



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 28, 2014 – 03:03 AM GMT

PDB ID : 4F6E  
Title : Crystal Structure of the K182R, A183P mutant manganese superoxide dismutase from *Saccharomyces cerevisiae*  
Authors : Sheng, Y.; Cascio, D.; Valentine, J.S.  
Deposited on : 2012-05-14  
Resolution : 1.60 Å(reported)

This is a full wwPDB 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 <http://wwpdb.org/ValidationPDFNotes.html>

---

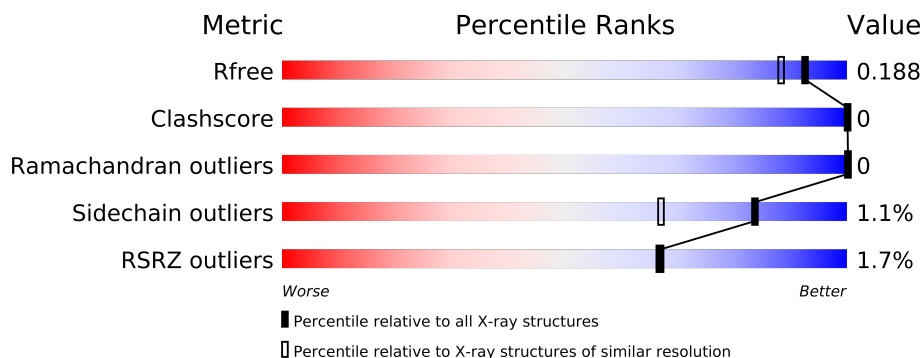
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 1.15 2013  
Xtriage (Phenix) : dev-1323  
EDS : stable22639  
Percentile statistics : 21963  
Refmac : 5.8.0049  
CCP4 : 6.3.0 (Settle)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)  
Validation Pipeline (wwPDB-VP) : stable22683

# 1 Overall quality at a glance

The reported resolution of this entry is 1.60 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))
$R_{free}$	66092	1872 (1.60-1.60)
Clashscore	79885	2199 (1.60-1.60)
Ramachandran outliers	78287	2126 (1.60-1.60)
Sidechain outliers	78261	2125 (1.60-1.60)
RSRZ outliers	66119	1872 (1.60-1.60)

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. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density.

Mol	Chain	Length	Quality of chain
1	A	207	
1	B	207	
1	C	207	
1	D	207	

The following table lists non-polymeric compounds that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Geometry	Electron density
3	TRS	C	302	-	X
4	MLY	D	301	-	X
5	GOL	D	303	-	X

## 2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 7238 atoms, of which 0 are hydrogen and 0 are deuterium.

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 Superoxide dismutase [Mn], mitochondrial.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	207	Total	C	N	O	S	0	0	0
			1670	1084	279	305	2			
1	B	205	Total	C	N	O	S	0	1	0
			1656	1073	276	305	2			
1	C	207	Total	C	N	O	S	0	2	0
			1677	1089	279	307	2			
1	D	205	Total	C	N	O	S	0	0	0
			1651	1070	276	303	2			

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	MLY	-	EXPRESSION TAG	UNP P00447
A	182	ARG	LYS	ENGINEERED MUTATION	UNP P00447
A	183	PRO	ALA	ENGINEERED MUTATION	UNP P00447
B	1	MLY	-	EXPRESSION TAG	UNP P00447
B	182	ARG	LYS	ENGINEERED MUTATION	UNP P00447
B	183	PRO	ALA	ENGINEERED MUTATION	UNP P00447
C	1	MLY	-	EXPRESSION TAG	UNP P00447
C	182	ARG	LYS	ENGINEERED MUTATION	UNP P00447
C	183	PRO	ALA	ENGINEERED MUTATION	UNP P00447
D	1	MLY	-	EXPRESSION TAG	UNP P00447
D	182	ARG	LYS	ENGINEERED MUTATION	UNP P00447
D	183	PRO	ALA	ENGINEERED MUTATION	UNP P00447

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

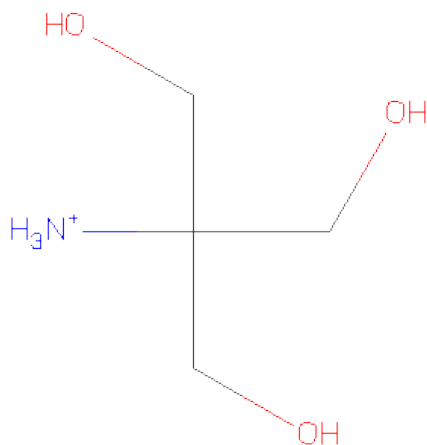
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	B	1	Total	Mn	0	0
			1	1		
2	A	1	Total	Mn	0	0
			1	1		

*Continued on next page...*

*Continued from previous page...*

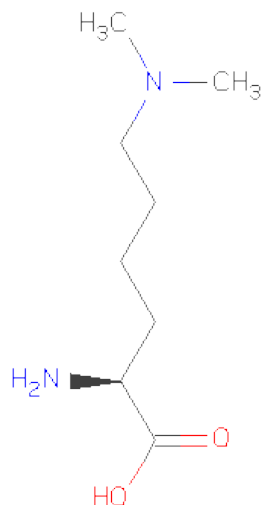
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	D	1	Total	Mn	0	0
			1	1		
2	C	1	Total	Mn	0	0
			1	1		

- Molecule 3 is 2-AMINO-2-HYDROXYMETHYL-PROPANE-1,3-DIOL (three-letter code: TRS) (formula:  $C_4H_{12}NO_3$ ).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	C	1	Total	C	N	O	0	0
			8	4	1	3		

- Molecule 4 is N-DIMETHYL-LYSINE (three-letter code: MLY) (formula:  $C_8H_{18}N_2O_2$ ).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	D	1	Total	C	N	O	0	0
			11	8	2	1		

- Molecule 5 is GLYCEROL (three-letter code: GOL) (formula: C<sub>3</sub>H<sub>8</sub>O<sub>3</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	D	1	Total	C	O	0	0
			6	3	3		

- Molecule 6 is water.

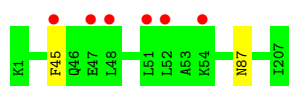
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	132	Total 132	O 132	0	0
6	B	142	Total 142	O 142	0	0
6	C	142	Total 142	O 142	0	0
6	D	139	Total 139	O 139	0	0

### 3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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.

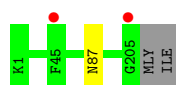
- Molecule 1: Superoxide dismutase [Mn], mitochondrial

Chain A: 



- Molecule 1: Superoxide dismutase [Mn], mitochondrial

Chain B: 



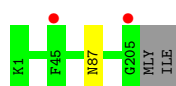
- Molecule 1: Superoxide dismutase [Mn], mitochondrial

Chain C: 



- Molecule 1: Superoxide dismutase [Mn], mitochondrial

Chain D: 



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	65.54Å 66.25Å 66.62Å 112.58° 103.63° 110.27°	Depositor
Resolution (Å)	37.65 – 1.60 37.65 – 1.60	Depositor EDS
% Data completeness (in resolution range)	90.5 (37.65-1.60) 90.6 (37.65-1.60)	Depositor EDS
$R_{merge}$	0.04	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.93 (at 1.60Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.7.3_928)	Depositor
R, $R_{free}$	0.164 , 0.195 0.159 , 0.188	Depositor DCC
$R_{free}$ test set	5251 reflections (5.00%)	DCC
Wilson B-factor (Å <sup>2</sup> )	13.9	Xtriage
Anisotropy	0.341	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.40 , 38.4	EDS
Estimated twinning fraction	0.000 for h+k+l,-h,-k 0.000 for -k,-l,h+k+l 0.009 for k,h,-h-k-l 0.010 for l,-h-k-l,h 0.008 for -l,-k,-h 0.013 for -h-k-l,l,k 0.008 for -h,h+k+l,-l	Xtriage
L-test for twinning	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtriage
Outliers	0 of 105023 reflections	Xtriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	7238	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	17.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.60% of the height of the origin peak. No significant pseudotranslation is detected.*

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



## 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: GOL, TRS, MLY, 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	0.34	0/1551	0.51	0/2129
1	B	0.33	0/1551	0.52	0/2129
1	C	0.35	0/1564	0.54	1/2147 (0.0%)
1	D	0.33	0/1543	0.52	0/2118
All	All	0.34	0/6209	0.52	1/8523 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	168	ASP	CB-CG-OD2	-5.36	113.47	118.30

There are no chirality outliers.

There are no planarity outliers.

### 5.2 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 hydrogens added by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, and the number in parentheses is this value normalized per 1000 atoms of the molecule in the chain. The Symm-Clashes column gives symmetry related clashes, in the same way as for the Clashes column.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1670	0	0	0	0
1	B	1656	0	0	0	0
1	C	1677	0	0	0	0
1	D	1651	0	0	0	0

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
2	D	1	0	0	0	0
3	C	8	0	0	0	0
4	D	11	0	0	0	0
5	D	6	0	0	0	0
6	A	132	0	0	0	0
6	B	142	0	0	0	0
6	C	142	0	0	0	0
6	D	139	0	0	0	0
All	All	7238	0	0	0	0

Clashscore is defined as the number of clashes calculated for the entry per 1000 atoms (including hydrogens) of the entry. The overall clashscore for this entry is 0.

There are no clashes within the asymmetric unit.

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	191/207 (92%)	187 (98%)	4 (2%)	0	100	100
1	B	191/207 (92%)	187 (98%)	4 (2%)	0	100	100
1	C	193/207 (93%)	188 (97%)	5 (3%)	0	100	100
1	D	190/207 (92%)	185 (97%)	5 (3%)	0	100	100
All	All	765/828 (92%)	747 (98%)	18 (2%)	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	156/156 (100%)	154 (99%)	2 (1%)	80	60
1	B	156/156 (100%)	155 (99%)	1 (1%)	92	84
1	C	158/156 (101%)	155 (98%)	3 (2%)	69	42
1	D	155/156 (99%)	154 (99%)	1 (1%)	92	84
All	All	625/624 (100%)	618 (99%)	7 (1%)	84	67

All (7) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	45	PHE
1	A	87	ASN
1	B	87	ASN
1	C	64	MET
1	C	69	GLN
1	C	87	ASN
1	D	87	ASN

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 chains in this entry.

## 5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

58 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	MLY	A	1	1	10,10,11	5.55	2 (20%)	9,11,13	1.44	1 (11%)
1	MLY	A	105	1	10,10,11	5.95	2 (20%)	9,11,13	1.23	1 (11%)
1	MLY	A	119	1	10,10,11	5.85	2 (20%)	9,11,13	0.96	1 (11%)
1	MLY	A	124	1	10,10,11	5.89	2 (20%)	9,11,13	1.05	1 (11%)
1	MLY	A	138	1	10,10,11	5.29	2 (20%)	9,11,13	2.50	1 (11%)
1	MLY	A	145	1	10,10,11	6.02	2 (20%)	9,11,13	0.65	0
1	MLY	A	181	1	10,10,11	5.66	2 (20%)	9,11,13	1.05	1 (11%)
1	MLY	A	187	1	10,10,11	6.08	2 (20%)	9,11,13	1.20	1 (11%)
1	MLY	A	196	1	10,10,11	5.59	2 (20%)	9,11,13	1.78	1 (11%)
1	MLY	A	206	1	10,10,11	5.92	2 (20%)	9,11,13	2.13	1 (11%)
1	MLY	A	29	1	10,10,11	5.79	2 (20%)	9,11,13	0.89	0
1	MLY	A	54	1	10,10,11	5.62	2 (20%)	9,11,13	1.05	1 (11%)
1	MLY	A	63	1	10,10,11	5.75	2 (20%)	9,11,13	1.30	1 (11%)
1	MLY	A	72	1	10,10,11	6.25	2 (20%)	9,11,13	0.75	0
1	MLY	A	8	1	10,10,11	5.98	2 (20%)	9,11,13	1.23	1 (11%)
1	MLY	B	1	1	10,10,11	5.69	2 (20%)	9,11,13	1.08	1 (11%)
1	MLY	B	105	1	10,10,11	5.67	2 (20%)	9,11,13	1.15	1 (11%)
1	MLY	B	119	1	10,10,11	5.87	2 (20%)	9,11,13	0.98	1 (11%)
1	MLY	B	124	1	10,10,11	5.83	2 (20%)	9,11,13	1.05	1 (11%)
1	MLY	B	138	1	10,10,11	5.32	2 (20%)	9,11,13	2.51	2 (22%)
1	MLY	B	145	1	10,10,11	6.29	2 (20%)	9,11,13	0.85	0
1	MLY	B	181	1	10,10,11	5.89	2 (20%)	9,11,13	1.08	1 (11%)
1	MLY	B	187	1	10,10,11	5.86	2 (20%)	9,11,13	1.17	1 (11%)
1	MLY	B	196	1	10,10,11	6.00	2 (20%)	9,11,13	1.71	1 (11%)
1	MLY	B	29	1	10,10,11	5.81	2 (20%)	9,11,13	0.98	1 (11%)
1	MLY	B	54	1	10,10,11	5.55	2 (20%)	9,11,13	0.78	0
1	MLY	B	63	1	10,10,11	6.01	2 (20%)	9,11,13	0.85	0
1	MLY	B	72	1	10,10,11	5.98	2 (20%)	9,11,13	0.56	0
1	MLY	B	8	1	10,10,11	5.63	2 (20%)	9,11,13	0.90	0
1	MLY	C	1	1	10,10,11	5.98	2 (20%)	9,11,13	1.37	1 (11%)
1	MLY	C	105	1	10,10,11	5.74	2 (20%)	9,11,13	1.20	1 (11%)
1	MLY	C	119	1	10,10,11	5.52	2 (20%)	9,11,13	0.98	1 (11%)
1	MLY	C	124	1	10,10,11	5.70	2 (20%)	9,11,13	0.77	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
1	MLY	C	138	1	10,10,11	5.23	2 (20%)	9,11,13	2.62	1 (11%)
1	MLY	C	145	1	10,10,11	5.95	2 (20%)	9,11,13	0.84	0
1	MLY	C	181	1	10,10,11	5.74	2 (20%)	9,11,13	0.90	0
1	MLY	C	187	1	10,10,11	6.00	2 (20%)	9,11,13	0.78	0
1	MLY	C	196	1	10,10,11	5.68	2 (20%)	9,11,13	1.37	1 (11%)
1	MLY	C	206	1	10,10,11	5.82	2 (20%)	9,11,13	1.73	1 (11%)
1	MLY	C	29	1	10,10,11	5.61	2 (20%)	9,11,13	0.75	0
1	MLY	C	54	1	10,10,11	5.80	2 (20%)	9,11,13	0.91	0
1	MLY	C	63	1	10,10,11	5.89	2 (20%)	9,11,13	1.32	1 (11%)
1	MLY	C	72	1	10,10,11	6.24	2 (20%)	9,11,13	0.74	0
1	MLY	C	8	1	10,10,11	5.88	2 (20%)	9,11,13	0.91	0
1	MLY	D	1	1	10,10,11	5.54	2 (20%)	9,11,13	1.18	1 (11%)
1	MLY	D	105	1	10,10,11	5.61	2 (20%)	9,11,13	1.44	1 (11%)
1	MLY	D	119	1	10,10,11	5.54	2 (20%)	9,11,13	1.11	1 (11%)
1	MLY	D	124	1	10,10,11	5.86	2 (20%)	9,11,13	1.40	1 (11%)
1	MLY	D	138	1	10,10,11	6.00	2 (20%)	9,11,13	2.50	1 (11%)
1	MLY	D	145	1	10,10,11	5.91	2 (20%)	9,11,13	0.75	0
1	MLY	D	181	1	10,10,11	5.50	1 (10%)	9,11,13	1.06	1 (11%)
1	MLY	D	187	1	10,10,11	6.07	2 (20%)	9,11,13	1.03	1 (11%)
1	MLY	D	196	1	10,10,11	5.66	2 (20%)	9,11,13	1.25	1 (11%)
1	MLY	D	29	1	10,10,11	5.53	2 (20%)	9,11,13	0.87	1 (11%)
1	MLY	D	54	1	10,10,11	5.82	2 (20%)	9,11,13	1.23	1 (11%)
1	MLY	D	63	1	10,10,11	5.48	2 (20%)	9,11,13	1.07	1 (11%)
1	MLY	D	72	1	10,10,11	6.22	2 (20%)	9,11,13	0.95	1 (11%)
1	MLY	D	8	1	10,10,11	6.07	2 (20%)	9,11,13	1.10	1 (11%)

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	MLY	A	1	1	-	0/7/9/11	0/0/0/0
1	MLY	A	105	1	-	0/7/9/11	0/0/0/0
1	MLY	A	119	1	-	0/7/9/11	0/0/0/0
1	MLY	A	124	1	-	0/7/9/11	0/0/0/0
1	MLY	A	138	1	-	0/7/9/11	0/0/0/0

*Continued on next page...*

*Continued from previous page...*

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	MLY	A	145	1	-	0/7/9/11	0/0/0/0
1	MLY	A	181	1	-	0/7/9/11	0/0/0/0
1	MLY	A	187	1	-	0/7/9/11	0/0/0/0
1	MLY	A	196	1	-	0/7/9/11	0/0/0/0
1	MLY	A	206	1	-	0/7/9/11	0/0/0/0
1	MLY	A	29	1	-	0/7/9/11	0/0/0/0
1	MLY	A	54	1	-	0/7/9/11	0/0/0/0
1	MLY	A	63	1	-	0/7/9/11	0/0/0/0
1	MLY	A	72	1	-	0/7/9/11	0/0/0/0
1	MLY	A	8	1	-	0/7/9/11	0/0/0/0
1	MLY	B	1	1	-	0/7/9/11	0/0/0/0
1	MLY	B	105	1	-	0/7/9/11	0/0/0/0
1	MLY	B	119	1	-	0/7/9/11	0/0/0/0
1	MLY	B	124	1	-	0/7/9/11	0/0/0/0
1	MLY	B	138	1	-	0/7/9/11	0/0/0/0
1	MLY	B	145	1	-	0/7/9/11	0/0/0/0
1	MLY	B	181	1	-	0/7/9/11	0/0/0/0
1	MLY	B	187	1	-	0/7/9/11	0/0/0/0
1	MLY	B	196	1	-	0/7/9/11	0/0/0/0
1	MLY	B	29	1	-	0/7/9/11	0/0/0/0
1	MLY	B	54	1	-	0/7/9/11	0/0/0/0
1	MLY	B	63	1	-	0/7/9/11	0/0/0/0
1	MLY	B	72	1	-	0/7/9/11	0/0/0/0
1	MLY	B	8	1	-	0/7/9/11	0/0/0/0
1	MLY	C	1	1	-	0/7/9/11	0/0/0/0
1	MLY	C	105	1	-	0/7/9/11	0/0/0/0
1	MLY	C	119	1	-	0/7/9/11	0/0/0/0
1	MLY	C	124	1	-	0/7/9/11	0/0/0/0
1	MLY	C	138	1	-	0/7/9/11	0/0/0/0
1	MLY	C	145	1	-	0/7/9/11	0/0/0/0
1	MLY	C	181	1	-	0/7/9/11	0/0/0/0
1	MLY	C	187	1	-	0/7/9/11	0/0/0/0
1	MLY	C	196	1	-	0/7/9/11	0/0/0/0
1	MLY	C	206	1	-	0/7/9/11	0/0/0/0
1	MLY	C	29	1	-	0/7/9/11	0/0/0/0
1	MLY	C	54	1	-	0/7/9/11	0/0/0/0
1	MLY	C	63	1	-	0/7/9/11	0/0/0/0
1	MLY	C	72	1	-	0/7/9/11	0/0/0/0
1	MLY	C	8	1	-	0/7/9/11	0/0/0/0
1	MLY	D	1	1	-	0/7/9/11	0/0/0/0
1	MLY	D	105	1	-	0/7/9/11	0/0/0/0
1	MLY	D	119	1	-	0/7/9/11	0/0/0/0

*Continued on next page...*

*Continued from previous page...*

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	MLY	D	124	1	-	0/7/9/11	0/0/0/0
1	MLY	D	138	1	-	0/7/9/11	0/0/0/0
1	MLY	D	145	1	-	0/7/9/11	0/0/0/0
1	MLY	D	181	1	-	0/7/9/11	0/0/0/0
1	MLY	D	187	1	-	0/7/9/11	0/0/0/0
1	MLY	D	196	1	-	0/7/9/11	0/0/0/0
1	MLY	D	29	1	-	0/7/9/11	0/0/0/0
1	MLY	D	54	1	-	0/7/9/11	0/0/0/0
1	MLY	D	63	1	-	0/7/9/11	0/0/0/0
1	MLY	D	72	1	-	0/7/9/11	0/0/0/0
1	MLY	D	8	1	-	0/7/9/11	0/0/0/0

All (115) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	145	MLY	O-C	19.61	1.24	1.11
1	A	72	MLY	O-C	19.52	1.24	1.11
1	C	72	MLY	O-C	19.52	1.24	1.11
1	D	72	MLY	O-C	19.45	1.24	1.11
1	A	187	MLY	O-C	19.02	1.24	1.11
1	D	8	MLY	O-C	19.00	1.24	1.11
1	D	187	MLY	O-C	18.93	1.24	1.11
1	B	63	MLY	O-C	18.79	1.24	1.11
1	A	145	MLY	O-C	18.77	1.24	1.11
1	C	187	MLY	O-C	18.72	1.24	1.11
1	D	138	MLY	O-C	18.72	1.24	1.11
1	A	8	MLY	O-C	18.71	1.24	1.11
1	B	72	MLY	O-C	18.69	1.24	1.11
1	C	1	MLY	O-C	18.68	1.24	1.11
1	B	196	MLY	O-C	18.65	1.24	1.11
1	A	105	MLY	O-C	18.59	1.24	1.11
1	C	145	MLY	O-C	18.58	1.24	1.11
1	A	206	MLY	O-C	18.51	1.24	1.11
1	D	145	MLY	O-C	18.50	1.24	1.11
1	A	124	MLY	O-C	18.40	1.24	1.11
1	C	8	MLY	O-C	18.40	1.24	1.11
1	B	181	MLY	O-C	18.39	1.24	1.11
1	C	63	MLY	O-C	18.39	1.24	1.11
1	D	124	MLY	O-C	18.32	1.24	1.11
1	B	119	MLY	O-C	18.28	1.24	1.11
1	A	119	MLY	O-C	18.26	1.24	1.11
1	B	124	MLY	O-C	18.24	1.24	1.11

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	187	MLY	O-C	18.22	1.23	1.11
1	B	29	MLY	O-C	18.17	1.23	1.11
1	C	206	MLY	O-C	18.16	1.23	1.11
1	D	54	MLY	O-C	18.14	1.23	1.11
1	C	54	MLY	O-C	18.14	1.23	1.11
1	A	29	MLY	O-C	18.03	1.23	1.11
1	C	181	MLY	O-C	17.96	1.23	1.11
1	A	63	MLY	O-C	17.92	1.23	1.11
1	C	105	MLY	O-C	17.89	1.23	1.11
1	B	1	MLY	O-C	17.82	1.23	1.11
1	C	124	MLY	O-C	17.78	1.23	1.11
1	C	196	MLY	O-C	17.76	1.23	1.11
1	A	181	MLY	O-C	17.73	1.23	1.11
1	B	105	MLY	O-C	17.70	1.23	1.11
1	B	8	MLY	O-C	17.61	1.23	1.11
1	D	196	MLY	O-C	17.58	1.23	1.11
1	A	54	MLY	O-C	17.56	1.23	1.11
1	D	105	MLY	O-C	17.46	1.23	1.11
1	C	29	MLY	O-C	17.43	1.23	1.11
1	A	196	MLY	O-C	17.41	1.23	1.11
1	A	1	MLY	O-C	17.34	1.23	1.11
1	D	1	MLY	O-C	17.31	1.23	1.11
1	B	54	MLY	O-C	17.30	1.23	1.11
1	D	119	MLY	O-C	17.27	1.23	1.11
1	D	181	MLY	O-C	17.26	1.23	1.11
1	C	119	MLY	O-C	17.22	1.23	1.11
1	D	29	MLY	O-C	17.15	1.23	1.11
1	D	63	MLY	O-C	17.10	1.23	1.11
1	B	138	MLY	O-C	16.57	1.22	1.11
1	A	138	MLY	O-C	16.45	1.22	1.11
1	C	138	MLY	O-C	16.33	1.22	1.11
1	B	196	MLY	CA-C	3.13	1.54	1.48
1	B	145	MLY	CA-C	3.04	1.54	1.48
1	D	196	MLY	CA-C	2.97	1.53	1.48
1	D	187	MLY	CA-C	2.94	1.53	1.48
1	D	29	MLY	CA-C	2.89	1.53	1.48
1	A	29	MLY	CA-C	2.87	1.53	1.48
1	C	29	MLY	CA-C	2.87	1.53	1.48
1	A	63	MLY	CA-C	2.85	1.53	1.48
1	C	187	MLY	CA-C	2.83	1.53	1.48
1	A	145	MLY	CA-C	2.81	1.53	1.48
1	A	72	MLY	CA-C	2.80	1.53	1.48

*Continued on next page...*



*Continued from previous page...*

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	138	MLY	CA-C	2.79	1.53	1.48
1	C	105	MLY	CA-C	2.73	1.53	1.48
1	B	119	MLY	CA-C	2.72	1.53	1.48
1	D	54	MLY	CA-C	2.72	1.53	1.48
1	A	105	MLY	CA-C	2.72	1.53	1.48
1	B	187	MLY	CA-C	2.70	1.53	1.48
1	A	124	MLY	CA-C	2.68	1.53	1.48
1	C	206	MLY	CA-C	2.68	1.53	1.48
1	D	138	MLY	CA-C	2.68	1.53	1.48
1	B	54	MLY	CA-C	2.67	1.53	1.48
1	B	63	MLY	CA-C	2.62	1.53	1.48
1	C	63	MLY	CA-C	2.61	1.53	1.48
1	A	119	MLY	CA-C	2.61	1.53	1.48
1	D	105	MLY	CA-C	2.60	1.53	1.48
1	C	124	MLY	CA-C	2.59	1.53	1.48
1	C	119	MLY	CA-C	2.59	1.53	1.48
1	A	8	MLY	CA-C	2.59	1.53	1.48
1	D	119	MLY	CA-C	2.59	1.53	1.48
1	D	124	MLY	CA-C	2.56	1.53	1.48
1	C	145	MLY	CA-C	2.56	1.53	1.48
1	C	72	MLY	CA-C	2.55	1.53	1.48
1	C	1	MLY	CA-C	2.53	1.53	1.48
1	B	105	MLY	CA-C	2.53	1.53	1.48
1	A	196	MLY	CA-C	2.53	1.53	1.48
1	D	63	MLY	CA-C	2.53	1.53	1.48
1	B	72	MLY	CA-C	2.52	1.53	1.48
1	C	54	MLY	CA-C	2.52	1.53	1.48
1	D	72	MLY	CA-C	2.51	1.53	1.48
1	A	187	MLY	CA-C	2.50	1.53	1.48
1	D	8	MLY	CA-C	2.49	1.52	1.48
1	A	54	MLY	CA-C	2.48	1.52	1.48
1	A	206	MLY	CA-C	2.47	1.52	1.48
1	D	145	MLY	CA-C	2.44	1.52	1.48
1	B	29	MLY	CA-C	2.43	1.52	1.48
1	B	138	MLY	CA-C	2.39	1.52	1.48
1	C	181	MLY	CA-C	2.39	1.52	1.48
1	C	8	MLY	CA-C	2.39	1.52	1.48
1	B	8	MLY	CA-C	2.37	1.52	1.48
1	B	124	MLY	CA-C	2.37	1.52	1.48
1	D	1	MLY	CA-C	2.36	1.52	1.48
1	C	196	MLY	CA-C	2.35	1.52	1.48
1	B	181	MLY	CA-C	2.32	1.52	1.48

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	181	MLY	CA-C	2.30	1.52	1.48
1	A	1	MLY	CA-C	2.28	1.52	1.48
1	C	138	MLY	CA-C	2.25	1.52	1.48
1	B	1	MLY	CA-C	2.18	1.52	1.48

All (42) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	138	MLY	C-CA-N	-7.57	106.26	113.83
1	D	138	MLY	C-CA-N	-7.28	106.56	113.83
1	A	138	MLY	C-CA-N	-7.27	106.56	113.83
1	B	138	MLY	C-CA-N	-7.07	106.77	113.83
1	A	206	MLY	C-CA-N	-6.11	107.73	113.83
1	A	196	MLY	C-CA-N	-4.99	108.85	113.83
1	C	206	MLY	C-CA-N	-4.83	109.01	113.83
1	B	196	MLY	C-CA-N	-4.76	109.08	113.83
1	D	105	MLY	C-CA-N	-3.78	110.05	113.83
1	A	1	MLY	C-CA-N	-3.74	110.09	113.83
1	D	124	MLY	C-CA-N	-3.69	110.14	113.83
1	C	1	MLY	C-CA-N	-3.63	110.21	113.83
1	C	196	MLY	C-CA-N	-3.58	110.26	113.83
1	A	63	MLY	C-CA-N	-3.35	110.48	113.83
1	A	8	MLY	C-CA-N	-3.34	110.49	113.83
1	C	63	MLY	C-CA-N	-3.34	110.50	113.83
1	D	196	MLY	C-CA-N	-3.33	110.50	113.83
1	B	187	MLY	C-CA-N	-3.15	110.68	113.83
1	C	105	MLY	C-CA-N	-3.15	110.68	113.83
1	D	54	MLY	C-CA-N	-3.13	110.71	113.83
1	B	181	MLY	C-CA-N	-3.07	110.77	113.83
1	A	187	MLY	C-CA-N	-3.04	110.80	113.83
1	D	1	MLY	C-CA-N	-2.97	110.86	113.83
1	B	105	MLY	C-CA-N	-2.94	110.89	113.83
1	A	105	MLY	C-CA-N	-2.82	111.02	113.83
1	D	8	MLY	C-CA-N	-2.71	111.13	113.83
1	D	181	MLY	C-CA-N	-2.70	111.14	113.83
1	D	119	MLY	C-CA-N	-2.70	111.14	113.83
1	A	124	MLY	C-CA-N	-2.54	111.29	113.83
1	B	1	MLY	C-CA-N	-2.53	111.30	113.83
1	A	181	MLY	C-CA-N	-2.46	111.37	113.83
1	A	54	MLY	C-CA-N	-2.39	111.44	113.83
1	B	29	MLY	C-CA-N	-2.39	111.44	113.83
1	B	119	MLY	C-CA-N	-2.37	111.46	113.83

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	187	MLY	C-CA-N	-2.32	111.51	113.83
1	B	138	MLY	CD-CE-NZ	2.30	119.61	113.59
1	D	63	MLY	C-CA-N	-2.25	111.58	113.83
1	A	119	MLY	C-CA-N	-2.21	111.62	113.83
1	C	119	MLY	C-CA-N	-2.20	111.63	113.83
1	D	72	MLY	C-CA-N	-2.18	111.66	113.83
1	B	124	MLY	C-CA-N	-2.11	111.72	113.83
1	D	29	MLY	C-CA-N	-2.04	111.80	113.83

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

## 5.5 Carbohydrates ⓘ

There are no carbohydrates in this entry.

## 5.6 Ligand geometry ⓘ

Of 7 ligands modelled in this entry, 4 are monoatomic - leaving 3 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	TRS	C	302	-	7,7,7	0.90	1 (14%)	9,9,9	0.78	0
4	MLY	D	301	1	10,10,11	5.91	2 (20%)	9,11,13	2.03	1 (11%)
5	GOL	D	303	-	5,5,5	0.27	0	5,5,5	0.41	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
3	TRS	C	302	-	-	0/9/9/9	0/0/0/0
4	MLY	D	301	1	-	0/7/9/11	0/0/0/0
5	GOL	D	303	-	-	0/4/4/4	0/0/0/0

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	D	301	MLY	O-C	18.46	1.24	1.11
4	D	301	MLY	CA-C	2.44	1.52	1.48
3	C	302	TRS	C-N	-2.33	1.47	1.50

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	D	301	MLY	C-CA-N	-5.89	107.95	113.83

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

## 5.7 Other polymers ⓘ

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 ⓘ

### 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, 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	207/207 (100%)	-0.16	6 (2%)	49	48	8, 14, 28, 42	0
1	B	205/207 (99%)	-0.34	2 (0%)	79	81	8, 15, 27, 42	0
1	C	207/207 (100%)	-0.24	3 (1%)	72	73	7, 14, 29, 42	0
1	D	205/207 (99%)	-0.16	2 (0%)	79	81	8, 15, 27, 34	0
All	All	824/828 (99%)	-0.22	13 (1%)	67	68	7, 15, 28, 42	0

All (13) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	207	ILE	4.3
1	A	45	PHE	4.0
1	A	54	MLY	3.7
1	D	45	PHE	3.4
1	B	205	GLY	2.5
1	D	205	GLY	2.5
1	A	47	GLU	2.4
1	C	52	LEU	2.4
1	A	51	LEU	2.2
1	A	52	LEU	2.2
1	C	105	MLY	2.2
1	A	48	LEU	2.1
1	B	45	PHE	2.1

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

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	RSR	LLDF	B-factors( $\text{\AA}^2$ )	Q<0.9
1	MLY	A	196	11/12	0.24	23.65	13,18,50,51	0
1	MLY	C	187	11/12	0.13	14.44	11,15,40,43	0
1	MLY	B	187	11/12	0.15	14.26	12,15,44,45	0
1	MLY	C	119	11/12	0.21	8.93	17,24,50,53	0
1	MLY	D	187	11/12	0.13	8.45	11,15,39,43	0
1	MLY	C	196	11/12	0.15	7.99	13,15,45,46	0
1	MLY	C	8	11/12	0.14	6.28	13,19,39,39	0
1	MLY	A	1	11/12	0.16	6.04	16,20,44,46	0
1	MLY	A	54	11/12	0.35	5.19	31,35,51,52	0
1	MLY	A	187	11/12	0.12	5.08	10,15,39,39	0
1	MLY	B	181	11/12	0.13	5.01	10,13,37,42	0
1	MLY	D	54	11/12	0.17	4.76	14,19,44,45	0
1	MLY	C	105	11/12	0.26	4.38	22,28,54,54	0
1	MLY	D	119	11/12	0.20	4.38	14,21,47,48	0
1	MLY	B	119	11/12	0.17	3.95	15,23,47,50	0
1	MLY	A	119	11/12	0.14	3.58	12,19,39,39	0
1	MLY	D	196	11/12	0.10	3.37	13,15,36,41	0
1	MLY	B	105	11/12	0.24	3.36	20,28,46,47	0
1	MLY	B	196	11/12	0.12	2.97	13,17,41,45	0
1	MLY	C	181	11/12	0.11	2.51	9,12,43,45	0
1	MLY	A	105	11/12	0.15	2.46	17,28,46,49	0
1	MLY	B	54	11/12	0.21	2.46	31,39,51,51	0
1	MLY	D	8	11/12	0.12	2.39	14,18,39,40	0
1	MLY	D	105	11/12	0.21	2.32	20,22,42,45	0
1	MLY	C	29	11/12	0.08	2.21	9,12,27,35	0
1	MLY	C	1	11/12	0.13	2.19	15,19,29,34	0
1	MLY	D	1	11/12	0.19	2.13	23,29,45,45	0
1	MLY	B	29	11/12	0.08	2.13	10,12,30,35	0
1	MLY	D	29	11/12	0.10	2.13	12,15,31,33	0
1	MLY	B	8	11/12	0.11	2.12	11,18,35,38	0
1	MLY	B	63	11/12	0.12	2.05	17,18,37,39	0
1	MLY	A	138	11/12	0.10	2.00	9,11,19,25	0
1	MLY	B	1	11/12	0.19	1.94	20,30,44,47	0
1	MLY	B	124	11/12	0.10	1.72	11,16,36,39	0
1	MLY	A	63	11/12	0.20	1.56	18,23,39,40	0
1	MLY	A	29	11/12	0.09	1.54	10,14,31,40	0
1	MLY	A	124	11/12	0.09	1.51	11,15,32,35	0
1	MLY	A	181	11/12	0.11	1.33	11,15,37,38	0
1	MLY	C	124	11/12	0.10	1.32	14,17,35,36	0
1	MLY	C	138	11/12	0.08	1.24	9,11,19,24	0
1	MLY	C	54	11/12	0.21	1.23	28,36,51,51	0

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Atoms	RSR	LLDF	B-factors( $\text{\AA}^2$ )	Q<0.9
1	MLY	D	145	11/12	0.11	0.85	11,16,21,28	0
1	MLY	A	8	11/12	0.10	0.74	15,19,29,33	0
1	MLY	D	63	11/12	0.11	0.56	13,17,37,39	0
1	MLY	C	63	11/12	0.13	0.55	17,20,36,40	0
1	MLY	C	72	11/12	0.11	0.48	9,13,28,31	0
1	MLY	A	72	11/12	0.11	0.44	10,12,33,33	0
1	MLY	A	145	11/12	0.08	0.37	11,14,19,31	0
1	MLY	B	138	11/12	0.09	0.33	10,13,25,35	0
1	MLY	D	124	11/12	0.08	0.32	11,15,29,30	0
1	MLY	B	72	11/12	0.09	0.25	10,12,35,36	0
1	MLY	B	145	11/12	0.09	0.10	11,16,25,26	0
1	MLY	D	181	11/12	0.07	-0.11	8,12,19,22	0
1	MLY	C	145	11/12	0.08	-0.14	11,14,21,25	0
1	MLY	D	72	11/12	0.09	-0.16	10,17,32,34	0
1	MLY	D	138	11/12	0.08	-0.21	10,11,19,25	0
1	MLY	C	206	11/12	0.10	-0.25	11,20,31,35	0
1	MLY	A	206	11/12	0.08	-0.51	11,16,23,23	0

### 6.3 Carbohydrates

There are no carbohydrates 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. 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	RSR	LLDF	B-factors( $\text{\AA}^2$ )	Q<0.9
5	GOL	D	303	6/6	0.15	10.17	16,18,20,21	0
3	TRS	C	302	8/8	0.30	8.47	27,38,41,43	0
4	MLY	D	301	11/12	0.28	3.87	31,45,53,53	0
2	MN	B	301	1/1	0.04	-2.40	9,9,9,9	0
2	MN	C	301	1/1	0.04	-2.65	8,8,8,8	0
2	MN	D	302	1/1	0.06	-2.82	10,10,10,10	0
2	MN	A	301	1/1	0.04	-4.63	9,9,9,9	0

## 6.5 Other polymers ⓘ

There are no such residues in this entry.