Full wwPDB X-ray Structure Validation Report (i)

Sep 23, 2025 – 11:13 am BST

PDB ID	:	7A6Q / pdb_00007a6q
Title	:	Crystal structure of human aldehyde dehydrogenase 1A3 in complex with selective NR6 inhibitor compound
Authors	:	Gelardi, E.L.M.; Garavaglia, S.
Deposited on	:	2020-08-26
Resolution	:	2.95 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:

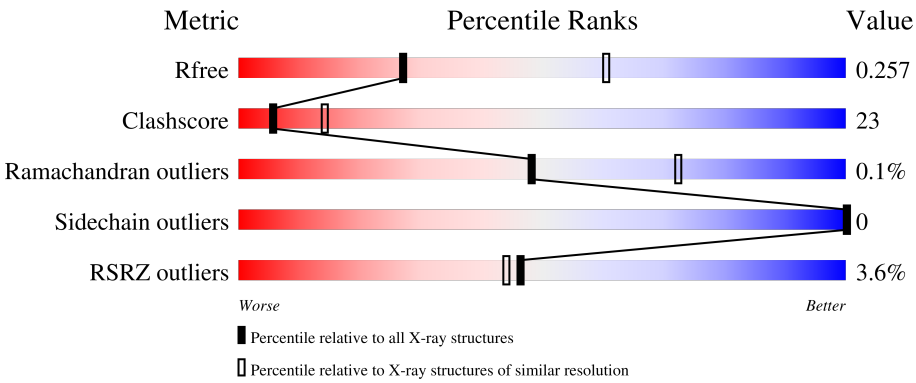
MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.46

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.95 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}	164625	1044 (2.98-2.94)
Clashscore	180529	1097 (2.98-2.94)
Ramachandran outliers	177936	1049 (2.98-2.94)
Sidechain outliers	177891	1049 (2.98-2.94)
RSRZ outliers	164620	1044 (2.98-2.94)

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	512	4% 58% 38% ·
1	B	512	3% 58% 38% ·

2 Entry composition (i)

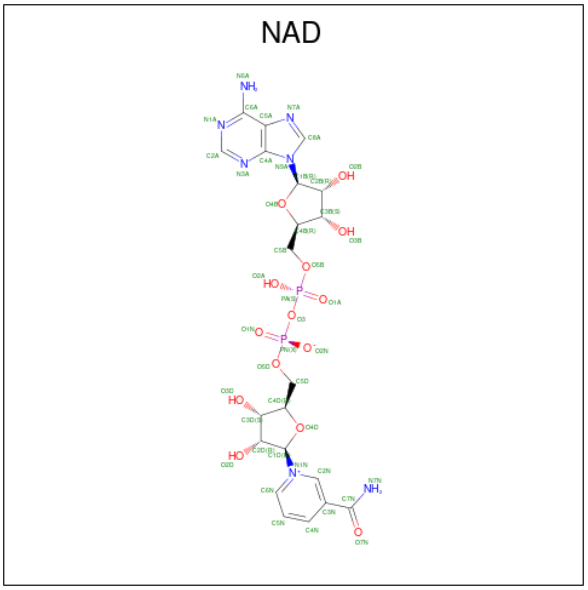
There are 7 unique types of molecules in this entry. The entry contains 7871 atoms, of which 84 are hydrogens and 0 are deuteriums.

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 Aldehyde dehydrogenase family 1 member A3.

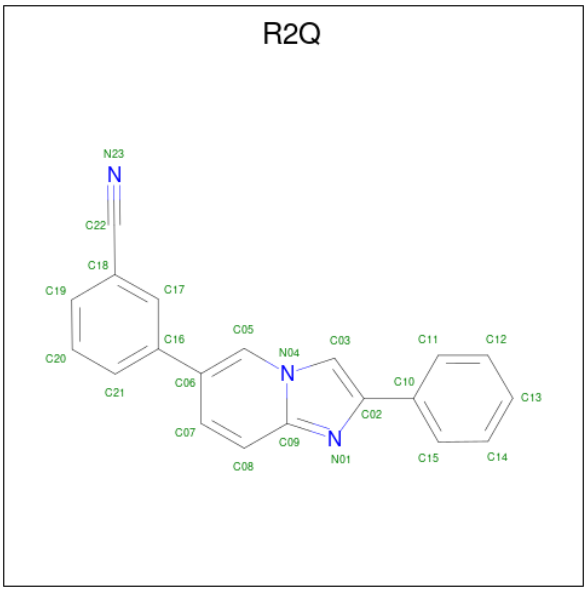
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	489	3780	2410	646	704	20	0	0	0
1	B	489	3780	2410	646	704	20	0	0	0

- Molecule 2 is NICOTINAMIDE-ADENINE-DINUCLEOTIDE (CCD ID: NAD) (formula: $C_{21}H_{27}N_7O_{14}P_2$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
2	A	1	44	21	7	14	2	0	0
2	B	1	44	21	7	14	2	0	0

- Molecule 3 is 3-(2-phenylimidazo[1,2-a]pyridin-6-yl)benzenecarbonitrile (CCD ID: R2Q) (formula: $C_{20}H_{13}N_3$) (labeled as "Ligand of Interest" by depositor).

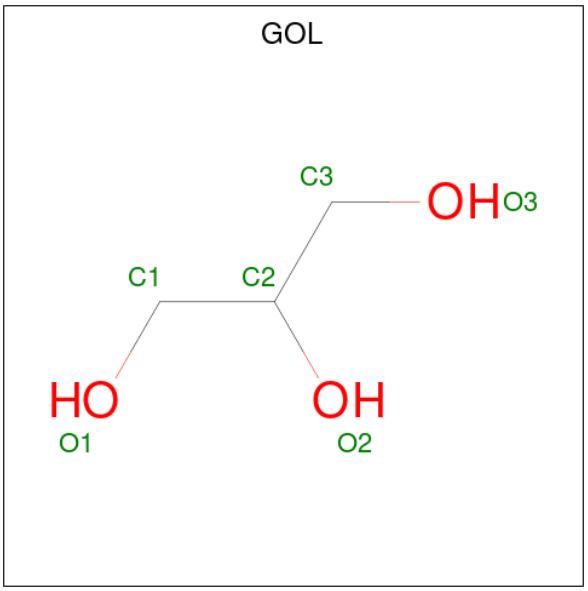


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	H	N		
3	A	1	36	20	13	3	0	0
			Total	C	H	N		
3	B	1	36	20	13	3	0	0

- Molecule 4 is SODIUM ION (CCD ID: NA) (formula: Na).

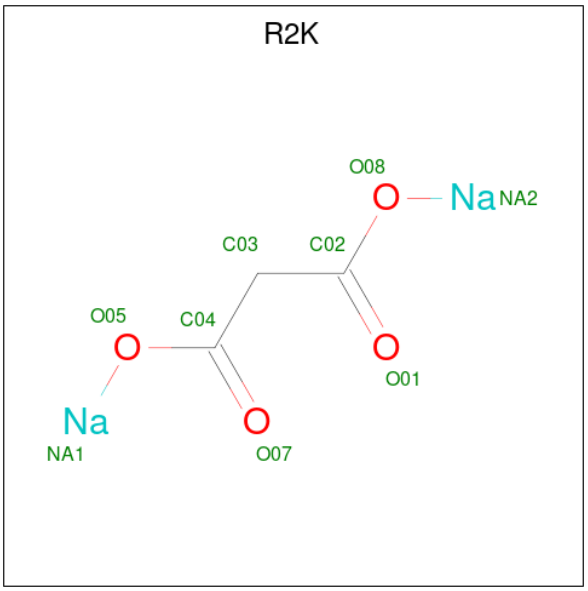
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Na		
4	A	2	2	2	0	0
			Total	Na		
4	B	2	2	2	0	0

- Molecule 5 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).



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

- Molecule 6 is (3-oxidanylidene-3-sodiooxy-propanoyl)oxysodium (CCD ID: R2K) (formula: $C_3H_2Na_2O_4$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	H	Na	O		
6	B	1	11	3	2	2	4	0	0

- Molecule 7 is water.

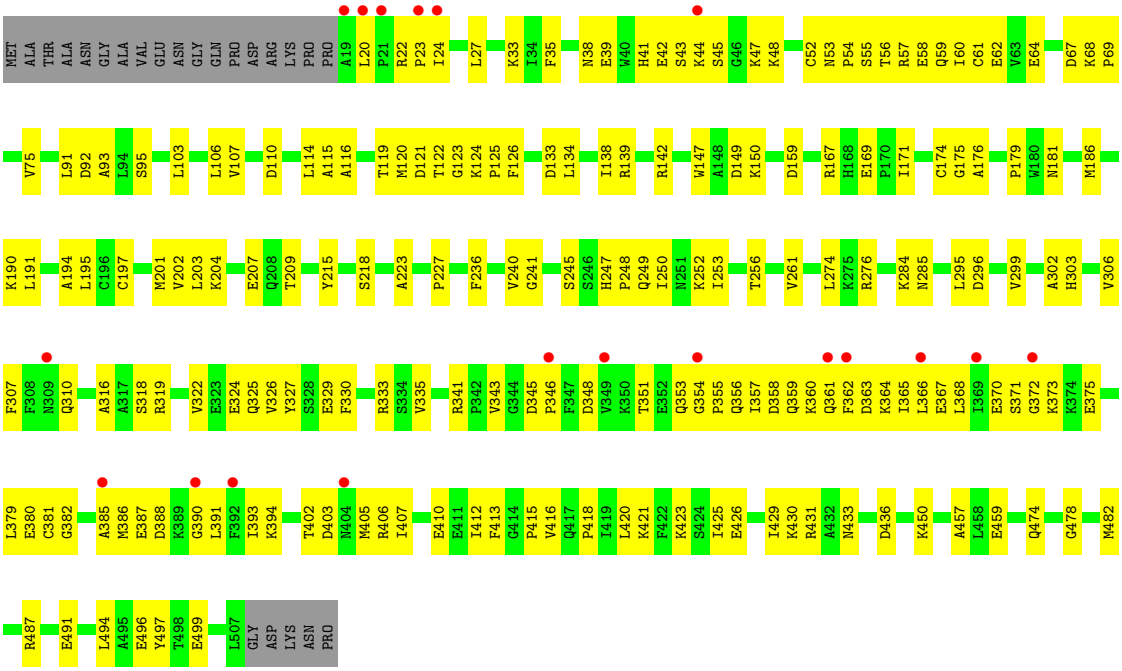
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
7	A	23	23	23	0	0
			Total	O		
7	B	15	15	15	0	0

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.

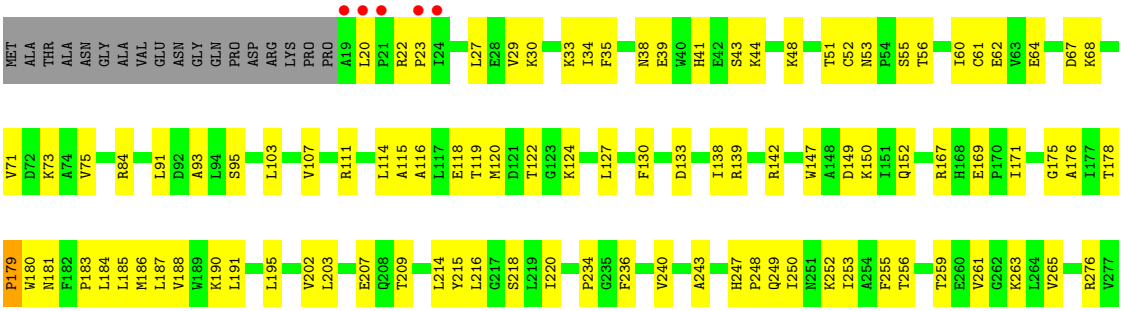
• Molecule 1: Aldehyde dehydrogenase family 1 member A3

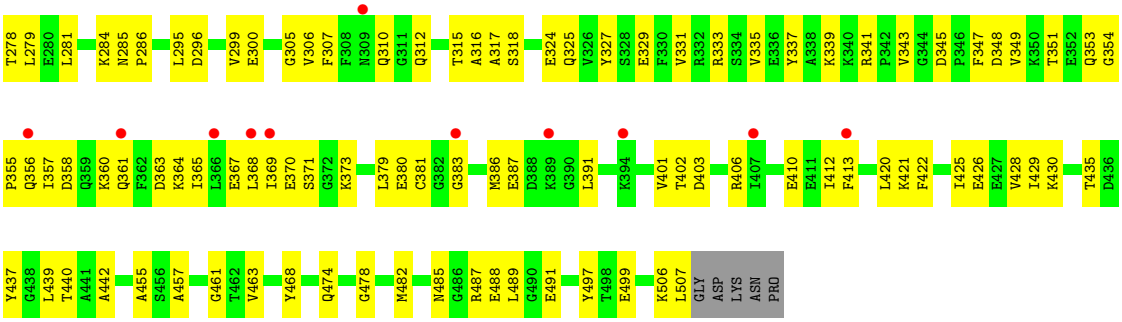
Chain A:



• Molecule 1: Aldehyde dehydrogenase family 1 member A3

Chain B:




T278 L279 E280 L281 K284 N285 P286 L295 D296 V299 E300 G305 V306 F307 F308 N309 Q310 G311 Q312 T315 A316 A317 S318 E324 Q325 V326 Y327 S328 E329 F330 V331 R332 R333 S334 V335 E336 Y337 A338 K339 K340 R341 P342 V343 G344 D345 P346 F347 D348 V349 K350 T351 E352 Q353 G354
P355 Q356 I357 D358 Q359 K360 Q361 F362 D363 K364 I365 L366 E367 L368 I369 E370 S371 G372 K373 L379 E380 C381 G382 G383 M386 E387 D388 K389 G390 L391 K394 V401 T402 D403 R406 I407 E410 E411 I412 F413 L420 K421 F422 I425 E426 E427 V428 I429 K430 T435 D436
Y437 G438 L439 T440 A441 A442 A455 S456 A457 G461 T462 V463 Y468 Q474 G478 M482 N485 G486 R487 E488 L489 G490 E491 Y497 T498 E499 K506 L507 GLY ASP LYS ASN PRO

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 2 21	Depositor
Cell constants a, b, c, α, β, γ	83.16Å 89.51Å 158.65Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.32 – 2.95 48.32 – 2.95	Depositor EDS
% Data completeness (in resolution range)	99.5 (48.32-2.95) 99.5 (48.32-2.95)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.10	Depositor
$< I/\sigma(I) >$ [1]	1.79 (at 2.96Å)	Xtriage
Refinement program	PHENIX 1.18.1_3865	Depositor
R, R_{free}	0.194 , 0.250 0.203 , 0.257	Depositor DCC
R_{free} test set	1306 reflections (5.09%)	wwPDB-VP
Wilson B-factor (Å^2)	74.4	Xtriage
Anisotropy	0.361	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.40 , 69.5	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.94	EDS
Total number of atoms	7871	wwPDB-VP
Average B, all atoms (Å^2)	77.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.97% 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: NA, NAD, GOL, R2K, R2Q

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	0.23	0/3858	0.44	0/5221
1	B	0.23	0/3858	0.41	0/5221
All	All	0.23	0/7716	0.43	0/10442

There are no bond length outliers.

There are no bond angle outliers.

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	3780	0	3813	187	4
1	B	3780	0	3813	160	0
2	A	44	0	24	10	0
2	B	44	0	24	3	3
3	A	23	13	0	1	0
3	B	23	13	0	1	0
4	A	2	0	0	0	0
4	B	2	0	0	0	0
5	A	30	40	40	3	0
5	B	12	16	16	1	0
6	B	9	2	0	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
7	A	23	0	0	1	0
7	B	15	0	0	8	0
All	All	7787	84	7730	355	4

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 23.

All (355) 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)
2:A:601:NAD:O4D	2:A:601:NAD:C1D	1.63	1.20
1:A:382:GLY:HA2	1:A:394:LYS:HD2	1.34	1.08
1:A:119:THR:HG21	1:A:126:PHE:HA	1.39	1.05
1:A:341:ARG:HH12	1:A:353:GLN:HB2	1.28	0.97
1:A:121:ASP:OD2	1:A:209:THR:HA	1.66	0.95
1:A:44:LYS:HD3	1:A:69:PRO:HG2	1.50	0.94
1:A:44:LYS:CD	1:A:69:PRO:CB	2.50	0.89
1:A:310:GLN:HE21	1:A:354:GLY:H	1.17	0.88
1:A:24:ILE:HG23	1:A:27:LEU:HD13	1.54	0.87
1:B:178:THR:HG22	1:B:190:LYS:HE2	1.55	0.87
1:A:406:ARG:NH1	1:A:410:GLU:OE2	2.10	0.85
1:A:412:ILE:HG21	1:A:416:VAL:HG12	1.58	0.85
1:A:44:LYS:HD3	1:A:69:PRO:CG	2.06	0.84
1:A:44:LYS:HD2	1:A:69:PRO:CB	2.06	0.84
1:A:412:ILE:HG21	1:A:416:VAL:CG1	2.09	0.83
1:B:127:LEU:HD11	1:B:349:VAL:HG13	1.60	0.82
1:B:339:LYS:HE2	1:B:381:CYS:HA	1.61	0.81
1:A:284:LYS:HG3	1:A:319:ARG:HD2	1.62	0.80
1:B:363:ASP:O	1:B:367:GLU:HG2	1.82	0.80
1:A:44:LYS:HD3	1:A:69:PRO:CB	2.12	0.79
1:A:363:ASP:O	1:A:367:GLU:HG2	1.84	0.78
1:B:122:THR:HG22	1:B:209:THR:HG21	1.63	0.78
1:B:180:TRP:CE3	1:B:357:ILE:HD13	2.20	0.77
1:B:23:PRO:HB2	1:B:347:PHE:HD2	1.49	0.76
1:B:341:ARG:NH1	1:B:353:GLN:HB2	2.00	0.76
1:A:44:LYS:HD2	1:A:69:PRO:HB3	1.66	0.76
1:A:364:LYS:HE3	1:A:413:PHE:CZ	2.21	0.76
1:A:24:ILE:HG21	1:A:27:LEU:HD22	1.68	0.75
1:B:30:LYS:NZ	7:B:702:HOH:O	2.18	0.75
1:A:186:MET:HE2	1:A:256:THR:HG21	1.67	0.75
1:A:91:LEU:HD22	1:A:95:SER:HB2	1.70	0.74

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:124:LYS:NZ	1:A:133:ASP:OD2	2.21	0.73
1:A:24:ILE:HD13	1:A:27:LEU:HD22	1.71	0.72
1:A:119:THR:CG2	1:A:126:PHE:HA	2.18	0.72
1:A:348:ASP:O	1:A:351:THR:HG22	1.90	0.72
1:B:296:ASP:OD1	1:B:333:ARG:NH2	2.21	0.72
1:A:425:ILE:HD11	1:A:450:LYS:HD2	1.71	0.71
1:A:360:LYS:O	1:A:364:LYS:HG2	1.91	0.71
1:A:299:VAL:HG12	1:A:330:PHE:CD1	2.26	0.71
1:A:412:ILE:HD13	1:A:416:VAL:HG13	1.73	0.71
1:A:284:LYS:HE2	1:A:410:GLU:O	1.91	0.70
1:A:245:SER:HA	1:A:253:ILE:HD12	1.72	0.70
1:A:382:GLY:CA	1:A:394:LYS:HD2	2.17	0.70
1:B:348:ASP:O	1:B:351:THR:HG22	1.92	0.70
1:B:35:PHE:CZ	1:B:38:ASN:HA	2.27	0.70
1:A:122:THR:HG22	1:A:209:THR:HG21	1.73	0.69
1:B:71:VAL:HG21	1:B:243:ALA:HB1	1.75	0.68
1:A:310:GLN:HE21	1:A:354:GLY:N	1.91	0.68
1:B:401:VAL:HG23	1:B:420:LEU:HG	1.74	0.68
1:A:119:THR:HG21	1:A:126:PHE:CA	2.19	0.68
1:A:299:VAL:HG12	1:A:330:PHE:CE1	2.30	0.67
1:A:44:LYS:CD	1:A:69:PRO:HB2	2.25	0.67
1:A:436:ASP:HB3	1:A:482:MET:HE2	1.77	0.67
1:B:22:ARG:HB2	1:B:23:PRO:HD2	1.76	0.67
1:A:310:GLN:HG3	1:A:353:GLN:HG3	1.75	0.67
1:A:44:LYS:HD2	1:A:69:PRO:HB2	1.76	0.67
1:A:295:LEU:O	1:A:299:VAL:HG13	1.95	0.66
1:B:343:VAL:HG22	1:B:353:GLN:HB3	1.76	0.66
1:A:176:ALA:HB3	1:A:203:LEU:HD22	1.78	0.66
1:B:167:ARG:NH1	1:B:169:GLU:OE2	2.29	0.66
1:B:178:THR:CG2	1:B:190:LYS:HE2	2.25	0.65
1:B:345:ASP:O	1:B:351:THR:HG21	1.95	0.65
1:A:252:LYS:HE3	1:A:496:GLU:O	1.97	0.65
1:A:35:PHE:CZ	1:A:38:ASN:HA	2.32	0.65
1:B:48:LYS:NZ	1:B:64:GLU:OE1	2.25	0.65
1:B:187:LEU:HD11	1:B:203:LEU:HD13	1.79	0.64
1:A:91:LEU:HD22	1:A:95:SER:CB	2.27	0.64
1:A:24:ILE:CG2	1:A:27:LEU:HD22	2.29	0.63
1:A:44:LYS:CD	1:A:69:PRO:HB3	2.22	0.63
1:B:402:THR:HG22	1:B:403:ASP:H	1.63	0.63
1:B:68:LYS:O	1:B:71:VAL:HG22	1.98	0.63
1:B:44:LYS:NZ	1:B:73:LYS:HE3	2.13	0.63

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:360:LYS:O	1:B:364:LYS:HG2	1.99	0.62
1:A:307:PHE:O	1:A:341:ARG:NH2	2.31	0.62
1:A:341:ARG:NH1	1:A:353:GLN:HB2	2.09	0.61
1:A:121:ASP:CG	1:A:209:THR:HA	2.24	0.61
1:A:115:ALA:O	1:A:119:THR:HG23	2.01	0.61
1:A:335:VAL:HG13	1:A:381:CYS:SG	2.41	0.60
1:A:379:LEU:HD23	1:A:380:GLU:N	2.15	0.60
1:B:103:LEU:O	1:B:107:VAL:HG23	2.01	0.60
1:B:295:LEU:O	1:B:299:VAL:HG23	2.02	0.60
1:A:116:ALA:O	1:A:120:MET:HG3	2.01	0.60
1:B:115:ALA:O	1:B:119:THR:HG22	2.02	0.60
1:A:24:ILE:CG2	1:A:27:LEU:HD13	2.31	0.59
1:B:75:VAL:HG22	1:B:250:ILE:HD11	1.84	0.59
1:B:178:THR:HG22	1:B:190:LYS:CE	2.31	0.59
1:B:27:LEU:HD21	7:B:702:HOH:O	2.00	0.59
1:A:207:GLU:CG	1:A:236:PHE:HA	2.31	0.59
1:B:327:TYR:CE2	1:B:421:LYS:HB2	2.37	0.59
1:A:20:LEU:HD12	1:A:20:LEU:O	2.03	0.59
1:B:39:GLU:HB2	1:B:41:HIS:HE1	1.67	0.59
1:B:341:ARG:HH12	1:B:353:GLN:HB2	1.67	0.59
1:B:402:THR:HG22	1:B:403:ASP:N	2.18	0.59
1:B:499:GLU:OE2	5:B:603:GOL:O2	2.21	0.58
1:A:121:ASP:OD2	1:A:209:THR:CA	2.47	0.58
1:B:91:LEU:HD22	1:B:95:SER:HB2	1.85	0.58
1:B:285:ASN:HB2	1:B:316:ALA:O	2.03	0.58
1:B:55:SER:HB3	1:B:355:PRO:HG3	1.84	0.58
1:A:285:ASN:HB2	1:A:316:ALA:O	2.04	0.57
1:A:478:GLY:HA3	1:A:487:ARG:HD3	1.84	0.57
1:A:207:GLU:HG2	1:A:236:PHE:CD2	2.39	0.57
1:A:48:LYS:HE3	1:A:64:GLU:OE2	2.05	0.57
1:B:23:PRO:CB	1:B:347:PHE:HD2	2.14	0.57
1:A:372:GLY:HA3	1:A:407:ILE:HG21	1.86	0.57
1:B:360:LYS:HG2	2:B:601:NAD:H5N	1.85	0.56
1:B:284:LYS:NZ	1:B:318:SER:HB3	2.19	0.56
1:A:303:HIS:CE1	1:A:341:ARG:HD2	2.41	0.56
1:A:284:LYS:CG	1:A:319:ARG:HD2	2.33	0.56
1:B:252:LYS:HG2	1:B:253:ILE:N	2.20	0.56
1:B:335:VAL:HG13	1:B:381:CYS:SG	2.46	0.56
1:A:360:LYS:CG	2:A:601:NAD:H5N	2.36	0.56
1:A:366:LEU:HG	1:A:370:GLU:OE2	2.05	0.56
1:B:20:LEU:HD12	1:B:20:LEU:O	2.06	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:318:SER:OG	1:B:412:ILE:HG12	2.06	0.55
1:A:39:GLU:HB2	1:A:41:HIS:HE1	1.70	0.55
1:A:52:CYS:HA	1:A:60:ILE:H	1.70	0.55
1:A:361:GLN:O	1:A:365:ILE:HG13	2.07	0.55
5:A:608:GOL:H32	5:A:609:GOL:O3	2.06	0.55
1:B:284:LYS:HZ2	1:B:318:SER:HB3	1.72	0.55
1:A:67:ASP:OD1	1:A:68:LYS:N	2.34	0.55
1:A:171:ILE:HG13	1:A:497:TYR:C	2.32	0.55
1:B:118:GLU:OE2	1:B:183:PRO:HD2	2.07	0.55
1:A:35:PHE:HZ	1:A:38:ASN:HD22	1.55	0.55
1:B:116:ALA:O	1:B:120:MET:HG3	2.07	0.55
1:B:91:LEU:HD22	1:B:95:SER:CB	2.37	0.55
1:B:325:GLN:OE1	1:B:325:GLN:N	2.39	0.54
1:B:478:GLY:HA3	1:B:487:ARG:HD3	1.90	0.54
1:A:403:ASP:OD1	1:A:431:ARG:NH2	2.39	0.54
1:B:259:THR:HA	1:B:281:LEU:HD13	1.90	0.54
1:A:362:PHE:CD1	1:A:393:ILE:HD11	2.43	0.54
1:A:57:ARG:HH11	1:A:390:GLY:HA2	1.72	0.54
1:B:29:VAL:HG21	1:B:61:CYS:SG	2.48	0.54
1:A:426:GLU:OE1	1:B:84:ARG:NH2	2.40	0.53
1:B:147:TRP:CZ2	1:B:491:GLU:HB2	2.43	0.53
1:B:124:LYS:HE3	1:B:133:ASP:OD2	2.08	0.53
1:B:171:ILE:HG13	1:B:497:TYR:C	2.32	0.53
1:A:325:GLN:OE1	1:A:325:GLN:N	2.37	0.53
1:B:426:GLU:HG3	1:B:430:LYS:HE3	1.90	0.53
1:A:249:GLN:OE1	1:A:249:GLN:HA	2.09	0.53
1:B:176:ALA:HB3	1:B:203:LEU:HD22	1.90	0.53
1:B:357:ILE:HG23	1:B:361:GLN:HB2	1.90	0.53
1:A:402:THR:HG22	1:A:403:ASP:N	2.23	0.53
1:B:259:THR:O	1:B:263:LYS:HG3	2.09	0.52
1:B:185:LEU:HD11	7:B:704:HOH:O	2.08	0.52
1:A:345:ASP:O	1:A:351:THR:HG21	2.09	0.52
1:A:360:LYS:HG2	2:A:601:NAD:C5N	2.40	0.52
1:A:167:ARG:NH1	1:A:169:GLU:OE2	2.43	0.52
1:B:506:LYS:O	1:B:507:LEU:HD23	2.10	0.52
1:A:296:ASP:O	1:A:299:VAL:HG22	2.10	0.52
1:B:207:GLU:CG	1:B:236:PHE:HA	2.40	0.52
1:A:364:LYS:HE3	1:A:413:PHE:CE1	2.45	0.52
1:B:357:ILE:CG2	1:B:361:GLN:HB2	2.39	0.52
1:B:361:GLN:O	1:B:365:ILE:HG13	2.10	0.52
1:B:138:ILE:O	1:B:142:ARG:HG2	2.10	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:386:MET:O	1:B:387:GLU:HG3	2.10	0.51
1:A:429:ILE:HD13	1:A:457:ALA:CB	2.40	0.51
1:A:245:SER:HA	1:A:253:ILE:CD1	2.38	0.51
1:A:356:GLN:HG2	1:A:391:LEU:O	2.10	0.51
3:A:602:R2Q:C22	7:A:705:HOH:O	2.59	0.51
1:A:147:TRP:CZ2	1:A:491:GLU:HB2	2.46	0.51
1:B:216:LEU:O	1:B:220:ILE:HG13	2.10	0.51
1:B:285:ASN:ND2	1:B:315:THR:HA	2.25	0.51
1:B:442:ALA:HB2	1:B:468:TYR:CD1	2.45	0.51
1:B:327:TYR:CD2	1:B:421:LYS:HB2	2.46	0.51
1:A:345:ASP:HB3	1:A:348:ASP:HB2	1.92	0.51
1:A:420:LEU:HD23	1:A:431:ARG:NH2	2.25	0.51
1:B:71:VAL:HG21	1:B:243:ALA:CB	2.40	0.51
1:A:360:LYS:HG2	2:A:601:NAD:H5N	1.92	0.51
1:B:207:GLU:HG2	1:B:236:PHE:CD2	2.46	0.51
1:B:51:THR:HA	6:B:604:R2K:O01	2.11	0.50
1:A:45:SER:OG	1:A:47:LYS:HG3	2.11	0.50
1:B:310:GLN:HE21	1:B:354:GLY:H	1.60	0.50
1:B:485:ASN:HB2	7:B:701:HOH:O	2.11	0.50
1:A:204:LYS:HD2	1:A:240:VAL:HG12	1.92	0.50
1:A:284:LYS:NZ	1:A:318:SER:HB3	2.26	0.50
1:A:362:PHE:HZ	1:A:385:ALA:HB2	1.77	0.50
1:B:67:ASP:OD1	1:B:68:LYS:N	2.37	0.50
1:B:139:ARG:NH2	1:B:474:GLN:HE22	2.09	0.50
1:A:138:ILE:O	1:A:142:ARG:HG2	2.12	0.50
1:A:139:ARG:HH21	1:A:474:GLN:HE22	1.59	0.50
2:A:601:NAD:H62A	5:A:605:GOL:H32	1.75	0.50
1:A:93:ALA:HB1	1:A:149:ASP:HA	1.94	0.50
1:B:27:LEU:HD11	7:B:702:HOH:O	2.11	0.50
1:B:39:GLU:HB2	1:B:41:HIS:CE1	2.46	0.49
1:B:179:PRO:HG3	1:B:256:THR:HG22	1.94	0.49
1:A:261:VAL:HG21	2:A:601:NAD:O1A	2.12	0.49
1:B:53:ASN:HB3	1:B:56:THR:OG1	2.12	0.49
1:B:284:LYS:HE2	1:B:410:GLU:O	2.12	0.49
1:B:329:GLU:OE1	1:B:329:GLU:HA	2.12	0.49
1:A:191:LEU:HD21	1:A:195:LEU:HD12	1.93	0.49
1:B:247:HIS:HB3	1:B:250:ILE:CG1	2.42	0.49
1:B:215:TYR:O	1:B:218:SER:OG	2.22	0.49
1:B:327:TYR:O	1:B:331:VAL:HG23	2.11	0.49
1:A:33:LYS:HB3	1:A:41:HIS:O	2.13	0.49
1:A:61:CYS:SG	1:A:62:GLU:N	2.85	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:356:GLN:HG2	1:B:391:LEU:O	2.12	0.49
1:A:174:CYS:O	1:A:201:MET:HA	2.12	0.49
1:B:179:PRO:HG2	1:B:181:ASN:OD1	2.12	0.49
1:B:439:LEU:HG	1:B:440:THR:HG23	1.94	0.49
1:B:111:ARG:HG2	1:B:130:PHE:CE1	2.47	0.48
1:B:306:VAL:HG13	1:B:307:PHE:CD2	2.47	0.48
1:A:357:ILE:HG23	1:A:358:ASP:H	1.78	0.48
1:B:379:LEU:HD23	1:B:380:GLU:N	2.28	0.48
1:A:343:VAL:HG13	1:A:343:VAL:O	2.13	0.48
1:B:357:ILE:HG23	1:B:358:ASP:H	1.78	0.48
1:B:61:CYS:SG	1:B:62:GLU:N	2.87	0.48
1:B:247:HIS:HB3	1:B:250:ILE:HG12	1.95	0.48
1:A:284:LYS:HD2	1:A:318:SER:CB	2.43	0.48
1:B:406:ARG:NH1	1:B:410:GLU:OE2	2.47	0.48
1:B:278:THR:HA	7:B:701:HOH:O	2.15	0.47
1:B:305:GLY:HA3	1:B:468:TYR:CD2	2.49	0.47
1:A:420:LEU:HD12	1:A:420:LEU:N	2.28	0.47
1:B:43:SER:N	1:B:64:GLU:OE2	2.32	0.47
1:A:191:LEU:C	1:A:191:LEU:HD23	2.39	0.47
1:A:201:MET:HE2	1:A:203:LEU:HD21	1.96	0.47
1:A:24:ILE:HG23	1:A:27:LEU:CD1	2.37	0.47
1:A:75:VAL:HG21	1:A:247:HIS:CD2	2.49	0.47
1:A:386:MET:O	1:A:387:GLU:HG3	2.14	0.47
1:B:191:LEU:C	1:B:191:LEU:HD23	2.39	0.47
1:A:329:GLU:HG3	1:A:333:ARG:HD2	1.97	0.47
1:A:368:LEU:HD12	1:A:371:SER:HB3	1.97	0.47
1:A:247:HIS:ND1	1:A:248:PRO:HD2	2.30	0.47
1:B:420:LEU:N	1:B:420:LEU:HD12	2.29	0.47
1:B:261:VAL:O	1:B:265:VAL:HG23	2.14	0.47
1:B:286:PRO:HD2	1:B:440:THR:O	2.15	0.47
1:A:179:PRO:HG2	1:A:181:ASN:OD1	2.15	0.46
1:A:412:ILE:O	1:A:413:PHE:CG	2.67	0.46
1:A:436:ASP:HB3	1:A:482:MET:CE	2.43	0.46
1:B:33:LYS:O	1:B:214:LEU:HD22	2.15	0.46
1:B:461:GLY:HA3	1:B:478:GLY:O	2.16	0.46
1:A:60:ILE:HD11	1:A:120:MET:O	2.14	0.46
1:A:56:THR:HG22	1:A:58:GLU:HB3	1.98	0.46
1:A:92:ASP:HB2	1:A:95:SER:OG	2.15	0.46
1:A:284:LYS:HG3	1:A:319:ARG:CD	2.40	0.46
1:B:149:ASP:OD1	1:B:150:LYS:HG3	2.14	0.46
1:B:44:LYS:HZ1	1:B:73:LYS:HE3	1.77	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:284:LYS:HE2	1:A:410:GLU:C	2.40	0.46
1:A:207:GLU:HG3	1:A:236:PHE:HA	1.98	0.46
1:A:368:LEU:HA	1:A:371:SER:HB3	1.97	0.46
1:B:184:LEU:O	1:B:188:VAL:HG23	2.16	0.46
1:A:247:HIS:HB3	1:A:250:ILE:HG13	1.98	0.46
1:A:22:ARG:HB2	1:A:23:PRO:HD2	1.98	0.46
1:A:197:CYS:SG	1:A:494:LEU:HD22	2.56	0.46
1:A:402:THR:HG22	1:A:403:ASP:H	1.81	0.46
1:B:324:GLU:HG3	1:B:325:GLN:OE1	2.16	0.46
1:B:368:LEU:HA	1:B:371:SER:HB3	1.97	0.46
1:B:482:MET:HE2	1:B:482:MET:HB3	1.86	0.46
1:A:274:LEU:HD23	1:A:274:LEU:HA	1.84	0.45
1:A:362:PHE:HD1	1:A:393:ILE:HD11	1.78	0.45
1:B:357:ILE:HG21	1:B:361:GLN:HG2	1.98	0.45
1:A:302:ALA:O	1:A:306:VAL:HG23	2.15	0.45
1:A:364:LYS:CE	1:A:413:PHE:CZ	2.96	0.45
1:B:284:LYS:HZ2	1:B:318:SER:CB	2.28	0.45
1:B:412:ILE:O	1:B:413:PHE:CG	2.70	0.45
1:A:329:GLU:O	1:A:333:ARG:HG3	2.16	0.45
1:A:318:SER:O	1:A:418:PRO:HG2	2.17	0.45
1:A:124:LYS:HG2	1:A:125:PRO:HD2	1.98	0.45
1:A:194:ALA:HB2	1:A:497:TYR:CE1	2.52	0.45
1:A:103:LEU:O	1:A:107:VAL:HG23	2.17	0.45
1:A:176:ALA:HB1	1:A:190:LYS:HD2	1.99	0.45
1:A:241:GLY:HA3	2:A:601:NAD:C2A	2.46	0.45
2:A:601:NAD:H62A	5:A:605:GOL:C3	2.30	0.45
1:A:42:GLU:HG2	1:A:43:SER:N	2.32	0.45
1:A:56:THR:C	1:A:58:GLU:H	2.25	0.45
1:A:53:ASN:N	1:A:60:ILE:HG13	2.32	0.44
1:A:106:LEU:HD12	1:A:223:ALA:HB2	1.97	0.44
1:A:296:ASP:OD1	1:A:333:ARG:NH2	2.34	0.44
1:B:255:PHE:HB3	1:B:279:LEU:HD23	2.00	0.44
1:B:52:CYS:HA	1:B:60:ILE:H	1.81	0.44
1:B:422:PHE:CD2	1:B:428:VAL:HB	2.52	0.44
1:A:276:ARG:N	1:A:276:ARG:CD	2.80	0.44
1:B:253:ILE:HD12	1:B:253:ILE:HA	1.87	0.44
1:B:329:GLU:O	1:B:333:ARG:HG3	2.17	0.44
1:B:369:ILE:HG21	1:B:383:GLY:HA2	2.00	0.44
1:A:54:PRO:HG2	1:A:122:THR:C	2.43	0.44
1:B:425:ILE:O	1:B:428:VAL:HG12	2.18	0.44
1:A:499:GLU:OE1	1:B:487:ARG:NH2	2.50	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:364:LYS:HG3	1:A:413:PHE:CZ	2.53	0.44
1:B:429:ILE:HD13	1:B:457:ALA:CB	2.47	0.44
1:A:433:ASN:ND2	1:A:459:GLU:HG3	2.33	0.43
1:B:191:LEU:HD21	1:B:195:LEU:HD12	1.99	0.43
1:B:279:LEU:HD12	1:B:485:ASN:OD1	2.18	0.43
1:A:114:LEU:HD21	1:A:215:TYR:CD1	2.53	0.43
1:A:359:GLN:OE1	1:A:391:LEU:HD21	2.18	0.43
1:B:75:VAL:CG2	1:B:250:ILE:HD11	2.47	0.43
1:A:426:GLU:O	1:A:430:LYS:HG3	2.19	0.43
1:B:93:ALA:HB1	1:B:149:ASP:HA	2.01	0.43
1:B:276:ARG:N	1:B:276:ARG:CD	2.82	0.43
3:B:602:R2Q:C22	7:B:704:HOH:O	2.67	0.43
1:B:114:LEU:HD21	1:B:215:TYR:CD1	2.52	0.43
1:B:186:MET:HE2	1:B:256:THR:HG21	2.01	0.43
1:A:307:PHE:HD1	1:A:415:PRO:HB3	1.84	0.43
1:A:364:LYS:CD	1:A:413:PHE:HZ	2.31	0.43
1:B:247:HIS:CE1	1:B:249:GLN:HB2	2.54	0.42
1:B:506:LYS:C	1:B:507:LEU:HD23	2.44	0.42
1:B:33:LYS:HB3	1:B:41:HIS:O	2.18	0.42
1:A:370:GLU:HA	1:A:373:LYS:HG2	2.01	0.42
1:B:357:ILE:CG2	1:B:361:GLN:CB	2.97	0.42
1:B:435:THR:HG23	1:B:437:TYR:O	2.18	0.42
1:A:149:ASP:OD1	1:A:150:LYS:HG3	2.18	0.42
1:A:207:GLU:HG2	1:A:236:PHE:CG	2.54	0.42
1:A:326:VAL:O	1:A:327:TYR:C	2.62	0.42
1:A:425:ILE:O	1:A:429:ILE:HG13	2.19	0.42
1:B:175:GLY:HA2	1:B:202:VAL:O	2.19	0.42
1:B:370:GLU:HA	1:B:373:LYS:HG2	2.01	0.42
1:A:175:GLY:HA2	1:A:202:VAL:O	2.20	0.42
1:A:38:ASN:OD1	1:A:227:PRO:HA	2.19	0.42
1:A:75:VAL:HG11	1:A:247:HIS:CE1	2.55	0.42
1:B:195:LEU:HD23	1:B:195:LEU:HA	1.74	0.42
1:B:71:VAL:CG1	1:B:240:VAL:HG13	2.50	0.42
1:B:412:ILE:HG13	1:B:413:PHE:H	1.84	0.42
2:B:601:NAD:H2D	2:B:601:NAD:H6N	1.59	0.42
2:B:601:NAD:H8A	2:B:601:NAD:H2B	1.98	0.42
1:A:134:LEU:O	1:A:138:ILE:HG13	2.20	0.42
1:B:152:GLN:NE2	7:B:705:HOH:O	2.50	0.42
1:A:345:ASP:OD1	1:A:346:PRO:HD2	2.20	0.41
1:A:123:GLY:O	1:A:355:PRO:HD2	2.19	0.41
1:A:324:GLU:OE1	1:A:423:LYS:HE3	2.20	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:601:NAD:O2A	2:A:601:NAD:H4D	2.20	0.41
1:B:60:ILE:HD11	1:B:120:MET:O	2.20	0.41
1:B:122:THR:HG22	1:B:209:THR:CG2	2.42	0.41
1:A:42:GLU:HG3	1:A:64:GLU:OE1	2.20	0.41
1:A:322:VAL:HG21	1:A:330:PHE:CD2	2.54	0.41
1:A:357:ILE:HG23	1:A:358:ASP:N	2.35	0.41
1:A:68:LYS:HB3	1:A:69:PRO:HD3	2.03	0.41
1:B:207:GLU:HG3	1:B:236:PHE:HA	2.02	0.41
1:B:300:GLU:HG3	1:B:337:TYR:OH	2.20	0.41
1:B:442:ALA:HB2	1:B:468:TYR:CE1	2.55	0.41
1:A:33:LYS:HA	1:A:64:GLU:CG	2.51	0.41
1:A:55:SER:OG	1:A:346:PRO:HG2	2.20	0.41
1:A:375:GLU:OE1	1:A:405:MET:HB3	2.21	0.41
1:A:191:LEU:CD2	1:A:195:LEU:HD12	2.50	0.41
1:B:124:LYS:HB2	1:B:124:LYS:HE2	1.85	0.41
1:B:312:GLN:HG2	1:B:413:PHE:O	2.20	0.41
1:A:56:THR:HG22	1:A:58:GLU:CB	2.50	0.41
1:B:34:ILE:HG12	1:B:234:PRO:HD2	2.03	0.41
1:B:306:VAL:HG23	1:B:317:ALA:O	2.21	0.41
1:A:386:MET:C	1:A:387:GLU:HG3	2.45	0.41
1:A:436:ASP:CB	1:A:482:MET:HE2	2.48	0.41
1:B:180:TRP:CD2	1:B:357:ILE:HD13	2.55	0.41
1:B:247:HIS:ND1	1:B:248:PRO:HD2	2.36	0.41
1:B:488:GLU:O	1:B:489:LEU:HB2	2.20	0.41
2:A:601:NAD:H8A	2:A:601:NAD:H2B	1.89	0.41
1:B:176:ALA:HB1	1:B:190:LYS:HD2	2.03	0.41
1:A:215:TYR:O	1:A:218:SER:OG	2.25	0.41
1:A:327:TYR:CE1	1:A:421:LYS:HB2	2.56	0.40
1:A:412:ILE:HD13	1:A:416:VAL:CG1	2.45	0.40
1:A:44:LYS:CD	1:A:69:PRO:CG	2.85	0.40
1:A:58:GLU:HG2	1:A:59:GLN:N	2.37	0.40
1:A:52:CYS:C	1:A:60:ILE:HG13	2.47	0.40
1:A:110:ASP:OD1	1:A:110:ASP:N	2.53	0.40
1:A:366:LEU:O	1:A:370:GLU:HG3	2.20	0.40
1:B:181:ASN:OD1	1:B:181:ASN:N	2.54	0.40
1:B:386:MET:C	1:B:387:GLU:HG3	2.47	0.40
1:B:455:ALA:HA	1:B:463:VAL:HG11	2.03	0.40

All (4) 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:388:ASP:CA	2:B:601:NAD:O7N[3_544]	1.38	0.82
1:A:388:ASP:CB	2:B:601:NAD:O7N[3_544]	2.01	0.19
1:A:388:ASP:C	2:B:601:NAD:O7N[3_544]	2.01	0.19
1:A:92:ASP:OD1	1:A:159:ASP:OD1[2_555]	2.09	0.11

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	487/512 (95%)	459 (94%)	28 (6%)	0	100	100
1	B	487/512 (95%)	460 (94%)	26 (5%)	1 (0%)	44	67
All	All	974/1024 (95%)	919 (94%)	54 (6%)	1 (0%)	48	72

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	179	PRO

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	405/422 (96%)	405 (100%)	0	100	100
1	B	405/422 (96%)	405 (100%)	0	100	100
All	All	810/844 (96%)	810 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

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	41	HIS
1	A	310	GLN
1	A	312	GLN
1	B	304	GLN
1	B	310	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 16 ligands modelled in this entry, 4 are monoatomic - leaving 12 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	$\#\|Z\| > 2$
6	R2K	B	604	1	4,8,8	1.33	0	3,9,9	1.38	1 (33%)
3	R2Q	B	602	-	23,26,26	1.92	4 (17%)	28,36,36	1.70	7 (25%)
5	GOL	B	605	-	5,5,5	0.85	0	5,5,5	1.02	1 (20%)
2	NAD	B	601	-	42,48,48	5.52	17 (40%)	50,73,73	1.97	6 (12%)
3	R2Q	A	602	-	23,26,26	1.91	4 (17%)	28,36,36	1.66	4 (14%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
5	GOL	A	605	-	5,5,5	0.85	0	5,5,5	0.97	0
5	GOL	A	608	-	5,5,5	0.85	0	5,5,5	0.67	0
5	GOL	A	609	-	5,5,5	0.90	0	5,5,5	1.23	1 (20%)
5	GOL	B	603	-	5,5,5	1.13	0	5,5,5	1.25	1 (20%)
5	GOL	A	606	-	5,5,5	0.84	0	5,5,5	1.15	1 (20%)
2	NAD	A	601	-	42,48,48	5.57	17 (40%)	50,73,73	1.71	6 (12%)
5	GOL	A	604	-	5,5,5	0.87	0	5,5,5	0.89	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
6	R2K	B	604	1	-	0/4/8/8	-
3	R2Q	B	602	-	-	0/10/10/10	0/4/4/4
5	GOL	B	605	-	-	0/4/4/4	-
2	NAD	B	601	-	-	16/26/62/62	0/5/5/5
3	R2Q	A	602	-	-	0/10/10/10	0/4/4/4
5	GOL	A	605	-	-	2/4/4/4	-
5	GOL	A	608	-	-	4/4/4/4	-
5	GOL	A	609	-	-	2/4/4/4	-
5	GOL	B	603	-	-	2/4/4/4	-
5	GOL	A	606	-	-	0/4/4/4	-
2	NAD	A	601	-	-	13/26/62/62	0/5/5/5
5	GOL	A	604	-	-	0/4/4/4	-

All (42) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	601	NAD	C2D-C1D	-16.72	1.28	1.53
2	A	601	NAD	C2D-C1D	-16.62	1.28	1.53
2	A	601	NAD	C2B-C1B	-16.51	1.28	1.53
2	A	601	NAD	O4D-C1D	16.26	1.63	1.41
2	B	601	NAD	C2B-C1B	-16.05	1.29	1.53
2	B	601	NAD	O4D-C1D	15.84	1.63	1.41
2	B	601	NAD	O4B-C1B	15.04	1.62	1.41
2	A	601	NAD	O4B-C1B	14.90	1.61	1.41
2	A	601	NAD	C7N-N7N	7.25	1.46	1.33
2	B	601	NAD	C7N-N7N	7.22	1.46	1.33

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	602	R2Q	C09-N01	7.19	1.40	1.33
3	A	602	R2Q	C09-N01	7.05	1.40	1.33
2	A	601	NAD	O4D-C4D	-5.93	1.31	1.45
2	B	601	NAD	O4D-C4D	-5.91	1.31	1.45
2	B	601	NAD	O4B-C4B	-5.88	1.31	1.45
2	A	601	NAD	O4B-C4B	-5.84	1.31	1.45
2	A	601	NAD	O3D-C3D	-4.49	1.32	1.43
2	B	601	NAD	O3D-C3D	-4.46	1.32	1.43
2	A	601	NAD	O2B-C2B	4.28	1.53	1.43
2	A	601	NAD	C6A-N6A	4.24	1.49	1.34
2	B	601	NAD	C6A-N6A	4.13	1.49	1.34
2	B	601	NAD	O2B-C2B	4.12	1.52	1.43
2	B	601	NAD	O2D-C2D	3.85	1.52	1.43
2	A	601	NAD	O2D-C2D	3.82	1.52	1.43
3	A	602	R2Q	C18-C22	3.70	1.52	1.44
2	A	601	NAD	C2A-N3A	3.70	1.38	1.32
2	B	601	NAD	C2A-N3A	3.69	1.38	1.32
3	B	602	R2Q	C18-C22	3.48	1.52	1.44
2	B	601	NAD	C5D-C4D	3.29	1.61	1.51
2	A	601	NAD	C5D-C4D	3.16	1.61	1.51
2	B	601	NAD	O3B-C3B	-3.11	1.35	1.43
2	A	601	NAD	O3B-C3B	-3.03	1.35	1.43
3	A	602	R2Q	C08-C09	-2.57	1.37	1.40
3	B	602	R2Q	C08-C09	-2.51	1.37	1.40
2	B	601	NAD	PA-O5B	2.49	1.69	1.59
2	A	601	NAD	PA-O5B	2.43	1.69	1.59
3	A	602	R2Q	C10-C02	2.35	1.52	1.48
2	B	601	NAD	C2N-N1N	2.32	1.37	1.35
3	B	602	R2Q	C05-N04	-2.27	1.33	1.37
2	A	601	NAD	C2N-N1N	2.26	1.37	1.35
2	B	601	NAD	C5A-C4A	-2.05	1.35	1.40
2	A	601	NAD	C4N-C3N	-2.00	1.35	1.39

All (28) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	601	NAD	C5A-C6A-N6A	8.86	133.81	120.35
2	A	601	NAD	C5A-C6A-N6A	7.32	131.47	120.35
2	B	601	NAD	N6A-C6A-N1A	-6.26	105.58	118.57
3	A	602	R2Q	C02-C03-N04	5.80	113.80	107.89
3	B	602	R2Q	C02-C03-N04	5.57	113.56	107.89
2	B	601	NAD	N3A-C2A-N1A	-5.33	120.34	128.68

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	601	NAD	N3A-C2A-N1A	-5.09	120.72	128.68
2	A	601	NAD	N6A-C6A-N1A	-4.73	108.75	118.57
3	A	602	R2Q	C07-C06-C16	-3.06	116.05	121.36
2	A	601	NAD	C6N-N1N-C2N	-2.74	119.48	121.97
3	A	602	R2Q	C15-C10-C02	-2.70	117.02	121.28
3	B	602	R2Q	C15-C10-C02	-2.69	117.03	121.28
2	A	601	NAD	PN-O3-PA	-2.68	123.64	132.83
3	B	602	R2Q	C17-C16-C06	-2.53	116.67	120.86
5	A	609	GOL	C3-C2-C1	-2.53	101.85	111.70
2	B	601	NAD	PN-O3-PA	-2.48	124.31	132.83
2	B	601	NAD	C5B-C4B-C3B	-2.38	106.26	115.18
3	A	602	R2Q	C07-C08-C09	-2.21	117.08	119.76
3	B	602	R2Q	C07-C08-C09	-2.18	117.12	119.76
3	B	602	R2Q	C17-C18-C22	-2.17	116.65	119.54
5	B	603	GOL	C3-C2-C1	-2.16	103.30	111.70
3	B	602	R2Q	C07-C06-C16	-2.13	117.67	121.36
2	B	601	NAD	C4A-C5A-N7A	-2.12	107.19	109.40
6	B	604	R2K	O01-C02-C03	-2.12	118.52	124.24
3	B	602	R2Q	C21-C16-C17	2.11	121.15	118.16
2	A	601	NAD	C3N-C7N-N7N	2.07	120.24	117.75
5	B	605	GOL	C3-C2-C1	-2.01	103.89	111.70
5	A	606	GOL	C3-C2-C1	-2.00	103.91	111.70

There are no chirality outliers.

All (39) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	601	NAD	O4B-C4B-C5B-O5B
2	A	601	NAD	C3B-C4B-C5B-O5B
2	A	601	NAD	C5D-O5D-PN-O3
2	A	601	NAD	C5D-O5D-PN-O2N
2	A	601	NAD	C2D-C1D-N1N-C2N
2	B	601	NAD	O4B-C4B-C5B-O5B
2	B	601	NAD	C3B-C4B-C5B-O5B
2	B	601	NAD	C5D-O5D-PN-O1N
2	B	601	NAD	C5D-O5D-PN-O2N
2	B	601	NAD	O4D-C4D-C5D-O5D
2	B	601	NAD	C3D-C4D-C5D-O5D
2	B	601	NAD	O4D-C1D-N1N-C2N
2	B	601	NAD	O4D-C1D-N1N-C6N
2	B	601	NAD	C2D-C1D-N1N-C2N
2	B	601	NAD	C2D-C1D-N1N-C6N

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Mol	Chain	Res	Type	Atoms
5	A	608	GOL	C1-C2-C3-O3
5	B	603	GOL	O1-C1-C2-C3
2	A	601	NAD	C2N-C3N-C7N-O7N
2	A	601	NAD	C2N-C3N-C7N-N7N
2	A	601	NAD	C4N-C3N-C7N-N7N
2	A	601	NAD	C4N-C3N-C7N-O7N
5	A	608	GOL	O1-C1-C2-C3
5	A	609	GOL	C1-C2-C3-O3
5	A	608	GOL	O1-C1-C2-O2
5	A	609	GOL	O2-C2-C3-O3
5	B	603	GOL	O1-C1-C2-O2
2	B	601	NAD	C4D-C5D-O5D-PN
5	A	605	GOL	O2-C2-C3-O3
5	A	608	GOL	O2-C2-C3-O3
2	A	601	NAD	C5D-O5D-PN-O1N
2	B	601	NAD	C4N-C3N-C7N-N7N
2	A	601	NAD	PN-O3-PA-O1A
2	B	601	NAD	PN-O3-PA-O2A
2	B	601	NAD	C4N-C3N-C7N-O7N
2	A	601	NAD	C2D-C1D-N1N-C6N
2	B	601	NAD	C5D-O5D-PN-O3
2	B	601	NAD	PN-O3-PA-O1A
5	A	605	GOL	C1-C2-C3-O3
2	A	601	NAD	O4D-C4D-C5D-O5D

There are no ring outliers.

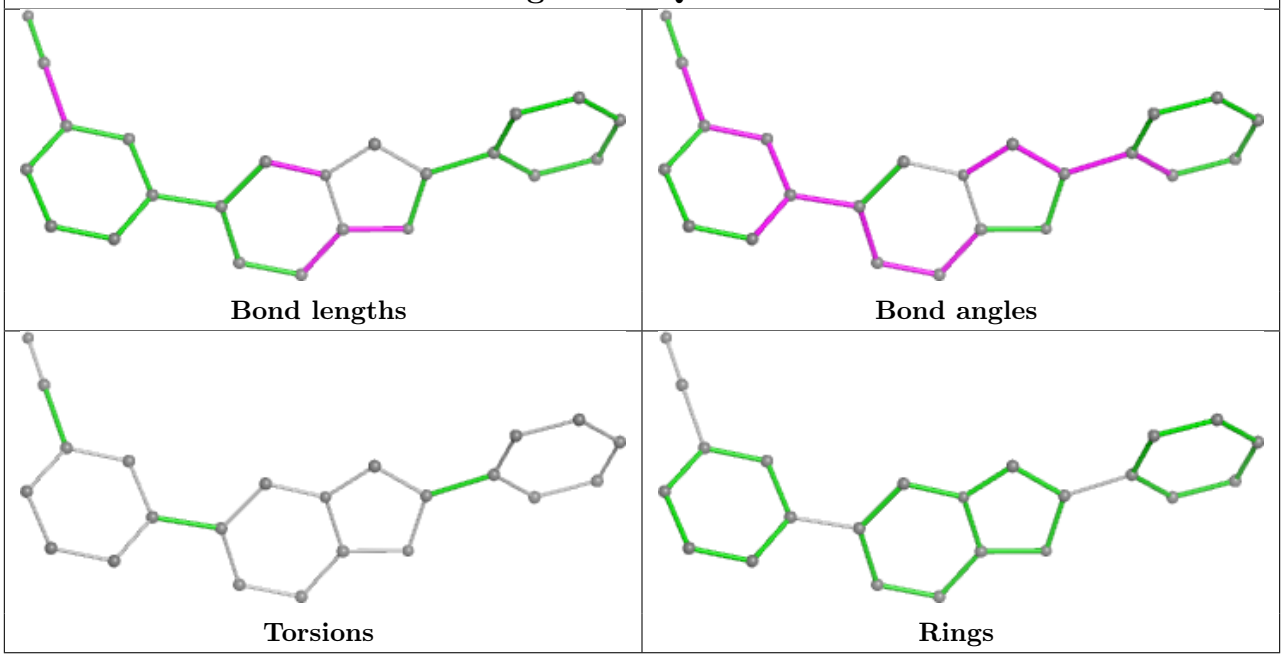
9 monomers are involved in 21 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	B	604	R2K	1	0
3	B	602	R2Q	1	0
2	B	601	NAD	3	3
3	A	602	R2Q	1	0
5	A	605	GOL	2	0
5	A	608	GOL	1	0
5	A	609	GOL	1	0
5	B	603	GOL	1	0
2	A	601	NAD	10	0

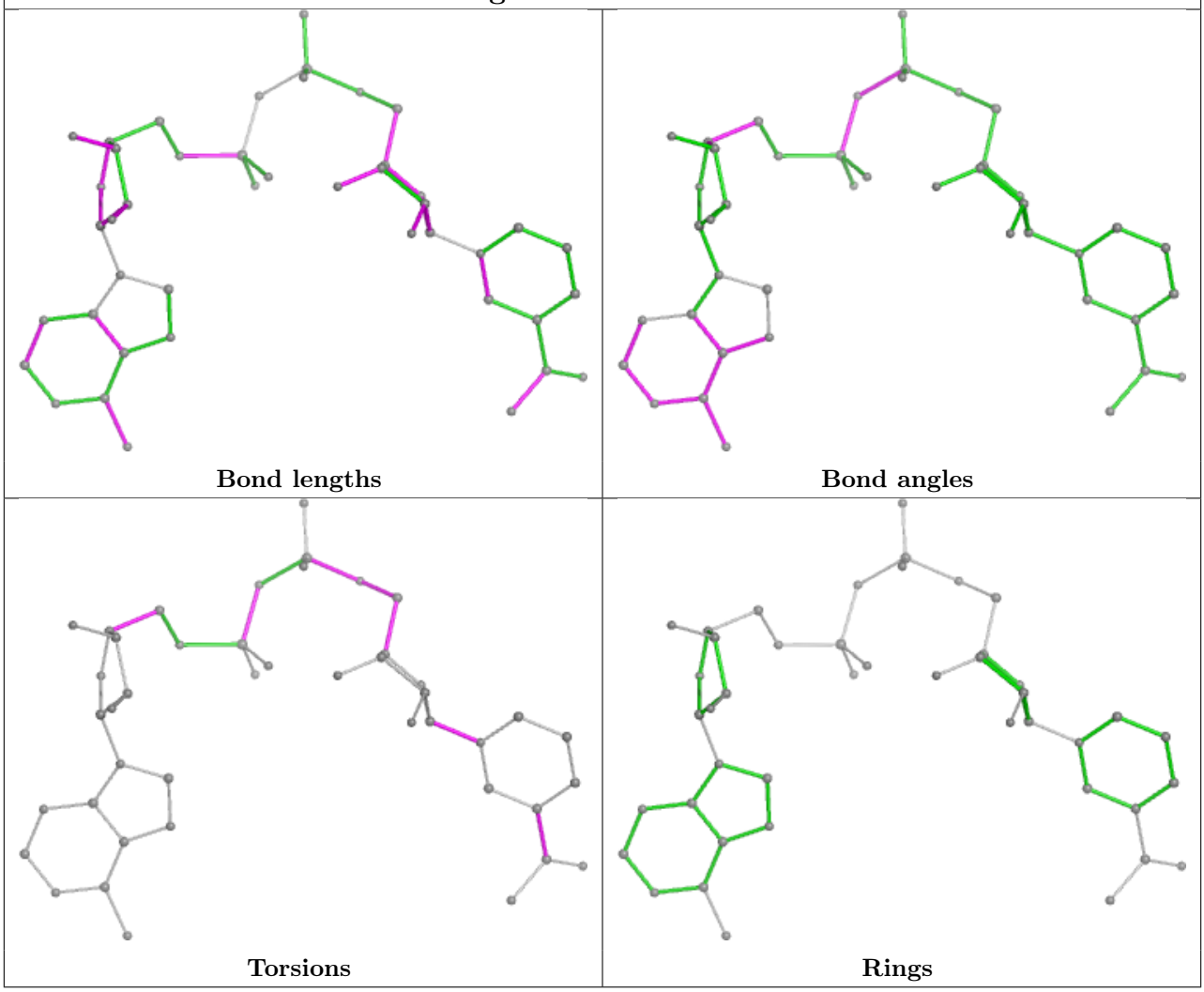
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will

also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

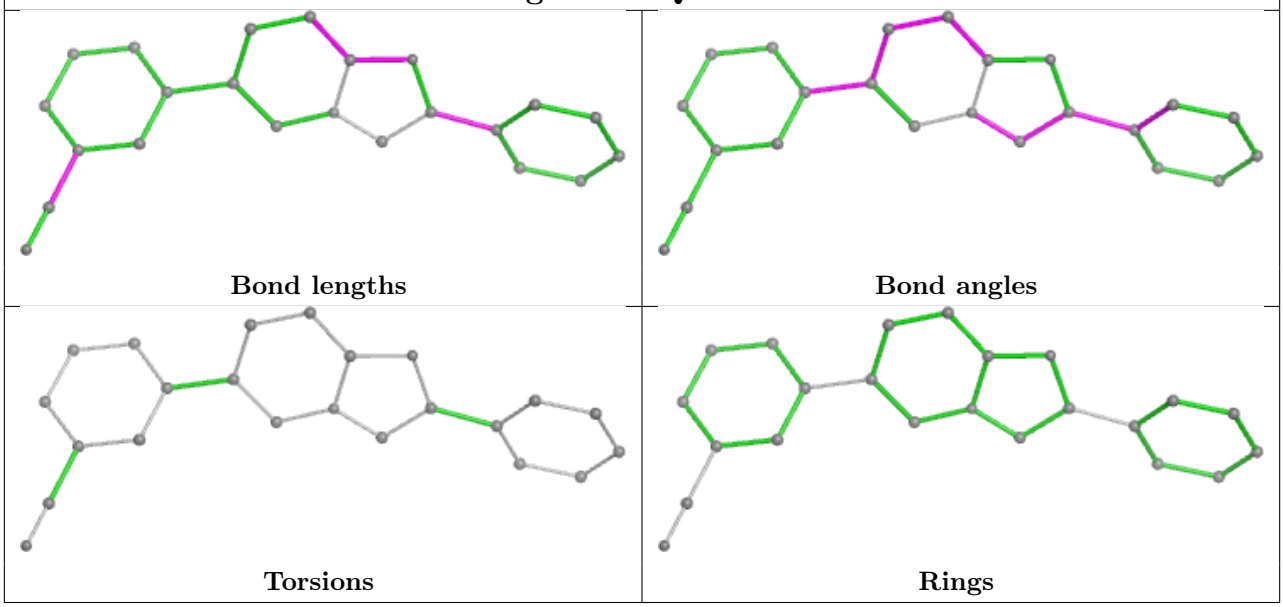
Ligand R2Q B 602



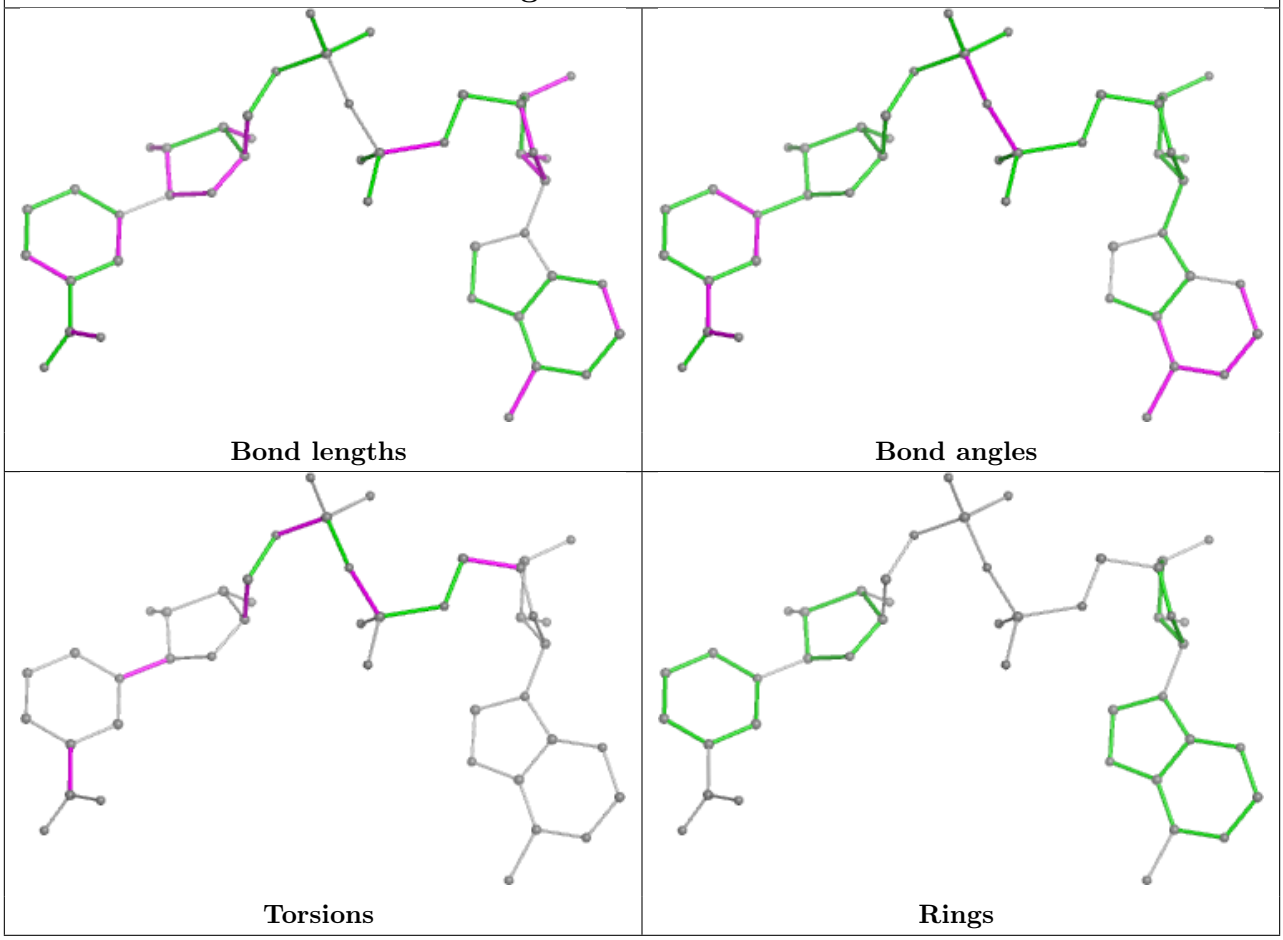
Ligand NAD B 601



Ligand R2Q A 602



Ligand NAD A 601



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	489/512 (95%)	-0.01	19 (3%)	44	41	42, 67, 141, 172	0
1	B	489/512 (95%)	0.01	16 (3%)	49	47	41, 68, 124, 157	0
All	All	978/1024 (95%)	0.00	35 (3%)	46	44	41, 67, 133, 172	0

All (35) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	21	PRO	4.2
1	B	24	ILE	4.0
1	A	372	GLY	3.5
1	A	19	ALA	3.5
1	B	23	PRO	3.4
1	A	24	ILE	3.3
1	A	23	PRO	3.2
1	B	20	LEU	3.2
1	A	20	LEU	3.0
1	A	392	PHE	2.8
1	B	413	PHE	2.8
1	A	354	GLY	2.8
1	A	349	VAL	2.8
1	A	385	ALA	2.7
1	A	44	LYS	2.7
1	B	366	LEU	2.7
1	B	407	ILE	2.7
1	A	390	GLY	2.7
1	B	383	GLY	2.7
1	B	361	GLN	2.5
1	A	362	PHE	2.5
1	A	21	PRO	2.4
1	A	346	PRO	2.3
1	A	366	LEU	2.3

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Mol	Chain	Res	Type	RSRZ
1	B	19	ALA	2.3
1	B	394	LYS	2.3
1	A	361	GLN	2.3
1	A	369	ILE	2.3
1	B	368	LEU	2.3
1	B	309	ASN	2.2
1	B	389	LYS	2.2
1	A	404	ASN	2.1
1	B	356	GLN	2.1
1	A	309	ASN	2.1
1	B	369	ILE	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)

There are no oligosaccharides 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
4	NA	A	603	1/1	0.61	0.27	97,97,97,97	0
3	R2Q	B	602	23/23	0.66	0.20	68,126,158,168	0
4	NA	B	606	1/1	0.71	0.30	66,66,66,66	0
3	R2Q	A	602	23/23	0.73	0.19	75,121,153,157	0
6	R2K	B	604	9/9	0.78	0.17	88,108,116,126	0
5	GOL	B	603	6/6	0.81	0.17	65,83,100,114	0
5	GOL	B	605	6/6	0.85	0.10	71,90,108,108	0
5	GOL	A	609	6/6	0.85	0.13	70,85,102,102	0
4	NA	B	607	1/1	0.87	0.23	83,83,83,83	0
2	NAD	B	601	44/44	0.89	0.11	46,75,171,178	0
4	NA	A	607	1/1	0.90	0.19	56,56,56,56	0
5	GOL	A	605	6/6	0.90	0.12	70,88,97,111	0

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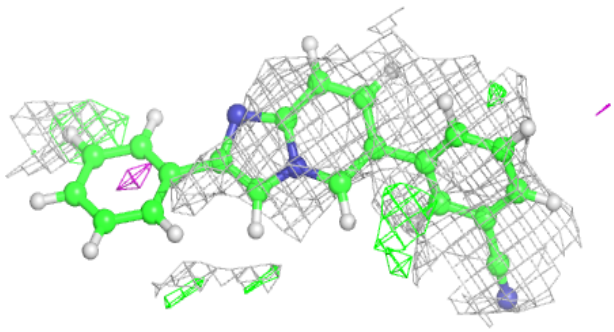
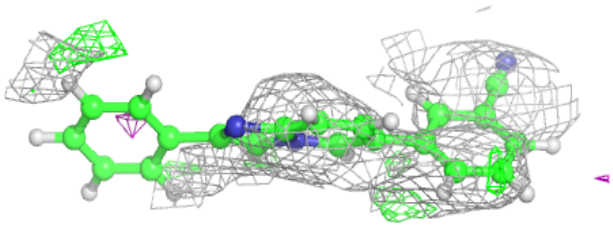
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
5	GOL	A	604	6/6	0.91	0.11	57,78,94,101	0
5	GOL	A	608	6/6	0.91	0.11	59,72,89,89	0
5	GOL	A	606	6/6	0.92	0.11	61,80,97,98	0
2	NAD	A	601	44/44	0.92	0.10	51,78,136,141	0

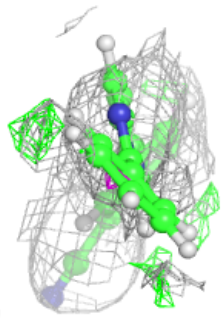
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around R2Q B 602:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative) and green (positive)

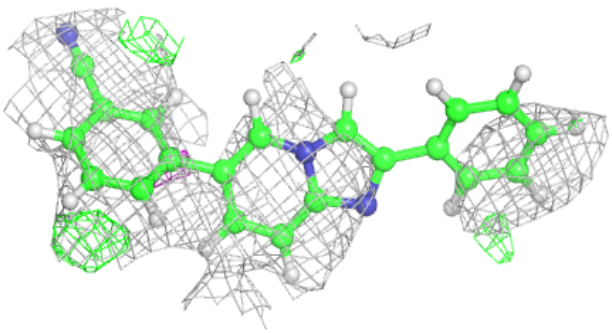


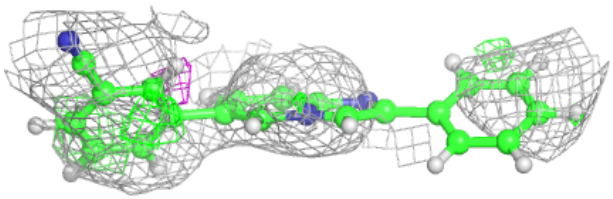


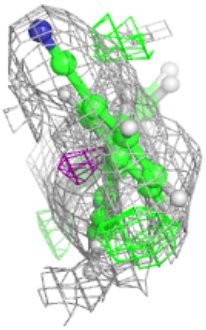


Electron density around R2Q A 602:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

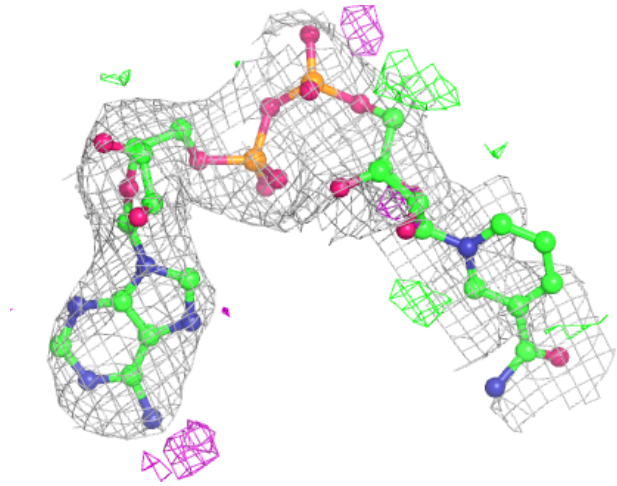


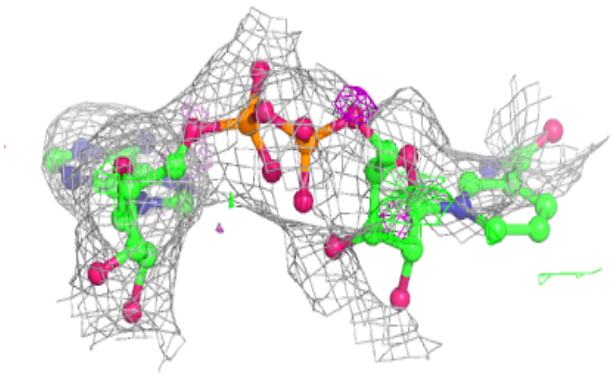


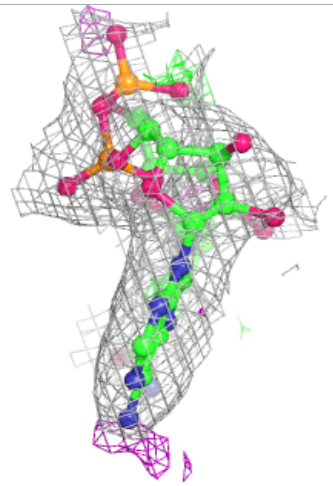


Electron density around NAD B 601:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

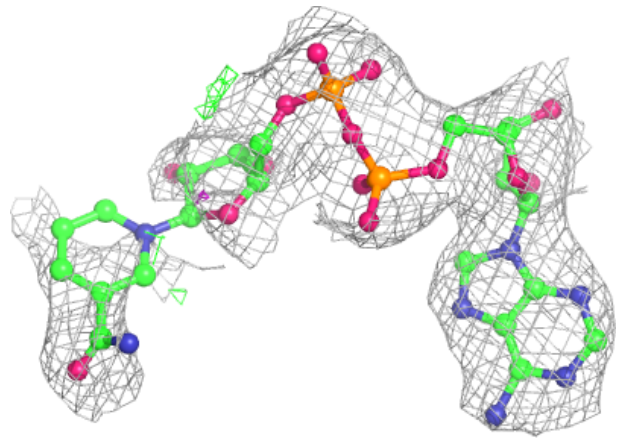


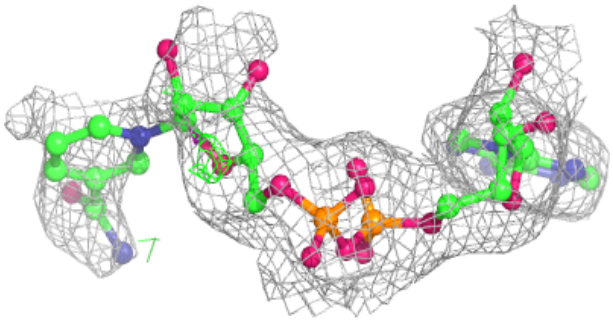


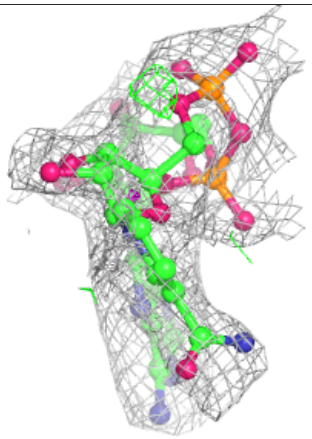


Electron density around NAD A 601:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)







6.5 Other polymers (i)

There are no such residues in this entry.