Full wwPDB X-ray Structure Validation Report (i)

Aug 8, 2023 – 04:40 AM EDT

PDB ID	:	1NSX
Title	:	Crystal structure of galactose mutarotase from Lactococcus lactis mutant H170N complexed with galactose
Authors	:	Holden, H.M.; Thoden, J.B.
Deposited on	:	2003-01-28
Resolution	:	1.75 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:

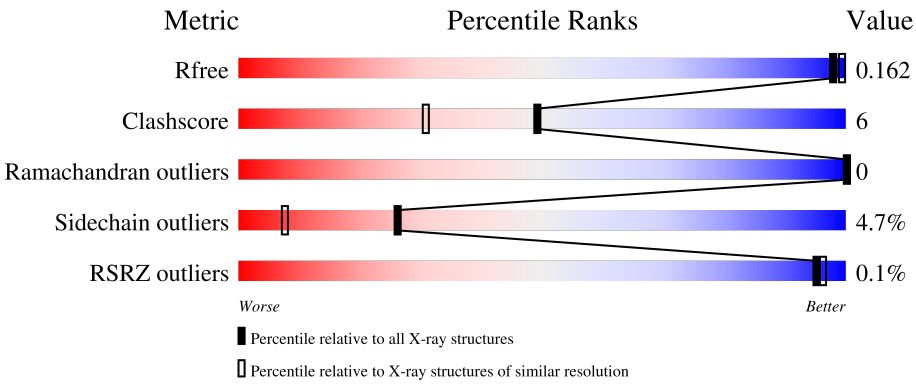
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.35
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.35

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 1.75 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}	130704	2340 (1.76-1.76)
Clashscore	141614	2466 (1.76-1.76)
Ramachandran outliers	138981	2437 (1.76-1.76)
Sidechain outliers	138945	2437 (1.76-1.76)
RSRZ outliers	127900	2298 (1.76-1.76)

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% 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	347	69% 24% • •
1	B	347	75% 22% • •

2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 5849 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.

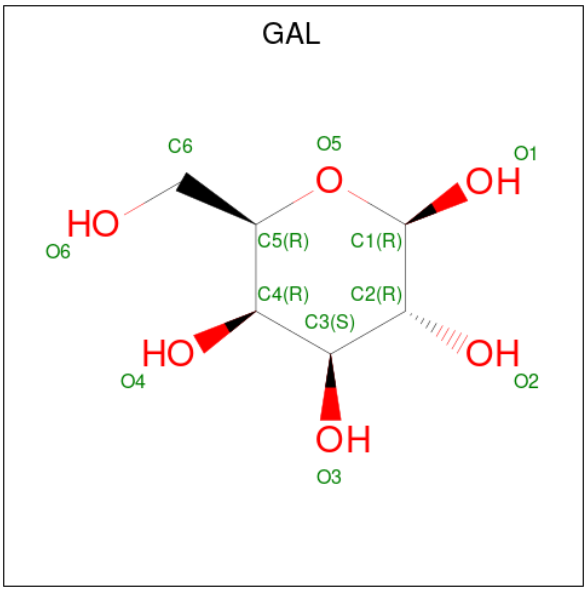
- Molecule 1 is a protein called GALACTOSE MUTAROTASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	339	2649	1670	446	530	3	0	2	0
1	B	346	2725	1715	465	542	3	0	2	0

There are 20 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	2	SER	GLU	cloning artifact	UNP Q9ZB17
A	170	ASN	HIS	engineered mutation	UNP Q9ZB17
A	340	LEU	-	expression tag	UNP Q9ZB17
A	341	GLU	-	expression tag	UNP Q9ZB17
A	342	HIS	-	expression tag	UNP Q9ZB17
A	343	HIS	-	expression tag	UNP Q9ZB17
A	344	HIS	-	expression tag	UNP Q9ZB17
A	345	HIS	-	expression tag	UNP Q9ZB17
A	346	HIS	-	expression tag	UNP Q9ZB17
A	347	HIS	-	expression tag	UNP Q9ZB17
B	2	SER	GLU	cloning artifact	UNP Q9ZB17
B	170	ASN	HIS	engineered mutation	UNP Q9ZB17
B	340	LEU	-	expression tag	UNP Q9ZB17
B	341	GLU	-	expression tag	UNP Q9ZB17
B	342	HIS	-	expression tag	UNP Q9ZB17
B	343	HIS	-	expression tag	UNP Q9ZB17
B	344	HIS	-	expression tag	UNP Q9ZB17
B	345	HIS	-	expression tag	UNP Q9ZB17
B	346	HIS	-	expression tag	UNP Q9ZB17
B	347	HIS	-	expression tag	UNP Q9ZB17

- Molecule 2 is beta-D-galactopyranose (three-letter code: GAL) (formula: $C_6H_{12}O_6$).



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

- Molecule 3 is SODIUM ION (three-letter code: NA) (formula: Na).

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

- Molecule 4 is water.

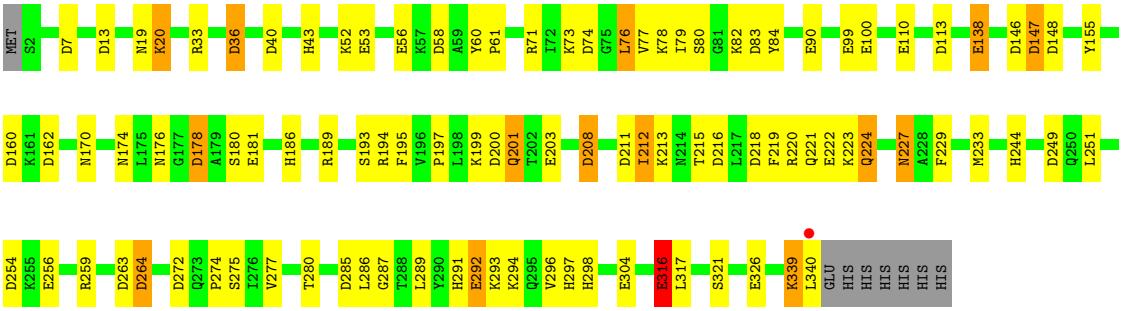
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
4	A	209	209	209	0	0
			Total	O		
4	B	241	241	241	0	0

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.

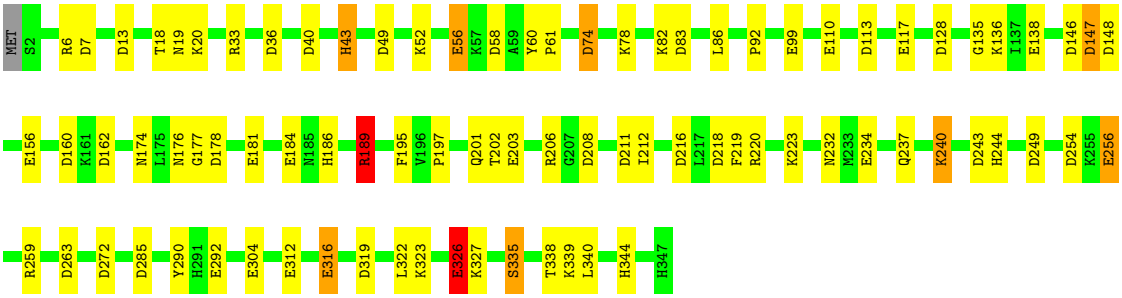
- Molecule 1: GALACTOSE MUTAROTASE

Chain A:



- Molecule 1: GALACTOSE MUTAROTASE

Chain B:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	44.90Å 76.40Å 211.40Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	30.00 – 1.75 71.85 – 1.73	Depositor EDS
% Data completeness (in resolution range)	98.1 (30.00-1.75) 96.8 (71.85-1.73)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.04	Depositor
$< I/\sigma(I) >$ [1]	3.14 (at 1.73Å)	Xtriage
Refinement program	TNT	Depositor
R, R_{free}	0.166 , 0.217 0.160 , 0.162	Depositor DCC
R_{free} test set	7555 reflections (10.04%)	wwPDB-VP
Wilson B-factor (Å^2)	18.7	Xtriage
Anisotropy	0.278	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.31 , 93.6	EDS
L-test for twinning[2]	$< \|L\| > = 0.48$, $< L^2 > = 0.30$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.98	EDS
Total number of atoms	5849	wwPDB-VP
Average B, all atoms (Å^2)	30.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.42% 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 (i)

5.1 Standard geometry (i)

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

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	0.95	13/2708 (0.5%)	1.53	56/3665 (1.5%)
1	B	0.98	19/2790 (0.7%)	1.51	61/3775 (1.6%)
All	All	0.96	32/5498 (0.6%)	1.52	117/7440 (1.6%)

All (32) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	100	GLU	CD-OE2	7.83	1.34	1.25
1	B	292	GLU	CD-OE2	7.48	1.33	1.25
1	A	292	GLU	CD-OE2	7.38	1.33	1.25
1	A	99	GLU	CD-OE2	6.95	1.33	1.25
1	B	99	GLU	CD-OE2	6.89	1.33	1.25
1	A	316	GLU	CD-OE2	6.76	1.33	1.25
1	B	304	GLU	CD-OE1	-6.68	1.18	1.25
1	B	56	GLU	CD-OE2	5.99	1.32	1.25
1	B	234	GLU	CD-OE2	5.98	1.32	1.25
1	A	326	GLU	CD-OE2	5.96	1.32	1.25
1	B	256	GLU	CD-OE2	5.92	1.32	1.25
1	A	90	GLU	CD-OE2	5.92	1.32	1.25
1	B	138	GLU	CD-OE2	5.83	1.32	1.25
1	B	312	GLU	CD-OE2	5.80	1.32	1.25
1	A	181	GLU	CD-OE2	5.78	1.32	1.25
1	B	316[A]	GLU	CD-OE2	5.69	1.31	1.25
1	B	316[B]	GLU	CD-OE2	5.69	1.31	1.25
1	B	203	GLU	CD-OE2	5.63	1.31	1.25
1	A	222	GLU	CD-OE2	5.54	1.31	1.25
1	B	110	GLU	CD-OE2	5.47	1.31	1.25
1	A	56	GLU	CD-OE2	5.40	1.31	1.25
1	B	181	GLU	CD-OE2	5.40	1.31	1.25
1	B	326[A]	GLU	CD-OE2	5.36	1.31	1.25
1	B	326[B]	GLU	CD-OE2	5.36	1.31	1.25

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	110	GLU	CD-OE2	5.29	1.31	1.25
1	B	304	GLU	CD-OE2	5.22	1.31	1.25
1	B	156	GLU	CD-OE2	5.21	1.31	1.25
1	B	117	GLU	CD-OE2	5.15	1.31	1.25
1	A	256	GLU	CD-OE2	5.11	1.31	1.25
1	B	184	GLU	CD-OE2	5.01	1.31	1.25
1	A	138	GLU	CD-OE2	5.00	1.31	1.25
1	A	53	GLU	CD-OE2	5.00	1.31	1.25

All (117) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	147	ASP	CB-CG-OD2	-11.31	108.12	118.30
1	A	147	ASP	CB-CG-OD2	-9.93	109.37	118.30
1	B	249	ASP	CB-CG-OD2	-9.85	109.44	118.30
1	B	259	ARG	NE-CZ-NH1	9.71	125.16	120.30
1	B	146	ASP	CB-CG-OD1	9.52	126.87	118.30
1	B	249	ASP	CB-CG-OD1	9.34	126.70	118.30
1	B	36	ASP	CB-CG-OD2	-9.31	109.92	118.30
1	A	71	ARG	NE-CZ-NH2	-9.13	115.73	120.30
1	A	194	ARG	NE-CZ-NH1	9.12	124.86	120.30
1	B	6	ARG	NE-CZ-NH1	8.88	124.74	120.30
1	A	7	ASP	CB-CG-OD2	-8.76	110.42	118.30
1	B	272	ASP	CB-CG-OD2	-8.69	110.48	118.30
1	B	206	ARG	NE-CZ-NH1	8.65	124.63	120.30
1	A	71	ARG	NE-CZ-NH1	8.60	124.60	120.30
1	B	147	ASP	CB-CG-OD1	8.50	125.95	118.30
1	B	40	ASP	CB-CG-OD1	8.47	125.93	118.30
1	B	36	ASP	CB-CG-OD1	8.34	125.81	118.30
1	A	194	ARG	NE-CZ-NH2	-8.33	116.13	120.30
1	A	249	ASP	CB-CG-OD2	-8.27	110.86	118.30
1	B	113	ASP	CB-CG-OD2	-8.26	110.87	118.30
1	A	208	ASP	CB-CG-OD1	8.16	125.64	118.30
1	A	113	ASP	CB-CG-OD2	-8.15	110.97	118.30
1	A	147	ASP	CB-CG-OD1	7.94	125.44	118.30
1	A	146	ASP	CB-CG-OD2	-7.87	111.22	118.30
1	B	272	ASP	CB-CG-OD1	7.84	125.36	118.30
1	A	146	ASP	CB-CG-OD1	7.79	125.31	118.30
1	B	254	ASP	CB-CG-OD1	7.72	125.24	118.30
1	A	218	ASP	CB-CG-OD2	-7.65	111.41	118.30
1	A	264	ASP	CB-CG-OD1	7.60	125.14	118.30
1	B	263	ASP	CB-CG-OD1	7.55	125.10	118.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	155	TYR	CB-CG-CD1	7.47	125.48	121.00
1	A	162	ASP	CB-CG-OD1	7.37	124.94	118.30
1	A	160	ASP	CB-CG-OD2	-7.35	111.69	118.30
1	B	162	ASP	CB-CG-OD1	7.24	124.81	118.30
1	A	218	ASP	CB-CG-OD1	7.17	124.75	118.30
1	A	7	ASP	CB-CG-OD1	7.10	124.69	118.30
1	B	128	ASP	CB-CG-OD1	7.07	124.66	118.30
1	A	113	ASP	CB-CG-OD1	7.05	124.65	118.30
1	A	155	TYR	CB-CG-CD2	-7.00	116.80	121.00
1	A	148	ASP	CB-CG-OD2	-6.99	112.01	118.30
1	A	162	ASP	CB-CG-OD2	-6.97	112.03	118.30
1	B	58	ASP	CB-CG-OD2	-6.92	112.07	118.30
1	A	33	ARG	N-CA-CB	-6.85	98.27	110.60
1	B	128	ASP	CB-CG-OD2	-6.74	112.24	118.30
1	A	216	ASP	CB-CG-OD1	6.70	124.33	118.30
1	B	189	ARG	NE-CZ-NH1	6.69	123.65	120.30
1	A	148	ASP	CB-CG-OD1	6.68	124.31	118.30
1	B	58	ASP	CB-CG-OD1	6.68	124.31	118.30
1	A	229	PHE	CB-CG-CD2	-6.67	116.13	120.80
1	A	211	ASP	CB-CG-OD2	-6.58	112.38	118.30
1	A	160	ASP	CB-CG-OD1	6.54	124.19	118.30
1	A	36	ASP	CB-CG-OD1	6.45	124.11	118.30
1	B	285	ASP	CB-CG-OD2	-6.45	112.49	118.30
1	A	264	ASP	CB-CG-OD2	-6.45	112.49	118.30
1	A	208	ASP	CB-CG-OD2	-6.44	112.50	118.30
1	B	40	ASP	CB-CG-OD2	-6.44	112.51	118.30
1	A	200	ASP	CB-CG-OD1	6.40	124.06	118.30
1	B	202	THR	CA-CB-CG2	-6.39	103.45	112.40
1	A	189	ARG	NE-CZ-NH2	-6.39	117.11	120.30
1	A	58	ASP	CB-CG-OD1	6.38	124.05	118.30
1	A	33	ARG	NE-CZ-NH1	6.37	123.48	120.30
1	B	33	ARG	N-CA-CB	-6.32	99.22	110.60
1	B	49	ASP	CB-CG-OD2	-6.32	112.61	118.30
1	A	36	ASP	CB-CG-OD2	-6.22	112.70	118.30
1	A	272	ASP	CB-CG-OD2	-6.18	112.74	118.30
1	A	178	ASP	CB-CG-OD1	6.18	123.86	118.30
1	A	200	ASP	CB-CG-OD2	-6.14	112.77	118.30
1	A	58	ASP	CB-CG-OD2	-6.13	112.79	118.30
1	B	232	ASN	N-CA-CB	6.11	121.59	110.60
1	A	83	ASP	CB-CG-OD1	6.10	123.79	118.30
1	B	243	ASP	CB-CG-OD1	6.10	123.79	118.30
1	A	254	ASP	CB-CG-OD1	6.05	123.75	118.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	254	ASP	CB-CG-OD2	-6.00	112.90	118.30
1	A	259	ARG	NE-CZ-NH2	-5.97	117.32	120.30
1	B	7	ASP	CB-CG-OD1	5.95	123.65	118.30
1	B	319	ASP	CB-CG-OD1	5.94	123.64	118.30
1	B	148	ASP	CB-CG-OD2	-5.93	112.96	118.30
1	B	178	ASP	CB-CG-OD1	5.91	123.62	118.30
1	B	290	TYR	CB-CG-CD2	-5.89	117.47	121.00
1	B	146	ASP	CB-CG-OD2	-5.88	113.01	118.30
1	B	259	ARG	NE-CZ-NH2	-5.82	117.39	120.30
1	B	49	ASP	CB-CG-OD1	5.78	123.50	118.30
1	B	13	ASP	CB-CG-OD2	-5.76	113.12	118.30
1	B	113	ASP	CB-CG-OD1	5.75	123.47	118.30
1	B	216	ASP	CB-CG-OD2	-5.74	113.13	118.30
1	B	74	ASP	CB-CG-OD2	-5.72	113.15	118.30
1	B	43	HIS	CB-CA-C	-5.71	98.99	110.40
1	B	148	ASP	CB-CG-OD1	5.69	123.42	118.30
1	B	243	ASP	CB-CG-OD2	-5.68	113.19	118.30
1	A	272	ASP	CB-CG-OD1	5.67	123.41	118.30
1	A	40	ASP	CB-CG-OD2	-5.63	113.24	118.30
1	A	285	ASP	CB-CG-OD2	-5.61	113.25	118.30
1	B	86	LEU	CB-CG-CD1	-5.59	101.49	111.00
1	B	74	ASP	CB-CG-OD1	5.58	123.33	118.30
1	A	216	ASP	CB-CG-OD2	-5.57	113.29	118.30
1	B	83	ASP	CB-CG-OD2	-5.55	113.30	118.30
1	A	249	ASP	CB-CG-OD1	5.55	123.30	118.30
1	A	229	PHE	CB-CG-CD1	5.53	124.67	120.80
1	A	178	ASP	CB-CG-OD2	-5.41	113.43	118.30
1	B	206	ARG	NE-CZ-NH2	-5.41	117.59	120.30
1	B	220	ARG	NE-CZ-NH2	-5.34	117.63	120.30
1	B	83	ASP	CB-CG-OD1	5.32	123.09	118.30
1	B	160	ASP	CB-CG-OD1	5.30	123.07	118.30
1	B	18	THR	CA-CB-CG2	-5.29	105.00	112.40
1	A	244	HIS	CB-CA-C	-5.27	99.86	110.40
1	B	244	HIS	CB-CA-C	-5.26	99.88	110.40
1	B	220	ARG	NE-CZ-NH1	5.23	122.92	120.30
1	B	162	ASP	CB-CG-OD2	-5.21	113.61	118.30
1	A	13	ASP	CB-CG-OD1	5.12	122.90	118.30
1	B	211	ASP	CB-CG-OD2	-5.10	113.71	118.30
1	B	335	SER	N-CA-CB	5.10	118.15	110.50
1	B	218	ASP	CB-CG-OD2	-5.06	113.74	118.30
1	A	203	GLU	CG-CD-OE1	5.04	128.39	118.30
1	B	189	ARG	N-CA-CB	5.04	119.68	110.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	263	ASP	CB-CG-OD1	5.03	122.83	118.30
1	B	218	ASP	CB-CG-OD1	5.02	122.82	118.30
1	A	83	ASP	CB-CG-OD2	-5.00	113.80	118.30

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	2649	0	2587	44	1
1	B	2725	0	2637	19	0
2	A	12	0	12	0	0
2	B	12	0	12	0	0
3	A	1	0	0	0	0
4	A	209	0	0	2	1
4	B	241	0	0	2	0
All	All	5849	0	5248	63	1

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 6.

All (63) 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:78:LYS:HB2	1:A:78:LYS:NZ	1.90	0.86
1:B:338:THR:HG22	1:B:339:LYS:HG3	1.66	0.77
1:A:180:SER:HA	1:A:296:VAL:HG13	1.67	0.76
1:A:20:LYS:HD2	1:A:147:ASP:OD2	1.90	0.70
1:A:170:ASN:ND2	1:A:304:GLU:OE2	2.32	0.62
1:A:78:LYS:HB2	1:A:78:LYS:HZ2	1.64	0.60
1:A:219:PHE:CD2	1:A:223:LYS:HG2	2.37	0.60
1:A:227:ASN:HD22	1:A:227:ASN:N	2.00	0.59
1:A:180:SER:O	1:A:296:VAL:HG11	2.03	0.58
1:A:289:LEU:HD23	1:A:294:LYS:HA	1.85	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:237:GLN:O	1:B:240:LYS:HE2	2.02	0.58
1:A:174:ASN:OD1	1:A:176:ASN:HB2	2.05	0.57
1:A:219:PHE:CE2	1:A:223:LYS:HG2	2.40	0.57
1:A:201:GLN:NE2	1:A:201:GLN:H	2.05	0.55
1:A:264:ASP:HA	1:A:339:LYS:HG2	1.89	0.54
1:A:212:ILE:O	1:A:215:THR:HG23	2.08	0.54
1:A:76:LEU:HD23	1:A:77:VAL:N	2.23	0.53
1:A:201:GLN:H	1:A:201:GLN:CD	2.12	0.53
1:B:322:LEU:CD1	1:B:326[A]:GLU:HG2	2.40	0.52
1:A:280:THR:O	1:A:298:HIS:HA	2.09	0.52
1:A:78:LYS:HB2	1:A:78:LYS:HZ3	1.75	0.51
1:A:339:LYS:O	1:A:340:LEU:HD23	2.11	0.51
1:A:215:THR:HB	1:A:233:MET:CE	2.42	0.50
1:B:344:HIS:HD2	4:B:2612:HOH:O	1.93	0.50
1:A:291:HIS:O	1:A:292:GLU:HB2	2.12	0.50
1:B:219:PHE:CD2	1:B:223:LYS:HG2	2.47	0.50
1:B:322:LEU:HD12	1:B:326[A]:GLU:HG2	1.94	0.49
1:A:197:PRO:HD2	1:A:208:ASP:O	2.13	0.49
1:A:316:GLU:H	1:A:316:GLU:CD	2.16	0.49
1:A:193:SER:O	1:A:212:ILE:HG13	2.13	0.48
1:A:287:GLY:O	1:A:294:LYS:HG3	2.12	0.48
1:A:178:ASP:OD1	1:A:293:LYS:HD3	2.13	0.47
1:B:338:THR:CG2	1:B:339:LYS:HG3	2.38	0.47
1:B:174:ASN:OD1	1:B:176:ASN:HB2	2.15	0.47
1:A:215:THR:HB	1:A:233:MET:HE3	1.98	0.46
1:B:189:ARG:NH2	1:B:256:GLU:O	2.44	0.46
1:A:294:LYS:CB	1:A:294:LYS:NZ	2.79	0.45
1:B:19:ASN:HB2	1:B:147:ASP:OD1	2.16	0.45
1:B:60:TYR:N	1:B:61:PRO:CD	2.79	0.45
1:A:297:HIS:O	1:A:298:HIS:HB2	2.17	0.45
1:B:74:ASP:HA	1:B:92:PRO:O	2.17	0.44
1:B:340:LEU:HA	1:B:340:LEU:HD12	1.74	0.44
1:A:79:ILE:HB	1:A:84:TYR:CE1	2.53	0.44
1:A:19:ASN:HB2	1:A:147:ASP:OD1	2.17	0.44
1:B:335:SER:HB2	4:B:2498:HOH:O	2.19	0.43
1:B:43:HIS:O	1:B:177:GLY:HA2	2.18	0.43
1:A:60:TYR:N	1:A:61:PRO:CD	2.81	0.43
1:A:224:GLN:HG3	4:A:1582:HOH:O	2.18	0.42
1:A:251:LEU:HD11	1:A:274:PRO:HB3	2.01	0.42
1:A:277:VAL:HB	1:A:304:GLU:HB2	1.99	0.42
1:A:36:ASP:OD1	1:A:43:HIS:ND1	2.51	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:292:GLU:HA	1:A:292:GLU:OE2	2.18	0.42
1:B:52:LYS:HE2	1:B:56:GLU:OE2	2.19	0.42
1:A:73:LYS:O	1:A:74:ASP:HB2	2.20	0.42
1:B:197:PRO:HD2	1:B:208:ASP:O	2.20	0.42
1:A:317:LEU:HD23	1:A:317:LEU:HA	1.86	0.41
1:B:135:GLY:HA3	1:B:136:LYS:HA	1.85	0.41
1:A:213:LYS:HG2	1:A:220:ARG:CZ	2.50	0.41
1:A:78:LYS:HA	1:A:82:LYS:O	2.21	0.41
1:A:178:ASP:CG	1:A:293:LYS:HD3	2.40	0.41
1:A:20:LYS:HD2	1:A:147:ASP:CG	2.42	0.41
1:A:138:GLU:HG3	4:A:1444:HOH:O	2.20	0.40

All (1) 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:80:SER:OG	4:A:1592:HOH:O[4_555]	2.07	0.13

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	339/347 (98%)	317 (94%)	22 (6%)	0	100	100
1	B	346/347 (100%)	328 (95%)	18 (5%)	0	100	100
All	All	685/694 (99%)	645 (94%)	40 (6%)	0	100	100

There are no Ramachandran outliers to report.

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	294/300 (98%)	278 (95%)	16 (5%)	22 5
1	B	301/300 (100%)	288 (96%)	13 (4%)	29 9
All	All	595/600 (99%)	566 (95%)	29 (5%)	26 7

All (29) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	20	LYS
1	A	52	LYS
1	A	76	LEU
1	A	186	HIS
1	A	195	PHE
1	A	199	LYS
1	A	201	GLN
1	A	212	ILE
1	A	221	GLN
1	A	224	GLN
1	A	227	ASN
1	A	275	SER
1	A	286	LEU
1	A	316	GLU
1	A	321	SER
1	A	339	LYS
1	B	20	LYS
1	B	78	LYS
1	B	82	LYS
1	B	186	HIS
1	B	189	ARG
1	B	195	PHE
1	B	201	GLN
1	B	212	ILE
1	B	240	LYS
1	B	323	LYS
1	B	326[A]	GLU

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Mol	Chain	Res	Type
1	B	326[B]	GLU
1	B	327	LYS

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	170	ASN
1	A	201	GLN
1	A	224	GLN
1	A	227	ASN
1	A	295	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 monosaccharides in this entry.

5.6 Ligand geometry (i)

Of 3 ligands modelled in this entry, 1 is monoatomic - leaving 2 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	GAL	A	1400	-	12,12,12	0.52	0	17,17,17	1.30	2 (11%)
2	GAL	B	2400	-	12,12,12	0.56	0	17,17,17	1.36	3 (17%)

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	GAL	A	1400	-	-	0/2/22/22	0/1/1/1
2	GAL	B	2400	-	-	1/2/22/22	0/1/1/1

There are no bond length outliers.

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	2400	GAL	O5-C1-C2	-3.16	104.65	110.28
2	A	1400	GAL	O2-C2-C1	2.63	115.25	109.16
2	A	1400	GAL	O6-C6-C5	-2.52	102.65	111.29
2	B	2400	GAL	C1-C2-C3	-2.41	105.31	110.31
2	B	2400	GAL	C3-C4-C5	-2.09	106.52	110.24

There are no chirality outliers.

All (1) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	2400	GAL	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)

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, 95th 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	339/347 (97%)	-0.75	1 (0%) 94 95	17, 26, 58, 84	0
1	B	346/347 (99%)	-0.81	0 100 100	16, 23, 50, 64	0
All	All	685/694 (98%)	-0.78	1 (0%) 95 96	16, 25, 55, 84	0

All (1) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	340	LEU	2.4

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, 95th 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
3	NA	A	1401	1/1	0.92	0.12	41,41,41,41	0
2	GAL	A	1400	12/12	0.96	0.08	17,27,50,57	0
2	GAL	B	2400	12/12	0.98	0.06	18,24,39,56	0

6.5 Other polymers (i)

There are no such residues in this entry.