



# Full wwPDB X-ray Structure Validation Report ⓘ

May 28, 2020 – 08:31 pm BST

PDB ID : 1TGC  
Title : ON THE DISORDERED ACTIVATION DOMAIN IN TRYPSINOGEN.  
CHEMICAL LABELLING AND LOW-TEMPERATURE CRYSTALLOG-  
RAPHY  
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Deposited on : 1981-10-26  
Resolution : 1.80 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](mailto: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.

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

MolProbity : 4.02b-467  
Xtriage (Phenix) : 1.13  
EDS : 2.11  
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) : 2.11

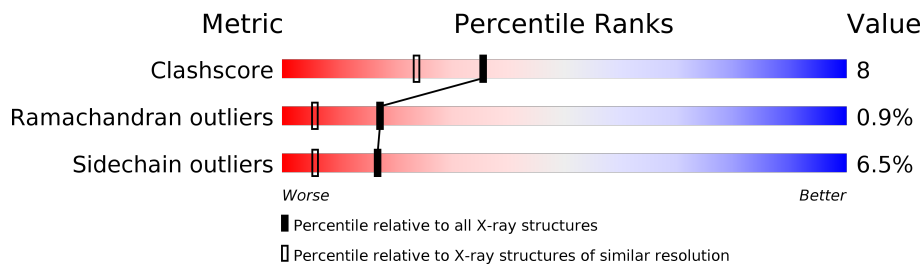
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.80 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	6793 (1.80-1.80)
Ramachandran outliers	138981	6697 (1.80-1.80)
Sidechain outliers	138945	6696 (1.80-1.80)

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  $\geq 3$ , 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  $\leq 5\%$ .

Mol	Chain	Length	Quality of chain
1	A	229	76% 18% . .

## 2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 1723 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 TRYPSINOGEN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	223	1629	1012	279	324	14	256	0	0

- Molecule 2 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	Ca	0	0
			1	1		


- Molecule 3 is water.

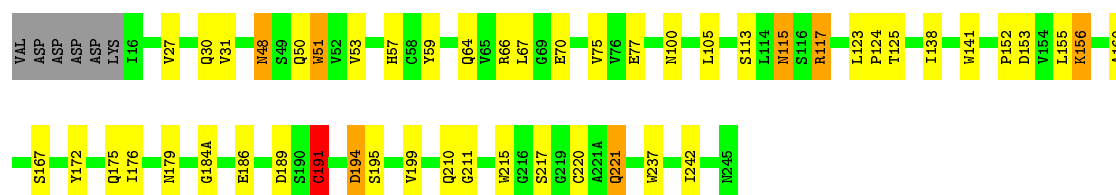
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	93	Total	O	0	0
			93	93		

### 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.

- Molecule 1: TRYPSINOGEN

Chain A:  76% 18%



## 4 Data and refinement statistics i

Property	Value	Source
Space group	P 31 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	55.11Å 55.11Å 109.38Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	(Not available) – 1.80 21.87 – 1.80	Depositor EDS
% Data completeness (in resolution range)	(Not available) ((Not available)-1.80) 65.1 (21.87-1.80)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$	-	Xtrriage
Refinement program	unknown	Depositor
R, $R_{free}$	(Not available) , (Not available) 0.180 , (Not available)	Depositor DCC
$R_{free}$ test set	No test flags present.	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	11.2	Xtrriage
Anisotropy	0.316	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.29 , 46.4	EDS
L-test for twinning <sup>1</sup>	$\langle  L  \rangle = 0.37$ , $\langle L^2 \rangle = 0.19$	Xtrriage
Estimated twinning fraction	0.096 for -h,-k,l	Xtrriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	1723	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	14.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.52% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  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

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	1.01	5/1660 (0.3%)	0.99	0/2250

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	7

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	141	TRP	NE1-CE2	-7.60	1.27	1.37
1	A	237	TRP	NE1-CE2	-7.58	1.27	1.37
1	A	215	TRP	NE1-CE2	-7.47	1.27	1.37
1	A	51	TRP	NE1-CE2	-7.27	1.28	1.37
1	A	186	GLU	CD-OE2	5.98	1.32	1.25

There are no bond angle outliers.

There are no chirality outliers.

All (7) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	189	ASP	Sidechain
1	A	191	CYS	Mainchain
1	A	194	ASP	Sidechain,Mainchain
1	A	210	GLN	Sidechain
1	A	221	GLN	Sidechain

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Mol	Chain	Res	Type	Group
1	A	70	GLU	Mainchain

## 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	1629	0	1588	22	7
2	A	1	0	0	0	0
3	A	93	0	0	0	3
All	All	1723	0	1588	22	7

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 8.

All (22) 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:48:ASN:HD22	1:A:50:GLN:H	1.44	0.65
1:A:64:GLN:HE21	1:A:66:ARG:HE	1.48	0.60
1:A:152:PRO:CG	1:A:156:LYS:HD2	2.32	0.59
1:A:100:ASN:HD21	1:A:179:ASN:HD22	1.49	0.59
1:A:115:ASN:HD22	1:A:117:ARG:H	1.54	0.56
1:A:160:ALA:HB1	1:A:184(A):GLY:HA2	1.87	0.55
1:A:64:GLN:NE2	1:A:66:ARG:HE	2.07	0.53
1:A:152:PRO:HG3	1:A:156:LYS:HD2	1.91	0.51
1:A:57:HIS:NE2	1:A:195:SER:HB3	2.26	0.49
1:A:48:ASN:HD22	1:A:48:ASN:C	2.16	0.48
1:A:51:TRP:CD2	1:A:242:ILE:HG12	2.48	0.48
1:A:138:ILE:HG12	1:A:199:VAL:HG22	1.95	0.48
1:A:31:VAL:HG22	1:A:67:LEU:HD23	1.97	0.46
1:A:48:ASN:ND2	1:A:50:GLN:H	2.12	0.46
1:A:64:GLN:HE22	1:A:66:ARG:HH21	1.63	0.46
1:A:199:VAL:HB	1:A:211:GLY:HA3	1.99	0.45
1:A:53:VAL:HG23	1:A:105:LEU:HD12	1.99	0.44
1:A:115:ASN:C	1:A:115:ASN:HD22	2.21	0.44
1:A:156:LYS:HB3	1:A:156:LYS:HE2	1.73	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:75:VAL:HG22	1:A:77:GLU:HG2	2.00	0.43
1:A:27:VAL:HG12	1:A:30:GLN:HB2	2.01	0.42
1:A:172:TYR:HB3	1:A:175:GLN:HB2	2.04	0.40

All (7) 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)
1:A:176:ILE:O	3:A:844:HOH:O[2_655]	1.69	0.51
1:A:125:THR:O	1:A:217:SER:OG[4_546]	1.80	0.40
1:A:176:ILE:C	3:A:844:HOH:O[2_655]	1.94	0.26
1:A:125:THR:O	1:A:217:SER:CB[4_546]	2.03	0.17
1:A:59:TYR:OH	1:A:153:ASP:OD2[5_565]	2.07	0.13
1:A:176:ILE:CB	3:A:844:HOH:O[2_655]	2.09	0.11
1:A:125:THR:OG1	1:A:175:GLN:OE1[4_546]	2.16	0.04

## 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	221/229 (96%)	212 (96%)	7 (3%)	2 (1%)	<b>17</b>   <b>6</b>

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	194	ASP
1	A	191	CYS



### 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	184/190 (97%)	172 (94%)	12 (6%)	17 6

All (12) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	48	ASN
1	A	113	SER
1	A	115	ASN
1	A	117	ARG
1	A	123	LEU
1	A	124	PRO
1	A	155	LEU
1	A	156	LYS
1	A	167	SER
1	A	191	CYS
1	A	220	CYS
1	A	221	GLN

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	30	GLN
1	A	48	ASN
1	A	64	GLN
1	A	74	ASN
1	A	97	ASN
1	A	100	ASN
1	A	101	ASN
1	A	115	ASN
1	A	210	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](#)

Of 1 ligands modelled in this entry, 1 is 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

### 6.1 Protein, DNA and RNA chains

Unable to reproduce the depositors R factor - this section is therefore empty.

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

Unable to reproduce the depositors R factor - this section is therefore empty.

### 6.3 Carbohydrates

Unable to reproduce the depositors R factor - this section is therefore empty.

### 6.4 Ligands

Unable to reproduce the depositors R factor - this section is therefore empty.

### 6.5 Other polymers

Unable to reproduce the depositors R factor - this section is therefore empty.