



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 7, 2026 – 01:35 AM UTC

PDB ID : 3IA2 / pdb_00003ia2
Title : Pseudomonas fluorescens esterase complexed to the R-enantiomer of a sulfonate transition state analog
Authors : Schrag, J.D.; Kazlauskas, R.J.; Jiang, Y.; Morley, K.
Deposited on : 2009-07-13
Resolution : 1.65 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

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

MolProbity : 4-5-2 with Phenix2.0
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0
EDS : 3.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

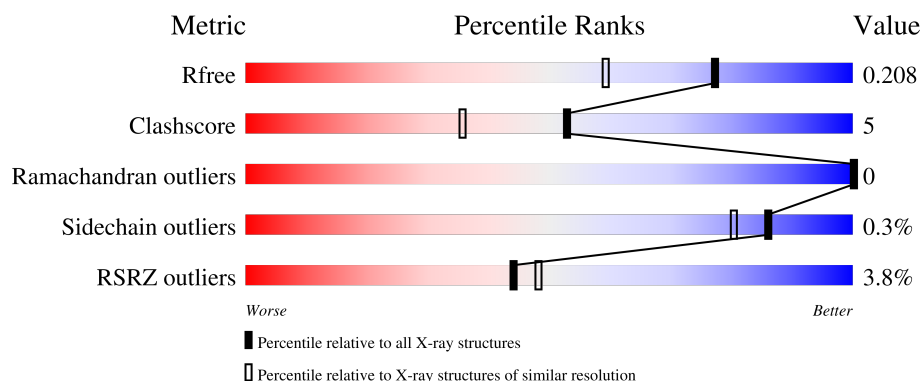
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.65 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}	180053	2563 (1.66-1.66)
Clashscore	190562	2662 (1.66-1.66)
Ramachandran outliers	187476	2621 (1.66-1.66)
Sidechain outliers	187428	2621 (1.66-1.66)
RSRZ outliers	180081	2564 (1.66-1.66)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. 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	271	4% 88% 12%
1	B	271	5% 90% 10%
1	C	271	3% 90% 10%
1	D	271	3% 92% 8%
1	E	271	4% 93% 7%

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Mol	Chain	Length	Quality of chain
1	F	271	3% 93% 7%

2 Entry composition [i](#)

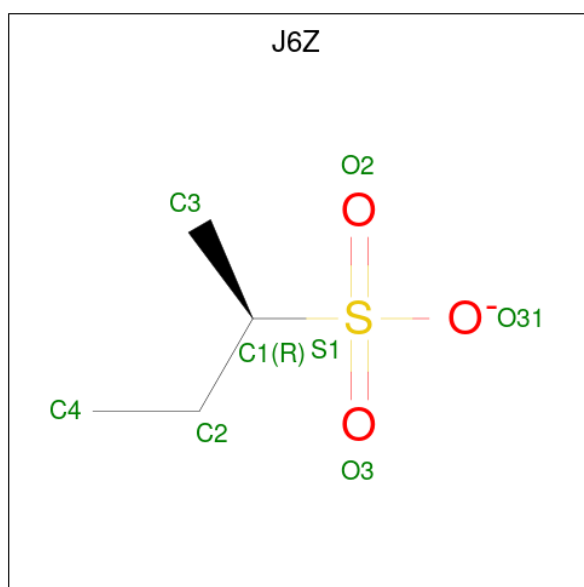
There are 5 unique types of molecules in this entry. The entry contains 14684 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Arylesterase.

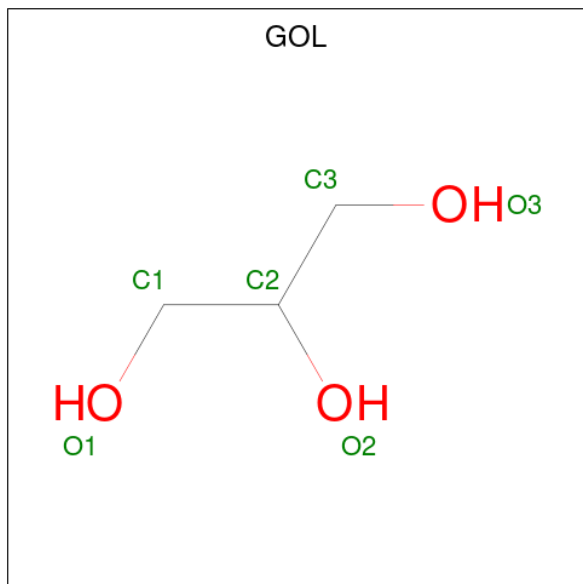
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	271	Total	C	N	O	S	0	12	0
			2209	1417	372	415	5			
1	B	271	Total	C	N	O	S	0	6	0
			2165	1390	364	406	5			
1	C	271	Total	C	N	O	S	0	7	0
			2174	1396	367	406	5			
1	D	271	Total	C	N	O	S	0	7	0
			2164	1394	361	404	5			
1	E	271	Total	C	N	O	S	0	7	0
			2158	1390	360	403	5			
1	F	271	Total	C	N	O	S	0	10	0
			2178	1403	361	409	5			

- Molecule 2 is (2R)-butane-2-sulfonate (CCD ID: J6Z) (formula: C₄H₉O₃S).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	O	S	0	0
			7	4	2	1		
2	B	1	Total	C	O	S	0	0
			7	4	2	1		
2	C	1	Total	C	O	S	0	0
			7	4	2	1		
2	D	1	Total	C	O	S	0	0
			7	4	2	1		
2	E	1	Total	C	O	S	0	0
			7	4	2	1		
2	F	1	Total	C	O	S	0	0
			7	4	2	1		

- Molecule 3 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).



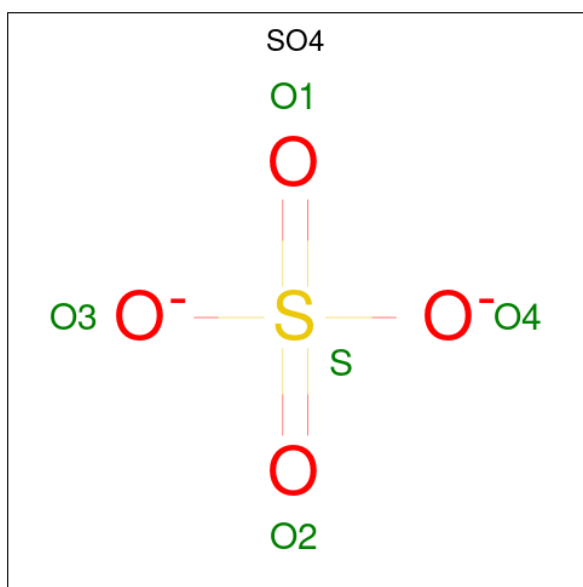
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			6	3	3		
3	A	1	Total	C	O	0	0
			6	3	3		
3	A	1	Total	C	O	0	0
			6	3	3		
3	A	1	Total	C	O	0	0
			6	3	3		
3	B	1	Total	C	O	0	0
			6	3	3		
3	B	1	Total	C	O	0	0
			6	3	3		

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

- Molecule 4 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



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

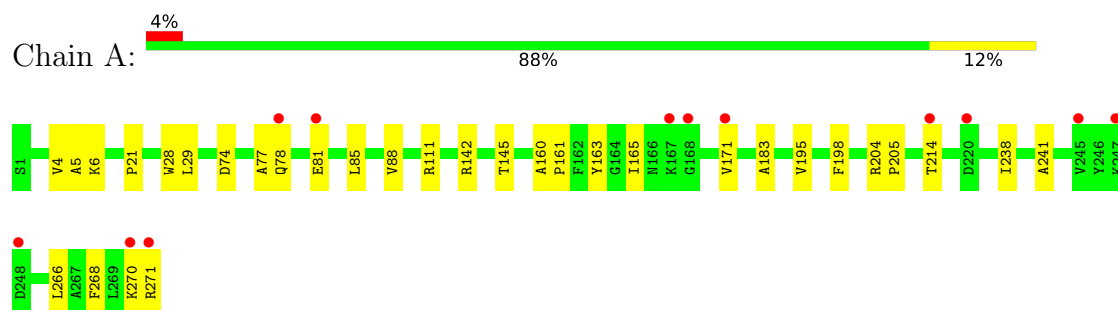
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	209	Total	O	0	0
			209	209		
5	B	251	Total	O	0	0
			251	251		
5	C	245	Total	O	0	0
			245	245		
5	D	241	Total	O	0	0
			241	241		
5	E	229	Total	O	0	0
			229	229		
5	F	244	Total	O	0	0
			244	244		

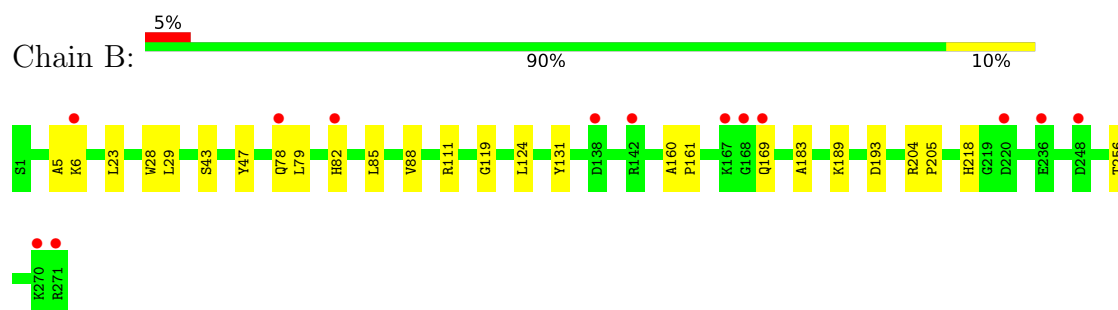
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide 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 ($RSRZ > 2$). 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.

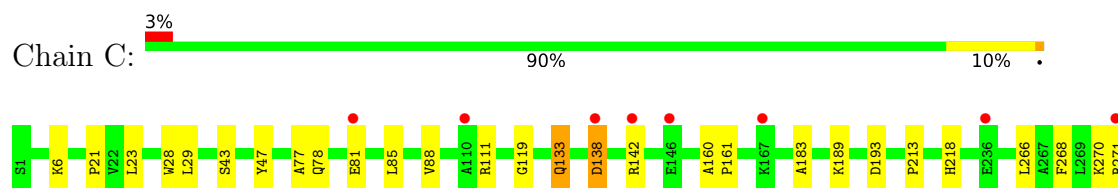
- Molecule 1: Arylesterase



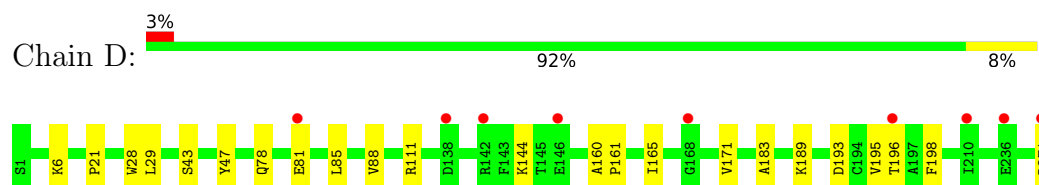
- Molecule 1: Arylesterase



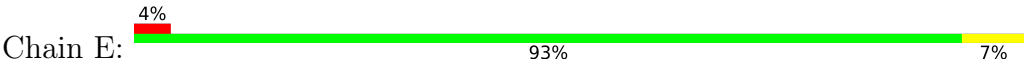
- Molecule 1: Arylesterase



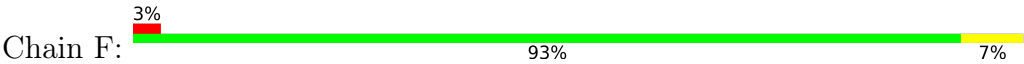
- Molecule 1: Arylesterase



- Molecule 1: Arylesterase



● Molecule 1: Arylesterase



4 Data and refinement statistics

Property	Value	Source
Space group	P 32	Depositor
Cell constants a, b, c, α , β , γ	146.22Å 146.22Å 129.96Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	48.57 – 1.65 48.57 – 1.65	Depositor EDS
% Data completeness (in resolution range)	97.3 (48.57-1.65) 97.3 (48.57-1.65)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.06	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.81 (at 1.65Å)	Xtriage
Refinement program	REFMAC 5.4.0069	Depositor
R, R_{free}	0.197 , 0.208 0.197 , 0.208	Depositor DCC
R_{free} test set	18410 reflections (5.06%)	wwPDB-VP
Wilson B-factor (Å ²)	19.8	Xtriage
Anisotropy	0.438	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 38.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.063 for -h,-k,l 0.000 for h,-h-k,-l 0.000 for -k,-h,-l	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	14684	wwPDB-VP
Average B, all atoms (Å ²)	22.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 24.05 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 4.1349e-03. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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: J6Z, SO4, GOL

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	0.33	0/2265	0.65	0/3068
1	B	0.33	0/2219	0.66	0/3008
1	C	0.33	0/2230	0.65	0/3018
1	D	0.32	0/2224	0.66	0/3016
1	E	0.33	0/2221	0.66	0/3012
1	F	0.33	0/2247	0.64	0/3047
All	All	0.33	0/13406	0.65	0/18169

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	2209	0	2172	44	0
1	B	2165	0	2124	17	0
1	C	2174	0	2144	24	0
1	D	2164	0	2138	20	0
1	E	2158	0	2132	13	0
1	F	2178	0	2152	15	0
2	A	7	0	9	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	7	0	9	0	0
2	C	7	0	9	0	0
2	D	7	0	9	0	0
2	E	7	0	9	0	0
2	F	7	0	9	0	0
3	A	24	0	32	0	0
3	B	24	0	32	0	0
3	C	24	0	32	0	0
3	D	24	0	32	0	0
3	E	30	0	40	0	0
3	F	24	0	32	0	0
4	A	5	0	0	0	0
4	B	5	0	0	0	0
4	C	5	0	0	0	0
4	D	5	0	0	0	0
4	E	5	0	0	0	0
5	A	209	0	0	0	0
5	B	251	0	0	0	0
5	C	245	0	0	0	0
5	D	241	0	0	1	0
5	E	229	0	0	0	0
5	F	244	0	0	0	0
All	All	14684	0	13116	133	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 (133) 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:A:271[B]:ARG:OXT	1:A:271[B]:ARG:HG2	1.60	0.98
1:C:133:GLN:H	1:C:133:GLN:HE21	1.02	0.94
1:D:144:LYS:NZ	1:D:196[A]:THR:HG22	1.86	0.90
1:C:6:LYS:H	1:C:78:GLN:HE22	1.20	0.90
1:E:6:LYS:H	1:E:78:GLN:HE22	1.19	0.87
1:A:271[B]:ARG:OXT	1:A:271[B]:ARG:CG	2.25	0.85
1:F:2[B]:THR:CG2	1:F:10:GLN:HG3	2.08	0.83
1:D:144:LYS:HZ1	1:D:196[A]:THR:HG22	1.45	0.80
1:D:6:LYS:H	1:D:78:GLN:HE22	1.34	0.75
1:A:214[B]:THR:CG2	1:A:241:ALA:CB	2.66	0.73
1:A:214[B]:THR:CG2	1:A:241:ALA:HB2	2.20	0.72

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:268:PHE:O	1:C:271[B]:ARG:HD2	1.90	0.72
1:F:2[B]:THR:HG21	1:F:10:GLN:HG3	1.73	0.70
1:A:214[B]:THR:HG21	1:A:241:ALA:HB2	1.75	0.69
1:F:2[B]:THR:HG23	1:F:10:GLN:HG3	1.75	0.68
1:D:85:LEU:HB3	1:D:88[B]:VAL:CG2	2.24	0.68
1:A:268:PHE:O	1:A:271[B]:ARG:HD2	1.94	0.68
1:A:214[B]:THR:HG23	1:A:241:ALA:CB	2.25	0.67
1:C:133:GLN:HE21	1:C:133:GLN:N	1.84	0.67
1:E:165[B]:ILE:HD11	1:E:171[B]:VAL:CG2	2.25	0.67
1:A:4:VAL:O	1:A:78[B]:GLN:NE2	2.29	0.65
1:C:133:GLN:H	1:C:133:GLN:NE2	1.86	0.65
1:C:268:PHE:O	1:C:271[B]:ARG:CD	2.45	0.65
1:A:165:ILE:HG12	1:A:171[B]:VAL:HG22	1.78	0.65
1:C:266:LEU:HG	1:C:270[B]:LYS:HE2	1.78	0.65
1:A:165:ILE:HD11	1:A:171[B]:VAL:HG21	1.79	0.64
1:B:169[B]:GLN:HG2	1:B:256:THR:HG21	1.78	0.64
1:E:88[A]:VAL:HG12	1:E:111:ARG:O	1.97	0.63
1:D:88[A]:VAL:HG12	1:D:111:ARG:O	1.99	0.63
1:A:165:ILE:HD11	1:A:171[B]:VAL:CG2	2.29	0.63
1:B:88[A]:VAL:HG12	1:B:111:ARG:O	1.98	0.63
1:A:142:ARG:HA	1:A:145[A]:THR:HG22	1.81	0.61
1:A:268:PHE:O	1:A:271[B]:ARG:CD	2.48	0.61
1:A:214[B]:THR:HG21	1:A:238:ILE:HG21	1.83	0.60
1:C:28:TRP:O	1:C:29:LEU:HB2	2.02	0.59
1:F:88[B]:VAL:HG22	1:F:111:ARG:O	2.02	0.59
1:C:268:PHE:HA	1:C:271[A]:ARG:HD2	1.84	0.59
1:D:28:TRP:O	1:D:29:LEU:HB2	2.02	0.58
1:E:6:LYS:N	1:E:78:GLN:HE22	1.95	0.58
1:A:6:LYS:H	1:A:78[A]:GLN:HE22	1.50	0.58
1:A:214[B]:THR:CG2	1:A:241:ALA:HA	2.35	0.57
1:A:77:ALA:O	1:A:81:GLU:OE1	2.24	0.56
1:D:81:GLU:OE2	1:D:111:ARG:NE	2.39	0.56
1:B:78[A]:GLN:O	1:B:82:HIS:HB2	2.04	0.56
1:F:28:TRP:O	1:F:29:LEU:HB2	2.04	0.56
1:A:85:LEU:HB3	1:A:88[B]:VAL:CG2	2.37	0.55
1:D:21:PRO:HG2	1:D:88[B]:VAL:HG22	1.87	0.55
1:B:28:TRP:O	1:B:29:LEU:HB2	2.08	0.54
1:C:88[A]:VAL:HG12	1:C:111:ARG:O	2.08	0.54
1:D:160:ALA:HB3	1:D:161:PRO:CD	2.39	0.53
1:D:144:LYS:CE	1:D:196[A]:THR:HG22	2.39	0.53
1:A:165:ILE:HG12	1:A:171[B]:VAL:CG2	2.38	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:28:TRP:O	1:E:29:LEU:HB2	2.08	0.52
1:D:160:ALA:HB3	1:D:161:PRO:HD3	1.90	0.52
1:A:28:TRP:O	1:A:29:LEU:HB2	2.10	0.52
1:D:85:LEU:HB3	1:D:88[B]:VAL:HG21	1.93	0.51
1:A:214[B]:THR:HG21	1:A:238:ILE:CG2	2.41	0.51
1:E:213:PRO:HG2	1:E:271:ARG:HH21	1.77	0.50
1:F:85:LEU:HB3	1:F:88[B]:VAL:CG1	2.43	0.49
1:E:160:ALA:HB3	1:E:161:PRO:HD3	1.95	0.49
1:B:85:LEU:HB3	1:B:88[B]:VAL:CG2	2.43	0.49
1:A:88[A]:VAL:HG12	1:A:111:ARG:O	2.12	0.49
1:B:160:ALA:HB3	1:B:161:PRO:CD	2.43	0.49
1:C:160:ALA:HB3	1:C:161:PRO:HD3	1.95	0.49
1:B:5:ALA:HA	1:B:78[A]:GLN:OE1	2.13	0.48
1:B:160:ALA:HB3	1:B:161:PRO:HD3	1.95	0.48
1:A:74:ASP:O	1:A:78[A]:GLN:HG3	2.13	0.48
1:A:165:ILE:CD1	1:A:171[B]:VAL:CG2	2.91	0.48
1:A:214[B]:THR:CG2	1:A:241:ALA:CA	2.92	0.47
1:C:29:LEU:O	1:C:183:ALA:HA	2.14	0.47
1:A:160:ALA:HB3	1:A:161:PRO:HD3	1.95	0.47
1:A:160:ALA:HB3	1:A:161:PRO:CD	2.45	0.47
1:A:165:ILE:CG1	1:A:171[B]:VAL:CG2	2.93	0.47
1:F:138[B]:ASP:O	1:F:142:ARG:HG3	2.14	0.47
1:C:43:SER:HA	1:C:47:TYR:O	2.15	0.46
1:E:165[B]:ILE:HD11	1:E:171[B]:VAL:HG21	1.98	0.46
1:A:5:ALA:HA	1:A:78[A]:GLN:OE1	2.16	0.46
1:A:214[B]:THR:HG23	1:A:241:ALA:HA	1.98	0.46
1:A:214[B]:THR:HG22	1:A:241:ALA:HA	1.98	0.46
1:C:160:ALA:HB3	1:C:161:PRO:CD	2.45	0.46
1:A:21:PRO:HG2	1:A:88[B]:VAL:HG22	1.97	0.46
1:A:214[B]:THR:HG23	1:A:241:ALA:HB1	1.96	0.46
1:C:268:PHE:O	1:C:271[B]:ARG:HD3	2.16	0.46
1:A:266:LEU:HD11	1:A:270:LYS:HE2	1.97	0.45
1:C:271[B]:ARG:O	1:C:271[B]:ARG:HG2	2.15	0.45
1:D:165[A]:ILE:HD11	1:D:171:VAL:HB	1.98	0.45
1:A:271[B]:ARG:OXT	1:A:271[B]:ARG:CD	2.64	0.45
1:C:213:PRO:HG2	1:C:271[B]:ARG:HH21	1.82	0.45
1:F:160:ALA:HB3	1:F:161:PRO:HD3	1.99	0.45
1:A:204:ARG:N	1:A:205:PRO:CD	2.80	0.45
1:A:142:ARG:O	1:A:145[A]:THR:HG22	2.17	0.44
1:D:196[A]:THR:HG21	5:D:1308:HOH:O	2.16	0.44
1:B:204:ARG:N	1:B:205:PRO:CD	2.81	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:28:TRP:O	1:D:29:LEU:CB	2.65	0.44
1:E:160:ALA:HB3	1:E:161:PRO:CD	2.47	0.44
1:A:29:LEU:O	1:A:183:ALA:HA	2.17	0.44
1:B:79:LEU:O	1:B:82:HIS:HB3	2.18	0.44
1:A:268:PHE:HA	1:A:271[A]:ARG:HD2	2.00	0.44
1:E:195:VAL:HA	1:E:198:PHE:CZ	2.53	0.44
1:F:29:LEU:O	1:F:183:ALA:HA	2.18	0.43
1:F:50[B]:ILE:CD1	1:F:85:LEU:HD11	2.48	0.43
1:F:160:ALA:HB3	1:F:161:PRO:CD	2.49	0.43
1:A:195:VAL:HA	1:A:198:PHE:CZ	2.53	0.43
1:C:85:LEU:HB3	1:C:88[B]:VAL:CG2	2.49	0.43
1:F:85:LEU:HB3	1:F:88[A]:VAL:HG22	2.01	0.43
1:C:119:GLY:HA2	1:C:218:HIS:CE1	2.54	0.43
1:B:189:LYS:HE3	1:B:193:ASP:OD2	2.18	0.43
1:E:165[A]:ILE:HD11	1:E:171[A]:VAL:HB	2.01	0.43
1:A:163:TYR:HB3	1:A:171[A]:VAL:HG21	2.01	0.42
1:C:21:PRO:HG2	1:C:88[B]:VAL:HG22	2.01	0.42
1:A:214[B]:THR:HG23	1:A:241:ALA:CA	2.49	0.42
1:B:29:LEU:O	1:B:183:ALA:HA	2.19	0.42
1:D:29:LEU:O	1:D:183:ALA:HA	2.19	0.42
1:E:29:LEU:O	1:E:183:ALA:HA	2.20	0.42
1:A:268:PHE:O	1:A:271[B]:ARG:HD3	2.19	0.42
1:C:77:ALA:O	1:C:81:GLU:HG2	2.20	0.42
1:D:43:SER:HA	1:D:47:TYR:O	2.20	0.42
1:D:195:VAL:HA	1:D:198:PHE:CZ	2.55	0.42
1:C:138:ASP:O	1:C:142:ARG:HG3	2.20	0.41
1:B:119:GLY:HA2	1:B:218:HIS:CE1	2.55	0.41
1:B:43:SER:HA	1:B:47:TYR:O	2.20	0.41
1:B:6:LYS:H	1:B:78[A]:GLN:HE22	1.69	0.41
1:A:142:ARG:HA	1:A:145[A]:THR:CG2	2.48	0.41
1:B:124[B]:LEU:HD21	1:B:131:TYR:CE2	2.56	0.41
1:C:189:LYS:HE3	1:C:193:ASP:OD2	2.21	0.41
1:B:23:LEU:C	1:B:23:LEU:HD23	2.46	0.40
1:C:23:LEU:C	1:C:23:LEU:HD23	2.46	0.40
1:F:43:SER:HA	1:F:47:TYR:O	2.21	0.40
1:F:24:PHE:HB3	1:F:35:TRP:CE2	2.57	0.40
1:D:189:LYS:HE3	1:D:193:ASP:OD2	2.21	0.40
1:E:124[B]:LEU:HD22	1:E:204:ARG:HG3	2.04	0.40
1:D:271:ARG:O	1:D:271:ARG:CG	2.69	0.40
1:F:28:TRP:O	1:F:29:LEU:CB	2.70	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	280/271 (103%)	273 (98%)	7 (2%)	0	100	100
1	B	275/271 (102%)	266 (97%)	9 (3%)	0	100	100
1	C	275/271 (102%)	268 (98%)	7 (2%)	0	100	100
1	D	276/271 (102%)	269 (98%)	7 (2%)	0	100	100
1	E	276/271 (102%)	269 (98%)	7 (2%)	0	100	100
1	F	279/271 (103%)	273 (98%)	6 (2%)	0	100	100
All	All	1661/1626 (102%)	1618 (97%)	43 (3%)	0	100	100

There are no Ramachandran outliers to report.

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	232/220 (106%)	232 (100%)	0	100	100
1	B	226/220 (103%)	226 (100%)	0	100	100
1	C	227/220 (103%)	225 (99%)	2 (1%)	70	56
1	D	227/220 (103%)	227 (100%)	0	100	100
1	E	227/220 (103%)	226 (100%)	1 (0%)	84	77
1	F	230/220 (104%)	229 (100%)	1 (0%)	84	77
All	All	1369/1320 (104%)	1365 (100%)	4 (0%)	86	80

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	133	GLN
1	C	138	ASP
1	E	30	LEU
1	F	30	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (10) such sidechains are listed below:

Mol	Chain	Res	Type
1	C	38	GLN
1	C	78	GLN
1	C	133	GLN
1	D	78	GLN
1	E	78	GLN
1	E	173	GLN
1	E	176	GLN
1	E	260	GLN
1	F	38	GLN
1	F	260	GLN

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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

36 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	$\# Z > 2$
3	GOL	C	273	-	5,5,5	0.37	0	5,5,5	0.28	0
3	GOL	D	273	-	5,5,5	0.37	0	5,5,5	0.29	0
3	GOL	E	275	-	5,5,5	0.35	0	5,5,5	0.31	0
3	GOL	D	275	-	5,5,5	0.36	0	5,5,5	0.30	0
3	GOL	D	276	-	5,5,5	0.35	0	5,5,5	0.27	0
3	GOL	B	276	-	5,5,5	0.37	0	5,5,5	0.27	0
3	GOL	B	273	-	5,5,5	0.38	0	5,5,5	0.30	0
3	GOL	A	273	-	5,5,5	0.38	0	5,5,5	0.25	0
3	GOL	F	274	-	5,5,5	0.34	0	5,5,5	0.32	0
3	GOL	A	275	-	5,5,5	0.34	0	5,5,5	0.32	0
3	GOL	F	276	-	5,5,5	0.37	0	5,5,5	0.39	0
3	GOL	B	275	-	5,5,5	0.35	0	5,5,5	0.30	0
3	GOL	C	274	-	5,5,5	0.37	0	5,5,5	0.34	0
3	GOL	C	276	-	5,5,5	0.36	0	5,5,5	0.29	0
3	GOL	E	274	-	5,5,5	0.35	0	5,5,5	0.27	0
4	SO4	D	277	-	4,4,4	0.23	0	6,6,6	0.07	0
3	GOL	E	277	-	5,5,5	0.37	0	5,5,5	0.30	0
4	SO4	E	278	-	4,4,4	0.23	0	6,6,6	0.08	0
3	GOL	E	276	-	5,5,5	0.37	0	5,5,5	0.36	0
3	GOL	D	274	-	5,5,5	0.36	0	5,5,5	0.28	0
2	J6Z	D	272	1	4,6,7	0.46	0	3,7,10	1.46	0
2	J6Z	B	272	1	4,6,7	0.45	0	3,7,10	1.31	0
3	GOL	F	273	-	5,5,5	0.36	0	5,5,5	0.23	0
4	SO4	B	277	-	4,4,4	0.24	0	6,6,6	0.09	0
2	J6Z	E	272	1	4,6,7	0.52	0	3,7,10	1.31	0
3	GOL	E	273	-	5,5,5	0.37	0	5,5,5	0.22	0
4	SO4	A	277	-	4,4,4	0.24	0	6,6,6	0.09	0
3	GOL	F	275	-	5,5,5	0.34	0	5,5,5	0.39	0
4	SO4	C	277	-	4,4,4	0.24	0	6,6,6	0.08	0
2	J6Z	C	272	1	4,6,7	0.48	0	3,7,10	1.22	0
3	GOL	A	274	-	5,5,5	0.34	0	5,5,5	0.35	0
3	GOL	B	274	-	5,5,5	0.38	0	5,5,5	0.22	0
2	J6Z	A	272	1	4,6,7	0.44	0	3,7,10	1.32	0
2	J6Z	F	272	1	4,6,7	0.47	0	3,7,10	1.37	0
3	GOL	C	275	-	5,5,5	0.35	0	5,5,5	0.33	0
3	GOL	A	276	-	5,5,5	0.37	0	5,5,5	0.31	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	GOL	C	273	-	-	0/4/4/4	-
3	GOL	D	273	-	-	0/4/4/4	-
3	GOL	E	275	-	-	2/4/4/4	-
3	GOL	D	275	-	-	2/4/4/4	-
3	GOL	D	276	-	-	3/4/4/4	-
3	GOL	B	276	-	-	3/4/4/4	-
3	GOL	B	273	-	-	0/4/4/4	-
3	GOL	A	273	-	-	0/4/4/4	-
3	GOL	F	274	-	-	1/4/4/4	-
3	GOL	A	275	-	-	0/4/4/4	-
3	GOL	F	276	-	-	3/4/4/4	-
3	GOL	B	275	-	-	2/4/4/4	-
3	GOL	C	274	-	-	0/4/4/4	-
3	GOL	C	276	-	-	2/4/4/4	-
3	GOL	E	274	-	-	0/4/4/4	-
3	GOL	E	277	-	-	2/4/4/4	-
3	GOL	E	276	-	-	0/4/4/4	-
3	GOL	D	274	-	-	0/4/4/4	-
2	J6Z	D	272	1	-	1/4/6/8	-
2	J6Z	B	272	1	-	1/4/6/8	-
3	GOL	F	273	-	-	0/4/4/4	-
2	J6Z	E	272	1	-	1/4/6/8	-
3	GOL	E	273	-	-	0/4/4/4	-
3	GOL	F	275	-	-	0/4/4/4	-
2	J6Z	C	272	1	-	1/4/6/8	-
3	GOL	A	274	-	-	0/4/4/4	-
3	GOL	B	274	-	-	0/4/4/4	-
2	J6Z	A	272	1	-	1/4/6/8	-
2	J6Z	F	272	1	-	1/4/6/8	-
3	GOL	C	275	-	-	1/4/4/4	-
3	GOL	A	276	-	-	2/4/4/4	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (29) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	272	J6Z	C3-C1-S1-O2
2	B	272	J6Z	C3-C1-S1-O2
2	C	272	J6Z	C3-C1-S1-O2
2	D	272	J6Z	C3-C1-S1-O2
2	E	272	J6Z	C3-C1-S1-O2
2	F	272	J6Z	C3-C1-S1-O2
3	C	276	GOL	C1-C2-C3-O3
3	C	276	GOL	O2-C2-C3-O3
3	D	276	GOL	C1-C2-C3-O3
3	F	276	GOL	O1-C1-C2-C3
3	B	275	GOL	C1-C2-C3-O3
3	B	276	GOL	O1-C1-C2-C3
3	B	276	GOL	C1-C2-C3-O3
3	D	275	GOL	C1-C2-C3-O3
3	D	276	GOL	O1-C1-C2-C3
3	E	275	GOL	O1-C1-C2-C3
3	E	277	GOL	O1-C1-C2-C3
3	F	274	GOL	C1-C2-C3-O3
3	D	276	GOL	O2-C2-C3-O3
3	F	276	GOL	O1-C1-C2-O2
3	B	276	GOL	O1-C1-C2-O2
3	A	276	GOL	C1-C2-C3-O3
3	E	277	GOL	O1-C1-C2-O2
3	B	275	GOL	O2-C2-C3-O3
3	D	275	GOL	O2-C2-C3-O3
3	A	276	GOL	O2-C2-C3-O3
3	F	276	GOL	C1-C2-C3-O3
3	E	275	GOL	O1-C1-C2-O2
3	C	275	GOL	C1-C2-C3-O3

There are no ring outliers.

No monomer is involved in short contacts.

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data

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	271/271 (100%)	0.43	12 (4%)	39	42	10, 22, 30, 33	12 (4%)
1	B	271/271 (100%)	0.20	13 (4%)	35	39	10, 21, 27, 32	6 (2%)
1	C	271/271 (100%)	0.22	8 (2%)	52	57	10, 21, 28, 31	7 (2%)
1	D	271/271 (100%)	0.26	9 (3%)	49	53	10, 21, 28, 34	7 (2%)
1	E	271/271 (100%)	0.36	12 (4%)	39	42	11, 22, 29, 36	7 (2%)
1	F	271/271 (100%)	0.18	8 (2%)	52	57	10, 20, 27, 33	10 (3%)
All	All	1626/1626 (100%)	0.27	62 (3%)	44	48	10, 21, 28, 36	49 (3%)

All (62) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	168	GLY	6.8
1	A	271[A]	ARG	5.4
1	E	168	GLY	4.4
1	B	248	ASP	4.2
1	A	168	GLY	4.1
1	A	78[A]	GLN	3.9
1	C	271[A]	ARG	3.8
1	C	81	GLU	3.8
1	E	248	ASP	3.5
1	B	169[A]	GLN	3.4
1	E	167	LYS	3.4
1	F	81	GLU	3.3
1	A	247	LYS	3.2
1	D	138	ASP	3.2
1	E	247	LYS	3.2
1	A	248	ASP	3.0
1	D	81	GLU	3.0
1	B	142	ARG	2.9
1	A	81	GLU	2.9

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Mol	Chain	Res	Type	RSRZ
1	D	168	GLY	2.8
1	F	248	ASP	2.8
1	B	78[A]	GLN	2.7
1	A	171[A]	VAL	2.7
1	F	6	LYS	2.7
1	B	138	ASP	2.7
1	E	270	LYS	2.6
1	D	142	ARG	2.6
1	E	271	ARG	2.6
1	C	167	LYS	2.6
1	C	110	ALA	2.5
1	D	196[A]	THR	2.5
1	E	236	GLU	2.5
1	F	142	ARG	2.5
1	A	220	ASP	2.5
1	C	138	ASP	2.5
1	C	236	GLU	2.5
1	E	110	ALA	2.4
1	A	167	LYS	2.4
1	F	247	LYS	2.4
1	E	142	ARG	2.4
1	D	146	GLU	2.3
1	A	214[A]	THR	2.3
1	A	270	LYS	2.3
1	B	271	ARG	2.3
1	B	270	LYS	2.3
1	B	82	HIS	2.2
1	F	271	ARG	2.2
1	B	167	LYS	2.2
1	B	236	GLU	2.2
1	C	146	GLU	2.2
1	E	170	VAL	2.1
1	F	8	GLY	2.1
1	F	270	LYS	2.1
1	E	84	ASP	2.1
1	D	271	ARG	2.1
1	D	236	GLU	2.0
1	B	220	ASP	2.0
1	C	142	ARG	2.0
1	E	94	SER	2.0
1	B	6	LYS	2.0
1	D	210	ILE	2.0

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Mol	Chain	Res	Type	RSRZ
1	A	245	VAL	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 oligosaccharides 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. 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	B-factors(Å ²)	Q<0.9
4	SO4	D	277	5/5	0.77	0.17	96,96,96,96	0
4	SO4	C	277	5/5	0.79	0.16	88,88,89,89	0
4	SO4	B	277	5/5	0.81	0.15	82,82,82,82	0
3	GOL	E	275	6/6	0.82	0.19	46,47,47,47	0
3	GOL	E	277	6/6	0.82	0.25	52,53,53,53	0
3	GOL	A	275	6/6	0.82	0.21	43,44,44,45	0
3	GOL	C	275	6/6	0.82	0.18	40,40,40,40	0
3	GOL	D	275	6/6	0.82	0.16	40,40,41,41	0
4	SO4	E	278	5/5	0.83	0.15	80,80,80,80	0
3	GOL	B	275	6/6	0.84	0.18	40,40,40,40	0
4	SO4	A	277	5/5	0.85	0.15	81,82,82,82	0
3	GOL	F	274	6/6	0.86	0.17	37,38,38,38	0
3	GOL	D	276	6/6	0.86	0.20	50,51,51,52	0
3	GOL	F	275	6/6	0.88	0.12	29,30,31,33	0
3	GOL	C	276	6/6	0.88	0.20	47,48,48,49	0
3	GOL	F	276	6/6	0.89	0.17	40,40,41,41	0
3	GOL	B	276	6/6	0.89	0.20	48,49,49,50	0
3	GOL	C	274	6/6	0.90	0.11	29,30,31,33	0
2	J6Z	F	272	7/8	0.90	0.15	31,31,32,32	0
2	J6Z	A	272	7/8	0.90	0.14	31,32,32,32	0
2	J6Z	B	272	7/8	0.90	0.15	30,30,30,31	0
2	J6Z	C	272	7/8	0.90	0.15	29,31,31,31	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	J6Z	D	272	7/8	0.91	0.14	30,31,31,32	0
3	GOL	B	273	6/6	0.91	0.11	27,29,30,32	0
3	GOL	E	276	6/6	0.91	0.13	41,41,41,41	0
2	J6Z	E	272	7/8	0.92	0.13	30,31,31,31	0
3	GOL	A	276	6/6	0.92	0.15	49,50,50,50	0
3	GOL	A	274	6/6	0.92	0.10	27,28,29,31	0
3	GOL	E	274	6/6	0.93	0.10	29,31,32,34	0
3	GOL	D	273	6/6	0.93	0.09	28,30,31,32	0
3	GOL	D	274	6/6	0.97	0.06	20,20,20,20	0
3	GOL	A	273	6/6	0.97	0.07	19,19,20,20	0
3	GOL	B	274	6/6	0.97	0.06	18,19,19,19	0
3	GOL	F	273	6/6	0.98	0.05	18,19,19,20	0
3	GOL	C	273	6/6	0.98	0.06	19,19,20,20	0
3	GOL	E	273	6/6	0.98	0.06	19,19,19,19	0

6.5 Other polymers [i](#)

There are no such residues in this entry.