



# wwPDB X-ray Structure Validation Summary Report ⓘ

Feb 14, 2017 – 02:44 pm GMT

PDB ID : 3N0S  
Title : Crystal structure of BA2930 mutant (H183A) in complex with AcCoA  
Authors : Klimecka, M.M.; Chruszcz, M.; Porebski, P.J.; Cymborowski, M.; Anderson, W.F.; Minor, W.  
Deposited on : 2010-05-14  
Resolution : 2.15 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

<http://wwpdb.org/validation/2016/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	:	1.7.2 (RC1), CSD as538be (2017)
Xtriage (Phenix)	:	1.9-1692
EDS	:	trunk28620
Percentile statistics	:	20161228.v01 (using entries in the PDB archive December 28th 2016)
Refmac	:	5.8.0135
CCP4	:	6.5.0
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	recalc28949

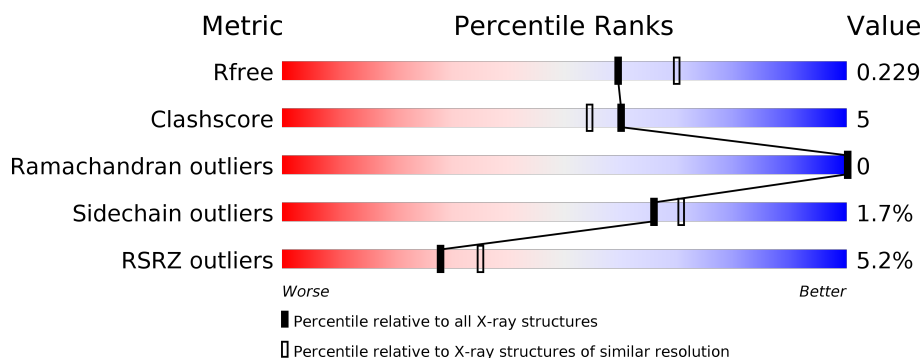
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.15 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))
$R_{free}$	100719	1170 (2.16-2.16)
Clashscore	112137	1278 (2.16-2.16)
Ramachandran outliers	110173	1256 (2.16-2.16)
Sidechain outliers	110143	1255 (2.16-2.16)
RSRZ outliers	101464	1175 (2.16-2.16)

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. 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	268	<div> <div>6%</div> <div>84%</div> <div>15%</div> <div>•</div> </div>
1	B	268	<div> <div>4%</div> <div>86%</div> <div>13%</div> <div>•</div> </div>
1	C	268	<div> <div>6%</div> <div>84%</div> <div>14%</div> <div>••</div> </div>
1	D	268	<div> <div>5%</div> <div>91%</div> <div>7%</div> <div>••</div> </div>

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 crite-

ria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
4	EPE	B	268	-	-	-	X

## 2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 8881 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.

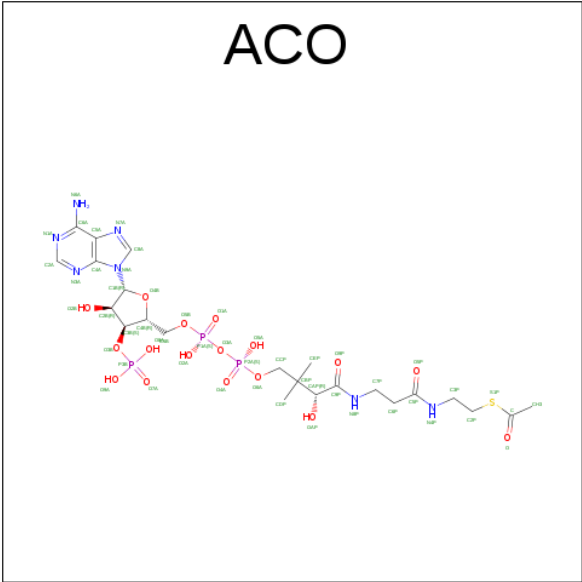
- Molecule 1 is a protein called Aminoglycoside N3-acetyltransferase.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	265	Total	C	N	O	S	Se	0	0	0
			2063	1306	351	394	3	9			
1	D	265	Total	C	N	O	S	Se	0	0	0
			2070	1311	353	394	3	9			
1	C	264	Total	C	N	O	S	Se	0	1	0
			2063	1307	352	392	3	9			
1	B	266	Total	C	N	O	S	Se	0	2	0
			2090	1326	356	396	3	9			

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	SER	-	EXPRESSION TAG	UNP Q81P86
A	-1	ASN	-	EXPRESSION TAG	UNP Q81P86
A	0	ALA	-	EXPRESSION TAG	UNP Q81P86
A	183	ALA	HIS	ENGINEERED MUTATION	UNP Q81P86
D	-2	SER	-	EXPRESSION TAG	UNP Q81P86
D	-1	ASN	-	EXPRESSION TAG	UNP Q81P86
D	0	ALA	-	EXPRESSION TAG	UNP Q81P86
D	183	ALA	HIS	ENGINEERED MUTATION	UNP Q81P86
C	-2	SER	-	EXPRESSION TAG	UNP Q81P86
C	-1	ASN	-	EXPRESSION TAG	UNP Q81P86
C	0	ALA	-	EXPRESSION TAG	UNP Q81P86
C	183	ALA	HIS	ENGINEERED MUTATION	UNP Q81P86
B	-2	SER	-	EXPRESSION TAG	UNP Q81P86
B	-1	ASN	-	EXPRESSION TAG	UNP Q81P86
B	0	ALA	-	EXPRESSION TAG	UNP Q81P86
B	183	ALA	HIS	ENGINEERED MUTATION	UNP Q81P86

- Molecule 2 is ACETYL COENZYME \*A (three-letter code: ACO) (formula: C<sub>23</sub>H<sub>38</sub>N<sub>7</sub>O<sub>17</sub>P<sub>3</sub>S).

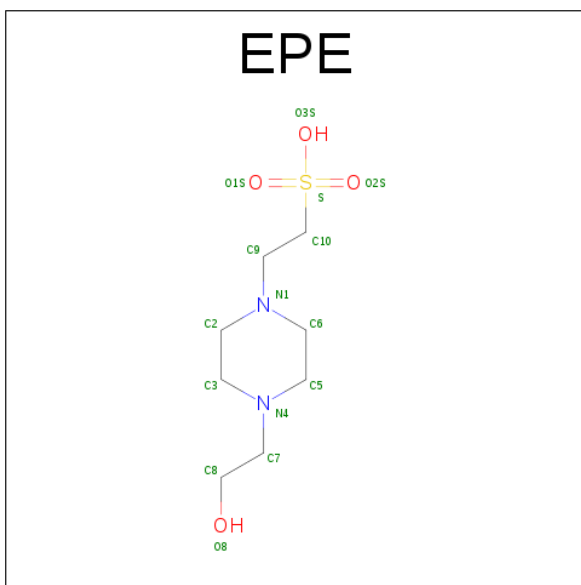


Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	S	0	0
			51	23	7	17	3	1		
2	D	1	Total	C	N	O	P	S	0	0
			51	23	7	17	3	1		
2	C	1	Total	C	N	O	P	S	0	0
			51	23	7	17	3	1		
2	B	1	Total	C	N	O	P	S	0	0
			51	23	7	17	3	1		

- Molecule 3 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	B	1	Total	Mg	0	0
			1	1		
3	D	1	Total	Mg	0	0
			1	1		

- Molecule 4 is 4-(2-HYDROXYETHYL)-1-PIPERAZINE ETHANESULFONIC ACID (three-letter code: EPE) (formula: C<sub>8</sub>H<sub>18</sub>N<sub>2</sub>O<sub>4</sub>S).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	B	1	Total	C	N	O	S	0	0
			15	8	2	4	1		

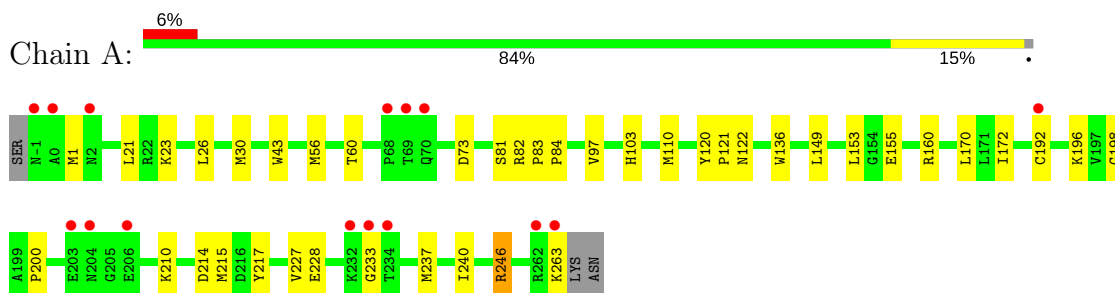
- Molecule 5 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	76	Total O 76 76	0	0
5	D	100	Total O 100 100	0	0
5	C	81	Total O 81 81	0	0
5	B	117	Total O 117 117	0	0

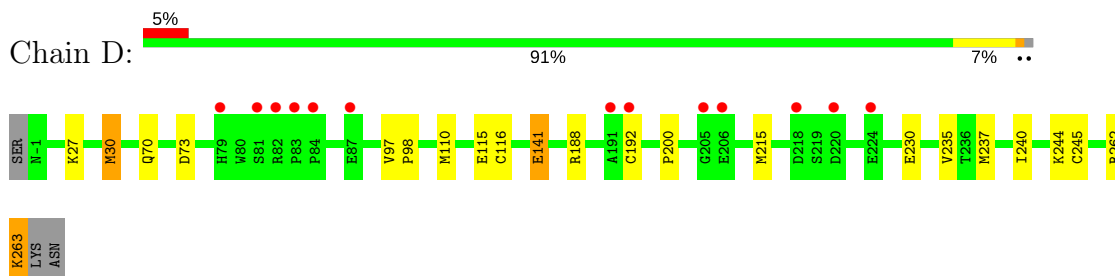
### 3 Residue-property plots [i](#)

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 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.

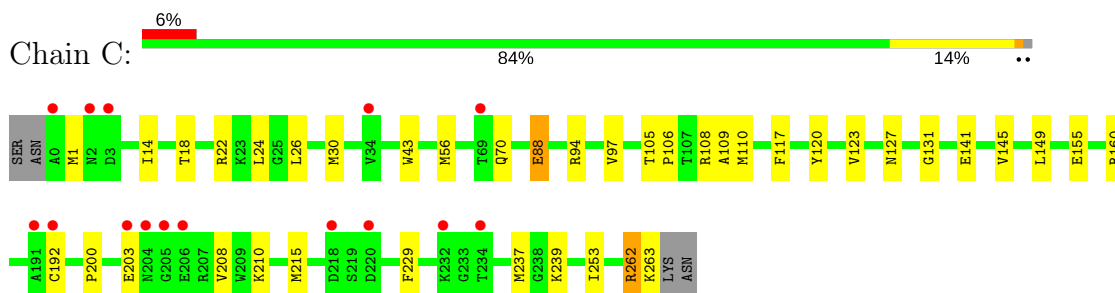
- Molecule 1: Aminoglycoside N3-acetyltransferase



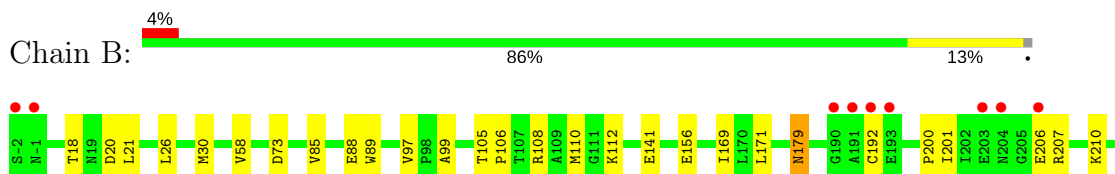
- Molecule 1: Aminoglycoside N3-acetyltransferase



- Molecule 1: Aminoglycoside N3-acetyltransferase



- Molecule 1: Aminoglycoside N3-acetyltransferase







## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	72.04Å 109.44Å 74.05Å 90.00° 111.86° 90.00°	Depositor
Resolution (Å)	50.00 – 2.15 30.24 – 2.14	Depositor EDS
% Data completeness (in resolution range)	99.0 (50.00-2.15) 98.7 (30.24-2.14)	Depositor EDS
$R_{merge}$	0.09	Depositor
$R_{sym}$	0.09	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.11 (at 2.14Å)	Xtriage
Refinement program	REFMAC 5.5.0109	Depositor
R, $R_{free}$	0.173 , 0.228 0.177 , 0.229	Depositor DCC
$R_{free}$ test set	2907 reflections (5.34%)	DCC
Wilson B-factor (Å <sup>2</sup> )	31.4	Xtriage
Anisotropy	0.026	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 49.2	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.000 for l,-k,h	Xtriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	8881	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	15.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 52.01 % of the origin peak, indicating pseudo translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo translational symmetry is equal to 5.1708e-05. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

<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 [i](#)

### 5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: MG, EPE, ACO

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	0.87	0/2098	0.80	1/2833 (0.0%)
1	B	0.94	1/2126 (0.0%)	0.86	1/2869 (0.0%)
1	C	0.91	0/2098	0.84	4/2832 (0.1%)
1	D	0.97	4/2105 (0.2%)	0.84	1/2840 (0.0%)
All	All	0.92	5/8427 (0.1%)	0.84	7/11374 (0.1%)

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 (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	192	CYS	CB-SG	8.53	1.96	1.82
1	D	116	CYS	CB-SG	-6.10	1.71	1.82
1	D	141	GLU	CG-CD	5.29	1.59	1.51
1	D	115	GLU	CG-CD	5.22	1.59	1.51
1	D	70	GLN	C-O	5.11	1.33	1.23

The worst 5 of 7 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	246	ARG	NE-CZ-NH1	-6.02	117.29	120.30
1	B	30	MSE	CG-SE-CE	-5.96	85.80	98.90
1	C	94	ARG	NE-CZ-NH2	-5.80	117.40	120.30
1	C	108	ARG	NE-CZ-NH2	5.33	122.97	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	30	MSE	CG-SE-CE	-5.17	87.53	98.90

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	233	GLY	Peptide

## 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	2063	0	2046	28	0
1	B	2090	0	2083	23	0
1	C	2063	0	2052	26	0
1	D	2070	0	2066	12	0
2	A	51	0	34	1	0
2	B	51	0	34	1	0
2	C	51	0	34	1	0
2	D	51	0	34	1	0
3	B	1	0	0	0	0
3	D	1	0	0	0	0
4	B	15	0	17	1	0
5	A	76	0	0	0	0
5	B	117	0	0	1	0
5	C	81	0	0	1	0
5	D	100	0	0	1	0
All	All	8881	0	8400	89	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 5.

The worst 5 of 89 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:248:MSE:HE3	1:B:253:ILE:HG21	1.35	1.07

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:110:MSE:HE1	2:A:266:ACO:H22	1.38	1.02
1:B:110:MSE:HE1	2:B:266:ACO:H22	1.45	0.99
1:D:110:MSE:HE1	2:D:266:ACO:H22	1.57	0.87
1:B:179:ASN:OD1	1:B:248:MSE:HE1	1.78	0.83

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	263/268 (98%)	255 (97%)	8 (3%)	0	100	100
1	B	266/268 (99%)	258 (97%)	8 (3%)	0	100	100
1	C	263/268 (98%)	253 (96%)	10 (4%)	0	100	100
1	D	263/268 (98%)	255 (97%)	8 (3%)	0	100	100
All	All	1055/1072 (98%)	1021 (97%)	34 (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	228/224 (102%)	221 (97%)	7 (3%)	45	44
1	B	232/224 (104%)	229 (99%)	3 (1%)	73	79

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	C	228/224 (102%)	224 (98%)	4 (2%)	64	68
1	D	230/224 (103%)	228 (99%)	2 (1%)	82	87
All	All	918/896 (102%)	902 (98%)	16 (2%)	66	71

5 of 16 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	73	ASP
1	D	263	LYS
1	C	262	ARG
1	A	263	LYS
1	B	141	GLU

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

### 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 carbohydrates in this entry.

## 5.6 Ligand geometry ⓘ

Of 7 ligands modelled in this entry, 2 are monoatomic - leaving 5 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
2	ACO	A	266	-	46,53,53	1.06	3 (6%)	53,79,79	1.70	7 (13%)
2	ACO	B	266	-	46,53,53	1.31	3 (6%)	53,79,79	1.82	9 (16%)
4	EPE	B	268	-	15,15,15	1.41	1 (6%)	18,20,20	0.95	1 (5%)
2	ACO	C	266	-	46,53,53	1.23	3 (6%)	53,79,79	1.80	6 (11%)
2	ACO	D	266	-	46,53,53	1.39	6 (13%)	53,79,79	2.02	11 (20%)

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
2	ACO	A	266	-	-	0/47/67/67	0/3/3/3
2	ACO	B	266	-	-	0/47/67/67	0/3/3/3
4	EPE	B	268	-	-	0/9/19/19	0/1/1/1
2	ACO	C	266	-	-	0/47/67/67	0/3/3/3
2	ACO	D	266	-	-	0/47/67/67	0/3/3/3

The worst 5 of 16 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	266	ACO	C4A-N3A	-3.41	1.30	1.35
2	D	266	ACO	P3B-O3B	-2.57	1.55	1.59
2	D	266	ACO	C5P-N4P	-2.30	1.27	1.33
2	A	266	ACO	C5A-N7A	-2.26	1.31	1.39
2	A	266	ACO	C2B-C1B	-2.13	1.50	1.53

The worst 5 of 34 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	266	ACO	N3A-C2A-N1A	-10.20	119.97	128.86
2	C	266	ACO	N3A-C2A-N1A	-9.39	120.68	128.86
2	B	266	ACO	N3A-C2A-N1A	-8.80	121.20	128.86
2	A	266	ACO	N3A-C2A-N1A	-7.95	121.93	128.86
2	C	266	ACO	C4B-O4B-C1B	-4.02	105.48	109.77

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
2	A	266	ACO	1	0
2	B	266	ACO	1	0
4	B	268	EPE	1	0
2	C	266	ACO	1	0
2	D	266	ACO	1	0

## 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 [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	256/268 (95%)	0.22	15 (5%) 23 30	4, 12, 30, 47	7 (2%)
1	B	257/268 (95%)	0.01	10 (3%) 40 47	4, 12, 30, 46	8 (3%)
1	C	255/268 (95%)	0.20	15 (5%) 23 30	3, 11, 30, 35	4 (1%)
1	D	256/268 (95%)	0.06	13 (5%) 29 36	4, 12, 29, 37	4 (1%)
All	All	1024/1072 (95%)	0.12	53 (5%) 28 35	3, 12, 30, 47	23 (2%)

The worst 5 of 53 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	82	ARG	4.8
1	A	233	GLY	4.6
1	A	-1	ASN	4.5
1	D	192	CYS	4.5
1	B	-2	SER	4.4

### 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 carbohydrates 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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. 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	LLDF	B-factors( $\text{\AA}^2$ )	Q<0.9
4	EPE	B	268	15/15	0.60	0.23	3.96	64,68,82,82	0
2	ACO	B	266	51/51	0.96	0.10	-0.53	15,27,44,47	0
2	ACO	D	266	51/51	0.96	0.10	-0.54	14,27,48,50	0
2	ACO	A	266	51/51	0.95	0.10	-0.64	20,31,51,52	0
2	ACO	C	266	51/51	0.95	0.10	-0.73	17,28,48,49	0
3	MG	B	267	1/1	0.86	0.21	-	37,37,37,37	0
3	MG	D	267	1/1	0.84	0.22	-	45,45,45,45	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.