WORLDWIDE PDB
PROTEIN DATA BANK

wwPDB X-ray Structure Validation Summary Report (i)

Dec 10, 2023 – 10:51 am GMT

PDB ID	:	1UP6
Title	:	Structure of the 6-phospho-beta glucosidase from Thermotoga maritima at 2.55 Angstrom resolution in the tetragonal form with manganese, NAD+ and glucose-6-phosphate
Authors	:	Varrot, A.; Yip, V.L.; Withers, S.G.; Davies, G.J.
Deposited on	:	2003-09-29
Resolution	:	2.55 Å(reported)

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

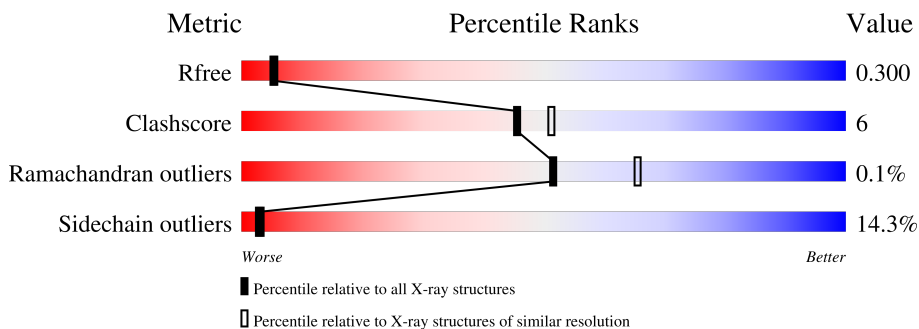|		
MolProbity	:	4.02b-467
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

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 2.55 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	Percentile Ranks	Value
Rfree		0.300
Clashscore		6
Ramachandran outliers		0.1%
Sidechain outliers		14.3%

Worse *Better*

■ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1284 (2.56-2.52)
Clashscore	141614	1332 (2.56-2.52)
Ramachandran outliers	138981	1315 (2.56-2.52)
Sidechain outliers	138945	1315 (2.56-2.52)

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%

Mol	Chain	Length	Quality of chain
1	A	416	74% 22% • •
1	B	416	74% 21% • •
1	C	416	75% 19% • •
1	D	416	75% 19% • •
1	E	416	67% 22% 5% 6%
1	F	416	73% 20% • •

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
1	G	416	73% 21% · ·
1	H	416	70% 22% · 5%

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:

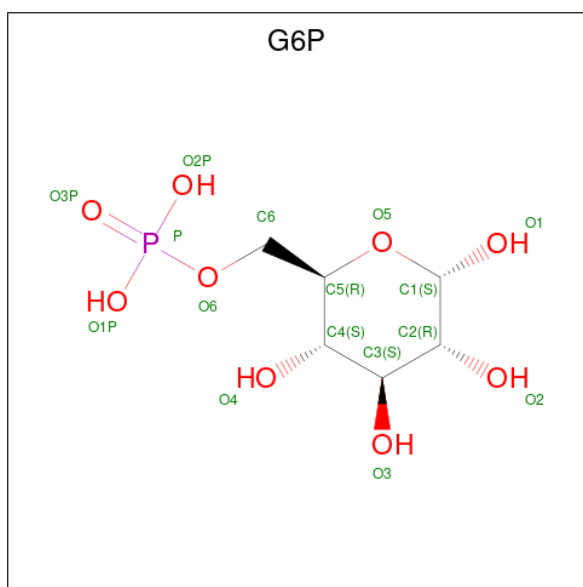| Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
4	G6P	A	1418	X	-	-	-
4	G6P	C	1418	X	-	-	-

2 Entry composition ⓘ

There are 6 unique types of molecules in this entry. The entry contains 26917 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 6-PHOSPHO-BETA-GLUCOSIDASE.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	413	Total 3356	C 2164	N 560	O 623	S 2	Se 7	0	1	0
1	B	410	Total 3331	C 2150	N 552	O 620	S 2	Se 7	39	0	0
1	C	407	Total 3303	C 2129	N 548	O 617	S 2	Se 7	14	0	0
1	D	404	Total 3276	C 2113	N 543	O 611	S 2	Se 7	10	0	0
1	E	390	Total 3165	C 2041	N 525	O 591	S 2	Se 6	121	0	0
1	F	399	Total 3240	C 2091	N 539	O 602	S 2	Se 6	80	0	0
1	G	404	Total 3280	C 2117	N 544	O 610	S 2	Se 7	20	0	0
1	H	395	Total 3209	C 2072	N 533	O 596	S 2	Se 6	104	0	0

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

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

- Molecule 3 is MANGANESE (II) ION (three-letter code: MN) (formula: Mn).

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

- Molecule 4 is 6-O-phosphono-alpha-D-glucopyranose (three-letter code: G6P) (formula: $C_6H_{13}O_9P$).

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total 16	C 6	O 9	P 1	0	0
4	C	1	Total 16	C 6	O 9	P 1	0	0

• Molecule 5 is SULFATE ION (three-letter code: SO4) (formula: O_4S).

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	B	1	Total 5	O 4	S 1	0	0
5	D	1	Total 5	O 4	S 1	0	0

Continued on next page...

Continued from previous page...

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	E	1	Total 5	O 4	S 1	0	0
5	G	1	Total 5	O 4	S 1	0	0

- Molecule 6 is water.

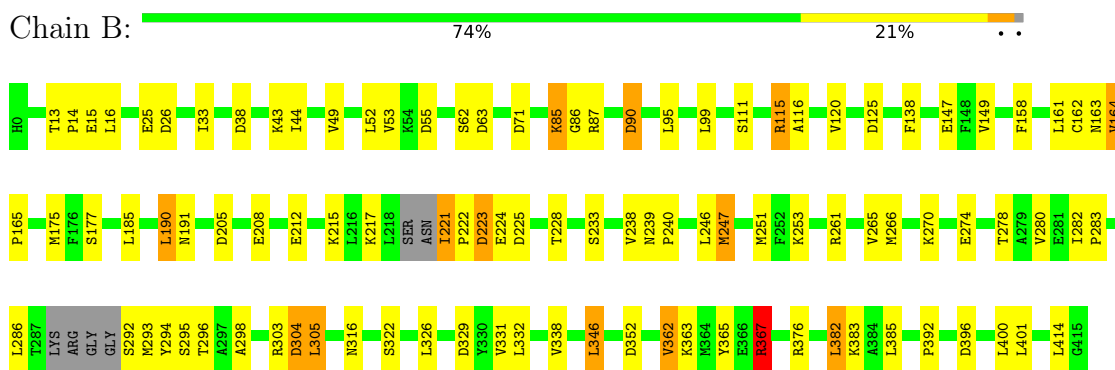| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	136	Total 136	O 136	0	0
6	B	83	Total 83	O 83	0	0
6	C	106	Total 106	O 106	0	0
6	D	95	Total 95	O 95	0	0
6	E	23	Total 23	O 23	0	0
6	F	36	Total 36	O 36	0	0
6	G	59	Total 59	O 59	0	0
6	H	30	Total 30	O 30	0	0

3 Residue-property plots ⓘ

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.
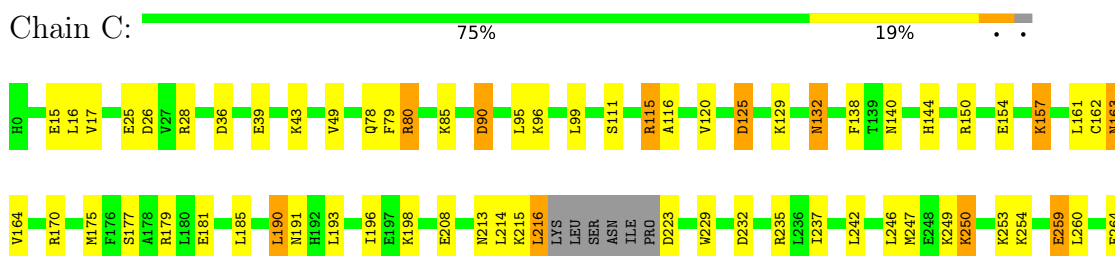
- Molecule 1: 6-PHOSPHO-BETA-GLUCOSIDASE
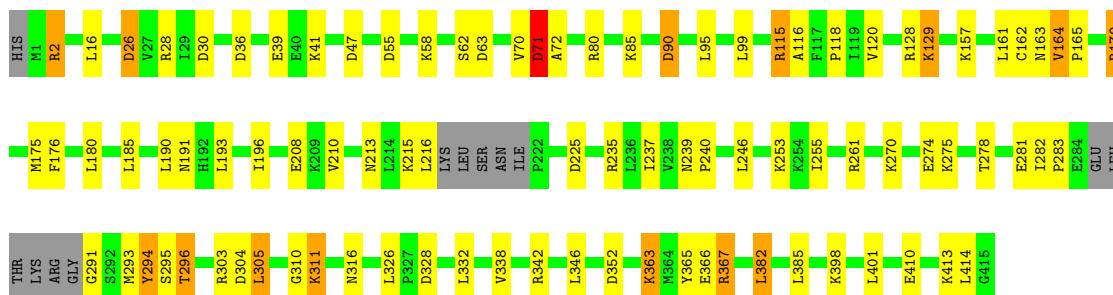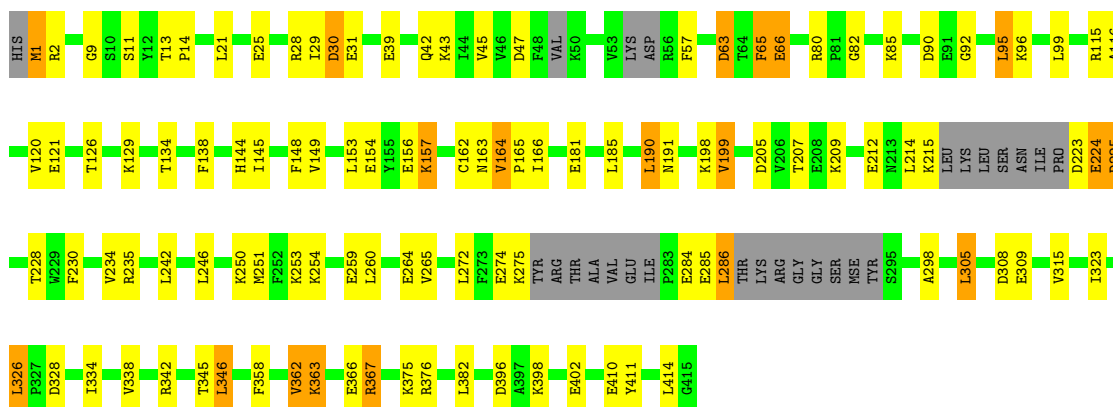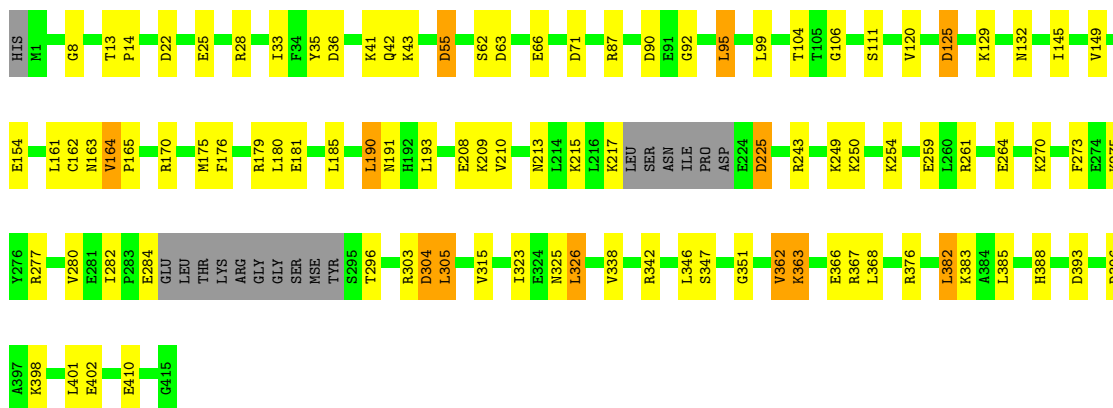
Chain A:

- Molecule 1: 6-PHOSPHO-BETA-GLUCOSIDASE

Chain B:

- Molecule 1: 6-PHOSPHO-BETA-GLUCOSIDASE

Chain C:

V265 M266 E271 E274 E285 L286 T287 LYS ARG G291 S292 S295 A298 D304 L305 D308 I323 L326 D329 V338 T345 L346 S347 V362 K363 M364 Y365 E366 L382 L401 I404 L405 R409 L414 G415

• Molecule 1: 6-PHOSPHO-BETA-GLUCOSIDASE

Chain D:
75%   19%

HIS M1 R2 L16 D26 V27 R28 I29 D30 D36 E39 E40 K41 D47 D55 K58 S62 D63 V70 D71 A72 R80 K85 D90 L95 L99 R115 A116 F117 P118 I119 V120 R128 K129 K157 L161 C162 N163 V164 P165 R170

M175 F176 L180 L185 L190 N191 H192 L193 I196 E208 K209 V210 N213 L214 K215 L216 LYS SER ASN ILE P222 D225 R235 L236 I237 V238 N239 P240 L246 K253 K254 I255 R261 K270 E274 K275 T278 E281 I282 P283 E284 GLU LEU

THR LYS ARG GLY G291 S292 M293 Y294 S295 T296 R303 D304 L305 G310 K311 N316 L326 P327 D328 L332 V338 R342 L346 D352 K363 M364 Y365 E366 R367 L382 L385 K398 L401 E410 K413 L414 G415

• Molecule 1: 6-PHOSPHO-BETA-GLUCOSIDASE

Chain E:
67%   22%   5%   6%

HIS M1 R2 G9 S10 S11 Y12 T13 P14 L21 E25 R28 I29 D30 E31 E39 Q42 K43 I44 V45 V46 D47 F48 VAL K50 V53 LYS ASP R56 F57 D63 T64 F65 E66 R80 P81 G82 K85 D90 E91 G92 L95 K96 L99 R115 A116

V120 E121 T126 K129 T134 F138 H144 I145 F148 V149 L153 E154 Y155 E156 K157 C162 N163 V164 P165 I166 E181 L185 L190 N191 K198 V199 D205 V206 T207 E208 K209 E212 N213 L214 K215 LEU LYS LEU ASN ILE PRO D223 E224 D225

T228 W229 F230 V234 R235 L242 L246 K250 M251 F252 K253 K254 E259 L260 E264 V265 L272 F273 E274 K275 TYR ARG THR ALA VAL GLU ILE P283 E284 E285 L286 THR LYS ARG GLY GLY SER MSE TYR S295 A298 L305 D308 E309 V315 I323

L326 P327 D328 I334 V338 R342 T345 L346 F358 V362 K363 E366 R367 K375 R376 L382 D396 A397 K398 E402 E410 Y411 L414 G415

• Molecule 1: 6-PHOSPHO-BETA-GLUCOSIDASE

Chain F:
73%   20%

HIS M1 G8 T13 P14 D22 E25 R28 I33 F34 Y35 D36 K41 Q42 K43 D55 S62 D63 E66 D71 R87 D90 E91 G92 L95 L99 T104 T105 G106 S111 V120 D125 K129 N132 I145 V149

E154 L161 C162 N163 V164 P165 R170 M175 F176 R179 L180 E181 L185 L190 N191 H192 L193 E208 K209 V210 N213 L214 K215 L216 K217 LEU SER ASN ILE PRO ASP E224 D225 R243 K249 K250 K254 E259 L260 R261 E264 K270 F273 E274 K275

Y276 R277 V280 E281 I282 P283 E284 GLU LEU THR LYS ARG GLY GLY SER MSE TYR S295 T296 R303 D304 L305 V315 I323 E324 N325 L326 V338 R342 L346 S347 G351 V362 K363 E366 R367 L368 R376 L382 K383 A384 L385 H388 D393 D396

A397 K398 L401 E402 E410 G415

• Molecule 1: 6-PHOSPHO-BETA-GLUCOSIDASE

Chain G:

73%   21%   • •

HIS M1 E15 L16 V17 K18 R28 I29 D30 I33 D36 E40 K41 V49 D55 S62 V70 D71 Q78 F79 R80 P81 G82 G83 L84 D90 L95 K96 L99 R115 A116 V120 D125 R128 F138 H144 K157 L161 C162

N163 V164 P165 I166 R170 E174 S177 A178 R179 L185 L190 N191 H192 L193 I196 E197 K198 E208 N213 L214 K215 L216 K217 L218 S219 ASN ILE PRO ASP GLU D225 F226 I237 L246 M247 K253 L260 R261 A262 R263 E264 V265 M266 F273 E274 R277

T278 E281 I282 E285 LEU THR LYS ARG GLY GLY S292 M293 Y294 S295 T296 A297 A298 D304 L305 L326 V338 R342 T345 L346 H353 F358 I359 H360 A361 V362 K363 M364 Y365 E366 R367 K375 L382 D393 K398 E406 R409 E410 Y411 V412 K413

L414 G415

● Molecule 1: 6-PHOSPHO-BETA-GLUCOSIDASE

Chain H:

70%   22%   • 5%

HIS M1 R2 I6 G7 G8 G9 S10 S11 L21 E25 D26 V27 R28 E31 E39 Q42 D47 K50 V53 K54 D55 K58 D63 T64 F65 V70 ASP ALA LYS Y74 Q78 D90 E91 G92 L95 L99 T104 T105 G106 V107 F110

R115 V136 N140 E147 E154 Y155 E156 L161 C162 N163 V164 P165 I166 N167 R170 M175 R179 L180 E181 L185 L190 N191 K198 D205 E208 K209 V210 F211 E212 N213 L216 LYS LEU SER ASN ILE PRO ASP E224 D232 R235 L236 I237

V238 R243 L246 K250 M251 F252 K253 K254 I255 S256 T257 H258 E259 L260 R261 A262 R263 M266 E269 K275 T278 A279 V280 E284 GLU LEU THR LYS ARG GLY GLY SER MSE TYR S295 T296 L301 I302 R303 D304 L305 E306 K311 V315 N325 L326 V338

L346 D352 V362 K363 M364 Y365 E366 R367 L368 R376 L382 L385 H388 D393 D396 A397 K398 D399 L400 L401 L414 G415

4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, α, β, γ	179.44Å 179.44Å 282.91Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	19.96 – 2.55 19.98 – 2.55	Depositor EDS
% Data completeness (in resolution range)	99.8 (19.96-2.55) 99.8 (19.98-2.55)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	4.95 (at 2.56Å)	Xtriage
Refinement program	REFMAC 5.1.24	Depositor
R, R_{free}	0.200 , 0.250 0.268 , 0.300	Depositor DCC
R_{free} test set	14357 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å^2)	34.5	Xtriage
Anisotropy	0.225	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.36 , 42.4	EDS
L-test for twinning[2]	$< \|L\| > = 0.49, < L^2 > = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.89	EDS
Total number of atoms	26917	wwPDB-VP
Average B, all atoms (Å^2)	20.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 14.72% 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: G6P, SO4, MN, NAD

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	0.75	1/3420 (0.0%)	0.88	15/4595 (0.3%)
1	B	0.67	0/3390	0.89	13/4558 (0.3%)
1	C	0.72	0/3361	0.88	10/4518 (0.2%)
1	D	0.70	0/3335	0.89	12/4484 (0.3%)
1	E	0.51	0/3219	0.77	8/4323 (0.2%)
1	F	0.51	0/3298	0.78	9/4435 (0.2%)
1	G	0.59	0/3338	0.81	8/4487 (0.2%)
1	H	0.49	0/3266	0.77	11/4392 (0.3%)
All	All	0.63	1/26627 (0.0%)	0.84	86/35792 (0.2%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	167	ASN	CG-OD1	5.05	1.35	1.24

The worst 5 of 86 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	115	ARG	NE-CZ-NH2	-8.91	115.84	120.30
1	B	90	ASP	CB-CG-OD2	8.03	125.53	118.30
1	D	115	ARG	NE-CZ-NH2	-7.76	116.42	120.30
1	B	367	ARG	NE-CZ-NH2	-7.57	116.52	120.30
1	A	304	ASP	CB-CG-OD2	7.44	125.00	118.30

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	3356	0	3393	54	0
1	B	3331	0	3362	46	0
1	C	3303	0	3322	47	0
1	D	3276	0	3300	36	0
1	E	3165	0	3184	43	0
1	F	3240	0	3275	38	0
1	G	3280	0	3313	45	0
1	H	3209	0	3239	37	0
2	A	44	0	26	5	0
2	C	44	0	26	2	0
2	G	44	0	26	3	0
3	A	3	0	0	0	0
3	C	1	0	0	0	0
3	G	1	0	0	0	0
4	A	16	0	9	1	0
4	C	16	0	10	1	0
5	B	5	0	0	0	0
5	D	5	0	0	0	0
5	E	5	0	0	0	0
5	G	5	0	0	0	0
6	A	136	0	0	1	0
6	B	83	0	0	1	0
6	C	106	0	0	2	0
6	D	95	0	0	2	0
6	E	23	0	0	0	0
6	F	36	0	0	0	0
6	G	59	0	0	0	0
6	H	30	0	0	0	0
All	All	26917	0	26485	334	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 6.

The worst 5 of 334 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

WORLDWIDE
wwPDB
PROTEIN DATA BANK

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:G:41:LYS:HE2	1:G:273:PHE:CZ	1.75	1.22
1:F:175:MSE:HE3	1:F:213:ASN:ND2	1.62	1.15
1:F:175:MSE:HE3	1:F:213:ASN:HD22	1.05	1.15
1:G:41:LYS:HE2	1:G:273:PHE:CE2	1.85	1.11
1:D:175:MSE:HE3	1:D:213:ASN:HD22	0.92	1.07

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	410/416 (99%)	398 (97%)	10 (2%)	2 (0%)	29	40
1	B	404/416 (97%)	393 (97%)	11 (3%)	0	100	100
1	C	401/416 (96%)	395 (98%)	6 (2%)	0	100	100
1	D	398/416 (96%)	387 (97%)	11 (3%)	0	100	100
1	E	378/416 (91%)	372 (98%)	5 (1%)	1 (0%)	41	51
1	F	393/416 (94%)	383 (98%)	10 (2%)	0	100	100
1	G	398/416 (96%)	386 (97%)	11 (3%)	1 (0%)	41	51
1	H	387/416 (93%)	379 (98%)	8 (2%)	0	100	100
All	All	3169/3328 (95%)	3093 (98%)	72 (2%)	4 (0%)	51	65

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	216	LEU
1	A	290	GLY
1	E	285	GLU
1	G	216	LEU

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	366/361 (101%)	327 (89%)	39 (11%)	6	7
1	B	364/361 (101%)	319 (88%)	45 (12%)	4	4
1	C	360/361 (100%)	312 (87%)	48 (13%)	4	3
1	D	357/361 (99%)	306 (86%)	51 (14%)	3	3
1	E	345/361 (96%)	280 (81%)	65 (19%)	1	1
1	F	353/361 (98%)	302 (86%)	51 (14%)	3	3
1	G	358/361 (99%)	305 (85%)	53 (15%)	3	2
1	H	350/361 (97%)	295 (84%)	55 (16%)	2	2
All	All	2853/2888 (99%)	2446 (86%)	407 (14%)	3	3

5 of 407 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	E	309	GLU
1	F	315	VAL
1	H	365	TYR
1	E	362	VAL
1	F	164	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 25 such sidechains are listed below:

Mol	Chain	Res	Type
1	F	213	ASN
1	G	163	ASN
1	H	320	ASN
1	F	353	HIS
1	G	320	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 ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 14 ligands modelled in this entry, 5 are monoatomic - leaving 9 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
4	G6P	C	1418	3	16,16,16	0.53	0	24,24,24	1.02	1 (4%)
2	NAD	G	1416	3	42,48,48	1.76	3 (7%)	50,73,73	1.27	2 (4%)
2	NAD	A	1416	3	42,48,48	1.80	3 (7%)	50,73,73	1.21	2 (4%)
5	SO4	G	1418	-	4,4,4	0.26	0	6,6,6	0.30	0
2	NAD	C	1416	3	42,48,48	1.79	3 (7%)	50,73,73	1.33	7 (14%)
5	SO4	E	1416	-	4,4,4	0.29	0	6,6,6	0.46	0
4	G6P	A	1418	3	16,16,16	0.94	1 (6%)	24,24,24	1.16	3 (12%)
5	SO4	B	1416	-	4,4,4	0.70	0	6,6,6	0.43	0
5	SO4	D	1416	-	4,4,4	0.78	0	6,6,6	0.35	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
4	G6P	C	1418	3	1/1/6/6	2/6/26/26	0/1/1/1
2	NAD	G	1416	3	-	10/26/62/62	0/5/5/5
2	NAD	A	1416	3	-	7/26/62/62	0/5/5/5
2	NAD	C	1416	3	-	10/26/62/62	0/5/5/5

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	G6P	A	1418	3	1/1/6/6	3/6/26/26	0/1/1/1

The worst 5 of 10 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	1416	NAD	O7N-C7N	9.55	1.42	1.24
2	C	1416	NAD	O7N-C7N	9.19	1.41	1.24
2	G	1416	NAD	O7N-C7N	9.15	1.41	1.24
2	C	1416	NAD	C2A-N3A	4.00	1.38	1.32
2	G	1416	NAD	C2A-N3A	3.98	1.38	1.32

The worst 5 of 15 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	G	1416	NAD	N3A-C2A-N1A	-5.82	119.59	128.68
2	A	1416	NAD	N3A-C2A-N1A	-4.72	121.30	128.68
2	C	1416	NAD	N3A-C2A-N1A	-4.63	121.45	128.68
2	G	1416	NAD	PN-O3-PA	-3.63	120.36	132.83
2	A	1416	NAD	O7N-C7N-C3N	-3.21	115.79	119.63

All (2) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
4	A	1418	G6P	C1
4	C	1418	G6P	C1

5 of 32 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	1416	NAD	PN-O3-PA-O5B
2	A	1416	NAD	PA-O3-PN-O5D
2	A	1416	NAD	C5D-O5D-PN-O3
2	A	1416	NAD	O4D-C1D-N1N-C6N
2	C	1416	NAD	C5B-O5B-PA-O2A

There are no ring outliers.

5 monomers are involved in 12 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	C	1418	G6P	1	0
2	G	1416	NAD	3	0

Continued from previous page...

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	1416	NAD	5	0
2	C	1416	NAD	2	0
4	A	1418	G6P	1	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 G6P C 1418

Bond lengths

Bond angles

Torsions

Rings

Ligand NAD G 1416

Bond lengths

Bond angles

Torsions

Rings

Ligand NAD A 1416

Bond lengths

Bond angles

Torsions

Rings

Ligand NAD C 1416

Bond lengths

Bond angles

Torsions

Rings

Ligand G6P A 1418

Bond lengths

Bond angles

Torsions

Rings
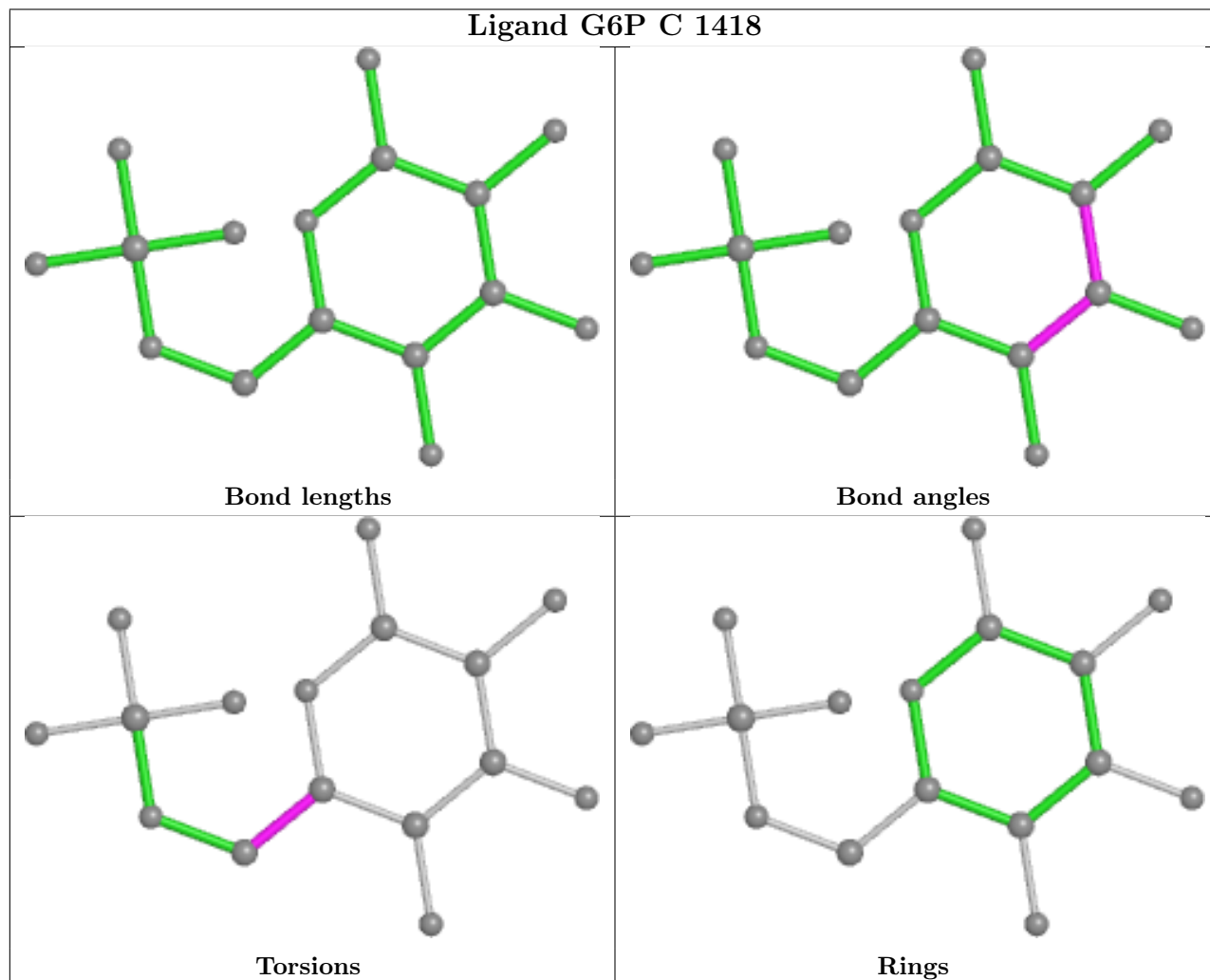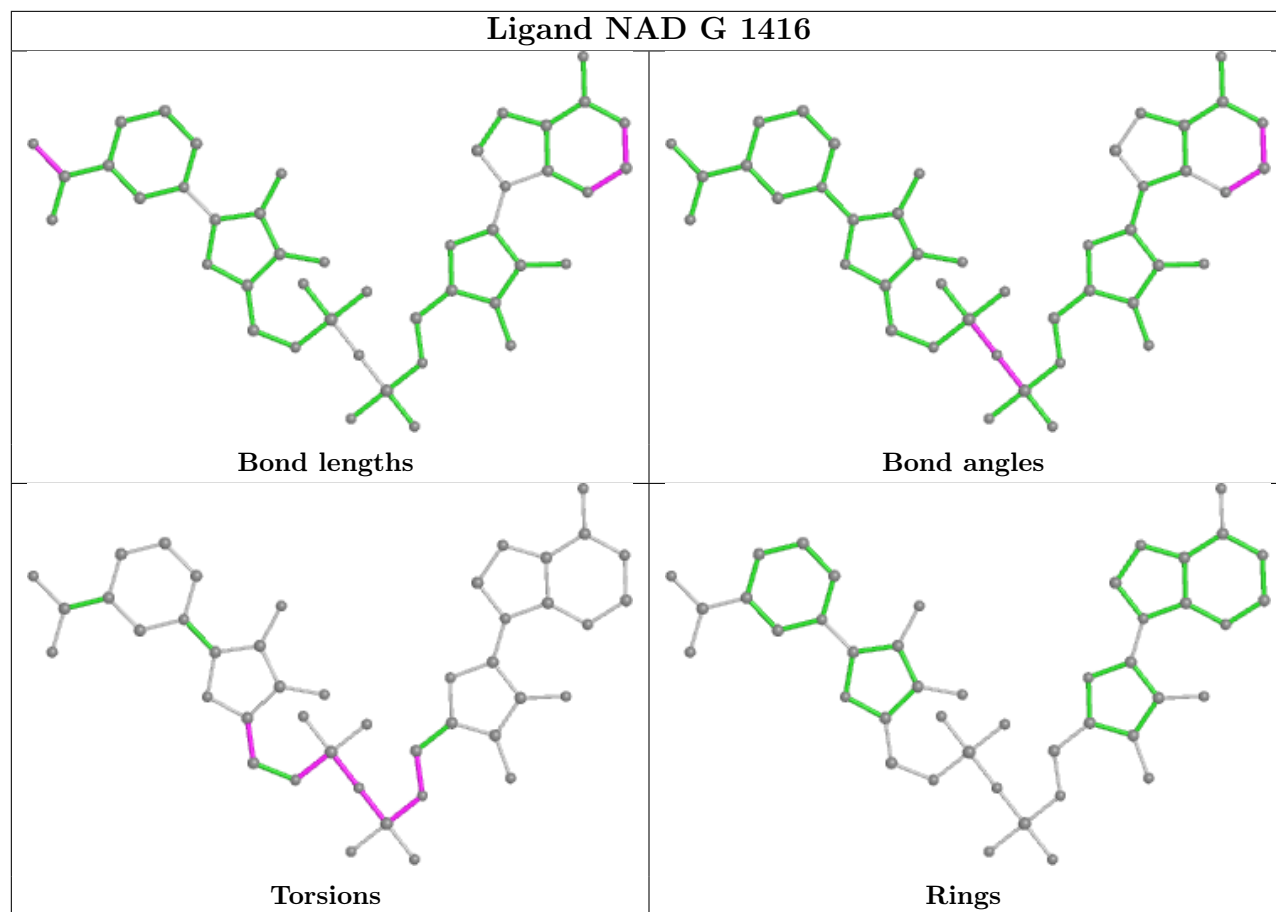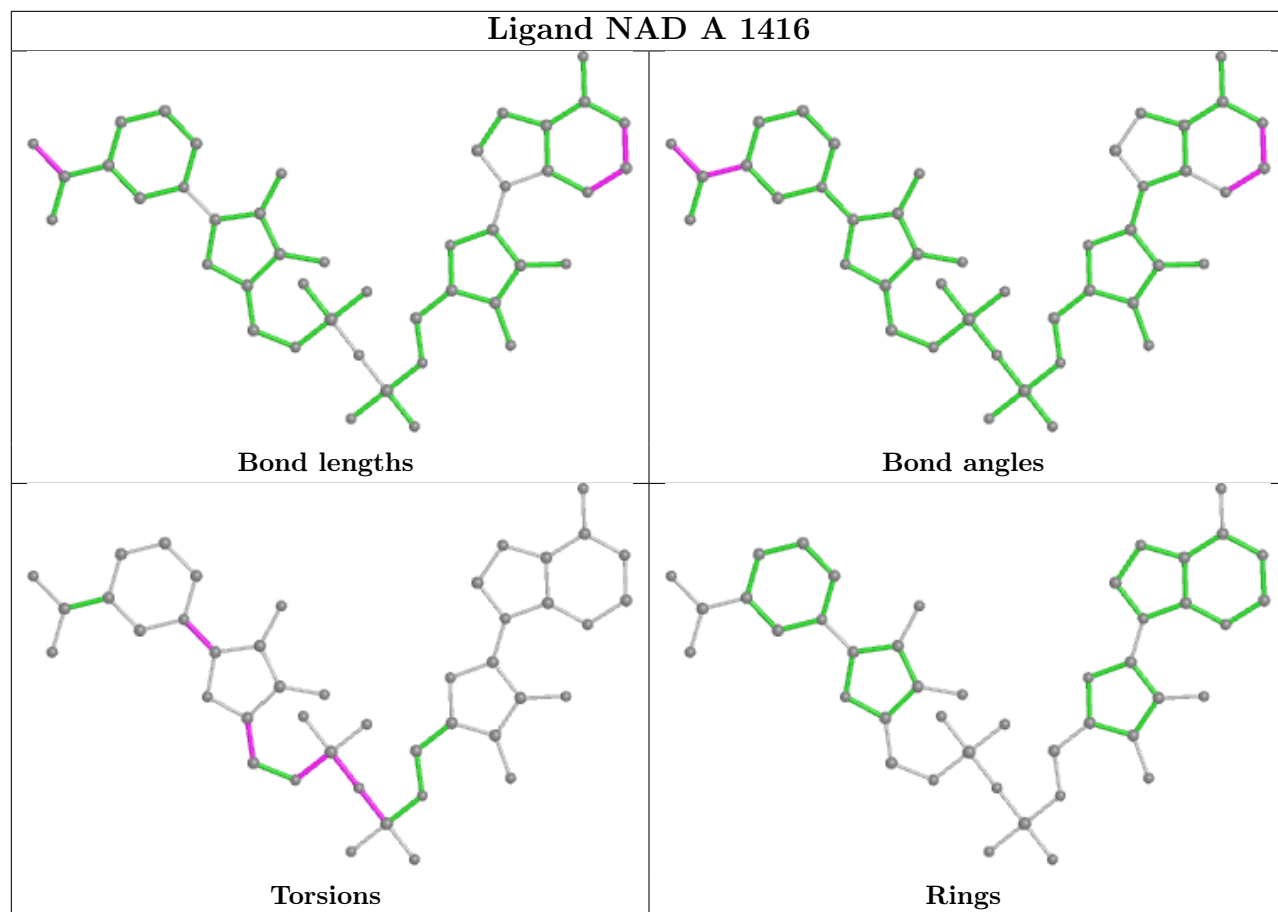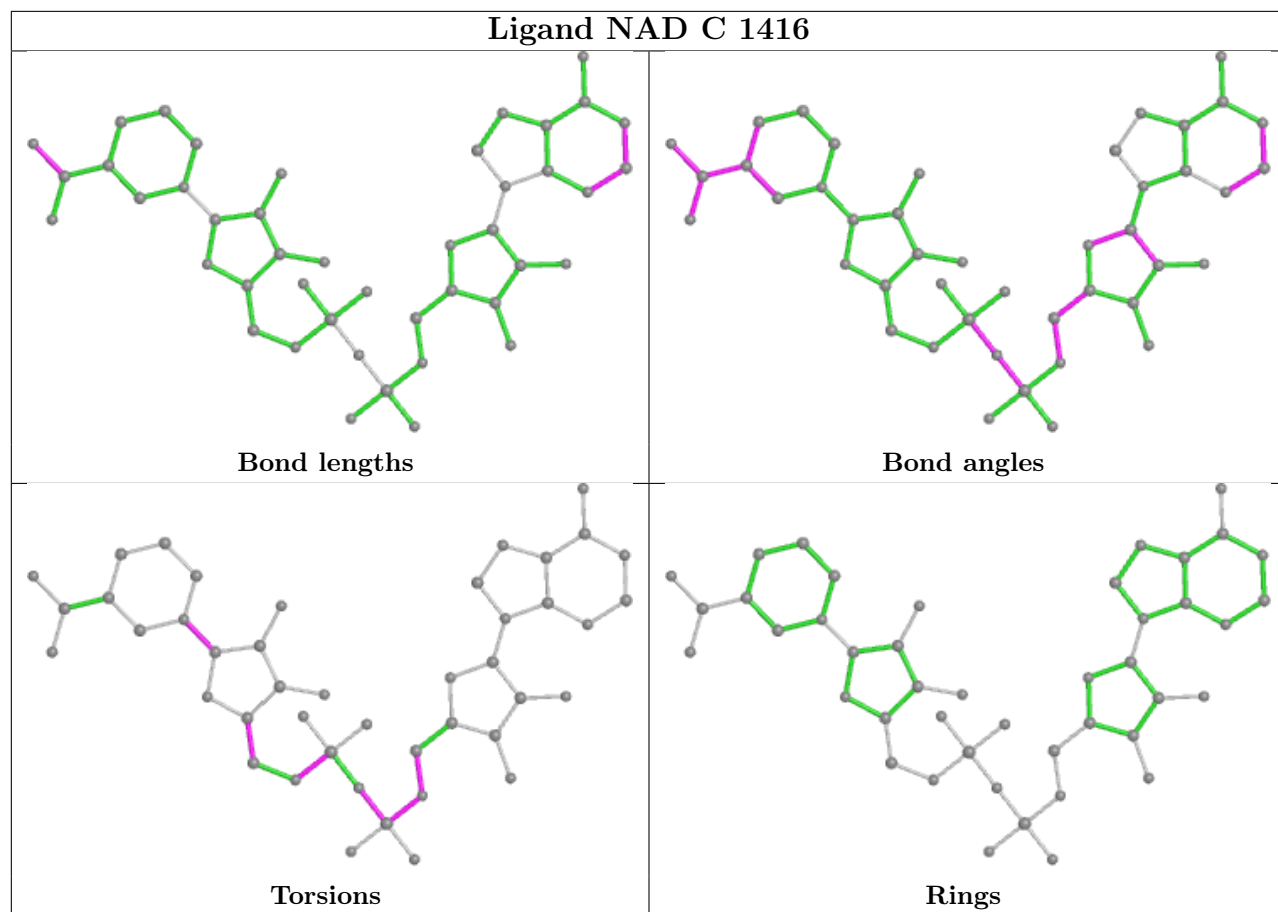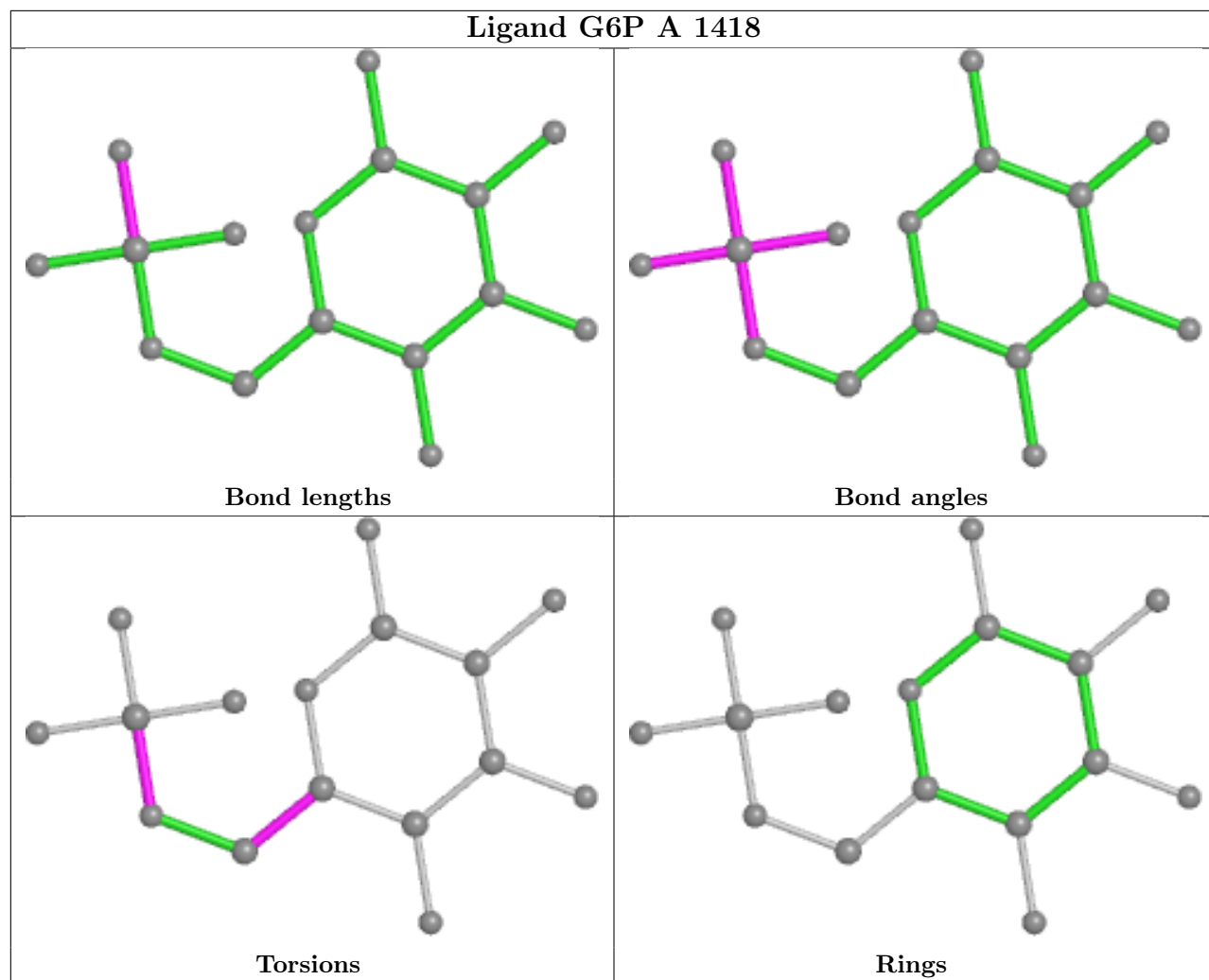
5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6   Fit of model and data ⓘ

6.1   Protein, DNA and RNA chains ⓘ

Unable to reproduce the depositors R factor - this section is therefore empty.

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

Unable to reproduce the depositors R factor - this section is therefore empty.

6.3   Carbohydrates ⓘ

Unable to reproduce the depositors R factor - this section is therefore empty.

6.4   Ligands ⓘ

Unable to reproduce the depositors R factor - this section is therefore empty.

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.
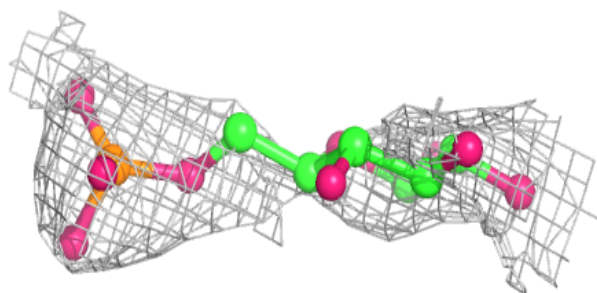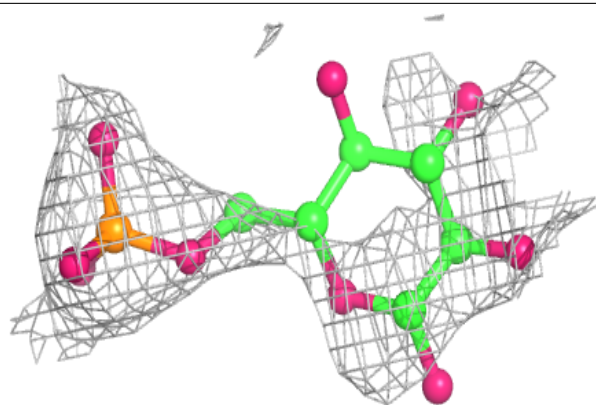

Electron density around NAD A 1416:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)
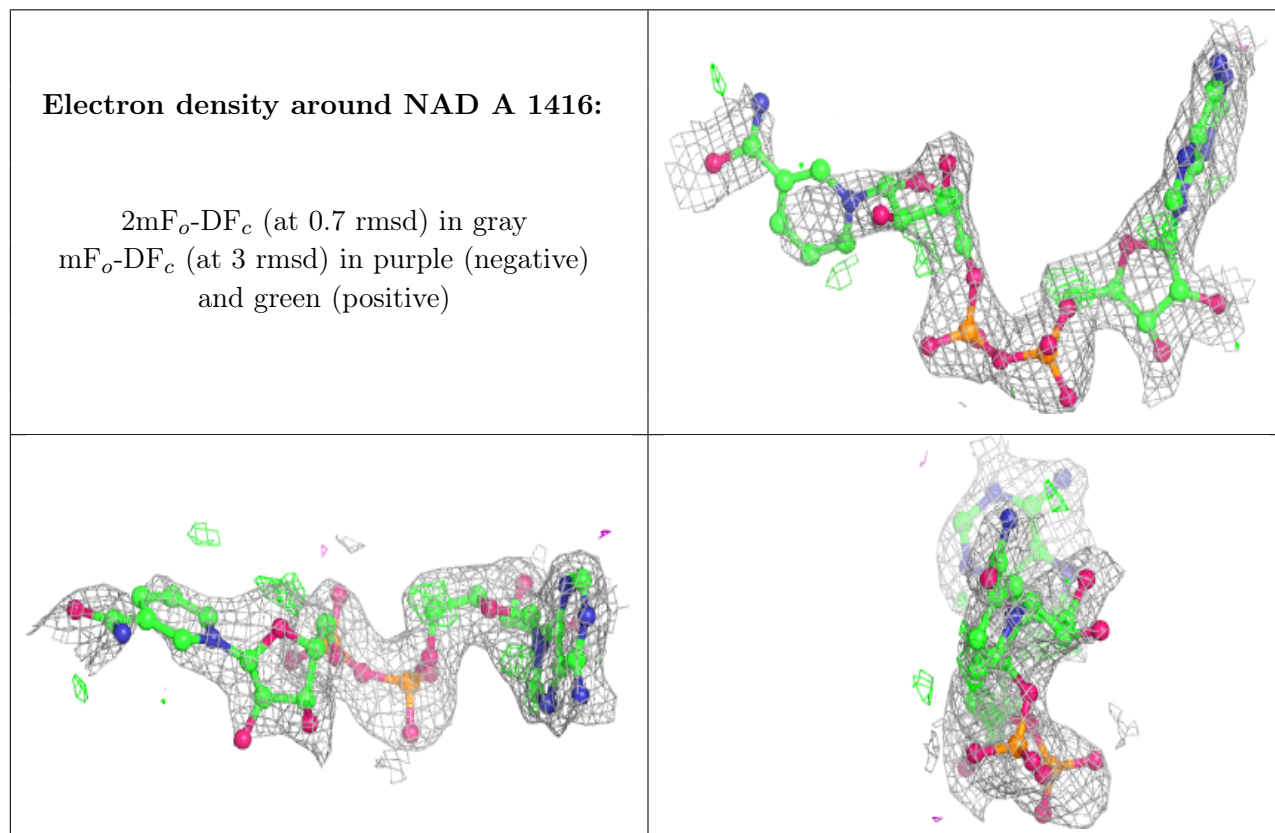
Electron density around NAD C 1416:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
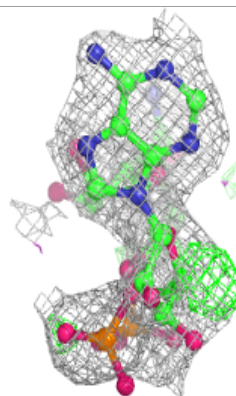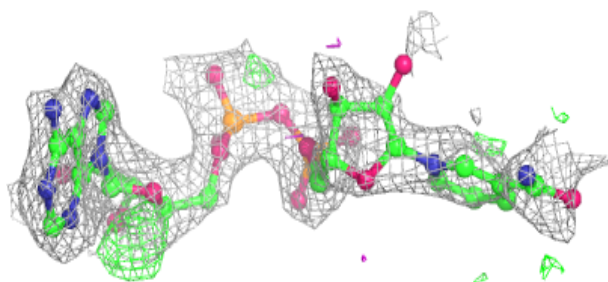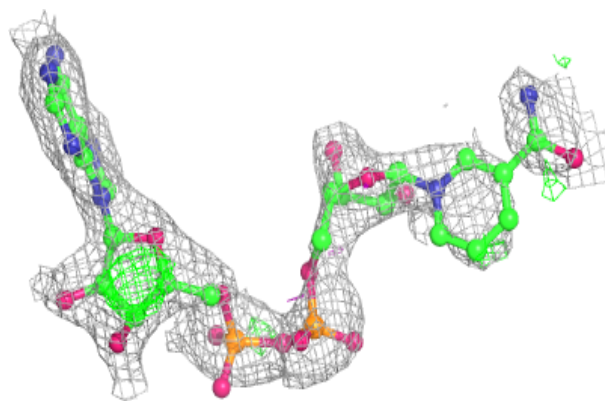
Electron density around NAD G 1416:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
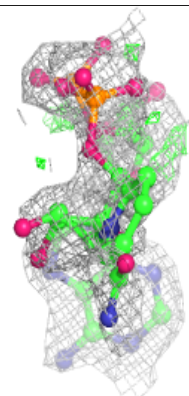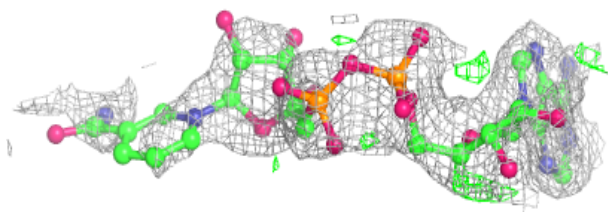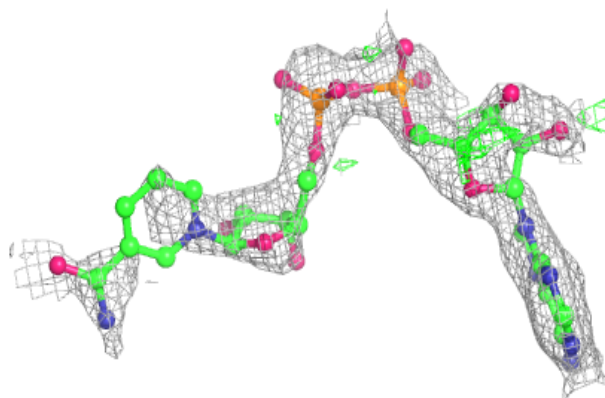
Electron density around G6P A 1418:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
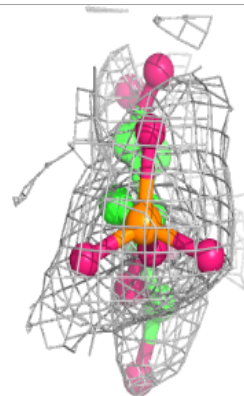
Electron density around G6P C 1418:

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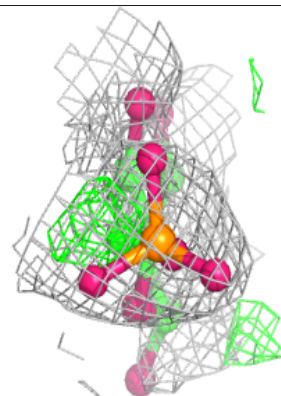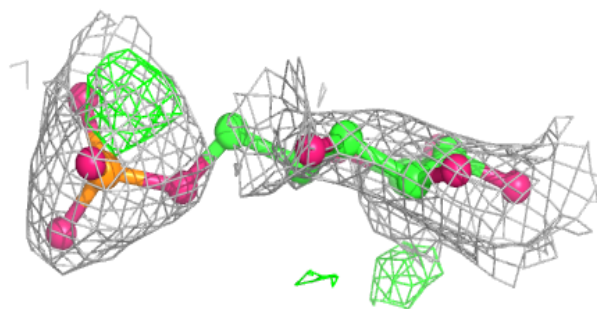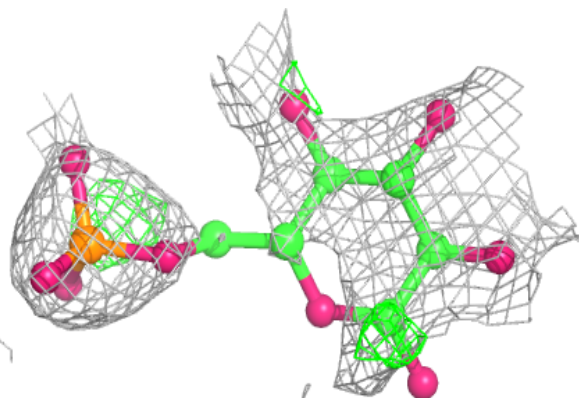
6.5 Other polymers ⓘ

Unable to reproduce the depositors R factor - this section is therefore empty.