



# Full wwPDB X-ray Structure Validation Report ⓘ

May 15, 2020 – 07:36 pm BST

PDB ID : 5BRX  
Title : X-ray crystal structure of Aplysia californica (Ac-AChBP) in complex with 2-pyridyl azatricyclo[3.3.1.1<sup>3,7</sup>]decane; 2-pyridylazaadamantane; 2-Aza (TI-8480)  
Authors : Bobango, J.; Sankaran, B.; Park, J.F.; Wu, J.; Talley, T.T.  
Deposited on : 2015-06-01  
Resolution : 2.05 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

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

MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.11
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.11

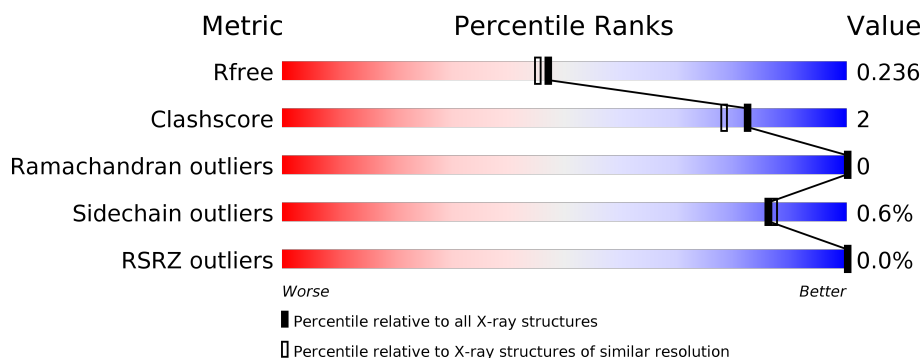
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.05 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))
$R_{free}$	130704	1692 (2.04-2.04)
Clashscore	141614	1773 (2.04-2.04)
Ramachandran outliers	138981	1752 (2.04-2.04)
Sidechain outliers	138945	1752 (2.04-2.04)
RSRZ outliers	127900	1672 (2.04-2.04)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria 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	230	
1	B	230	
1	C	230	
1	D	230	
1	E	230	
1	F	230	

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Mol	Chain	Length	Quality of chain
1	G	230	<div><div></div><div>89%</div><div></div><div>•</div><div>8%</div></div>
1	H	230	<div><div></div><div>84%</div><div></div><div>6%</div><div>10%</div></div>
1	I	230	<div><div></div><div>88%</div><div></div><div>5%</div><div>7%</div></div>
1	J	230	<div><div></div><div>84%</div><div></div><div>7%</div><div>9%</div></div>

## 2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 17237 atoms, of which 180 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 Soluble acetylcholine receptor.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	209	Total	C	N	O	S	0	0	0
			1631	1030	266	327	8			
1	B	212	Total	C	N	O	S	0	0	0
			1648	1043	266	331	8			
1	C	209	Total	C	N	O	S	0	0	0
			1623	1028	262	325	8			
1	D	214	Total	C	N	O	S	0	0	0
			1652	1043	267	334	8			
1	E	209	Total	C	N	O	S	0	0	0
			1614	1023	259	324	8			
1	F	209	Total	C	N	O	S	0	0	0
			1636	1036	266	326	8			
1	G	212	Total	C	N	O	S	0	0	0
			1651	1044	266	333	8			
1	H	208	Total	C	N	O	S	0	0	0
			1620	1026	261	325	8			
1	I	214	Total	C	N	O	S	0	0	0
			1648	1041	266	333	8			
1	J	209	Total	C	N	O	S	0	0	0
			1617	1024	259	326	8			

There are 120 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-8	ASP	-	expression tag	UNP Q8WSF8
A	-7	TYR	-	expression tag	UNP Q8WSF8
A	-6	LYS	-	expression tag	UNP Q8WSF8
A	-5	ASP	-	expression tag	UNP Q8WSF8
A	-4	ASP	-	expression tag	UNP Q8WSF8
A	-3	ASP	-	expression tag	UNP Q8WSF8
A	-2	ASP	-	expression tag	UNP Q8WSF8
A	-1	LYS	-	expression tag	UNP Q8WSF8
A	0	LEU	-	expression tag	UNP Q8WSF8

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Chain	Residue	Modelled	Actual	Comment	Reference
A	55	TRP	TYR	engineered mutation	UNP Q8WSF8
A	220	SER	-	expression tag	UNP Q8WSF8
A	221	ARG	-	expression tag	UNP Q8WSF8
B	-8	ASP	-	expression tag	UNP Q8WSF8
B	-7	TYR	-	expression tag	UNP Q8WSF8
B	-6	LYS	-	expression tag	UNP Q8WSF8
B	-5	ASP	-	expression tag	UNP Q8WSF8
B	-4	ASP	-	expression tag	UNP Q8WSF8
B	-3	ASP	-	expression tag	UNP Q8WSF8
B	-2	ASP	-	expression tag	UNP Q8WSF8
B	-1	LYS	-	expression tag	UNP Q8WSF8
B	0	LEU	-	expression tag	UNP Q8WSF8
B	55	TRP	TYR	engineered mutation	UNP Q8WSF8
B	220	SER	-	expression tag	UNP Q8WSF8
B	221	ARG	-	expression tag	UNP Q8WSF8
C	-8	ASP	-	expression tag	UNP Q8WSF8
C	-7	TYR	-	expression tag	UNP Q8WSF8
C	-6	LYS	-	expression tag	UNP Q8WSF8
C	-5	ASP	-	expression tag	UNP Q8WSF8
C	-4	ASP	-	expression tag	UNP Q8WSF8
C	-3	ASP	-	expression tag	UNP Q8WSF8
C	-2	ASP	-	expression tag	UNP Q8WSF8
C	-1	LYS	-	expression tag	UNP Q8WSF8
C	0	LEU	-	expression tag	UNP Q8WSF8
C	55	TRP	TYR	engineered mutation	UNP Q8WSF8
C	220	SER	-	expression tag	UNP Q8WSF8
C	221	ARG	-	expression tag	UNP Q8WSF8
D	-8	ASP	-	expression tag	UNP Q8WSF8
D	-7	TYR	-	expression tag	UNP Q8WSF8
D	-6	LYS	-	expression tag	UNP Q8WSF8
D	-5	ASP	-	expression tag	UNP Q8WSF8
D	-4	ASP	-	expression tag	UNP Q8WSF8
D	-3	ASP	-	expression tag	UNP Q8WSF8
D	-2	ASP	-	expression tag	UNP Q8WSF8
D	-1	LYS	-	expression tag	UNP Q8WSF8
D	0	LEU	-	expression tag	UNP Q8WSF8
D	55	TRP	TYR	engineered mutation	UNP Q8WSF8
D	220	SER	-	expression tag	UNP Q8WSF8
D	221	ARG	-	expression tag	UNP Q8WSF8
E	-8	ASP	-	expression tag	UNP Q8WSF8
E	-7	TYR	-	expression tag	UNP Q8WSF8
E	-6	LYS	-	expression tag	UNP Q8WSF8

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Chain	Residue	Modelled	Actual	Comment	Reference
E	-5	ASP	-	expression tag	UNP Q8WSF8
E	-4	ASP	-	expression tag	UNP Q8WSF8
E	-3	ASP	-	expression tag	UNP Q8WSF8
E	-2	ASP	-	expression tag	UNP Q8WSF8
E	-1	LYS	-	expression tag	UNP Q8WSF8
E	0	LEU	-	expression tag	UNP Q8WSF8
E	55	TRP	TYR	engineered mutation	UNP Q8WSF8
E	220	SER	-	expression tag	UNP Q8WSF8
E	221	ARG	-	expression tag	UNP Q8WSF8
F	-8	ASP	-	expression tag	UNP Q8WSF8
F	-7	TYR	-	expression tag	UNP Q8WSF8
F	-6	LYS	-	expression tag	UNP Q8WSF8
F	-5	ASP	-	expression tag	UNP Q8WSF8
F	-4	ASP	-	expression tag	UNP Q8WSF8
F	-3	ASP	-	expression tag	UNP Q8WSF8
F	-2	ASP	-	expression tag	UNP Q8WSF8
F	-1	LYS	-	expression tag	UNP Q8WSF8
F	0	LEU	-	expression tag	UNP Q8WSF8
F	55	TRP	TYR	engineered mutation	UNP Q8WSF8
F	220	SER	-	expression tag	UNP Q8WSF8
F	221	ARG	-	expression tag	UNP Q8WSF8
G	-8	ASP	-	expression tag	UNP Q8WSF8
G	-7	TYR	-	expression tag	UNP Q8WSF8
G	-6	LYS	-	expression tag	UNP Q8WSF8
G	-5	ASP	-	expression tag	UNP Q8WSF8
G	-4	ASP	-	expression tag	UNP Q8WSF8
G	-3	ASP	-	expression tag	UNP Q8WSF8
G	-2	ASP	-	expression tag	UNP Q8WSF8
G	-1	LYS	-	expression tag	UNP Q8WSF8
G	0	LEU	-	expression tag	UNP Q8WSF8
G	55	TRP	TYR	engineered mutation	UNP Q8WSF8
G	220	SER	-	expression tag	UNP Q8WSF8
G	221	ARG	-	expression tag	UNP Q8WSF8
H	-8	ASP	-	expression tag	UNP Q8WSF8
H	-7	TYR	-	expression tag	UNP Q8WSF8
H	-6	LYS	-	expression tag	UNP Q8WSF8
H	-5	ASP	-	expression tag	UNP Q8WSF8
H	-4	ASP	-	expression tag	UNP Q8WSF8
H	-3	ASP	-	expression tag	UNP Q8WSF8
H	-2	ASP	-	expression tag	UNP Q8WSF8
H	-1	LYS	-	expression tag	UNP Q8WSF8
H	0	LEU	-	expression tag	UNP Q8WSF8

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Chain	Residue	Modelled	Actual	Comment	Reference
H	55	TRP	TYR	engineered mutation	UNP Q8WSF8
H	220	SER	-	expression tag	UNP Q8WSF8
H	221	ARG	-	expression tag	UNP Q8WSF8
I	-8	ASP	-	expression tag	UNP Q8WSF8
I	-7	TYR	-	expression tag	UNP Q8WSF8
I	-6	LYS	-	expression tag	UNP Q8WSF8
I	-5	ASP	-	expression tag	UNP Q8WSF8
I	-4	ASP	-	expression tag	UNP Q8WSF8
I	-3	ASP	-	expression tag	UNP Q8WSF8
I	-2	ASP	-	expression tag	UNP Q8WSF8
I	-1	LYS	-	expression tag	UNP Q8WSF8
I	0	LEU	-	expression tag	UNP Q8WSF8
I	55	TRP	TYR	engineered mutation	UNP Q8WSF8
I	220	SER	-	expression tag	UNP Q8WSF8
I	221	ARG	-	expression tag	UNP Q8WSF8
J	-8	ASP	-	expression tag	UNP Q8WSF8
J	-7	TYR	-	expression tag	UNP Q8WSF8
J	-6	LYS	-	expression tag	UNP Q8WSF8
J	-5	ASP	-	expression tag	UNP Q8WSF8
J	-4	ASP	-	expression tag	UNP Q8WSF8
J	-3	ASP	-	expression tag	UNP Q8WSF8
J	-2	ASP	-	expression tag	UNP Q8WSF8
J	-1	LYS	-	expression tag	UNP Q8WSF8
J	0	LEU	-	expression tag	UNP Q8WSF8
J	55	TRP	TYR	engineered mutation	UNP Q8WSF8
J	220	SER	-	expression tag	UNP Q8WSF8
J	221	ARG	-	expression tag	UNP Q8WSF8

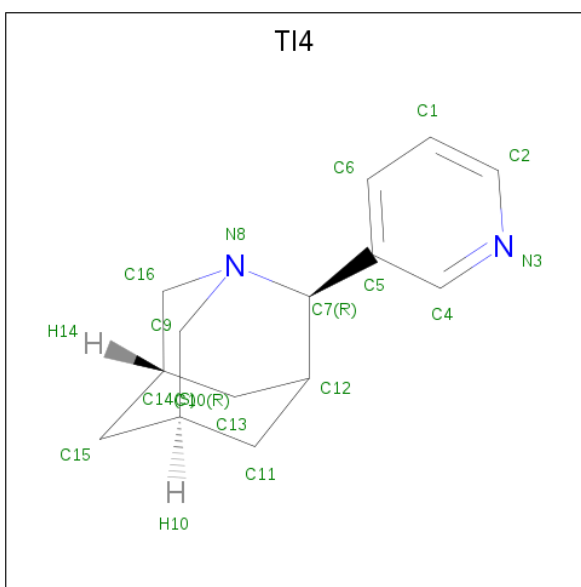
- Molecule 2 is SULFATE ION (three-letter code: SO4) (formula: O<sub>4</sub>S).



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	B	1	Total	O	S	0	0
			5	4	1		
2	C	1	Total	O	S	0	0
			5	4	1		
2	D	1	Total	O	S	0	0
			5	4	1		
2	F	1	Total	O	S	0	0
			5	4	1		
2	F	1	Total	O	S	0	0
			5	4	1		
2	G	1	Total	O	S	0	0
			5	4	1		
2	H	1	Total	O	S	0	0
			5	4	1		
2	I	1	Total	O	S	0	0
			5	4	1		

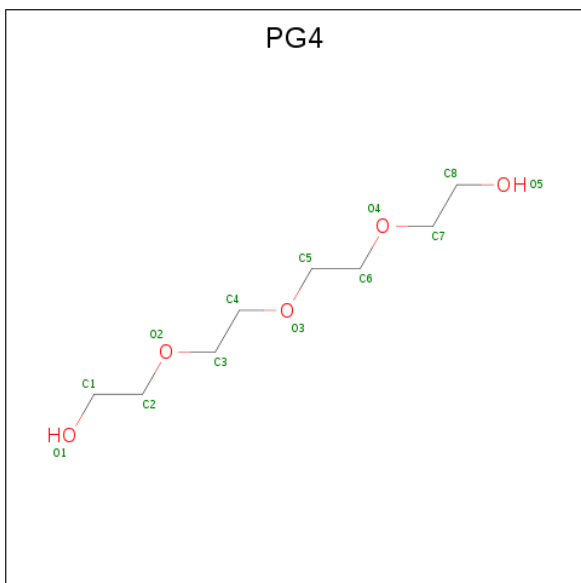
- Molecule 3 is (2R,3S,5R,7S)-2-(pyridin-3-yl)-1-azatricyclo[3.3.1.1<sup>3,7</sup>]decane (three-letter code: TI4) (formula: C<sub>14</sub>H<sub>18</sub>N<sub>2</sub>).





Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	H	N	0	0
			34	14	18	2		
3	D	1	Total	C	H	N	0	0
			34	14	18	2		
3	F	1	Total	C	H	N	0	0
			34	14	18	2		
3	I	1	Total	C	H	N	0	0
			34	14	18	2		

- Molecule 4 is TETRAETHYLENE GLYCOL (three-letter code: PG4) (formula:  $C_8H_{18}O_5$ ).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	H	O	0	0
			31	8	18	5		
4	C	1	Total	C	H	O	0	0
			31	8	18	5		
4	E	1	Total	C	H	O	0	0
			31	8	18	5		
4	F	1	Total	C	H	O	0	0
			31	8	18	5		
4	H	1	Total	C	H	O	0	0
			31	8	18	5		
4	J	1	Total	C	H	O	0	0
			31	8	18	5		

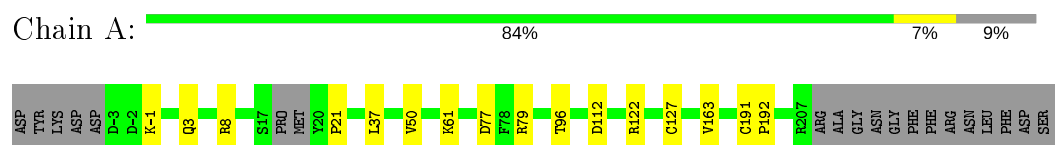
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	58	Total	O	0	0
			58	58		
5	B	53	Total	O	0	0
			53	53		
5	C	58	Total	O	0	0
			58	58		
5	D	55	Total	O	0	0
			55	55		
5	E	50	Total	O	0	0
			50	50		
5	F	51	Total	O	0	0
			51	51		
5	G	50	Total	O	0	0
			50	50		
5	H	54	Total	O	0	0
			54	54		
5	I	55	Total	O	0	0
			55	55		
5	J	41	Total	O	0	0
			41	41		

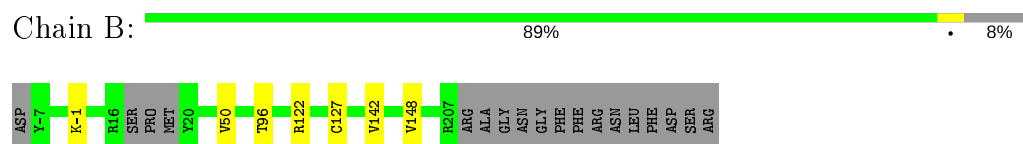
### 3 Residue-property plots [i](#)

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

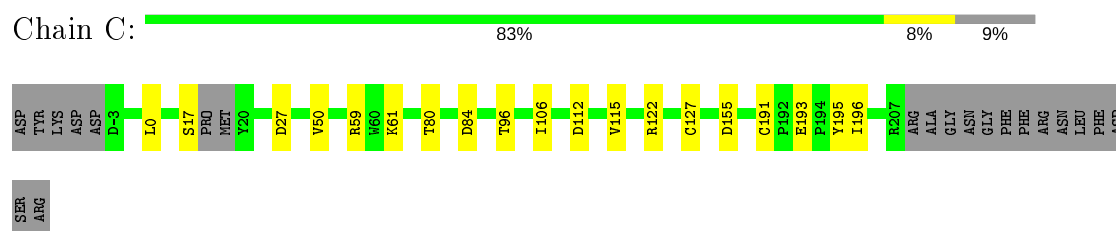
- Molecule 1: Soluble acetylcholine receptor



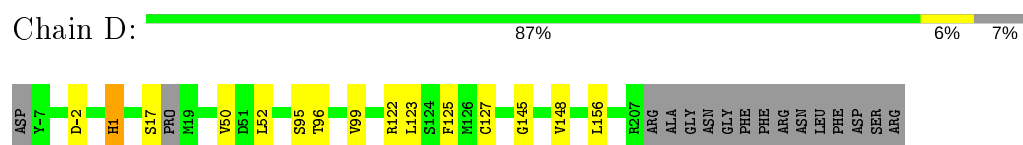
- Molecule 1: Soluble acetylcholine receptor



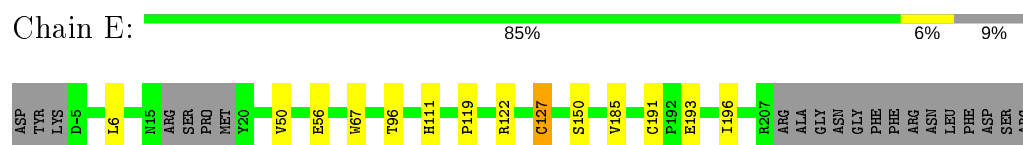
- Molecule 1: Soluble acetylcholine receptor




- Molecule 1: Soluble acetylcholine receptor



- Molecule 1: Soluble acetylcholine receptor




- Molecule 1: Soluble acetylcholine receptor

Chain F:  85% 6% 9%




- Molecule 1: Soluble acetylcholine receptor

Chain G:  89% 8%




- Molecule 1: Soluble acetylcholine receptor

Chain H:  84% 6% 10%




- Molecule 1: Soluble acetylcholine receptor

Chain I:  88% 5% 7%



- Molecule 1: Soluble acetylcholine receptor

Chain J:  84% 7% 9%



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 41	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	98.30Å 98.30Å 270.24Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	49.15 – 2.05 49.15 – 2.05	Depositor EDS
% Data completeness (in resolution range)	99.9 (49.15-2.05) 94.2 (49.15-2.05)	Depositor EDS
$R_{merge}$	0.16	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.49 (at 2.05Å)	Xtriage
Refinement program	PHENIX 1.9_1692	Depositor
R, $R_{free}$	0.197 , 0.235 0.199 , 0.236	Depositor DCC
$R_{free}$ test set	2003 reflections (1.26%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	20.7	Xtriage
Anisotropy	0.345	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 24.6	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	0.488 for h,-k,-l	Xtriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	17237	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	22.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.46% of the height of the origin peak. No significant pseudotranslation is detected.*

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

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.333 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: TI4, PG4, 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	0.38	0/1670	0.53	0/2283
1	B	0.36	0/1688	0.52	0/2309
1	C	0.38	0/1663	0.53	0/2276
1	D	0.37	0/1692	0.53	0/2317
1	E	0.37	0/1654	0.52	0/2266
1	F	0.38	0/1676	0.53	0/2291
1	G	0.36	0/1691	0.52	0/2313
1	H	0.37	0/1660	0.54	0/2272
1	I	0.37	0/1688	0.53	0/2312
1	J	0.36	0/1657	0.52	0/2270
All	All	0.37	0/16739	0.53	0/22909

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	1631	0	1531	12	0
1	B	1648	0	1532	5	0
1	C	1623	0	1512	14	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	D	1652	0	1518	11	0
1	E	1614	0	1490	10	0
1	F	1636	0	1535	9	0
1	G	1651	0	1534	7	0
1	H	1620	0	1509	9	0
1	I	1648	0	1512	6	0
1	J	1617	0	1492	10	0
2	A	10	0	0	0	0
2	B	5	0	0	0	0
2	C	5	0	0	0	0
2	D	5	0	0	0	0
2	F	10	0	0	0	0
2	G	5	0	0	0	0
2	H	5	0	0	0	0
2	I	5	0	0	0	0
3	A	16	18	18	1	0
3	D	16	18	18	1	0
3	F	16	18	18	1	0
3	I	16	18	18	1	0
4	A	13	18	18	0	0
4	C	13	18	18	1	0
4	E	13	18	18	0	0
4	F	13	18	18	0	0
4	H	13	18	18	2	0
4	J	13	18	18	0	0
5	A	58	0	0	0	0
5	B	53	0	0	0	0
5	C	58	0	0	1	0
5	D	55	0	0	1	0
5	E	50	0	0	0	0
5	F	51	0	0	0	0
5	G	50	0	0	0	0
5	H	54	0	0	0	0
5	I	55	0	0	0	0
5	J	41	0	0	0	0
All	All	17057	180	15345	78	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 2.

All (78) 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:D:122:ARG:HD2	1:E:96:THR:O	1.97	0.65
1:E:150:SER:CB	1:E:193:GLU:HG3	2.27	0.64
1:E:185:VAL:HG22	1:E:196:ILE:HD12	1.79	0.64
1:A:77:ASP:OD2	1:A:79:ARG:NH2	2.26	0.63
1:I:122:ARG:HD2	1:J:96:THR:O	1.99	0.62
1:H:191:CYS:HB3	1:H:193:GLU:OE2	2.00	0.62
1:G:122:ARG:HD2	1:H:96:THR:O	2.03	0.58
1:B:50:VAL:HG21	1:B:127:CYS:SG	2.44	0.58
1:J:150:SER:CB	1:J:193:GLU:HG3	2.34	0.58
1:I:52:LEU:HG	1:I:125:PHE:HE2	1.69	0.57
1:F:50:VAL:HG21	1:F:127:CYS:SG	2.45	0.57
1:F:61:LYS:HE3	1:F:112:ASP:O	2.05	0.56
5:C:439:HOH:O	1:D:99:VAL:HG23	2.06	0.55
1:F:37:LEU:HG	1:F:163:VAL:HG11	1.89	0.55
1:B:122:ARG:HD2	1:C:96:THR:O	2.06	0.55
1:E:50:VAL:HG21	1:E:127:CYS:SG	2.47	0.55
1:G:118:ILE:HD12	4:H:302:PG4:H22	1.87	0.55
1:G:50:VAL:HG21	1:G:127:CYS:SG	2.49	0.53
1:F:122:ARG:HD2	1:G:96:THR:O	2.07	0.53
1:A:61:LYS:HE3	1:A:112:ASP:O	2.09	0.53
1:A:37:LEU:HG	1:A:163:VAL:HG11	1.90	0.52
3:A:303:TI4:H133	3:A:303:TI4:H6	1.92	0.52
1:A:50:VAL:HG21	1:A:127:CYS:SG	2.49	0.51
1:H:155:ASP:OD1	1:H:196:ILE:HD13	2.11	0.50
1:A:8:ARG:CZ	1:H:0:LEU:HD13	2.42	0.50
1:D:99:VAL:HG21	5:D:447:HOH:O	2.12	0.50
1:A:79:ARG:HG3	1:B:148:VAL:HG21	1.93	0.50
1:D:52:LEU:HG	1:D:125:PHE:HE2	1.77	0.49
1:A:21:PRO:HB2	1:E:6:LEU:HD23	1.94	0.49
1:H:193:GLU:HG2	1:H:195:TYR:CE2	2.48	0.49
1:C:80:THR:OG1	1:C:84:ASP:OD2	2.31	0.48
3:F:303:TI4:H6	3:F:303:TI4:H133	1.94	0.48
1:D:50:VAL:HG21	1:D:127:CYS:SG	2.53	0.48
1:A:96:THR:O	1:E:122:ARG:HD2	2.14	0.48
1:G:105:GLN:OE1	1:G:105:GLN:HA	2.14	0.47
1:J:50:VAL:HG21	1:J:127:CYS:SG	2.54	0.47
1:A:79:ARG:N	1:A:79:ARG:HD3	2.30	0.47
1:F:96:THR:O	1:J:122:ARG:HD2	2.14	0.47
1:E:50:VAL:CG2	1:E:127:CYS:SG	3.02	0.47
1:H:50:VAL:HG21	1:H:127:CYS:SG	2.53	0.47
1:H:61:LYS:HE3	1:H:112:ASP:O	2.15	0.46
1:C:106:ILE:HB	1:D:148:VAL:HG11	1.97	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:G:6:LEU:HD23	1:H:21:PRO:HB2	1.97	0.46
1:C:0:LEU:HD13	1:F:8:ARG:CZ	2.45	0.46
1:B:-1:LYS:HD3	1:C:27:ASP:OD1	2.15	0.46
3:D:302:TI4:H6	3:D:302:TI4:H133	1.98	0.46
1:J:185:VAL:HG22	1:J:196:ILE:HD12	1.96	0.45
1:A:122:ARG:HD2	1:B:96:THR:O	2.17	0.45
1:E:150:SER:HB2	1:E:193:GLU:HG3	1.99	0.45
1:F:21:PRO:HB2	1:J:6:LEU:HD23	1.99	0.45
1:J:20:TYR:CE1	1:J:22:GLY:HA2	2.52	0.45
3:I:302:TI4:H133	3:I:302:TI4:H6	1.99	0.44
1:C:50:VAL:HG21	1:C:127:CYS:SG	2.58	0.44
1:C:61:LYS:HE3	1:C:112:ASP:O	2.18	0.44
1:I:145:GLY:HA2	1:I:156:LEU:HD11	2.01	0.43
1:D:145:GLY:HA2	1:D:156:LEU:HD11	2.00	0.43
1:I:95:SER:HB3	1:I:123:LEU:HD11	2.01	0.43
1:J:30:THR:HG21	1:J:157:LYS:HE3	2.01	0.43
1:F:191:CYS:HA	1:F:192:PRO:HD3	1.84	0.43
1:H:147:TRP:O	4:H:302:PG4:H12	2.19	0.43
1:C:191:CYS:HB3	1:C:193:GLU:OE2	2.18	0.43
1:C:195:TYR:CE1	4:C:302:PG4:H21	2.53	0.42
1:E:67:TRP:CZ3	1:E:111:HIS:HA	2.54	0.42
1:F:77:ASP:OD2	1:F:79:ARG:NH2	2.41	0.42
1:C:155:ASP:OD1	1:C:196:ILE:HD13	2.19	0.42
1:D:95:SER:HB3	1:D:123:LEU:HD11	2.01	0.42
1:C:122:ARG:HD2	1:D:96:THR:O	2.19	0.42
1:C:59:ARG:HA	1:C:115:VAL:O	2.20	0.42
1:I:50:VAL:HG21	1:I:127:CYS:SG	2.60	0.42
1:D:-2:ASP:O	1:D:1:HIS:HB3	2.19	0.42
1:E:56:GLU:O	1:E:119:PRO:HD2	2.21	0.41
1:A:191:CYS:HA	1:A:192:PRO:HD3	1.83	0.41
1:I:52:LEU:HG	1:I:125:PHE:CE2	2.53	0.41
1:J:67:TRP:CZ3	1:J:111:HIS:HA	2.56	0.41
1:C:106:ILE:HG21	1:D:148:VAL:HG21	2.02	0.41
1:J:50:VAL:CG2	1:J:127:CYS:SG	3.10	0.40
1:C:17:SER:HB2	1:G:8:ARG:HG3	2.03	0.40
1:A:-1:LYS:O	1:A:3:GLN:HG3	2.22	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	205/230 (89%)	203 (99%)	2 (1%)	0	100	100
1	B	208/230 (90%)	205 (99%)	3 (1%)	0	100	100
1	C	205/230 (89%)	201 (98%)	4 (2%)	0	100	100
1	D	210/230 (91%)	207 (99%)	3 (1%)	0	100	100
1	E	205/230 (89%)	202 (98%)	3 (2%)	0	100	100
1	F	205/230 (89%)	203 (99%)	2 (1%)	0	100	100
1	G	208/230 (90%)	204 (98%)	4 (2%)	0	100	100
1	H	204/230 (89%)	201 (98%)	3 (2%)	0	100	100
1	I	210/230 (91%)	207 (99%)	3 (1%)	0	100	100
1	J	205/230 (89%)	203 (99%)	2 (1%)	0	100	100
All	All	2065/2300 (90%)	2036 (99%)	29 (1%)	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	182/208 (88%)	182 (100%)	0	100	100
1	B	182/208 (88%)	181 (100%)	1 (0%)	88	89
1	C	180/208 (86%)	180 (100%)	0	100	100
1	D	181/208 (87%)	179 (99%)	2 (1%)	73	73

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	E	177/208 (85%)	175 (99%)	2 (1%)	73	73
1	F	182/208 (88%)	182 (100%)	0	100	100
1	G	183/208 (88%)	183 (100%)	0	100	100
1	H	180/208 (86%)	179 (99%)	1 (1%)	86	87
1	I	180/208 (86%)	178 (99%)	2 (1%)	73	73
1	J	178/208 (86%)	176 (99%)	2 (1%)	73	73
All	All	1805/2080 (87%)	1795 (99%)	10 (1%)	86	87

All (10) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	142	VAL
1	D	1	HIS
1	D	17	SER
1	E	127	CYS
1	E	191	CYS
1	H	161	ASP
1	I	1	HIS
1	I	17	SER
1	J	127	CYS
1	J	191	CYS

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	F	187	HIS
1	H	105	GLN
1	J	1	HIS

### 5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

## 5.5 Carbohydrates [i](#)

There are no carbohydrates in this entry.

## 5.6 Ligand geometry [i](#)

20 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	I	301	-	4,4,4	0.23	0	6,6,6	0.13	0
3	TI4	D	302	-	19,19,19	0.82	0	26,28,28	1.33	2 (7%)
2	SO4	A	301	-	4,4,4	0.23	0	6,6,6	0.15	0
4	PG4	E	301	-	12,12,12	1.12	1 (8%)	11,11,11	0.60	0
4	PG4	A	304	-	12,12,12	1.01	0	11,11,11	0.52	0
3	TI4	A	303	-	19,19,19	0.91	0	26,28,28	1.40	5 (19%)
4	PG4	F	304	-	12,12,12	1.01	0	11,11,11	0.40	0
3	TI4	I	302	-	19,19,19	0.81	0	26,28,28	1.33	3 (11%)
4	PG4	J	301	-	12,12,12	1.07	0	11,11,11	0.51	0
2	SO4	F	302	-	4,4,4	0.20	0	6,6,6	0.19	0
2	SO4	H	301	-	4,4,4	0.25	0	6,6,6	0.22	0
4	PG4	H	302	-	12,12,12	1.07	0	11,11,11	0.51	0
2	SO4	B	301	-	4,4,4	0.23	0	6,6,6	0.18	0
3	TI4	F	303	-	19,19,19	1.00	0	26,28,28	1.28	3 (11%)
2	SO4	C	301	-	4,4,4	0.22	0	6,6,6	0.21	0
2	SO4	F	301	-	4,4,4	0.23	0	6,6,6	0.15	0
4	PG4	C	302	-	12,12,12	1.00	1 (8%)	11,11,11	0.47	0
2	SO4	D	301	-	4,4,4	0.24	0	6,6,6	0.08	0
2	SO4	G	301	-	4,4,4	0.24	0	6,6,6	0.20	0
2	SO4	A	302	-	4,4,4	0.20	0	6,6,6	0.13	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	PG4	E	301	-	-	5/10/10/10	-
4	PG4	A	304	-	-	4/10/10/10	-
4	PG4	F	304	-	-	7/10/10/10	-
3	TI4	I	302	-	-	2/4/32/32	0/5/4/4
4	PG4	J	301	-	-	4/10/10/10	-
3	TI4	D	302	-	-	2/4/32/32	0/5/4/4
4	PG4	H	302	-	-	8/10/10/10	-
3	TI4	F	303	-	-	1/4/32/32	0/5/4/4
4	PG4	C	302	-	-	3/10/10/10	-
3	TI4	A	303	-	-	3/4/32/32	0/5/4/4

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	E	301	PG4	C7-C8	2.17	1.61	1.49
4	C	302	PG4	C7-C8	2.10	1.60	1.49

All (13) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	302	TI4	C16-N8-C7	3.24	114.81	109.82
3	I	302	TI4	C16-N8-C7	3.19	114.73	109.82
3	F	303	TI4	C16-N8-C7	2.62	113.86	109.82
3	A	303	TI4	C16-N8-C7	2.62	113.86	109.82
3	A	303	TI4	C11-C10-C9	2.58	112.30	109.66
3	A	303	TI4	C5-C7-N8	2.56	117.20	112.46
3	F	303	TI4	C11-C10-C9	2.40	112.11	109.66
3	F	303	TI4	C9-N8-C7	-2.19	106.46	109.82
3	I	302	TI4	C13-C12-C11	-2.17	105.32	109.05
3	I	302	TI4	C12-C7-N8	-2.16	107.22	110.84
3	A	303	TI4	C9-N8-C7	-2.10	106.59	109.82
3	D	302	TI4	C13-C12-C11	-2.05	105.54	109.05
3	A	303	TI4	C15-C10-C9	-2.02	107.59	109.66

There are no chirality outliers.

All (39) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	304	PG4	O3-C5-C6-O4
4	C	302	PG4	O3-C5-C6-O4

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Mol	Chain	Res	Type	Atoms
4	F	304	PG4	O2-C3-C4-O3
4	F	304	PG4	O3-C5-C6-O4
4	F	304	PG4	O4-C7-C8-O5
4	F	304	PG4	C8-C7-O4-C6
4	F	304	PG4	O1-C1-C2-O2
4	H	302	PG4	O4-C7-C8-O5
4	H	302	PG4	O3-C5-C6-O4
4	E	301	PG4	O3-C5-C6-O4
4	J	301	PG4	O3-C5-C6-O4
4	C	302	PG4	O4-C7-C8-O5
4	A	304	PG4	O4-C7-C8-O5
4	E	301	PG4	C8-C7-O4-C6
4	E	301	PG4	O2-C3-C4-O3
4	J	301	PG4	O1-C1-C2-O2
4	F	304	PG4	C4-C3-O2-C2
4	C	302	PG4	C3-C4-O3-C5
4	E	301	PG4	C6-C5-O3-C4
4	H	302	PG4	C3-C4-O3-C5
4	H	302	PG4	C1-C2-O2-C3
4	E	301	PG4	C1-C2-O2-C3
4	J	301	PG4	C6-C5-O3-C4
4	H	302	PG4	C6-C5-O3-C4
4	H	302	PG4	O1-C1-C2-O2
4	A	304	PG4	C8-C7-O4-C6
4	F	304	PG4	C1-C2-O2-C3
3	A	303	TI4	C4-C5-C7-N8
4	A	304	PG4	C5-C6-O4-C7
3	I	302	TI4	C4-C5-C7-N8
3	A	303	TI4	C6-C5-C7-N8
3	D	302	TI4	C4-C5-C7-N8
4	H	302	PG4	O2-C3-C4-O3
3	I	302	TI4	C6-C5-C7-N8
4	J	301	PG4	C3-C4-O3-C5
3	A	303	TI4	C6-C5-C7-C12
3	F	303	TI4	C4-C5-C7-N8
4	H	302	PG4	C5-C6-O4-C7
3	D	302	TI4	C6-C5-C7-N8

There are no ring outliers.

6 monomers are involved in 7 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	D	302	TI4	1	0
3	A	303	TI4	1	0
3	I	302	TI4	1	0
4	H	302	PG4	2	0
3	F	303	TI4	1	0
4	C	302	PG4	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, 95<sup>th</sup> percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	209/230 (90%)	-0.34	0 100 100	14, 20, 36, 43	0
1	B	212/230 (92%)	-0.34	0 100 100	15, 22, 34, 41	0
1	C	209/230 (90%)	-0.35	0 100 100	15, 21, 33, 43	0
1	D	214/230 (93%)	-0.37	0 100 100	14, 20, 36, 47	0
1	E	209/230 (90%)	-0.36	0 100 100	14, 21, 31, 41	0
1	F	209/230 (90%)	-0.34	0 100 100	14, 19, 36, 42	0
1	G	212/230 (92%)	-0.34	0 100 100	15, 22, 33, 41	0
1	H	208/230 (90%)	-0.34	1 (0%) 91 92	14, 21, 33, 44	0
1	I	214/230 (93%)	-0.36	0 100 100	14, 20, 35, 46	0
1	J	209/230 (90%)	-0.37	0 100 100	14, 21, 32, 48	0
All	All	2105/2300 (91%)	-0.35	1 (0%) 100 100	14, 21, 34, 48	0

All (1) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	H	159	ASP	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. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q<0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
4	PG4	E	301	13/13	0.79	0.17	28,37,44,45	0
4	PG4	J	301	13/13	0.83	0.15	29,37,44,48	0
4	PG4	F	304	13/13	0.86	0.16	23,36,43,46	0
4	PG4	A	304	13/13	0.86	0.16	22,35,42,43	0
4	PG4	C	302	13/13	0.88	0.15	24,30,39,47	0
4	PG4	H	302	13/13	0.90	0.13	23,32,36,43	0
2	SO4	C	301	5/5	0.90	0.26	42,45,58,61	0
2	SO4	F	302	5/5	0.92	0.22	46,49,62,65	0
2	SO4	A	302	5/5	0.93	0.21	40,44,59,62	0
2	SO4	H	301	5/5	0.94	0.20	45,50,55,61	0
3	TI4	I	302	16/16	0.94	0.14	21,29,36,39	0
3	TI4	D	302	16/16	0.95	0.14	20,30,36,36	0
2	SO4	F	301	5/5	0.95	0.20	49,51,57,63	0
3	TI4	F	303	16/16	0.95	0.16	16,24,30,31	0
2	SO4	G	301	5/5	0.96	0.18	43,49,52,55	0
3	TI4	A	303	16/16	0.96	0.17	16,25,31,32	0
2	SO4	I	301	5/5	0.97	0.23	45,51,57,58	0
2	SO4	D	301	5/5	0.97	0.20	43,48,54,54	0
2	SO4	B	301	5/5	0.97	0.15	44,48,55,60	0
2	SO4	A	301	5/5	0.97	0.17	44,50,54,62	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.