



wwPDB X-ray Structure Validation Summary Report ⓘ

Jul 3, 2017 – 07:27 PM EDT

PDB ID : 2J6P
Title : STRUCTURE OF AS-SB REDUCTASE FROM LEISHMANIA MAJOR
Authors : Bisacchi, D.; Zhou, Y.; Rosen, B.P.; Mukhopadhyay, R.; Bordo, D.
Deposited on : unknown
Resolution : 2.15 Å(reported)

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

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<http://wwpdb.org/validation/2016/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

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

MolProbity : 4.02b-467
Mogul : 1.7.2 (RC1), CSD as538be (2017)
Xtriage (Phenix) : 1.9-1692
EDS : rb-20029824
Percentile statistics : 20161228.v01 (using entries in the PDB archive December 28th 2016)
Refmac : 5.8.0135
CCP4 : 6.5.0
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : rb-20029824

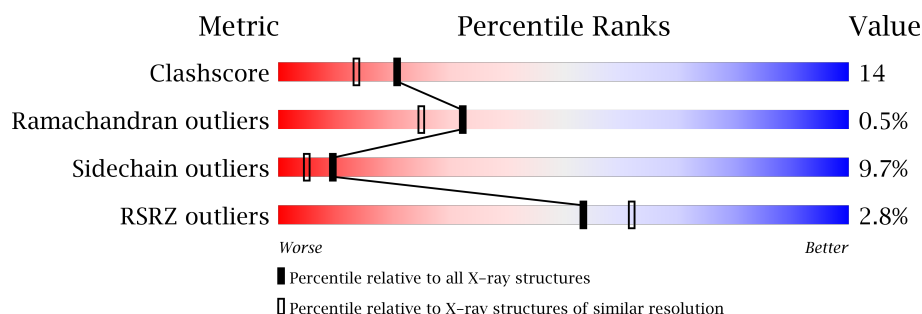
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.15 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))
Clashscore	112137	1278 (2.16-2.16)
Ramachandran outliers	110173	1256 (2.16-2.16)
Sidechain outliers	110143	1255 (2.16-2.16)
RSRZ outliers	101464	1175 (2.16-2.16)

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

Mol	Chain	Length	Quality of chain
1	A	152	<div> <div>0%</div> <div>67% 21% 6% • 5%</div> </div>
1	B	152	<div> <div>2%</div> <div>64% 23% 5% • 5%</div> </div>
1	C	152	<div> <div>2%</div> <div>64% 26% • • 5%</div> </div>
1	D	152	<div> <div>3%</div> <div>64% 23% 7% • 5%</div> </div>
1	E	152	<div> <div>3%</div> <div>71% 17% 7% • 5%</div> </div>
1	F	152	<div> <div>5%</div> <div>64% 22% 9% • 5%</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
2	EPE	A	201	-	-	-	X
2	EPE	B	201	-	-	-	X
3	GOL	A	202	-	-	X	X
3	GOL	B	203	-	-	X	X
3	GOL	C	202	-	-	X	-
4	SO4	B	205	-	-	X	-
4	SO4	D	204	-	-	-	X
4	SO4	F	201	-	-	-	X

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 7503 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 SB(V)-AS(V) REDUCTASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	145	Total	C	N	O	S	5	1	0
			1157	739	190	219	9			
1	B	145	Total	C	N	O	S	5	2	0
			1161	741	191	220	9			
1	C	145	Total	C	N	O	S	5	0	0
			1155	738	190	219	8			
1	D	145	Total	C	N	O	S	5	0	0
			1155	738	190	219	8			
1	E	145	Total	C	N	O	S	5	2	0
			1161	741	191	220	9			
1	F	145	Total	C	N	O	S	5	2	0
			1161	741	191	220	9			

There are 150 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	128	LYS	-	expression tag	UNP Q6Q1Q5
A	129	LEU	-	expression tag	UNP Q6Q1Q5
A	130	GLY	-	expression tag	UNP Q6Q1Q5
A	131	PRO	-	expression tag	UNP Q6Q1Q5
A	132	GLU	-	expression tag	UNP Q6Q1Q5
A	133	GLN	-	expression tag	UNP Q6Q1Q5
A	134	LYS	-	expression tag	UNP Q6Q1Q5
A	135	LEU	-	expression tag	UNP Q6Q1Q5
A	136	ILE	-	expression tag	UNP Q6Q1Q5
A	137	SER	-	expression tag	UNP Q6Q1Q5
A	138	GLU	-	expression tag	UNP Q6Q1Q5
A	139	GLU	-	expression tag	UNP Q6Q1Q5
A	140	ASP	-	expression tag	UNP Q6Q1Q5
A	141	LEU	-	expression tag	UNP Q6Q1Q5
A	142	ASN	-	expression tag	UNP Q6Q1Q5
A	143	SER	-	expression tag	UNP Q6Q1Q5
A	144	ALA	-	expression tag	UNP Q6Q1Q5

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Chain	Residue	Modelled	Actual	Comment	Reference
A	145	VAL	-	expression tag	UNP Q6Q1Q5
A	146	ASP	-	expression tag	UNP Q6Q1Q5
A	147	HIS	-	expression tag	UNP Q6Q1Q5
A	148	HIS	-	expression tag	UNP Q6Q1Q5
A	149	HIS	-	expression tag	UNP Q6Q1Q5
A	150	HIS	-	expression tag	UNP Q6Q1Q5
A	151	HIS	-	expression tag	UNP Q6Q1Q5
A	152	HIS	-	expression tag	UNP Q6Q1Q5
B	128	LYS	-	expression tag	UNP Q6Q1Q5
B	129	LEU	-	expression tag	UNP Q6Q1Q5
B	130	GLY	-	expression tag	UNP Q6Q1Q5
B	131	PRO	-	expression tag	UNP Q6Q1Q5
B	132	GLU	-	expression tag	UNP Q6Q1Q5
B	133	GLN	-	expression tag	UNP Q6Q1Q5
B	134	LYS	-	expression tag	UNP Q6Q1Q5
B	135	LEU	-	expression tag	UNP Q6Q1Q5
B	136	ILE	-	expression tag	UNP Q6Q1Q5
B	137	SER	-	expression tag	UNP Q6Q1Q5
B	138	GLU	-	expression tag	UNP Q6Q1Q5
B	139	GLU	-	expression tag	UNP Q6Q1Q5
B	140	ASP	-	expression tag	UNP Q6Q1Q5
B	141	LEU	-	expression tag	UNP Q6Q1Q5
B	142	ASN	-	expression tag	UNP Q6Q1Q5
B	143	SER	-	expression tag	UNP Q6Q1Q5
B	144	ALA	-	expression tag	UNP Q6Q1Q5
B	145	VAL	-	expression tag	UNP Q6Q1Q5
B	146	ASP	-	expression tag	UNP Q6Q1Q5
B	147	HIS	-	expression tag	UNP Q6Q1Q5
B	148	HIS	-	expression tag	UNP Q6Q1Q5
B	149	HIS	-	expression tag	UNP Q6Q1Q5
B	150	HIS	-	expression tag	UNP Q6Q1Q5
B	151	HIS	-	expression tag	UNP Q6Q1Q5
B	152	HIS	-	expression tag	UNP Q6Q1Q5
C	128	LYS	-	expression tag	UNP Q6Q1Q5
C	129	LEU	-	expression tag	UNP Q6Q1Q5
C	130	GLY	-	expression tag	UNP Q6Q1Q5
C	131	PRO	-	expression tag	UNP Q6Q1Q5
C	132	GLU	-	expression tag	UNP Q6Q1Q5
C	133	GLN	-	expression tag	UNP Q6Q1Q5
C	134	LYS	-	expression tag	UNP Q6Q1Q5
C	135	LEU	-	expression tag	UNP Q6Q1Q5
C	136	ILE	-	expression tag	UNP Q6Q1Q5

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Chain	Residue	Modelled	Actual	Comment	Reference
C	137	SER	-	expression tag	UNP Q6Q1Q5
C	138	GLU	-	expression tag	UNP Q6Q1Q5
C	139	GLU	-	expression tag	UNP Q6Q1Q5
C	140	ASP	-	expression tag	UNP Q6Q1Q5
C	141	LEU	-	expression tag	UNP Q6Q1Q5
C	142	ASN	-	expression tag	UNP Q6Q1Q5
C	143	SER	-	expression tag	UNP Q6Q1Q5
C	144	ALA	-	expression tag	UNP Q6Q1Q5
C	145	VAL	-	expression tag	UNP Q6Q1Q5
C	146	ASP	-	expression tag	UNP Q6Q1Q5
C	147	HIS	-	expression tag	UNP Q6Q1Q5
C	148	HIS	-	expression tag	UNP Q6Q1Q5
C	149	HIS	-	expression tag	UNP Q6Q1Q5
C	150	HIS	-	expression tag	UNP Q6Q1Q5
C	151	HIS	-	expression tag	UNP Q6Q1Q5
C	152	HIS	-	expression tag	UNP Q6Q1Q5
D	128	LYS	-	expression tag	UNP Q6Q1Q5
D	129	LEU	-	expression tag	UNP Q6Q1Q5
D	130	GLY	-	expression tag	UNP Q6Q1Q5
D	131	PRO	-	expression tag	UNP Q6Q1Q5
D	132	GLU	-	expression tag	UNP Q6Q1Q5
D	133	GLN	-	expression tag	UNP Q6Q1Q5
D	134	LYS	-	expression tag	UNP Q6Q1Q5
D	135	LEU	-	expression tag	UNP Q6Q1Q5
D	136	ILE	-	expression tag	UNP Q6Q1Q5
D	137	SER	-	expression tag	UNP Q6Q1Q5
D	138	GLU	-	expression tag	UNP Q6Q1Q5
D	139	GLU	-	expression tag	UNP Q6Q1Q5
D	140	ASP	-	expression tag	UNP Q6Q1Q5
D	141	LEU	-	expression tag	UNP Q6Q1Q5
D	142	ASN	-	expression tag	UNP Q6Q1Q5
D	143	SER	-	expression tag	UNP Q6Q1Q5
D	144	ALA	-	expression tag	UNP Q6Q1Q5
D	145	VAL	-	expression tag	UNP Q6Q1Q5
D	146	ASP	-	expression tag	UNP Q6Q1Q5
D	147	HIS	-	expression tag	UNP Q6Q1Q5
D	148	HIS	-	expression tag	UNP Q6Q1Q5
D	149	HIS	-	expression tag	UNP Q6Q1Q5
D	150	HIS	-	expression tag	UNP Q6Q1Q5
D	151	HIS	-	expression tag	UNP Q6Q1Q5
D	152	HIS	-	expression tag	UNP Q6Q1Q5
E	128	LYS	-	expression tag	UNP Q6Q1Q5

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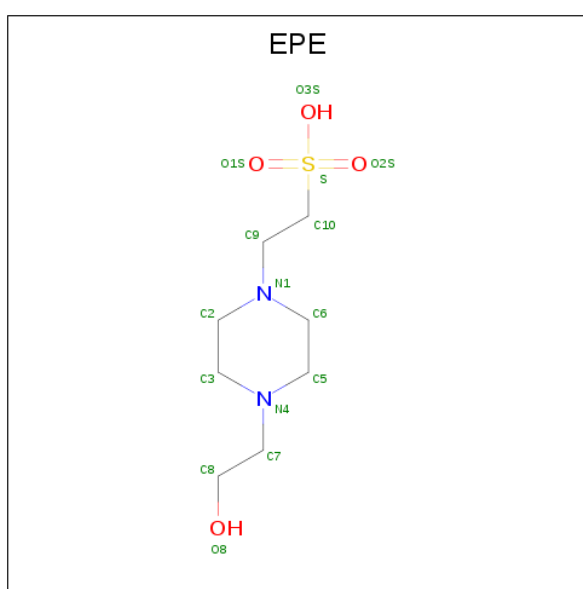
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E	129	LEU	-	expression tag	UNP Q6Q1Q5
E	130	GLY	-	expression tag	UNP Q6Q1Q5
E	131	PRO	-	expression tag	UNP Q6Q1Q5
E	132	GLU	-	expression tag	UNP Q6Q1Q5
E	133	GLN	-	expression tag	UNP Q6Q1Q5
E	134	LYS	-	expression tag	UNP Q6Q1Q5
E	135	LEU	-	expression tag	UNP Q6Q1Q5
E	136	ILE	-	expression tag	UNP Q6Q1Q5
E	137	SER	-	expression tag	UNP Q6Q1Q5
E	138	GLU	-	expression tag	UNP Q6Q1Q5
E	139	GLU	-	expression tag	UNP Q6Q1Q5
E	140	ASP	-	expression tag	UNP Q6Q1Q5
E	141	LEU	-	expression tag	UNP Q6Q1Q5
E	142	ASN	-	expression tag	UNP Q6Q1Q5
E	143	SER	-	expression tag	UNP Q6Q1Q5
E	144	ALA	-	expression tag	UNP Q6Q1Q5
E	145	VAL	-	expression tag	UNP Q6Q1Q5
E	146	ASP	-	expression tag	UNP Q6Q1Q5
E	147	HIS	-	expression tag	UNP Q6Q1Q5
E	148	HIS	-	expression tag	UNP Q6Q1Q5
E	149	HIS	-	expression tag	UNP Q6Q1Q5
E	150	HIS	-	expression tag	UNP Q6Q1Q5
E	151	HIS	-	expression tag	UNP Q6Q1Q5
E	152	HIS	-	expression tag	UNP Q6Q1Q5
F	128	LYS	-	expression tag	UNP Q6Q1Q5
F	129	LEU	-	expression tag	UNP Q6Q1Q5
F	130	GLY	-	expression tag	UNP Q6Q1Q5
F	131	PRO	-	expression tag	UNP Q6Q1Q5
F	132	GLU	-	expression tag	UNP Q6Q1Q5
F	133	GLN	-	expression tag	UNP Q6Q1Q5
F	134	LYS	-	expression tag	UNP Q6Q1Q5
F	135	LEU	-	expression tag	UNP Q6Q1Q5
F	136	ILE	-	expression tag	UNP Q6Q1Q5
F	137	SER	-	expression tag	UNP Q6Q1Q5
F	138	GLU	-	expression tag	UNP Q6Q1Q5
F	139	GLU	-	expression tag	UNP Q6Q1Q5
F	140	ASP	-	expression tag	UNP Q6Q1Q5
F	141	LEU	-	expression tag	UNP Q6Q1Q5
F	142	ASN	-	expression tag	UNP Q6Q1Q5
F	143	SER	-	expression tag	UNP Q6Q1Q5
F	144	ALA	-	expression tag	UNP Q6Q1Q5
F	145	VAL	-	expression tag	UNP Q6Q1Q5

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Chain	Residue	Modelled	Actual	Comment	Reference
F	146	ASP	-	expression tag	UNP Q6Q1Q5
F	147	HIS	-	expression tag	UNP Q6Q1Q5
F	148	HIS	-	expression tag	UNP Q6Q1Q5
F	149	HIS	-	expression tag	UNP Q6Q1Q5
F	150	HIS	-	expression tag	UNP Q6Q1Q5
F	151	HIS	-	expression tag	UNP Q6Q1Q5
F	152	HIS	-	expression tag	UNP Q6Q1Q5

- Molecule 2 is 4-(2-HYDROXYETHYL)-1-PIPERAZINE ETHANESULFONIC ACID (three-letter code: EPE) (formula: C₈H₁₈N₂O₄S).



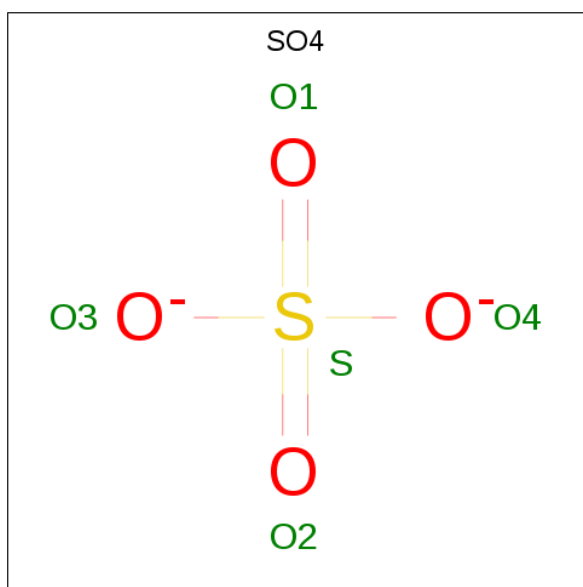
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	S	0	0
			15	8	2	4	1		
2	B	1	Total	C	N	O	S	0	0
			15	8	2	4	1		
2	C	1	Total	C	N	O	S	0	0
			15	8	2	4	1		
2	D	1	Total	C	N	O	S	0	0
			15	8	2	4	1		

- Molecule 3 is GLYCEROL (three-letter code: GOL) (formula: C₃H₈O₃).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
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		
3	C	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		

- Molecule 4 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



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

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	88	Total	O	0	0
			88	88		
5	B	83	Total	O	0	0
			83	83		
5	C	79	Total	O	0	0
			79	79		

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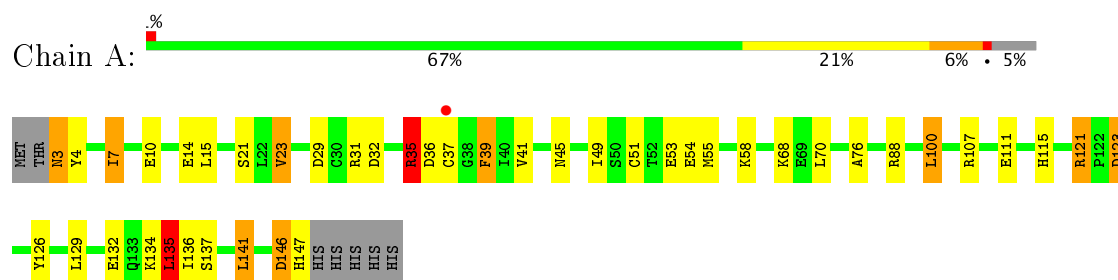
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	D	73	Total 73	O 73	0	0
5	E	48	Total 48	O 48	0	0
5	F	41	Total 41	O 41	0	0

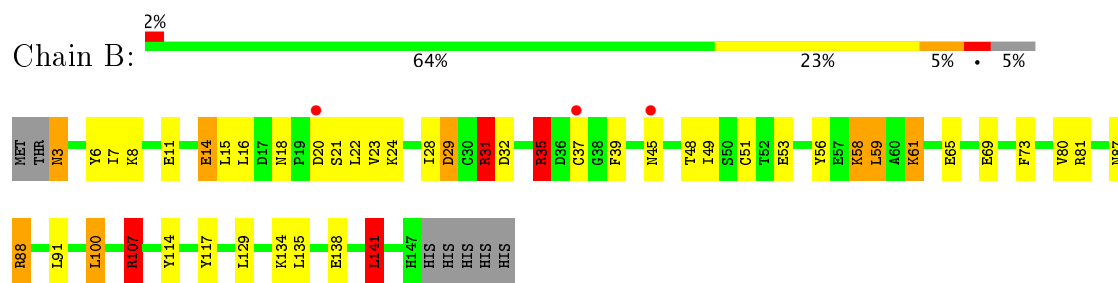
3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). 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.

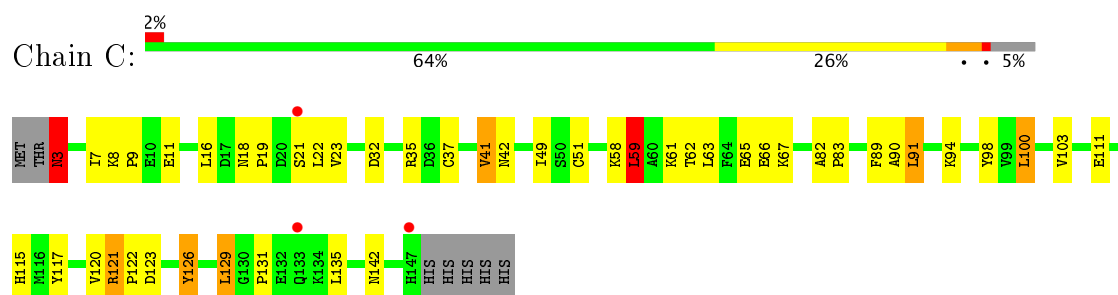
• Molecule 1: SB(V)-AS(V) REDUCTASE



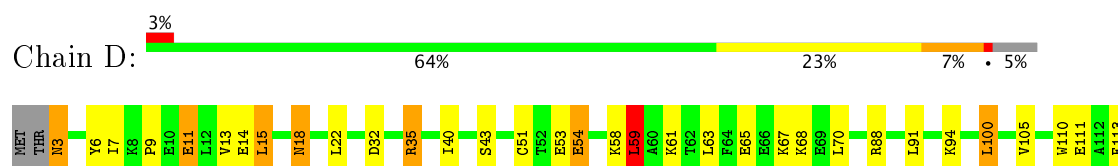
• Molecule 1: SB(V)-AS(V) REDUCTASE

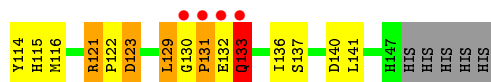


• Molecule 1: SB(V)-AS(V) REDUCTASE

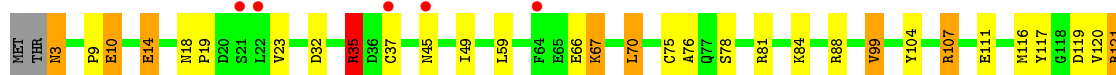


• Molecule 1: SB(V)-AS(V) REDUCTASE

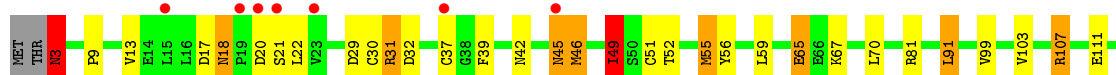




• Molecule 1: SB(V)-AS(V) REDUCTASE



• Molecule 1: SB(V)-AS(V) REDUCTASE



4 Data and refinement statistics

Property	Value	Source
Space group	P 32 2 1	Depositor
Cell constants a, b, c, α , β , γ	111.82Å 111.82Å 177.38Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	65.37 – 2.15 65.41 – 2.15	Depositor EDS
% Data completeness (in resolution range)	100.0 (65.37-2.15) 97.4 (65.41-2.15)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	6.04 (at 2.14Å)	Xtriage
Refinement program	REFMAC 5.2.0005	Depositor
R, R_{free}	0.190 , 0.241 0.197 , (Not available)	Depositor DCC
R_{free} test set	No test flags present.	DCC
Wilson B-factor (Å ²)	27.9	Xtriage
Anisotropy	0.180	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.38 , 58.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	0.025 for -h,-k,l	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	7503	wwPDB-VP
Average B, all atoms (Å ²)	35.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.16% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: GOL, EPE, 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	1.79	20/1185 (1.7%)	1.63	15/1603 (0.9%)
1	B	1.78	18/1193 (1.5%)	1.60	17/1614 (1.1%)
1	C	1.64	13/1179 (1.1%)	1.57	11/1595 (0.7%)
1	D	1.69	15/1179 (1.3%)	1.43	13/1595 (0.8%)
1	E	1.48	6/1193 (0.5%)	1.28	13/1614 (0.8%)
1	F	1.45	10/1193 (0.8%)	1.39	13/1614 (0.8%)
All	All	1.64	82/7122 (1.2%)	1.49	82/9635 (0.9%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	B	1	0
1	C	1	0
All	All	2	0

The worst 5 of 82 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	31	ARG	CD-NE	-9.42	1.30	1.46
1	C	37	CYS	CB-SG	9.12	1.97	1.82
1	A	4	TYR	CD1-CE1	9.06	1.52	1.39
1	B	3	ASN	N-CA	8.81	1.64	1.46
1	B	51	CYS	CB-SG	-8.57	1.67	1.82

The worst 5 of 82 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	121	ARG	NE-CZ-NH1	-29.43	105.58	120.30
1	A	121	ARG	NE-CZ-NH1	-28.94	105.83	120.30
1	B	31	ARG	NE-CZ-NH2	-21.04	109.78	120.30
1	A	121	ARG	NE-CZ-NH2	20.10	130.35	120.30
1	B	107	ARG	NE-CZ-NH1	-17.61	111.50	120.30

All (2) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
1	B	3	ASN	CA
1	C	3	ASN	CA

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	1157	0	1144	25	0
1	B	1161	0	1146	40	0
1	C	1155	0	1144	32	0
1	D	1155	0	1144	31	0
1	E	1161	0	1146	29	0
1	F	1161	0	1146	38	0
2	A	15	0	13	2	0
2	B	15	0	13	4	0
2	C	15	0	18	0	0
2	D	15	0	17	0	0
3	A	6	0	7	5	0
3	B	12	0	16	11	0
3	C	6	0	8	5	0
3	D	6	0	8	2	0
3	E	6	0	8	1	0
4	A	10	0	0	0	0
4	B	10	0	0	2	0
4	D	10	0	0	0	0
4	E	5	0	0	0	0
4	F	10	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	A	88	0	0	1	0
5	B	83	0	0	1	0
5	C	79	0	0	9	0
5	D	73	0	0	2	0
5	E	48	0	0	1	0
5	F	41	0	0	1	0
All	All	7503	0	6978	193	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 14.

The worst 5 of 193 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:107:ARG:HD2	3:B:203:GOL:H12	1.19	1.15
1:C:8:LYS:HE2	3:C:202:GOL:H2	1.14	1.11
1:B:107:ARG:CD	3:B:203:GOL:H12	1.90	1.01
1:B:107:ARG:HD2	3:B:203:GOL:C1	1.96	0.95
1:A:115:HIS:NE2	3:C:202:GOL:H11	1.81	0.95

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	144/152 (95%)	139 (96%)	4 (3%)	1 (1%)	25	17
1	B	145/152 (95%)	141 (97%)	4 (3%)	0	100	100
1	C	143/152 (94%)	138 (96%)	4 (3%)	1 (1%)	25	17
1	D	143/152 (94%)	136 (95%)	5 (4%)	2 (1%)	13	6
1	E	145/152 (95%)	139 (96%)	6 (4%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	F	145/152 (95%)	134 (92%)	11 (8%)	0	100	100
All	All	865/912 (95%)	827 (96%)	34 (4%)	4 (0%)	32	25

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	146	ASP
1	D	131	PRO
1	D	133	GLN
1	C	131	PRO

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	127/133 (96%)	118 (93%)	9 (7%)	17	11
1	B	128/133 (96%)	118 (92%)	10 (8%)	15	9
1	C	126/133 (95%)	117 (93%)	9 (7%)	17	11
1	D	126/133 (95%)	114 (90%)	12 (10%)	10	5
1	E	128/133 (96%)	112 (88%)	16 (12%)	5	2
1	F	128/133 (96%)	111 (87%)	17 (13%)	4	1
All	All	763/798 (96%)	690 (90%)	73 (10%)	9	5

5 of 73 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	59	LEU
1	E	3	ASN
1	F	99	VAL
1	D	123	ASP
1	E	23	VAL

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 10 such

sidechains are listed below:

Mol	Chain	Res	Type
1	C	45	ASN
1	D	3	ASN
1	F	3	ASN
1	C	3	ASN
1	E	133	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 carbohydrates in this entry.

5.6 Ligand geometry [i](#)

19 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	EPE	A	201	2,4	15,15,15	1.17	1 (6%)	18,20,20	2.77	8 (44%)
3	GOL	A	202	-	5,5,5	1.34	1 (20%)	5,5,5	1.57	1 (20%)
4	SO4	A	203	2	4,4,4	0.61	0	6,6,6	0.57	0
4	SO4	A	204	-	4,4,4	0.28	0	6,6,6	1.75	2 (33%)
2	EPE	B	201	2,4	15,15,15	1.16	1 (6%)	18,20,20	3.10	8 (44%)
3	GOL	B	202	-	5,5,5	0.49	0	5,5,5	0.75	0
3	GOL	B	203	-	5,5,5	1.02	0	5,5,5	1.10	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	SO4	B	204	-	4,4,4	0.30	0	6,6,6	0.58	0
4	SO4	B	205	2	4,4,4	0.40	0	6,6,6	0.48	0
2	EPE	C	201	-	15,15,15	1.06	0	18,20,20	2.41	6 (33%)
3	GOL	C	202	-	5,5,5	0.74	0	5,5,5	2.00	2 (40%)
2	EPE	D	201	-	15,15,15	1.13	2 (13%)	18,20,20	2.25	7 (38%)
3	GOL	D	202	-	5,5,5	0.44	0	5,5,5	0.42	0
4	SO4	D	203	-	4,4,4	0.36	0	6,6,6	1.46	1 (16%)
4	SO4	D	204	-	4,4,4	0.82	0	6,6,6	0.57	0
3	GOL	E	201	-	5,5,5	0.92	0	5,5,5	1.66	1 (20%)
4	SO4	E	202	-	4,4,4	0.32	0	6,6,6	0.78	0
4	SO4	F	201	-	4,4,4	0.27	0	6,6,6	0.48	0
4	SO4	F	202	-	4,4,4	0.87	0	6,6,6	1.07	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	EPE	A	201	2,4	-	0/9/19/19	0/1/1/1
3	GOL	A	202	-	-	0/4/4/4	0/0/0/0
4	SO4	A	203	2	-	0/0/0/0	0/0/0/0
4	SO4	A	204	-	-	0/0/0/0	0/0/0/0
2	EPE	B	201	2,4	-	0/9/19/19	0/1/1/1
3	GOL	B	202	-	-	0/4/4/4	0/0/0/0
3	GOL	B	203	-	-	0/4/4/4	0/0/0/0
4	SO4	B	204	-	-	0/0/0/0	0/0/0/0
4	SO4	B	205	2	-	0/0/0/0	0/0/0/0
2	EPE	C	201	-	-	0/9/19/19	0/1/1/1
3	GOL	C	202	-	-	0/4/4/4	0/0/0/0
2	EPE	D	201	-	-	0/9/19/19	0/1/1/1
3	GOL	D	202	-	-	0/4/4/4	0/0/0/0
4	SO4	D	203	-	-	0/0/0/0	0/0/0/0
4	SO4	D	204	-	-	0/0/0/0	0/0/0/0
3	GOL	E	201	-	-	0/4/4/4	0/0/0/0
4	SO4	E	202	-	-	0/0/0/0	0/0/0/0
4	SO4	F	201	-	-	0/0/0/0	0/0/0/0
4	SO4	F	202	-	-	0/0/0/0	0/0/0/0

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	202	GOL	O2-C2	-2.34	1.36	1.43
2	D	201	EPE	C9-N1	2.05	1.52	1.47
2	D	201	EPE	C2-N1	2.10	1.52	1.47
2	A	201	EPE	C10-S	3.56	1.82	1.77
2	B	201	EPE	C10-S	3.56	1.82	1.77

The worst 5 of 36 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	201	EPE	C5-C6-N1	-6.86	96.76	110.63
2	B	201	EPE	C6-C5-N4	-5.27	99.98	110.63
2	A	201	EPE	C6-C5-N4	-4.97	100.58	110.63
3	E	201	GOL	O2-C2-C1	-3.56	92.03	108.84
2	A	201	EPE	C5-C6-N1	-3.26	104.04	110.63

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

8 monomers are involved in 29 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	201	EPE	2	0
3	A	202	GOL	5	0
2	B	201	EPE	4	0
3	B	203	GOL	11	0
4	B	205	SO4	2	0
3	C	202	GOL	5	0
3	D	202	GOL	2	0
3	E	201	GOL	1	0

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

6 Fit of model and data [i](#)

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

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	145/152 (95%)	-0.14	1 (0%) 87 90	16, 27, 52, 65	2 (1%)
1	B	145/152 (95%)	-0.05	3 (2%) 64 71	18, 29, 52, 62	3 (2%)
1	C	145/152 (95%)	-0.00	3 (2%) 64 71	17, 29, 57, 68	1 (0%)
1	D	145/152 (95%)	0.01	4 (2%) 53 62	18, 32, 60, 82	1 (0%)
1	E	145/152 (95%)	-0.11	5 (3%) 46 53	21, 36, 56, 67	3 (2%)
1	F	145/152 (95%)	0.34	8 (5%) 26 33	24, 44, 72, 84	3 (2%)
All	All	870/912 (95%)	0.01	24 (2%) 53 62	16, 33, 60, 84	13 (1%)

The worst 5 of 24 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	F	21	SER	4.3
1	B	37[A]	CYS	3.9
1	E	21	SER	3.8
1	E	37[A]	CYS	3.8
1	C	21	SER	3.7

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

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

6.3 Carbohydrates [i](#)

There are no carbohydrates in this entry.

6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors(Å ²)	Q<0.9
3	GOL	B	203	6/6	0.93	0.19	6.96	40,47,52,62	0
3	GOL	A	202	6/6	0.93	0.16	5.88	35,39,45,55	0
2	EPE	A	201	15/15	0.98	0.17	5.23	15,19,23,24	15
2	EPE	B	201	15/15	0.98	0.17	4.76	17,22,23,25	15
4	SO4	D	204	5/5	0.94	0.17	4.01	49,55,61,61	0
4	SO4	F	201	5/5	1.00	0.13	2.14	26,29,30,31	0
4	SO4	B	205	5/5	1.00	0.13	1.44	12,12,13,17	5
4	SO4	E	202	5/5	1.00	0.11	1.33	26,26,28,31	0
4	SO4	A	203	5/5	0.99	0.13	1.19	14,15,16,20	5
4	SO4	D	203	5/5	0.98	0.13	0.09	38,44,50,50	0
4	SO4	A	204	5/5	0.98	0.13	0.08	45,51,52,56	0
4	SO4	B	204	5/5	0.98	0.13	-0.09	41,44,48,51	0
4	SO4	F	202	5/5	0.95	0.10	-0.53	45,45,50,53	0
2	EPE	C	201	15/15	0.99	0.11	-0.61	19,29,34,34	0
2	EPE	D	201	15/15	0.99	0.10	-1.54	22,29,34,35	0
3	GOL	E	201	6/6	0.94	0.14	-	47,50,54,60	0
3	GOL	B	202	6/6	0.94	0.11	-	46,56,58,61	0
3	GOL	D	202	6/6	0.92	0.13	-	51,54,55,57	0
3	GOL	C	202	6/6	0.87	0.17	-	41,53,58,60	0

6.5 Other polymers [i](#)

There are no such residues in this entry.