



# wwPDB X-ray Structure Validation Summary Report ⓘ

Aug 14, 2025 – 04:11 PM EDT

PDB ID : 9OLQ / pdb\_00009olq  
Title : Designed allosteric facilitated dissociation switch AS1\_K46L\_E50W\_K172  
W\_E173Y in complex state THE  
Authors : Bera, A.K.; Broerman, A.; Baker, D.  
Deposited on : 2025-05-12  
Resolution : 3.48 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.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

MolProbity : 4-5-2 with Phenix2.0rc1  
Xtriage (Phenix) : 2.0rc1  
EDS : 3.0  
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)  
CCP4 : 9.0.006 (Gargrove)  
Density-Fitness : 1.0.12  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.45.1

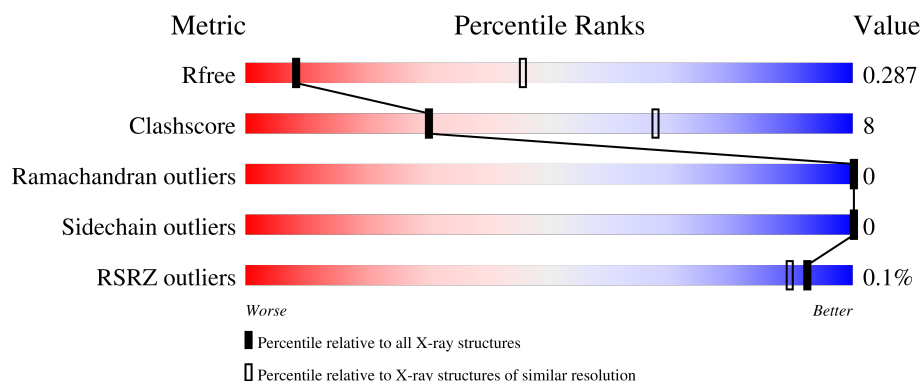
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.48 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))
$R_{free}$	164625	1099 (3.54-3.42)
Clashscore	180529	1048 (3.52-3.44)
Ramachandran outliers	177936	1033 (3.52-3.44)
Sidechain outliers	177891	1034 (3.52-3.44)
RSRZ outliers	164620	1098 (3.54-3.42)

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 of 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	266	
1	D	266	
1	G	266	
1	J	266	
1	M	266	

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Mol	Chain	Length	Quality of chain
2	B	127	
2	E	127	
2	H	127	
2	K	127	
2	N	127	
3	C	26	
3	F	26	
3	I	26	
3	L	26	
3	O	26	

## 2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 15510 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 Designed allosteric facilitated dissociation switch AS1 H.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	256	Total	C	N	O	S	0	0	0
			1972	1252	341	373	6			
1	D	257	Total	C	N	O	S	0	0	0
			1981	1257	342	376	6			
1	G	255	Total	C	N	O	S	0	0	0
			1966	1249	340	371	6			
1	J	251	Total	C	N	O	S	0	0	0
			1931	1228	335	363	5			
1	M	232	Total	C	N	O	S	0	0	0
			1798	1150	312	331	5			

- Molecule 2 is a protein called Designed allosteric facilitated dissociation switch AS1 T.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	124	Total	C	N	O	S	0	0	0
			994	613	187	190	4			
2	E	124	Total	C	N	O	S	0	0	0
			994	613	187	190	4			
2	H	124	Total	C	N	O	S	0	0	0
			994	613	187	190	4			
2	K	124	Total	C	N	O	S	0	0	0
			994	613	187	190	4			
2	N	121	Total	C	N	O	S	0	0	0
			968	599	178	187	4			

- Molecule 3 is a protein called Designed allosteric facilitated dissociation switch AS1 E.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	C	23	Total	C	N	O	0	0	0
			188	121	33	34			
3	F	23	Total	C	N	O	0	0	0
			188	121	33	34			

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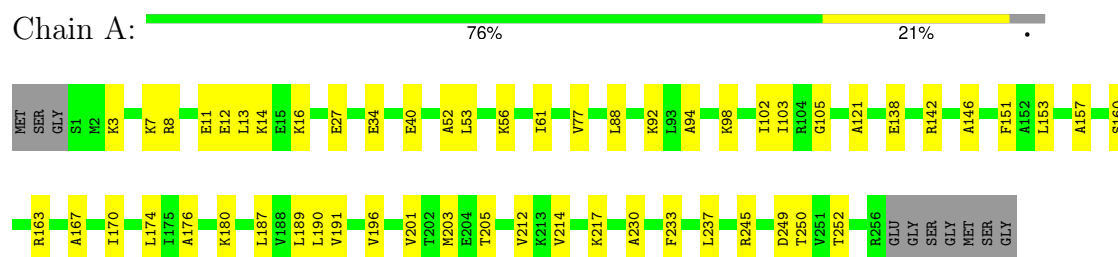
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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	I	25	Total	C	N	O	0	0	0
			206	131	35	40			
3	L	20	Total	C	N	O	0	0	0
			159	103	25	31			
3	O	22	Total	C	N	O	0	0	0
			177	115	29	33			

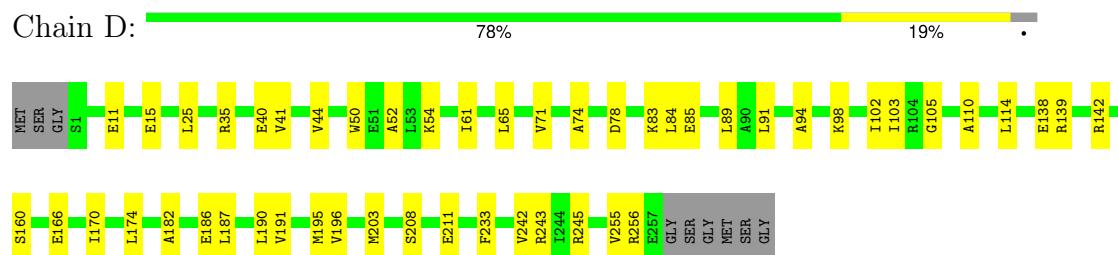
### 3 Residue-property plots [i](#)

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.

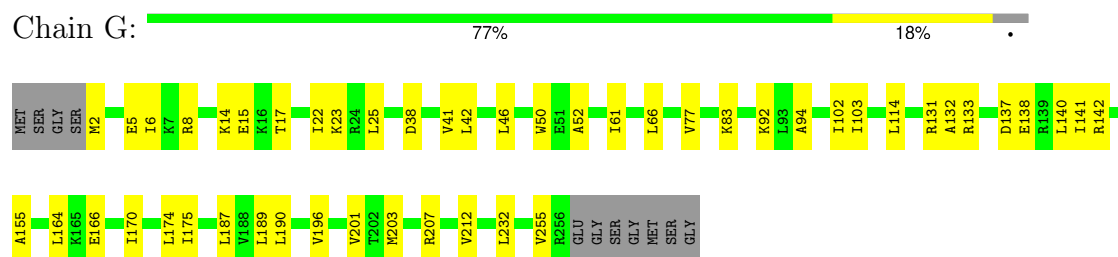
- Molecule 1: Designed allosteric facilitated dissociation switch AS1 H



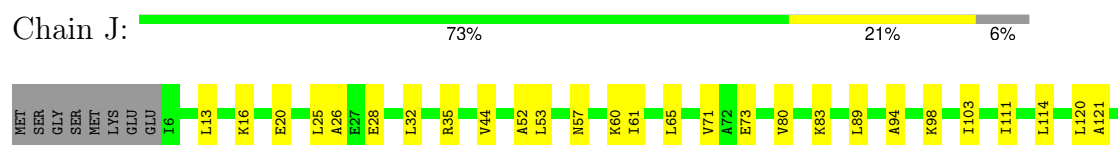
- Molecule 1: Designed allosteric facilitated dissociation switch AS1 H



- Molecule 1: Designed allosteric facilitated dissociation switch AS1 H



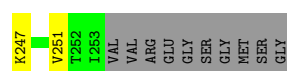
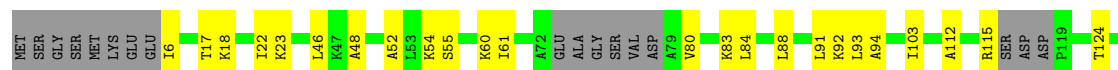
- Molecule 1: Designed allosteric facilitated dissociation switch AS1 H





- Molecule 1: Designed allosteric facilitated dissociation switch AS1 H

Chain M: 67% 21% 13%



- Molecule 2: Designed allosteric facilitated dissociation switch AS1 T

Chain B: 72% 26% .



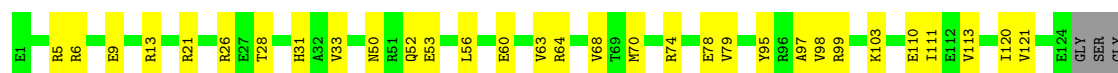
- Molecule 2: Designed allosteric facilitated dissociation switch AS1 T

Chain E: % 81% 17% .



- Molecule 2: Designed allosteric facilitated dissociation switch AS1 T

Chain H: 73% 24% .



- Molecule 2: Designed allosteric facilitated dissociation switch AS1 T

Chain K: 83% 15% .

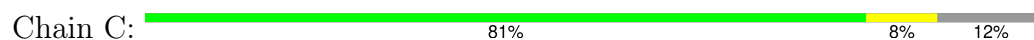


- Molecule 2: Designed allosteric facilitated dissociation switch AS1 T

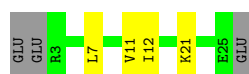
Chain N: 71% 24% 5%



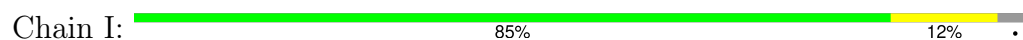
- Molecule 3: Designed allosteric facilitated dissociation switch AS1 E



- Molecule 3: Designed allosteric facilitated dissociation switch AS1 E



- Molecule 3: Designed allosteric facilitated dissociation switch AS1 E



- Molecule 3: Designed allosteric facilitated dissociation switch AS1 E



- Molecule 3: Designed allosteric facilitated dissociation switch AS1 E





## 4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	285.58Å 96.40Å 74.69Å 90.00° 90.39° 90.00°	Depositor
Resolution (Å)	41.16 – 3.48 41.16 – 3.48	Depositor EDS
% Data completeness (in resolution range)	99.3 (41.16-3.48) 99.3 (41.16-3.48)	Depositor EDS
$R_{merge}$	0.32	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.48 (at 3.48Å)	Xtriage
Refinement program	PHENIX 1.21.2_5419	Depositor
R, $R_{free}$	0.247 , 0.287 0.247 , 0.287	Depositor DCC
$R_{free}$ test set	2001 reflections (7.64%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	98.3	Xtriage
Anisotropy	0.633	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.31 , 49.4	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.44$ , $\langle L^2 \rangle = 0.26$	Xtriage
Estimated twinning fraction	0.065 for -h,-k,l	Xtriage
$F_o, F_c$ correlation	0.92	EDS
Total number of atoms	15510	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	111.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.11% 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 [i](#)

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

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	0.08	0/1986	0.21	0/2672
1	D	0.10	0/1995	0.23	0/2684
1	G	0.08	0/1980	0.22	0/2664
1	J	0.08	0/1945	0.21	0/2619
1	M	0.10	0/1808	0.25	0/2426
2	B	0.10	0/1002	0.25	0/1345
2	E	0.09	0/1002	0.23	0/1345
2	H	0.09	0/1002	0.22	0/1345
2	K	0.08	0/1002	0.23	0/1345
2	N	0.09	0/975	0.23	0/1309
3	C	0.07	0/187	0.20	0/244
3	F	0.07	0/187	0.18	0/244
3	I	0.07	0/205	0.17	0/268
3	L	0.07	0/158	0.21	0/208
3	O	0.08	0/176	0.18	0/230
All	All	0.09	0/15610	0.22	0/20948

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

### 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	1972	0	2106	35	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	D	1981	0	2112	34	0
1	G	1966	0	2098	32	0
1	J	1931	0	2064	34	0
1	M	1798	0	1935	55	0
2	B	994	0	1010	21	0
2	E	994	0	1010	11	0
2	H	994	0	1010	22	0
2	K	994	0	1010	12	0
2	N	968	0	980	39	0
3	C	188	0	219	4	0
3	F	188	0	219	5	0
3	I	206	0	234	2	0
3	L	159	0	180	1	0
3	O	177	0	206	5	0
All	All	15510	0	16393	266	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 266 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:M:247:LYS:HE3	2:N:111:ILE:H	1.28	0.97
1:M:247:LYS:CE	2:N:111:ILE:H	1.80	0.94
2:N:110:GLU:HB2	2:N:121:VAL:HB	1.50	0.91
1:M:174:LEU:HD11	1:M:190:LEU:HB3	1.58	0.85
1:M:247:LYS:HE3	2:N:111:ILE:N	1.93	0.81

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	254/266 (96%)	243 (96%)	11 (4%)	0	100	100
1	D	255/266 (96%)	245 (96%)	10 (4%)	0	100	100
1	G	253/266 (95%)	243 (96%)	10 (4%)	0	100	100
1	J	249/266 (94%)	242 (97%)	7 (3%)	0	100	100
1	M	222/266 (84%)	214 (96%)	8 (4%)	0	100	100
2	B	122/127 (96%)	117 (96%)	5 (4%)	0	100	100
2	E	122/127 (96%)	118 (97%)	4 (3%)	0	100	100
2	H	122/127 (96%)	117 (96%)	5 (4%)	0	100	100
2	K	122/127 (96%)	117 (96%)	5 (4%)	0	100	100
2	N	117/127 (92%)	108 (92%)	9 (8%)	0	100	100
3	C	21/26 (81%)	21 (100%)	0	0	100	100
3	F	21/26 (81%)	21 (100%)	0	0	100	100
3	I	23/26 (88%)	23 (100%)	0	0	100	100
3	L	18/26 (69%)	18 (100%)	0	0	100	100
3	O	20/26 (77%)	19 (95%)	1 (5%)	0	100	100
All	All	1941/2095 (93%)	1866 (96%)	75 (4%)	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	204/210 (97%)	204 (100%)	0	100	100
1	D	205/210 (98%)	205 (100%)	0	100	100
1	G	203/210 (97%)	203 (100%)	0	100	100
1	J	199/210 (95%)	199 (100%)	0	100	100
1	M	184/210 (88%)	184 (100%)	0	100	100
2	B	104/105 (99%)	104 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	E	104/105 (99%)	104 (100%)	0	100	100
2	H	104/105 (99%)	104 (100%)	0	100	100
2	K	104/105 (99%)	104 (100%)	0	100	100
2	N	102/105 (97%)	102 (100%)	0	100	100
3	C	20/23 (87%)	20 (100%)	0	100	100
3	F	20/23 (87%)	20 (100%)	0	100	100
3	I	22/23 (96%)	22 (100%)	0	100	100
3	L	17/23 (74%)	17 (100%)	0	100	100
3	O	19/23 (83%)	19 (100%)	0	100	100
All	All	1611/1690 (95%)	1611 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
2	B	77	ASN
1	G	57	ASN
2	H	118	GLN
1	M	185	GLN

### 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 oligosaccharides in this entry.

## 5.6 Ligand geometry ⓘ

There are no ligands in this entry.

## 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	256/266 (96%)	-0.48	0	100	100	81, 98, 114, 130	0
1	D	257/266 (96%)	-0.45	0	100	100	79, 101, 119, 142	0
1	G	255/266 (95%)	-0.48	0	100	100	84, 118, 135, 149	0
1	J	251/266 (94%)	-0.50	0	100	100	90, 128, 141, 155	0
1	M	232/266 (87%)	-0.31	0	100	100	122, 148, 161, 168	0
2	B	124/127 (97%)	-0.53	0	100	100	79, 86, 116, 139	0
2	E	124/127 (97%)	-0.54	1 (0%)	82	67	79, 87, 119, 142	0
2	H	124/127 (97%)	-0.59	0	100	100	79, 92, 123, 137	0
2	K	124/127 (97%)	-0.64	0	100	100	80, 92, 130, 142	0
2	N	121/127 (95%)	-0.58	0	100	100	83, 108, 132, 148	0
3	C	23/26 (88%)	-0.61	0	100	100	85, 95, 114, 122	0
3	F	23/26 (88%)	-0.65	0	100	100	95, 109, 123, 129	0
3	I	25/26 (96%)	-0.68	0	100	100	110, 133, 159, 168	0
3	L	20/26 (76%)	-0.60	0	100	100	124, 129, 151, 154	0
3	O	22/26 (84%)	-0.33	0	100	100	129, 154, 163, 165	0
All	All	1981/2095 (94%)	-0.49	1 (0%)	92	89	79, 107, 150, 168	0

All (1) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	E	22	THR	2.5

### 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 oligosaccharides in this entry.

### 6.4 Ligands [i](#)

There are no ligands in this entry.

### 6.5 Other polymers [i](#)

There are no such residues in this entry.