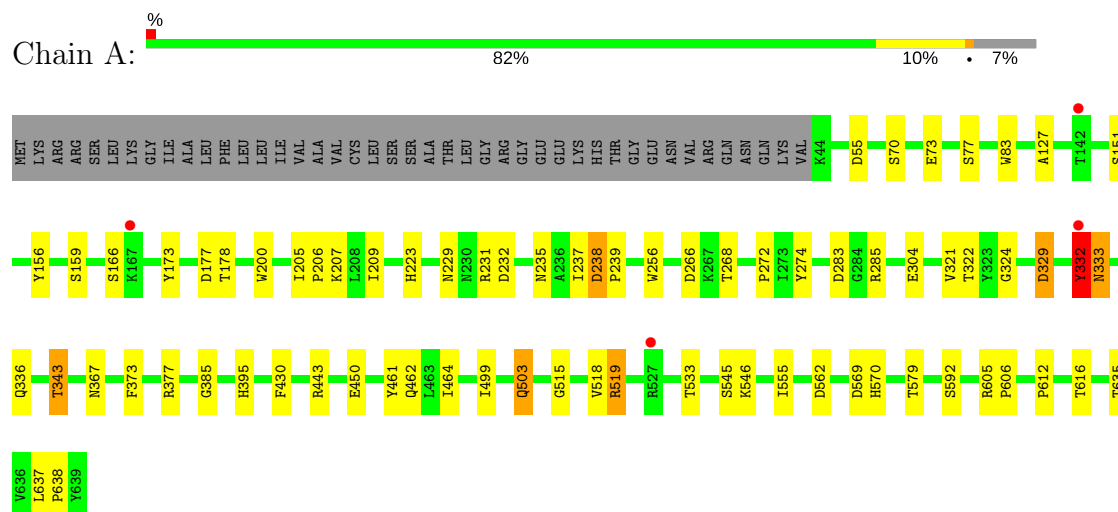
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	75	Total	O	0	0
			75	75		
5	B	82	Total	O	0	0
			82	82		

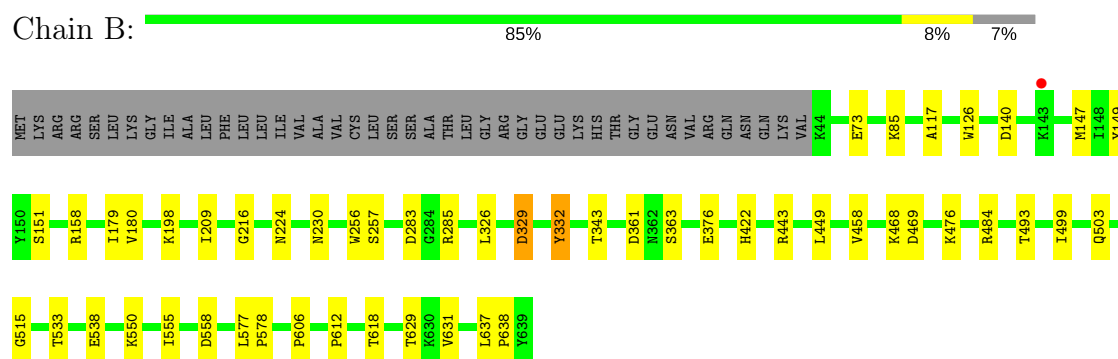
3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry 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 ($\text{RSRZ} > 2$). 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: Extracellular arabinanase



• Molecule 1: Extracellular arabinanase



4 Data and refinement statistics

Property	Value	Source
Space group	P 61 2 2	Depositor
Cell constants a, b, c, α , β , γ	129.17Å 129.17Å 488.36Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	48.82 – 2.85 48.82 – 2.84	Depositor EDS
% Data completeness (in resolution range)	99.8 (48.82-2.85) 99.8 (48.82-2.84)	Depositor EDS
R_{merge}	0.13	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	5.67 (at 2.86Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.8.4_1496)	Depositor
R, R_{free}	0.183 , 0.242 0.184 , 0.242	Depositor DCC
R_{free} test set	2101 reflections (3.64%)	DCC
Wilson B-factor (Å ²)	52.6	Xtriage
Anisotropy	0.646	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 39.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.45$, $\langle L^2 \rangle = 0.28$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	9874	wwPDB-VP
Average B, all atoms (Å ²)	46.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.70% 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, 0.333 respectively for untwinned datasets, and 0.375, 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: AHR, PEG, 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	1/4830 (0.0%)	0.59	1/6568 (0.0%)
1	B	0.46	0/4848	0.60	0/6589
All	All	0.46	1/9678 (0.0%)	0.60	1/13157 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	332	TYR	CE2-CZ	5.09	1.45	1.38

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	332	TYR	CB-CG-CD2	5.86	124.52	121.00

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	4695	0	4460	54	0
1	B	4713	0	4492	36	0
2	A	60	0	0	5	0
2	B	40	0	0	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	A	28	0	40	0	0
3	B	35	0	50	2	0
4	A	73	0	59	9	0
4	B	73	0	57	14	0
5	A	75	0	0	1	0
5	B	82	0	0	1	0
All	All	9874	0	9158	94	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 5.

All (94) 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)
4:A:718:AHR:O2'	5:A:801:HOH:O	1.96	0.81
1:A:285:ARG:NH2	1:A:343:THR:O	2.16	0.79
1:A:304:GLU:OE2	1:A:332:TYR:OH	2.03	0.75
1:A:637:LEU:HD21	4:B:719:AHR:O3'	1.89	0.72
1:A:70:SER:HG	4:A:720:AHR:HC	1.40	0.70
1:B:285:ARG:NH2	1:B:343:THR:O	2.24	0.70
1:A:70:SER:OG	4:A:720:AHR:O3'	2.14	0.65
1:A:570:HIS:HD2	4:B:719:AHR:H3'	1.63	0.62
1:A:499:ILE:HB	1:A:503:GLN:HE21	1.67	0.59
1:B:458:VAL:HG21	1:B:484:ARG:HG3	1.83	0.59
1:A:151:SER:HB3	1:A:237:ILE:HG22	1.85	0.59
1:A:156:TYR:CE2	4:A:723:AHR:H2'	2.38	0.59
1:B:73:GLU:OE1	4:B:715:AHR:O3'	2.22	0.58
1:A:443:ARG:NH1	2:A:711:SO4:O2	2.36	0.58
1:B:256:TRP:CD2	4:B:719:AHR:H5'1	2.39	0.57
1:A:450:GLU:OE1	1:A:519:ARG:NH1	2.38	0.57
1:A:499:ILE:O	1:A:503:GLN:HB2	2.05	0.57
1:A:322:THR:HG23	1:A:333:ASN:O	2.05	0.56
4:A:723:AHR:H3'	1:B:612:PRO:HG2	1.85	0.56
1:B:618:THR:HG23	1:B:631:VAL:HG12	1.87	0.56
1:A:570:HIS:CD2	4:B:719:AHR:H3'	2.41	0.55
1:A:324:GLY:O	1:A:332:TYR:HE1	1.89	0.55
1:A:592:SER:HB3	1:A:616:THR:HG22	1.89	0.55
1:B:179:ILE:HG13	1:B:180:VAL:HG23	1.88	0.55
1:B:126:TRP:O	1:B:151:SER:HB3	2.07	0.54
1:A:570:HIS:HD2	4:B:719:AHR:C3'	2.20	0.54
1:B:443:ARG:HG2	5:B:823:HOH:O	2.08	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:156:TYR:CD2	4:A:723:AHR:H4'	2.43	0.54
1:A:207:LYS:NZ	2:A:705:SO4:O3	2.36	0.54
1:A:612:PRO:HG2	4:B:720:AHR:H3'	1.90	0.54
4:A:722:AHR:O3'	1:B:637:LEU:CD2	2.56	0.53
1:A:385:GLY:N	2:A:706:SO4:O1	2.27	0.53
1:A:177:ASP:OD1	1:A:178:THR:N	2.41	0.53
1:A:606:PRO:HD2	1:A:638:PRO:HA	1.92	0.52
4:B:718:AHR:O2'	4:B:719:AHR:H5'2	2.09	0.52
1:A:373:PHE:HB2	1:A:464:ILE:HD13	1.90	0.52
1:B:85:LYS:NZ	4:B:714:AHR:H2'	2.25	0.52
1:B:224:ASN:HB2	3:B:711:PEG:H11	1.92	0.51
4:A:722:AHR:O3'	1:B:637:LEU:HD21	2.11	0.51
1:B:283:ASP:OD2	1:B:285:ARG:HD3	2.11	0.50
1:B:515:GLY:HA3	1:B:533:THR:O	2.11	0.50
1:A:324:GLY:C	1:A:332:TYR:HE1	2.14	0.50
1:A:515:GLY:HA3	1:A:533:THR:O	2.12	0.49
1:A:430:PHE:CZ	1:A:518:VAL:HG21	2.48	0.49
1:A:159:SER:OG	1:A:235:ASN:OD1	2.30	0.48
1:A:231:ARG:NH2	1:A:232:ASP:OD2	2.46	0.48
1:B:230:ASN:HB2	1:B:257:SER:HB3	1.95	0.48
1:A:499:ILE:HB	1:A:503:GLN:NE2	2.28	0.48
1:B:209:ILE:HD13	1:B:216:GLY:HA2	1.96	0.48
1:A:336:GLN:HB3	1:A:367:ASN:HB2	1.96	0.47
1:A:462:GLN:HG3	1:A:545:SER:HB3	1.96	0.47
1:A:238:ASP:OD2	1:A:395:HIS:NE2	2.47	0.47
1:A:569:ASP:O	1:A:635:THR:HB	2.15	0.47
1:A:205:ILE:O	1:A:209:ILE:HG13	2.15	0.47
1:A:73:GLU:OE2	4:A:718:AHR:O3'	2.31	0.46
1:A:283:ASP:OD2	1:A:285:ARG:HD3	2.16	0.46
1:A:461:TYR:CE2	1:A:546:LYS:HB2	2.52	0.46
1:B:326:LEU:HA	1:B:332:TYR:CG	2.51	0.45
1:A:272:PRO:HB2	1:A:274:TYR:CZ	2.52	0.45
1:A:77:SER:HB2	1:A:83:TRP:CE3	2.53	0.44
1:B:469:ASP:N	2:B:707:SO4:O1	2.49	0.44
1:A:200:TRP:CZ3	1:A:206:PRO:HG3	2.53	0.44
1:A:127:ALA:O	1:A:239:PRO:HD2	2.18	0.44
1:B:606:PRO:HD2	1:B:638:PRO:HA	2.00	0.43
1:B:256:TRP:CE2	4:B:719:AHR:H5'1	2.52	0.43
1:B:85:LYS:HZ2	4:B:714:AHR:H2'	1.81	0.43
1:A:377:ARG:NH2	1:A:562:ASP:OD2	2.51	0.43
1:B:158:ARG:HD3	1:B:198:LYS:HG2	2.00	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:550:LYS:HE3	1:B:558:ASP:OD2	2.19	0.43
4:B:715:HR:O2'	4:B:716:HR:H5'2	2.19	0.43
1:B:376:GLU:OE1	1:B:476:LYS:HD3	2.19	0.43
1:A:555:ILE:HA	1:A:555:ILE:HD13	1.89	0.42
1:A:55:ASP:HB3	1:A:395:HIS:CE1	2.54	0.42
1:B:326:LEU:HA	1:B:332:TYR:CD1	2.55	0.42
1:B:449:LEU:HA	1:B:449:LEU:HD23	1.82	0.42
4:B:717:HR:O2'	4:B:718:HR:H5'2	2.19	0.42
1:A:579:THR:N	2:A:710:SO4:O2	2.52	0.42
1:A:605:ARG:HA	1:A:606:PRO:HD3	1.92	0.42
1:A:223:HIS:NE2	1:A:229:ASN:HA	2.35	0.42
1:B:468:LYS:HE3	1:B:538:GLU:O	2.20	0.42
1:B:577:LEU:HA	1:B:578:PRO:HD2	1.85	0.42
1:B:422:HIS:NE2	4:B:716:HR:H5'1	2.34	0.41
1:B:499:ILE:O	1:B:503:GLN:HB3	2.20	0.41
1:B:555:ILE:HA	1:B:555:ILE:HD13	1.81	0.41
1:A:503:GLN:HB3	1:A:503:GLN:HE21	1.55	0.41
1:A:223:HIS:ND1	2:A:712:SO4:O2	2.54	0.41
1:B:147:MET:HE2	1:B:149:TYR:CE1	2.56	0.41
1:B:361:ASP:OD1	1:B:363:SER:HB2	2.21	0.41
1:A:166:SER:HB2	1:A:173:TYR:HA	2.03	0.41
1:B:224:ASN:H	3:B:711:PEG:H11	1.85	0.41
1:A:266:ASP:OD1	1:A:268:THR:HB	2.21	0.41
1:A:322:THR:HG21	1:A:332:TYR:CD2	2.56	0.41

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	595/639 (93%)	562 (94%)	32 (5%)	1 (0%)	51 81

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	B	595/639 (93%)	562 (94%)	32 (5%)	1 (0%)	51 81
All	All	1190/1278 (93%)	1124 (94%)	64 (5%)	2 (0%)	51 81

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	256	TRP
1	B	117	ALA

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	495/536 (92%)	486 (98%)	9 (2%)	64 88
1	B	500/536 (93%)	494 (99%)	6 (1%)	75 93
All	All	995/1072 (93%)	980 (98%)	15 (2%)	73 90

All (15) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	238	ASP
1	A	321	VAL
1	A	329[A]	ASP
1	A	329[B]	ASP
1	A	332	TYR
1	A	333	ASN
1	A	343	THR
1	A	503	GLN
1	A	519	ARG
1	B	140	ASP
1	B	329[A]	ASP
1	B	329[B]	ASP
1	B	332	TYR
1	B	493	THR

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Mol	Chain	Res	Type
1	B	629	THR

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	503	GLN
1	A	570	HIS

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no carbohydrates in this entry.

5.6 Ligand geometry [i](#)

45 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the chemical component dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
2	SO4	A	701	-	4,4,4	0.16	0	6,6,6	0.18	0
2	SO4	A	702	-	4,4,4	0.18	0	6,6,6	0.27	0
2	SO4	A	703	-	4,4,4	0.21	0	6,6,6	0.17	0
2	SO4	A	704	-	4,4,4	0.17	0	6,6,6	0.33	0
2	SO4	A	705	-	4,4,4	0.15	0	6,6,6	0.11	0
2	SO4	A	706	-	4,4,4	0.14	0	6,6,6	0.23	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	SO4	A	707	-	4,4,4	0.19	0	6,6,6	0.09	0
2	SO4	A	708	-	4,4,4	0.14	0	6,6,6	0.12	0
2	SO4	A	709	-	4,4,4	0.18	0	6,6,6	0.06	0
2	SO4	A	710	-	4,4,4	0.15	0	6,6,6	0.17	0
2	SO4	A	711	-	4,4,4	0.15	0	6,6,6	0.35	0
2	SO4	A	712	-	4,4,4	0.15	0	6,6,6	0.18	0
3	PEG	A	713	-	6,6,6	0.75	0	5,5,5	0.28	0
3	PEG	A	714	-	6,6,6	0.74	0	5,5,5	0.30	0
3	PEG	A	715	-	6,6,6	0.76	0	5,5,5	0.38	0
3	PEG	A	716	-	6,6,6	0.77	0	5,5,5	0.34	0
4	AHR	A	717	4	9,9,10	1.42	3 (33%)	9,12,14	1.05	1 (11%)
4	AHR	A	718	4	9,9,10	1.41	2 (22%)	9,12,14	1.28	1 (11%)
4	AHR	A	719	4	9,9,10	1.44	2 (22%)	9,12,14	2.64	3 (33%)
4	AHR	A	720	4	9,9,10	1.77	4 (44%)	9,12,14	2.20	3 (33%)
4	AHR	A	721	4	9,9,10	2.42	3 (33%)	9,12,14	1.28	1 (11%)
4	AHR	A	722	4	9,9,10	2.52	5 (55%)	9,12,14	2.35	4 (44%)
4	AHR	A	723	4	9,9,10	1.90	2 (22%)	9,12,14	2.61	3 (33%)
4	AHR	A	724	4	10,10,10	1.54	2 (20%)	13,14,14	1.59	2 (15%)
2	SO4	B	701	-	4,4,4	0.16	0	6,6,6	0.20	0
2	SO4	B	702	-	4,4,4	0.18	0	6,6,6	0.19	0
2	SO4	B	703	-	4,4,4	0.21	0	6,6,6	0.07	0
2	SO4	B	704	-	4,4,4	0.23	0	6,6,6	0.29	0
2	SO4	B	705	-	4,4,4	0.13	0	6,6,6	0.12	0
2	SO4	B	706	-	4,4,4	0.17	0	6,6,6	0.12	0
2	SO4	B	707	-	4,4,4	0.21	0	6,6,6	0.17	0
2	SO4	B	708	-	4,4,4	0.19	0	6,6,6	0.09	0
3	PEG	B	709	-	6,6,6	0.78	0	5,5,5	0.50	0
3	PEG	B	710	-	6,6,6	0.76	0	5,5,5	0.25	0
3	PEG	B	711	-	6,6,6	0.68	0	5,5,5	0.34	0
3	PEG	B	712	-	6,6,6	0.71	0	5,5,5	0.35	0
3	PEG	B	713	-	6,6,6	0.83	0	5,5,5	0.28	0
4	AHR	B	714	4	9,9,10	1.46	1 (11%)	9,12,14	1.26	1 (11%)
4	AHR	B	715	4	9,9,10	1.75	2 (22%)	9,12,14	1.97	4 (44%)
4	AHR	B	716	4	9,9,10	1.64	2 (22%)	9,12,14	1.64	3 (33%)
4	AHR	B	717	4	9,9,10	2.34	3 (33%)	9,12,14	2.50	4 (44%)
4	AHR	B	718	4	9,9,10	2.68	4 (44%)	9,12,14	2.51	4 (44%)
4	AHR	B	719	4	9,9,10	1.72	3 (33%)	9,12,14	1.16	1 (11%)
4	AHR	B	720	4	9,9,10	2.39	4 (44%)	9,12,14	1.89	2 (22%)
4	AHR	B	721	4	10,10,10	2.35	2 (20%)	13,14,14	1.53	3 (23%)

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	SO4	A	701	-	-	0/0/0/0	0/0/0/0
2	SO4	A	702	-	-	0/0/0/0	0/0/0/0
2	SO4	A	703	-	-	0/0/0/0	0/0/0/0
2	SO4	A	704	-	-	0/0/0/0	0/0/0/0
2	SO4	A	705	-	-	0/0/0/0	0/0/0/0
2	SO4	A	706	-	-	0/0/0/0	0/0/0/0
2	SO4	A	707	-	-	0/0/0/0	0/0/0/0
2	SO4	A	708	-	-	0/0/0/0	0/0/0/0
2	SO4	A	709	-	-	0/0/0/0	0/0/0/0
2	SO4	A	710	-	-	0/0/0/0	0/0/0/0
2	SO4	A	711	-	-	0/0/0/0	0/0/0/0
2	SO4	A	712	-	-	0/0/0/0	0/0/0/0
3	PEG	A	713	-	-	0/4/4/4	0/0/0/0
3	PEG	A	714	-	-	0/4/4/4	0/0/0/0
3	PEG	A	715	-	-	0/4/4/4	0/0/0/0
3	PEG	A	716	-	-	0/4/4/4	0/0/0/0
4	AHR	A	717	4	-	0/2/15/18	0/1/1/1
4	AHR	A	718	4	-	0/2/15/18	0/1/1/1
4	AHR	A	719	4	-	0/2/15/18	0/1/1/1
4	AHR	A	720	4	-	0/2/15/18	0/1/1/1
4	AHR	A	721	4	-	0/2/15/18	0/1/1/1
4	AHR	A	722	4	-	0/2/15/18	0/1/1/1
4	AHR	A	723	4	-	0/2/15/18	0/1/1/1
4	AHR	A	724	4	-	0/2/18/18	0/1/1/1
2	SO4	B	701	-	-	0/0/0/0	0/0/0/0
2	SO4	B	702	-	-	0/0/0/0	0/0/0/0
2	SO4	B	703	-	-	0/0/0/0	0/0/0/0
2	SO4	B	704	-	-	0/0/0/0	0/0/0/0
2	SO4	B	705	-	-	0/0/0/0	0/0/0/0
2	SO4	B	706	-	-	0/0/0/0	0/0/0/0
2	SO4	B	707	-	-	0/0/0/0	0/0/0/0
2	SO4	B	708	-	-	0/0/0/0	0/0/0/0
3	PEG	B	709	-	-	0/4/4/4	0/0/0/0
3	PEG	B	710	-	-	0/4/4/4	0/0/0/0
3	PEG	B	711	-	-	0/4/4/4	0/0/0/0
3	PEG	B	712	-	-	0/4/4/4	0/0/0/0
3	PEG	B	713	-	-	0/4/4/4	0/0/0/0
4	AHR	B	714	4	-	0/2/15/18	0/1/1/1
4	AHR	B	715	4	-	0/2/15/18	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	AHR	B	716	4	-	0/2/15/18	0/1/1/1
4	AHR	B	717	4	-	0/2/15/18	0/1/1/1
4	AHR	B	718	4	-	0/2/15/18	0/1/1/1
4	AHR	B	719	4	-	0/2/15/18	0/1/1/1
4	AHR	B	720	4	-	0/2/15/18	0/1/1/1
4	AHR	B	721	4	-	0/2/18/18	0/1/1/1

All (44) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	721	AHR	C1'-C2'	-6.44	1.45	1.52
4	A	721	AHR	O4'-C4'	-5.39	1.35	1.44
4	B	717	AHR	C2'-C3'	-4.95	1.45	1.53
4	B	718	AHR	C2'-C3'	-4.75	1.46	1.53
4	A	723	AHR	C2'-C3'	-4.72	1.46	1.53
4	B	718	AHR	C3'-C4'	-4.58	1.41	1.53
4	B	720	AHR	C2'-C3'	-4.42	1.46	1.53
4	A	722	AHR	C3'-C4'	-4.14	1.42	1.53
4	A	724	AHR	C1'-C2'	-3.95	1.48	1.52
4	B	715	AHR	C2'-C3'	-3.67	1.47	1.53
4	B	720	AHR	O2'-C2'	-3.65	1.35	1.43
4	A	721	AHR	C1'-C2'	-3.56	1.45	1.51
4	A	722	AHR	C1'-C2'	-3.56	1.45	1.51
4	B	717	AHR	C1'-C2'	-3.48	1.45	1.51
4	B	714	AHR	C2'-C3'	-3.48	1.48	1.53
4	B	720	AHR	C1'-C2'	-3.44	1.45	1.51
4	B	719	AHR	O4'-C4'	-3.43	1.38	1.44
4	B	718	AHR	C1'-C2'	-3.27	1.46	1.51
4	A	722	AHR	O4'-C4'	-3.21	1.39	1.44
4	A	718	AHR	C2'-C3'	-3.13	1.48	1.53
4	A	717	AHR	C2'-C3'	-3.00	1.48	1.53
4	A	719	AHR	O4'-C1'	-2.98	1.37	1.43
4	B	716	AHR	O4'-C1'	-2.95	1.37	1.43
4	B	718	AHR	O3'-C3'	-2.79	1.36	1.43
4	B	721	AHR	C2'-C3'	-2.68	1.46	1.53
4	A	720	AHR	C1'-C2'	-2.64	1.47	1.51
4	B	719	AHR	C2'-C3'	-2.59	1.49	1.53
4	B	716	AHR	C2'-C3'	-2.50	1.49	1.53
4	A	722	AHR	C2'-C3'	-2.42	1.49	1.53
4	B	717	AHR	C3'-C4'	-2.40	1.46	1.53
4	A	720	AHR	O4'-C1'	-2.39	1.38	1.43
4	A	723	AHR	O2'-C2'	-2.33	1.38	1.43

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	720	AHR	C2'-C3'	-2.32	1.49	1.53
4	A	722	AHR	O5'-C5'	-2.25	1.32	1.42
4	B	719	AHR	C3'-C4'	-2.19	1.47	1.53
4	A	717	AHR	O4'-C4'	-2.17	1.40	1.44
4	A	720	AHR	O4'-C4'	-2.16	1.40	1.44
4	A	719	AHR	C2'-C3'	-2.16	1.50	1.53
4	A	724	AHR	C2'-C3'	-2.03	1.48	1.53
4	A	717	AHR	C3'-C4'	-2.01	1.47	1.53
4	A	721	AHR	O2'-C2'	2.03	1.47	1.43
4	B	720	AHR	O4'-C1'	2.15	1.48	1.43
4	A	718	AHR	O4'-C4'	2.25	1.48	1.44
4	B	715	AHR	O4'-C4'	2.32	1.48	1.44

All (40) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	723	AHR	C1'-C2'-C3'	-6.34	91.92	101.67
4	B	718	AHR	C1'-C2'-C3'	-5.16	93.73	101.67
4	A	719	AHR	C1'-C2'-C3'	-5.00	93.99	101.67
4	A	719	AHR	O4'-C1'-C2'	-4.94	96.12	106.00
4	A	722	AHR	O4'-C1'-C2'	-4.70	96.60	106.00
4	B	717	AHR	C5'-C4'-C3'	-4.67	103.76	115.05
4	B	720	AHR	C1'-C2'-C3'	-4.39	94.93	101.67
4	B	715	AHR	C1'-C2'-C3'	-4.35	94.98	101.67
4	A	724	AHR	O4'-C4'-C5'	-4.06	100.49	109.16
4	A	720	AHR	C5'-C4'-C3'	-4.00	105.37	115.05
4	B	718	AHR	C5'-C4'-C3'	-3.77	105.94	115.05
4	A	720	AHR	O4'-C1'-C2'	-3.67	98.65	106.00
4	B	717	AHR	O4'-C1'-C2'	-3.53	98.93	106.00
4	B	717	AHR	C1'-C2'-C3'	-3.50	96.29	101.67
4	A	722	AHR	C5'-C4'-C3'	-3.30	107.08	115.05
4	B	718	AHR	O4'-C1'-C2'	-3.09	99.81	106.00
4	A	720	AHR	C1'-C2'-C3'	-3.07	96.95	101.67
4	B	716	AHR	O4'-C1'-C2'	-3.06	99.87	106.00
4	A	719	AHR	C5'-C4'-C3'	-3.02	107.76	115.05
4	A	722	AHR	O3'-C3'-C4'	-2.91	102.59	111.09
4	A	723	AHR	O4'-C1'-C2'	-2.91	100.18	106.00
4	B	716	AHR	C5'-C4'-C3'	-2.79	108.30	115.05
4	B	714	AHR	O2'-C2'-C3'	-2.70	106.13	111.28
4	B	717	AHR	O2'-C2'-C3'	-2.67	106.19	111.28
4	A	723	AHR	C5'-C4'-C3'	-2.61	108.75	115.05
4	B	721	AHR	C5'-C4'-C3'	-2.53	108.94	115.05

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	722	AHR	O3'-C3'-C2'	-2.47	105.99	111.91
4	B	715	AHR	C5'-C4'-C3'	-2.45	109.13	115.05
4	A	717	AHR	C5'-C4'-C3'	-2.43	109.17	115.05
4	B	720	AHR	O4'-C1'-C2'	-2.42	101.14	106.00
4	B	721	AHR	C1'-C2'-C3'	-2.33	99.35	102.30
4	A	721	AHR	O3'-C3'-C2'	-2.19	106.68	111.91
4	A	724	AHR	O1'-C1'-O4'	-2.16	108.23	111.14
4	A	718	AHR	C1'-C2'-C3'	-2.14	98.38	101.67
4	B	715	AHR	O4'-C1'-C2'	-2.14	101.72	106.00
4	B	716	AHR	C1'-C2'-C3'	-2.13	98.39	101.67
4	B	719	AHR	O3'-C3'-C4'	-2.12	104.89	111.09
4	B	718	AHR	O3'-C3'-C4'	-2.05	105.10	111.09
4	B	715	AHR	C1'-O4'-C4'	-2.03	103.32	108.15
4	B	721	AHR	O1'-C1'-O4'	2.55	114.55	111.14

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

18 monomers are involved in 31 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	705	SO4	1	0
2	A	706	SO4	1	0
2	A	710	SO4	1	0
2	A	711	SO4	1	0
2	A	712	SO4	1	0
4	A	718	AHR	2	0
4	A	720	AHR	2	0
4	A	722	AHR	2	0
4	A	723	AHR	3	0
2	B	707	SO4	1	0
3	B	711	PEG	2	0
4	B	714	AHR	2	0
4	B	715	AHR	2	0
4	B	716	AHR	2	0
4	B	717	AHR	1	0
4	B	718	AHR	2	0
4	B	719	AHR	7	0
4	B	720	AHR	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 [i](#)

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

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	596/639 (93%)	-0.21	4 (0%)	87 84	20, 45, 71, 103	0
1	B	596/639 (93%)	-0.28	1 (0%)	94 94	24, 42, 68, 95	0
All	All	1192/1278 (93%)	-0.24	5 (0%)	92 90	20, 43, 69, 103	0

All (5) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	527	ARG	2.7
1	B	143	LYS	2.4
1	A	142	THR	2.4
1	A	167	LYS	2.1
1	A	332	TYR	2.0

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

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

6.3 Carbohydrates [i](#)

There are no carbohydrates in this entry.

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(\AA^2)	Q<0.9
4	AHR	A	718	9/10	0.58	0.65	22.04	75,82,93,94	9
4	AHR	A	723	9/10	0.78	0.45	13.76	53,61,65,67	9
4	AHR	B	715	9/10	0.81	0.35	12.25	88,96,107,108	9
4	AHR	A	722	9/10	0.85	0.39	12.06	49,56,62,63	9
4	AHR	B	719	9/10	0.76	0.47	12.00	63,70,76,77	9
4	AHR	B	720	9/10	0.76	0.46	10.87	67,74,78,81	9
4	AHR	B	718	9/10	0.89	0.37	9.13	63,67,75,79	9
4	AHR	A	724	10/10	0.73	0.42	8.68	59,66,74,74	10
3	PEG	A	713	7/7	0.75	0.32	7.47	74,82,91,94	0
3	PEG	A	715	7/7	0.87	0.25	7.31	59,68,72,83	0
4	AHR	A	720	9/10	0.87	0.35	6.10	49,55,65,67	9
3	PEG	B	711	7/7	0.85	0.34	5.54	74,78,83,94	0
3	PEG	B	709	7/7	0.88	0.36	5.28	47,55,59,62	0
4	AHR	B	717	9/10	0.88	0.38	5.27	63,69,79,81	9
3	PEG	B	713	7/7	0.89	0.22	4.56	54,59,67,73	0
3	PEG	B	710	7/7	0.83	0.31	4.21	64,76,81,84	0
3	PEG	A	714	7/7	0.91	0.37	3.55	64,67,71,72	0
4	AHR	A	721	9/10	0.89	0.35	2.92	49,53,61,65	9
3	PEG	B	712	7/7	0.88	0.27	1.99	60,64,78,80	0
3	PEG	A	716	7/7	0.85	0.24	1.38	83,83,83,83	0
2	SO4	A	701	5/5	0.96	0.24	-0.11	75,82,93,95	0
2	SO4	A	704	5/5	0.99	0.14	-0.55	61,64,68,70	0
2	SO4	B	704	5/5	0.92	0.15	-0.78	81,84,91,105	0
2	SO4	A	702	5/5	0.99	0.13	-1.27	53,56,63,68	0
2	SO4	B	706	5/5	0.82	0.44	-	118,118,127,143	0
4	AHR	B	721	10/10	0.81	0.36	-	73,80,88,88	10
4	AHR	A	717	9/10	0.73	0.46	-	77,83,89,91	9
2	SO4	A	709	5/5	0.79	0.36	-	114,118,120,140	0
2	SO4	A	708	5/5	0.85	0.38	-	85,101,115,117	5
2	SO4	B	708	5/5	0.84	0.57	-	111,111,111,111	5
2	SO4	A	706	5/5	0.92	0.27	-	73,82,85,89	5
2	SO4	A	711	5/5	0.81	0.51	-	54,54,54,54	5
2	SO4	A	705	5/5	0.82	0.36	-	125,130,132,141	5
2	SO4	B	703	5/5	0.89	0.31	-	80,82,90,100	5
2	SO4	B	705	5/5	0.94	0.24	-	119,119,124,135	0
4	AHR	A	719	9/10	0.78	0.36	-	57,64,72,73	9
2	SO4	A	712	5/5	0.72	0.32	-	135,135,135,135	0
4	AHR	B	714	9/10	0.79	0.41	-	91,97,102,105	9
2	SO4	A	707	5/5	0.81	0.39	-	112,118,137,140	0
2	SO4	A	703	5/5	0.78	0.30	-	93,99,115,134	5
2	SO4	B	702	5/5	0.93	0.23	-	66,69,87,93	5
2	SO4	B	707	5/5	0.77	0.45	-	33,43,67,75	5

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors(\AA^2)	Q<0.9
4	AHR	B	716	9/10	0.87	0.32	-	70,78,86,86	9
2	SO4	B	701	5/5	0.88	0.23	-	64,69,87,87	5
2	SO4	A	710	5/5	0.91	0.46	-	74,80,83,92	5

6.5 Other polymers [i](#)

There are no such residues in this entry.