



# Full wwPDB X-ray Structure Validation Report ⓘ

Nov 9, 2024 – 09:46 AM EST

PDB ID : 5K5S  
Title : Crystal structure of the active form of human calcium-sensing receptor extra-cellular domain  
Authors : Geng, Y.; Mosyak, L.; Kurinov, I.; Zuo, H.; Sturchler, E.; Cheng, T.C.; Subramanyam, P.; Brown, A.P.; Brennan, S.C.; Mun, H.-C.; Bush, M.; Chen, Y.; Nguyen, T.; Cao, B.; Chang, D.; Quick, M.; Conigrave, A.; Colecraft, H.M.; McDonald, P.; Fan, Q.R.  
Deposited on : 2016-05-23  
Resolution : 2.60 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.

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 : 4.02b-467  
Mogul : 2022.3.0, CSD as543be (2022)  
Xtriage (Phenix) : 1.20.1  
EDS : 3.0  
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)  
CCP4 : 9.0.003 (Gargrove)  
Density-Fitness : 1.0.11  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)

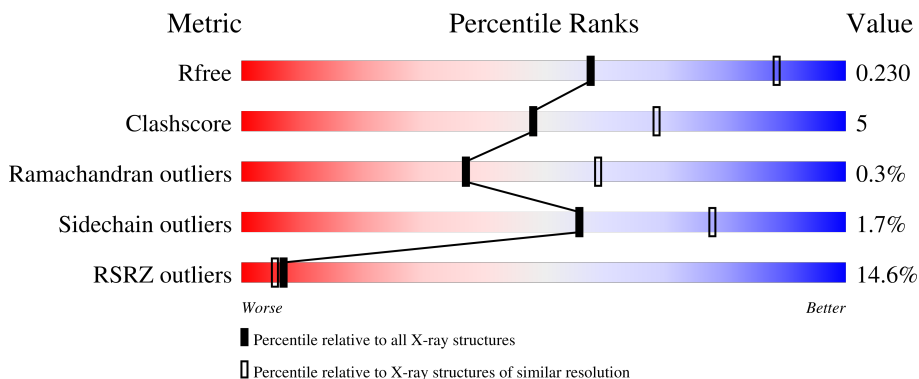
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.60 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))
$R_{free}$	164625	3775 (2.60-2.60)
Clashscore	180529	4181 (2.60-2.60)
Ramachandran outliers	177936	4129 (2.60-2.60)
Sidechain outliers	177891	4129 (2.60-2.60)
RSRZ outliers	164620	3775 (2.60-2.60)

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 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	615	
1	B	615	

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:

Validation Pipeline (wwPDB-VP) : 2.39

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	PO4	B	702	-	X	-	-
3	PO4	B	703	-	X	-	-

## 2 Entry composition i

There are 6 unique types of molecules in this entry. The entry contains 8913 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 Extracellular calcium-sensing receptor.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	531	4203	2675	707	800	21	0	0	0
1	B	537	4251	2703	717	810	21	0	0	0

There are 60 discrepancies between the modelled and reference sequences:

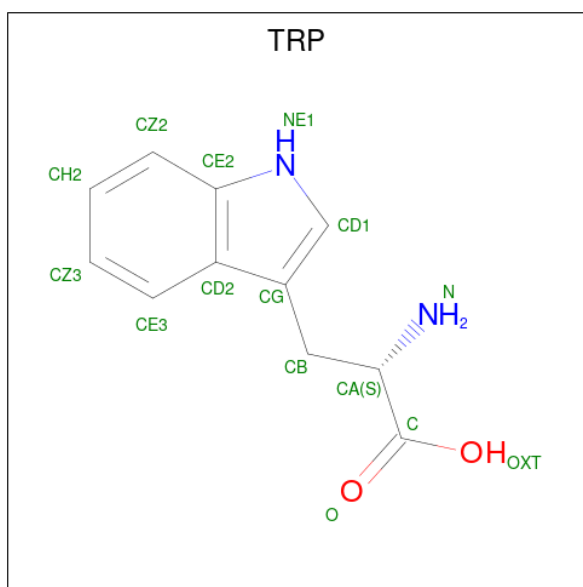
Chain	Residue	Modelled	Actual	Comment	Reference
A	1	MET	-	initiating methionine	UNP P41180
A	2	ALA	-	expression tag	UNP P41180
A	3	PHE	-	expression tag	UNP P41180
A	4	TYR	-	expression tag	UNP P41180
A	5	SER	-	expression tag	UNP P41180
A	6	CYS	-	expression tag	UNP P41180
A	7	CYS	-	expression tag	UNP P41180
A	8	TRP	-	expression tag	UNP P41180
A	9	VAL	-	expression tag	UNP P41180
A	10	LEU	-	expression tag	UNP P41180
A	11	LEU	-	expression tag	UNP P41180
A	12	ALA	-	expression tag	UNP P41180
A	13	LEU	-	expression tag	UNP P41180
A	14	THR	-	expression tag	UNP P41180
A	15	TRP	-	expression tag	UNP P41180
A	16	HIS	-	expression tag	UNP P41180
A	17	THR	-	expression tag	UNP P41180
A	18	SER	-	expression tag	UNP P41180
A	19	ALA	-	expression tag	UNP P41180
A	386	GLN	ASN	engineered mutation	UNP P41180
A	402	ASN	SER	engineered mutation	UNP P41180
A	468	GLN	ASN	engineered mutation	UNP P41180
A	608	ASP	-	expression tag	UNP P41180
A	609	TYR	-	expression tag	UNP P41180
A	610	LYS	-	expression tag	UNP P41180

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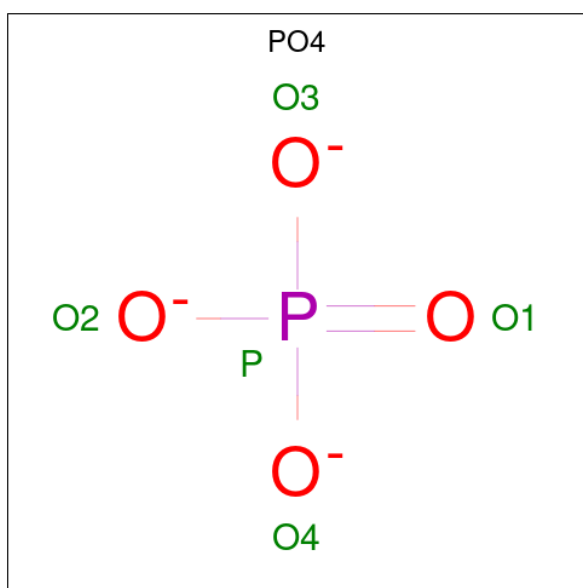
Chain	Residue	Modelled	Actual	Comment	Reference
A	611	ASP	-	expression tag	UNP P41180
A	612	ASP	-	expression tag	UNP P41180
A	613	ASP	-	expression tag	UNP P41180
A	614	ASP	-	expression tag	UNP P41180
A	615	LYS	-	expression tag	UNP P41180
B	1	MET	-	initiating methionine	UNP P41180
B	2	ALA	-	expression tag	UNP P41180
B	3	PHE	-	expression tag	UNP P41180
B	4	TYR	-	expression tag	UNP P41180
B	5	SER	-	expression tag	UNP P41180
B	6	CYS	-	expression tag	UNP P41180
B	7	CYS	-	expression tag	UNP P41180
B	8	TRP	-	expression tag	UNP P41180
B	9	VAL	-	expression tag	UNP P41180
B	10	LEU	-	expression tag	UNP P41180
B	11	LEU	-	expression tag	UNP P41180
B	12	ALA	-	expression tag	UNP P41180
B	13	LEU	-	expression tag	UNP P41180
B	14	THR	-	expression tag	UNP P41180
B	15	TRP	-	expression tag	UNP P41180
B	16	HIS	-	expression tag	UNP P41180
B	17	THR	-	expression tag	UNP P41180
B	18	SER	-	expression tag	UNP P41180
B	19	ALA	-	expression tag	UNP P41180
B	386	GLN	ASN	engineered mutation	UNP P41180
B	402	ASN	SER	engineered mutation	UNP P41180
B	468	GLN	ASN	engineered mutation	UNP P41180
B	608	ASP	-	expression tag	UNP P41180
B	609	TYR	-	expression tag	UNP P41180
B	610	LYS	-	expression tag	UNP P41180
B	611	ASP	-	expression tag	UNP P41180
B	612	ASP	-	expression tag	UNP P41180
B	613	ASP	-	expression tag	UNP P41180
B	614	ASP	-	expression tag	UNP P41180
B	615	LYS	-	expression tag	UNP P41180

- Molecule 2 is TRYPTOPHAN (three-letter code: TRP) (formula: C<sub>11</sub>H<sub>12</sub>N<sub>2</sub>O<sub>2</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
2	A	1	15	11	2	2	0	0
2	B	1	15	11	2	2	0	0

- Molecule 3 is PHOSPHATE ION (three-letter code: PO4) (formula: O<sub>4</sub>P).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	O	P		
3	A	1	5	4	1	0	0
3	A	1	5	4	1	0	0

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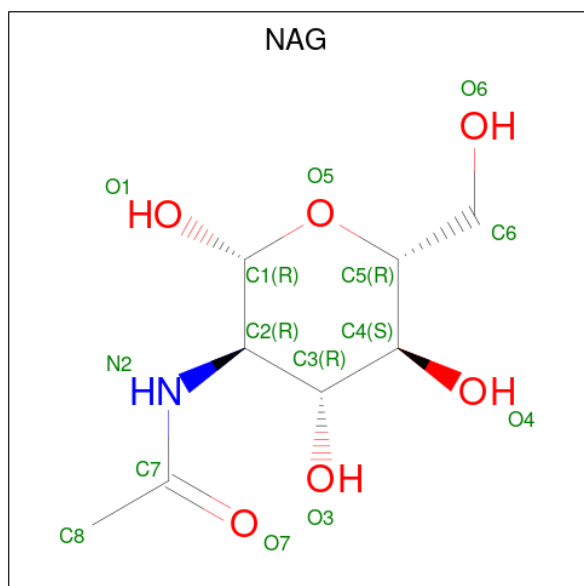
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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	B	1	Total	O	P	0	0
			5	4	1		
3	B	1	Total	O	P	0	0
			5	4	1		

- Molecule 4 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	5	Total	Ca	0	0
			5	5		
4	B	3	Total	Ca	0	0
			3	3		

- Molecule 5 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: C<sub>8</sub>H<sub>15</sub>NO<sub>6</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	A	1	Total	C	N	O	0	0
			14	8	1	5		
5	A	1	Total	C	N	O	0	0
			14	8	1	5		
5	A	1	Total	C	N	O	0	0
			14	8	1	5		
5	A	1	Total	C	N	O	0	0
			14	8	1	5		
5	B	1	Total	C	N	O	0	0
			14	8	1	5		

- Molecule 6 is water.

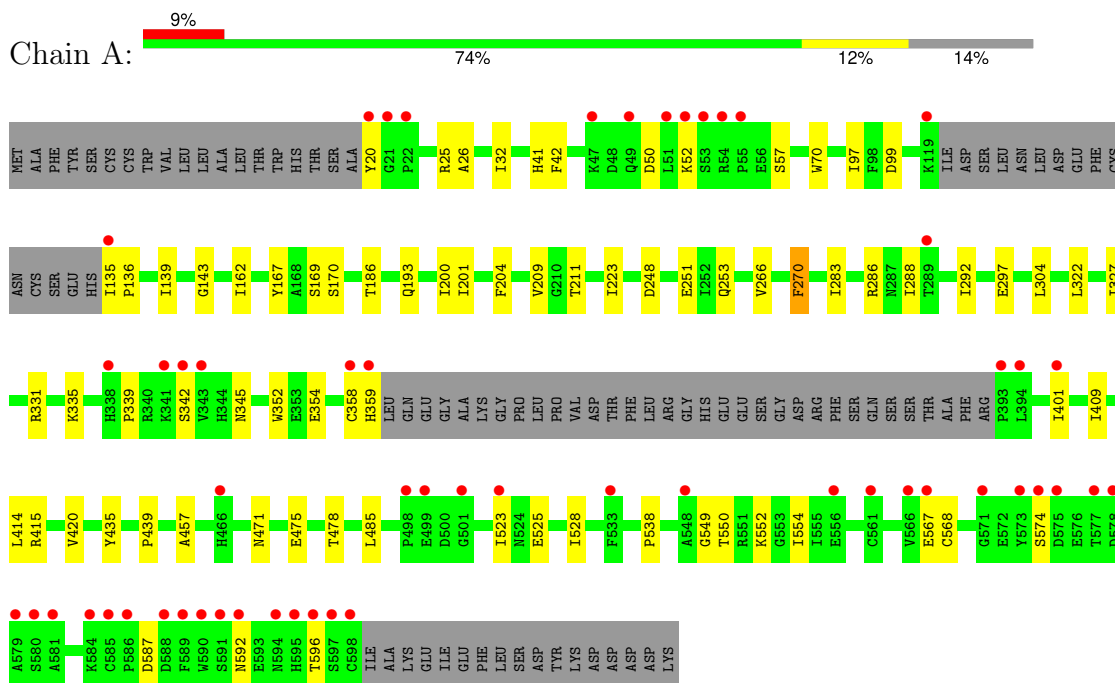
<b>Mol</b>	<b>Chain</b>	<b>Residues</b>	<b>Atoms</b>		<b>ZeroOcc</b>	<b>AltConf</b>
6	A	189	Total 189	O 189	0	0
6	B	142	Total 142	O 142	0	0



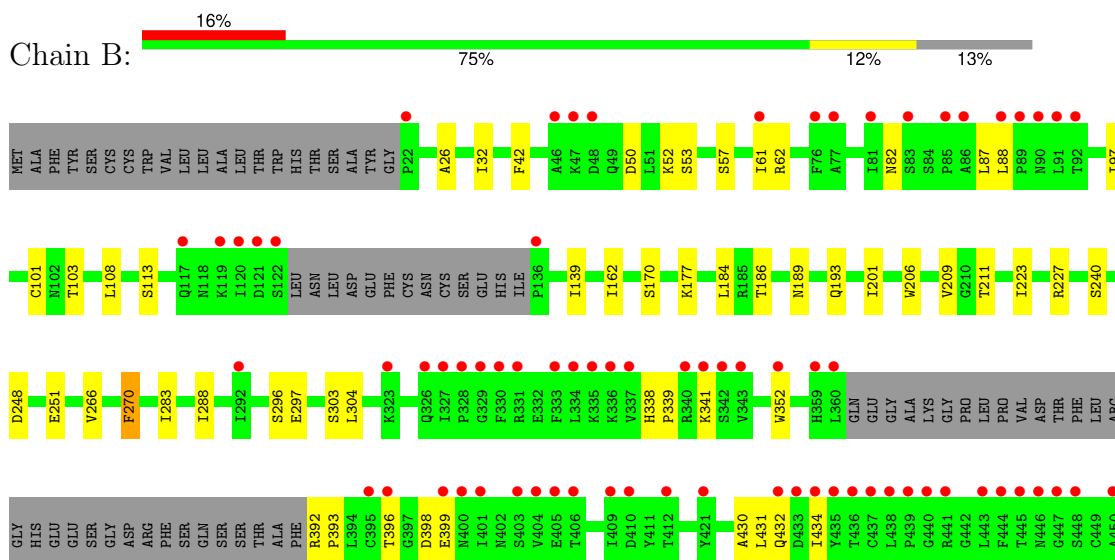
### 3 Residue-property plots [i](#)

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: Extracellular calcium-sensing receptor



- Molecule 1: Extracellular calcium-sensing receptor





## 4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	107.66Å 127.45Å 146.77Å 90.00° 108.72° 90.00°	Depositor
Resolution (Å)	38.07 – 2.60 38.07 – 2.60	Depositor EDS
% Data completeness (in resolution range)	84.7 (38.07-2.60) 84.7 (38.07-2.60)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.60 (at 2.62Å)	Xtrriage
Refinement program	BUSTER 2.10.1	Depositor
R, $R_{free}$	0.211 , 0.222 0.219 , 0.230	Depositor DCC
$R_{free}$ test set	2475 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	50.4	Xtrriage
Anisotropy	0.041	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 81.6	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	0.018 for h,-k,-h-l	Xtrriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	8913	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	67.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.35% 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](#)

Bond lengths and bond angles in the following residue types are not validated in this section: PO4, CA, NAG

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	0.44	0/4305	0.69	0/5837
1	B	0.45	0/4352	0.71	0/5898
All	All	0.45	0/8657	0.70	0/11735

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	B	0	1
All	All	0	2

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	354	GLU	Sidechain
1	B	189	ASN	Sidechain

### 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	4203	0	4037	47	0
1	B	4251	0	4097	42	0
2	A	15	0	9	4	0
2	B	15	0	9	3	0
3	A	10	0	0	0	0
3	B	10	0	0	0	0
4	A	5	0	0	0	0
4	B	3	0	0	0	0
5	A	56	0	52	0	0
5	B	14	0	13	0	0
6	A	189	0	0	1	0
6	B	142	0	0	2	0
All	All	8913	0	8217	91	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.

All (91) 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:253:GLN:HE22	1:A:286:ARG:HH11	0.97	0.96
1:A:193:GLN:HE22	1:A:297:GLU:H	1.20	0.88
1:B:193:GLN:HE22	1:B:297:GLU:H	1.22	0.86
1:A:253:GLN:HE22	1:A:286:ARG:NH1	1.73	0.85
1:A:253:GLN:NE2	1:A:286:ARG:HH11	1.75	0.85
1:A:335:LYS:HA	1:A:401:ILE:HD11	1.60	0.83
1:A:32:ILE:HG23	1:A:139:ILE:HG12	1.66	0.77
2:A:701:TRP:N	2:A:701:TRP:CD1	2.54	0.75
1:B:32:ILE:HG23	1:B:139:ILE:HG12	1.69	0.75
1:A:331:ARG:HH22	1:A:409:ILE:HG23	1.54	0.72
1:A:554:ILE:HD12	1:B:552:LYS:HB3	1.71	0.71
2:A:701:TRP:N	2:A:701:TRP:HD1	1.89	0.69
1:A:20:TYR:HB3	1:A:25:ARG:HH22	1.59	0.68
1:B:338:HIS:HB3	1:B:341:LYS:HB2	1.78	0.66
1:B:227:ARG:NH1	1:B:240:SER:HB3	2.12	0.65
1:A:253:GLN:NE2	1:A:286:ARG:NH1	2.41	0.62
2:B:701:TRP:CD1	2:B:701:TRP:N	2.67	0.62
1:B:209:VAL:HG12	1:B:266:VAL:HB	1.81	0.61
1:B:61:ILE:HG22	1:B:62:ARG:HG3	1.83	0.60
1:B:227:ARG:HH12	1:B:240:SER:HB3	1.64	0.60
1:A:331:ARG:NH2	1:A:409:ILE:HG23	2.15	0.60
1:A:209:VAL:HG12	1:A:266:VAL:HB	1.84	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:41:HIS:HD2	1:A:99:ASP:OD2	1.85	0.59
1:B:186:THR:HA	1:B:485:LEU:HD21	1.83	0.59
1:B:193:GLN:HE22	1:B:297:GLU:N	1.97	0.59
1:B:87:LEU:HA	1:B:432:GLN:OE1	2.02	0.59
1:A:266:VAL:HG22	1:A:292:ILE:HD11	1.84	0.59
1:A:170:SER:HG	2:A:701:TRP:N	2.01	0.58
1:A:50:ASP:HB2	1:A:52:LYS:HG3	1.85	0.58
1:B:82:ASN:HA	6:B:801:HOH:O	2.04	0.57
1:A:169:SER:HA	2:A:701:TRP:OXT	2.05	0.56
1:A:552:LYS:HB3	1:B:554:ILE:HD12	1.88	0.55
1:A:549:GLY:H	1:A:574:SER:HB3	1.71	0.54
1:B:339:PRO:HD3	1:B:352:TRP:CE2	2.43	0.53
1:A:186:THR:HA	1:A:485:LEU:HD12	1.89	0.53
1:B:170:SER:HG	2:B:701:TRP:N	2.07	0.53
2:B:701:TRP:N	2:B:701:TRP:HD1	2.06	0.53
1:A:568:CYS:SG	1:A:574:SER:HB2	2.49	0.52
1:A:211:THR:HB	1:A:223:ILE:HD12	1.92	0.52
1:A:193:GLN:HE22	1:A:297:GLU:N	1.99	0.52
1:B:211:THR:HB	1:B:223:ILE:HD12	1.90	0.52
1:A:26:ALA:HB3	1:A:97:ILE:HB	1.93	0.51
1:B:50:ASP:HB2	1:B:52:LYS:HG3	1.94	0.50
1:A:201:ILE:HD13	1:A:209:VAL:HG11	1.93	0.50
1:B:184:LEU:HD11	1:B:464:LEU:HB3	1.93	0.49
1:A:200:ILE:HG12	1:A:523:ILE:HD11	1.93	0.49
1:B:600:ALA:O	1:B:601:LYS:HB2	2.13	0.49
1:B:26:ALA:HB3	1:B:97:ILE:HB	1.95	0.49
1:B:201:ILE:HD13	1:B:209:VAL:HG11	1.94	0.48
1:B:471:ASN:HB3	1:B:475:GLU:H	1.78	0.48
1:B:223:ILE:HG12	1:B:270:PHE:HB2	1.95	0.48
1:A:478:THR:O	1:A:485:LEU:HD23	2.14	0.48
1:B:352:TRP:CZ3	1:B:399:GLU:HB2	2.48	0.48
1:B:468:GLN:HB3	6:B:819:HOH:O	2.14	0.48
1:A:292:ILE:HG21	1:A:538:PRO:HG2	1.96	0.47
1:A:550:THR:HG22	1:A:567:GLU:HA	1.95	0.47
1:B:101:CYS:O	1:B:103:THR:HG23	2.15	0.47
1:A:248:ASP:HB2	1:A:251:GLU:H	1.80	0.47
1:B:177:LYS:HA	1:B:177:LYS:HD3	1.71	0.46
1:A:223:ILE:HG12	1:A:270:PHE:HB2	1.97	0.45
1:A:525:GLU:HA	1:A:528:ILE:HD12	1.98	0.45
1:A:283:ILE:HG23	1:A:288:ILE:HB	1.97	0.45
1:B:32:ILE:HD13	1:B:431:LEU:HD22	1.98	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:248:ASP:HB2	1:B:251:GLU:H	1.81	0.45
1:A:471:ASN:HB3	1:A:475:GLU:H	1.82	0.45
1:B:539:PHE:CZ	1:B:544:ARG:HD2	2.51	0.45
1:A:292:ILE:HA	6:A:802:HOH:O	2.17	0.45
1:A:204:PHE:HE1	1:A:525:GLU:HG2	1.83	0.44
1:B:495:HIS:HB2	1:B:504:VAL:HG13	1.99	0.44
1:B:352:TRP:HZ3	1:B:399:GLU:HB2	1.82	0.44
1:B:396:THR:C	1:B:398:ASP:H	2.22	0.44
1:A:592:ASN:HD21	1:A:596:THR:HB	1.83	0.44
1:A:135:ILE:N	1:A:136:PRO:CD	2.81	0.43
1:B:42:PHE:CZ	1:B:304:LEU:HD11	2.53	0.43
1:B:283:ILE:HG23	1:B:288:ILE:HB	2.00	0.43
1:A:162:ILE:HA	1:A:457:ALA:HB1	2.00	0.43
1:A:342:SER:HB3	1:A:345:ASN:HB3	1.99	0.43
1:B:162:ILE:HA	1:B:457:ALA:HB1	2.00	0.43
1:B:392:ARG:N	1:B:393:PRO:HD2	2.33	0.42
1:A:322:LEU:O	1:A:415:ARG:HD3	2.19	0.42
1:B:525:GLU:HA	1:B:528:ILE:HD12	2.01	0.42
1:B:499:GLU:HG3	1:B:500:ASP:H	1.84	0.42
1:A:339:PRO:HD3	1:A:352:TRP:CD2	2.55	0.42
1:A:42:PHE:CZ	1:A:304:LEU:HD11	2.56	0.41
1:A:253:GLN:OE1	1:A:286:ARG:NH1	2.49	0.41
1:A:143:GLY:HA2	1:A:167:TYR:CE2	2.55	0.41
1:B:490:SER:OG	1:B:507:GLU:HG3	2.21	0.41
1:A:327:ILE:HD12	1:A:414:LEU:HD13	2.02	0.41
1:A:70:TRP:HB3	1:A:420:VAL:HG21	2.04	0.40
1:B:430:ALA:O	1:B:434:ILE:HG12	2.21	0.40
1:B:201:ILE:HG23	1:B:206:TRP:HB2	2.04	0.40

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	525/615 (85%)	500 (95%)	23 (4%)	2 (0%)	30	52
1	B	531/615 (86%)	502 (94%)	28 (5%)	1 (0%)	44	66
All	All	1056/1230 (86%)	1002 (95%)	51 (5%)	3 (0%)	37	59

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	439	PRO
1	A	587	ASP
1	B	601	LYS

### 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	457/531 (86%)	452 (99%)	5 (1%)	70	86
1	B	463/531 (87%)	454 (98%)	9 (2%)	52	75
All	All	920/1062 (87%)	906 (98%)	14 (2%)	56	81

All (14) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	57	SER
1	A	270	PHE
1	A	358	CYS
1	A	359	HIS
1	A	435	TYR
1	B	53	SER
1	B	57	SER
1	B	88	LEU
1	B	108	LEU
1	B	113	SER
1	B	270	PHE
1	B	296	SER
1	B	303	SER

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Mol	Chain	Res	Type
1	B	599	ILE

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

Mol	Chain	Res	Type
1	A	41	HIS
1	A	72	GLN
1	A	193	GLN
1	B	193	GLN

### 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 oligosaccharides in this entry.

### 5.6 Ligand geometry [i](#)

Of 19 ligands modelled in this entry, 8 are monoatomic - leaving 11 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
5	NAG	A	708	1	14,14,15	0.31	0	17,19,21	0.62	0
2	TRP	B	701	-	14,16,16	0.81	0	13,22,22	0.88	0
5	NAG	B	707	1	14,14,15	0.44	0	17,19,21	2.56	3 (17%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
5	NAG	A	710	1	14,14,15	0.36	0	17,19,21	1.54	3 (17%)
5	NAG	A	711	1	14,14,15	0.27	0	17,19,21	1.06	1 (5%)
2	TRP	A	701	-	14,16,16	0.87	1 (7%)	13,22,22	0.96	0
3	PO4	A	702	-	4,4,4	2.02	3 (75%)	6,6,6	0.92	0
3	PO4	B	703	-	4,4,4	2.30	4 (100%)	6,6,6	0.38	0
3	PO4	B	702	-	4,4,4	2.12	3 (75%)	6,6,6	1.10	1 (16%)
5	NAG	A	709	1	14,14,15	0.28	0	17,19,21	0.94	2 (11%)
3	PO4	A	703	-	4,4,4	2.23	1 (25%)	6,6,6	0.73	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
5	NAG	A	708	1	-	0/6/23/26	0/1/1/1
5	NAG	B	707	1	-	5/6/23/26	0/1/1/1
5	NAG	A	710	1	-	5/6/23/26	0/1/1/1
5	NAG	A	711	1	-	4/6/23/26	0/1/1/1
2	TRP	A	701	-	-	2/7/8/8	0/2/2/2
5	NAG	A	709	1	-	4/6/23/26	0/1/1/1
2	TRP	B	701	-	-	2/7/8/8	0/2/2/2

All (12) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	703	PO4	P-O1	2.93	1.57	1.50
3	B	703	PO4	P-O1	2.83	1.57	1.50
3	B	702	PO4	P-O3	2.35	1.61	1.54
3	A	702	PO4	P-O2	2.28	1.61	1.54
2	A	701	TRP	OXT-C	-2.26	1.23	1.30
3	B	702	PO4	P-O2	2.26	1.61	1.54
3	A	702	PO4	P-O4	2.24	1.61	1.54
3	A	702	PO4	P-O3	2.22	1.61	1.54
3	B	702	PO4	P-O4	2.15	1.60	1.54
3	B	703	PO4	P-O2	2.12	1.60	1.54
3	B	703	PO4	P-O4	2.09	1.60	1.54
3	B	703	PO4	P-O3	2.05	1.60	1.54

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	B	707	NAG	C1-O5-C5	7.42	122.13	112.19
5	B	707	NAG	C1-C2-N2	6.01	119.91	110.43
5	A	710	NAG	C2-N2-C7	3.65	127.80	122.90
5	A	710	NAG	C1-C2-N2	-3.62	104.73	110.43
5	A	711	NAG	C1-C2-N2	-3.60	104.76	110.43
5	B	707	NAG	C2-N2-C7	3.31	127.33	122.90
5	A	709	NAG	O5-C1-C2	-2.72	107.09	111.29
5	A	710	NAG	C1-O5-C5	2.19	115.13	112.19
3	B	702	PO4	O3-P-O2	2.04	114.26	107.91
5	A	709	NAG	C1-C2-N2	-2.03	107.23	110.43

There are no chirality outliers.

All (22) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	701	TRP	N-CA-CB-CG
2	A	701	TRP	CA-CB-CG-CD1
2	B	701	TRP	CA-CB-CG-CD1
5	A	710	NAG	C3-C2-N2-C7
5	A	710	NAG	O7-C7-N2-C2
5	B	707	NAG	C1-C2-N2-C7
5	A	710	NAG	C8-C7-N2-C2
5	A	710	NAG	O5-C5-C6-O6
5	A	709	NAG	C8-C7-N2-C2
5	A	711	NAG	C8-C7-N2-C2
5	A	711	NAG	O7-C7-N2-C2
5	A	710	NAG	C4-C5-C6-O6
5	A	709	NAG	O7-C7-N2-C2
5	B	707	NAG	C8-C7-N2-C2
5	A	709	NAG	O5-C5-C6-O6
5	A	709	NAG	C4-C5-C6-O6
5	B	707	NAG	O7-C7-N2-C2
5	B	707	NAG	C4-C5-C6-O6
5	A	711	NAG	C4-C5-C6-O6
5	A	711	NAG	O5-C5-C6-O6
2	B	701	TRP	N-CA-CB-CG
5	B	707	NAG	O5-C5-C6-O6

There are no ring outliers.

2 monomers are involved in 7 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	701	TRP	3	0
2	A	701	TRP	4	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

### 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	531/615 (86%)	0.32	55 (10%) 13 11	20, 53, 133, 211	0
1	B	537/615 (87%)	0.83	101 (18%) 4 3	31, 69, 119, 157	0
All	All	1068/1230 (86%)	0.58	156 (14%) 7 5	20, 61, 126, 211	0

All (156) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	393	PRO	6.4
1	A	590	TRP	6.1
1	A	589	PHE	5.9
1	B	48	ASP	5.1
1	A	135	ILE	4.8
1	A	119	LYS	4.7
1	B	436	THR	4.6
1	A	586	PRO	4.5
1	B	435	TYR	4.5
1	B	122	SER	4.5
1	B	443	LEU	4.5
1	B	438	LEU	4.4
1	B	404	VAL	4.2
1	B	556	GLU	4.2
1	B	439	PRO	4.2
1	B	120	ILE	3.8
1	B	399	GLU	3.7
1	A	51	LEU	3.7
1	A	20	TYR	3.6
1	B	401	ILE	3.6
1	A	359	HIS	3.5
1	B	136	PRO	3.4
1	A	584	LYS	3.3
1	A	598	CYS	3.2

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	A	573	TYR	3.2
1	A	47	LYS	3.2
1	B	360	LEU	3.2
1	B	474	GLY	3.2
1	A	591	SER	3.2
1	B	591	SER	3.2
1	B	447	GLY	3.2
1	A	53	SER	3.2
1	A	548	ALA	3.2
1	A	49	GLN	3.2
1	B	352	TRP	3.2
1	B	323	LYS	3.1
1	B	342	SER	3.1
1	B	448	SER	3.1
1	B	432	GLN	3.1
1	B	328	PRO	3.1
1	A	592	ASN	3.1
1	B	450	ALA	3.1
1	A	54	ARG	3.1
1	B	453	LYS	3.1
1	B	47	LYS	3.1
1	A	466	HIS	3.0
1	B	601	LYS	3.0
1	B	337	VAL	3.0
1	B	441	ARG	3.0
1	B	592	ASN	3.0
1	B	600	ALA	3.0
1	A	581	ALA	2.9
1	A	501	GLY	2.9
1	A	556	GLU	2.9
1	A	533	PHE	2.9
1	A	401	ILE	2.9
1	A	577	THR	2.9
1	B	444	PHE	2.8
1	A	341	LYS	2.8
1	A	578	ASP	2.8
1	B	451	ASP	2.8
1	B	446	ASN	2.8
1	B	445	THR	2.8
1	B	468	GLN	2.8
1	B	498	PRO	2.8
1	B	462	LYS	2.8

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	B	330	PHE	2.8
1	B	335	LYS	2.8
1	B	46	ALA	2.7
1	B	326	GLN	2.7
1	B	85	PRO	2.7
1	A	566	VAL	2.7
1	B	119	LYS	2.7
1	B	92	THR	2.7
1	A	575	ASP	2.7
1	A	289	THR	2.7
1	B	602	GLU	2.6
1	A	498	PRO	2.6
1	B	86	ALA	2.6
1	A	596	THR	2.6
1	B	405	GLU	2.6
1	B	341	LYS	2.6
1	B	334	LEU	2.6
1	A	499	GLU	2.5
1	A	523	ILE	2.5
1	B	584	LYS	2.5
1	B	467	LEU	2.5
1	B	434	ILE	2.5
1	B	480	ASP	2.5
1	A	571	GLY	2.5
1	A	22	PRO	2.5
1	A	358	CYS	2.5
1	A	595	HIS	2.5
1	B	506	LYS	2.4
1	B	89	PRO	2.4
1	A	394	LEU	2.4
1	B	343	VAL	2.4
1	A	21	GLY	2.4
1	B	400	ASN	2.4
1	B	340	ARG	2.4
1	A	343	VAL	2.4
1	B	437	CYS	2.4
1	A	52	LYS	2.3
1	A	55	PRO	2.3
1	B	76	PHE	2.3
1	B	81	ILE	2.3
1	B	410	ASP	2.3
1	B	472	ASN	2.3

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	B	117	GLN	2.3
1	B	292	ILE	2.3
1	A	574	SER	2.3
1	A	588	ASP	2.3
1	B	396	THR	2.3
1	B	327	ILE	2.3
1	A	342	SER	2.3
1	A	597	SER	2.3
1	B	83	SER	2.3
1	B	535	ARG	2.2
1	B	395	CYS	2.2
1	B	476	GLN	2.2
1	B	440	GLY	2.2
1	B	454	LYS	2.2
1	B	403	SER	2.2
1	B	61	ILE	2.2
1	B	409	ILE	2.2
1	B	329	GLY	2.2
1	A	580	SER	2.2
1	B	22	PRO	2.2
1	B	412	THR	2.2
1	B	90	ASN	2.2
1	B	333	PHE	2.2
1	B	77	ALA	2.2
1	B	91	LEU	2.2
1	B	406	THR	2.2
1	B	359	HIS	2.2
1	B	589	PHE	2.2
1	A	579	ALA	2.2
1	B	121	ASP	2.1
1	B	433	ASP	2.1
1	B	575	ASP	2.1
1	B	475	GLU	2.1
1	B	336	LYS	2.1
1	B	88	LEU	2.1
1	B	558	GLU	2.1
1	B	421	TYR	2.1
1	B	331	ARG	2.1
1	B	456	GLU	2.1
1	B	496	LEU	2.1
1	B	567	GLU	2.0
1	B	452	ILE	2.0

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Mol	Chain	Res	Type	RSRZ
1	B	455	VAL	2.0
1	A	594	ASN	2.0
1	A	338	HIS	2.0
1	A	567	GLU	2.0
1	A	561	CYS	2.0
1	A	585	CYS	2.0

## 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
5	NAG	A	708	14/15	0.52	0.18	88,91,94,95	0
4	CA	A	707	1/1	0.59	0.19	139,139,139,139	0
4	CA	A	712	1/1	0.69	0.20	140,140,140,140	0
5	NAG	A	710	14/15	0.69	0.16	84,88,94,95	0
5	NAG	A	711	14/15	0.71	0.17	68,71,74,78	0
5	NAG	B	707	14/15	0.78	0.13	71,72,74,74	0
5	NAG	A	709	14/15	0.79	0.16	70,73,81,84	0
3	PO4	A	703	5/5	0.86	0.17	76,77,78,79	0
2	TRP	B	701	15/15	0.86	0.16	45,48,52,59	0
4	CA	B	704	1/1	0.89	0.10	102,102,102,102	0
3	PO4	B	703	5/5	0.90	0.14	72,72,74,75	0
3	PO4	B	702	5/5	0.92	0.09	59,60,60,65	0
4	CA	A	706	1/1	0.92	0.13	83,83,83,83	0
4	CA	B	705	1/1	0.93	0.14	81,81,81,81	0
2	TRP	A	701	15/15	0.94	0.09	18,28,30,57	0
4	CA	B	706	1/1	0.96	0.12	111,111,111,111	0
4	CA	A	705	1/1	0.96	0.13	56,56,56,56	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
3	PO4	A	702	5/5	0.97	0.07	26,30,33,35	0
4	CA	A	704	1/1	0.98	0.04	53,53,53,53	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.