



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 01:33 AM UTC

PDB ID : 1XIH / pdb\_00001xih  
Title : MODES OF BINDING SUBSTRATES AND THEIR ANALOGUES TO THE  
ENZYME D-XYLOSE ISOMERASE  
Authors : Carrell, H.L.; Glusker, J.P.  
Deposited on : 1994-03-07  
Resolution : 1.70 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	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

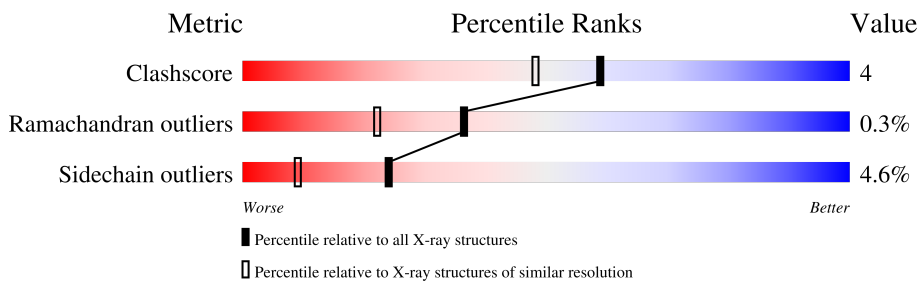
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 1.70 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	190562	5924 (1.70-1.70)
Ramachandran outliers	187476	5846 (1.70-1.70)
Sidechain outliers	187428	5846 (1.70-1.70)

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  $\leq 5\%$ .

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	388	

## 2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 3420 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.

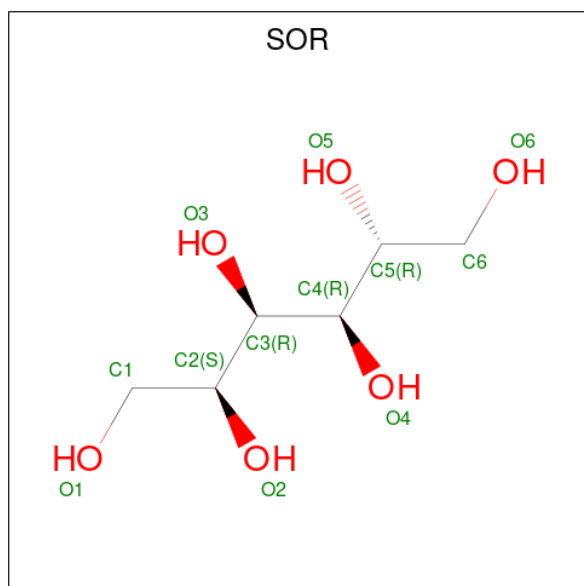
- Molecule 1 is a protein called D-XYLOSE ISOMERASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	385	3032	1906	546	572	8	0	1	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	41	GLN	ARG	conflict	UNP P24300

- Molecule 2 is sorbitol (CCD ID: SOR) (formula:  $C_6H_{14}O_6$ ).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
2	A	1	12	6	6	0	0

- Molecule 3 is MANGANESE (II) ION (CCD ID: MN) (formula: Mn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total 1	Mn 1	0	0

- Molecule 4 is water.

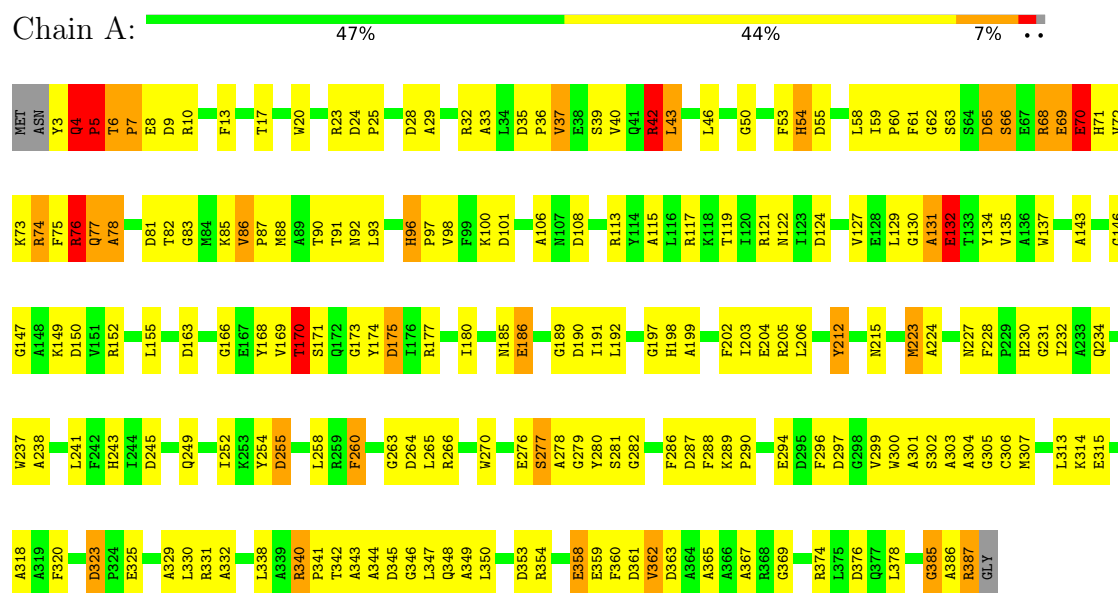
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	375	Total 375	O 375	0	0

### 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: D-XYLOSE ISOMERASE



## 4 Data and refinement statistics

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

Property	Value	Source
Space group	I 2 2 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	93.66Å 100.02Å 102.70Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	12.00 – 1.70	Depositor
% Data completeness (in resolution range)	(Not available) (12.00-1.70)	Depositor
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
Refinement program	PROLSQ	Depositor
R, $R_{free}$	0.158 , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	3420	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	13.0	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: SOR, 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	1.93	121/3112 (3.9%)	2.21	157/4212 (3.7%)

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	20

All (121) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	175	ASP	C-N	-22.75	1.05	1.33
1	A	36	PRO	C-N	17.80	1.55	1.33
1	A	7	PRO	C-N	16.30	1.56	1.33
1	A	119	THR	C-N	14.81	1.52	1.33
1	A	98	VAL	C-N	14.48	1.53	1.33
1	A	17	THR	C-N	14.35	1.49	1.34
1	A	278	ALA	C-N	13.83	1.48	1.33
1	A	255	ASP	C-N	13.19	1.52	1.33
1	A	63	SER	C-N	13.00	1.50	1.33
1	A	386	ALA	C-N	-12.05	1.16	1.33
1	A	28	ASP	C-N	11.00	1.48	1.33
1	A	191	ILE	C-N	10.83	1.47	1.33
1	A	202	PHE	C-N	10.79	1.46	1.33
1	A	143	ALA	C-N	10.78	1.49	1.33
1	A	72	VAL	C-N	10.77	1.48	1.33
1	A	50	GLY	C-N	-10.73	1.20	1.33
1	A	224	ALA	C-N	10.47	1.47	1.33
1	A	152	ARG	C-N	9.78	1.46	1.33

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	338	LEU	C-N	9.17	1.47	1.33
1	A	323	ASP	C-N	9.11	1.45	1.33
1	A	378	LEU	C-N	8.96	1.45	1.33
1	A	6	THR	C-N	8.76	1.42	1.34
1	A	93	LEU	C-N	8.76	1.46	1.33
1	A	361	ASP	C-N	8.73	1.44	1.33
1	A	68	ARG	C-N	-8.70	1.22	1.33
1	A	190	ASP	C-N	8.68	1.45	1.33
1	A	92	ASN	C-N	8.47	1.45	1.33
1	A	61	PHE	C-N	-8.34	1.21	1.33
1	A	113	ARG	C-N	8.20	1.44	1.33
1	A	346	GLY	C-N	7.93	1.44	1.33
1	A	350	LEU	C-N	7.91	1.44	1.34
1	A	252	ILE	C-N	-7.85	1.23	1.33
1	A	129	LEU	C-N	7.81	1.44	1.33
1	A	320	PHE	C-N	7.78	1.44	1.33
1	A	106	ALA	C-N	7.75	1.44	1.33
1	A	42	ARG	C-N	7.72	1.44	1.34
1	A	363	ASP	C-N	7.59	1.44	1.33
1	A	71	HIS	C-N	7.58	1.43	1.33
1	A	332	ALA	C-N	-7.54	1.22	1.33
1	A	353	ASP	C-N	-7.50	1.23	1.33
1	A	205	ARG	C-N	7.46	1.43	1.33
1	A	3	TYR	C-N	-7.40	1.21	1.33
1	A	73	LYS	C-N	-7.32	1.24	1.33
1	A	223	MET	C-N	7.31	1.44	1.33
1	A	124	ASP	C-N	7.30	1.43	1.33
1	A	254	TYR	C-N	7.26	1.43	1.33
1	A	374	ARG	C-N	7.26	1.43	1.33
1	A	290	PRO	C-N	7.18	1.43	1.33
1	A	171	SER	C-N	7.17	1.44	1.33
1	A	82	THR	C-N	7.06	1.43	1.33
1	A	146	GLY	C-N	7.02	1.45	1.33
1	A	131	ALA	C-N	-7.00	1.24	1.33
1	A	304	ALA	C-N	6.99	1.42	1.33
1	A	70	GLU	C-N	6.95	1.43	1.33
1	A	281	SER	C-N	6.92	1.43	1.33
1	A	135	VAL	C-N	6.90	1.43	1.33
1	A	155	LEU	C-N	6.77	1.42	1.33
1	A	241	LEU	C-N	6.74	1.44	1.33
1	A	8	GLU	C-N	6.69	1.43	1.33
1	A	5	PRO	C-N	-6.63	1.24	1.32

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	65	ASP	C-N	6.62	1.43	1.33
1	A	331	ARG	C-N	-6.59	1.25	1.33
1	A	204	GLU	C-N	6.54	1.43	1.33
1	A	227	ASN	C-N	6.45	1.43	1.33
1	A	100	LYS	C-N	6.42	1.42	1.33
1	A	282	GLY	C-N	6.40	1.42	1.33
1	A	215	ASN	C-N	-6.39	1.25	1.33
1	A	35	ASP	C-N	6.35	1.48	1.33
1	A	101	ASP	C-N	6.34	1.40	1.32
1	A	25	PRO	C-N	6.29	1.42	1.33
1	A	127	VAL	C-N	-6.29	1.25	1.33
1	A	342	THR	C-N	6.29	1.42	1.33
1	A	121	ARG	C-N	6.20	1.43	1.33
1	A	115	ALA	C-N	6.19	1.42	1.33
1	A	230	HIS	C-N	6.19	1.41	1.33
1	A	59	ILE	C-N	6.15	1.40	1.33
1	A	130	GLY	C-N	6.12	1.41	1.33
1	A	288	PHE	C-N	-6.04	1.26	1.33
1	A	294	GLU	C-N	6.01	1.43	1.33
1	A	173	GLY	C-N	-5.97	1.25	1.33
1	A	345	ASP	C-N	-5.96	1.24	1.33
1	A	132	GLU	C-N	5.93	1.42	1.33
1	A	150	ASP	C-N	5.90	1.41	1.33
1	A	74	ARG	C-N	5.88	1.41	1.33
1	A	354	ARG	C-N	5.87	1.42	1.33
1	A	359	GLU	C-N	5.85	1.41	1.33
1	A	329	ALA	C-N	5.84	1.41	1.33
1	A	234	GLN	C-N	5.76	1.41	1.33
1	A	243	HIS	C-N	-5.76	1.26	1.33
1	A	238	ALA	C-N	-5.74	1.26	1.33
1	A	302	SER	C-N	5.73	1.41	1.34
1	A	279	GLY	C-N	5.72	1.41	1.33
1	A	344	ALA	C-N	5.63	1.41	1.33
1	A	54	HIS	C-N	5.63	1.41	1.33
1	A	341	PRO	C-N	5.59	1.42	1.33
1	A	199	ALA	C-N	5.57	1.41	1.33
1	A	87	PRO	C-N	5.52	1.40	1.33
1	A	306	CYS	C-N	-5.51	1.26	1.33
1	A	280	TYR	C-N	5.46	1.41	1.33
1	A	83	GLY	C-N	5.46	1.40	1.33
1	A	315	GLU	C-N	5.41	1.41	1.33
1	A	134	TYR	C-N	5.41	1.49	1.33

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	197	GLY	C-N	5.39	1.40	1.33
1	A	62	GLY	C-N	-5.35	1.26	1.33
1	A	348	GLN	C-N	5.34	1.41	1.33
1	A	365	ALA	C-N	5.30	1.41	1.34
1	A	108	ASP	C-N	5.30	1.40	1.33
1	A	189	GLY	C-N	-5.27	1.25	1.33
1	A	270	TRP	C-N	5.25	1.41	1.33
1	A	150	ASP	CA-CB	5.19	1.60	1.53
1	A	77	GLN	C-N	5.14	1.41	1.34
1	A	13	PHE	C-N	5.12	1.41	1.33
1	A	349	ALA	C-N	5.11	1.40	1.33
1	A	212	TYR	C-N	5.10	1.42	1.33
1	A	4	GLN	C-N	-5.09	1.26	1.33
1	A	237	TRP	C-N	5.08	1.41	1.33
1	A	264	ASP	C-N	-5.08	1.27	1.33
1	A	307	MET	C-N	5.04	1.40	1.33
1	A	258	LEU	C-N	-5.02	1.26	1.33
1	A	376	ASP	C-N	5.02	1.40	1.34
1	A	29	ALA	C-N	-5.00	1.26	1.33

All (157) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	340	ARG	CD-NE-CZ	28.00	163.60	124.40
1	A	7	PRO	CA-C-N	15.53	142.34	120.29
1	A	7	PRO	C-N-CA	15.53	142.34	120.29
1	A	7	PRO	O-C-N	-12.64	101.07	122.17
1	A	387	ARG	CD-NE-CZ	11.99	141.18	124.40
1	A	387	ARG	CA-C-O	11.08	139.64	120.80
1	A	173	GLY	O-C-N	-9.91	110.03	122.32
1	A	8	GLU	O-C-N	-9.86	110.91	122.15
1	A	315	GLU	O-C-N	-9.69	112.09	122.07
1	A	359	GLU	O-C-N	9.24	134.92	122.26
1	A	280	TYR	CA-C-N	-8.88	108.69	122.37
1	A	280	TYR	C-N-CA	-8.88	108.69	122.37
1	A	163	ASP	O-C-N	-8.87	112.94	122.07
1	A	69	GLU	O-C-N	-8.81	112.10	122.15
1	A	265	LEU	CA-C-O	-8.35	111.61	120.63
1	A	5	PRO	CA-C-N	-8.19	112.17	123.96
1	A	5	PRO	C-N-CA	-8.19	112.17	123.96
1	A	243	HIS	CA-C-O	-8.17	112.72	121.38
1	A	353	ASP	CA-C-N	8.06	133.49	120.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	353	ASP	C-N-CA	8.06	133.49	120.60
1	A	69	GLU	CA-C-N	7.94	131.25	120.38
1	A	69	GLU	C-N-CA	7.94	131.25	120.38
1	A	342	THR	CA-C-N	-7.80	106.63	121.54
1	A	342	THR	C-N-CA	-7.80	106.63	121.54
1	A	260	PHE	CA-C-N	7.40	133.67	122.86
1	A	260	PHE	C-N-CA	7.40	133.67	122.86
1	A	303	ALA	O-C-N	-7.37	113.60	122.22
1	A	190	ASP	O-C-N	7.33	132.21	123.27
1	A	279	GLY	O-C-N	-7.28	115.11	122.54
1	A	146	GLY	O-C-N	-7.16	114.47	122.28
1	A	60	PRO	O-C-N	7.15	131.57	122.85
1	A	359	GLU	CA-C-N	-7.09	111.36	121.50
1	A	359	GLU	C-N-CA	-7.09	111.36	121.50
1	A	276	GLU	CA-C-N	-7.05	109.25	121.66
1	A	276	GLU	C-N-CA	-7.05	109.25	121.66
1	A	149	LYS	CA-C-N	-7.00	112.85	122.30
1	A	149	LYS	C-N-CA	-7.00	112.85	122.30
1	A	66	SER	O-C-N	-6.97	113.16	122.23
1	A	171	SER	O-C-N	-6.97	113.00	122.33
1	A	318	ALA	O-C-N	-6.93	114.78	122.12
1	A	76	ARG	NE-CZ-NH2	-6.88	113.01	119.20
1	A	367	ALA	CA-C-N	-6.82	111.74	121.50
1	A	367	ALA	C-N-CA	-6.82	111.74	121.50
1	A	300	TRP	O-C-N	-6.78	114.28	122.22
1	A	71	HIS	O-C-N	6.74	129.83	122.15
1	A	190	ASP	CA-C-N	-6.69	114.47	123.10
1	A	190	ASP	C-N-CA	-6.69	114.47	123.10
1	A	46	LEU	CA-C-N	-6.68	112.81	122.29
1	A	46	LEU	C-N-CA	-6.68	112.81	122.29
1	A	71	HIS	CA-C-N	-6.62	111.39	120.46
1	A	71	HIS	C-N-CA	-6.62	111.39	120.46
1	A	330	LEU	O-C-N	-6.61	115.12	122.12
1	A	86	VAL	CA-C-N	-6.58	112.99	119.64
1	A	86	VAL	C-N-CA	-6.58	112.99	119.64
1	A	343	ALA	CA-C-N	-6.56	108.82	121.94
1	A	343	ALA	C-N-CA	-6.56	108.82	121.94
1	A	301	ALA	O-C-N	6.54	129.61	122.15
1	A	3	TYR	CA-C-N	6.52	132.00	121.83
1	A	3	TYR	C-N-CA	6.52	132.00	121.83
1	A	332	ALA	CA-C-O	-6.52	113.64	120.55
1	A	358	GLU	O-C-N	-6.49	114.62	122.22

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	315	GLU	CA-C-N	6.48	129.26	120.38
1	A	315	GLU	C-N-CA	6.48	129.26	120.38
1	A	245	ASP	O-C-N	6.37	130.81	123.29
1	A	119	THR	O-C-N	-6.34	115.54	122.07
1	A	314	LYS	CA-C-N	-6.30	112.25	120.44
1	A	314	LYS	C-N-CA	-6.30	112.25	120.44
1	A	180	ILE	CA-C-N	-6.26	111.20	122.28
1	A	180	ILE	C-N-CA	-6.26	111.20	122.28
1	A	174	TYR	CA-C-N	-6.21	112.41	122.34
1	A	174	TYR	C-N-CA	-6.21	112.41	122.34
1	A	59	ILE	CA-C-N	6.18	126.54	119.93
1	A	59	ILE	C-N-CA	6.18	126.54	119.93
1	A	358	GLU	N-CA-C	-6.15	104.63	111.71
1	A	349	ALA	O-C-N	6.13	128.62	122.12
1	A	263	GLY	CA-C-O	6.10	126.02	120.53
1	A	122	ASN	CA-CB-CG	-6.10	106.50	112.60
1	A	4	GLN	CA-C-O	6.04	126.09	119.32
1	A	117	ARG	NE-CZ-NH2	-6.03	113.78	119.20
1	A	88	MET	O-C-N	5.97	130.39	123.41
1	A	266	ARG	CD-NE-CZ	5.97	132.76	124.40
1	A	180	ILE	O-C-N	5.96	129.74	122.95
1	A	24	ASP	CA-CB-CG	5.95	118.55	112.60
1	A	119	THR	CA-C-O	5.94	127.06	120.82
1	A	362	VAL	CA-C-N	5.92	128.69	120.29
1	A	362	VAL	C-N-CA	5.92	128.69	120.29
1	A	325	GLU	O-C-N	5.91	128.89	122.15
1	A	318	ALA	CA-C-O	5.89	126.79	120.55
1	A	50	GLY	CA-C-O	-5.79	115.91	121.41
1	A	132	GLU	N-CA-CB	-5.77	102.04	110.47
1	A	255	ASP	O-C-N	5.75	130.09	123.02
1	A	171	SER	CA-C-O	5.74	126.57	119.79
1	A	297	ASP	CA-C-N	5.69	126.30	119.98
1	A	297	ASP	C-N-CA	5.69	126.30	119.98
1	A	98	VAL	O-C-N	-5.68	116.13	121.87
1	A	367	ALA	O-C-N	5.67	130.70	122.43
1	A	206	LEU	CA-C-N	-5.66	112.70	120.28
1	A	206	LEU	C-N-CA	-5.66	112.70	120.28
1	A	61	PHE	CA-C-O	-5.63	114.82	120.96
1	A	191	ILE	O-C-N	-5.62	117.40	123.14
1	A	306	CYS	CA-C-N	5.61	127.79	120.28
1	A	306	CYS	C-N-CA	5.61	127.79	120.28
1	A	198	HIS	CA-C-O	-5.57	114.97	120.82

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	170	THR	O-C-N	-5.56	114.84	122.46
1	A	385	GLY	N-CA-C	-5.56	106.52	115.08
1	A	96	HIS	CA-C-N	5.56	125.40	119.28
1	A	96	HIS	C-N-CA	5.56	125.40	119.28
1	A	3	TYR	O-C-N	-5.55	114.12	123.00
1	A	344	ALA	O-C-N	5.55	130.60	122.39
1	A	42	ARG	CA-C-O	5.50	126.25	120.42
1	A	70	GLU	O-C-N	5.49	127.94	122.12
1	A	78	ALA	CA-C-O	5.48	126.27	119.97
1	A	132	GLU	N-CA-C	-5.46	106.75	113.41
1	A	305	GLY	N-CA-C	-5.46	106.05	113.37
1	A	28	ASP	O-C-N	5.45	129.05	122.94
1	A	6	THR	O-C-N	-5.42	116.71	121.32
1	A	147	GLY	N-CA-C	-5.41	107.22	115.66
1	A	202	PHE	CA-C-N	-5.39	111.45	120.30
1	A	202	PHE	C-N-CA	-5.39	111.45	120.30
1	A	288	PHE	O-C-N	-5.39	116.64	123.17
1	A	203	ILE	O-C-N	5.38	127.88	121.80
1	A	264	ASP	CA-C-N	5.38	127.75	120.38
1	A	264	ASP	C-N-CA	5.38	127.75	120.38
1	A	294	GLU	CA-C-N	-5.38	112.65	122.12
1	A	294	GLU	C-N-CA	-5.38	112.65	122.12
1	A	76	ARG	CA-C-N	-5.38	112.53	120.28
1	A	76	ARG	C-N-CA	-5.38	112.53	120.28
1	A	369	GLY	O-C-N	-5.37	117.31	122.84
1	A	192	LEU	CA-C-O	-5.33	115.75	121.56
1	A	137	TRP	CA-C-N	-5.33	110.96	121.41
1	A	137	TRP	C-N-CA	-5.33	110.96	121.41
1	A	40	VAL	O-C-N	-5.32	116.69	121.91
1	A	5	PRO	O-C-N	5.30	129.57	123.06
1	A	231	GLY	CA-C-N	-5.29	112.91	120.42
1	A	231	GLY	C-N-CA	-5.29	112.91	120.42
1	A	191	ILE	CA-C-O	5.28	126.74	120.72
1	A	342	THR	O-C-N	5.27	129.39	122.33
1	A	13	PHE	CA-C-N	-5.23	115.31	120.60
1	A	13	PHE	C-N-CA	-5.23	115.31	120.60
1	A	132	GLU	O-C-N	-5.21	114.96	122.36
1	A	143	ALA	O-C-N	5.19	128.60	123.46
1	A	331	ARG	CA-C-O	-5.19	114.92	120.42
1	A	279	GLY	CA-C-O	5.15	125.69	119.82
1	A	90	THR	O-C-N	-5.15	117.91	123.42
1	A	277	SER	O-C-N	-5.14	115.41	122.46

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	33	ALA	CA-C-N	-5.14	113.28	122.07
1	A	33	ALA	C-N-CA	-5.14	113.28	122.07
1	A	61	PHE	CA-C-N	5.13	130.67	122.25
1	A	61	PHE	C-N-CA	5.13	130.67	122.25
1	A	353	ASP	O-C-N	-5.09	115.75	122.57
1	A	134	TYR	O-C-N	-5.09	116.41	123.12
1	A	258	LEU	CA-C-N	-5.07	113.10	120.75
1	A	258	LEU	C-N-CA	-5.07	113.10	120.75
1	A	323	ASP	CA-CB-CG	5.04	117.64	112.60
1	A	174	TYR	O-C-N	5.04	128.96	123.01
1	A	168	TYR	CA-C-O	5.04	126.11	120.82
1	A	260	PHE	CA-CB-CG	-5.01	108.79	113.80

There are no chirality outliers.

All (20) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	132	GLU	Mainchain
1	A	170	THR	Mainchain
1	A	177	ARG	Mainchain
1	A	223	MET	Mainchain
1	A	249	GLN	Mainchain
1	A	260	PHE	Mainchain
1	A	277	SER	Mainchain
1	A	286	PHE	Mainchain
1	A	287	ASP	Mainchain
1	A	299	VAL	Mainchain
1	A	358	GLU	Mainchain
1	A	385	GLY	Mainchain
1	A	5	PRO	Mainchain
1	A	53	PHE	Peptide
1	A	6	THR	Mainchain
1	A	65	ASP	Mainchain
1	A	68	ARG	Mainchain
1	A	69	GLU	Mainchain
1	A	7	PRO	Mainchain
1	A	85	LYS	Mainchain

## 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	3032	0	2896	26	0
2	A	12	0	11	0	0
3	A	1	0	0	0	0
4	A	375	0	0	7	0
All	All	3420	0	2907	26	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 (26) 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:42:ARG:HA	1:A:42:ARG:HE	1.62	0.64
1:A:340:ARG:HD2	4:A:637:HOH:O	2.00	0.61
1:A:96:HIS:ND1	1:A:97:PRO:HD2	2.22	0.55
1:A:289:LYS:HE2	4:A:727:HOH:O	2.07	0.54
1:A:58:LEU:HD11	1:A:75:PHE:CG	2.44	0.52
1:A:360:PHE:CD2	1:A:362:VAL:HG12	2.45	0.52
1:A:37:VAL:HB	1:A:78:ALA:HB2	1.93	0.50
1:A:185:ASN:HD22	1:A:186:GLU:HB2	1.79	0.48
1:A:54:HIS:O	1:A:55:ASP:C	2.57	0.47
1:A:4:GLN:HE21	1:A:5:PRO:HD2	1.81	0.46
1:A:212:TYR:HB3	4:A:739:HOH:O	2.13	0.46
1:A:20:TRP:CE3	1:A:289:LYS:HB3	2.51	0.46
1:A:76:ARG:HD3	4:A:770:HOH:O	2.17	0.45
1:A:10:ARG:NH1	4:A:741:HOH:O	2.49	0.44
1:A:186:GLU:OE1	1:A:255:ASP:OD1	2.36	0.44
1:A:387:ARG:HD2	4:A:684:HOH:O	2.18	0.44
1:A:70:GLU:O	1:A:74:ARG:HG3	2.17	0.43
1:A:323:ASP:OD2	1:A:387:ARG:NH2	2.50	0.43
1:A:289:LYS:HE2	4:A:695:HOH:O	2.18	0.43
1:A:228:PHE:CZ	1:A:232:ILE:HD11	2.53	0.43
1:A:32:ARG:HG2	1:A:296:PHE:HE2	1.84	0.43
1:A:77:GLN:NE2	1:A:81:ASP:OD1	2.52	0.43
1:A:86:VAL:O	1:A:131:ALA:HA	2.19	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:39:SER:O	1:A:43:LEU:HB2	2.20	0.41
1:A:9:ASP:O	1:A:10:ARG:HB2	2.20	0.40
1:A:166:GLY:O	1:A:170:THR:HG23	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	384/388 (99%)	370 (96%)	13 (3%)	1 (0%)	36 22

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	186	GLU

### 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	303/304 (100%)	289 (95%)	14 (5%)	24 9

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



Mol	Chain	Res	Type
1	A	4	GLN
1	A	23	ARG
1	A	37	VAL
1	A	42	ARG
1	A	43	LEU
1	A	66	SER
1	A	70	GLU
1	A	76	ARG
1	A	91	THR
1	A	132	GLU
1	A	169	VAL
1	A	175	ASP
1	A	313	LEU
1	A	347	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	4	GLN
1	A	49	HIS
1	A	71	HIS
1	A	185	ASN
1	A	348	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 2 ligands modelled in this entry, 1 is monoatomic - leaving 1 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$
2	SOR	A	389	3	11,11,11	0.90	1 (9%)	14,14,14	1.86	3 (21%)

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
2	SOR	A	389	3	-	2/16/16/16	-

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	389	SOR	O1-C1	-2.39	1.32	1.42

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	389	SOR	O5-C5-C6	-4.50	98.79	109.03
2	A	389	SOR	O6-C6-C5	-3.84	103.10	111.16
2	A	389	SOR	O1-C1-C2	-2.11	106.73	111.16

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	389	SOR	C4-C5-C6-O6
2	A	389	SOR	O5-C5-C6-O6

There are no ring outliers.

No monomer is involved in short contacts.

## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
1	A	3

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	A	50:GLY	C	51:VAL	N	1.20
1	A	386:ALA	C	387:ARG	N	1.16
1	A	175:ASP	C	176:ILE	N	1.05

## 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.