wwPDB X-ray Structure Validation Summary Report (i)

May 28, 2020 – 08:11 pm BST

PDB ID	:	1PED
Title	:	BACTERIAL SECONDARY ALCOHOL DEHYDROGENASE (APO-FORM)
Authors	:	Korkhin, Y.; Frolow, F.
Deposited on	:	1995-12-28
Resolution	:	2.15 Å(reported)

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

|		
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.11

1   Overall quality at a glance (i)

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.

■ Percentile relative to all X-ray structures
▯ Percentile relative to X-ray structures of similar resolution
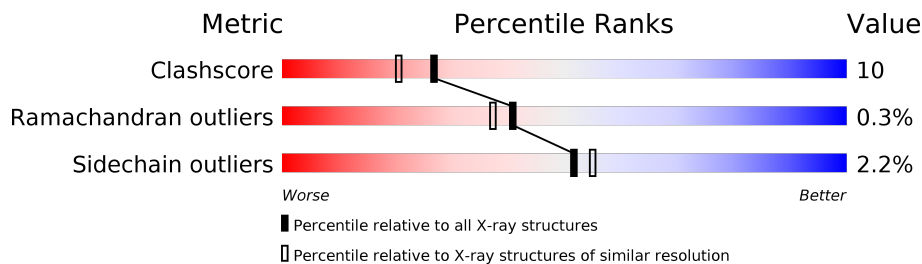
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
Clashscore	141614	1585 (2.16-2.16)
Ramachandran outliers	138981	1560 (2.16-2.16)
Sidechain outliers	138945	1559 (2.16-2.16)

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 respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=5%

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	351	77% 23% •
1	B	351	77% 23%
1	C	351	77% 22% •
1	D	351	77% 22% •

2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 11122 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 NADP-DEPENDENT ALCOHOL DEHYDROGENASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	351	Total 2640	C 1675	N 460	O 482	S 23	0	0	0
1	B	351	Total 2640	C 1675	N 460	O 482	S 23	0	0	0
1	C	351	Total 2640	C 1675	N 460	O 482	S 23	0	0	0
1	D	351	Total 2640	C 1675	N 460	O 482	S 23	0	0	0

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	154	THR	SER	CONFLICT	UNP P25984
A	234	LYS	GLU	CONFLICT	UNP P25984
B	154	THR	SER	CONFLICT	UNP P25984
B	234	LYS	GLU	CONFLICT	UNP P25984
C	154	THR	SER	CONFLICT	UNP P25984
C	234	LYS	GLU	CONFLICT	UNP P25984
D	154	THR	SER	CONFLICT	UNP P25984
D	234	LYS	GLU	CONFLICT	UNP P25984

- Molecule 2 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	B	1	Total 1	Zn 1	0	0
2	A	1	Total 1	Zn 1	0	0
2	D	1	Total 1	Zn 1	0	0
2	C	1	Total 1	Zn 1	0	0

• Molecule 3 is water.

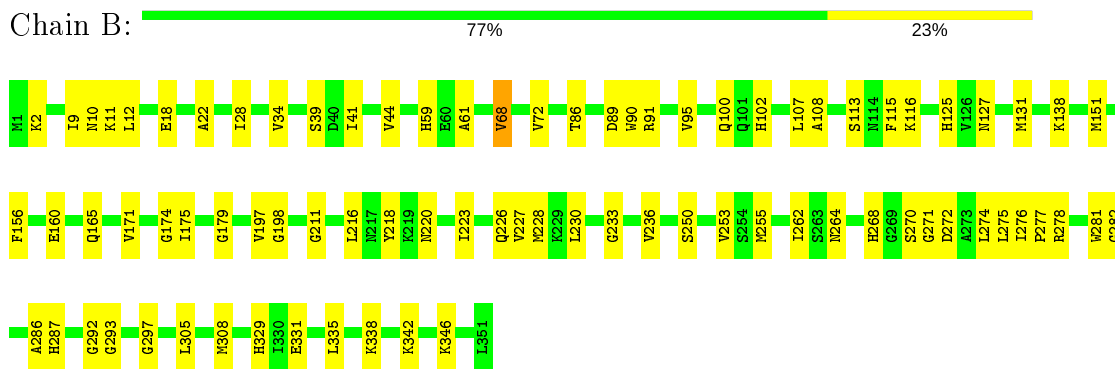| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	145	Total 145	O 145	0	0
3	B	141	Total 141	O 141	0	0
3	C	145	Total 145	O 145	0	0
3	D	127	Total 127	O 127	0	0

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. 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. 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.
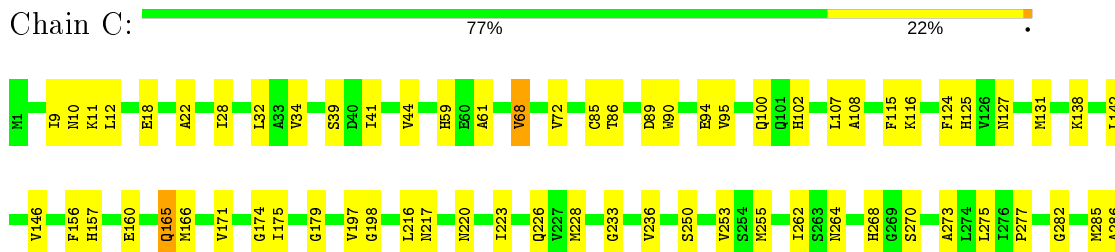
Note EDS was not executed.

- Molecule 1: NADP-DEPENDENT ALCOHOL DEHYDROGENASE
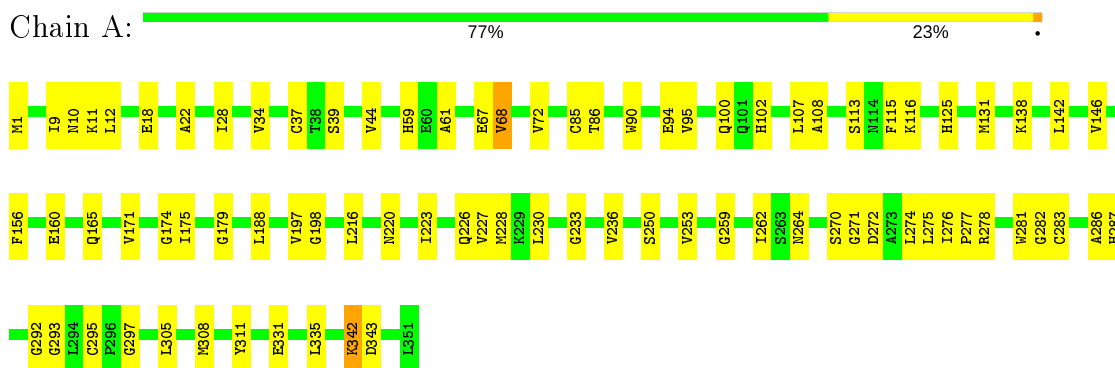
- Molecule 1: NADP-DEPENDENT ALCOHOL DEHYDROGENASE

- Molecule 1: NADP-DEPENDENT ALCOHOL DEHYDROGENASE

H287 G292 G293 L294 C295 P296 G297 L305 M308 F327 E331 L335 K338 K342 D343 L351

● Molecule 1: NADP-DEPENDENT ALCOHOL DEHYDROGENASE

Chain D:

77%   22%

M1 I9 N10 K11 L12 E18 R19 A22 I28 V34 S35 P36 S39 D40 T41 V44 H59 E60 A61 E67 V68 V72 C85 T86 W90 E94 V95 Q100 Q101 H102 L107 A108 F115 K116 H125 V126 N127 M131 K138 L142

V146 F156 E160 Q165 M166 V171 G174 I175 G179 R193 V197 G198 L216 N220 I223 V227 M228 K229 L230 G233 V236 S250 V253 I262 S263 N264 H268 G269 S270 A273 L274 L275 I276 P277 G282 M285 A286 H287

G292 G293 L294 C295 P296 G297 L305 M308 E331 L335 K338 K342 D343 A347 L351

4 Data and refinement statistics (i)

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	80.40Å 102.26Å 193.50Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	50.00 – 2.15	Depositor
% Data completeness (in resolution range)	79.0 (50.00-2.15)	Depositor
R_{merge}	0.04	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	X-PLOR 3.1	Depositor
R, R_{free}	0.215 , 0.258	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	11122	wwPDB-VP
Average B, all atoms (Å^2)	43.0	wwPDB-VP

5 Model quality ⓘ

5.1 Standard geometry ⓘ

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

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	0.32	0/2689	0.58	0/3626
1	B	0.31	0/2689	0.57	0/3626
1	C	0.30	0/2689	0.58	0/3626
1	D	0.30	0/2689	0.58	0/3626
All	All	0.31	0/10756	0.58	0/14504

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	2640	0	2681	61	0
1	B	2640	0	2681	64	0
1	C	2640	0	2681	64	0
1	D	2640	0	2681	60	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
2	D	1	0	0	0	0
3	A	145	0	0	6	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	141	0	0	8	0
3	C	145	0	0	8	0
3	D	127	0	0	4	0
All	All	11122	0	10724	215	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 10.

The worst 5 of 215 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:A:197:VAL:HG21	1:A:223:ILE:HD11	1.53	0.90
1:C:275:LEU:HD23	1:D:273:ALA:HB1	1.52	0.89
1:C:273:ALA:HB1	1:D:275:LEU:HD23	1.55	0.89
1:C:197:VAL:HG21	1:C:223:ILE:HD11	1.53	0.88
1:D:197:VAL:HG21	1:D:223:ILE:HD11	1.55	0.88

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	349/351 (99%)	328 (94%)	20 (6%)	1 (0%)	41	37
1	B	349/351 (99%)	328 (94%)	20 (6%)	1 (0%)	41	37
1	C	349/351 (99%)	328 (94%)	20 (6%)	1 (0%)	41	37
1	D	349/351 (99%)	327 (94%)	21 (6%)	1 (0%)	41	37
All	All	1396/1404 (99%)	1311 (94%)	81 (6%)	4 (0%)	41	37

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	270	SER
1	B	270	SER
1	C	270	SER
1	D	270	SER

5.3.2 Protein sidechains (i)

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	279/279 (100%)	273 (98%)	6 (2%)	52	55
1	B	279/279 (100%)	273 (98%)	6 (2%)	52	55
1	C	279/279 (100%)	273 (98%)	6 (2%)	52	55
1	D	279/279 (100%)	273 (98%)	6 (2%)	52	55
All	All	1116/1116 (100%)	1092 (98%)	24 (2%)	52	55

5 of 24 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	220	ASN
1	C	68	VAL
1	D	220	ASN
1	B	342	LYS
1	C	18	GLU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 39 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	226	GLN
1	C	54	ASN
1	D	226	GLN
1	B	232	ASN
1	B	268	HIS

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)

Of 4 ligands modelled in this entry, 4 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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)

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates (i)

EDS was not executed - this section is therefore empty.

6.4 Ligands (i)

EDS was not executed - this section is therefore empty.

6.5 Other polymers (i)

EDS was not executed - this section is therefore empty.