



Full wwPDB X-ray Structure Validation Report ⓘ

Jan 15, 2018 – 02:29 PM EST

PDB ID : 3FCJ
Title : Nitroalkane oxidase: mutant402N crystallized with nitroethane
Authors : Major, D.T.; Gao, J.; Heroux, A.; Orville, A.M.; Valley, M.P.; Fitzpatrick, P.F.
Deposited on : 2008-11-21
Resolution : 2.40 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	:	1.7.2 (RC1), CSD as538be (2017)
Xtriage (Phenix)	:	1.9-1692
EDS	:	rb-20030736
Percentile statistics	:	20161228.v01 (using entries in the PDB archive December 28th 2016)
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)	:	rb-20030736

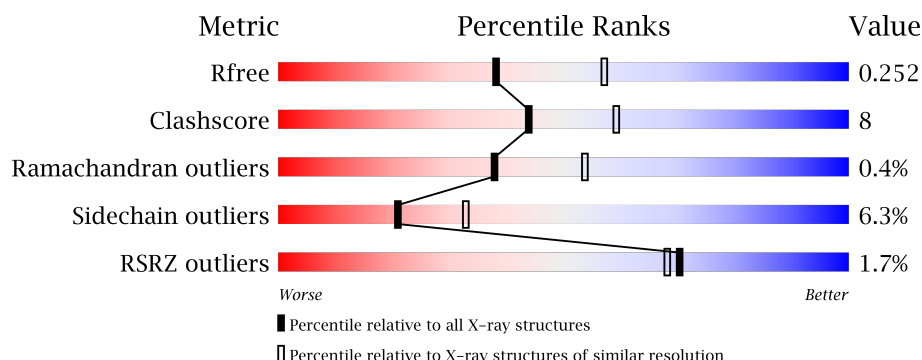
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.40 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}	100719	3166 (2.40-2.40)
Clashscore	112137	3674 (2.40-2.40)
Ramachandran outliers	110173	3616 (2.40-2.40)
Sidechain outliers	110143	3617 (2.40-2.40)
RSRZ outliers	101464	3195 (2.40-2.40)

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	438	<div> <div>0.1%</div> <div>82%</div> <div>15%</div> <div>0.4%</div> </div>
1	B	438	<div> <div>3%</div> <div>75%</div> <div>21%</div> <div>1%</div> </div>
1	C	438	<div> <div>0.1%</div> <div>83%</div> <div>12%</div> <div>0.6%</div> </div>
1	D	438	<div> <div>2%</div> <div>84%</div> <div>12%</div> <div>1.2%</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.

ria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	NIE	A	600	-	-	-	X
3	NIE	B	600	-	-	-	X
3	NIE	C	600	-	-	-	X
3	NIE	D	600	-	-	-	X
4	GOL	A	701	-	-	-	X
4	GOL	C	701	-	-	-	X

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 13850 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.

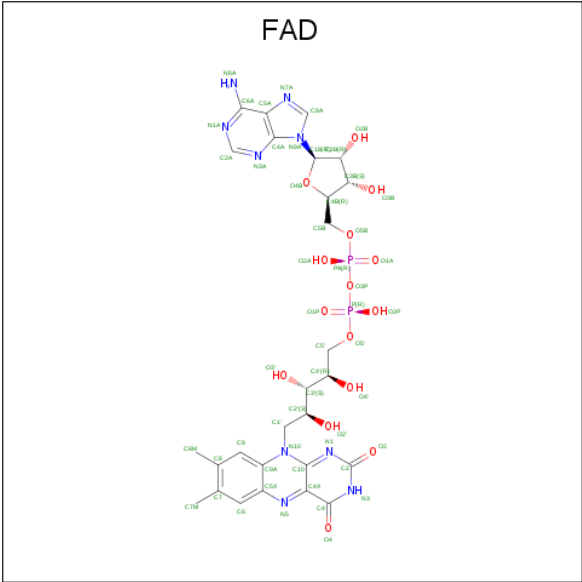
- Molecule 1 is a protein called Nitroalkane oxidase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	431	Total	C	N	O	S	0	0	0
			3303	2094	566	623	20			
1	B	431	Total	C	N	O	S	0	0	0
			3302	2093	566	623	20			
1	C	430	Total	C	N	O	S	0	0	0
			3293	2089	562	622	20			
1	D	432	Total	C	N	O	S	0	0	0
			3313	2099	570	624	20			

There are 4 discrepancies between the modelled and reference sequences:

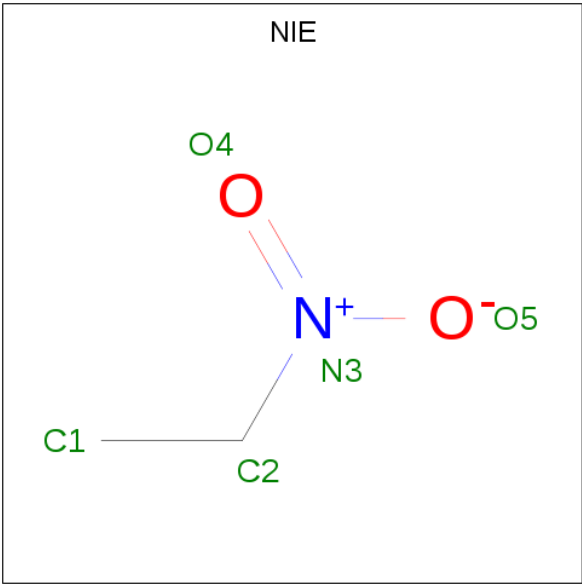
Chain	Residue	Modelled	Actual	Comment	Reference
A	402	ASN	ASP	ENGINEERED	UNP Q8X1D8
B	402	ASN	ASP	ENGINEERED	UNP Q8X1D8
C	402	ASN	ASP	ENGINEERED	UNP Q8X1D8
D	402	ASN	ASP	ENGINEERED	UNP Q8X1D8

- Molecule 2 is FLAVIN-ADENINE DINUCLEOTIDE (three-letter code: FAD) (formula: $C_{27}H_{33}N_9O_{15}P_2$).



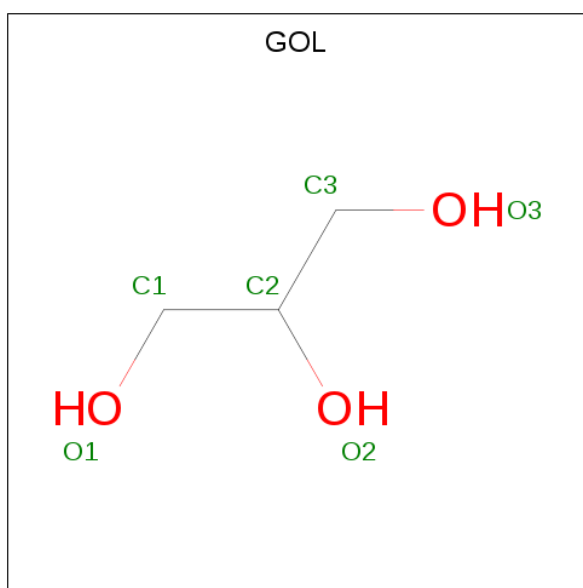
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
2	B	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
2	C	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
2	D	1	Total	C	N	O	P	0	0
			53	27	9	15	2		

- Molecule 3 is nitroethane (three-letter code: NIE) (formula: C₂H₅NO₂).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	O	0	0
			5	2	1	2		
3	B	1	Total	C	N	O	0	0
			5	2	1	2		
3	C	1	Total	C	N	O	0	0
			5	2	1	2		
3	D	1	Total	C	N	O	0	0
			5	2	1	2		

- Molecule 4 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			6	3	3		
4	A	1	Total	C	O	0	0
			6	3	3		
4	B	1	Total	C	O	0	0
			6	3	3		
4	C	1	Total	C	O	0	0
			6	3	3		
4	C	1	Total	C	O	0	0
			6	3	3		
4	D	1	Total	C	O	0	0
			6	3	3		

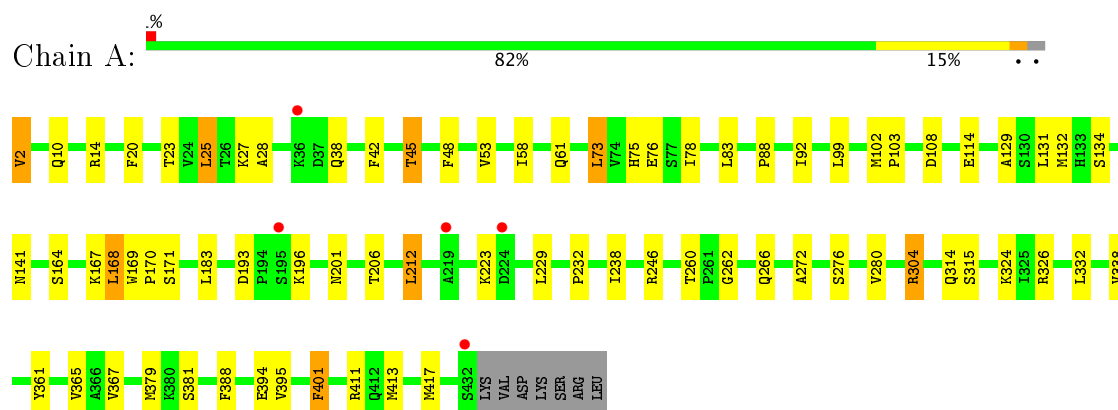
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	90	Total 90	O 90	0	0
5	B	73	Total 73	O 73	0	0
5	C	103	Total 103	O 103	0	0
5	D	105	Total 105	O 105	0	0

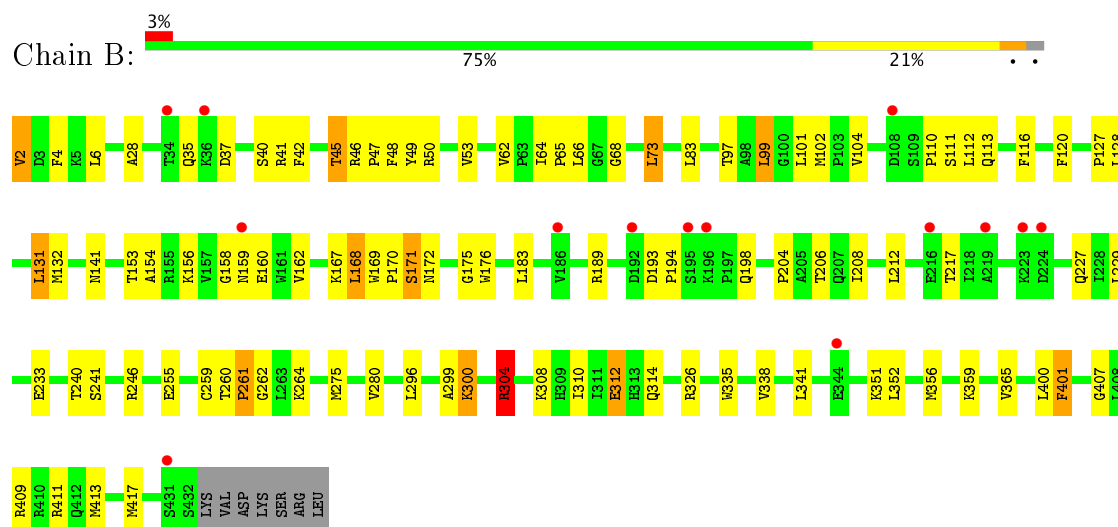
3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of 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.

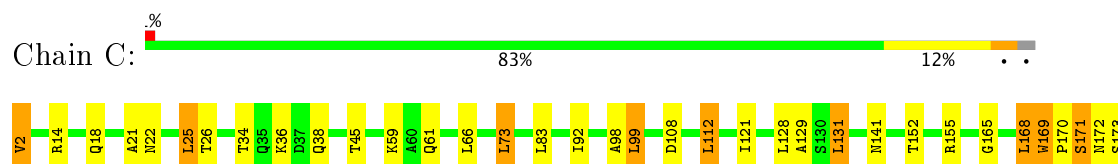
• Molecule 1: Nitroalkane oxidase

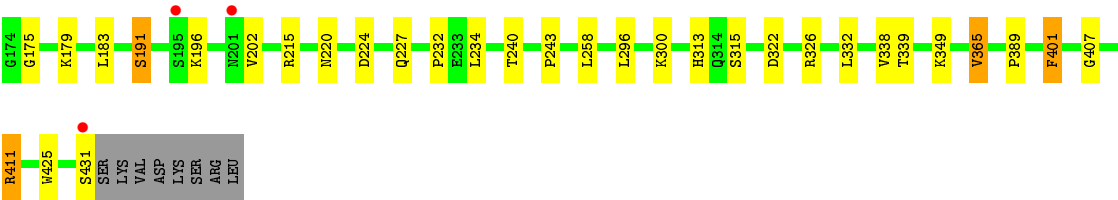


• Molecule 1: Nitroalkane oxidase

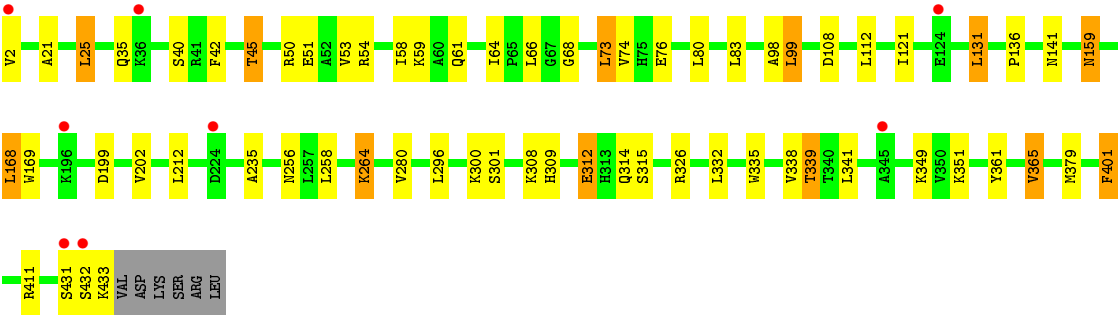
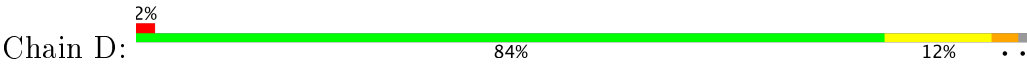


• Molecule 1: Nitroalkane oxidase





• Molecule 1: Nitroalkane oxidase



4 Data and refinement statistics

Property	Value	Source
Space group	P 32 2 1	Depositor
Cell constants a, b, c, α , β , γ	108.76 Å 108.76 Å 340.90 Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	20.00 – 2.40 20.00 – 2.40	Depositor EDS
% Data completeness (in resolution range)	98.8 (20.00-2.40) 99.0 (20.00-2.40)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.10	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.73 (at 2.41 Å)	Xtriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.197 , 0.251 0.198 , 0.252	Depositor DCC
R_{free} test set	4556 reflections (5.24%)	DCC
Wilson B-factor (Å ²)	42.3	Xtriage
Anisotropy	0.001	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 34.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.022 for -h,-k,l	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	13850	wwPDB-VP
Average B, all atoms (Å ²)	43.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.51% 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, 0.333 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: GOL, FAD, NIE

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	0.67	0/3372	0.72	0/4577
1	B	0.63	0/3371	0.70	1/4576 (0.0%)
1	C	0.66	0/3362	0.73	0/4564
1	D	0.67	0/3382	0.70	0/4590
All	All	0.66	0/13487	0.71	1/18307 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	304	ARG	NE-CZ-NH1	5.00	122.80	120.30

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	3303	0	3310	59	0
1	B	3302	0	3308	76	0
1	C	3293	0	3299	42	0
1	D	3313	0	3321	42	0
2	A	53	0	31	5	0
2	B	53	0	31	12	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	C	53	0	31	5	0
2	D	53	0	31	2	0
3	A	5	0	5	2	0
3	B	5	0	5	3	0
3	C	5	0	5	1	0
3	D	5	0	5	1	0
4	A	12	0	16	1	0
4	B	6	0	8	0	0
4	C	12	0	16	1	0
4	D	6	0	8	0	0
5	A	90	0	0	0	0
5	B	73	0	0	1	0
5	C	103	0	0	3	0
5	D	105	0	0	2	0
All	All	13850	0	13430	205	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 8.

All (205) 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:379:MET:HE3	1:B:401:PHE:HA	1.28	1.13
1:D:199:ASP:HB3	1:D:202:VAL:HG12	1.50	0.94
1:A:379:MET:CE	1:B:401:PHE:HA	2.02	0.89
1:A:379:MET:HE1	1:B:400:LEU:C	1.97	0.85
1:B:168:LEU:C	1:B:170:PRO:HD3	1.99	0.83
1:B:296:LEU:O	1:B:300:LYS:HG3	1.79	0.82
1:D:199:ASP:HB3	1:D:202:VAL:CG1	2.11	0.79
1:B:73:LEU:HB3	1:B:338:VAL:HB	1.65	0.78
2:B:500:FAD:N5	3:B:600:NIE:O4	2.17	0.77
1:B:168:LEU:O	1:B:170:PRO:HD3	1.85	0.77
1:C:326:ARG:NE	5:C:489:HOH:O	2.14	0.76
1:A:73:LEU:HB3	1:A:338:VAL:HB	1.69	0.73
1:D:141:ASN:HD21	2:D:500:FAD:H61A	1.39	0.70
1:A:379:MET:HE3	1:B:401:PHE:CA	2.15	0.70
1:A:168:LEU:C	1:A:170:PRO:HD3	2.13	0.69
1:D:312:GLU:HG3	5:D:541:HOH:O	1.91	0.69
1:B:42:PHE:O	1:B:45:THR:HB	1.92	0.69
1:A:2:VAL:N	4:C:701:GOL:HO3	1.91	0.69
1:C:141:ASN:HD21	2:C:500:FAD:H61A	1.40	0.68

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:314:GLN:HE21	1:D:315:SER:H	1.41	0.67
1:C:38:GLN:HG3	1:C:232:PRO:O	1.94	0.67
1:D:99:LEU:HD22	1:D:131:LEU:HD23	1.75	0.66
1:A:304:ARG:HD3	2:B:500:FAD:H51A	1.79	0.64
1:B:326:ARG:HB3	1:B:365:VAL:HG13	1.79	0.64
1:A:141:ASN:HD21	2:A:500:FAD:H61A	1.46	0.64
1:C:296:LEU:O	1:C:300:LYS:HG3	1.99	0.62
1:B:4:PHE:HD1	1:D:339:THR:HG21	1.64	0.62
1:D:296:LEU:O	1:D:300:LYS:HG3	1.99	0.62
1:A:379:MET:HE2	2:B:500:FAD:H3'	1.82	0.62
1:C:73:LEU:HB3	1:C:338:VAL:HB	1.81	0.62
1:B:259:CYS:HB2	1:B:264:LYS:HD3	1.81	0.61
1:C:168:LEU:C	1:C:170:PRO:HD2	2.21	0.61
1:B:4:PHE:CD1	1:D:339:THR:HG21	2.34	0.61
1:C:38:GLN:NE2	1:C:234:LEU:H	1.98	0.61
1:D:335:TRP:O	1:D:339:THR:HB	2.01	0.61
1:C:92:ILE:HG12	1:C:240:THR:HG21	1.81	0.61
1:B:171:SER:O	1:B:172:ASN:HB2	2.01	0.60
1:A:304:ARG:HG2	2:B:500:FAD:O5B	2.01	0.60
1:B:259:CYS:SG	1:B:264:LYS:HG2	2.42	0.60
1:A:38:GLN:HE22	1:A:238:ILE:HA	1.67	0.59
4:A:701:GOL:HO1	1:C:2:VAL:N	2.00	0.59
1:B:128:LEU:HD12	1:B:175:GLY:HA2	1.82	0.59
1:A:401:PHE:CE1	3:A:600:NIE:H2A	2.37	0.59
1:B:156:LYS:HD2	1:B:160:GLU:O	2.02	0.59
1:A:229:LEU:HD11	1:A:246:ARG:HB2	1.84	0.58
1:C:92:ILE:HG21	1:C:240:THR:HG23	1.85	0.58
1:C:99:LEU:HD22	1:C:131:LEU:HD23	1.84	0.58
1:B:314:GLN:HE21	1:C:315:SER:H	1.50	0.58
1:B:341:LEU:HD23	1:B:351:LYS:HB3	1.85	0.58
1:A:38:GLN:HG3	1:A:232:PRO:O	2.03	0.58
1:C:14:ARG:O	1:C:18:GLN:HG3	2.04	0.58
1:D:159:ASN:HD22	1:D:159:ASN:H	1.52	0.58
1:A:379:MET:CE	1:B:401:PHE:CA	2.77	0.57
1:D:73:LEU:HB3	1:D:338:VAL:HB	1.85	0.57
1:D:326:ARG:HB3	1:D:365:VAL:HG13	1.87	0.57
1:B:112:LEU:HD12	1:B:116:PHE:HE2	1.70	0.57
1:D:401:PHE:C	1:D:401:PHE:CD2	2.78	0.57
1:B:141:ASN:HD21	2:B:500:FAD:H61A	1.52	0.57
1:C:112:LEU:HD23	1:C:258:LEU:HD12	1.87	0.57
1:C:61:GLN:HE21	1:C:98:ALA:HB2	1.69	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:35:GLN:HE21	1:D:40:SER:HB3	1.69	0.56
1:A:53:VAL:HG22	1:A:58:ILE:HG13	1.86	0.56
2:A:500:FAD:N5	3:A:600:NIE:O5	2.38	0.55
1:B:99:LEU:HD22	1:B:131:LEU:HD23	1.87	0.55
1:D:64:ILE:HA	1:D:68:GLY:O	2.06	0.55
1:A:324:LYS:HE2	1:C:425:TRP:CZ3	2.41	0.55
1:B:314:GLN:HE22	1:C:313:HIS:HB3	1.70	0.55
1:A:379:MET:HE1	1:B:401:PHE:N	2.22	0.54
1:D:141:ASN:ND2	2:D:500:FAD:H61A	2.05	0.54
2:B:500:FAD:C5X	3:B:600:NIE:O4	2.56	0.54
1:C:326:ARG:HD3	1:C:365:VAL:HG22	1.88	0.54
1:B:102:MET:SD	1:B:275:MET:CE	2.96	0.54
1:B:156:LYS:HE2	1:B:158:GLY:O	2.08	0.54
1:D:50:ARG:NH1	5:D:485:HOH:O	2.40	0.54
1:B:110:PRO:HA	1:B:113:GLN:HE21	1.72	0.53
1:C:129:ALA:HA	1:C:183:LEU:O	2.09	0.53
1:B:102:MET:SD	1:B:275:MET:HE1	2.50	0.52
1:A:379:MET:CE	2:B:500:FAD:H3'	2.38	0.52
1:B:49:TYR:O	1:B:53:VAL:HG23	2.08	0.52
1:B:308:LYS:HD2	1:B:312:GLU:HG2	1.91	0.52
1:B:62:VAL:HB	1:B:68:GLY:HA3	1.92	0.51
1:B:112:LEU:HD12	1:B:116:PHE:CE2	2.44	0.51
1:B:97:THR:O	1:B:101:LEU:HG	2.10	0.51
1:C:407:GLY:O	1:C:411:ARG:HG3	2.09	0.51
1:D:42:PHE:O	1:D:45:THR:HB	2.10	0.51
1:A:23:THR:O	1:A:27:LYS:HE3	2.10	0.51
1:A:326:ARG:HB3	1:A:365:VAL:HG13	1.91	0.51
1:C:326:ARG:HB3	1:C:365:VAL:HG13	1.92	0.51
1:B:352:LEU:O	1:B:356:MET:HG2	2.11	0.51
1:B:401:PHE:CD2	1:B:401:PHE:C	2.84	0.51
1:D:112:LEU:CD2	1:D:258:LEU:HD12	2.40	0.51
1:A:132:MET:O	1:A:167:LYS:HE3	2.11	0.51
1:C:21:ALA:HA	1:C:25:LEU:HB2	1.93	0.50
1:D:112:LEU:HD23	1:D:258:LEU:HD12	1.93	0.50
1:A:314:GLN:HB2	1:D:314:GLN:HB2	1.93	0.50
1:C:155:ARG:HB3	1:C:191:SER:O	2.11	0.50
1:C:322:ASP:O	1:C:326:ARG:HG3	2.10	0.50
1:B:64:ILE:HA	1:B:68:GLY:O	2.10	0.50
1:B:112:LEU:CD1	1:B:116:PHE:HE2	2.24	0.50
1:D:264:LYS:HB2	1:D:264:LYS:NZ	2.26	0.50
1:A:141:ASN:ND2	2:A:500:FAD:H61A	2.08	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:35:GLN:HB3	1:B:40:SER:HB2	1.93	0.49
1:A:183:LEU:HD11	1:A:212:LEU:HG	1.93	0.49
1:D:199:ASP:CB	1:D:202:VAL:HG12	2.34	0.49
1:C:128:LEU:HD12	1:C:175:GLY:HA2	1.95	0.49
1:A:379:MET:HE1	1:B:400:LEU:O	2.12	0.49
1:A:315:SER:H	1:D:314:GLN:HE21	1.61	0.48
1:D:59:LYS:HE3	1:D:121:ILE:O	2.13	0.48
1:B:159:ASN:ND2	5:B:442:HOH:O	2.46	0.48
1:B:37:ASP:OD1	1:B:40:SER:OG	2.21	0.48
2:C:500:FAD:H52A	2:C:500:FAD:O2P	2.13	0.48
2:A:500:FAD:O5B	1:B:304:ARG:HG2	2.14	0.48
1:D:308:LYS:HE3	1:D:312:GLU:HB3	1.96	0.48
1:A:206:THR:O	1:A:262:GLY:HA2	2.14	0.47
1:A:379:MET:HE2	1:A:379:MET:HB2	1.51	0.47
2:C:500:FAD:N5	3:C:600:NIE:H2A	2.30	0.47
1:B:153:THR:HA	1:B:189:ARG:O	2.15	0.47
1:D:136:PRO:HA	1:D:168:LEU:HD12	1.96	0.47
1:A:381:SER:HB2	1:A:388:PHE:CD2	2.50	0.47
1:A:102:MET:HB3	1:A:103:PRO:HD3	1.96	0.47
1:B:413:MET:O	1:B:417:MET:HG3	2.15	0.46
1:D:99:LEU:HD12	3:D:600:NIE:H2	1.97	0.46
1:C:169:TRP:N	1:C:170:PRO:HD2	2.31	0.46
1:B:2:VAL:HG11	1:D:74:VAL:HG11	1.96	0.46
1:A:92:ILE:HG13	1:A:92:ILE:O	2.15	0.46
1:A:168:LEU:O	1:A:170:PRO:HD3	2.15	0.46
1:A:326:ARG:HD2	1:A:365:VAL:HG13	1.97	0.46
1:B:171:SER:HA	1:B:241:SER:O	2.15	0.46
1:C:171:SER:O	1:C:172:ASN:HB2	2.16	0.46
1:A:314:GLN:NE2	1:D:315:SER:H	2.12	0.46
1:C:326:ARG:NH2	5:C:489:HOH:O	2.49	0.46
1:B:102:MET:SD	1:B:275:MET:HE3	2.56	0.46
1:A:102:MET:HG2	1:A:272:ALA:HA	1.97	0.45
1:B:206:THR:HA	1:B:262:GLY:HA2	1.98	0.45
1:B:46:ARG:HB3	1:B:47:PRO:HD3	1.97	0.45
1:C:152:THR:HA	1:C:165:GLY:HA3	1.98	0.45
1:B:132:MET:O	1:B:167:LYS:HE3	2.17	0.45
1:B:168:LEU:C	1:B:170:PRO:CD	2.80	0.45
1:A:361:TYR:O	1:A:365:VAL:HB	2.16	0.45
1:C:99:LEU:HD13	1:C:131:LEU:HB3	1.99	0.45
1:C:173:SER:OG	1:C:243:PRO:HD2	2.16	0.45
1:D:432:SER:O	1:D:433:LYS:CB	2.65	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:61:GLN:NE2	1:A:76:GLU:OE2	2.40	0.44
2:C:500:FAD:HM81	1:D:379:MET:CE	2.46	0.44
1:A:14:ARG:HB2	1:A:78:ILE:HG21	1.98	0.44
1:B:359:LYS:HD2	1:B:409:ARG:HG3	2.00	0.44
1:A:401:PHE:CD2	1:A:401:PHE:C	2.87	0.44
1:C:401:PHE:C	1:C:401:PHE:CD2	2.89	0.44
1:A:88:PRO:HG2	1:A:394:GLU:CD	2.38	0.44
1:A:10:GLN:HG3	1:A:75:HIS:CE1	2.52	0.44
1:A:379:MET:CE	1:B:400:LEU:O	2.65	0.44
1:A:129:ALA:HA	1:A:183:LEU:O	2.17	0.43
1:A:53:VAL:HG22	1:A:58:ILE:CG1	2.48	0.43
1:C:326:ARG:CZ	5:C:489:HOH:O	2.62	0.43
1:D:21:ALA:HA	1:D:25:LEU:HB2	2.00	0.43
1:B:141:ASN:ND2	2:B:500:FAD:H61A	2.16	0.43
1:B:229:LEU:HD11	1:B:246:ARG:HB2	2.00	0.43
1:A:20:PHE:CE2	1:A:25:LEU:HD13	2.53	0.43
1:C:59:LYS:HG3	1:C:121:ILE:HA	2.01	0.43
1:B:120:PHE:CE1	1:B:127:PRO:HB2	2.54	0.43
1:B:208:ILE:O	1:B:261:PRO:HA	2.19	0.43
1:B:41:ARG:NH2	1:B:233:GLU:OE2	2.48	0.43
1:A:42:PHE:O	1:A:45:THR:HB	2.18	0.43
1:B:28:ALA:HA	1:B:48:PHE:CZ	2.54	0.43
2:A:500:FAD:H52A	2:A:500:FAD:O2P	2.18	0.43
1:B:6:LEU:HD21	1:B:335:TRP:CH2	2.53	0.43
1:C:389:PRO:HB3	1:D:235:ALA:HB2	2.00	0.43
1:C:179:LYS:HB2	1:C:215:ARG:HH12	1.84	0.42
1:B:170:PRO:HA	2:B:500:FAD:C4	2.49	0.42
1:B:299:ALA:HA	1:B:310:ILE:HG13	1.99	0.42
1:D:76:GLU:O	1:D:80:LEU:HG	2.20	0.42
1:D:309:HIS:O	1:D:312:GLU:HB2	2.19	0.42
1:A:28:ALA:HA	1:A:48:PHE:CZ	2.54	0.42
1:B:104:VAL:HG21	1:B:183:LEU:HD21	2.00	0.42
1:A:14:ARG:HB2	1:A:78:ILE:CG2	2.49	0.42
2:B:500:FAD:C4X	3:B:600:NIE:O4	2.68	0.42
1:C:22:ASN:O	1:C:26:THR:OG1	2.32	0.42
1:D:61:GLN:HE21	1:D:98:ALA:HB2	1.83	0.42
1:D:51:GLU:OE1	1:D:54:ARG:NH2	2.52	0.42
1:B:64:ILE:C	1:B:66:LEU:H	2.22	0.42
1:C:224:ASP:HB2	1:C:227:GLN:HE21	1.85	0.42
1:A:276:SER:O	1:A:280:VAL:HB	2.19	0.42
1:B:198:GLN:HE22	1:B:204:PRO:HB3	1.85	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:341:LEU:HD23	1:D:351:LYS:HB3	2.01	0.42
1:A:134:SER:HB2	1:A:168:LEU:O	2.19	0.41
1:B:128:LEU:HD21	1:B:176:TRP:CZ2	2.55	0.41
1:B:154:ALA:HA	1:B:162:VAL:O	2.20	0.41
1:A:379:MET:CE	1:B:400:LEU:C	2.80	0.41
1:D:53:VAL:HG22	1:D:58:ILE:HG13	2.02	0.41
1:B:300:LYS:HE3	1:B:300:LYS:HB3	1.81	0.41
1:C:92:ILE:HG12	1:C:240:THR:CG2	2.47	0.41
1:B:314:GLN:NE2	1:C:315:SER:H	2.15	0.41
1:D:361:TYR:O	1:D:365:VAL:HB	2.20	0.41
1:A:413:MET:O	1:A:417:MET:HG3	2.21	0.41
1:A:193:ASP:OD1	1:A:196:LYS:HG3	2.21	0.41
1:A:367:VAL:HG22	1:A:395:VAL:HG13	2.02	0.41
1:B:193:ASP:HA	1:B:194:PRO:HD2	1.72	0.41
1:B:35:GLN:HB3	1:B:40:SER:CB	2.50	0.41
1:B:131:LEU:C	1:B:131:LEU:HD12	2.41	0.40
1:B:407:GLY:O	1:B:411:ARG:HG3	2.20	0.40
1:A:304:ARG:CD	2:B:500:FAD:H51A	2.48	0.40
1:C:92:ILE:HG21	1:C:240:THR:CG2	2.48	0.40
1:C:170:PRO:HA	2:C:500:FAD:C4	2.52	0.40
1:A:304:ARG:NE	1:A:304:ARG:HA	2.37	0.40
1:B:240:THR:HG21	2:B:500:FAD:HM72	2.03	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	429/438 (98%)	416 (97%)	12 (3%)	1 (0%)	51 67
1	B	429/438 (98%)	412 (96%)	14 (3%)	3 (1%)	25 37
1	C	428/438 (98%)	416 (97%)	10 (2%)	2 (0%)	32 46

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	D	430/438 (98%)	420 (98%)	9 (2%)	1 (0%)	51	67
All	All	1716/1752 (98%)	1664 (97%)	45 (3%)	7 (0%)	38	54

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	169	TRP
1	B	169	TRP
1	C	169	TRP
1	D	169	TRP
1	C	220	ASN
1	B	65	PRO
1	B	261	PRO

5.3.2 Protein sidechains ⓘ

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	353/363 (97%)	332 (94%)	21 (6%)	23	36
1	B	353/363 (97%)	333 (94%)	20 (6%)	24	38
1	C	352/363 (97%)	328 (93%)	24 (7%)	18	29
1	D	354/363 (98%)	330 (93%)	24 (7%)	18	29
All	All	1412/1452 (97%)	1323 (94%)	89 (6%)	21	33

All (89) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	2	VAL
1	A	25	LEU
1	A	45	THR
1	A	73	LEU
1	A	83	LEU
1	A	99	LEU
1	A	108	ASP

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Mol	Chain	Res	Type
1	A	114	GLU
1	A	131	LEU
1	A	164	SER
1	A	168	LEU
1	A	171	SER
1	A	201	ASN
1	A	212	LEU
1	A	223	LYS
1	A	260	THR
1	A	266	GLN
1	A	304	ARG
1	A	332	LEU
1	A	401	PHE
1	A	411	ARG
1	B	2	VAL
1	B	45	THR
1	B	50	ARG
1	B	73	LEU
1	B	83	LEU
1	B	99	LEU
1	B	111	SER
1	B	131	LEU
1	B	168	LEU
1	B	171	SER
1	B	212	LEU
1	B	217	THR
1	B	227	GLN
1	B	255	GLU
1	B	260	THR
1	B	280	VAL
1	B	300	LYS
1	B	304	ARG
1	B	312	GLU
1	B	401	PHE
1	C	2	VAL
1	C	25	LEU
1	C	34	THR
1	C	36	LYS
1	C	45	THR
1	C	66	LEU
1	C	73	LEU
1	C	83	LEU

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Mol	Chain	Res	Type
1	C	99	LEU
1	C	108	ASP
1	C	112	LEU
1	C	131	LEU
1	C	168	LEU
1	C	171	SER
1	C	191	SER
1	C	196	LYS
1	C	202	VAL
1	C	332	LEU
1	C	339	THR
1	C	349	LYS
1	C	365	VAL
1	C	401	PHE
1	C	411	ARG
1	C	431	SER
1	D	2	VAL
1	D	25	LEU
1	D	45	THR
1	D	66	LEU
1	D	73	LEU
1	D	83	LEU
1	D	99	LEU
1	D	108	ASP
1	D	131	LEU
1	D	159	ASN
1	D	168	LEU
1	D	212	LEU
1	D	256	ASN
1	D	264	LYS
1	D	280	VAL
1	D	301	SER
1	D	312	GLU
1	D	332	LEU
1	D	339	THR
1	D	349	LYS
1	D	365	VAL
1	D	401	PHE
1	D	411	ARG
1	D	431	SER

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (48) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	16	HIS
1	A	35	GLN
1	A	38	GLN
1	A	43	GLN
1	A	113	GLN
1	A	137	ASN
1	A	141	ASN
1	A	256	ASN
1	A	314	GLN
1	B	38	GLN
1	B	55	HIS
1	B	61	GLN
1	B	113	GLN
1	B	137	ASN
1	B	141	ASN
1	B	144	GLN
1	B	198	GLN
1	B	256	ASN
1	B	266	GLN
1	B	314	GLN
1	C	16	HIS
1	C	22	ASN
1	C	38	GLN
1	C	43	GLN
1	C	61	GLN
1	C	113	GLN
1	C	137	ASN
1	C	141	ASN
1	C	198	GLN
1	C	256	ASN
1	C	266	GLN
1	C	357	GLN
1	D	18	GLN
1	D	22	ASN
1	D	35	GLN
1	D	113	GLN
1	D	137	ASN
1	D	141	ASN
1	D	144	GLN
1	D	159	ASN
1	D	198	GLN
1	D	227	GLN
1	D	251	HIS

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Mol	Chain	Res	Type
1	D	256	ASN
1	D	266	GLN
1	D	309	HIS
1	D	314	GLN
1	D	402	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 carbohydrates in this entry.

5.6 Ligand geometry [i](#)

14 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
2	FAD	A	500	-	51,58,58	1.31	4 (7%)	54,89,89	1.93	9 (16%)
3	NIE	A	600	-	3,4,4	1.01	0	0,4,4	0.00	-
4	GOL	A	700	-	5,5,5	0.40	0	5,5,5	0.44	0
4	GOL	A	701	-	5,5,5	0.33	0	5,5,5	0.42	0
2	FAD	B	500	-	51,58,58	1.43	7 (13%)	54,89,89	1.88	7 (12%)
3	NIE	B	600	-	3,4,4	0.52	0	0,4,4	0.00	-
4	GOL	B	700	-	5,5,5	0.43	0	5,5,5	0.54	0
2	FAD	C	500	-	51,58,58	1.57	7 (13%)	54,89,89	2.29	8 (14%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	NIE	C	600	-	3,4,4	0.69	0	0,4,4	0.00	-
4	GOL	C	700	-	5,5,5	0.25	0	5,5,5	0.69	0
4	GOL	C	701	-	5,5,5	0.31	0	5,5,5	0.44	0
2	FAD	D	500	-	51,58,58	1.40	7 (13%)	54,89,89	1.87	6 (11%)
3	NIE	D	600	-	3,4,4	0.63	0	0,4,4	0.00	-
4	GOL	D	700	-	5,5,5	0.42	0	5,5,5	0.32	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	FAD	A	500	-	-	0/28/50/50	0/6/6/6
3	NIE	A	600	-	-	0/1/2/2	0/0/0/0
4	GOL	A	700	-	-	0/4/4/4	0/0/0/0
4	GOL	A	701	-	-	0/4/4/4	0/0/0/0
2	FAD	B	500	-	-	0/28/50/50	0/6/6/6
3	NIE	B	600	-	-	0/1/2/2	0/0/0/0
4	GOL	B	700	-	-	0/4/4/4	0/0/0/0
2	FAD	C	500	-	-	0/28/50/50	0/6/6/6
3	NIE	C	600	-	-	0/1/2/2	0/0/0/0
4	GOL	C	700	-	-	0/4/4/4	0/0/0/0
4	GOL	C	701	-	-	0/4/4/4	0/0/0/0
2	FAD	D	500	-	-	0/28/50/50	0/6/6/6
3	NIE	D	600	-	-	0/1/2/2	0/0/0/0
4	GOL	D	700	-	-	0/4/4/4	0/0/0/0

All (25) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	500	FAD	C5X-N5	2.03	1.38	1.35
2	C	500	FAD	C2A-N1A	2.14	1.37	1.33
2	D	500	FAD	C1'-N10	2.18	1.50	1.48
2	C	500	FAD	C5X-N5	2.19	1.38	1.35
2	B	500	FAD	C9A-N10	2.26	1.41	1.38
2	D	500	FAD	C5X-N5	2.48	1.39	1.35
2	B	500	FAD	C2A-N1A	2.49	1.38	1.33
2	C	500	FAD	C2A-N3A	2.55	1.36	1.32
2	A	500	FAD	C4-N3	2.82	1.38	1.33
2	D	500	FAD	C2A-N1A	2.99	1.39	1.33
2	B	500	FAD	C4-N3	3.07	1.38	1.33

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	500	FAD	C2A-N3A	3.36	1.37	1.32
2	D	500	FAD	C4-N3	3.49	1.39	1.33
2	C	500	FAD	C4-N3	3.70	1.39	1.33
2	A	500	FAD	C10-N1	3.77	1.38	1.33
2	A	500	FAD	C2A-N3A	3.87	1.38	1.32
2	B	500	FAD	C10-N1	3.96	1.38	1.33
2	B	500	FAD	C2A-N3A	3.99	1.38	1.32
2	A	500	FAD	C4X-N5	4.04	1.39	1.33
2	D	500	FAD	C4X-N5	4.25	1.39	1.33
2	C	500	FAD	C10-N1	4.43	1.39	1.33
2	B	500	FAD	C4X-N5	4.46	1.39	1.33
2	D	500	FAD	C10-N1	4.56	1.39	1.33
2	C	500	FAD	C4X-N5	4.83	1.40	1.33
2	C	500	FAD	C1'-N10	5.49	1.54	1.48

All (30) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	500	FAD	N3A-C2A-N1A	-12.39	118.06	128.86
2	A	500	FAD	N3A-C2A-N1A	-10.05	120.11	128.86
2	B	500	FAD	N3A-C2A-N1A	-8.78	121.21	128.86
2	D	500	FAD	N3A-C2A-N1A	-8.47	121.48	128.86
2	C	500	FAD	C4X-C4-N3	-3.85	118.01	123.48
2	D	500	FAD	C4X-C4-N3	-3.29	118.80	123.48
2	B	500	FAD	C4X-C4-N3	-2.97	119.25	123.48
2	A	500	FAD	C4X-C4-N3	-2.81	119.49	123.48
2	A	500	FAD	C4X-C10-N10	-2.46	118.81	120.52
2	B	500	FAD	C10-C4X-N5	-2.29	117.96	120.59
2	B	500	FAD	C9A-C5X-N5	-2.12	119.08	122.24
2	A	500	FAD	C9A-C5X-N5	-2.08	119.14	122.24
2	C	500	FAD	C9A-C5X-N5	-2.04	119.20	122.24
2	C	500	FAD	C6-C5X-C9A	2.06	121.67	119.00
2	A	500	FAD	C1'-N10-C9A	2.17	120.33	118.35
2	A	500	FAD	C6-C5X-C9A	2.25	121.92	119.00
2	B	500	FAD	C4-C4X-N5	2.52	121.44	118.68
2	C	500	FAD	C1'-N10-C9A	2.62	120.75	118.35
2	D	500	FAD	C4-C4X-N5	2.74	121.69	118.68
2	A	500	FAD	C5X-C9A-N10	2.87	119.79	117.66
2	D	500	FAD	C4X-N5-C5X	2.95	119.88	116.76
2	C	500	FAD	C5X-C9A-N10	2.99	119.88	117.66
2	A	500	FAD	C4X-N5-C5X	3.00	119.93	116.76
2	C	500	FAD	C4X-N5-C5X	3.01	119.94	116.76

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	500	FAD	C1'-N10-C9A	3.49	121.55	118.35
2	B	500	FAD	C4X-N5-C5X	4.99	122.03	116.76
2	A	500	FAD	C4-N3-C2	5.12	119.64	115.16
2	B	500	FAD	C4-N3-C2	5.65	120.10	115.16
2	C	500	FAD	C4-N3-C2	6.65	120.97	115.16
2	D	500	FAD	C4-N3-C2	6.87	121.17	115.16

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

10 monomers are involved in 28 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	500	FAD	5	0
3	A	600	NIE	2	0
4	A	701	GOL	1	0
2	B	500	FAD	12	0
3	B	600	NIE	3	0
2	C	500	FAD	5	0
3	C	600	NIE	1	0
4	C	701	GOL	1	0
2	D	500	FAD	2	0
3	D	600	NIE	1	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	431/438 (98%)	-0.36	5 (1%) 79 77	28, 42, 56, 65	1 (0%)
1	B	431/438 (98%)	-0.19	14 (3%) 48 46	30, 50, 65, 75	1 (0%)
1	C	430/438 (98%)	-0.40	3 (0%) 87 86	26, 40, 56, 64	1 (0%)
1	D	432/438 (98%)	-0.37	8 (1%) 67 64	28, 40, 55, 67	2 (0%)
All	All	1724/1752 (98%)	-0.33	30 (1%) 70 68	26, 42, 60, 75	5 (0%)

All (30) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	195	SER	3.8
1	B	196	LYS	3.3
1	A	224	ASP	3.2
1	B	36	LYS	3.0
1	D	224	ASP	3.0
1	D	36	LYS	2.9
1	B	216	GLU	2.9
1	D	432	SER	2.8
1	A	195	SER	2.8
1	B	108	ASP	2.7
1	D	196	LYS	2.7
1	B	34	THR	2.6
1	A	219	ALA	2.5
1	B	223	LYS	2.5
1	A	36	LYS	2.4
1	D	2	VAL	2.4
1	B	186	VAL	2.3
1	B	195	SER	2.3
1	B	159	ASN	2.3
1	C	201	ASN	2.3
1	D	431	SER	2.2

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Mol	Chain	Res	Type	RSRZ
1	B	224	ASP	2.2
1	B	344	GLU	2.2
1	A	432	SER	2.1
1	C	431	SER	2.1
1	D	124	GLU	2.1
1	B	219	ALA	2.0
1	B	431	SER	2.0
1	B	192	ASP	2.0
1	D	345	ALA	2.0

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

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

6.3 Carbohydrates [i](#)

There are no carbohydrates 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. 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	NIE	A	600	5/5	0.49	0.37	18.16	67,68,71,72	0
3	NIE	C	600	5/5	0.61	0.36	12.97	67,70,72,74	0
4	GOL	A	701	6/6	0.92	0.30	6.60	60,63,64,64	0
3	NIE	B	600	5/5	0.82	0.27	6.52	60,60,61,62	0
4	GOL	C	701	6/6	0.87	0.27	5.97	64,65,66,67	0
3	NIE	D	600	5/5	0.80	0.24	4.23	50,51,55,56	0
4	GOL	A	700	6/6	0.98	0.11	0.74	38,41,41,42	0
2	FAD	B	500	53/53	0.95	0.12	-0.09	31,39,47,48	0
2	FAD	C	500	53/53	0.96	0.12	-0.17	31,35,37,38	0
2	FAD	D	500	53/53	0.97	0.11	-0.19	28,32,37,38	0
4	GOL	D	700	6/6	0.97	0.09	-0.30	42,44,45,45	0
2	FAD	A	500	53/53	0.97	0.11	-0.32	28,35,37,38	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors(\AA^2)	Q<0.9
4	GOL	C	700	6/6	0.97	0.10	-0.41	43,44,44,44	0
4	GOL	B	700	6/6	0.98	0.10	-0.52	45,46,48,51	0

6.5 Other polymers [i](#)

There are no such residues in this entry.