



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 14, 2018 – 12:20 am GMT

PDB ID : 4L6I  
Title : Methylthioadenosine phosphorylase from *Schistosoma mansoni* in complex with adenine  
Authors : Torini, J.R.; DeMarco, R.; Brandao-Neto, J.; Pereira, H.M.  
Deposited on : 2013-06-12  
Resolution : 2.10 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 : 1.7.3 (157068), CSD as539be (2018)  
Xtriage (Phenix) : 1.13  
EDS : trunk31020  
Percentile statistics : 20171227.v01 (using entries in the PDB archive December 27th 2017)  
Refmac : 5.8.0158  
CCP4 : 7.0 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : trunk31020

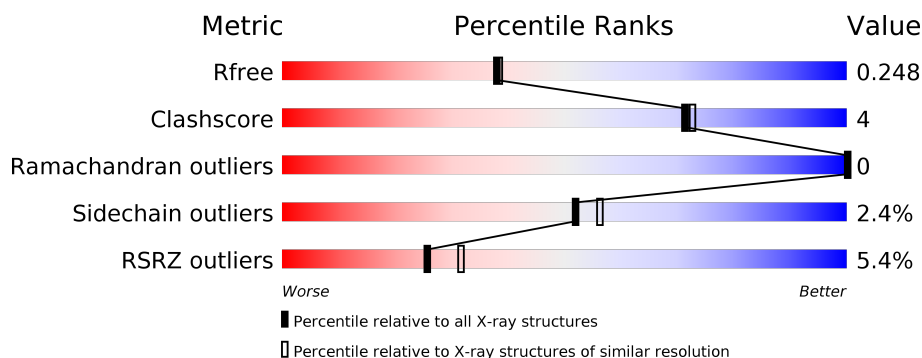
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.10 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))
$R_{free}$	111664	4608 (2.10-2.10)
Clashscore	122126	5109 (2.10-2.10)
Ramachandran outliers	120053	5059 (2.10-2.10)
Sidechain outliers	120020	5060 (2.10-2.10)
RSRZ outliers	108989	4497 (2.10-2.10)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$ . The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	320	<div> <div>6%</div> <div> <div></div> <div>80%</div> <div>11%</div> <div>10%</div> </div> </div>
1	B	320	<div> <div>6%</div> <div> <div></div> <div>80%</div> <div>10%</div> <div>9%</div> </div> </div>
1	C	320	<div> <div>3%</div> <div> <div></div> <div>80%</div> <div>7%</div> <div>13%</div> </div> </div>
1	D	320	<div> <div>6%</div> <div> <div></div> <div>80%</div> <div>9%</div> <div>11%</div> </div> </div>
1	E	320	<div> <div>4%</div> <div> <div></div> <div>78%</div> <div>12%</div> <div>10%</div> </div> </div>
1	F	320	<div> <div>4%</div> <div> <div></div> <div>82%</div> <div>8%</div> <div>10%</div> </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	SO4	B	302	-	-	X	-
3	SO4	E	302	-	-	X	-

## 2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 13756 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 S-methyl-5'-thioadenosine phosphorylase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	289	Total	C	N	O	S	0	0	0
			2197	1395	384	401	17			
1	B	290	Total	C	N	O	S	0	0	0
			2197	1390	380	409	18			
1	C	277	Total	C	N	O	S	0	0	0
			2105	1337	365	388	15			
1	D	286	Total	C	N	O	S	0	0	0
			2168	1375	379	397	17			
1	E	288	Total	C	N	O	S	0	0	0
			2202	1394	381	410	17			
1	F	288	Total	C	N	O	S	0	0	0
			2193	1388	382	408	15			

There are 126 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-20	MET	-	EXPRESSION TAG	UNP I0B503
A	-19	GLY	-	EXPRESSION TAG	UNP I0B503
A	-18	SER	-	EXPRESSION TAG	UNP I0B503
A	-17	SER	-	EXPRESSION TAG	UNP I0B503
A	-16	HIS	-	EXPRESSION TAG	UNP I0B503
A	-15	HIS	-	EXPRESSION TAG	UNP I0B503
A	-14	HIS	-	EXPRESSION TAG	UNP I0B503
A	-13	HIS	-	EXPRESSION TAG	UNP I0B503
A	-12	HIS	-	EXPRESSION TAG	UNP I0B503
A	-11	HIS	-	EXPRESSION TAG	UNP I0B503
A	-10	SER	-	EXPRESSION TAG	UNP I0B503
A	-9	SER	-	EXPRESSION TAG	UNP I0B503
A	-8	GLY	-	EXPRESSION TAG	UNP I0B503
A	-7	LEU	-	EXPRESSION TAG	UNP I0B503
A	-6	VAL	-	EXPRESSION TAG	UNP I0B503
A	-5	PRO	-	EXPRESSION TAG	UNP I0B503
A	-4	ARG	-	EXPRESSION TAG	UNP I0B503

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Chain	Residue	Modelled	Actual	Comment	Reference
A	-3	GLY	-	EXPRESSION TAG	UNP I0B503
A	-2	SER	-	EXPRESSION TAG	UNP I0B503
A	-1	HIS	-	EXPRESSION TAG	UNP I0B503
A	0	MET	-	EXPRESSION TAG	UNP I0B503
B	-20	MET	-	EXPRESSION TAG	UNP I0B503
B	-19	GLY	-	EXPRESSION TAG	UNP I0B503
B	-18	SER	-	EXPRESSION TAG	UNP I0B503
B	-17	SER	-	EXPRESSION TAG	UNP I0B503
B	-16	HIS	-	EXPRESSION TAG	UNP I0B503
B	-15	HIS	-	EXPRESSION TAG	UNP I0B503
B	-14	HIS	-	EXPRESSION TAG	UNP I0B503
B	-13	HIS	-	EXPRESSION TAG	UNP I0B503
B	-12	HIS	-	EXPRESSION TAG	UNP I0B503
B	-11	HIS	-	EXPRESSION TAG	UNP I0B503
B	-10	SER	-	EXPRESSION TAG	UNP I0B503
B	-9	SER	-	EXPRESSION TAG	UNP I0B503
B	-8	GLY	-	EXPRESSION TAG	UNP I0B503
B	-7	LEU	-	EXPRESSION TAG	UNP I0B503
B	-6	VAL	-	EXPRESSION TAG	UNP I0B503
B	-5	PRO	-	EXPRESSION TAG	UNP I0B503
B	-4	ARG	-	EXPRESSION TAG	UNP I0B503
B	-3	GLY	-	EXPRESSION TAG	UNP I0B503
B	-2	SER	-	EXPRESSION TAG	UNP I0B503
B	-1	HIS	-	EXPRESSION TAG	UNP I0B503
B	0	MET	-	EXPRESSION TAG	UNP I0B503
C	-20	MET	-	EXPRESSION TAG	UNP I0B503
C	-19	GLY	-	EXPRESSION TAG	UNP I0B503
C	-18	SER	-	EXPRESSION TAG	UNP I0B503
C	-17	SER	-	EXPRESSION TAG	UNP I0B503
C	-16	HIS	-	EXPRESSION TAG	UNP I0B503
C	-15	HIS	-	EXPRESSION TAG	UNP I0B503
C	-14	HIS	-	EXPRESSION TAG	UNP I0B503
C	-13	HIS	-	EXPRESSION TAG	UNP I0B503
C	-12	HIS	-	EXPRESSION TAG	UNP I0B503
C	-11	HIS	-	EXPRESSION TAG	UNP I0B503
C	-10	SER	-	EXPRESSION TAG	UNP I0B503
C	-9	SER	-	EXPRESSION TAG	UNP I0B503
C	-8	GLY	-	EXPRESSION TAG	UNP I0B503
C	-7	LEU	-	EXPRESSION TAG	UNP I0B503
C	-6	VAL	-	EXPRESSION TAG	UNP I0B503
C	-5	PRO	-	EXPRESSION TAG	UNP I0B503
C	-4	ARG	-	EXPRESSION TAG	UNP I0B503

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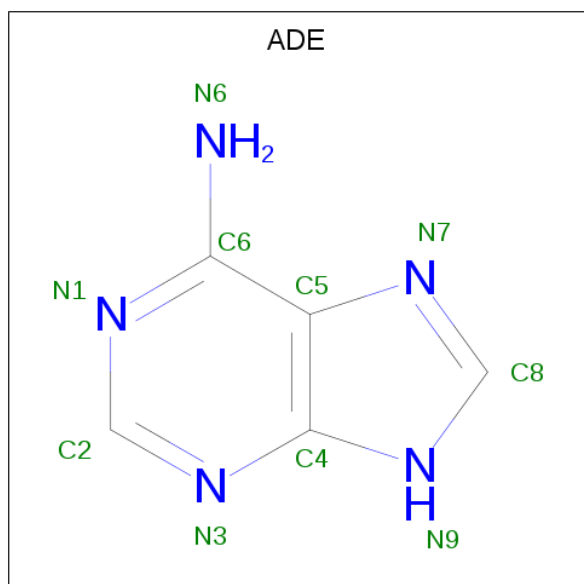
Chain	Residue	Modelled	Actual	Comment	Reference
C	-3	GLY	-	EXPRESSION TAG	UNP I0B503
C	-2	SER	-	EXPRESSION TAG	UNP I0B503
C	-1	HIS	-	EXPRESSION TAG	UNP I0B503
C	0	MET	-	EXPRESSION TAG	UNP I0B503
D	-20	MET	-	EXPRESSION TAG	UNP I0B503
D	-19	GLY	-	EXPRESSION TAG	UNP I0B503
D	-18	SER	-	EXPRESSION TAG	UNP I0B503
D	-17	SER	-	EXPRESSION TAG	UNP I0B503
D	-16	HIS	-	EXPRESSION TAG	UNP I0B503
D	-15	HIS	-	EXPRESSION TAG	UNP I0B503
D	-14	HIS	-	EXPRESSION TAG	UNP I0B503
D	-13	HIS	-	EXPRESSION TAG	UNP I0B503
D	-12	HIS	-	EXPRESSION TAG	UNP I0B503
D	-11	HIS	-	EXPRESSION TAG	UNP I0B503
D	-10	SER	-	EXPRESSION TAG	UNP I0B503
D	-9	SER	-	EXPRESSION TAG	UNP I0B503
D	-8	GLY	-	EXPRESSION TAG	UNP I0B503
D	-7	LEU	-	EXPRESSION TAG	UNP I0B503
D	-6	VAL	-	EXPRESSION TAG	UNP I0B503
D	-5	PRO	-	EXPRESSION TAG	UNP I0B503
D	-4	ARG	-	EXPRESSION TAG	UNP I0B503
D	-3	GLY	-	EXPRESSION TAG	UNP I0B503
D	-2	SER	-	EXPRESSION TAG	UNP I0B503
D	-1	HIS	-	EXPRESSION TAG	UNP I0B503
D	0	MET	-	EXPRESSION TAG	UNP I0B503
E	-20	MET	-	EXPRESSION TAG	UNP I0B503
E	-19	GLY	-	EXPRESSION TAG	UNP I0B503
E	-18	SER	-	EXPRESSION TAG	UNP I0B503
E	-17	SER	-	EXPRESSION TAG	UNP I0B503
E	-16	HIS	-	EXPRESSION TAG	UNP I0B503
E	-15	HIS	-	EXPRESSION TAG	UNP I0B503
E	-14	HIS	-	EXPRESSION TAG	UNP I0B503
E	-13	HIS	-	EXPRESSION TAG	UNP I0B503
E	-12	HIS	-	EXPRESSION TAG	UNP I0B503
E	-11	HIS	-	EXPRESSION TAG	UNP I0B503
E	-10	SER	-	EXPRESSION TAG	UNP I0B503
E	-9	SER	-	EXPRESSION TAG	UNP I0B503
E	-8	GLY	-	EXPRESSION TAG	UNP I0B503
E	-7	LEU	-	EXPRESSION TAG	UNP I0B503
E	-6	VAL	-	EXPRESSION TAG	UNP I0B503
E	-5	PRO	-	EXPRESSION TAG	UNP I0B503
E	-4	ARG	-	EXPRESSION TAG	UNP I0B503

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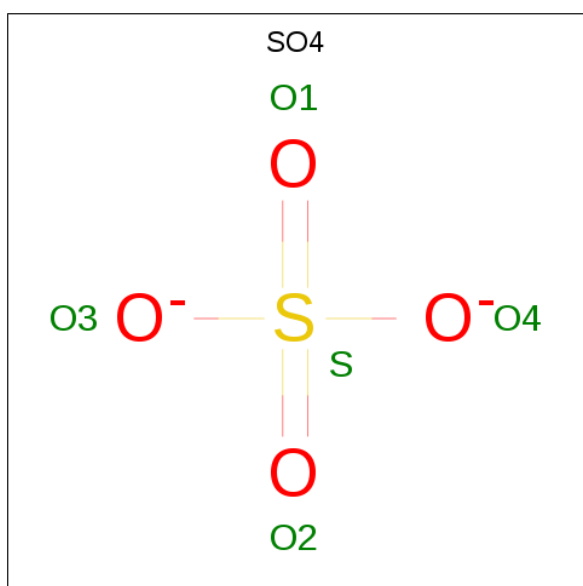
Chain	Residue	Modelled	Actual	Comment	Reference
E	-3	GLY	-	EXPRESSION TAG	UNP I0B503
E	-2	SER	-	EXPRESSION TAG	UNP I0B503
E	-1	HIS	-	EXPRESSION TAG	UNP I0B503
E	0	MET	-	EXPRESSION TAG	UNP I0B503
F	-20	MET	-	EXPRESSION TAG	UNP I0B503
F	-19	GLY	-	EXPRESSION TAG	UNP I0B503
F	-18	SER	-	EXPRESSION TAG	UNP I0B503
F	-17	SER	-	EXPRESSION TAG	UNP I0B503
F	-16	HIS	-	EXPRESSION TAG	UNP I0B503
F	-15	HIS	-	EXPRESSION TAG	UNP I0B503
F	-14	HIS	-	EXPRESSION TAG	UNP I0B503
F	-13	HIS	-	EXPRESSION TAG	UNP I0B503
F	-12	HIS	-	EXPRESSION TAG	UNP I0B503
F	-11	HIS	-	EXPRESSION TAG	UNP I0B503
F	-10	SER	-	EXPRESSION TAG	UNP I0B503
F	-9	SER	-	EXPRESSION TAG	UNP I0B503
F	-8	GLY	-	EXPRESSION TAG	UNP I0B503
F	-7	LEU	-	EXPRESSION TAG	UNP I0B503
F	-6	VAL	-	EXPRESSION TAG	UNP I0B503
F	-5	PRO	-	EXPRESSION TAG	UNP I0B503
F	-4	ARG	-	EXPRESSION TAG	UNP I0B503
F	-3	GLY	-	EXPRESSION TAG	UNP I0B503
F	-2	SER	-	EXPRESSION TAG	UNP I0B503
F	-1	HIS	-	EXPRESSION TAG	UNP I0B503
F	0	MET	-	EXPRESSION TAG	UNP I0B503

- Molecule 2 is ADENINE (three-letter code: ADE) (formula:  $C_5H_5N_5$ ).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	N	0	0
			10	5	5		
2	B	1	Total	C	N	0	0
			10	5	5		
2	D	1	Total	C	N	0	0
			10	5	5		
2	E	1	Total	C	N	0	0
			10	5	5		

- Molecule 3 is SULFATE ION (three-letter code: SO4) (formula: O<sub>4</sub>S).



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

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	127	Total	O	0	0
			127	127		
4	B	114	Total	O	0	0
			114	114		

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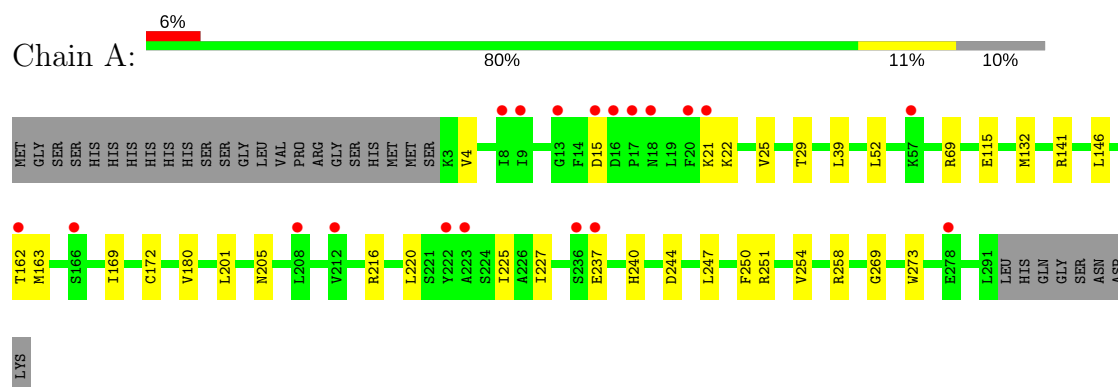
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	C	94	Total 94	O 94	0	0
4	D	80	Total 80	O 80	0	0
4	E	91	Total 91	O 91	0	0
4	F	128	Total 128	O 128	0	0

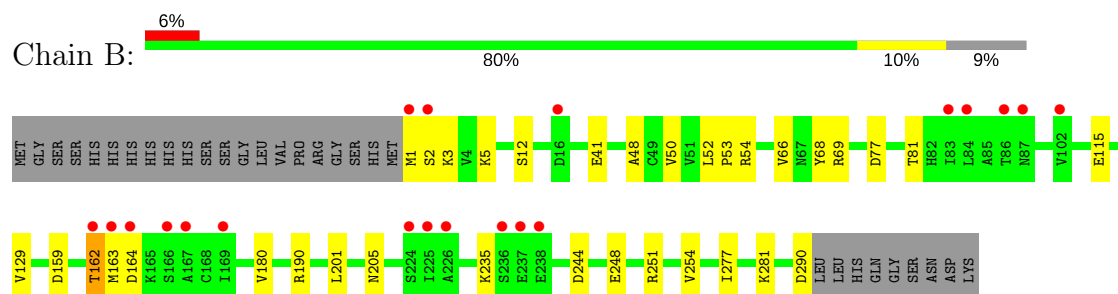
### 3 Residue-property plots [i](#)

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

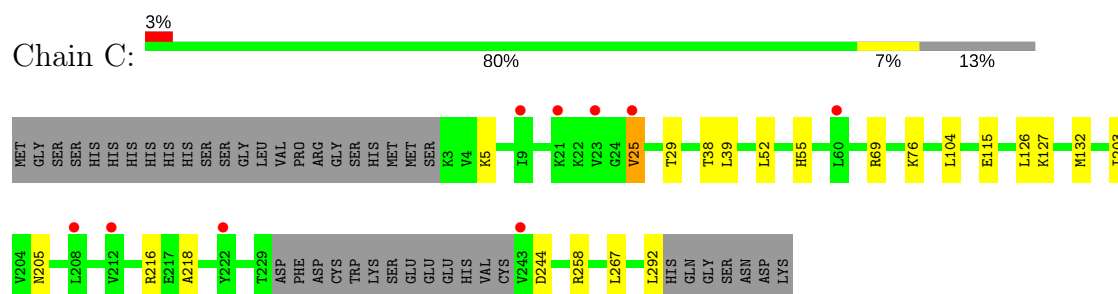
- Molecule 1: S-methyl-5'-thioadenosine phosphorylase



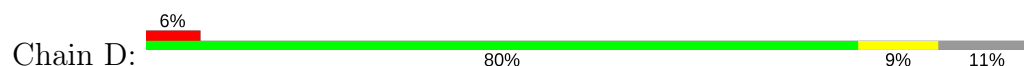
- Molecule 1: S-methyl-5'-thioadenosine phosphorylase

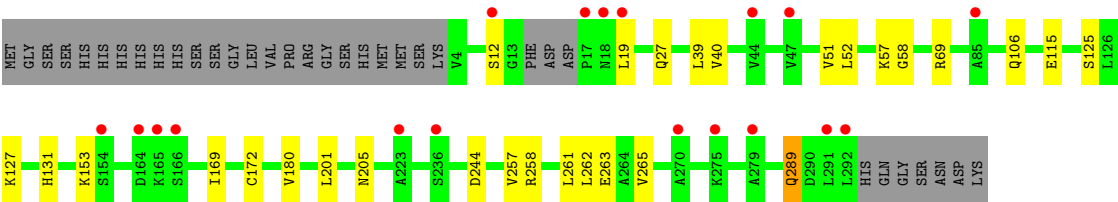


- Molecule 1: S-methyl-5'-thioadenosine phosphorylase

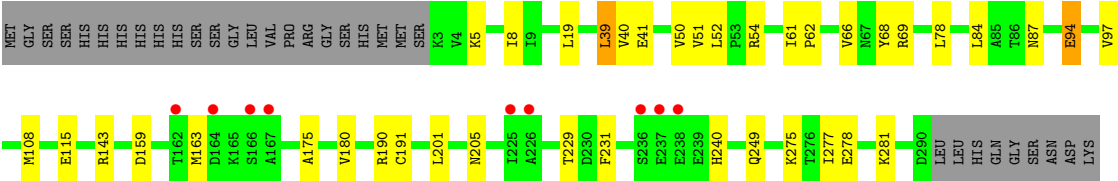
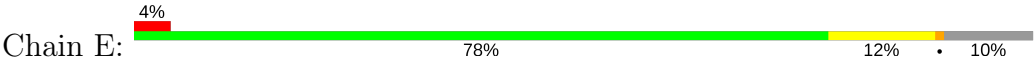


- Molecule 1: S-methyl-5'-thioadenosine phosphorylase

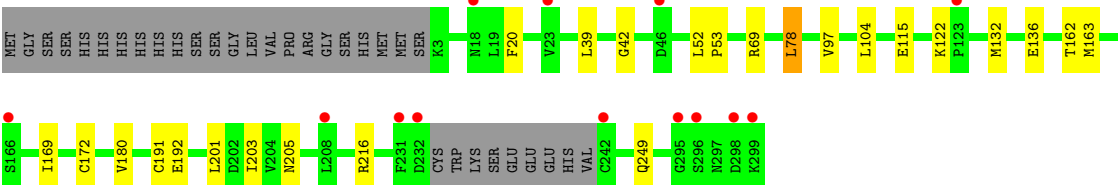
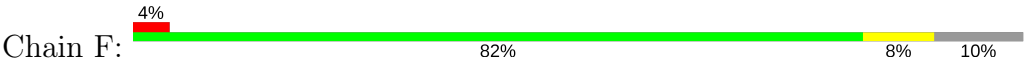




• Molecule 1: S-methyl-5'-thioadenosine phosphorylase



• Molecule 1: S-methyl-5'-thioadenosine phosphorylase



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	81.27Å 82.55Å 150.30Å 90.00° 100.61° 90.00°	Depositor
Resolution (Å)	30.01 – 2.10 30.01 – 2.10	Depositor EDS
% Data completeness (in resolution range)	91.0 (30.01-2.10) 91.0 (30.01-2.10)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.12	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.89 (at 2.10Å)	Xtriage
Refinement program	PHENIX 1.8.2_1309	Depositor
R, $R_{free}$	0.192 , 0.241 0.202 , 0.248	Depositor DCC
$R_{free}$ test set	5227 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	24.9	Xtriage
Anisotropy	0.234	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 49.2	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	13756	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	30.0	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 58.56 % 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 2.0086e-05. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

<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: ADE, 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	0.39	0/2242	0.56	0/3041
1	B	0.37	0/2242	0.53	0/3043
1	C	0.35	0/2145	0.54	0/2908
1	D	0.37	0/2211	0.54	0/2999
1	E	0.37	0/2247	0.53	0/3048
1	F	0.38	0/2235	0.53	0/3029
All	All	0.37	0/13322	0.54	0/18068

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	2197	0	2195	18	0
1	B	2197	0	2169	20	0
1	C	2105	0	2121	12	0
1	D	2168	0	2159	17	0
1	E	2202	0	2185	24	0
1	F	2193	0	2187	12	0
2	A	10	0	4	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	10	0	4	0	0
2	D	10	0	4	0	0
2	E	10	0	4	0	0
3	B	5	0	0	2	0
3	C	5	0	0	1	0
3	E	5	0	0	2	0
3	F	5	0	0	0	0
4	A	127	0	0	0	0
4	B	114	0	0	1	0
4	C	94	0	0	1	0
4	D	80	0	0	0	0
4	E	91	0	0	1	0
4	F	128	0	0	1	0
All	All	13756	0	13032	99	0

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

All (99) 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:B:54:ARG:NH1	3:B:302:SO4:O4	2.07	0.88
1:E:69:ARG:HD2	1:E:115:GLU:HB3	1.65	0.78
1:B:41:GLU:HG2	1:B:50:VAL:HG22	1.66	0.76
1:E:54:ARG:NH1	3:E:302:SO4:O1	2.18	0.76
1:F:191:CYS:SG	4:F:512:HOH:O	2.52	0.67
1:E:69:ARG:HD2	1:E:115:GLU:CB	2.25	0.67
1:E:40:VAL:HG13	1:E:51:VAL:HB	1.79	0.65
1:A:254:VAL:HG12	1:A:258:ARG:HE	1.62	0.65
1:B:3:LYS:HG3	1:B:81:THR:HG21	1.78	0.64
1:A:162:THR:HG23	1:A:163:MET:HG3	1.78	0.64
1:D:69:ARG:HD2	1:D:115:GLU:HB3	1.80	0.64
1:C:25:VAL:HG13	1:C:38:THR:HG21	1.80	0.63
1:A:180:VAL:HB	1:A:201:LEU:HD13	1.82	0.62
1:E:39:LEU:HD22	1:E:52:LEU:HD13	1.82	0.62
1:F:69:ARG:HD2	1:F:115:GLU:HB3	1.82	0.62
1:F:132:MET:HE2	1:F:216:ARG:HG2	1.83	0.60
1:B:69:ARG:HD2	1:B:115:GLU:CB	2.32	0.60
1:A:250:PHE:O	1:A:254:VAL:HG23	2.02	0.60
1:D:69:ARG:HD2	1:D:115:GLU:CB	2.33	0.59
1:C:132:MET:HE2	1:C:216:ARG:HG2	1.84	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:180:VAL:HB	1:D:201:LEU:HD13	1.85	0.57
1:B:180:VAL:HB	1:B:201:LEU:HD13	1.87	0.57
1:B:69:ARG:HD2	1:B:115:GLU:HB3	1.86	0.56
1:A:132:MET:HE2	1:A:216:ARG:HG2	1.88	0.54
1:A:251:ARG:NH2	1:C:292:LEU:HD11	2.23	0.54
1:F:69:ARG:HD2	1:F:115:GLU:CB	2.37	0.54
1:A:227:ILE:HD13	1:A:250:PHE:CZ	2.44	0.53
1:D:40:VAL:HG23	1:D:51:VAL:HB	1.92	0.52
1:B:5:LYS:NZ	1:B:41:GLU:OE2	2.39	0.52
1:E:190:ARG:HH22	1:E:240:HIS:CE1	2.28	0.52
1:A:22:LYS:HD2	1:A:25:VAL:HG23	1.92	0.51
1:C:258:ARG:NH2	4:C:475:HOH:O	2.31	0.51
1:A:247:LEU:HD13	1:C:292:LEU:HD22	1.91	0.51
1:E:277:ILE:HG22	1:E:281:LYS:HE2	1.92	0.51
1:C:69:ARG:HD2	1:C:115:GLU:CB	2.41	0.51
1:A:69:ARG:HD2	1:A:115:GLU:CB	2.41	0.51
1:B:244:ASP:OD2	4:B:496:HOH:O	2.19	0.51
1:C:76:LYS:HD2	1:C:218:ALA:HB1	1.93	0.50
1:E:275:LYS:HZ3	1:E:275:LYS:HA	1.76	0.50
1:B:129:VAL:HG12	1:B:290:ASP:HB3	1.94	0.50
1:D:39:LEU:HD13	1:D:52:LEU:HB2	1.92	0.50
1:A:4:VAL:HG21	1:A:269:GLY:HA2	1.93	0.49
1:E:5:LYS:NZ	1:E:41:GLU:OE2	2.37	0.49
1:A:146:LEU:HD13	1:A:225:ILE:HG12	1.95	0.49
1:E:143:ARG:NH2	1:E:175:ALA:O	2.46	0.48
1:B:162:THR:HG23	1:B:163:MET:HG3	1.94	0.48
1:E:94:GLU:HB2	4:E:417:HOH:O	2.12	0.48
1:F:39:LEU:HD12	1:F:78:LEU:HD22	1.94	0.48
1:B:12:SER:N	3:B:302:SO4:O3	2.46	0.48
1:E:159:ASP:O	1:E:163:MET:HG2	2.14	0.47
1:A:39:LEU:HG	1:A:52:LEU:HD13	1.95	0.47
1:A:254:VAL:CG1	1:A:258:ARG:HE	2.26	0.47
1:E:97:VAL:HG22	1:E:231:PHE:HZ	1.79	0.47
1:F:104:LEU:HD21	1:F:203:ILE:HD11	1.97	0.46
1:D:169:ILE:O	1:D:172:CYS:HB3	2.15	0.46
1:A:237:GLU:HA	1:A:240:HIS:CE1	2.51	0.46
1:C:104:LEU:HD21	1:C:203:ILE:HD11	1.96	0.46
1:B:69:ARG:HD2	1:B:115:GLU:HB2	1.98	0.46
1:C:55:HIS:NE2	3:C:301:SO4:O1	2.39	0.46
1:E:180:VAL:HB	1:E:201:LEU:HD13	1.98	0.45
1:E:108:MET:HG2	1:F:192:GLU:HG2	1.98	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:52:LEU:HD12	1:B:53:PRO:HD2	1.99	0.45
1:E:41:GLU:HG3	1:E:50:VAL:HG22	1.98	0.45
1:E:8:ILE:HD13	1:E:84:LEU:HB2	1.99	0.45
1:F:162:THR:HG23	1:F:163:MET:HG3	1.97	0.45
1:C:69:ARG:HD2	1:C:115:GLU:HB3	1.98	0.45
1:D:12:SER:O	1:D:258:ARG:NH1	2.50	0.45
1:E:275:LYS:NZ	1:E:278:GLU:OE1	2.47	0.44
1:B:5:LYS:HE2	1:B:48:ALA:HB1	1.98	0.43
1:E:61:ILE:HA	1:E:62:PRO:HD3	1.91	0.43
1:E:66:VAL:HB	1:E:68:TYR:CE1	2.53	0.43
1:A:141:ARG:HH22	1:A:273:TRP:HA	1.82	0.43
1:C:127:LYS:HD2	1:C:127:LYS:N	2.33	0.43
1:E:229:THR:HA	1:E:249:GLN:HG2	2.00	0.43
1:B:190:ARG:NH2	1:B:235:LYS:O	2.50	0.43
1:D:57:LYS:HA	1:D:58:GLY:HA2	1.71	0.43
1:D:40:VAL:CG2	1:D:51:VAL:HB	2.49	0.43
1:D:153:LYS:HE3	1:D:263:GLU:HB2	2.00	0.42
1:B:66:VAL:HB	1:B:68:TYR:CE1	2.54	0.42
1:D:106:GLN:HB3	1:E:191:CYS:HB2	2.01	0.42
1:D:261:LEU:O	1:D:265:VAL:HG13	2.19	0.42
1:D:262:LEU:O	1:D:265:VAL:HG22	2.19	0.42
1:A:69:ARG:HD2	1:A:115:GLU:HB3	2.01	0.42
1:B:159:ASP:HB3	1:B:162:THR:HG22	2.00	0.41
1:B:3:LYS:HD2	1:B:277:ILE:HD13	2.02	0.41
1:D:19:LEU:HD23	1:D:262:LEU:HD13	2.00	0.41
1:F:180:VAL:HB	1:F:201:LEU:HD13	2.02	0.41
1:F:169:ILE:O	1:F:172:CYS:HB3	2.20	0.41
1:A:169:ILE:O	1:A:172:CYS:HB3	2.20	0.41
1:F:20:PHE:CE1	1:F:42:GLY:HA3	2.56	0.41
1:C:39:LEU:HD22	1:C:52:LEU:HB2	2.03	0.41
1:D:69:ARG:NH2	1:D:125:SER:OG	2.54	0.40
1:E:39:LEU:HD12	1:E:78:LEU:HD12	2.02	0.40
1:E:87:ASN:HA	3:E:302:SO4:O1	2.22	0.40
1:F:52:LEU:HD12	1:F:53:PRO:HD2	2.03	0.40
1:B:248:GLU:HA	1:B:251:ARG:NH1	2.36	0.40
1:B:1:MET:HA	1:B:2:SER:HA	1.61	0.40
1:D:127:LYS:HA	1:D:127:LYS:HD3	1.83	0.40
1:D:131:HIS:HD2	1:D:289:GLN:HG3	1.86	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	287/320 (90%)	283 (99%)	4 (1%)	0	100	100
1	B	288/320 (90%)	285 (99%)	3 (1%)	0	100	100
1	C	273/320 (85%)	272 (100%)	1 (0%)	0	100	100
1	D	282/320 (88%)	274 (97%)	8 (3%)	0	100	100
1	E	286/320 (89%)	281 (98%)	5 (2%)	0	100	100
1	F	284/320 (89%)	282 (99%)	2 (1%)	0	100	100
All	All	1700/1920 (88%)	1677 (99%)	23 (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	238/274 (87%)	232 (98%)	6 (2%)	50	55
1	B	238/274 (87%)	232 (98%)	6 (2%)	50	55
1	C	230/274 (84%)	223 (97%)	7 (3%)	44	47
1	D	234/274 (85%)	229 (98%)	5 (2%)	56	62
1	E	240/274 (88%)	236 (98%)	4 (2%)	63	70
1	F	239/274 (87%)	233 (98%)	6 (2%)	50	55
All	All	1419/1644 (86%)	1385 (98%)	34 (2%)	52	56

All (34) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	15	ASP
1	A	21	LYS
1	A	29	THR
1	A	205	ASN
1	A	220	LEU
1	A	244	ASP
1	B	77	ASP
1	B	162	THR
1	B	164	ASP
1	B	205	ASN
1	B	254	VAL
1	B	281	LYS
1	C	5	LYS
1	C	25	VAL
1	C	29	THR
1	C	126	LEU
1	C	205	ASN
1	C	244	ASP
1	C	267	LEU
1	D	27	GLN
1	D	205	ASN
1	D	244	ASP
1	D	257	VAL
1	D	289	GLN
1	E	19	LEU
1	E	39	LEU
1	E	94	GLU
1	E	205	ASN
1	F	78	LEU
1	F	97	VAL
1	F	122	LYS
1	F	136	GLU
1	F	205	ASN
1	F	249	GLN

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

### 5.3.3 RNA ⓘ

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](#)

8 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	ADE	A	301	-	9,11,11	1.13	1 (11%)	7,15,15	0.81	0
2	ADE	B	301	-	9,11,11	1.04	0	7,15,15	0.80	0
3	SO4	B	302	-	4,4,4	0.20	0	6,6,6	0.13	0
3	SO4	C	301	-	4,4,4	0.21	0	6,6,6	0.26	0
2	ADE	D	301	-	9,11,11	1.07	1 (11%)	7,15,15	0.73	0
2	ADE	E	301	-	9,11,11	0.97	0	7,15,15	1.00	1 (14%)
3	SO4	E	302	-	4,4,4	0.13	0	6,6,6	0.16	0
3	SO4	F	301	-	4,4,4	0.17	0	6,6,6	0.37	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
2	ADE	A	301	-	-	0/0/0/0	0/2/2/2
2	ADE	B	301	-	-	0/0/0/0	0/2/2/2
3	SO4	B	302	-	-	0/0/0/0	0/0/0/0
3	SO4	C	301	-	-	0/0/0/0	0/0/0/0
2	ADE	D	301	-	-	0/0/0/0	0/2/2/2
2	ADE	E	301	-	-	0/0/0/0	0/2/2/2

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	SO4	E	302	-	-	0/0/0/0	0/0/0/0
3	SO4	F	301	-	-	0/0/0/0	0/0/0/0

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	301	ADE	C4-N9	2.23	1.39	1.34
2	A	301	ADE	C4-N9	2.57	1.39	1.34

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	E	301	ADE	C5-C6-N6	2.15	124.85	120.47

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

3 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	302	SO4	2	0
3	C	301	SO4	1	0
3	E	302	SO4	2	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

### 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, 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	289/320 (90%)	0.16	19 (6%) 18 23	11, 24, 49, 68	0
1	B	290/320 (90%)	0.33	20 (6%) 17 21	15, 27, 54, 88	0
1	C	277/320 (86%)	0.19	9 (3%) 47 55	16, 31, 56, 70	0
1	D	286/320 (89%)	0.37	18 (6%) 20 25	16, 30, 50, 75	0
1	E	288/320 (90%)	0.18	13 (4%) 33 39	14, 28, 55, 83	0
1	F	288/320 (90%)	0.15	13 (4%) 33 39	14, 25, 48, 70	0
All	All	1718/1920 (89%)	0.23	92 (5%) 26 32	11, 28, 53, 88	0

All (92) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	2	SER	7.4
1	B	1	MET	6.0
1	D	292	LEU	5.7
1	C	25	VAL	4.7
1	D	19	LEU	4.6
1	B	166	SER	4.4
1	D	18	ASN	4.3
1	B	238	GLU	4.2
1	A	16	ASP	4.0
1	A	18	ASN	3.9
1	E	225	ILE	3.9
1	E	162	THR	3.7
1	F	299	LYS	3.7
1	F	231	PHE	3.6
1	B	226	ALA	3.6
1	C	9	ILE	3.5
1	E	167	ALA	3.5
1	A	17	PRO	3.5
1	C	23	VAL	3.5

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Mol	Chain	Res	Type	RSRZ
1	B	162	THR	3.4
1	D	17	PRO	3.4
1	F	232	ASP	3.4
1	E	237	GLU	3.4
1	E	238	GLU	3.3
1	B	164	ASP	3.3
1	F	123	PRO	3.3
1	D	236	SER	3.3
1	A	237	GLU	3.1
1	C	222	TYR	3.1
1	F	295	GLY	3.0
1	A	57	LYS	3.0
1	B	236	SER	2.9
1	A	223	ALA	2.9
1	A	162	THR	2.9
1	F	296	SER	2.8
1	D	291	LEU	2.7
1	D	164	ASP	2.7
1	A	15	ASP	2.7
1	E	166	SER	2.7
1	B	237	GLU	2.7
1	C	208	LEU	2.7
1	C	212	VAL	2.6
1	A	20	PHE	2.6
1	D	279	ALA	2.6
1	A	13	GLY	2.6
1	B	102	VAL	2.6
1	D	44	VAL	2.6
1	D	154	SER	2.6
1	E	236	SER	2.6
1	E	85	ALA	2.6
1	D	47	VAL	2.6
1	F	23	VAL	2.6
1	B	83	ILE	2.6
1	D	12	SER	2.5
1	E	86	THR	2.5
1	D	165	LYS	2.5
1	D	270	ALA	2.5
1	A	166	SER	2.4
1	A	21	LYS	2.4
1	B	167	ALA	2.4
1	D	166	SER	2.4

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Mol	Chain	Res	Type	RSRZ
1	B	163	MET	2.4
1	F	46	ASP	2.4
1	F	18	ASN	2.4
1	E	9	ILE	2.4
1	D	223	ALA	2.4
1	B	86	THR	2.4
1	B	224	SER	2.4
1	E	164	ASP	2.3
1	B	87	ASN	2.3
1	E	84	LEU	2.3
1	B	16	ASP	2.3
1	F	298	ASP	2.3
1	B	169	ILE	2.3
1	A	236	SER	2.3
1	E	226	ALA	2.2
1	A	9	ILE	2.2
1	C	60	LEU	2.2
1	A	8	ILE	2.2
1	F	242	CYS	2.2
1	A	212	VAL	2.2
1	C	243	VAL	2.2
1	D	85	ALA	2.2
1	B	225	ILE	2.1
1	F	208	LEU	2.1
1	F	166	SER	2.1
1	B	84	LEU	2.1
1	A	278	GLU	2.1
1	C	21	LYS	2.0
1	A	222	TYR	2.0
1	A	208	LEU	2.0
1	D	275	LYS	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
2	ADE	B	301	10/10	0.94	0.15	27,28,29,30	0
3	SO4	E	302	5/5	0.96	0.20	40,46,54,55	0
2	ADE	E	301	10/10	0.97	0.12	22,24,27,28	0
2	ADE	D	301	10/10	0.97	0.09	19,25,28,30	0
2	ADE	A	301	10/10	0.97	0.10	14,16,18,18	0
3	SO4	C	301	5/5	0.98	0.08	27,34,38,38	0
3	SO4	B	302	5/5	0.98	0.21	40,50,54,56	0
3	SO4	F	301	5/5	0.99	0.07	21,24,27,27	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.