Full wwPDB X-ray Structure Validation Report (i)

Feb 5, 2024 – 06:13 AM EST

PDB ID	:	8ACN
Title	:	CRYSTAL STRUCTURES OF ACONITASE WITH ISOCITRATE AND NITROISOCITRATE BOUND
Authors	:	Lauble, H.; Kennedy, M.C.; Beinert, H.; Stout, C.D.
Deposited on	:	1991-05-15
Resolution	:	2.00 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:

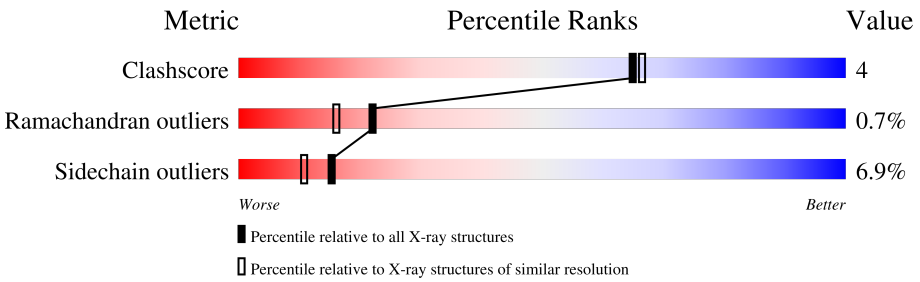
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

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 2.00 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))
Clashscore	141614	9178 (2.00-2.00)
Ramachandran outliers	138981	9054 (2.00-2.00)
Sidechain outliers	138945	9053 (2.00-2.00)

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%

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	754	82% 15% • •

2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 6154 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.

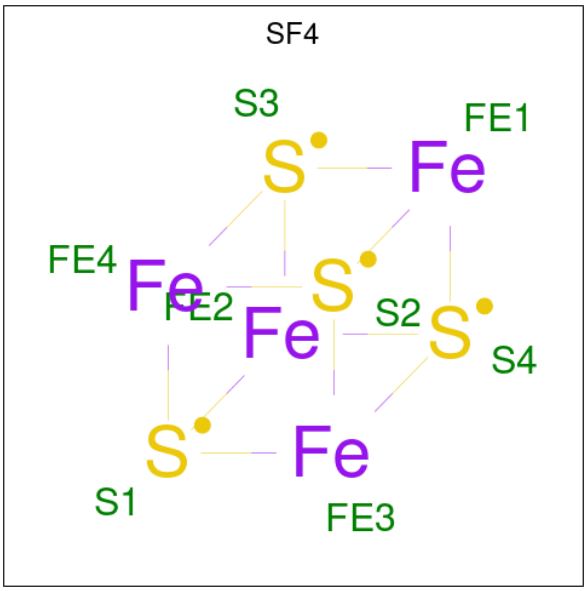
- Molecule 1 is a protein called ACONITASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	753	5812	3663	1031	1096	22	0	0	0

There are 15 discrepancies between the modelled and reference sequences:

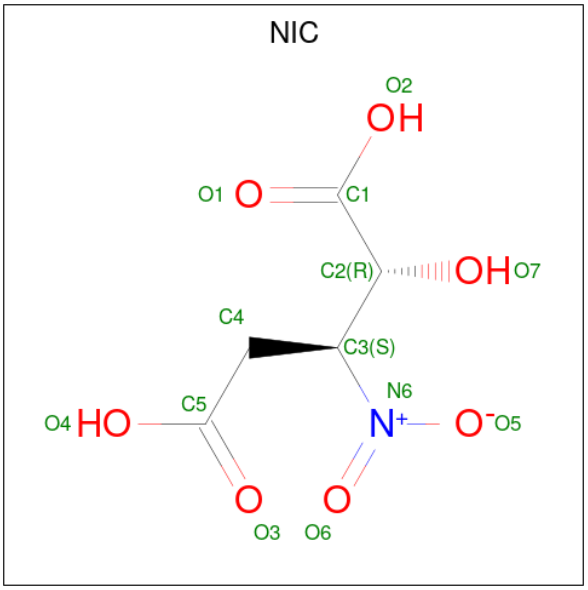
Chain	Residue	Modelled	Actual	Comment	Reference
A	13	HIS	ASN	conflict	UNP P20004
A	26	ASP	ASN	conflict	UNP P20004
A	72	GLN	ARG	conflict	UNP P20004
A	190	MET	THR	conflict	UNP P20004
A	382	LYS	GLN	conflict	UNP P20004
A	408	VAL	ILE	conflict	UNP P20004
A	528	ARG	GLN	conflict	UNP P20004
A	550	LYS	ARG	conflict	UNP P20004
A	597	SER	VAL	conflict	UNP P20004
A	600	ARG	GLY	conflict	UNP P20004
A	625	GLN	LYS	conflict	UNP P20004
A	647	SER	ALA	conflict	UNP P20004
A	653	PHE	HIS	conflict	UNP P20004
A	700	GLN	LYS	conflict	UNP P20004
A	752	GLN	-	insertion	UNP P20004

- Molecule 2 is IRON/SULFUR CLUSTER (three-letter code: SF4) (formula: Fe_4S_4).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	Fe	S		
2	A	1	8	4	4	0	0

- Molecule 3 is NITROISOCITRIC ACID (three-letter code: NIC) (formula: $C_5H_7NO_7$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
3	A	1	13	5	1	7	0	0

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
4	A	321	321	321	0	0

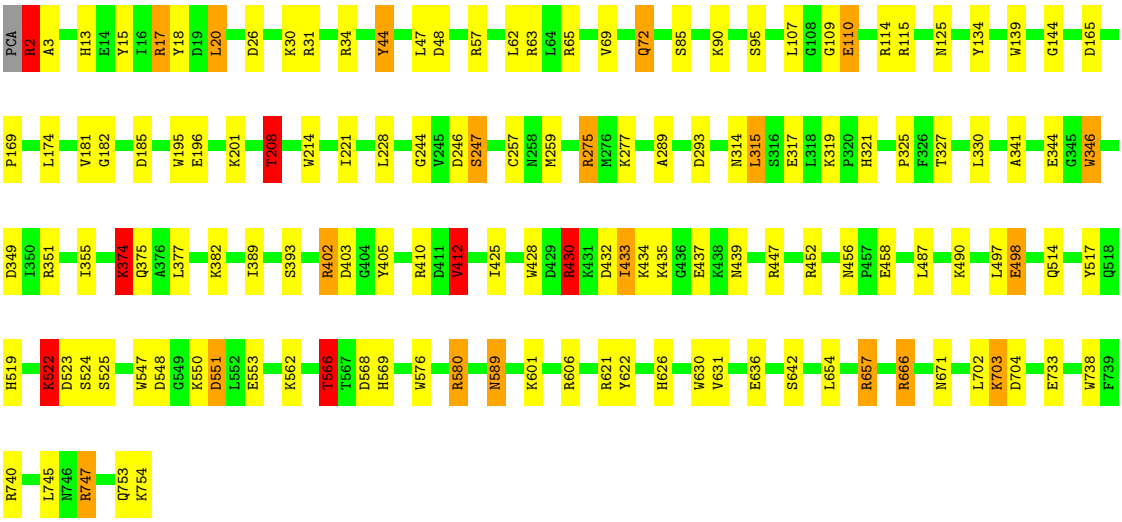
3 Residue-property plots (i)

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. 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.

Note EDS was not executed.

- Molecule 1: ACONITASE

Chain A: 82% 15%



4 Data and refinement statistics (i)

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	B 1 1 2	Depositor
Cell constants a, b, c, α, β, γ	185.50Å 72.00Å 73.00Å 90.00° 90.00° 77.70°	Depositor
Resolution (Å)	(Not available) – 2.00	Depositor
% Data completeness (in resolution range)	(Not available) ((Not available)-2.00)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	X-PLOR	Depositor
R, R_{free}	0.161 , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	6154	wwPDB-VP
Average B, all atoms ($Å^2$)	18.0	wwPDB-VP

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: NIC, SF4

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	0.80	0/5938	1.57	78/8044 (1.0%)

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

There are no bond length outliers.

All (78) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	580	ARG	NE-CZ-NH1	26.99	133.80	120.30
1	A	580	ARG	NE-CZ-NH2	-21.17	109.72	120.30
1	A	410	ARG	NE-CZ-NH1	17.46	129.03	120.30
1	A	402	ARG	NE-CZ-NH2	-16.17	112.21	120.30
1	A	666	ARG	NE-CZ-NH2	-14.52	113.04	120.30
1	A	410	ARG	NE-CZ-NH2	-14.14	113.23	120.30
1	A	430	ARG	NE-CZ-NH2	-13.75	113.42	120.30
1	A	447	ARG	NE-CZ-NH2	-13.11	113.74	120.30
1	A	65	ARG	NE-CZ-NH2	-12.88	113.86	120.30
1	A	666	ARG	NE-CZ-NH1	10.78	125.69	120.30
1	A	402	ARG	NE-CZ-NH1	10.62	125.61	120.30
1	A	65	ARG	NE-CZ-NH1	9.25	124.93	120.30
1	A	325	PRO	CA-C-N	8.98	136.96	117.20
1	A	430	ARG	NE-CZ-NH1	8.97	124.78	120.30
1	A	346	TRP	CD1-CG-CD2	8.90	113.42	106.30
1	A	195	TRP	CD1-CG-CD2	8.66	113.23	106.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	63	ARG	NE-CZ-NH2	-8.57	116.01	120.30
1	A	522	LYS	CA-C-N	-8.50	98.50	117.20
1	A	139	TRP	CD1-CG-CD2	8.36	112.99	106.30
1	A	566	THR	N-CA-CB	-8.28	94.57	110.30
1	A	428	TRP	CD1-CG-CD2	8.16	112.83	106.30
1	A	31	ARG	NE-CZ-NH2	-8.15	116.23	120.30
1	A	275	ARG	NE-CZ-NH1	8.01	124.30	120.30
1	A	630	TRP	CD1-CG-CD2	8.01	112.70	106.30
1	A	405	TYR	CB-CG-CD2	-7.88	116.28	121.00
1	A	606	ARG	NE-CZ-NH2	-7.69	116.45	120.30
1	A	547	TRP	CD1-CG-CD2	7.53	112.33	106.30
1	A	576	TRP	CD1-CG-CD2	7.51	112.31	106.30
1	A	44	TYR	CB-CG-CD2	-7.37	116.58	121.00
1	A	17	ARG	NE-CZ-NH2	-7.33	116.64	120.30
1	A	214	TRP	CD1-CG-CD2	7.32	112.16	106.30
1	A	346	TRP	CE2-CD2-CG	-7.20	101.54	107.30
1	A	428	TRP	CE2-CD2-CG	-7.19	101.55	107.30
1	A	195	TRP	CE2-CD2-CG	-7.14	101.59	107.30
1	A	576	TRP	CE2-CD2-CG	-7.12	101.61	107.30
1	A	214	TRP	CE2-CD2-CG	-7.11	101.61	107.30
1	A	630	TRP	CE2-CD2-CG	-7.02	101.69	107.30
1	A	498	GLU	CA-CB-CG	6.96	128.72	113.40
1	A	547	TRP	CE2-CD2-CG	-6.86	101.81	107.30
1	A	195	TRP	CG-CD1-NE1	-6.81	103.29	110.10
1	A	139	TRP	CE2-CD2-CG	-6.77	101.89	107.30
1	A	747	ARG	NE-CZ-NH2	-6.72	116.94	120.30
1	A	657	ARG	NE-CZ-NH2	-6.60	117.00	120.30
1	A	580	ARG	CG-CD-NE	-6.58	97.97	111.80
1	A	738	TRP	CD1-CG-CD2	6.53	111.53	106.30
1	A	447	ARG	NE-CZ-NH1	6.45	123.53	120.30
1	A	551	ASP	CB-CG-OD1	6.29	123.96	118.30
1	A	115	ARG	NE-CZ-NH2	-6.25	117.18	120.30
1	A	15	TYR	CB-CG-CD2	-6.24	117.25	121.00
1	A	458	GLU	OE1-CD-OE2	-6.22	115.83	123.30
1	A	374	LYS	CA-CB-CG	6.09	126.79	113.40
1	A	208	THR	N-CA-CB	-6.00	98.90	110.30
1	A	412	VAL	CB-CA-C	-5.97	100.06	111.40
1	A	165	ASP	CB-CG-OD2	5.76	123.49	118.30
1	A	630	TRP	CG-CD1-NE1	-5.70	104.40	110.10
1	A	139	TRP	CB-CG-CD1	-5.69	119.60	127.00
1	A	293	ASP	CB-CG-OD1	5.68	123.41	118.30
1	A	548	ASP	CB-CG-OD1	5.65	123.39	118.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	738	TRP	CE2-CD2-CG	-5.60	102.82	107.30
1	A	428	TRP	CG-CD1-NE1	-5.56	104.54	110.10
1	A	48	ASP	CB-CG-OD1	5.53	123.28	118.30
1	A	346	TRP	CG-CD1-NE1	-5.46	104.64	110.10
1	A	351	ARG	NE-CZ-NH2	-5.45	117.57	120.30
1	A	325	PRO	O-C-N	-5.45	113.98	122.70
1	A	452	ARG	NE-CZ-NH1	5.37	122.98	120.30
1	A	139	TRP	CG-CD1-NE1	-5.34	104.76	110.10
1	A	34	ARG	NE-CZ-NH2	-5.31	117.64	120.30
1	A	636	GLU	OE1-CD-OE2	-5.30	116.94	123.30
1	A	139	TRP	CG-CD2-CE3	5.29	138.66	133.90
1	A	740	ARG	NE-CZ-NH1	5.24	122.92	120.30
1	A	452	ARG	NE-CZ-NH2	-5.24	117.68	120.30
1	A	703	LYS	CD-CE-NZ	-5.19	99.76	111.70
1	A	630	TRP	CB-CG-CD1	-5.18	120.27	127.00
1	A	498	GLU	OE1-CD-OE2	-5.16	117.11	123.30
1	A	57	ARG	NE-CZ-NH1	5.14	122.87	120.30
1	A	522	LYS	O-C-N	5.14	130.92	122.70
1	A	18	TYR	CB-CG-CD2	-5.11	117.93	121.00
1	A	2	ARG	CB-CG-CD	5.04	124.72	111.60

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	666	ARG	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	5812	0	5794	48	0
2	A	8	0	0	0	0
3	A	13	0	4	3	0
4	A	321	0	0	2	0
All	All	6154	0	5798	48	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 4.

All (48) 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:430:ARG:HH22	1:A:439:ASN:HD21	1.21	0.84
1:A:430:ARG:HH22	1:A:439:ASN:ND2	1.85	0.74
1:A:13:HIS:HB3	4:A:1198:HOH:O	1.87	0.73
1:A:430:ARG:HD2	1:A:432:ASP:OD1	1.93	0.68
1:A:374:LYS:HD2	1:A:375:GLN:HG3	1.84	0.60
1:A:580:ARG:HH22	3:A:755:NIC:C5	2.14	0.60
1:A:2:ARG:HE	1:A:3:ALA:N	2.00	0.58
1:A:208:THR:HG22	1:A:314:ASN:HA	1.87	0.57
1:A:402:ARG:HD2	1:A:403:ASP:OD1	2.07	0.55
1:A:566:THR:HB	1:A:569:HIS:ND1	2.21	0.55
1:A:85:SER:HB2	1:A:745:LEU:HD21	1.89	0.54
1:A:430:ARG:NH2	1:A:439:ASN:HD21	1.98	0.53
1:A:319:LYS:O	1:A:321:HIS:HD2	1.92	0.52
1:A:182:GLY:HA3	1:A:671:ASN:HD21	1.75	0.52
1:A:246:ASP:O	1:A:275:ARG:NH1	2.44	0.51
1:A:277:LYS:HG3	1:A:289:ALA:HB1	1.95	0.48
1:A:26:ASP:O	1:A:30:LYS:HD3	2.14	0.47
1:A:517:TYR:OH	1:A:519:HIS:HD2	1.97	0.47
1:A:221:ILE:HG12	1:A:259:MET:HB3	1.95	0.47
1:A:642:SER:OG	3:A:755:NIC:H3	2.16	0.46
1:A:377:LEU:HG	1:A:412:VAL:HG13	1.98	0.46
1:A:622:TYR:O	1:A:626:HIS:HD2	1.99	0.45
1:A:144:GLY:HA3	1:A:393:SER:HA	1.99	0.45
1:A:208:THR:O	1:A:315:LEU:HB2	2.18	0.44
1:A:341:ALA:HA	1:A:346:TRP:CE3	2.53	0.43
1:A:275:ARG:NH2	4:A:1055:HOH:O	2.51	0.43
1:A:522:LYS:HE3	1:A:522:LYS:HA	1.99	0.43
1:A:355:ILE:HD13	1:A:355:ILE:HG21	1.81	0.43
1:A:44:TYR:HA	1:A:47:LEU:HG	2.00	0.43
1:A:26:ASP:HB3	1:A:30:LYS:NZ	2.34	0.43
1:A:319:LYS:HE3	1:A:319:LYS:HA	2.00	0.42
1:A:566:THR:CG2	1:A:568:ASP:H	2.33	0.42
1:A:433:ILE:HD13	1:A:456:ASN:HD22	1.84	0.42
1:A:72:GLN:NE2	3:A:755:NIC:H41	2.35	0.42
1:A:110:GLU:O	1:A:114:ARG:HG3	2.20	0.42
1:A:69:VAL:O	1:A:95:SER:HA	2.19	0.42
1:A:621:ARG:HG2	1:A:654:LEU:HD22	2.00	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:17:ARG:HB3	1:A:20:LEU:HB2	2.02	0.41
1:A:181:VAL:HB	1:A:185:ASP:HB2	2.01	0.41
1:A:244:GLY:O	1:A:247:SER:HB3	2.20	0.41
1:A:434:LYS:HG2	1:A:437:GLU:HB2	2.03	0.41
1:A:17:ARG:NH2	1:A:20:LEU:HD23	2.36	0.41
1:A:355:ILE:HD11	1:A:389:ILE:HG12	2.03	0.41
1:A:90:LYS:HD2	1:A:134:TYR:O	2.21	0.40
1:A:551:ASP:CG	1:A:703:LYS:NZ	2.75	0.40
1:A:589:ASN:HD22	1:A:589:ASN:C	2.25	0.40
1:A:62:LEU:O	1:A:196:GLU:HA	2.22	0.40
1:A:169:PRO:O	1:A:257:CYS:HB3	2.22	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	751/754 (100%)	724 (96%)	22 (3%)	5 (1%)	22 16

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	524	SER
1	A	109	GLY
1	A	523	ASP
1	A	525	SER
1	A	753	GLN

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	622/622 (100%)	579 (93%)	43 (7%)	15 11

All (43) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	2	ARG
1	A	20	LEU
1	A	72	GLN
1	A	107	LEU
1	A	110	GLU
1	A	125	ASN
1	A	174	LEU
1	A	201	LYS
1	A	208	THR
1	A	228	LEU
1	A	247	SER
1	A	315	LEU
1	A	317	GLU
1	A	327	THR
1	A	330	LEU
1	A	344	GLU
1	A	349	ASP
1	A	374	LYS
1	A	382	LYS
1	A	412	VAL
1	A	425	ILE
1	A	430	ARG
1	A	433	ILE
1	A	435	LYS
1	A	487	LEU
1	A	490	LYS
1	A	497	LEU
1	A	498	GLU
1	A	514	GLN
1	A	522	LYS

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Mol	Chain	Res	Type
1	A	550	LYS
1	A	553	GLU
1	A	562	LYS
1	A	566	THR
1	A	589	ASN
1	A	601	LYS
1	A	631	VAL
1	A	657	ARG
1	A	702	LEU
1	A	704	ASP
1	A	733	GLU
1	A	747	ARG
1	A	754	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (13) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	9	HIS
1	A	148	GLN
1	A	321	HIS
1	A	439	ASN
1	A	514	GLN
1	A	519	HIS
1	A	536	GLN
1	A	539	GLN
1	A	585	ASN
1	A	589	ASN
1	A	625	GLN
1	A	637	ASN
1	A	671	ASN

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 monosaccharides 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	$\#\|Z\| > 2$
3	NIC	A	755	2	9,12,12	1.73	3 (33%)	9,16,16	2.53	5 (55%)
2	SF4	A	999	4,1,3	0,12,12	-	-	-		

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	NIC	A	755	2	-	2/14/16/16	-
2	SF4	A	999	4,1,3	-	-	0/6/5/5

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	755	NIC	C4-C3	-3.15	1.48	1.53
3	A	755	NIC	C2-C1	2.62	1.56	1.52
3	A	755	NIC	O2-C1	-2.10	1.23	1.30

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	A	755	NIC	C3-C4-C5	-4.60	103.53	112.65
3	A	755	NIC	C4-C3-C2	3.09	119.99	111.42
3	A	755	NIC	O3-C5-C4	2.58	131.08	122.80
3	A	755	NIC	O7-C2-C1	2.54	115.99	110.66

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	A	755	NIC	O4-C5-O3	-2.51	117.04	123.30

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	755	NIC	C2-C3-N6-O6
3	A	755	NIC	C3-C4-C5-O3

There are no ring outliers.

1 monomer is involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	755	NIC	3	0

5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

6 Fit of model and data (i)

6.1 Protein, DNA and RNA chains (i)

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates (i)

EDS was not executed - this section is therefore empty.

6.4 Ligands (i)

EDS was not executed - this section is therefore empty.

6.5 Other polymers (i)

EDS was not executed - this section is therefore empty.