



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 15, 2017 – 02:44 am GMT

PDB ID : 4NMB  
Title : Crystal structure of proline utilization A (PutA) from *Geobacter sulfurreducens* PCA in complex with L-lactate  
Authors : Singh, H.; Almo, S.C.; Tanner, J.J.  
Deposited on : 2013-11-14  
Resolution : 2.20 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

<http://wwpdb.org/validation/2016/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 : 1.7.2 (RC1), CSD as538be (2017)  
Xtriage (Phenix) : 1.9-1692  
EDS : trunk28620  
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) : recalc28949

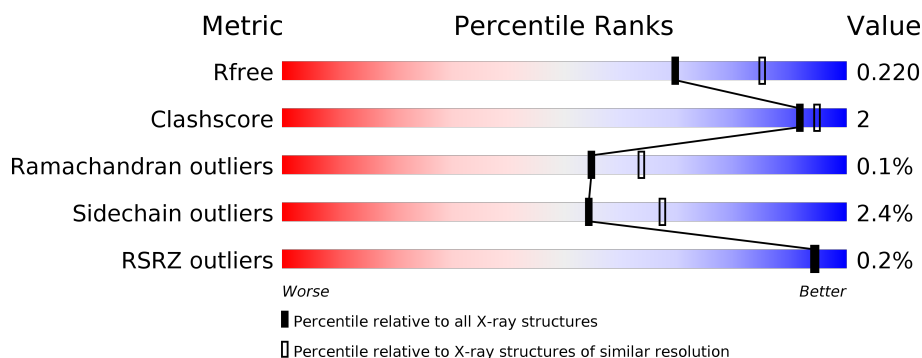
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.20 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	100719	4002 (2.20-2.20)
Clashscore	112137	4730 (2.20-2.20)
Ramachandran outliers	110173	4656 (2.20-2.20)
Sidechain outliers	110143	4657 (2.20-2.20)
RSRZ outliers	101464	4033 (2.20-2.20)

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	1005	
1	B	1005	

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
4	MES	A	2003	-	-	-	X
4	MES	B	2003	-	-	-	X

## 2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 15839 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.

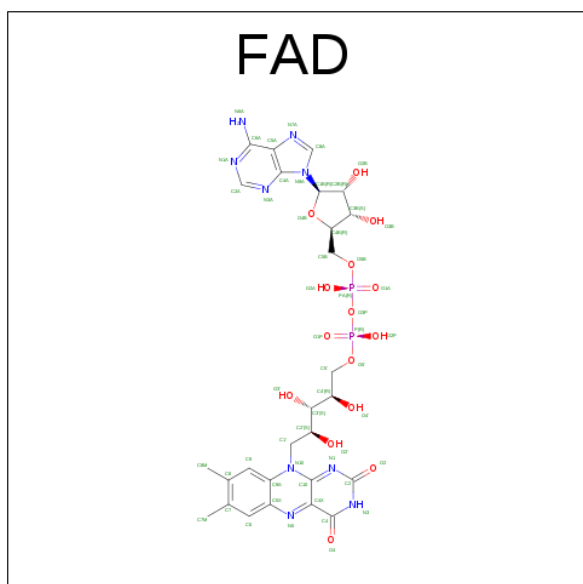
- Molecule 1 is a protein called Proline dehydrogenase and Delta-1-pyrroline-5-carboxylate dehydrogenase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	976	Total	C	N	O	S	0	0	0
			7515	4796	1302	1379	38			
1	B	976	Total	C	N	O	S	0	0	0
			7553	4818	1304	1393	38			

There are 2 discrepancies between the modelled and reference sequences:

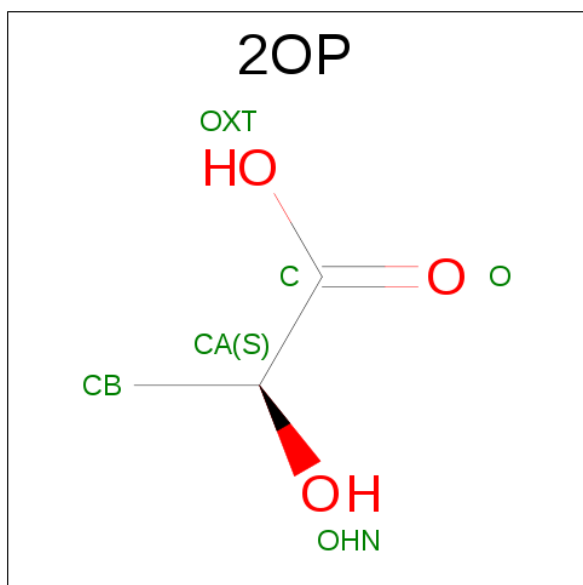
Chain	Residue	Modelled	Actual	Comment	Reference
A	0	SER	-	EXPRESSION TAG	UNP Q746X3
B	0	SER	-	EXPRESSION TAG	UNP Q746X3

- Molecule 2 is FLAVIN-ADENINE DINUCLEOTIDE (three-letter code: FAD) (formula:  $C_{27}H_{33}N_9O_{15}P_2$ ).



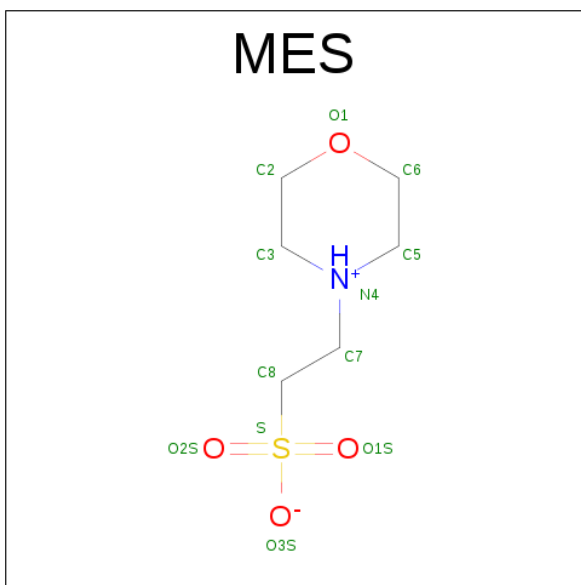
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
2	B	1	Total	C	N	O	P	0	0
			53	27	9	15	2		

- Molecule 3 is (2S)-2-HYDROXYPROPANOIC ACID (three-letter code: 2OP) (formula:  $C_3H_6O_3$ ).



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		

- Molecule 4 is 2-(N-MORPHOLINO)-ETHANESULFONIC ACID (three-letter code: MES) (formula:  $C_6H_{13}NO_4S$ ).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total	C	N	O	S	0	0
			12	6	1	4	1		
4	B	1	Total	C	N	O	S	0	0
			12	6	1	4	1		

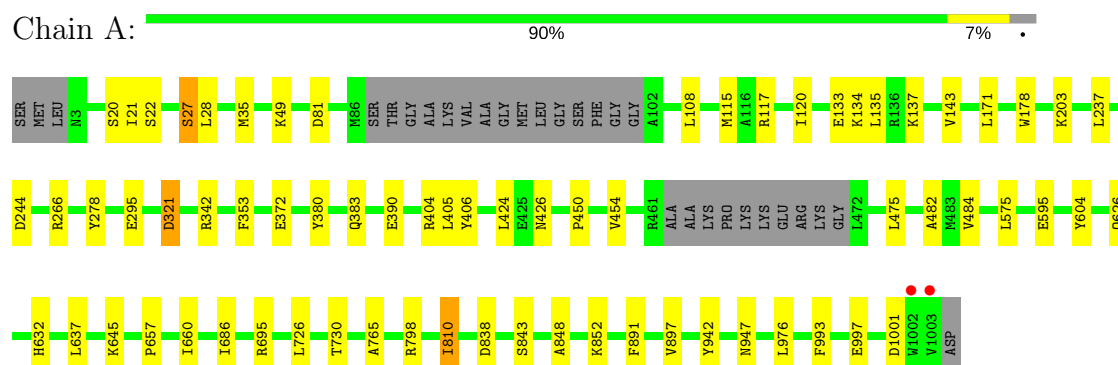
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	319	Total	O	0	0
			319	319		
5	B	310	Total	O	0	0
			310	310		

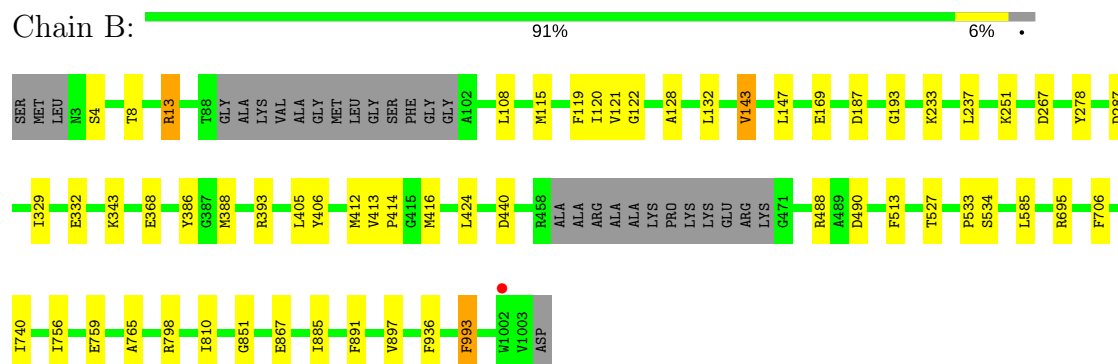
### 3 Residue-property plots

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: Proline dehydrogenase and Delta-1-pyrroline-5-carboxylate dehydrogenase



- Molecule 1: Proline dehydrogenase and Delta-1-pyrroline-5-carboxylate dehydrogenase



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	95.65Å 152.06Å 175.13Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	114.82 – 2.20 114.82 – 2.20	Depositor EDS
% Data completeness (in resolution range)	99.4 (114.82-2.20) 99.3 (114.82-2.20)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.11	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.19 (at 2.20Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.8_1069)	Depositor
R, $R_{free}$	0.180 , 0.220 0.180 , 0.220	Depositor DCC
$R_{free}$ test set	6510 reflections (5.03%)	DCC
Wilson B-factor (Å <sup>2</sup> )	23.2	Xtriage
Anisotropy	0.561	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 35.8	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	15839	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	27.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.33% 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

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: 2OP, FAD, MES

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	0/7686	0.51	0/10431
1	B	0.40	0/7724	0.52	0/10472
All	All	0.40	0/15410	0.52	0/20903

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

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	7515	0	7290	29	0
1	B	7553	0	7360	27	0
2	A	53	0	31	1	0
2	B	53	0	31	1	0
3	A	6	0	5	0	0
3	B	6	0	5	0	0
4	A	12	0	13	1	0
4	B	12	0	13	1	0
5	A	319	0	0	0	0
5	B	310	0	0	0	0
All	All	15839	0	14748	56	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 (56) 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:533:PRO:HD2	1:B:867:GLU:HG2	1.71	0.72
1:B:810:ILE:HD11	1:B:897:VAL:HG11	1.70	0.72
1:B:534:SER:N	1:B:867:GLU:OE2	2.27	0.67
1:B:287:ASP:OD1	1:B:343:LYS:NZ	2.26	0.67
1:A:637:LEU:HD21	1:A:997:GLU:HG3	1.77	0.66
1:B:406:TYR:HB2	2:B:2001:FAD:HM72	1.78	0.66
1:A:632:HIS:HD2	1:A:1001:ASP:HB2	1.64	0.63
1:A:406:TYR:HB2	2:A:2001:FAD:HM72	1.80	0.63
1:A:117:ARG:HA	1:A:120:ILE:HG12	1.85	0.59
1:B:143:VAL:HG13	1:B:406:TYR:HA	1.87	0.56
1:B:169:GLU:OE1	1:B:233:LYS:NZ	2.40	0.52
1:B:13:ARG:NH1	1:B:368:GLU:OE2	2.44	0.50
1:B:329:ILE:HB	1:B:332:GLU:HG3	1.94	0.50
1:A:424:LEU:HD21	1:B:993:PHE:HB2	1.96	0.48
1:B:119:PHE:HE1	1:B:388:MET:HG3	1.79	0.48
1:B:187:ASP:O	1:B:193:GLY:HA2	2.14	0.47
1:A:133:GLU:O	1:A:137:LYS:HG2	2.15	0.47
1:A:134:LYS:HB2	1:A:134:LYS:HE3	1.59	0.47
1:B:740:ILE:HG12	1:B:756:ILE:HG21	1.97	0.47
4:B:2003:MES:H81	4:B:2003:MES:H32	1.66	0.46
1:B:513:PHE:HB3	1:B:706:PHE:HB3	1.97	0.46
1:A:203:LYS:NZ	1:A:244:ASP:OD2	2.49	0.46
1:B:765:ALA:HA	1:B:798:ARG:O	2.16	0.45
1:B:4:SER:O	1:B:8:THR:OG1	2.34	0.45
1:A:645:LYS:HD2	1:A:726:LEU:HD12	1.98	0.45
1:A:993:PHE:HB2	1:B:424:LEU:HD21	1.98	0.45
4:A:2003:MES:H81	4:A:2003:MES:H32	1.45	0.44
1:A:810:ILE:HD11	1:A:897:VAL:HG11	1.98	0.44
1:A:135:LEU:HD13	1:A:405:LEU:HD12	2.00	0.43
1:A:810:ILE:HD13	1:A:810:ILE:HA	1.70	0.43
1:A:27:SER:OG	1:A:390:GLU:OE2	2.33	0.43
1:A:765:ALA:HA	1:A:798:ARG:O	2.19	0.43
1:A:35:MET:SD	1:A:115:MET:HG3	2.59	0.42
1:B:251:LYS:HE3	1:B:251:LYS:HB3	1.91	0.42
1:A:484:VAL:HB	1:A:604:TYR:CG	2.55	0.42
1:A:657:PRO:HB2	1:A:686:ILE:HG21	2.02	0.42
1:A:475:LEU:HD11	1:A:575:LEU:HD11	2.01	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:413:VAL:HB	1:B:414:PRO:HD3	2.02	0.42
1:A:353:PHE:O	1:A:380:TYR:HA	2.20	0.42
1:A:450:PRO:O	1:A:454:VAL:HG23	2.20	0.41
1:B:128:ALA:O	1:B:132:LEU:HG	2.19	0.41
1:B:488:ARG:HB3	1:B:490:ASP:OD1	2.20	0.41
1:A:28:LEU:HD22	1:A:426:ASN:HB3	2.02	0.41
1:B:393:ARG:HD2	1:B:405:LEU:HD21	2.02	0.41
1:B:851:GLY:HA3	1:B:885:ILE:HD13	2.01	0.41
1:A:171:LEU:HD22	1:A:178:TRP:HH2	1.86	0.41
1:B:120:ILE:HG22	1:B:122:GLY:H	1.86	0.41
1:A:595:GLU:OE1	1:A:686:ILE:HG12	2.20	0.40
1:B:121:VAL:HG12	1:B:386:TYR:CE1	2.55	0.40
1:A:321:ASP:HB2	1:A:482:ALA:HA	2.03	0.40
1:A:660:ILE:HD13	1:A:730:THR:HG21	2.03	0.40
1:A:942:TYR:CD1	1:A:947:ASN:HA	2.56	0.40
1:A:383:GLN:HA	1:A:404:ARG:O	2.21	0.40
1:A:848:ALA:O	1:A:852:LYS:HG3	2.21	0.40
1:B:120:ILE:HG12	1:B:147:LEU:HD11	2.04	0.40
1:B:412:MET:HG2	1:B:416:MET:HE2	2.02	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	970/1005 (96%)	946 (98%)	23 (2%)	1 (0%)	55	63
1	B	970/1005 (96%)	953 (98%)	17 (2%)	0	100	100
All	All	1940/2010 (96%)	1899 (98%)	40 (2%)	1 (0%)	55	63

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	22	SER

### 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	753/821 (92%)	732 (97%)	21 (3%)	49	61
1	B	765/821 (93%)	750 (98%)	15 (2%)	60	74
All	All	1518/1642 (92%)	1482 (98%)	36 (2%)	54	67

All (36) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	20	SER
1	A	21	ILE
1	A	27	SER
1	A	49	LYS
1	A	81	ASP
1	A	108	LEU
1	A	143	VAL
1	A	237	LEU
1	A	266	ARG
1	A	278	TYR
1	A	295	GLU
1	A	321	ASP
1	A	342	ARG
1	A	372	GLU
1	A	626	GLN
1	A	695	ARG
1	A	810	ILE
1	A	838	ASP
1	A	843	SER
1	A	891	PHE
1	A	976	LEU
1	B	13	ARG
1	B	108	LEU

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Mol	Chain	Res	Type
1	B	115	MET
1	B	143	VAL
1	B	237	LEU
1	B	267	ASP
1	B	278	TYR
1	B	440	ASP
1	B	527	THR
1	B	585	LEU
1	B	695	ARG
1	B	759	GLU
1	B	891	PHE
1	B	936	PHE
1	B	993	PHE

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

### 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](#)

6 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	FAD	A	2001	-	51,58,58	2.03	18 (35%)	54,89,89	2.11	12 (22%)
3	2OP	A	2002	-	2,5,5	0.63	0	1,6,6	0.02	0
4	MES	A	2003	-	12,12,12	0.60	0	14,16,16	3.86	5 (35%)
2	FAD	B	2001	-	51,58,58	2.08	17 (33%)	54,89,89	2.11	13 (24%)
3	2OP	B	2002	-	2,5,5	0.66	0	1,6,6	0.16	0
4	MES	B	2003	-	12,12,12	0.65	0	14,16,16	4.47	6 (42%)

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	FAD	A	2001	-	-	0/28/50/50	0/6/6/6
3	2OP	A	2002	-	-	0/0/4/4	0/0/0/0
4	MES	A	2003	-	-	0/6/14/14	0/1/1/1
2	FAD	B	2001	-	-	0/28/50/50	0/6/6/6
3	2OP	B	2002	-	-	0/0/4/4	0/0/0/0
4	MES	B	2003	-	-	0/6/14/14	0/1/1/1

All (35) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	2001	FAD	C2B-C1B	-3.33	1.48	1.53
2	B	2001	FAD	C2B-C1B	-2.93	1.49	1.53
2	A	2001	FAD	PA-O5B	-2.40	1.48	1.59
2	A	2001	FAD	O4'-C4'	-2.36	1.38	1.43
2	A	2001	FAD	O2'-C2'	-2.27	1.38	1.43
2	B	2001	FAD	O3'-C3'	-2.26	1.37	1.43
2	A	2001	FAD	O4B-C4B	-2.25	1.39	1.45
2	B	2001	FAD	PA-O5B	-2.24	1.49	1.59
2	A	2001	FAD	O2B-C2B	-2.22	1.37	1.43
2	B	2001	FAD	O2'-C2'	-2.19	1.38	1.43
2	B	2001	FAD	O4'-C4'	-2.12	1.38	1.43
2	B	2001	FAD	O2B-C2B	-2.10	1.38	1.43
2	A	2001	FAD	P-O1P	2.01	1.58	1.50
2	B	2001	FAD	P-O1P	2.16	1.59	1.50
2	A	2001	FAD	C4X-C10	2.22	1.44	1.41
2	B	2001	FAD	C6A-N6A	2.63	1.44	1.34
2	A	2001	FAD	C2A-N3A	2.64	1.36	1.32
2	A	2001	FAD	C6A-N6A	2.65	1.44	1.34

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	2001	FAD	C2A-N3A	2.67	1.36	1.32
2	A	2001	FAD	C4-N3	2.67	1.37	1.33
2	B	2001	FAD	C4-N3	2.87	1.38	1.33
2	B	2001	FAD	C5X-N5	2.90	1.39	1.35
2	A	2001	FAD	C2-N1	2.94	1.44	1.38
2	A	2001	FAD	C5X-N5	3.06	1.40	1.35
2	B	2001	FAD	C2-N1	3.10	1.44	1.38
2	A	2001	FAD	C9A-N10	3.82	1.43	1.38
2	A	2001	FAD	C10-N1	3.90	1.38	1.33
2	A	2001	FAD	C4-C4X	4.01	1.49	1.41
2	A	2001	FAD	C4X-N5	4.13	1.39	1.33
2	B	2001	FAD	C10-N1	4.49	1.39	1.33
2	B	2001	FAD	C4X-N5	4.51	1.39	1.33
2	B	2001	FAD	C4-C4X	4.57	1.50	1.41
2	B	2001	FAD	C9A-N10	4.66	1.44	1.38
2	B	2001	FAD	O4-C4	5.36	1.38	1.24
2	A	2001	FAD	O4-C4	5.45	1.38	1.24

All (36) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	2001	FAD	N3A-C2A-N1A	-10.35	119.85	128.86
2	B	2001	FAD	N3A-C2A-N1A	-9.62	120.48	128.86
4	A	2003	MES	O3S-S-O2S	-3.88	102.47	111.37
4	A	2003	MES	O3S-S-O1S	-3.48	103.39	111.37
4	B	2003	MES	O3S-S-O2S	-3.48	103.40	111.37
2	B	2001	FAD	C4-C4X-C10	-3.15	117.41	119.96
4	B	2003	MES	O2S-S-O1S	-3.03	103.35	113.86
2	B	2001	FAD	C4X-C10-N10	-3.02	118.42	120.52
4	B	2003	MES	O3S-S-O1S	-2.99	104.52	111.37
2	A	2001	FAD	C4X-C4-N3	-2.63	119.74	123.48
2	A	2001	FAD	C4-C4X-C10	-2.61	117.85	119.96
2	A	2001	FAD	C4X-C10-N10	-2.34	118.89	120.52
2	B	2001	FAD	O2P-P-O5'	-2.20	97.74	108.14
2	B	2001	FAD	C4X-C4-N3	-2.20	120.35	123.48
2	A	2001	FAD	O2A-PA-O5B	-2.18	97.85	108.14
2	B	2001	FAD	C4A-C5A-N7A	-2.13	107.35	109.41
2	A	2001	FAD	O2P-P-O5'	-2.05	98.46	108.14
2	B	2001	FAD	C1'-N10-C9A	2.03	120.21	118.35
2	B	2001	FAD	O5'-P-O1P	2.18	118.04	109.25
2	B	2001	FAD	O5B-PA-O1A	2.19	118.08	109.25
2	A	2001	FAD	O5'-P-O1P	2.29	118.48	109.25

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	2001	FAD	C4X-N5-C5X	2.30	119.19	116.76
2	A	2001	FAD	C1'-N10-C9A	2.37	120.52	118.35
2	A	2001	FAD	O5B-PA-O1A	2.48	119.27	109.25
2	B	2001	FAD	C4-C4X-N5	2.92	121.88	118.68
2	B	2001	FAD	C5X-C9A-N10	3.33	120.13	117.66
2	A	2001	FAD	C5X-C9A-N10	3.35	120.14	117.66
2	B	2001	FAD	C4X-N5-C5X	4.03	121.01	116.76
4	B	2003	MES	O3S-S-C8	5.62	112.97	106.06
2	B	2001	FAD	C4-N3-C2	6.17	120.56	115.16
4	A	2003	MES	O3S-S-C8	6.47	114.02	106.06
2	A	2001	FAD	C4-N3-C2	6.55	120.89	115.16
4	A	2003	MES	O1S-S-C8	8.11	113.75	106.79
4	A	2003	MES	O2S-S-C8	8.25	113.88	106.79
4	B	2003	MES	O1S-S-C8	8.72	114.28	106.79
4	B	2003	MES	O2S-S-C8	11.76	116.89	106.79

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

4 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	2001	FAD	1	0
4	A	2003	MES	1	0
2	B	2001	FAD	1	0
4	B	2003	MES	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	976/1005 (97%)	-0.36	2 (0%) 94 94	12, 25, 53, 79	0
1	B	976/1005 (97%)	-0.40	1 (0%) 95 95	14, 24, 44, 68	0
All	All	1952/2010 (97%)	-0.38	3 (0%) 94 94	12, 25, 49, 79	0

All (3) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	1003	VAL	3.2
1	B	1002	TRP	2.8
1	A	1002	TRP	2.1

### 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, 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	LLDF	B-factors( $\text{\AA}^2$ )	Q<0.9
4	MES	A	2003	12/12	0.97	0.13	4.17	19,38,50,53	0
4	MES	B	2003	12/12	0.97	0.17	3.13	31,52,59,60	0
2	FAD	B	2001	53/53	0.98	0.11	0.43	11,19,24,29	0
3	2OP	A	2002	6/6	0.96	0.12	0.27	22,29,32,33	0
2	FAD	A	2001	53/53	0.97	0.10	-0.45	15,20,26,35	0
3	2OP	B	2002	6/6	0.97	0.09	-0.85	25,30,35,36	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.