



Full wwPDB X-ray Structure Validation Report ⓘ

Jun 23, 2014 – 05:12 PM EDT

PDB ID : 4N8Q
Title : Alternative substrates of Mycobacterium tuberculosis anthranilate phosphoribosyl transferase
Authors : Castell, A.; Cookson, T.V.M.; Bulloch, E.; Evans, G.L.; Baker, E.N.; Lott, J.S.; Parker, E.J.
Deposited on : 2013-10-17
Resolution : 2.08 Å(reported)

This is a full wwPDB validation 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/ValidationPDFNotes.html>

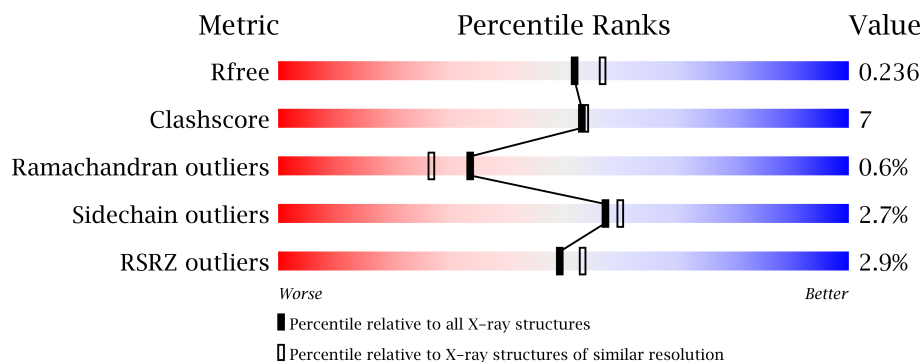
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : **FAILED**
Xtriage (Phenix) : dev-1439
EDS : stable23161
Percentile statistics : 21963
Refmac : 5.8.0049
CCP4 : 6.3.0 (Settle)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)
Validation Pipeline (wwPDB-VP) : stable23161

1 Overall quality at a glance

The reported resolution of this entry is 2.08 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}	66092	3396 (2.10-2.06)
Clashscore	79885	4085 (2.10-2.06)
Ramachandran outliers	78287	4045 (2.10-2.06)
Sidechain outliers	78261	4046 (2.10-2.06)
RSRZ outliers	66119	3397 (2.10-2.06)

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. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density.

Mol	Chain	Length	Quality of chain
1	A	378	
1	B	378	

The following table lists non-polymeric compounds that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Geometry	Electron density
2	FA0	A	601	-	X

2 Entry composition i

There are 3 unique types of molecules in this entry. The entry contains 5361 atoms, of which 0 are hydrogen and 0 are deuterium.

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.

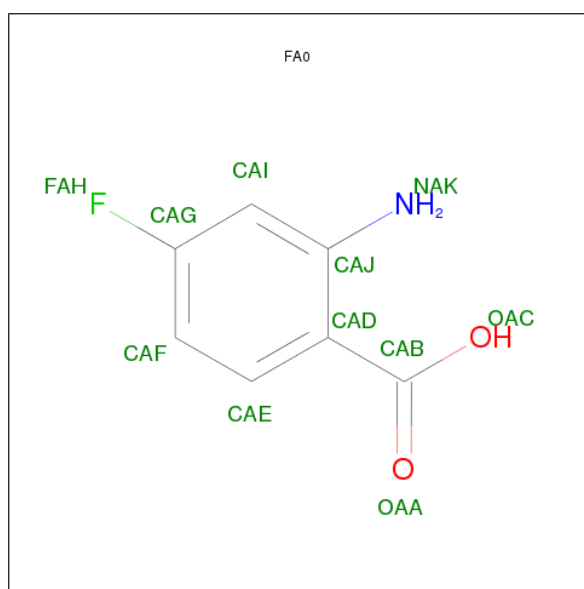
- Molecule 1 is a protein called Anthranilate phosphoribosyltransferase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	346	Total	C	N	O	S	0	3	0
			2533	1583	473	468	9			
1	B	345	Total	C	N	O	S	0	2	0
			2512	1573	464	466	9			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	371	LEU	-	EXPRESSION TAG	UNP P66992
B	372	ALA	-	EXPRESSION TAG	UNP P66992

- Molecule 2 is 2-AMINO-4-FLUOROBENZOICACID (three-letter code: FA0) (formula: C₇H₆FNO₂).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	F	N	O	0	0
			11	7	1	1	2		

Continued on next page...

Continued from previous page...

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	B	1	Total	C	F	N	O	0	0
			11	7	1	1	2		

- Molecule 3 is water.

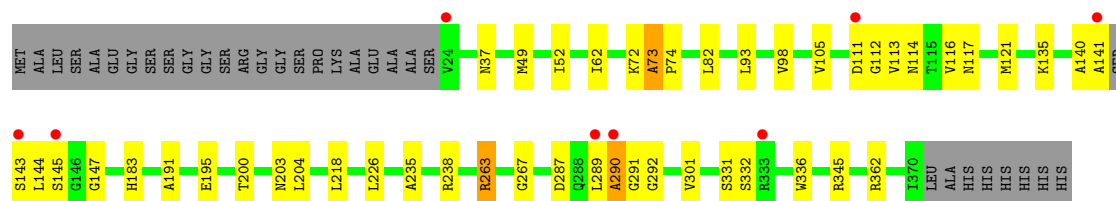
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	160	Total	O	0	0
			160	160		
3	B	134	Total	O	0	0
			134	134		

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 errors 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.

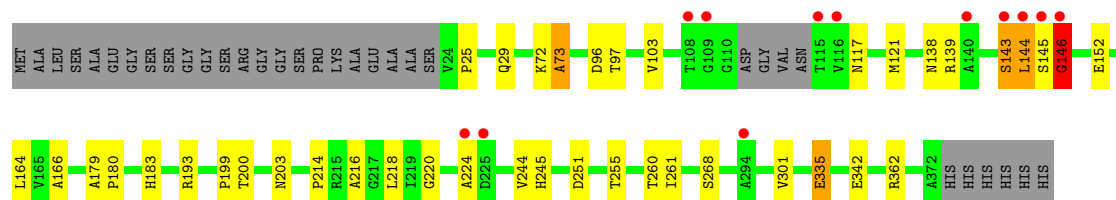
- Molecule 1: Anthranilate phosphoribosyltransferase

Chain A: 



- Molecule 1: Anthranilate phosphoribosyltransferase

Chain B: 



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	79.59Å 91.00Å 120.04Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	72.52 – 2.08 72.52 – 2.08	Depositor EDS
% Data completeness (in resolution range)	100.0 (72.52-2.08) 100.0 (72.52-2.08)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	0.08	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.66 (at 2.08Å)	Xtriage
Refinement program	REFMAC 5.5.0102	Depositor
R, R_{free}	0.197 , 0.234 0.199 , 0.236	Depositor DCC
R_{free} test set	2667 reflections (5.33%)	DCC
Wilson B-factor (Å ²)	29.9	Xtriage
Anisotropy	0.689	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 36.2	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning	$\langle L \rangle = 0.43$, $\langle L^2 \rangle = 0.25$	Xtriage
Outliers	0 of 52750 reflections	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	5361	wwPDB-VP
Average B, all atoms (Å ²)	33.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.97% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: FA0

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	0.74	0/2583	0.74	2/3522 (0.1%)
1	B	0.69	0/2562	0.76	3/3495 (0.1%)
All	All	0.72	0/5145	0.75	5/7017 (0.1%)

There are no bond length outliers.

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	146	GLY	N-CA-C	12.75	144.99	113.10
1	A	263	ARG	NE-CZ-NH2	-5.58	117.51	120.30
1	B	362	ARG	NE-CZ-NH2	-5.52	117.54	120.30
1	A	362	ARG	NE-CZ-NH1	5.39	123.00	120.30
1	B	362	ARG	NE-CZ-NH1	5.10	122.85	120.30

There are no chirality outliers.

There are no planarity outliers.

5.2 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 hydrogens added by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, and the number in parentheses is this value normalized per 1000 atoms of the molecule in the chain. The Symm-Clashes column gives symmetry related clashes, in the same way as for the Clashes column.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2533	0	2531	41	0
1	B	2512	0	2511	30	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	A	11	0	0	0	0
2	B	11	0	0	0	0
3	A	160	0	0	4	0
3	B	134	0	0	4	0
All	All	5361	0	5042	71	0

Clashscore is defined as the number of clashes calculated for the entry per 1000 atoms (including hydrogens) of the entry. The overall clashscore for this entry is 7.

All (71) close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:290:ALA:CB	1:A:291:GLY:HA2	1.73	1.15
1:A:290:ALA:HB1	1:A:291:GLY:CA	1.79	1.11
1:A:49:MET:HE2	1:A:82:LEU:HD22	1.18	1.09
1:A:49:MET:CE	1:A:82:LEU:HD22	1.86	1.05
1:B:143:SER:HB3	1:B:193:ARG:NH1	1.84	0.92
1:A:49:MET:HE2	1:A:82:LEU:CD2	1.99	0.92
1:A:117:ASN:ND2	1:A:290:ALA:HB3	1.87	0.88
1:A:290:ALA:HB1	1:A:291:GLY:HA2	0.89	0.83
1:A:140:ALA:HB2	1:A:145:SER:O	1.83	0.79
1:A:263:ARG:HD3	1:A:336:TRP:CZ3	2.21	0.74
1:A:140:ALA:O	1:A:141:ALA:HB2	1.86	0.74
1:B:335:GLU:H	1:B:335:GLU:CD	1.91	0.73
1:A:143:SER:OG	1:A:144:LEU:N	2.20	0.72
1:B:72:LYS:O	1:B:73:ALA:HB3	1.91	0.70
1:A:263:ARG:HD2	3:A:717:HOH:O	1.93	0.68
1:B:144:LEU:C	1:B:144:LEU:HD22	2.17	0.65
1:A:140:ALA:O	1:A:141:ALA:CB	2.45	0.64
1:B:72:LYS:O	1:B:73:ALA:CB	2.46	0.64
1:A:238:ARG:HA	3:A:727:HOH:O	1.97	0.64
1:A:289:LEU:O	1:A:290:ALA:O	2.16	0.63
1:B:200:THR:H	1:B:203:ASN:ND2	1.98	0.62
1:B:179:ALA:HB3	1:B:180:PRO:HD3	1.83	0.60
1:B:183:HIS:HD2	3:B:703:HOH:O	1.84	0.59
1:B:224:ALA:HB2	1:B:245:HIS:NE2	2.18	0.59
1:A:200:THR:H	1:A:203:ASN:ND2	2.00	0.59
1:B:164:LEU:HG	3:B:790:HOH:O	2.02	0.58
1:A:290:ALA:CB	1:A:291:GLY:CA	2.52	0.57
1:B:97:THR:HB	1:B:166:ALA:HB1	1.86	0.57
1:B:220:GLY:HA3	1:B:251:ASP:O	2.06	0.56
1:B:139:ARG:NH1	1:B:152:GLU:OE1	2.37	0.55
1:B:144:LEU:HD13	1:B:145:SER:OG	2.08	0.54

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:72:LYS:O	1:A:73:ALA:HB3	2.08	0.53
1:A:183:HIS:HD2	3:A:705:HOH:O	1.91	0.53
1:A:238:ARG:HG3	3:A:843:HOH:O	2.08	0.52
1:A:140:ALA:CB	1:A:145:SER:O	2.55	0.52
1:A:116:VAL:HG11	1:A:147:GLY:N	2.25	0.52
1:B:25:PRO:HA	1:B:29:GLN:OE1	2.12	0.50
1:A:204:LEU:HD11	1:A:226:LEU:HD22	1.94	0.49
1:A:72:LYS:O	1:A:73:ALA:CB	2.60	0.48
1:A:345[B]:ARG:HG2	1:A:345[B]:ARG:HH11	1.78	0.47
1:B:200:THR:H	1:B:203:ASN:HD22	1.60	0.47
1:B:143:SER:HA	1:B:144:LEU:HA	1.64	0.47
1:A:52:ILE:HG12	1:A:62:ILE:HG12	1.96	0.46
1:B:224:ALA:HB2	1:B:245:HIS:CE1	2.51	0.46
1:B:144:LEU:HD13	1:B:145:SER:H	1.81	0.46
1:A:113:VAL:O	1:A:114:ASN:HB3	2.16	0.46
1:B:144:LEU:HD13	1:B:145:SER:N	2.31	0.46
1:B:214:PRO:HD2	3:B:816:HOH:O	2.15	0.46
1:A:144:LEU:HG	1:A:292:GLY:C	2.36	0.45
1:B:138:ASN:H	1:B:146:GLY:HA2	1.79	0.45
1:A:289:LEU:O	1:A:290:ALA:C	2.54	0.45
1:B:103:VAL:HG12	1:B:216:ALA:HB3	1.97	0.45
1:B:72:LYS:HB3	1:B:72:LYS:HE3	1.84	0.44
1:A:345[B]:ARG:NH1	1:A:345[B]:ARG:HG2	2.33	0.43
1:A:105:VAL:O	1:A:135:LYS:NZ	2.51	0.43
1:A:121:MET:HG3	1:A:301:VAL:HG22	2.00	0.43
1:A:121:MET:CG	1:A:301:VAL:HG22	2.49	0.42
1:A:140:ALA:CB	1:A:145:SER:HB3	2.50	0.42
1:A:332:SER:O	1:A:332:SER:OG	2.26	0.42
1:A:111:ASP:HA	1:A:112:GLY:HA2	1.74	0.42
1:A:191:ALA:O	1:A:195:GLU:HG3	2.20	0.42
1:A:235:ALA:O	1:A:267:GLY:HA2	2.20	0.42
1:B:96:ASP:HA	3:B:778:HOH:O	2.20	0.41
1:B:342[B]:GLU:HA	1:B:342[B]:GLU:OE2	2.19	0.41
1:B:244:VAL:HG12	1:B:261:ILE:HG12	2.02	0.41
1:A:73:ALA:HA	1:A:74:PRO:HD2	1.92	0.41
1:B:335:GLU:N	1:B:335:GLU:CD	2.69	0.41
1:A:93:LEU:HD22	1:A:98:VAL:HG22	2.02	0.41
1:B:121:MET:CG	1:B:301:VAL:HG22	2.50	0.41
1:A:113:VAL:HG12	1:A:114:ASN:N	2.36	0.40
1:B:143:SER:HB3	1:B:193:ARG:CZ	2.50	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	345/378 (91%)	332 (96%)	11 (3%)	2 (1%)	33	27
1	B	343/378 (91%)	330 (96%)	11 (3%)	2 (1%)	33	27
All	All	688/756 (91%)	662 (96%)	22 (3%)	4 (1%)	33	27

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	290	ALA
1	A	73	ALA
1	B	73	ALA
1	B	146	GLY

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	246/264 (93%)	242 (98%)	4 (2%)	75	79
1	B	244/264 (92%)	235 (96%)	9 (4%)	45	45
All	All	490/528 (93%)	477 (97%)	13 (3%)	57	60

All (13) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	37	ASN
1	A	218	LEU
1	A	287	ASP
1	A	331	SER
1	B	117	ASN

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	B	143	SER
1	B	144	LEU
1	B	199	PRO
1	B	218	LEU
1	B	255	THR
1	B	260	THR
1	B	268	SER
1	B	335	GLU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (7) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	56	ASN
1	A	183	HIS
1	A	203	ASN
1	B	56	ASN
1	B	183	HIS
1	B	188	HIS
1	B	203	ASN

5.3.3 RNA ⓘ

There are no RNA chains in this entry.

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

Mogul failed to run properly - this section will therefore be empty.

5.5 Carbohydrates ⓘ

Mogul failed to run properly - this section will therefore be empty.

5.6 Ligand geometry ⓘ

Mogul failed to run properly - this section will therefore be empty.

5.7 Other polymers ⓘ

Mogul failed to run properly - this section will therefore be empty.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	346/378 (91%)	-0.06	8 (2%) 57 62	17, 30, 53, 69	0
1	B	345/378 (91%)	0.00	12 (3%) 42 45	20, 31, 58, 63	0
All	All	691/756 (91%)	-0.03	20 (2%) 49 53	17, 30, 56, 69	0

All (20) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	141	ALA	10.5
1	A	145	SER	7.7
1	B	145	SER	5.7
1	B	144	LEU	4.9
1	B	140	ALA	4.2
1	A	333	ARG	3.6
1	B	109	GLY	3.5
1	A	143	SER	3.5
1	B	143	SER	3.5
1	A	111	ASP	3.0
1	A	24	VAL	2.7
1	B	115	THR	2.6
1	B	108	THR	2.4
1	B	225	ASP	2.3
1	B	146	GLY	2.2
1	B	116	VAL	2.2
1	B	224	ALA	2.2
1	A	289	LEU	2.0
1	A	290	ALA	2.0
1	B	294	ALA	2.0

6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

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

6.3 Carbohydrates ⓘ

There are no carbohydrates in this entry.

6.4 Ligands ⓘ

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	RSR	LLDF	B-factors(Å ²)	Q<0.9
2	FA0	A	601	11/11	0.16	3.53	52,52,53,55	0
2	FA0	B	601	11/11	0.13	-0.22	37,39,44,46	0

6.5 Other polymers ⓘ

There are no such residues in this entry.