WORLDWIDE wwPDB PROTEIN DATA BANK

wwPDB X-ray Structure Validation Summary Report (i)

Dec 10, 2023 – 04:28 pm GMT

PDB ID	:	1GXD
Title	:	proMMP-2/TIMP-2 complex
Authors	:	Morgunova, E.; Tuuttila, A.; Bergmann, U.; Tryggvason, K.
Deposited on	:	2002-04-02
Resolution	:	3.10 Å(reported)

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

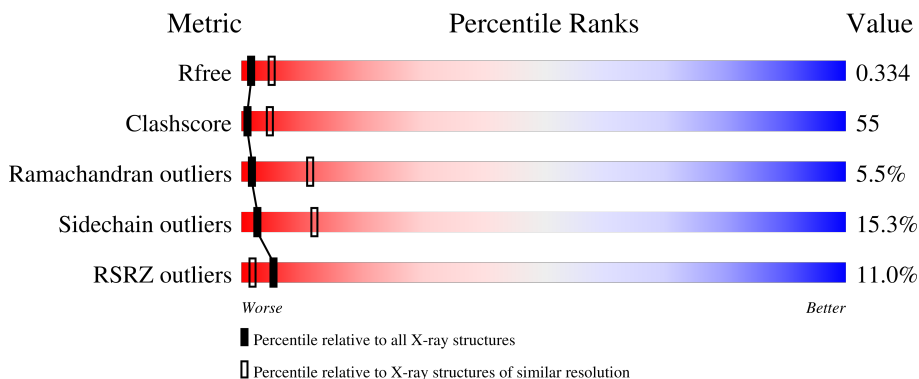|		
MolProbity	:	4.02b-467
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

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 3.10 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	Percentile Ranks	Value
Rfree		0.334
Clashscore		55
Ramachandran outliers		5.5%
Sidechain outliers		15.3%
RSRZ outliers		11.0%

Worse — *Better*

▮ 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))
R$_{free}$	130704	1094 (3.10-3.10)
Clashscore	141614	1184 (3.10-3.10)
Ramachandran outliers	138981	1141 (3.10-3.10)
Sidechain outliers	138945	1141 (3.10-3.10)
RSRZ outliers	127900	1067 (3.10-3.10)

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 of 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% 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	631	7% · 41% · 45% · 13% ··
1	B	631	7% · 38% · 46% · 13% ··
2	C	194	26% · 24% · 55% · 18% ··
2	D	194	20% · 31% · 55% · 11% ··

2 Entry composition ⓘ

There are 5 unique types of molecules in this entry. The entry contains 12945 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 72 KDA TYPE IV COLLAGENASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	624	Total	C	N	O	S	0	0	0
			4963	3186	817	933	27			
1	B	623	Total	C	N	O	S	0	0	0
			4958	3183	816	932	27			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	375	ALA	GLU	engineered mutation	UNP P08253
B	375	ALA	GLU	engineered mutation	UNP P08253

- Molecule 2 is a protein called METALLOPROTEINASE INHIBITOR 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	C	192	Total	C	N	O	S	0	0	0
			1504	952	254	281	17			
2	D	192	Total	C	N	O	S	0	0	0
			1504	952	254	281	17			

- Molecule 3 is SULFATE ION (three-letter code: SO4) (formula: O_4S).

SO4

O1

O3 O⁻ — S — O⁻ O4

S

O2

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total 5	O 4	S 1	0	0
3	B	1	Total 5	O 4	S 1	0	0

- Molecule 4 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	2	Total 2	Zn 2	0	0
4	B	2	Total 2	Zn 2	0	0

- Molecule 5 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	1	Total 1	Ca 1	0	0
5	B	1	Total 1	Ca 1	0	0

3 Residue-property plots ⓘ

These plots are drawn for all protein, RNA, DNA and oligosaccharide 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: 72 KDA TYPE IV COLLAGENASE

Chain A:

- Molecule 1: 72 KDA TYPE IV COLLAGENASE

Chain B:

• Molecule 2: METALLOPROTEINASE INHIBITOR 2

Chain C:

26%

24% 55% 18%

• Molecule 2: METALLOPROTEINASE INHIBITOR 2

Chain D:

20%

31%   55%   11%
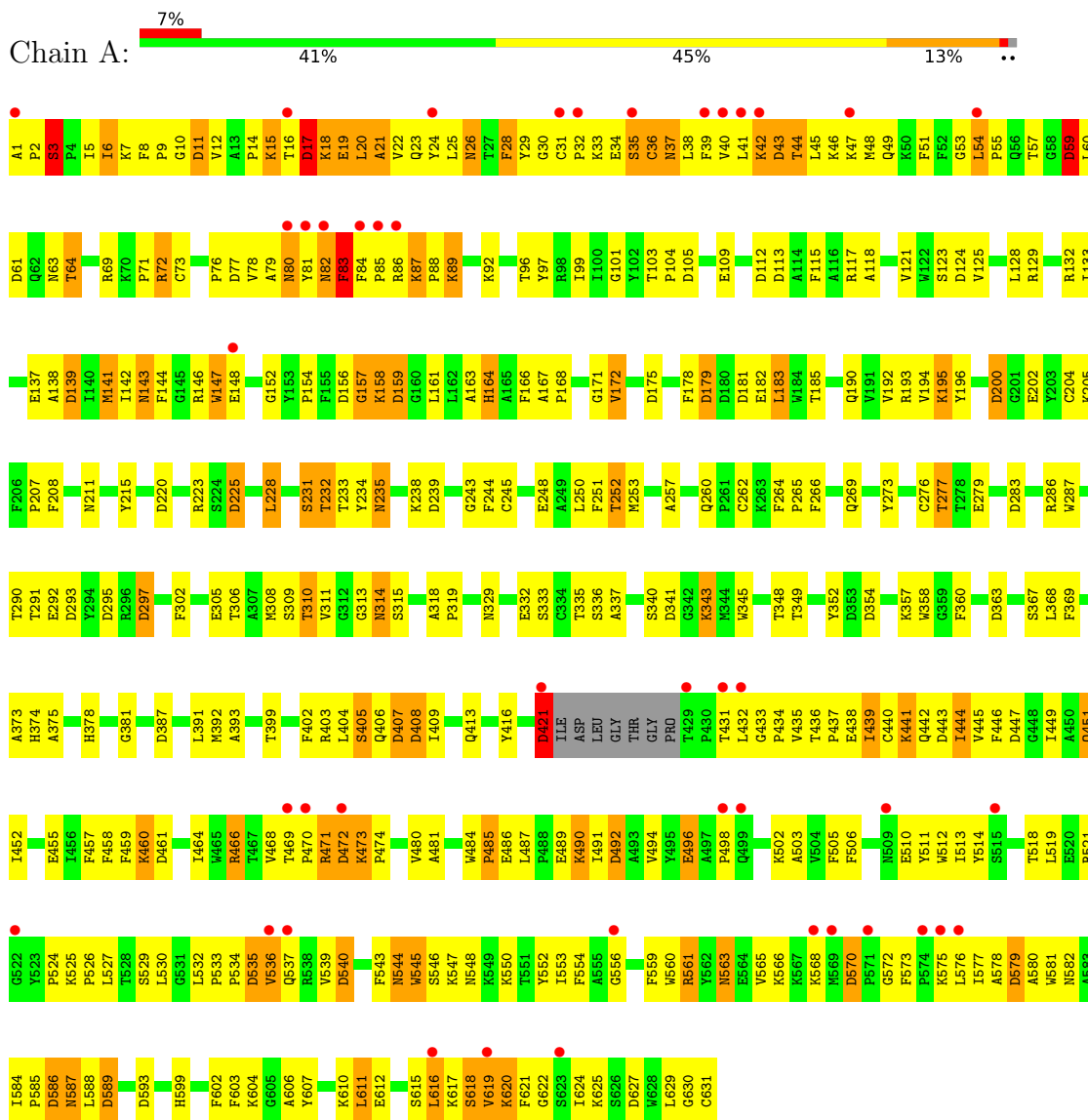
4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α, β, γ	75.70Å 374.57Å 191.00Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	8.00 – 3.10 12.97 – 3.10	Depositor EDS
% Data completeness (in resolution range)	100.0 (8.00-3.10) 94.1 (12.97-3.10)	Depositor EDS
R_{merge}	0.01	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.36 (at 3.10Å)	Xtriage
Refinement program	REFMAC 5.0	Depositor
R, R_{free}	0.275 , 0.333 0.283 , 0.334	Depositor DCC
R_{free} test set	2343 reflections (5.06%)	wwPDB-VP
Wilson B-factor (Å^2)	84.8	Xtriage
Anisotropy	0.366	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.26 , 54.3	EDS
L-test for twinning[2]	$< |L| > = 0.47$, $< L^2 > = 0.30$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.85	EDS
Total number of atoms	12945	wwPDB-VP
Average B, all atoms (Å^2)	37.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.42% of the height of the origin peak. No significant pseudotranslation is detected.*

---

[1]Intensities estimated from amplitudes.
[2]Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: CA, SO4, 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	0.42	0/5118	0.85	34/6939 (0.5%)
1	B	0.48	0/5113	0.89	31/6931 (0.4%)
2	C	0.31	0/1540	0.78	11/2079 (0.5%)
2	D	0.33	1/1540 (0.1%)	0.83	10/2079 (0.5%)
All	All	0.42	1/13311 (0.0%)	0.86	86/18028 (0.5%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	149	MET	CA-CB	-6.89	1.38	1.53

The worst 5 of 86 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	149	MET	N-CA-CB	18.16	143.28	110.60
1	B	573	PHE	N-CA-C	-9.62	85.02	111.00
1	A	573	PHE	N-CA-C	-8.03	89.31	111.00
1	B	105	ASP	CB-CG-OD2	6.79	124.41	118.30
1	A	179	ASP	CB-CG-OD2	6.56	124.20	118.30

There are no chirality outliers.

There are no planarity outliers.

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	4963	0	4674	464	0
1	B	4958	0	4667	517	0
2	C	1504	0	1470	278	3
2	D	1504	0	1470	176	3
3	A	5	0	0	1	0
3	B	5	0	0	0	0
4	A	2	0	0	0	0
4	B	2	0	0	1	0
5	A	1	0	0	0	0
5	B	1	0	0	0	0
All	All	12945	0	12281	1376	3

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 55.

The worst 5 of 1376 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:429:THR:CG2	1:B:430:PRO:HD2	1.18	1.59
1:A:409:ILE:HG13	1:A:432:LEU:CD1	1.16	1.58
1:A:409:ILE:CD1	1:A:432:LEU:HD21	1.10	1.58
1:A:409:ILE:CG1	1:A:432:LEU:HD11	1.14	1.52
1:B:429:THR:HG23	1:B:430:PRO:CD	1.06	1.49

All (3) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:C:41:LYS:CE	2:D:151:TRP:O[7_645]	1.53	0.67
2:C:135:MET:SD	2:D:42:ARG:NH1[5_545]	1.57	0.63
2:C:41:LYS:NZ	2:D:151:TRP:O[7_645]	1.94	0.26

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	619/631 (98%)	508 (82%)	81 (13%)	30 (5%)	2	14
1	B	618/631 (98%)	513 (83%)	75 (12%)	30 (5%)	2	14
2	C	190/194 (98%)	145 (76%)	27 (14%)	18 (10%)	0	3
2	D	190/194 (98%)	148 (78%)	31 (16%)	11 (6%)	1	10
All	All	1617/1650 (98%)	1314 (81%)	214 (13%)	89 (6%)	2	11

5 of 89 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	19	GLU
1	A	44	THR
1	A	54	LEU
1	A	157	GLY
1	A	439	ILE

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	522/527 (99%)	442 (85%)	80 (15%)	2	12
1	B	522/527 (99%)	440 (84%)	82 (16%)	2	11
2	C	166/168 (99%)	140 (84%)	26 (16%)	2	11
2	D	166/168 (99%)	144 (87%)	22 (13%)	4	16
All	All	1376/1390 (99%)	1166 (85%)	210 (15%)	2	12

5 of 210 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	231	SER
1	B	486	GLU
2	D	122	TYR
1	B	272	SER

Continued on next page...

W O R L D W I D E
wwPDB
PROTEIN DATA BANK

Continued from previous page...

Mol	Chain	Res	Type
1	B	343	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 33 such sidechains are listed below:

Mol	Chain	Res	Type
2	C	119	ASN
2	C	156	ASN
2	D	158	ASN
1	B	80	ASN
1	B	62	GLN

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 monosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 8 ligands modelled in this entry, 6 are monoatomic - leaving 2 for Mogul analysis.

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	$\#|Z| > 2$
3	SO4	A	1632	-	4,4,4	0.15	0	6,6,6	0.27	0
3	SO4	B	1632	-	4,4,4	0.16	0	6,6,6	0.17	0

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.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	1632	SO4	1	0

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

The following chains have linkage breaks:

Mol	Chain	Number of breaks
1	B	1
1	A	1

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	B	630:GLY	C	631:CYS	N	2.14
1	A	630:GLY	C	631:CYS	N	2.05

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	624/631 (98%)	0.17	43 (6%)	16	7	27, 36, 45, 74	0
1	B	623/631 (98%)	0.13	47 (7%)	14	5	28, 36, 46, 81	0
2	C	192/194 (98%)	1.40	51 (26%)	0	0	35, 37, 76, 106	0
2	D	192/194 (98%)	1.17	38 (19%)	1	0	36, 37, 75, 107	0
All	All	1631/1650 (98%)	0.42	179 (10%)	5	2	27, 37, 47, 107	0

The worst 5 of 179 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	85	PRO	12.6
2	D	113	THR	11.3
2	C	23	ALA	9.4
2	C	24	VAL	8.0
2	D	156	ASN	7.9

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 monosaccharides 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. 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	RSCC	RSR	B-factors(Å²)	Q<0.9
5	CA	B	1635	1/1	0.95	0.14	40,40,40,40	0
5	CA	A	1635	1/1	0.97	0.07	58,58,58,58	0
3	SO4	A	1632	5/5	0.97	0.11	63,64,65,66	0
3	SO4	B	1632	5/5	0.98	0.08	74,75,75,75	0
4	ZN	A	1634	1/1	0.98	0.05	72,72,72,72	0
4	ZN	B	1634	1/1	0.99	0.07	55,55,55,55	0
4	ZN	A	1633	1/1	0.99	0.07	61,61,61,61	0
4	ZN	B	1633	1/1	0.99	0.06	50,50,50,50	0

6.5 Other polymers (i)

There are no such residues in this entry.