Full wwPDB X-ray Structure Validation Report (i)

Dec 15, 2024 – 04:10 AM EST

PDB ID	:	2AO7
Title	:	Adam10 Disintegrin and cysteine- rich domain
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Deposited on	:	2005-08-12
Resolution	:	2.90 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*
A user guide is available at
https://www.wwpdb.org/validation/2017/XrayValidationReportHelp
with specific help available everywhere you see the (i) symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

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

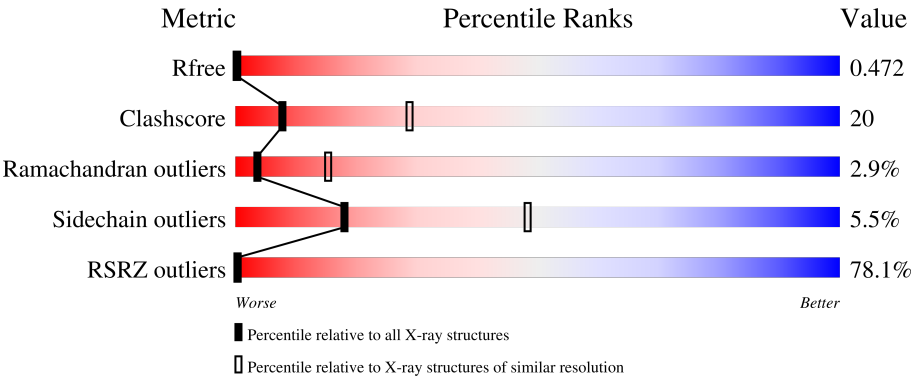
MolProbity	:	4.02b-467
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.21
EDS	:	3.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.004 (Gargrove)
Density-Fitness	:	1.0.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.40

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.90 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	2335 (2.90-2.90)
Clashscore	180529	2564 (2.90-2.90)
Ramachandran outliers	177936	2514 (2.90-2.90)
Sidechain outliers	177891	2516 (2.90-2.90)
RSRZ outliers	164620	2337 (2.90-2.90)

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 >=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 <=5%

Mol	Chain	Length	Quality of chain
1	A	192	59% 44% 29% · 24%

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

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	SO4	A	648	-	-	X	-

2 Entry composition

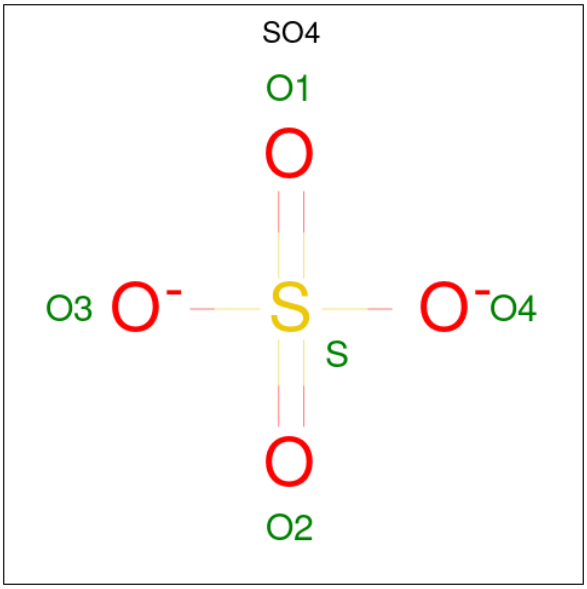
There are 2 unique types of molecules in this entry. The entry contains 1109 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 ADAM 10.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	146	Total	C	N	O	S	0	0	0
			1099	666	198	209	26			

- Molecule 2 is SULFATE ION (three-letter code: SO4) (formula: O_4S).



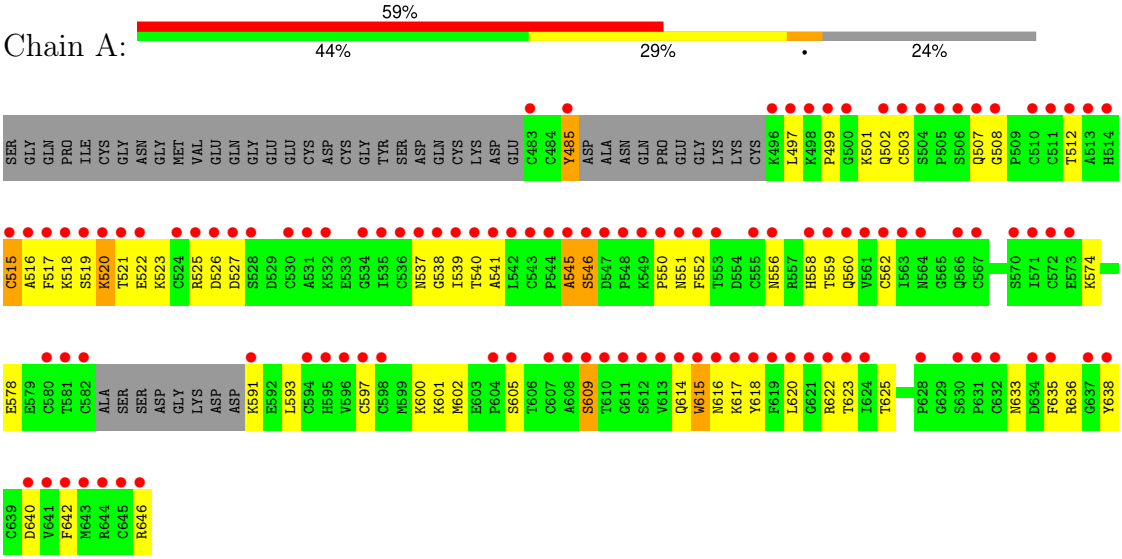
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	O	S		0	0
			5	4	1			
2	A	1	Total	O	S		0	0
			5	4	1			

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. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

- Molecule 1: ADAM 10

Chain A:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	I 41 3 2	Depositor
Cell constants a, b, c, α, β, γ	146.78Å 146.78Å 146.78Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	8.00 – 2.90 8.00 – 2.90	Depositor EDS
% Data completeness (in resolution range)	(Not available) (8.00-2.90) 94.0 (8.00-2.90)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	6.50 (at 2.39Å)	Xtriage
Refinement program	CNS	Depositor
R, R_{free}	0.261 , 0.289 0.477 , 0.472	Depositor DCC
R_{free} test set	311 reflections (5.24%)	wwPDB-VP
Wilson B-factor (Å^2)	44.9	Xtriage
Anisotropy	0.000	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.47 , 63.6	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.53	EDS
Total number of atoms	1109	wwPDB-VP
Average B, all atoms (Å^2)	39.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.73% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: SO4

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	0.46	0/1119	0.69	0/1501

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

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	1099	0	1036	42	12
2	A	10	0	0	1	2
All	All	1109	0	1036	42	12

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 20.

All (42) 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:556:ASN:HD22	1:A:560:GLN:HE21	1.09	0.94
1:A:559:THR:HG22	1:A:560:GLN:HG3	1.55	0.88

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:556:ASN:HD22	1:A:560:GLN:NE2	1.75	0.84
1:A:545:ALA:O	1:A:546:SER:HB2	1.90	0.71
1:A:556:ASN:ND2	1:A:560:GLN:HE21	1.89	0.68
1:A:502:GLN:HE21	1:A:516:ALA:HA	1.61	0.65
1:A:518:LYS:HB3	1:A:522:GLU:HG3	1.82	0.61
1:A:545:ALA:O	1:A:546:SER:CB	2.51	0.59
1:A:508:GLY:HA3	1:A:541:ALA:O	2.04	0.58
1:A:523:LYS:NZ	1:A:526:ASP:HA	2.19	0.58
1:A:559:THR:HG22	1:A:560:GLN:CG	2.33	0.57
1:A:633:ASN:O	1:A:636:ARG:HB2	2.06	0.56
1:A:485:TYR:H	1:A:485:TYR:HD2	1.52	0.56
1:A:614:GLN:O	1:A:615:TRP:HB2	2.07	0.55
1:A:556:ASN:O	1:A:559:THR:HB	2.06	0.54
1:A:519:SER:C	1:A:521:THR:H	2.10	0.54
1:A:485:TYR:HA	1:A:497:LEU:HA	1.91	0.53
1:A:622:ARG:HG2	1:A:622:ARG:HH11	1.73	0.53
1:A:623:THR:HG22	1:A:623:THR:O	2.09	0.53
1:A:502:GLN:NE2	1:A:517:PHE:H	2.08	0.51
1:A:552:PHE:CD2	1:A:574:LYS:HA	2.47	0.50
1:A:525:ARG:NH1	2:A:648:SO4:S	2.86	0.49
1:A:518:LYS:O	1:A:538:GLY:HA2	2.13	0.48
1:A:578:GLU:HG3	1:A:601:LYS:HG2	1.96	0.48
1:A:537:ASN:HD21	1:A:540:THR:HG22	1.80	0.47
1:A:485:TYR:N	1:A:485:TYR:CD2	2.83	0.46
1:A:640:ASP:HB3	1:A:642:PHE:H	1.83	0.44
1:A:503:CYS:O	1:A:515:CYS:HB3	2.18	0.43
1:A:616:ASN:OD1	1:A:620:LEU:HA	2.18	0.43
1:A:646:ARG:HD2	1:A:646:ARG:HA	1.84	0.43
1:A:485:TYR:HD2	1:A:485:TYR:N	2.14	0.43
1:A:523:LYS:HZ1	1:A:526:ASP:HA	1.84	0.42
1:A:519:SER:O	1:A:521:THR:N	2.51	0.42
1:A:552:PHE:HB3	1:A:574:LYS:HG3	2.01	0.42
1:A:551:ASN:O	1:A:562:CYS:O	2.38	0.42
1:A:640:ASP:CB	1:A:642:PHE:H	2.33	0.41
1:A:591:LYS:C	1:A:593:LEU:H	2.23	0.41
1:A:597:CYS:SG	1:A:609:SER:HA	2.60	0.41
1:A:620:LEU:HB2	1:A:622:ARG:NH1	2.36	0.41
1:A:519:SER:C	1:A:521:THR:N	2.74	0.40
1:A:507:GLN:H	1:A:507:GLN:HG3	1.66	0.40
1:A:616:ASN:C	1:A:618:TYR:N	2.74	0.40

All (12) symmetry-related close contacts are listed below. The label for Atom-2 includes the

symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:512:THR:OG1	1:A:605:SER:OG[33_554]	1.66	0.54
1:A:501:LYS:NZ	1:A:635:PHE:O[10_655]	1.96	0.24
1:A:502:GLN:CD	1:A:635:PHE:CZ[10_655]	1.99	0.21
1:A:525:ARG:CG	1:A:622:ARG:NH2[24_555]	2.03	0.17
1:A:622:ARG:NH2	2:A:648:SO4:O2[24_555]	2.03	0.17
1:A:521:THR:OG1	1:A:602:MET:SD[33_554]	2.07	0.13
1:A:502:GLN:CG	1:A:635:PHE:CE2[10_655]	2.09	0.11
1:A:502:GLN:CG	1:A:635:PHE:CZ[10_655]	2.12	0.08
1:A:600:LYS:CE	1:A:617:LYS:CE[43_655]	2.14	0.06
1:A:622:ARG:NE	2:A:648:SO4:O2[24_555]	2.17	0.03
1:A:499:PRO:CB	1:A:638:TYR:CD2[10_655]	2.18	0.02
1:A:527:ASP:O	1:A:558:HIS:NE2[24_555]	2.18	0.02

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	140/192 (73%)	123 (88%)	13 (9%)	4 (3%)	3 15

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	545	ALA
1	A	546	SER
1	A	520	LYS
1	A	550	PRO

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	128/165 (78%)	121 (94%)	7 (6%)	18 48

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

Mol	Chain	Res	Type
1	A	485	TYR
1	A	515	CYS
1	A	520	LYS
1	A	539	ILE
1	A	609	SER
1	A	615	TRP
1	A	625	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	502	GLN
1	A	507	GLN
1	A	560	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)

2 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
2	SO4	A	647	-	4,4,4	0.37	0	6,6,6	0.12	0
2	SO4	A	648	-	4,4,4	0.39	0	6,6,6	0.12	0

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	648	SO4	1	2

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

Warning: The R factor obtained from EDS is 0.4846, which does not match the depositor's R factor of 0.261. Please interpret the results in this section carefully.

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^{th} 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^2)	Q<0.9
1	A	146/192 (76%)	3.09	114 (78%) 0 0	21, 40, 52, 60	0

All (114) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	611	GLY	10.3
1	A	546	SER	7.8
1	A	536	CYS	7.3
1	A	483	CYS	7.2
1	A	516	ALA	7.1
1	A	534	GLY	6.6
1	A	622	ARG	6.4
1	A	541	ALA	6.4
1	A	503	CYS	6.2
1	A	512	THR	5.6
1	A	535	ILE	5.2
1	A	508	GLY	5.2
1	A	551	ASN	5.2
1	A	525	ARG	4.8
1	A	515	CYS	4.8
1	A	519	SER	4.7
1	A	613	VAL	4.7
1	A	572	CYS	4.6
1	A	556	ASN	4.5
1	A	511	CYS	4.5
1	A	640	ASP	4.5
1	A	500	GLY	4.4
1	A	580	CYS	4.4
1	A	555	CYS	4.3

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Mol	Chain	Res	Type	RSRZ
1	A	561	VAL	4.3
1	A	540	THR	4.3
1	A	513	ALA	4.3
1	A	506	SER	4.2
1	A	524	CYS	4.2
1	A	514	HIS	4.1
1	A	528	SER	4.1
1	A	637	GLY	4.0
1	A	624	ILE	4.0
1	A	526	ASP	4.0
1	A	597	CYS	3.8
1	A	598	CYS	3.7
1	A	616	ASN	3.7
1	A	547	ASP	3.7
1	A	543	CYS	3.6
1	A	594	CYS	3.6
1	A	614	GLN	3.6
1	A	566	GLN	3.5
1	A	505	PRO	3.5
1	A	553	THR	3.4
1	A	527	ASP	3.4
1	A	542	LEU	3.4
1	A	558	HIS	3.4
1	A	538	GLY	3.4
1	A	644	ARG	3.3
1	A	630	SER	3.3
1	A	522	GLU	3.3
1	A	562	CYS	3.3
1	A	608	ALA	3.3
1	A	499	PRO	3.2
1	A	498	LYS	3.2
1	A	591	LYS	3.2
1	A	618	TYR	3.2
1	A	641	VAL	3.2
1	A	520	LYS	3.2
1	A	548	PRO	3.2
1	A	485	TYR	3.1
1	A	595	HIS	3.1
1	A	507	GLN	3.1
1	A	582	CYS	3.1
1	A	607	CYS	3.1
1	A	549	LYS	3.0

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Mol	Chain	Res	Type	RSRZ
1	A	544	PRO	3.0
1	A	510	CYS	3.0
1	A	621	GLY	3.0
1	A	518	LYS	3.0
1	A	532	LYS	2.9
1	A	517	PHE	2.9
1	A	619	PHE	2.9
1	A	560	GLN	2.9
1	A	497	LEU	2.9
1	A	620	LEU	2.9
1	A	563	ILE	2.9
1	A	581	THR	2.8
1	A	623	THR	2.8
1	A	617	LYS	2.8
1	A	545	ALA	2.8
1	A	631	PRO	2.7
1	A	570	SER	2.7
1	A	642	PHE	2.7
1	A	521	THR	2.6
1	A	502	GLN	2.6
1	A	643	MET	2.5
1	A	605	SER	2.5
1	A	567	CYS	2.5
1	A	645	CYS	2.5
1	A	537	ASN	2.5
1	A	612	SER	2.5
1	A	596	VAL	2.5
1	A	628	PRO	2.4
1	A	571	ILE	2.4
1	A	610	THR	2.4
1	A	646	ARG	2.4
1	A	634	ASP	2.4
1	A	615	TRP	2.4
1	A	573	GLU	2.4
1	A	604	PRO	2.4
1	A	539	ILE	2.3
1	A	564	ASN	2.3
1	A	530	CYS	2.3
1	A	638	TYR	2.2
1	A	531	ALA	2.2
1	A	635	PHE	2.2
1	A	632	CYS	2.2

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Mol	Chain	Res	Type	RSRZ
1	A	504	SER	2.1
1	A	559	THR	2.1
1	A	550	PRO	2.1
1	A	496	LYS	2.1
1	A	609	SER	2.0
1	A	552	PHE	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^{th} 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^2)	Q<0.9
2	SO4	A	648	5/5	0.22	0.23	87,87,88,88	0
2	SO4	A	647	5/5	0.55	0.31	61,62,62,63	0

6.5 Other polymers (i)

There are no such residues in this entry.