Full wwPDB X-ray Structure Validation Report ⓘ

May 22, 2020 – 01:58 am BST

PDB ID	:	1TPE
Title	:	COMPARISON OF THE STRUCTURES AND THE CRYSTAL CONTACTS OF TRYPANOSOMAL TRIOSEPHOSPHATE ISOMERASE IN FOUR DIFFERENT CRYSTAL FORMS
Authors	:	Noble, M.E.M.; Radha Kishan, K.V.; Zeelen, J.Ph.; Wierenga, R.K.
Deposited on	:	1994-02-28
Resolution	:	2.10 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*
A user guide is available at
https://www.wwpdb.org/validation/2017/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:

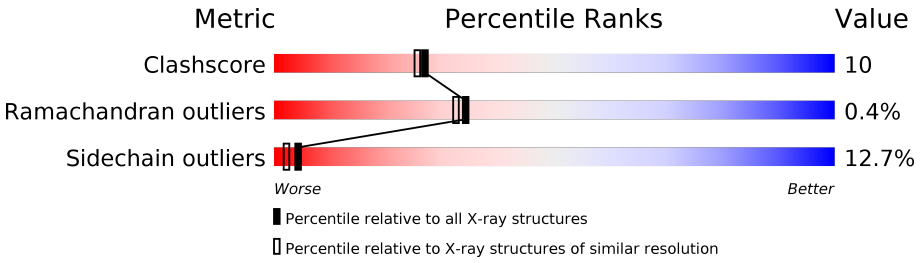
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.11

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 2.10 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	141614	5710 (2.10-2.10)
Ramachandran outliers	138981	5647 (2.10-2.10)
Sidechain outliers	138945	5648 (2.10-2.10)

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	250	68% 24% 6%

2 Entry composition (i)

There are 2 unique types of molecules in this entry. The entry contains 1989 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 TRIOSEPHOSPHATE ISOMERASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	249	1889	1200	334	350	5	0	0	0

- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
2	A	100	100	100	0	0

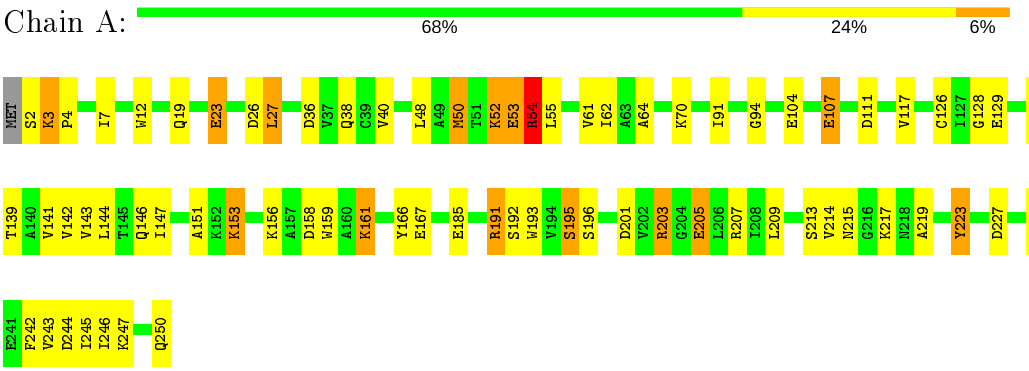
3 Residue-property plots (i)

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

Chain A:



4 Data and refinement statistics (i)

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

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	95.40Å 48.20Å 67.50Å 90.00° 120.00° 90.00°	Depositor
Resolution (Å)	15.00 – 2.10	Depositor
% Data completeness (in resolution range)	(Not available) (15.00-2.10)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	TNT, X-PLOR	Depositor
R, R_{free}	0.155 , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	1989	wwPDB-VP
Average B, all atoms (Å^2)	23.0	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	1.02	10/1923 (0.5%)	1.44	16/2606 (0.6%)

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	A	0	1

All (10) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	156	LYS	CE-NZ	-9.08	1.26	1.49
1	A	107	GLU	CD-OE1	6.91	1.33	1.25
1	A	135	GLU	CD-OE2	6.81	1.33	1.25
1	A	23	GLU	CD-OE2	6.38	1.32	1.25
1	A	185	GLU	CD-OE1	6.37	1.32	1.25
1	A	53	GLU	CD-OE1	5.92	1.32	1.25
1	A	104	GLU	CD-OE2	5.55	1.31	1.25
1	A	129	GLU	CD-OE2	5.44	1.31	1.25
1	A	133	GLU	CD-OE1	5.19	1.31	1.25
1	A	205	GLU	CD-OE2	5.06	1.31	1.25

All (16) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	54	ARG	NE-CZ-NH1	11.34	125.97	120.30
1	A	134	ARG	NE-CZ-NH2	-10.40	115.10	120.30
1	A	54	ARG	NE-CZ-NH2	-9.66	115.47	120.30
1	A	134	ARG	NE-CZ-NH1	8.29	124.45	120.30
1	A	26	ASP	CB-CG-OD1	-7.19	111.83	118.30
1	A	54	ARG	CD-NE-CZ	6.96	133.35	123.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	244	ASP	CB-CG-OD2	6.33	124.00	118.30
1	A	36	ASP	CB-CG-OD1	-6.26	112.67	118.30
1	A	201	ASP	CB-CG-OD1	6.07	123.76	118.30
1	A	227	ASP	CB-CG-OD2	-6.03	112.87	118.30
1	A	227	ASP	CB-CG-OD1	5.84	123.56	118.30
1	A	244	ASP	CB-CG-OD1	-5.54	113.31	118.30
1	A	223	TYR	CB-CG-CD2	5.43	124.26	121.00
1	A	166	TYR	CB-CG-CD1	-5.36	117.78	121.00
1	A	201	ASP	CB-CG-OD2	-5.34	113.49	118.30
1	A	36	ASP	CB-CG-OD2	5.28	123.05	118.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	240	PRO	Mainchain

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	1889	0	1925	39	0
2	A	100	0	0	1	0
All	All	1989	0	1925	39	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.

All (39) 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:50:MET:HG3	1:A:54:ARG:HD3	1.44	0.99
1:A:243:VAL:O	1:A:247:LYS:HG2	1.84	0.77
1:A:247:LYS:O	1:A:250:GLN:HG2	1.86	0.74
1:A:50:MET:HG3	1:A:54:ARG:CD	2.22	0.65

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:50:MET:O	1:A:54:ARG:HD2	1.98	0.64
1:A:27:LEU:HD11	1:A:240:PRO:HB3	1.80	0.63
1:A:50:MET:CG	1:A:54:ARG:HD3	2.26	0.62
1:A:191:ARG:HG2	1:A:203:ARG:HE	1.63	0.61
1:A:12:TRP:CD1	1:A:238:LEU:HD13	2.35	0.60
1:A:144:LEU:HD13	1:A:193:TRP:CD1	2.37	0.60
1:A:191:ARG:HG3	1:A:203:ARG:HG2	1.85	0.58
1:A:243:VAL:HG13	1:A:247:LYS:HE3	1.88	0.56
1:A:243:VAL:CG1	1:A:247:LYS:HE3	2.34	0.56
1:A:144:LEU:N	1:A:144:LEU:HD23	2.21	0.54
1:A:191:ARG:O	1:A:203:ARG:HG3	2.07	0.54
1:A:70:LYS:HB2	2:A:350:HOH:O	2.08	0.54
1:A:64:ALA:HB3	1:A:91:ILE:HG13	1.92	0.52
1:A:3:LYS:NZ	1:A:223:TYR:O	2.44	0.51
1:A:151:ALA:HB2	1:A:159:TRP:HZ2	1.76	0.50
1:A:195:SER:OG	1:A:203:ARG:HD2	2.12	0.49
1:A:128:GLY:HA3	1:A:167:GLU:O	2.14	0.47
1:A:111:ASP:OD1	1:A:153:LYS:HE2	2.14	0.47
1:A:142:VAL:O	1:A:146:GLN:HG3	2.14	0.46
1:A:139:THR:O	1:A:143:VAL:HG22	2.15	0.45
1:A:215:ASN:O	1:A:219:ALA:HB2	2.17	0.45
1:A:117:VAL:HG11	1:A:158:ASP:HB3	1.97	0.45
1:A:233:VAL:HG21	1:A:245:ILE:HG21	1.99	0.45
1:A:40:VAL:HG22	1:A:61:VAL:CG2	2.48	0.44
1:A:2:SER:O	1:A:3:LYS:HB2	2.16	0.44
1:A:50:MET:HB3	1:A:50:MET:HE3	1.79	0.43
1:A:19:GLN:O	1:A:23:GLU:HG3	2.18	0.43
1:A:7:ILE:HA	1:A:38:GLN:O	2.19	0.42
1:A:7:ILE:HB	1:A:209:LEU:HD21	2.01	0.42
1:A:242:PHE:CE2	1:A:246:ILE:HD11	2.55	0.42
1:A:70:LYS:HB3	1:A:70:LYS:HE2	1.90	0.41
1:A:27:LEU:HD23	1:A:27:LEU:O	2.20	0.41
1:A:161:LYS:HE2	1:A:161:LYS:HB3	1.21	0.41
1:A:94:GLY:O	1:A:126:CYS:HB2	2.21	0.41
1:A:48:LEU:O	1:A:52:LYS:HB2	2.22	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	247/250 (99%)	240 (97%)	6 (2%)	1 (0%)	34 32

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	3	LYS

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	197/198 (100%)	172 (87%)	25 (13%)	4 2

All (25) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	4	PRO
1	A	27	LEU
1	A	50	MET
1	A	52	LYS
1	A	53	GLU
1	A	54	ARG
1	A	55	LEU
1	A	62	ILE
1	A	107	GLU
1	A	136	SER

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Mol	Chain	Res	Type
1	A	141	VAL
1	A	147	ILE
1	A	153	LYS
1	A	161	LYS
1	A	191	ARG
1	A	192	SER
1	A	195	SER
1	A	196	SER
1	A	203	ARG
1	A	205	GLU
1	A	207	ARG
1	A	213	SER
1	A	214	VAL
1	A	217	LYS
1	A	238	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	19	GLN
1	A	89	ASN
1	A	181	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)

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 is therefore empty.

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

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

6.4 Ligands

EDS was not executed - this section is therefore empty.

6.5 Other polymers

EDS was not executed - this section is therefore empty.