



# Full wwPDB X-ray Structure Validation Report ⓘ

Aug 31, 2020 – 09:35 AM BST

PDB ID : 1DQ5  
Title : Manganese;Manganese concanavalin A at pH 5.0  
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Deposited on : 1999-12-30  
Resolution : 2.00 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	:	2.13
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)	:	2.13

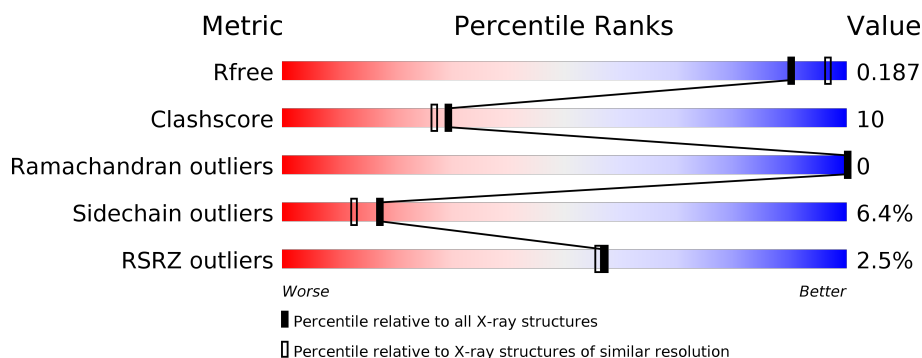
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.00 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))
$R_{free}$	130704	8085 (2.00-2.00)
Clashscore	141614	9178 (2.00-2.00)
Ramachandran outliers	138981	9054 (2.00-2.00)
Sidechain outliers	138945	9053 (2.00-2.00)
RSRZ outliers	127900	7900 (2.00-2.00)

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  $\leq 5\%$ . 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	237	<div> <div>3%</div> <div>71%</div> <div>24%</div> <div>5%</div> </div>

## 2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 1917 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 Concanavalin-Br.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	237	Total	C	N	O	S	0	0	0
			1809	1141	302	364	2			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	58	ASP	GLY	conflict	UNP P55915
A	70	ALA	GLY	conflict	UNP P55915
A	151	ASP	GLU	conflict	UNP P55915
A	155	GLU	ARG	conflict	UNP P55915

- Molecule 2 is MANGANESE (II) ION (three-letter code: MN) (formula: Mn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	2	Total	Mn	0	0
			2	2		

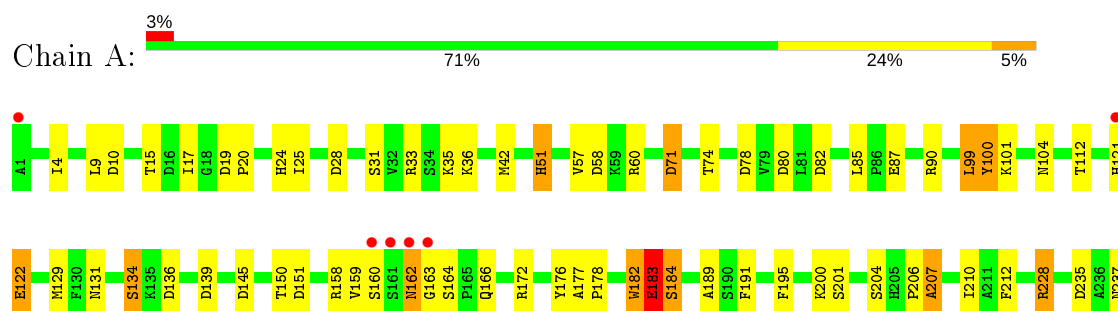
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	106	Total	O	0	0
			106	106		

### 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: Concanavalin-Br



## 4 Data and refinement statistics

Property	Value	Source
Space group	I 2 2 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	63.23Å 87.44Å 89.27Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	8.00 – 2.00 11.73 – 2.00	Depositor EDS
% Data completeness (in resolution range)	89.0 (8.00-2.00) 87.4 (11.73-2.00)	Depositor EDS
$R_{merge}$	0.07	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.32 (at 2.00Å)	Xtriage
Refinement program	X-PLOR 3.843	Depositor
R, $R_{free}$	0.189 , 0.210 0.186 , 0.187	Depositor DCC
$R_{free}$ test set	1491 reflections (10.05%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	24.1	Xtriage
Anisotropy	0.342	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 70.1	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.013 for -h,-l,-k	Xtriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	1917	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	22.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.78% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</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 ⓘ

### 5.1 Standard geometry ⓘ

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

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	0.80	0/1851	1.94	42/2522 (1.7%)

There are no bond length outliers.

All (42) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	60	ARG	NE-CZ-NH2	13.57	127.08	120.30
1	A	172	ARG	NE-CZ-NH1	13.04	126.82	120.30
1	A	136	ASP	CB-CG-OD2	-11.59	107.87	118.30
1	A	28	ASP	CB-CG-OD2	9.92	127.23	118.30
1	A	172	ARG	NE-CZ-NH2	-9.18	115.71	120.30
1	A	58	ASP	CB-CG-OD2	9.07	126.46	118.30
1	A	100	TYR	CB-CG-CD1	-9.00	115.60	121.00
1	A	145	ASP	CB-CG-OD1	8.33	125.79	118.30
1	A	87	GLU	OE1-CD-OE2	8.10	133.01	123.30
1	A	90	ARG	NE-CZ-NH1	-7.59	116.50	120.30
1	A	207	ALA	O-C-N	-7.48	110.73	122.70
1	A	145	ASP	CB-CG-OD2	-7.25	111.78	118.30
1	A	158	ARG	NE-CZ-NH2	-7.07	116.77	120.30
1	A	10	ASP	CB-CG-OD2	-7.03	111.97	118.30
1	A	82	ASP	CB-CG-OD1	-6.98	112.02	118.30
1	A	80	ASP	CB-CG-OD2	-6.62	112.34	118.30
1	A	78	ASP	CB-CG-OD2	6.45	124.11	118.30
1	A	58	ASP	OD1-CG-OD2	-6.39	111.15	123.30
1	A	71	ASP	CB-CG-OD1	6.38	124.04	118.30
1	A	176	TYR	N-CA-CB	-6.36	99.16	110.60
1	A	228	ARG	CD-NE-CZ	6.35	132.49	123.60
1	A	33	ARG	NE-CZ-NH1	6.13	123.36	120.30
1	A	131	ASN	N-CA-CB	6.02	121.44	110.60
1	A	139	ASP	CB-CG-OD2	5.84	123.56	118.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	195	PHE	CB-CG-CD2	5.84	124.89	120.80
1	A	4	ILE	CB-CG1-CD1	5.74	129.97	113.90
1	A	100	TYR	CG-CD2-CE2	-5.73	116.72	121.30
1	A	176	TYR	O-C-N	-5.54	113.83	122.70
1	A	235	ASP	CB-CG-OD2	-5.53	113.32	118.30
1	A	80	ASP	CB-CG-OD1	5.50	123.25	118.30
1	A	82	ASP	CB-CG-OD2	5.43	123.18	118.30
1	A	212	PHE	CB-CG-CD2	-5.42	117.01	120.80
1	A	182	TRP	N-CA-CB	5.39	120.30	110.60
1	A	207	ALA	CA-C-N	5.39	129.06	117.20
1	A	9	LEU	N-CA-C	-5.32	96.64	111.00
1	A	87	GLU	CA-CB-CG	-5.32	101.70	113.40
1	A	51	HIS	N-CA-CB	5.25	120.05	110.60
1	A	85	LEU	CB-CA-C	-5.23	100.26	110.20
1	A	57	VAL	CA-CB-CG1	5.17	118.65	110.90
1	A	189	ALA	N-CA-CB	5.13	117.28	110.10
1	A	183	GLU	OE1-CD-OE2	5.07	129.38	123.30
1	A	134	SER	CB-CA-C	5.00	119.61	110.10

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	1809	0	1755	34	0
2	A	2	0	0	0	0
3	A	106	0	0	7	0
All	All	1917	0	1755	34	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 (34) 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:183:GLU:HG3	3:A:332:HOH:O	1.48	1.11
1:A:160:SER:OG	1:A:162:ASN:ND2	1.91	1.03
1:A:162:ASN:ND2	1:A:162:ASN:H	1.72	0.86
1:A:17:ILE:HD13	1:A:228:ARG:HD3	1.59	0.85
1:A:160:SER:HG	1:A:162:ASN:ND2	1.77	0.83
1:A:159:VAL:CG1	1:A:163:GLY:HA2	2.13	0.78
1:A:150:THR:O	1:A:151:ASP:HB2	1.94	0.66
1:A:134:SER:HB3	3:A:351:HOH:O	1.97	0.65
1:A:99:LEU:N	1:A:99:LEU:HD23	2.17	0.59
1:A:164:SER:O	1:A:166:GLN:NE2	2.35	0.59
1:A:71:ASP:O	3:A:360:HOH:O	2.18	0.57
1:A:159:VAL:HG13	1:A:163:GLY:C	2.25	0.56
1:A:162:ASN:N	1:A:162:ASN:ND2	2.41	0.55
1:A:121:HIS:CE1	3:A:356:HOH:O	2.58	0.54
1:A:150:THR:HG22	1:A:150:THR:O	2.08	0.53
1:A:182:TRP:CG	1:A:183:GLU:N	2.77	0.53
1:A:15:THR:HG22	1:A:19:ASP:O	2.09	0.51
1:A:35:LYS:HE2	3:A:339:HOH:O	2.12	0.49
1:A:182:TRP:CZ2	1:A:184:SER:HA	2.48	0.47
1:A:51:HIS:CD2	3:A:348:HOH:O	2.68	0.47
1:A:159:VAL:HG13	1:A:163:GLY:HA2	1.94	0.46
1:A:100:TYR:HB2	1:A:207:ALA:HB3	1.97	0.46
1:A:159:VAL:HG13	1:A:163:GLY:CA	2.47	0.45
1:A:35:LYS:HD3	1:A:35:LYS:HA	1.75	0.45
1:A:122:GLU:N	3:A:358:HOH:O	2.35	0.44
1:A:159:VAL:CG1	1:A:163:GLY:CA	2.93	0.44
1:A:237:ASN:HA	1:A:237:ASN:HD22	1.61	0.44
1:A:177:ALA:HA	1:A:178:PRO:HD3	1.74	0.43
1:A:129:MET:HE3	1:A:129:MET:HB2	1.41	0.42
1:A:112:THR:O	1:A:191:PHE:HA	2.19	0.42
1:A:182:TRP:CH2	1:A:184:SER:HA	2.54	0.42
1:A:201:SER:CB	1:A:206:PRO:HB3	2.50	0.41
1:A:104:ASN:HD22	1:A:210:ILE:CG1	2.33	0.40
1:A:20:PRO:HD2	1:A:24:HIS:CE1	2.56	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	235/237 (99%)	224 (95%)	11 (5%)	0	100	100

There are no Ramachandran outliers to report.

### 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	203/203 (100%)	190 (94%)	13 (6%)	17	13

All (13) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	25	ILE
1	A	31	SER
1	A	36	LYS
1	A	42	MET
1	A	74	THR
1	A	99	LEU
1	A	101	LYS
1	A	122	GLU
1	A	162	ASN
1	A	183	GLU
1	A	184	SER
1	A	200	LYS
1	A	204	SER

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	14	ASN
1	A	69	ASN
1	A	104	ASN
1	A	121	HIS
1	A	162	ASN
1	A	237	ASN

### 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 monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 2 ligands modelled in this entry, 2 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 ⓘ

There are no chain breaks in this entry.

## 6 Fit of model and data [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	237/237 (100%)	-0.36	6 (2%) 57 56	10, 20, 37, 55	0

All (6) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	162	ASN	4.4
1	A	163	GLY	3.9
1	A	1	ALA	2.7
1	A	161	SER	2.5
1	A	160	SER	2.2
1	A	121	HIS	2.1

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

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

### 6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

### 6.4 Ligands [i](#)

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, 95<sup>th</sup> 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(Å <sup>2</sup> )	Q<0.9
2	MN	A	301	1/1	0.98	0.04	28,28,28,28	0
2	MN	A	302	1/1	0.99	0.03	30,30,30,30	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.