wwPDB X-ray Structure Validation Summary Report (i)

Jan 31, 2016 – 07:17 PM GMT

PDB ID	:	1EX5
Title	:	FRUCTOSE 1,6-BISPHOSPHATE ALDOLASE FROM RABBIT MUSCLE
Authors	:	Maurady, A.; Sygusch, J.
Deposited on	:	2000-04-25
Resolution	:	2.20 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 (i) symbol.

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

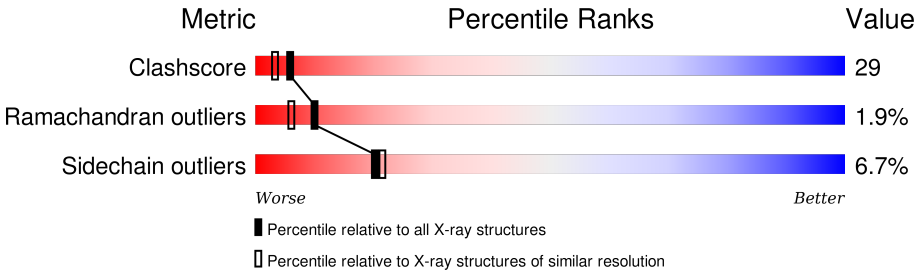
MolProbity	:	4.02b-467
Mogul	:	1.7 (RC4), CSD as536be (2015)
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20151230.v01 (using entries in the PDB archive December 30th 2015)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	trunk26865

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 2.20 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))
Clashscore	102246	4477 (2.20-2.20)
Ramachandran outliers	100387	4404 (2.20-2.20)
Sidechain outliers	100360	4405 (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 >=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 <=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.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	363	55% 41% .
1	B	363	52% 45% .
1	C	363	55% 42% .
1	D	363	54% 43% .

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 17144 atoms, of which 2628 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 FRUCTOSE 1,6-BISPHOSPHATE ALDOLASE.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	363	Total	C	H	N	O	S	0	15	0
			3547	1812	673	512	539	11			
1	B	363	Total	C	H	N	O	S	0	11	0
			3507	1794	661	505	535	12			
1	C	363	Total	C	H	N	O	S	0	3	0
			3428	1751	646	494	526	11			
1	D	363	Total	C	H	N	O	S	0	6	0
			3444	1759	648	496	530	11			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	187	ALA	GLU	ENGINEERED	UNP P00883
B	187	ALA	GLU	ENGINEERED	UNP P00883
C	187	ALA	GLU	ENGINEERED	UNP P00883
D	187	ALA	GLU	ENGINEERED	UNP P00883

- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	750	Total	O	0	0
			750	750		
2	B	700	Total	O	0	0
			700	700		
2	C	888	Total	O	0	0
			888	888		
2	D	880	Total	O	0	0
			880	880		

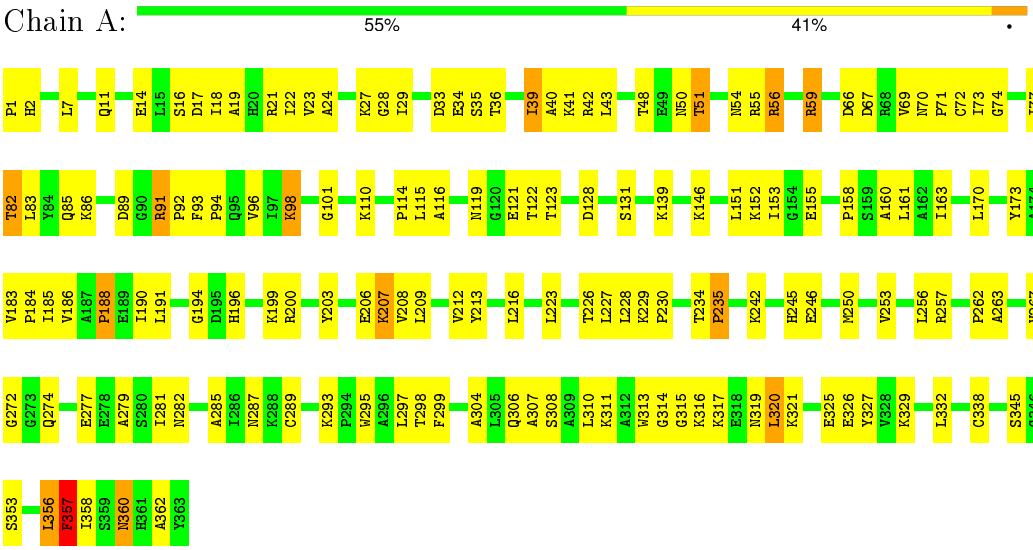
3 Residue-property plots (i)

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

Note EDS was not executed.

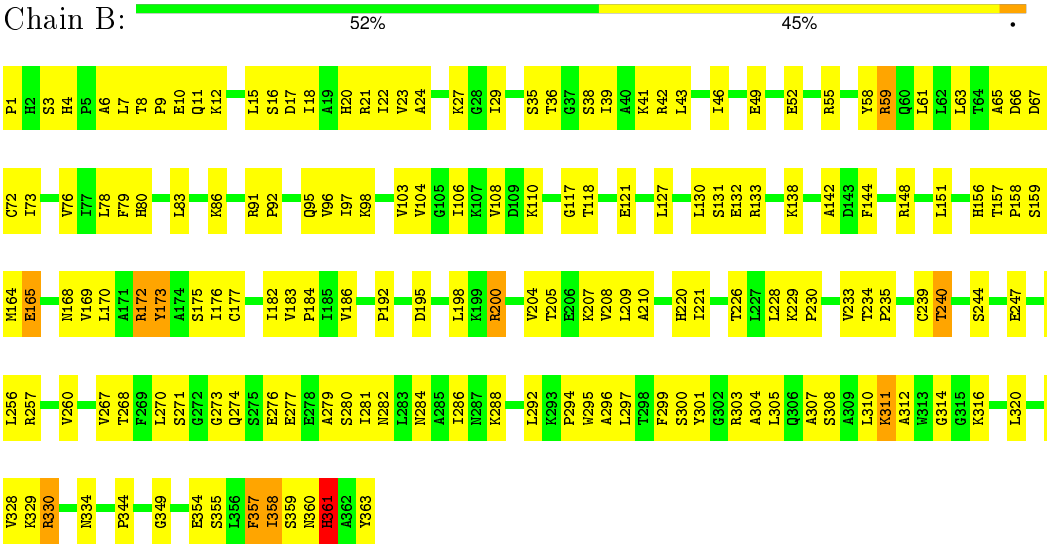
• Molecule 1: FRUCTOSE 1,6-BISPHOSPHATE ALDOLASE

Chain A:



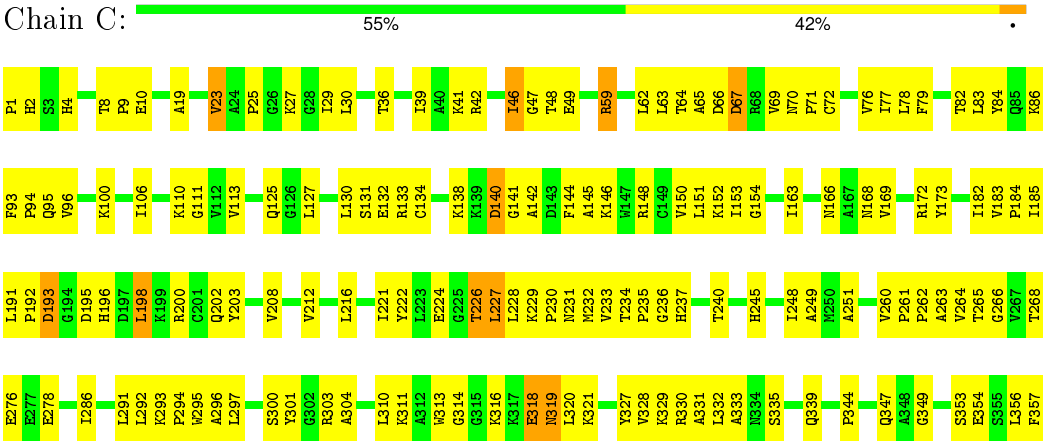
• Molecule 1: FRUCTOSE 1,6-BISPHOSPHATE ALDOLASE

Chain B:



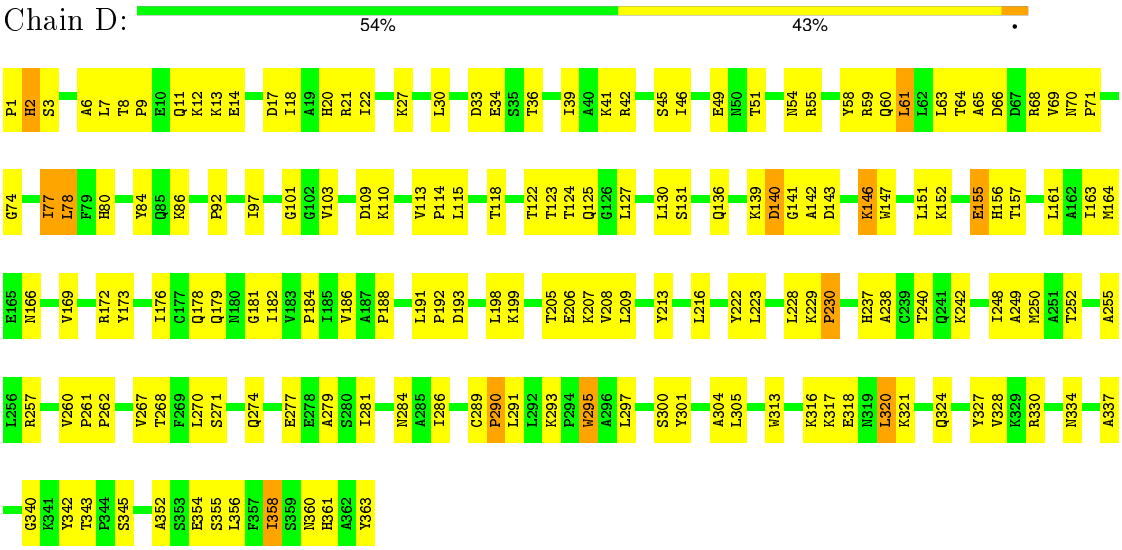
• Molecule 1: FRUCTOSE 1,6-BISPHOSPHATE ALDOLASE

Chain C:



• Molecule 1: FRUCTOSE 1,6-BISPHOSPHATE ALDOLASE

Chain D:



4 Data and refinement statistics (i)

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

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	165.97Å 58.36Å 86.95Å 90.00° 103.16° 90.00°	Depositor
Resolution (Å)	9.00 – 2.20	Depositor
% Data completeness (in resolution range)	8.0 (9.00-2.20)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	X-PLOR 3.1	Depositor
R, R_{free}	0.179 , 0.229	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	17144	wwPDB-VP
Average B, all atoms (Å^2)	7.0	wwPDB-VP

5 Model quality

5.1 Standard geometry

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	0.34	0/2930	0.64	2/3967 (0.1%)
1	B	0.34	0/2903	0.65	2/3933 (0.1%)
1	C	0.34	0/2838	0.59	0/3846
1	D	0.34	0/2851	0.64	1/3863 (0.0%)
All	All	0.34	0/11522	0.63	5/15609 (0.0%)

There are no bond length outliers.

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	D	2	HIS	N-CA-C	-8.08	89.18	111.00
1	A	360	ASN	N-CA-C	-7.35	91.15	111.00
1	B	360	ASN	N-CA-C	5.54	125.96	111.00
1	B	361	HIS	N-CA-C	5.45	125.72	111.00
1	A	357	PHE	N-CA-C	5.29	125.28	111.00

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	2874	673	2916	168	0
1	B	2846	661	2879	177	0
1	C	2782	646	2802	159	0
1	D	2796	648	2823	164	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	A	750	0	0	61	0
2	B	700	0	0	85	0
2	C	888	0	0	64	0
2	D	880	0	0	77	0
All	All	14516	2628	11420	652	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 29.

The worst 5 of 652 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:D:27:LYS:HE2	1:D:74:GLY:HA2	1.36	1.07
1:A:91:ARG:HD2	1:A:96:VAL:HG22	1.47	0.97
1:B:207:LYS:HD3	1:C:1:PRO:HG2	1.49	0.94
1:A:203:TYR:HE2	1:D:1:PRO:HB3	1.36	0.90
1:C:187:ALA:HB2	1:C:229:LYS:HB3	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	376/363 (104%)	322 (86%)	43 (11%)	11 (3%)	6 2
1	B	372/363 (102%)	327 (88%)	39 (10%)	6 (2%)	12 8
1	C	364/363 (100%)	326 (90%)	33 (9%)	5 (1%)	14 10
1	D	367/363 (101%)	327 (89%)	34 (9%)	6 (2%)	12 8
All	All	1479/1452 (102%)	1302 (88%)	149 (10%)	28 (2%)	10 6

5 of 28 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	357	PHE
1	B	3	SER
1	B	307	ALA
1	B	355	SER
1	A	89	ASP

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	302/290 (104%)	283 (94%)	19 (6%)	22	24
1	B	300/290 (103%)	283 (94%)	17 (6%)	25	29
1	C	292/290 (101%)	273 (94%)	19 (6%)	21	23
1	D	295/290 (102%)	271 (92%)	24 (8%)	15	14
All	All	1189/1160 (102%)	1110 (93%)	79 (7%)	20	22

5 of 79 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	361	HIS
1	C	150	VAL
1	D	295	TRP
1	C	4	HIS
1	C	66	ASP

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 25 such sidechains are listed below:

Mol	Chain	Res	Type
1	C	179	GLN
1	C	339	GLN
1	D	324	GLN
1	C	306	GLN
1	C	361	HIS

5.3.3 RNA

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates

There are no carbohydrates in this entry.

5.6 Ligand geometry

There are no ligands in this entry.

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

6.1 Protein, DNA and RNA chains

EDS was not executed - this section will therefore be empty.

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

EDS was not executed - this section will therefore be empty.

6.3 Carbohydrates

EDS was not executed - this section will therefore be empty.

6.4 Ligands

EDS was not executed - this section will therefore be empty.

6.5 Other polymers

EDS was not executed - this section will therefore be empty.