



Full wwPDB X-ray Structure Validation Report ⓘ

Jan 31, 2016 – 07:41 PM GMT

PDB ID : 1GPE
Title : GLUCOSE OXIDASE FROM PENICILLIUM AMAGASAKIENSE
Authors : Hendle, J.; Kalisz, H.M.; Hecht, H.J.
Deposited on : 1999-03-24
Resolution : 1.80 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
<http://wwpdb.org/validation/2016/XrayValidationReportHelp>
with specific help available everywhere you see the ⓘ symbol.

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

MolProbity : 4.02b-467
Mogul : 1.7 (RC4), CSD as536be (2015)
Xtriage (Phenix) : 1.9-1692
EDS : rb-20026688
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)
Refmac : 5.8.0135
CCP4 : 6.5.0
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : trunk26865

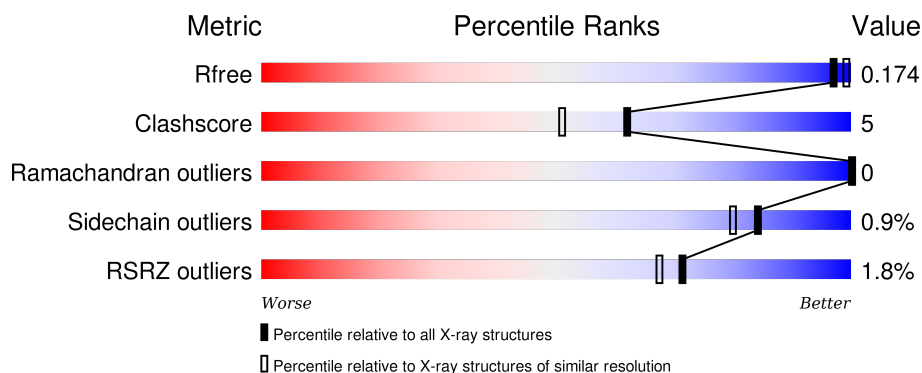
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.80 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}	91344	4533 (1.80-1.80)
Clashscore	102246	5383 (1.80-1.80)
Ramachandran outliers	100387	5320 (1.80-1.80)
Sidechain outliers	100360	5319 (1.80-1.80)
RSRZ outliers	91569	4547 (1.80-1.80)

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 on the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. 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	587	<div> <div>2%</div> <div>87%</div> <div>13%</div> <div>•</div> </div>
1	B	587	<div> <div>2%</div> <div>84%</div> <div>16%</div> <div>•</div> </div>

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	NAG	A	601	-	-	-	X
2	NAG	A	605	-	-	-	X
2	NAG	B	601	-	-	-	X
2	NAG	B	605	-	-	-	X

2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 10067 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.

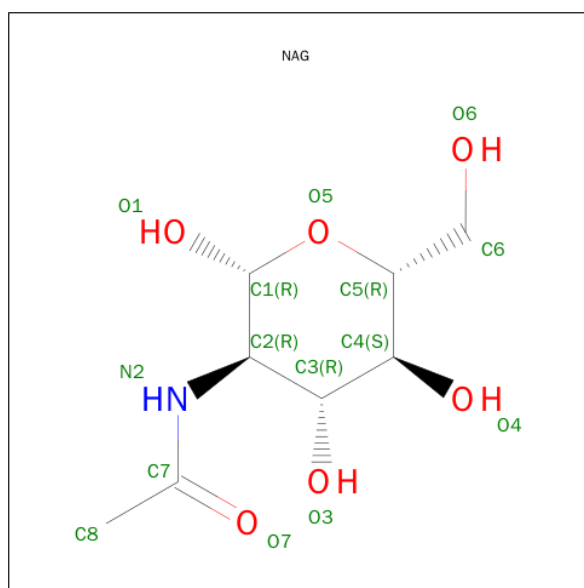
- Molecule 1 is a protein called PROTEIN (GLUCOSE OXIDASE).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	587	Total	C	N	O	S	0	0	0
			4509	2857	763	871	18			
1	B	587	Total	C	N	O	S	0	0	0
			4509	2857	763	871	18			

- Molecule 2 is a polymer of unknown type called SUGAR (5-MER).

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	5	Total	C	N	O	0	0
			61	34	2	25		
2	B	5	Total	C	N	O	0	0
			61	34	2	25		

- Molecule 3 is SUGAR (N-ACETYL-D-GLUCOSAMINE) (three-letter code: NAG) (formula: $C_8H_{15}NO_6$).

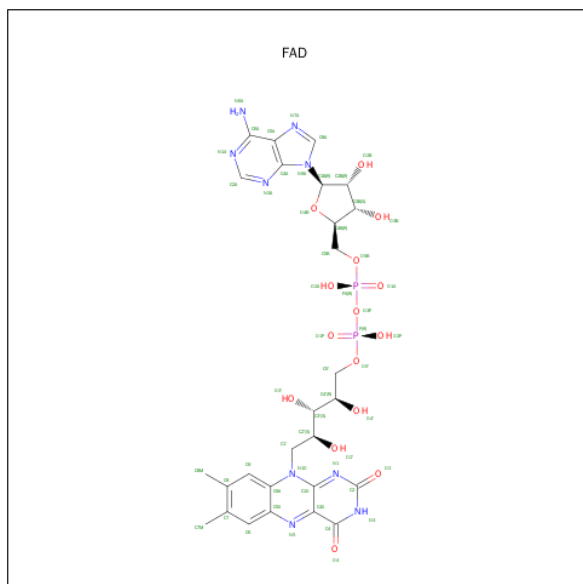


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	O	0	0
			14	8	1	5		
3	A	1	Total	C	N	O	0	0
			14	8	1	5		
3	B	1	Total	C	N	O	0	0
			14	8	1	5		
3	B	1	Total	C	N	O	0	0
			14	8	1	5		

- Molecule 4 is a polymer of unknown type called SUGAR (2-MER).

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	2	Total	C	N	O	0	0
			28	16	2	10		
4	B	2	Total	C	N	O	0	0
			28	16	2	10		

- Molecule 5 is FLAVIN-ADENINE DINUCLEOTIDE (three-letter code: FAD) (formula: $C_{27}H_{33}N_9O_{15}P_2$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
5	A	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
5	B	1	Total	C	N	O	P	0	0
			53	27	9	15	2		

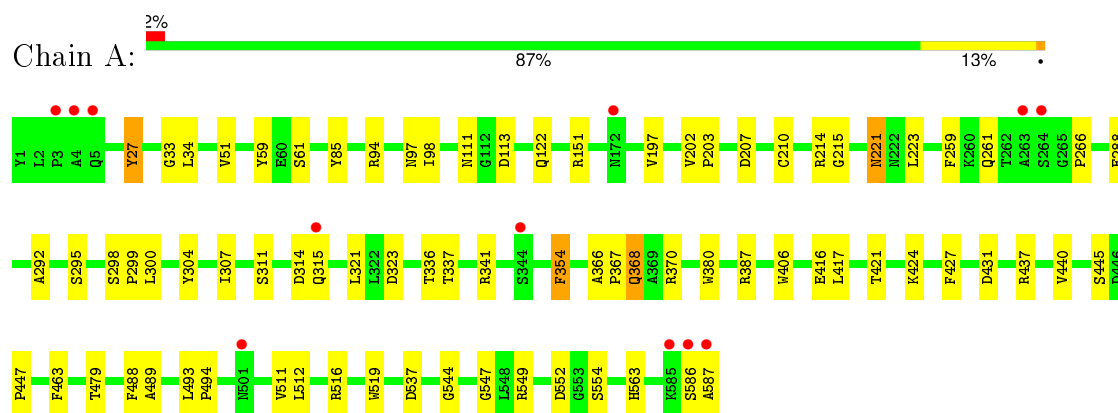
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	338	Total 338	O 338	0	0
6	B	371	Total 371	O 371	0	0

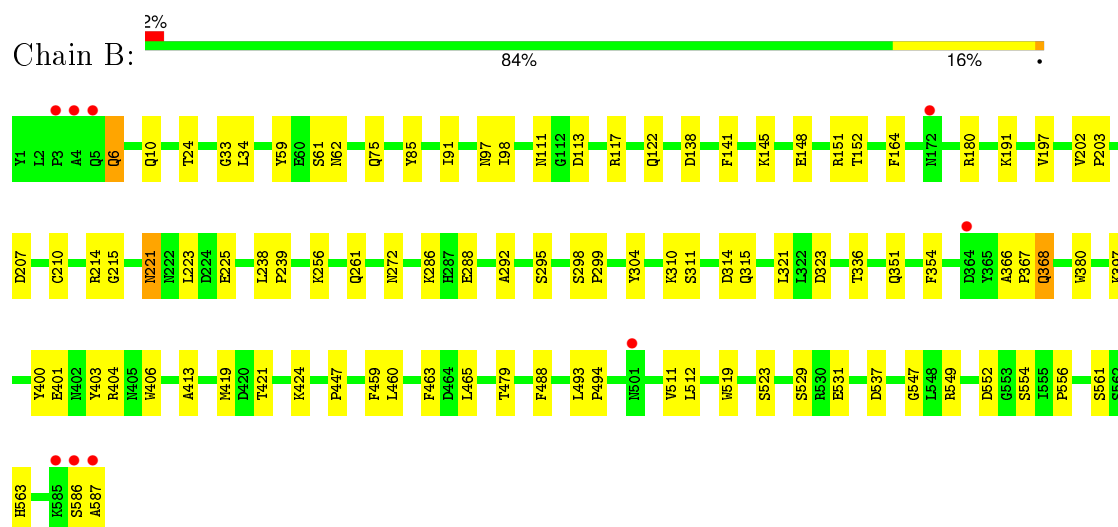
3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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 ($\text{RSRZ} > 2$). 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: PROTEIN (GLUCOSE OXIDASE)



• Molecule 1: PROTEIN (GLUCOSE OXIDASE)



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	57.60Å 132.10Å 151.30Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 1.80 20.00 – 1.80	Depositor EDS
% Data completeness (in resolution range)	94.7 (20.00-1.80) 94.8 (20.00-1.80)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	7.57 (at 1.80Å)	Xtriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.160 , 0.198 0.144 , 0.174	Depositor DCC
R_{free} test set	5114 reflections (5.28%)	DCC
Wilson B-factor (Å ²)	11.2	Xtriage
Anisotropy	0.429	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 42.9	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Outliers	1 of 101974 reflections (0.001%)	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	10067	wwPDB-VP
Average B, all atoms (Å ²)	14.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 9.74% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.375 respectively for untwinned datasets, and 0.333, 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: BMA, NAG, FAD, MAN

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	0.45	0/4608	1.13	12/6266 (0.2%)
1	B	0.45	0/4608	1.14	11/6266 (0.2%)
All	All	0.45	0/9216	1.14	23/12532 (0.2%)

There are no bond length outliers.

All (23) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	549	ARG	NE-CZ-NH2	-6.71	116.94	120.30
1	A	370	ARG	NE-CZ-NH2	-6.69	116.95	120.30
1	A	214	ARG	NE-CZ-NH1	6.54	123.57	120.30
1	B	214	ARG	NE-CZ-NH2	-6.51	117.04	120.30
1	B	403	TYR	CB-CG-CD2	-6.43	117.14	121.00
1	A	323	ASP	CB-CG-OD2	6.38	124.04	118.30
1	A	437	ARG	NE-CZ-NH2	-6.35	117.13	120.30
1	A	431	ASP	CB-CG-OD2	-6.17	112.75	118.30
1	B	549	ARG	NE-CZ-NH2	-6.14	117.23	120.30
1	B	323	ASP	CB-CG-OD2	6.05	123.74	118.30
1	B	180	ARG	NE-CZ-NH2	-5.78	117.41	120.30
1	A	27	TYR	CB-CG-CD1	-5.50	117.70	121.00
1	A	314	ASP	CB-CG-OD2	-5.48	113.37	118.30
1	A	94	ARG	NE-CZ-NH2	-5.47	117.57	120.30
1	B	138	ASP	CB-CG-OD1	5.45	123.21	118.30
1	B	537	ASP	CB-CG-OD1	5.38	123.15	118.30
1	B	404	ARG	NE-CZ-NH2	-5.32	117.64	120.30
1	B	214	ARG	NE-CZ-NH1	5.31	122.96	120.30
1	A	537	ASP	CB-CG-OD1	5.31	123.08	118.30
1	A	370	ARG	NE-CZ-NH1	5.26	122.93	120.30
1	B	400	TYR	CB-CG-CD2	-5.15	117.91	121.00
1	B	214	ARG	CD-NE-CZ	5.08	130.71	123.60

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Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
1	A	516	ARG	NE-CZ-NH1	5.04	122.82	120.30

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	4509	0	4394	44	0
1	B	4509	0	4394	58	0
2	A	61	0	52	1	0
2	B	61	0	52	0	0
3	A	28	0	25	0	0
3	B	28	0	26	0	0
4	A	28	0	25	0	0
4	B	28	0	25	0	0
5	A	53	0	31	4	0
5	B	53	0	31	5	0
6	A	338	0	0	2	0
6	B	371	0	0	2	0
All	All	10067	0	9055	100	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 (100) 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:368:GLN:HE21	1:A:368:GLN:H	1.16	0.90
1:A:97:ASN:HD21	1:B:97:ASN:HD21	0.89	0.88
1:A:97:ASN:HD21	1:B:97:ASN:ND2	1.72	0.86
1:B:368:GLN:HE21	1:B:368:GLN:H	1.20	0.86
1:A:97:ASN:ND2	1:B:97:ASN:HD21	1.75	0.81
1:A:111:ASN:HB2	5:A:600:FAD:C5X	2.16	0.74
1:B:111:ASN:HB2	5:B:600:FAD:C5X	2.19	0.71

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:151:ARG:HD3	1:B:225:GLU:HG2	1.75	0.67
1:B:336:THR:HG21	1:B:511:VAL:HG22	1.78	0.66
1:B:6:GLN:HG3	1:B:62:ASN:HA	1.79	0.65
1:B:261:GLN:HE21	1:B:321:LEU:HD11	1.63	0.64
1:A:261:GLN:HE21	1:A:321:LEU:HD11	1.64	0.62
1:A:366:ALA:HB3	1:A:367:PRO:HD3	1.84	0.59
1:B:261:GLN:NE2	1:B:321:LEU:HD11	2.18	0.59
1:A:261:GLN:NE2	1:A:321:LEU:HD11	2.19	0.57
1:A:368:GLN:N	1:A:368:GLN:HE21	1.95	0.57
1:A:111:ASN:HB2	5:A:600:FAD:N5	2.19	0.57
1:A:336:THR:HG21	1:A:511:VAL:HG22	1.87	0.56
1:B:24:THR:HG22	1:B:286:LYS:HG3	1.87	0.56
1:B:111:ASN:HB2	5:B:600:FAD:N5	2.21	0.55
1:B:221:ASN:HB3	1:B:223:LEU:HG	1.88	0.55
1:B:531:GLU:CD	1:B:531:GLU:H	2.11	0.54
1:A:300:LEU:HD21	1:A:440:VAL:HG22	1.90	0.53
1:A:380:TRP:CH2	1:A:463:PHE:HB2	2.43	0.53
1:B:6:GLN:HB3	1:B:62:ASN:CB	2.40	0.52
1:B:465:LEU:HD13	1:B:512:LEU:HD13	1.92	0.52
1:B:238:LEU:HB3	1:B:239:PRO:HD3	1.91	0.51
1:B:298:SER:N	1:B:299:PRO:HD2	2.26	0.50
1:B:141:PHE:CZ	1:B:145:LYS:HE3	2.46	0.50
1:A:311:SER:O	1:A:315:GLN:HG3	2.10	0.50
1:B:85:TYR:HB2	1:B:98:ILE:HB	1.94	0.50
1:B:113:ASP:O	1:B:221:ASN:HA	2.12	0.50
1:B:311:SER:O	1:B:315:GLN:HG3	2.12	0.50
1:B:6:GLN:HB3	1:B:62:ASN:HB2	1.93	0.49
1:B:91:ILE:HD12	1:B:460:LEU:HD23	1.93	0.49
1:B:203:PRO:O	1:B:215:GLY:HA3	2.13	0.48
1:B:10:GLN:HB2	1:B:59:TYR:HB3	1.95	0.48
1:A:387:ARG:HD2	6:A:670:HOH:O	2.13	0.47
1:B:459:PHE:CD2	1:B:512:LEU:HD12	2.49	0.47
1:A:421:THR:HA	1:A:424:LYS:O	2.14	0.47
1:A:113:ASP:O	1:A:221:ASN:HA	2.14	0.47
1:A:85:TYR:HB2	1:A:98:ILE:HB	1.96	0.47
1:A:221:ASN:HB3	1:A:223:LEU:HG	1.95	0.47
1:B:34:LEU:C	1:B:34:LEU:HD23	2.35	0.47
1:A:259:PHE:CZ	1:A:307:ILE:HD11	2.49	0.47
1:A:341:ARG:HG2	1:A:489:ALA:HB3	1.96	0.47
1:B:366:ALA:HB3	1:B:367:PRO:HD3	1.97	0.47
1:A:207:ASP:HB3	1:A:210:CYS:SG	2.54	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:152:THR:HG22	1:B:164:PHE:CE2	2.50	0.47
1:A:586:SER:O	1:A:587:ALA:HB3	2.15	0.46
1:B:75:GLN:NE2	6:B:871:HOH:O	2.47	0.46
1:B:586:SER:O	1:B:587:ALA:HB3	2.14	0.46
1:A:197:VAL:HB	1:A:202:VAL:HB	1.98	0.46
1:A:34:LEU:C	1:A:34:LEU:HD23	2.36	0.46
1:A:519:TRP:CE3	5:A:600:FAD:HM73	2.51	0.46
1:A:266:PRO:HD2	1:A:544:GLY:O	2.16	0.46
1:A:288:GLU:HG2	1:A:547:GLY:HA2	1.97	0.46
1:A:151:ARG:HG3	6:A:824:HOH:O	2.16	0.45
1:B:493:LEU:HA	1:B:494:PRO:C	2.35	0.45
1:B:413:ALA:HB3	1:B:561:SER:HB3	1.98	0.45
1:A:122:GLN:HA	1:A:406:TRP:CZ2	2.51	0.45
1:B:563:HIS:HA	6:B:775:HOH:O	2.17	0.45
1:B:24:THR:CG2	1:B:286:LYS:HG3	2.47	0.44
1:B:59:TYR:CZ	1:B:61:SER:HB2	2.52	0.44
1:B:529:SER:HB2	1:B:531:GLU:OE1	2.17	0.44
1:B:397:LYS:O	1:B:401:GLU:HG3	2.17	0.44
1:B:33:GLY:HA3	5:B:600:FAD:O5B	2.18	0.44
1:A:304:TYR:CZ	1:A:447:PRO:HA	2.53	0.44
1:A:33:GLY:HA3	5:A:600:FAD:O5B	2.18	0.44
1:A:292:ALA:HA	1:A:552:ASP:HB3	1.99	0.44
1:B:523:SER:HB3	1:B:556:PRO:O	2.18	0.43
1:B:292:ALA:HA	1:B:552:ASP:HB3	2.00	0.43
1:B:117:ARG:NH2	1:B:148:GLU:OE2	2.50	0.43
1:B:256:LYS:HG2	1:B:272:ASN:HB3	2.01	0.43
1:A:445:SER:O	1:A:447:PRO:HD3	2.18	0.43
1:A:354:PHE:HB3	1:A:417:LEU:HB2	2.00	0.43
1:B:288:GLU:HG2	1:B:547:GLY:HA2	2.01	0.43
1:A:298:SER:N	1:A:299:PRO:HD2	2.32	0.43
1:B:295:SER:HA	1:B:554:SER:OG	2.19	0.43
1:A:59:TYR:CZ	1:A:61:SER:HB2	2.54	0.43
1:A:416:GLU:OE2	1:A:563:HIS:NE2	2.50	0.42
1:B:351:GLN:HA	1:B:419:MET:O	2.20	0.42
1:A:295:SER:HA	1:A:554:SER:OG	2.18	0.42
1:B:141:PHE:CE2	1:B:145:LYS:HE3	2.53	0.42
2:A:601:NAG:H61	2:A:605:NAG:C7	2.49	0.42
1:B:380:TRP:CH2	1:B:463:PHE:HB2	2.54	0.42
1:B:111:ASN:HB2	5:B:600:FAD:C4X	2.50	0.41
1:B:197:VAL:HB	1:B:202:VAL:HB	2.02	0.41
1:B:479:THR:HG22	1:B:488:PHE:CD1	2.55	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:479:THR:HG22	1:A:488:PHE:CD1	2.56	0.41
1:B:519:TRP:CE3	5:B:600:FAD:HM73	2.56	0.41
1:B:310:LYS:HE3	1:B:314:ASP:OD2	2.20	0.41
1:A:337:THR:HA	1:A:427:PHE:O	2.20	0.41
1:B:421:THR:HA	1:B:424:LYS:O	2.21	0.41
1:A:203:PRO:O	1:A:215:GLY:HA3	2.21	0.41
1:A:493:LEU:HA	1:A:494:PRO:C	2.41	0.41
1:B:207:ASP:HB3	1:B:210:CYS:SG	2.61	0.40
1:B:122:GLN:HA	1:B:406:TRP:CZ2	2.57	0.40
1:A:27:TYR:HB2	1:A:51:VAL:HG22	2.04	0.40
1:B:304:TYR:CZ	1:B:447:PRO:HA	2.55	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	585/587 (100%)	566 (97%)	19 (3%)	0	100	100
1	B	585/587 (100%)	566 (97%)	19 (3%)	0	100	100
All	All	1170/1174 (100%)	1132 (97%)	38 (3%)	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	478/478 (100%)	474 (99%)	4 (1%)	86	83
1	B	478/478 (100%)	473 (99%)	5 (1%)	82	77
All	All	956/956 (100%)	947 (99%)	9 (1%)	84	80

All (9) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	221	ASN
1	A	354	PHE
1	A	368	GLN
1	A	512	LEU
1	B	6	GLN
1	B	191	LYS
1	B	221	ASN
1	B	354	PHE
1	B	368	GLN

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	75	GLN
1	A	261	GLN
1	A	368	GLN
1	A	374	ASN
1	B	75	GLN
1	B	97	ASN
1	B	184	GLN
1	B	226	ASN
1	B	261	GLN
1	B	368	GLN
1	B	374	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates ⓘ

14 carbohydrates 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	NAG	A	601	1,2	14,14,15	1.17	1 (7%)	15,19,21	1.25	2 (13%)
4	NAG	A	603	1,4	14,14,15	1.15	1 (7%)	15,19,21	1.41	1 (6%)
2	NAG	A	605	2	14,14,15	1.14	1 (7%)	15,19,21	1.38	2 (13%)
2	BMA	A	606	2	11,11,12	0.71	0	14,15,17	1.27	3 (21%)
2	MAN	A	607	2	11,11,12	0.91	1 (9%)	14,15,17	1.45	1 (7%)
2	MAN	A	608	2	11,11,12	0.84	0	14,15,17	1.67	2 (14%)
4	NAG	A	613	4	14,14,15	1.22	1 (7%)	15,19,21	3.41	5 (33%)
2	NAG	B	601	1,2	14,14,15	1.17	1 (7%)	15,19,21	1.18	2 (13%)
4	NAG	B	603	1,4	14,14,15	1.21	1 (7%)	15,19,21	1.41	2 (13%)
2	NAG	B	605	2	14,14,15	1.15	1 (7%)	15,19,21	1.50	3 (20%)
2	BMA	B	606	2	11,11,12	0.72	0	14,15,17	0.97	1 (7%)
2	MAN	B	607	2	11,11,12	0.87	0	14,15,17	1.35	1 (7%)
2	MAN	B	608	2	11,11,12	1.01	0	14,15,17	2.43	2 (14%)
4	NAG	B	613	4	14,14,15	1.24	1 (7%)	15,19,21	0.83	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
2	NAG	A	601	1,2	-	0/6/23/26	0/1/1/1
4	NAG	A	603	1,4	-	0/6/23/26	0/1/1/1
2	NAG	A	605	2	-	0/6/23/26	0/1/1/1
2	BMA	A	606	2	-	0/2/19/22	0/1/1/1
2	MAN	A	607	2	-	0/2/19/22	0/1/1/1
2	MAN	A	608	2	-	0/2/19/22	0/1/1/1
4	NAG	A	613	4	-	0/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	NAG	B	601	1,2	-	0/6/23/26	0/1/1/1
4	NAG	B	603	1,4	-	0/6/23/26	0/1/1/1
2	NAG	B	605	2	-	0/6/23/26	0/1/1/1
2	BMA	B	606	2	-	0/2/19/22	0/1/1/1
2	MAN	B	607	2	-	0/2/19/22	0/1/1/1
2	MAN	B	608	2	-	0/2/19/22	0/1/1/1
4	NAG	B	613	4	-	0/6/23/26	0/1/1/1

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	603	NAG	O7-C7	-3.69	1.14	1.23
4	A	603	NAG	O7-C7	-3.65	1.14	1.23
2	A	601	NAG	O7-C7	-3.60	1.14	1.23
2	B	605	NAG	O7-C7	-3.58	1.14	1.23
2	B	601	NAG	O7-C7	-3.56	1.15	1.23
4	A	613	NAG	O7-C7	-3.53	1.15	1.23
2	A	605	NAG	O7-C7	-3.53	1.15	1.23
4	B	613	NAG	O7-C7	-3.50	1.15	1.23
2	A	607	MAN	C1-C2	2.03	1.57	1.52

All (27) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	613	NAG	C4-C3-C2	-4.88	103.65	111.23
4	A	613	NAG	O7-C7-N2	-4.85	111.97	121.86
4	A	603	NAG	C1-O5-C5	-3.86	107.34	112.25
2	A	605	NAG	C4-C3-C2	-3.57	105.67	111.23
2	B	605	NAG	C4-C3-C2	-3.19	106.27	111.23
2	B	601	NAG	C1-O5-C5	-3.03	108.40	112.25
4	B	603	NAG	C1-O5-C5	-2.96	108.49	112.25
2	A	608	MAN	C3-C4-C5	-2.53	105.79	110.20
2	A	601	NAG	C4-C3-C2	-2.49	107.36	111.23
2	A	601	NAG	C1-O5-C5	-2.47	109.11	112.25
2	A	606	BMA	O3-C3-C2	-2.37	105.72	110.00
2	A	606	BMA	C1-C2-C3	-2.35	106.76	109.54
2	A	605	NAG	C1-O5-C5	-2.34	109.28	112.25
2	B	606	BMA	C1-C2-C3	-2.19	106.95	109.54
2	B	601	NAG	C4-C3-C2	-2.07	108.00	111.23
2	B	605	NAG	C3-C4-C5	2.15	113.94	110.20
2	B	608	MAN	O3-C3-C4	2.24	115.38	110.34
4	A	613	NAG	C1-O5-C5	2.29	115.16	112.25

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	606	BMA	C2-C3-C4	2.53	115.34	111.04
2	B	605	NAG	C2-N2-C7	3.04	126.95	123.04
4	A	613	NAG	O7-C7-C8	3.35	128.20	122.06
4	B	603	NAG	O4-C4-C3	3.41	118.02	110.34
2	B	607	MAN	C1-O5-C5	4.04	117.38	112.25
2	A	607	MAN	C1-O5-C5	4.23	117.62	112.25
2	A	608	MAN	C1-O5-C5	4.77	118.30	112.25
2	B	608	MAN	C1-O5-C5	8.27	122.74	112.25
4	A	613	NAG	C2-N2-C7	10.03	135.92	123.04

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

2 monomers are involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	601	NAG	1	0
2	A	605	NAG	1	0

5.6 Ligand geometry

6 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
5	FAD	A	600	-	48,58,58	1.58	7 (14%)	54,89,89	2.28	13 (24%)
3	NAG	A	602	1	14,14,15	0.99	1 (7%)	15,19,21	1.02	1 (6%)
3	NAG	A	604	1	14,14,15	1.21	1 (7%)	15,19,21	4.06	5 (33%)
5	FAD	B	600	-	48,58,58	1.55	7 (14%)	54,89,89	2.69	13 (24%)
3	NAG	B	602	1	14,14,15	0.98	1 (7%)	15,19,21	0.87	1 (6%)
3	NAG	B	604	1	14,14,15	1.17	1 (7%)	15,19,21	1.45	2 (13%)

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	FAD	A	600	-	-	0/30/50/50	0/6/6/6
3	NAG	A	602	1	-	0/6/23/26	0/1/1/1
3	NAG	A	604	1	-	0/6/23/26	0/1/1/1
5	FAD	B	600	-	-	0/30/50/50	0/6/6/6
3	NAG	B	602	1	-	0/6/23/26	0/1/1/1
3	NAG	B	604	1	-	0/6/23/26	0/1/1/1

All (18) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	600	FAD	C10-N10	-4.75	1.33	1.39
5	B	600	FAD	C10-N10	-4.33	1.34	1.39
5	A	600	FAD	PA-O2A	-3.83	1.38	1.54
5	B	600	FAD	PA-O2A	-3.64	1.39	1.54
3	B	604	NAG	O7-C7	-3.56	1.15	1.23
3	A	604	NAG	O7-C7	-3.39	1.15	1.23
3	A	602	NAG	O7-C7	-3.15	1.15	1.23
5	A	600	FAD	P-O2P	-3.00	1.42	1.54
3	B	602	NAG	O7-C7	-2.96	1.16	1.23
5	B	600	FAD	P-O2P	-2.96	1.42	1.54
5	A	600	FAD	C5'-C4'	2.17	1.55	1.51
5	A	600	FAD	C4-C4X	2.19	1.45	1.41
5	B	600	FAD	C4-C4X	2.24	1.45	1.41
5	B	600	FAD	C5'-C4'	2.59	1.55	1.51
5	B	600	FAD	O5'-C5'	3.20	1.57	1.44
5	A	600	FAD	O5'-C5'	3.28	1.58	1.44
5	A	600	FAD	O4B-C1B	4.41	1.46	1.41
5	B	600	FAD	O4B-C1B	4.68	1.47	1.41

All (35) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	B	600	FAD	N3A-C2A-N1A	-10.35	120.97	128.89
5	B	600	FAD	C4X-C10-N10	-5.88	117.06	120.52
5	B	600	FAD	C4X-C4-N3	-5.69	115.80	123.59
5	A	600	FAD	N3A-C2A-N1A	-5.66	124.56	128.89
5	A	600	FAD	C4X-C4-N3	-5.39	116.22	123.59
5	A	600	FAD	C4X-C10-N10	-4.75	117.72	120.52

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	B	600	FAD	C4B-O4B-C1B	-4.66	104.59	109.72
5	B	600	FAD	O4B-C1B-N9A	-4.05	99.63	108.10
5	A	600	FAD	C4B-O4B-C1B	-4.04	105.28	109.72
5	A	600	FAD	O4B-C1B-N9A	-3.87	100.00	108.10
3	A	604	NAG	O7-C7-N2	-3.83	114.06	121.86
3	A	604	NAG	C4-C3-C2	-3.32	106.07	111.23
3	A	602	NAG	C4-C3-C2	-3.22	106.22	111.23
5	A	600	FAD	C4-C4X-C10	-3.19	117.90	119.94
5	B	600	FAD	C1B-N9A-C4A	-3.14	122.20	126.94
5	A	600	FAD	C1B-N9A-C4A	-3.06	122.32	126.94
5	B	600	FAD	C1'-C2'-C3'	-3.05	101.11	109.82
5	A	600	FAD	C1'-C2'-C3'	-2.72	102.04	109.82
3	B	602	NAG	C4-C3-C2	-2.64	107.13	111.23
5	A	600	FAD	C6-C5X-N5	-2.34	115.96	118.96
5	B	600	FAD	C6-C5X-N5	-2.24	116.08	118.96
5	B	600	FAD	C4-C4X-C10	-2.22	118.52	119.94
3	B	604	NAG	C8-C7-N2	-2.04	112.20	116.11
5	B	600	FAD	O2P-P-O1P	2.10	123.89	112.53
5	A	600	FAD	O2P-P-O1P	2.34	125.23	112.53
3	A	604	NAG	O7-C7-C8	2.59	126.82	122.06
5	A	600	FAD	C1'-N10-C9A	2.68	121.86	118.86
5	B	600	FAD	C4A-C5A-N7A	2.76	112.02	109.48
3	B	604	NAG	O7-C7-C8	3.08	127.71	122.06
5	A	600	FAD	C2A-N1A-C6A	3.62	125.23	118.77
5	B	600	FAD	C2A-N1A-C6A	4.82	127.38	118.77
3	A	604	NAG	C3-C2-N2	5.39	123.48	110.56
5	A	600	FAD	C4-N3-C2	8.31	122.43	115.25
5	B	600	FAD	C4-N3-C2	8.70	122.76	115.25
3	A	604	NAG	C2-N2-C7	13.26	140.07	123.04

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

2 monomers are involved in 9 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	600	FAD	4	0
5	B	600	FAD	5	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, 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	587/587 (100%)	-0.35	12 (2%) 68 64	5, 12, 26, 59	0
1	B	587/587 (100%)	-0.35	9 (1%) 76 72	5, 12, 25, 56	0
All	All	1174/1174 (100%)	-0.35	21 (1%) 71 67	5, 12, 26, 59	0

All (21) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	587	ALA	12.5
1	A	587	ALA	12.1
1	A	263	ALA	9.6
1	B	5	GLN	8.5
1	B	4	ALA	5.8
1	A	586	SER	5.7
1	A	264	SER	5.6
1	A	5	GLN	4.9
1	B	3	PRO	4.2
1	A	3	PRO	3.7
1	B	172	ASN	3.1
1	B	501	ASN	3.0
1	A	501	ASN	2.6
1	A	344	SER	2.5
1	B	586	SER	2.5
1	A	172	ASN	2.5
1	A	585	LYS	2.5
1	B	585	LYS	2.3
1	B	364	ASP	2.2
1	A	4	ALA	2.1
1	A	315	GLN	2.1

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](#)

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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. 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	LLDF	B-factors(Å ²)	Q<0.9
2	NAG	A	601	14/15	0.90	0.19	3.40	27,30,32,32	0
2	NAG	A	605	14/15	0.84	0.21	2.72	32,33,36,37	0
2	NAG	B	601	14/15	0.92	0.18	2.21	26,29,30,30	0
2	NAG	B	605	14/15	0.79	0.20	2.02	30,32,36,37	0
4	NAG	B	603	14/15	0.89	0.13	1.05	20,24,28,33	0
2	BMA	B	606	11/12	0.79	0.15	0.91	31,34,35,35	0
2	BMA	A	606	11/12	0.84	0.15	0.79	32,34,36,37	0
2	MAN	B	607	11/12	0.86	0.15	0.46	35,36,38,41	0
4	NAG	A	603	14/15	0.91	0.11	0.41	17,20,22,26	0
2	MAN	A	607	11/12	0.86	0.13	0.08	35,36,38,41	0
2	MAN	A	608	11/12	0.67	0.41	-	43,45,46,46	0
4	NAG	B	613	14/15	0.57	0.54	-	35,40,42,42	0
4	NAG	A	613	14/15	0.77	0.34	-	28,32,35,36	0
2	MAN	B	608	11/12	0.69	0.42	-	42,45,46,46	0

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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. 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	LLDF	B-factors(Å ²)	Q<0.9
3	NAG	A	604	14/15	0.90	0.13	1.18	15,18,28,30	0
3	NAG	A	602	14/15	0.95	0.09	0.47	9,11,17,19	0
3	NAG	B	604	14/15	0.92	0.12	0.40	13,16,20,22	0
3	NAG	B	602	14/15	0.96	0.09	0.12	10,12,13,14	0
5	FAD	A	600	53/53	0.98	0.07	-0.02	5,7,8,10	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors(\AA^2)	Q<0.9
5	FAD	B	600	53/53	0.98	0.06	-0.23	3,6,8,9	0

6.5 Other polymers [i](#)

There are no such residues in this entry.