



# wwPDB X-ray Structure Validation Summary Report ⓘ

Jun 13, 2020 – 02:07 pm BST

PDB ID : 1AMT  
Title : Crystal structure of alamethicin at 1.5 angstrom resolution  
Authors : Fox, R.O.; Richards, F.M.  
Deposited on : 1987-12-08  
Resolution : 1.50 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](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  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtrriage (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

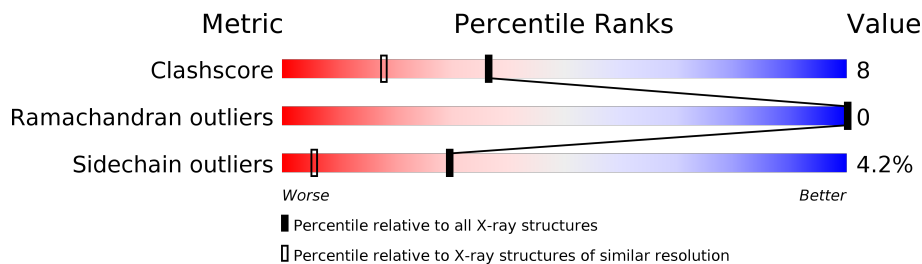
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.50 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	3144 (1.50-1.50)
Ramachandran outliers	138981	3066 (1.50-1.50)
Sidechain outliers	138945	3064 (1.50-1.50)

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  $\leq 5\%$

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	21	
1	B	21	
1	C	21	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
1	PHL	C	20	-	X	-	-
2	CCN	B	22	-	X	-	-

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<b>Mol</b>	<b>Type</b>	<b>Chain</b>	<b>Res</b>	<b>Chirality</b>	<b>Geometry</b>	<b>Clashes</b>	<b>Electron density</b>
3	MOH	B	23	-	-	X	-
3	MOH	B	28	-	-	X	-

## 2 Entry composition [i](#)

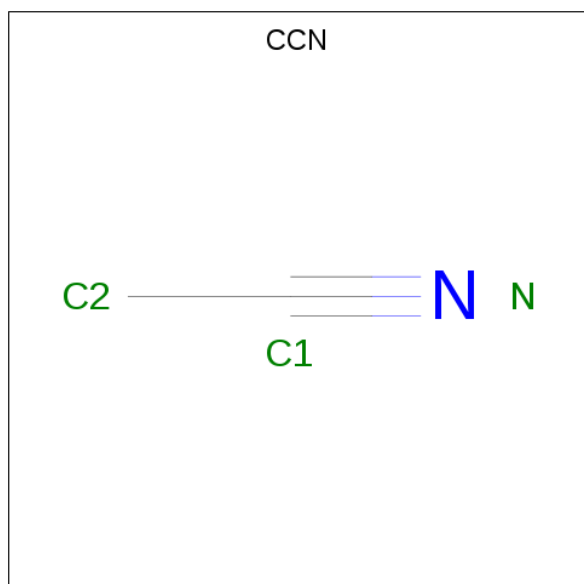
There are 3 unique types of molecules in this entry. The entry contains 449 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 ALAMETHICIN F30.

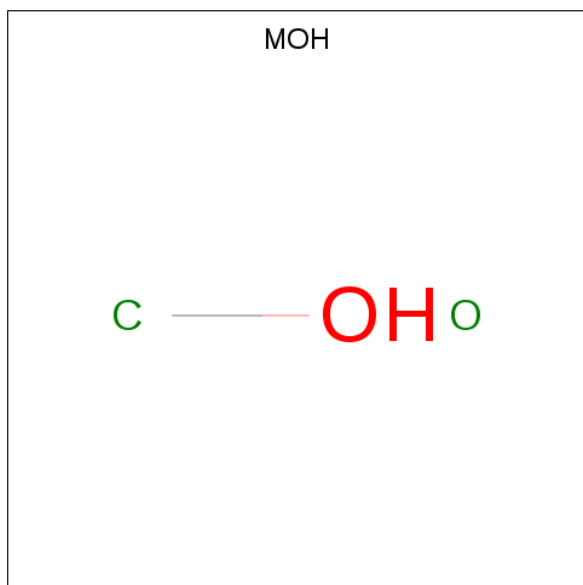
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
1	A	21	139	92	22	25	0	0	0
1	B	21	139	92	22	25	0	0	0
1	C	21	139	92	22	25	0	0	0

- Molecule 2 is ACETONITRILE (three-letter code: CCN) (formula: C<sub>2</sub>H<sub>3</sub>N).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	N		
2	A	1	3	2	1	0	0
2	B	1	3	2	1	0	0

- Molecule 3 is METHANOL (three-letter code: MOH) (formula: CH<sub>4</sub>O).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			2	1	1		
3	B	1	Total	C	O	0	0
			2	1	1		
3	B	1	Total	C	O	0	0
			2	1	1		
3	B	1	Total	C	O	0	0
			2	1	1		
3	B	1	Total	C	O	0	0
			2	1	1		
3	B	1	Total	C	O	0	0
			2	1	1		
3	B	1	Total	C	O	0	0
			2	1	1		
3	B	1	Total	C	O	0	0
			2	1	1		
3	C	1	Total	C	O	0	0
			2	1	1		
3	C	1	Total	C	O	0	0
			2	1	1		
3	C	1	Total	C	O	0	0
			2	1	1		
3	C	1	Total	C	O	0	0
			2	1	1		

### 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: ALAMETHICIN F30

Chain A: 



- Molecule 1: ALAMETHICIN F30

Chain B: 



- Molecule 1: ALAMETHICIN F30

Chain C: 



## 4 Data and refinement statistics

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

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	33.33Å 29.62Å 23.20Å 90.00° 120.40° 90.00°	Depositor
Resolution (Å)	10.00 – 1.50	Depositor
% Data completeness (in resolution range)	(Not available) (10.00-1.50)	Depositor
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
Refinement program	PROLSQ	Depositor
R, $R_{free}$	0.155 , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	449	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	7.0	wwPDB-VP

## 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: PHL, CCN, MOH, ACE, AIB

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	3.16	7/79 (8.9%)	2.44	2/110 (1.8%)
1	B	3.25	10/79 (12.7%)	2.69	9/110 (8.2%)
1	C	3.08	7/79 (8.9%)	2.74	10/110 (9.1%)
All	All	3.16	24/237 (10.1%)	2.63	21/330 (6.4%)

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
1	C	0	1
All	All	0	2

The worst 5 of 24 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	18	GLU	CD-OE2	-13.56	1.10	1.25
1	C	18	GLU	CD-OE1	-10.23	1.14	1.25
1	B	18	GLU	C-O	8.78	1.40	1.23
1	B	19	GLN	CD-NE2	-8.60	1.11	1.32
1	C	18	GLU	C-O	8.50	1.39	1.23

The worst 5 of 21 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	11	GLY	CA-C-O	-8.79	104.78	120.60
1	B	18	GLU	OE1-CD-OE2	-8.03	113.66	123.30
1	C	18	GLU	OE1-CD-OE2	-7.22	114.64	123.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	11	GLY	O-C-N	-7.06	111.40	122.70
1	B	14	PRO	CB-CA-C	6.65	128.62	112.00

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	15	VAL	Mainchain
1	C	11	GLY	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	139	0	143	0	0
1	B	139	0	145	2	0
1	C	139	0	145	1	0
2	A	3	0	3	0	0
2	B	3	0	3	1	0
3	A	2	0	0	1	0
3	B	16	0	0	3	0
3	C	8	0	0	1	0
All	All	449	0	439	7	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 8.

The worst 5 of 7 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)
3:B:23:MOH:O	3:B:28:MOH:C	2.34	0.75
1:B:1:AIB:HB13	1:B:2:PRO:HD3	1.77	0.67
3:B:23:MOH:C	3:B:28:MOH:C	2.86	0.54
1:B:4:ALA:HB3	2:B:22:CCN:H22	1.95	0.47
3:B:23:MOH:C	3:B:28:MOH:O	2.65	0.44

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	11/21 (52%)	11 (100%)	0	0	100	100
1	B	11/21 (52%)	11 (100%)	0	0	100	100
1	C	11/21 (52%)	10 (91%)	1 (9%)	0	100	100
All	All	33/63 (52%)	32 (97%)	1 (3%)	0	100	100

There are no Ramachandran outliers to report.

### 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	8/8 (100%)	8 (100%)	0	100	100
1	B	8/8 (100%)	8 (100%)	0	100	100
1	C	8/8 (100%)	7 (88%)	1 (12%)	4	0
All	All	24/24 (100%)	23 (96%)	1 (4%)	30	6

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	12	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

27 non-standard protein/DNA/RNA residues are modelled in this entry.

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
1	AIB	C	13	1	1,5,6	1.24	0	2,7,9	0.98	0
1	AIB	C	17	1	1,5,6	4.07	1 (100%)	2,7,9	1.36	0
1	AIB	A	16	1	1,5,6	2.30	1 (100%)	2,7,9	0.39	0
1	AIB	B	1	1	1,5,6	2.66	1 (100%)	2,7,9	1.04	0
1	AIB	C	10	1	1,5,6	1.77	0	2,7,9	1.00	0
1	AIB	A	10	1	1,5,6	2.18	1 (100%)	2,7,9	1.40	0
1	PHL	B	20	1	11,11,11	3.54	6 (54%)	11,13,13	3.24	6 (54%)
1	AIB	C	1	1	1,5,6	0.11	0	2,7,9	0.79	0
1	AIB	A	17	1	1,5,6	1.06	0	2,7,9	0.72	0
1	AIB	B	3	1	1,5,6	2.47	1 (100%)	2,7,9	1.42	0
1	AIB	A	3	1	1,5,6	6.43	1 (100%)	2,7,9	2.90	1 (50%)
1	AIB	B	13	1	1,5,6	3.54	1 (100%)	2,7,9	0.52	0
1	AIB	C	3	1	1,5,6	2.22	1 (100%)	2,7,9	1.03	0
1	AIB	B	10	1	1,5,6	1.62	0	2,7,9	0.86	0
1	PHL	C	20	1	11,11,11	3.25	6 (54%)	11,13,13	4.44	9 (81%)
1	PHL	A	20	1	11,11,11	1.88	5 (45%)	11,13,13	1.83	3 (27%)
1	AIB	C	8	1	1,5,6	1.09	0	2,7,9	1.04	0
1	AIB	A	8	1	1,5,6	6.44	1 (100%)	2,7,9	1.20	0
1	AIB	A	1	1	1,5,6	1.84	0	2,7,9	0.61	0
1	AIB	A	5	1	1,5,6	5.31	1 (100%)	2,7,9	1.98	1 (50%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
1	AIB	B	16	1	1,5,6	5.35	1 (100%)	2,7,9	0.11	0
1	AIB	B	5	1	1,5,6	0.40	0	2,7,9	1.48	0
1	AIB	B	17	1	1,5,6	3.27	1 (100%)	2,7,9	0.63	0
1	AIB	A	13	1	1,5,6	0.15	0	2,7,9	0.50	0
1	AIB	C	5	1	1,5,6	4.35	1 (100%)	2,7,9	0.90	0
1	AIB	B	8	1	1,5,6	5.28	1 (100%)	2,7,9	0.51	0
1	AIB	C	16	1	1,5,6	3.85	1 (100%)	2,7,9	0.88	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	AIB	C	13	1	-	0/2/3/6	-
1	AIB	C	17	1	-	0/2/3/6	-
1	AIB	A	16	1	-	0/2/3/6	-
1	AIB	B	1	1	-	0/2/3/6	-
1	AIB	C	10	1	-	0/2/3/6	-
1	AIB	A	10	1	-	0/2/3/6	-
1	PHL	B	20	1	-	0/6/6/6	0/1/1/1
1	AIB	C	1	1	-	0/2/3/6	-
1	AIB	A	17	1	-	0/2/3/6	-
1	AIB	B	3	1	-	0/2/3/6	-
1	AIB	A	3	1	-	0/2/3/6	-
1	AIB	B	13	1	-	0/2/3/6	-
1	AIB	C	3	1	-	0/2/3/6	-
1	AIB	B	10	1	-	0/2/3/6	-
1	PHL	C	20	1	-	0/6/6/6	0/1/1/1
1	PHL	A	20	1	-	0/6/6/6	0/1/1/1
1	AIB	C	8	1	-	0/2/3/6	-
1	AIB	A	8	1	-	0/2/3/6	-
1	AIB	A	1	1	-	0/2/3/6	-
1	AIB	A	5	1	-	0/2/3/6	-
1	AIB	B	16	1	-	1/2/3/6	-
1	AIB	B	5	1	-	0/2/3/6	-
1	AIB	B	17	1	-	1/2/3/6	-
1	AIB	A	13	1	-	0/2/3/6	-
1	AIB	C	5	1	-	0/2/3/6	-
1	AIB	B	8	1	-	0/2/3/6	-
1	AIB	C	16	1	-	0/2/3/6	-

The worst 5 of 32 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	20	PHL	C-CA	10.16	1.68	1.52
1	A	8	AIB	O-C	6.44	1.41	1.19
1	A	3	AIB	O-C	6.43	1.41	1.19
1	C	20	PHL	CE1-CD1	6.32	1.52	1.38
1	B	16	AIB	O-C	5.35	1.37	1.19

The worst 5 of 20 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	20	PHL	CB-CA-C	7.08	125.00	112.21
1	C	20	PHL	CD2-CG-CD1	6.85	128.94	118.17
1	B	20	PHL	CB-CG-CD1	-6.33	108.34	120.91
1	C	20	PHL	CZ-CE1-CD1	-5.93	111.16	120.19
1	C	20	PHL	CE2-CZ-CE1	5.86	130.82	119.93

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	B	16	AIB	O-C-CA-CB1
1	B	17	AIB	O-C-CA-CB2

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	C	13	AIB	1	0
1	B	1	AIB	1	0

## 5.5 Carbohydrates [i](#)

There are no carbohydrates in this entry.

## 5.6 Ligand geometry [i](#)

15 ligands are modelled in this entry.

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	MOH	C	22	-	1,1,1	1.94	0	-		
3	MOH	C	25	-	1,1,1	0.31	0	-		
3	MOH	B	26	-	1,1,1	0.61	0	-		
3	MOH	C	23	-	1,1,1	0.06	0	-		
3	MOH	B	25	-	1,1,1	0.07	0	-		
3	MOH	A	23	-	1,1,1	0.20	0	-		
3	MOH	B	28	-	1,1,1	0.27	0	-		
3	MOH	C	24	-	1,1,1	0.27	0	-		
3	MOH	B	30	-	1,1,1	0.26	0	-		
3	MOH	B	29	-	1,1,1	0.12	0	-		
3	MOH	B	23	-	1,1,1	0.48	0	-		
3	MOH	B	24	-	1,1,1	0.90	0	-		
3	MOH	B	27	-	1,1,1	0.06	0	-		
2	CCN	A	22	-	2,2,2	0.98	0	1,1,1	3.85	1 (100%)
2	CCN	B	22	-	2,2,2	1.51	1 (50%)	1,1,1	6.52	1 (100%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	22	CCN	C1-N	2.13	1.29	1.14

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	22	CCN	C2-C1-N	-6.52	120.78	174.72
2	A	22	CCN	C2-C1-N	-3.85	142.81	174.72

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

5 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	C	25	MOH	1	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	23	MOH	1	0
3	B	28	MOH	3	0
3	B	23	MOH	3	0
2	B	22	CCN	1	0

## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
1	C	3
1	A	2
1	B	1

The worst 5 of 6 chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	C	2:PRO	C	3:AIB	N	1.20
1	C	11:GLY	C	12:LEU	N	1.20
1	B	6:ALA	C	7:GLN	N	1.19
1	C	5:AIB	C	6:ALA	N	1.19
1	A	3:AIB	C	4:ALA	N	1.17

## 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.