wwPDB X-ray Structure Validation Summary Report (i)

Jul 26, 2023 – 02:34 AM EDT

PDB ID	:	1AON
Title	:	CRYSTAL STRUCTURE OF THE ASYMMETRIC CHAPERONIN COMPLEX GROEL/GROES/(ADP)7
Authors	:	Xu, Z.; Horwich, A.L.; Sigler, P.B.
Deposited on	:	1997-07-08
Resolution	:	3.00 Å(reported)

This is a wwPDB X-ray Structure Validation Summary Report for a publicly released PDB entry.

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/XrayValidationReportHelp
with specific help available everywhere you see the (i) symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

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

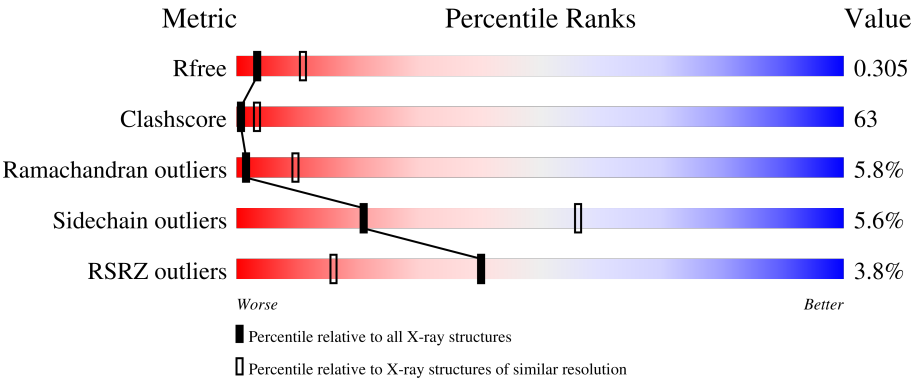
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.34
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.34

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 3.00 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	2092 (3.00-3.00)
Clashscore	141614	2416 (3.00-3.00)
Ramachandran outliers	138981	2333 (3.00-3.00)
Sidechain outliers	138945	2336 (3.00-3.00)
RSRZ outliers	127900	1990 (3.00-3.00)

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	547	3% 29% 58% 8%
1	B	547	3% 29% 58% 8%
1	C	547	3% 29% 57% 9%
1	D	547	3% 30% 58% 8%
1	E	547	6% 28% 59% 9%

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
1	F	547	6% 27% 60% 8%
1	G	547	5% 27% 59% 9%
1	H	547	29% 59% 6%
1	I	547	30% 58% 7%
1	J	547	31% 59% 6%
1	K	547	28% 61% 6%
1	L	547	27% 62% 6%
1	M	547	28% 61% 7%
1	N	547	31% 59% 6%
2	O	97	18% 33% 59% 8%
2	P	97	13% 34% 57% 9%
2	Q	97	11% 31% 58% 11%
2	R	97	14% 27% 61% 12%
2	S	97	13% 35% 57% 8%
2	T	97	19% 31% 57% 12%
2	U	97	13% 29% 60% 11%

2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 58870 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 GROEL.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	524	Total 3808	C 2368	N 653	O 767	S 20	0	0	0
1	B	524	Total 3808	C 2368	N 653	O 767	S 20	0	0	0
1	C	524	Total 3808	C 2368	N 653	O 767	S 20	0	0	0
1	D	524	Total 3808	C 2368	N 653	O 767	S 20	0	0	0
1	E	524	Total 3808	C 2368	N 653	O 767	S 20	0	0	0
1	F	524	Total 3808	C 2368	N 653	O 767	S 20	0	0	0
1	G	524	Total 3808	C 2368	N 653	O 767	S 20	0	0	0
1	H	524	Total 3849	C 2394	N 662	O 773	S 20	0	0	0
1	I	524	Total 3849	C 2394	N 662	O 773	S 20	0	0	0
1	J	524	Total 3849	C 2394	N 662	O 773	S 20	0	0	0
1	K	524	Total 3849	C 2394	N 662	O 773	S 20	0	0	0
1	L	524	Total 3849	C 2394	N 662	O 773	S 20	0	0	0
1	M	524	Total 3849	C 2394	N 662	O 773	S 20	0	0	0
1	N	524	Total 3849	C 2394	N 662	O 773	S 20	0	0	0

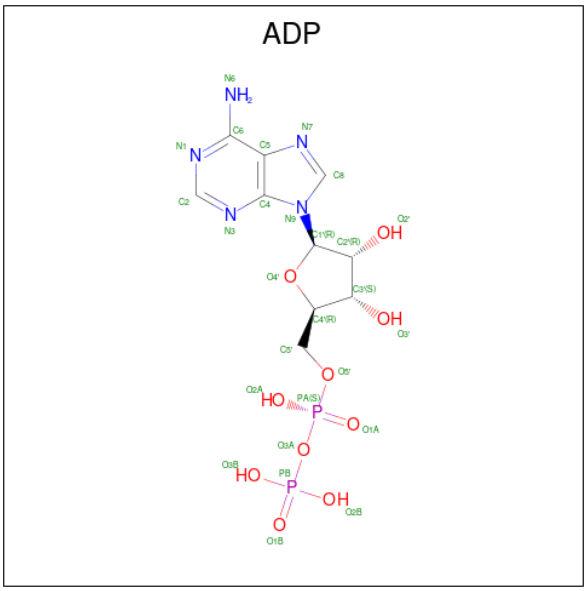
- Molecule 2 is a protein called GROEL/GROES COMPLEX.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	O	97	Total 725	C 452	N 127	O 145	S 1	0	0	0
2	P	97	Total 725	C 452	N 127	O 145	S 1	0	0	0
2	Q	97	Total 725	C 452	N 127	O 145	S 1	0	0	0
2	R	97	Total 725	C 452	N 127	O 145	S 1	0	0	0
2	S	97	Total 725	C 452	N 127	O 145	S 1	0	0	0
2	T	97	Total 725	C 452	N 127	O 145	S 1	0	0	0
2	U	97	Total 725	C 452	N 127	O 145	S 1	0	0	0

- Molecule 3 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total 1	Mg 1	0	0
3	B	1	Total 1	Mg 1	0	0
3	C	1	Total 1	Mg 1	0	0
3	D	1	Total 1	Mg 1	0	0
3	E	1	Total 1	Mg 1	0	0
3	F	1	Total 1	Mg 1	0	0
3	G	1	Total 1	Mg 1	0	0

- Molecule 4 is ADENOSINE-5'-DIPHOSPHATE (three-letter code: ADP) (formula: $C_{10}H_{15}N_5O_{10}P_2$).



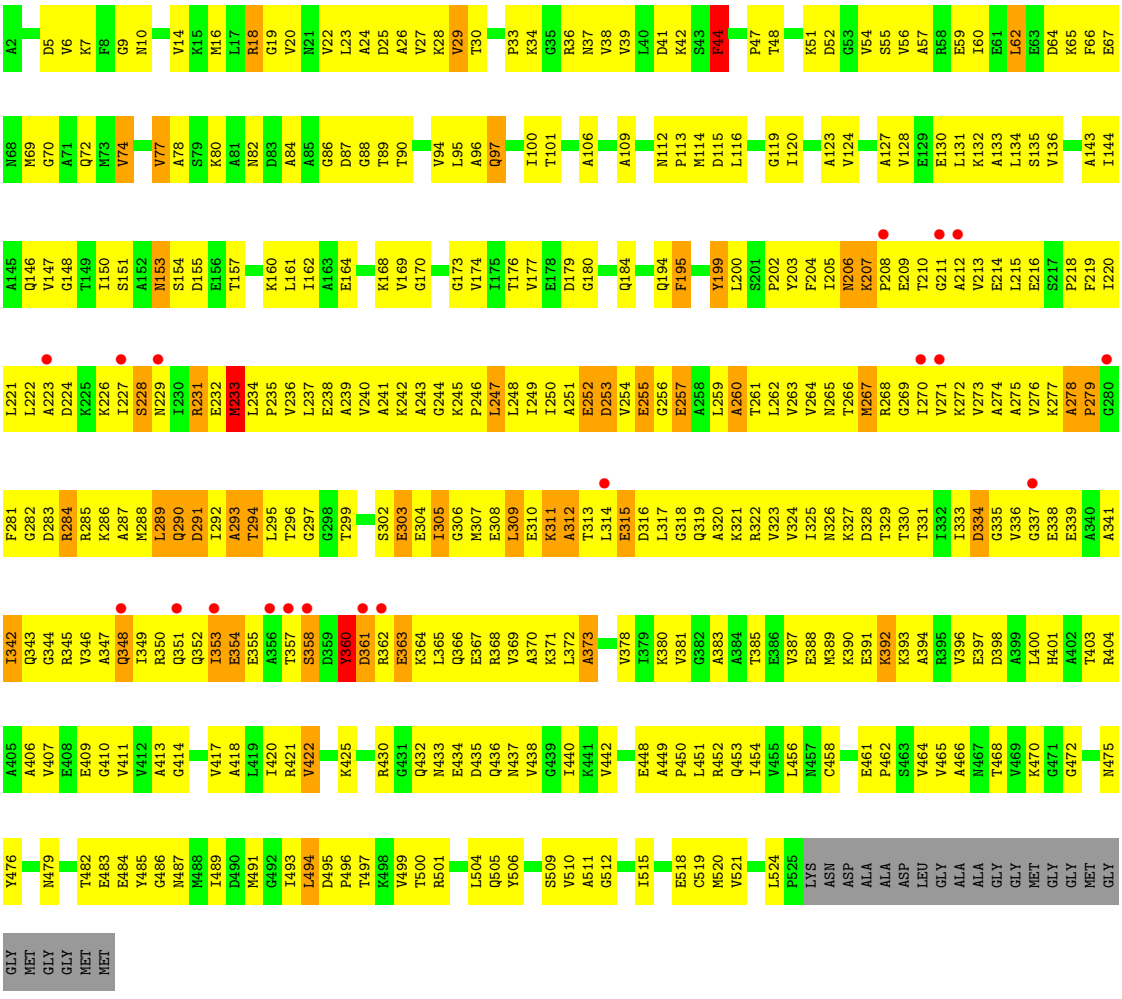
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
4	B	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
4	C	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
4	D	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
4	E	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
4	F	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
4	G	1	Total	C	N	O	P	0	0
			27	10	5	10	2		

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.

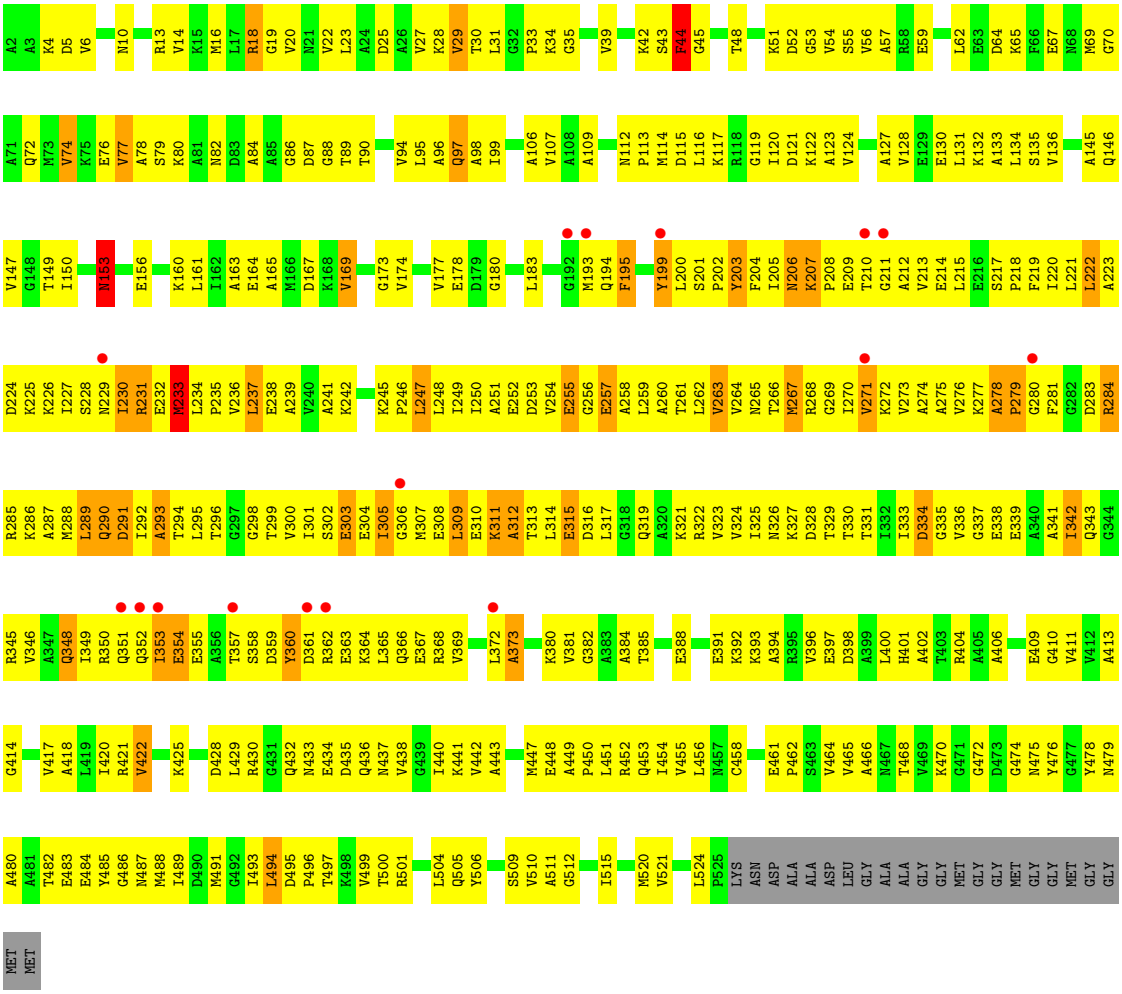
• Molecule 1: GROEL

Chain A:



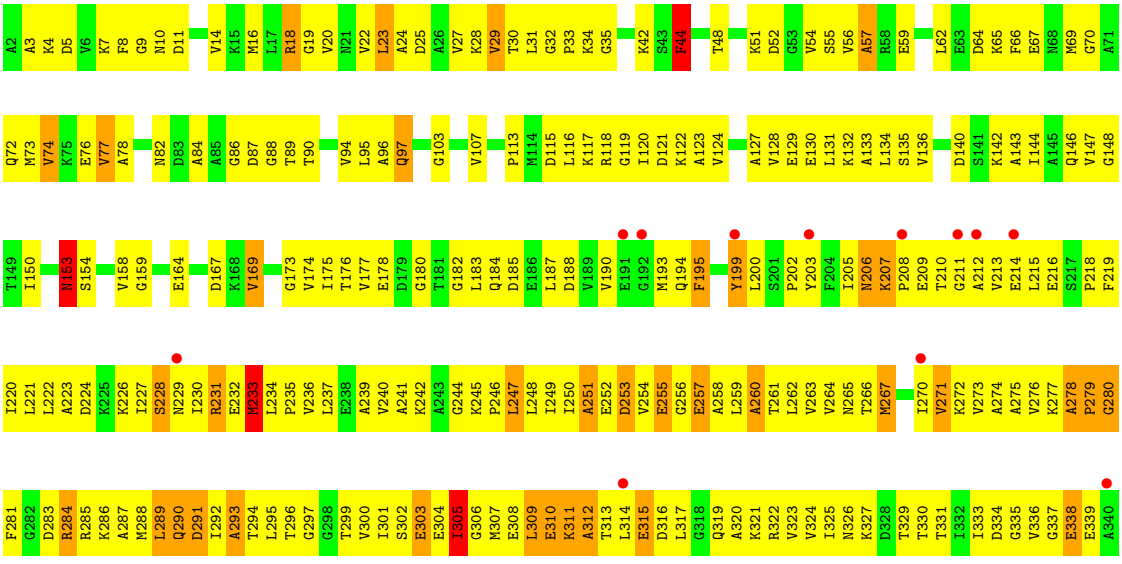
• Molecule 1: GROEL

Chain B:



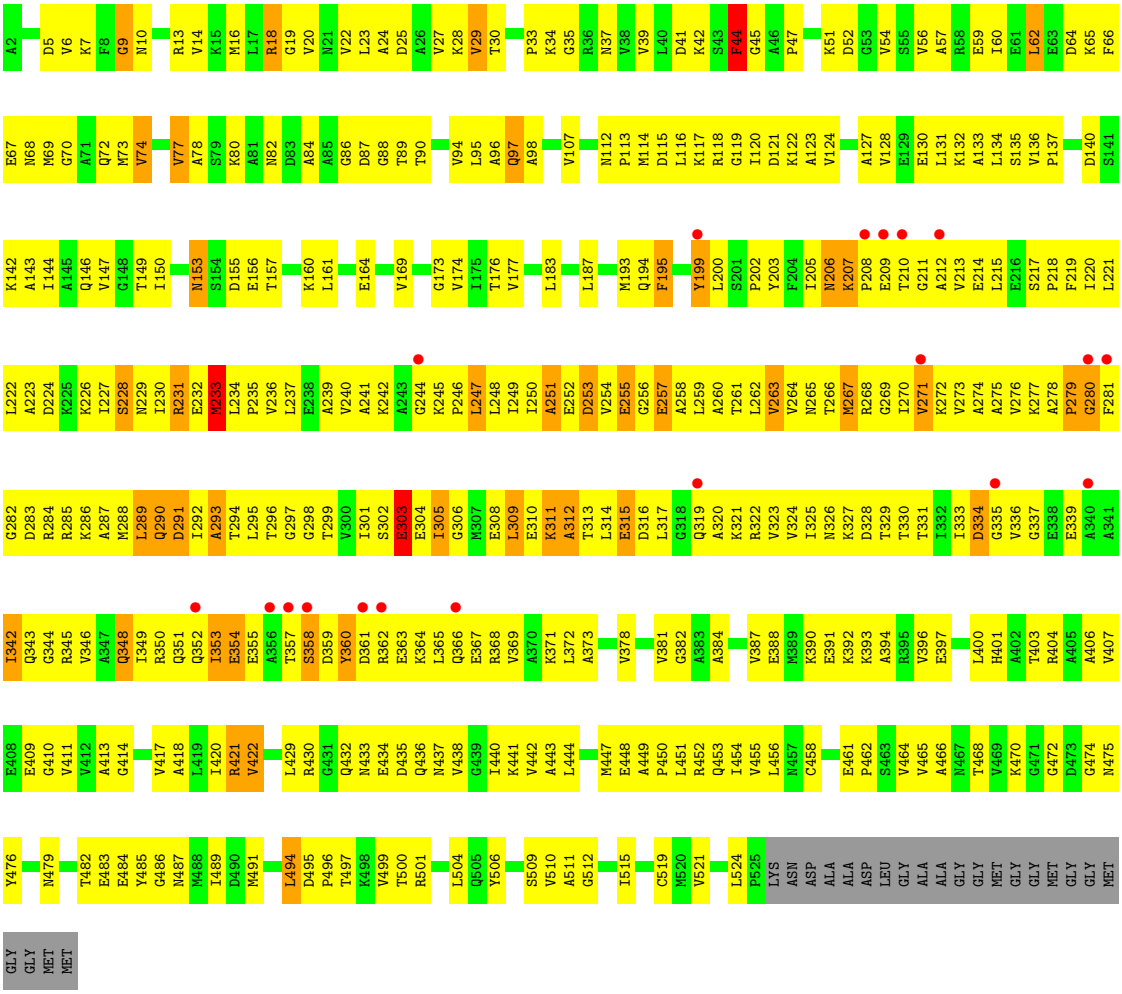
• Molecule 1: GROEL

Chain C:



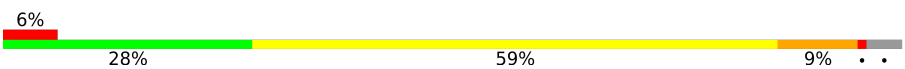
• Molecule 1: GROEL

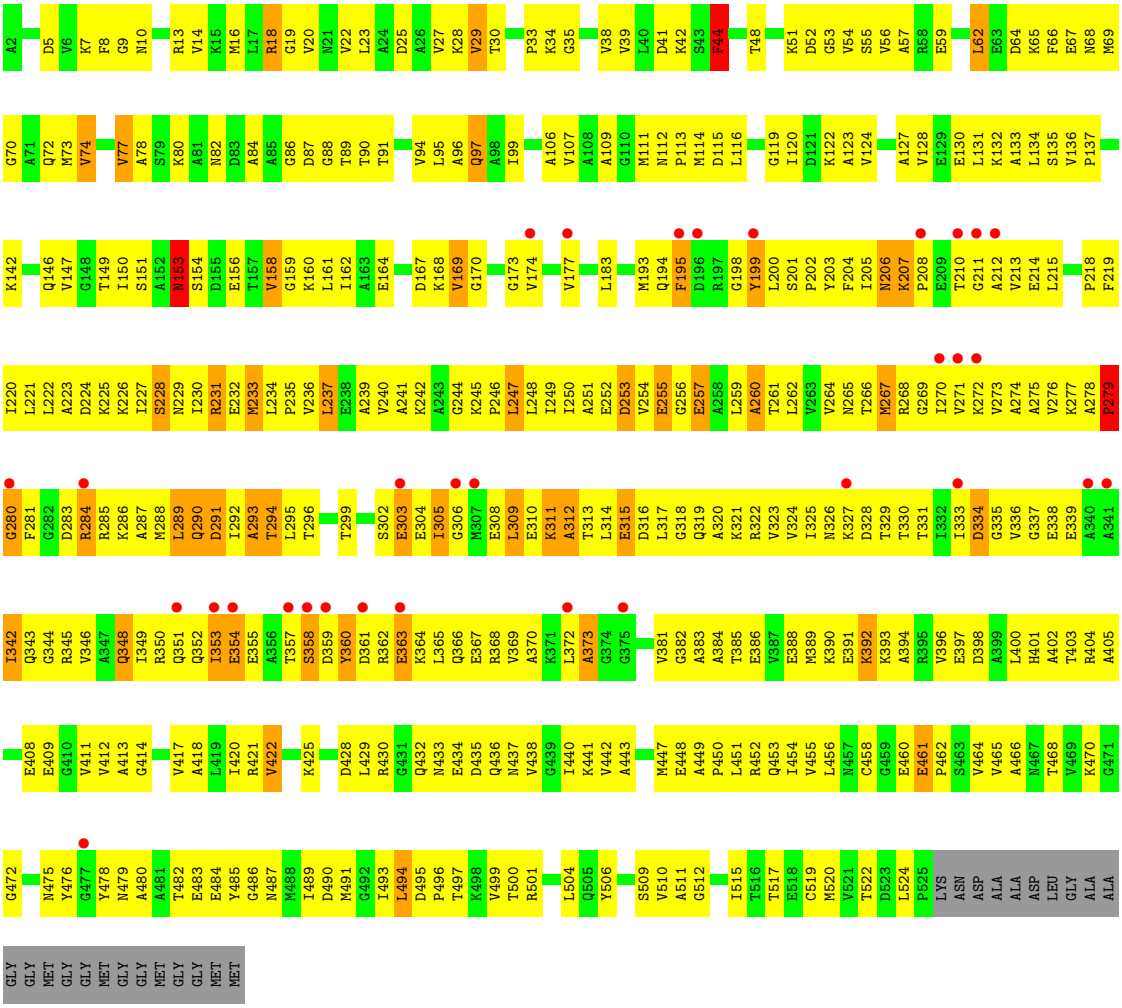
Chain D:



• Molecule 1: GROEL

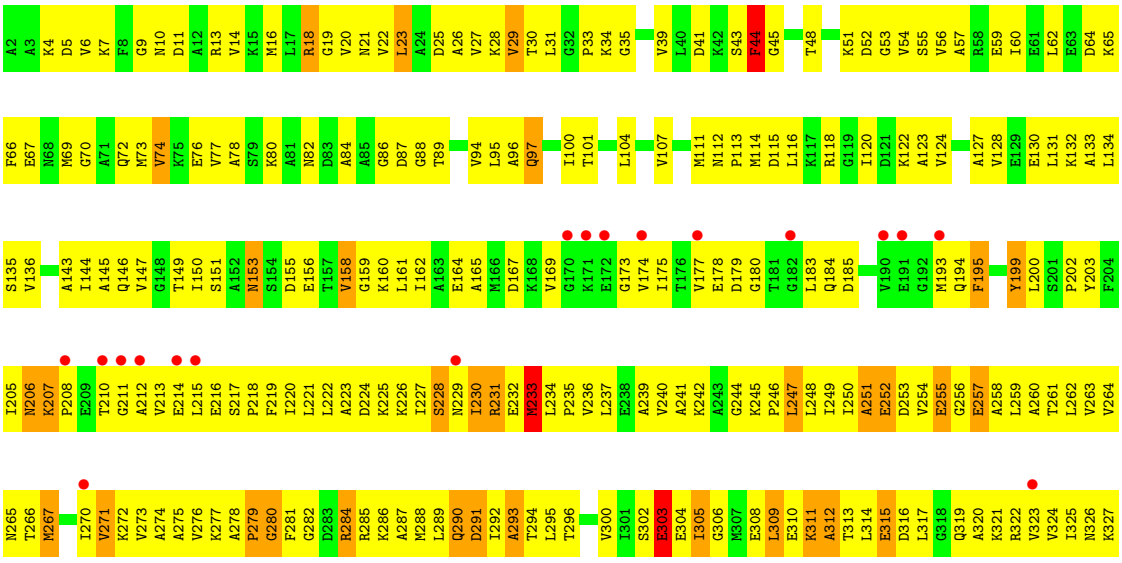
Chain E:

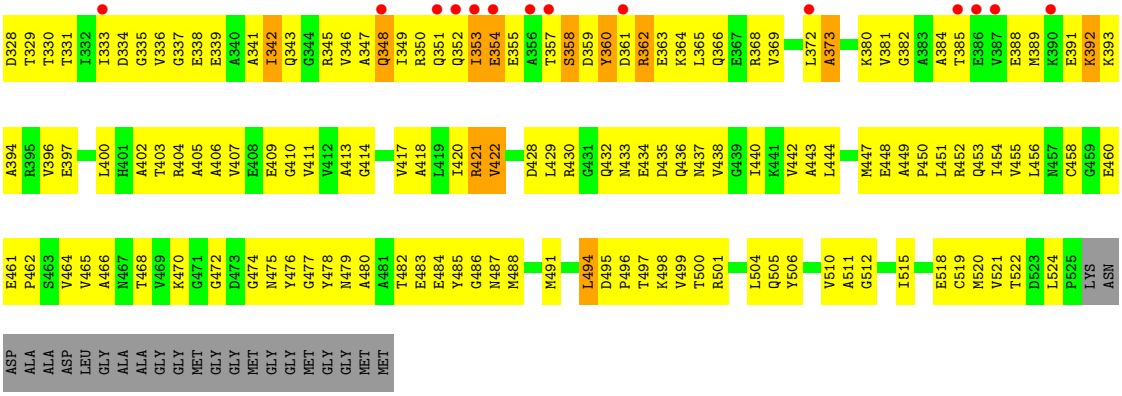




• Molecule 1: GROEL

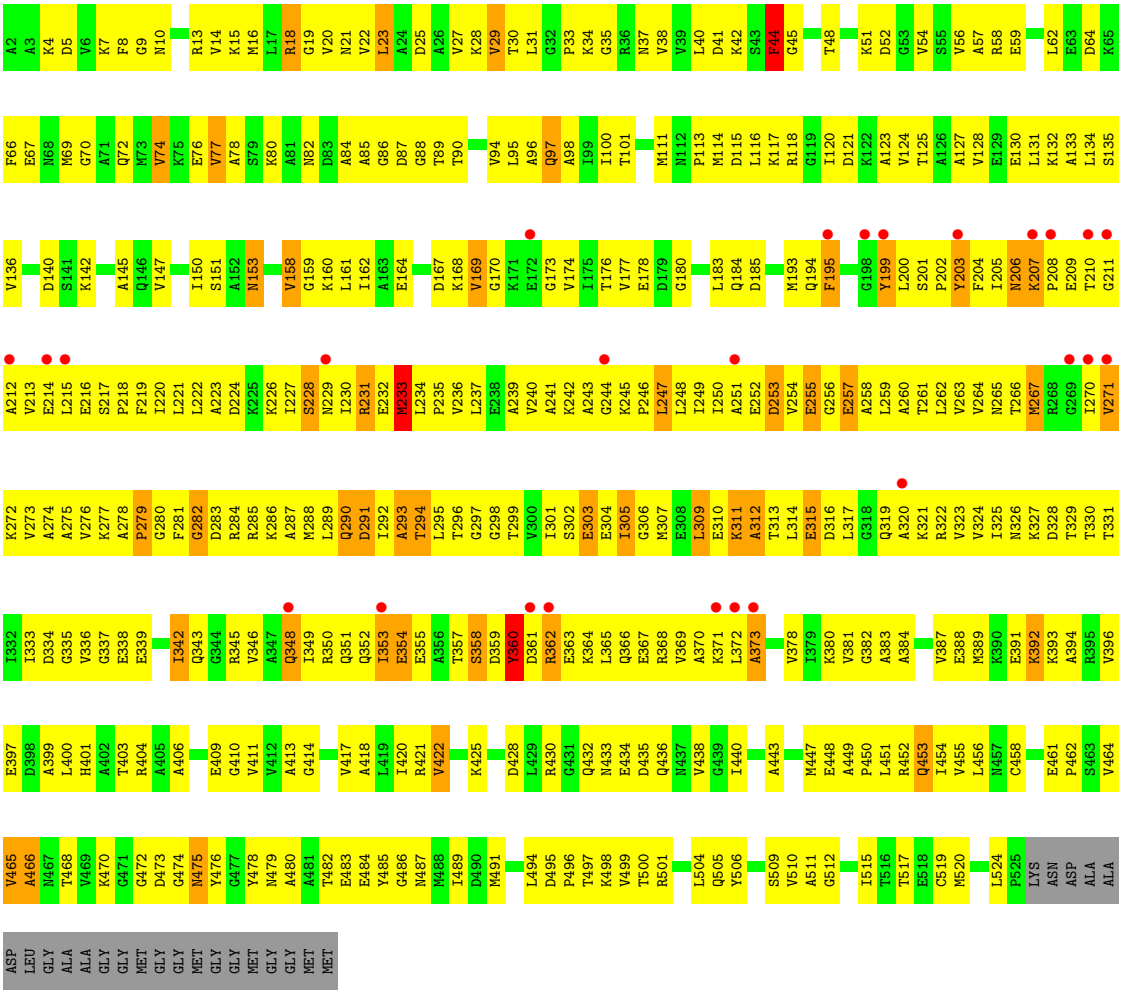
Chain F:





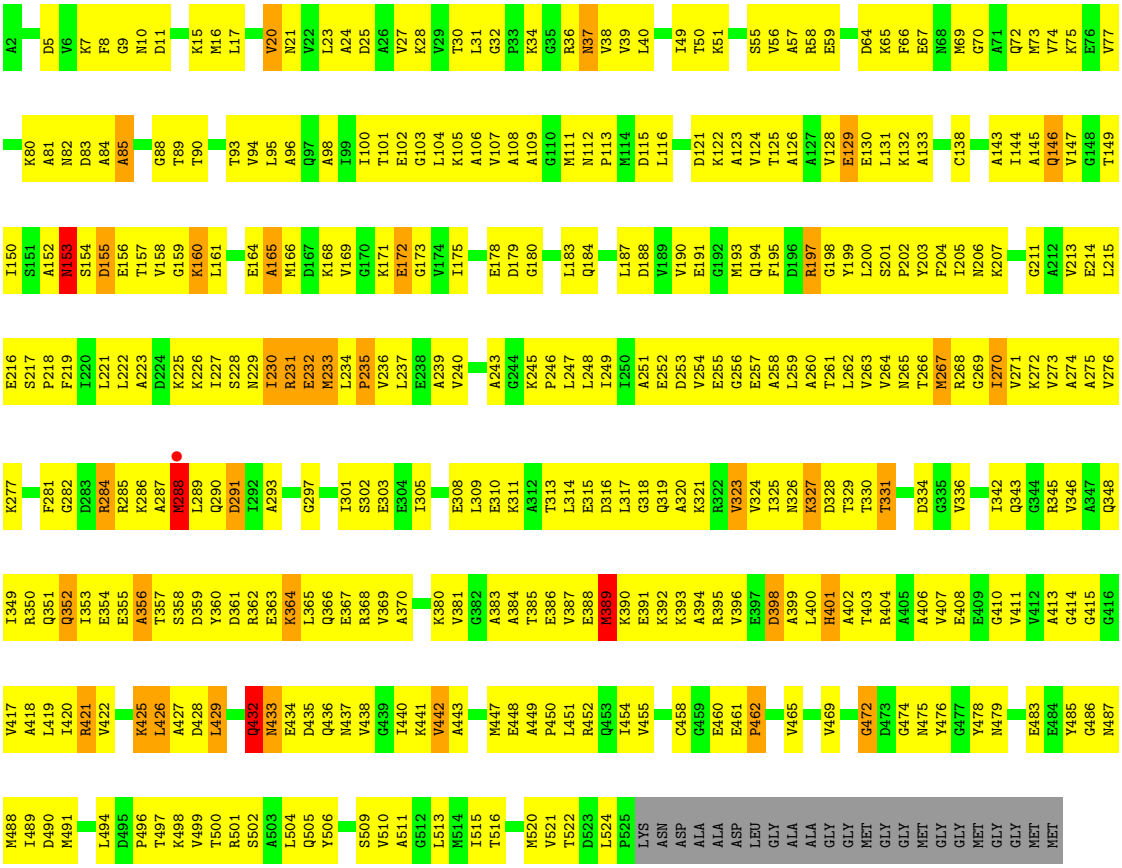
• Molecule 1: GROEL

Chain G:



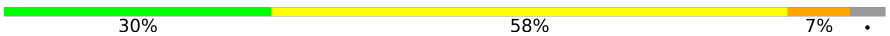
• Molecule 1: GROEL

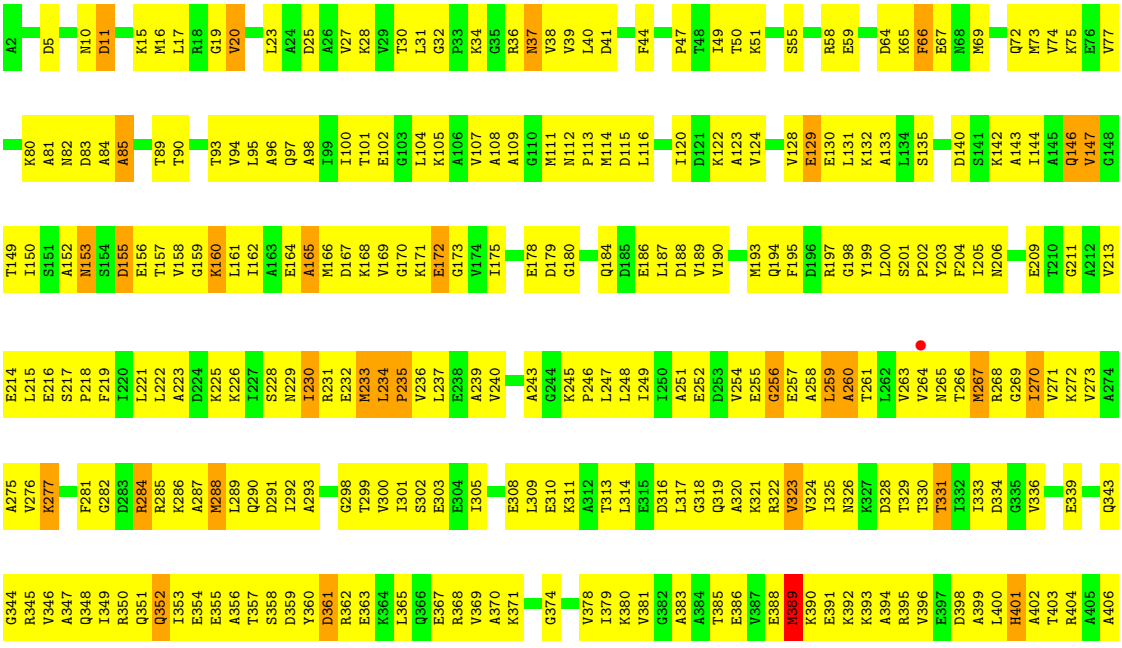
Chain H:



• Molecule 1: GROEL

Chain I:





V407 E408 E409 G410 V411 V412 A413 G414 G415 G416 V417 A418 L419 I420 R421 V422 A423 S424 K425 L426 A427 D428 L429 Q432 N433 E434 D435 Q436 N437 V438 G439 I440 K441 V442 A443 A446 M447 E448 A449 P450 L451 R452 Q453 I454 V455 L456 N457 C458 G459 E460 E461 P462 V465 A466 V469 K470

G471 G472 D473 G474 N475 Y476 G477 Y478 N479 E483 E484 Y485 G486 N487 M488 I489 D490 M491 L494 D495 P496 T497 K498 V499 T500 L504 Q505 Y506 A507 A508 S509 V510 A511 G512 L513 T516 T517 M520 V521 T522 D523 L524 P525 LYS ASN ASP ALA ALA ASP LEU GLY ALA ALA GLY GLY

MET GLY GLY MET GLY GLY MET GLY GLY MET MET

- Molecule 1: GROEL

Chain J: .% 31% 59% 6% •

A2 D5 V6 K7 F8 G9 N10 D11 K15 M16 L17 R18 G19 V20 N21 V22 L23 A24 D25 A26 V27 K28 V29 T30 L31 G32 P33 K34 N37 V38 V39 L40 S43 F44 I49 T50 K51 S55 V56 A57 R58 E59 D64 K65 F66 E67 N68 M69 G70 A71 Q72 M73

V77 N82 A85 G88 T89 T90 T93 V94 L95 A96 Q97 A98 I99 I100 T101 E102 G103 L104 K105 A106 V107 A108 A109 G110 M111 N112 P113 M114 D115 L116 K117 I120 D121 K122 A123 V124 T125 V128 E129 E130 L131 K132 S135 V136 P137 C138 S139 D140 A143 I144 A145 Q146

V147 G148 T149 I150 S151 A152 N153 S154 D155 E156 T157 V158 G159 K160 L161 E164 A165 M166 D167 K168 V169 G170 K171 E172 G173 V174 I175 G180 T181 E186 L187 D188 V189 V190 E191 G192 M193 Q194 F195 D196 R197 G198 Y199 L200 S201 P202 Y203 F204 I205 N206 K207 G211 A212 V213 E214 L215

E216 S217 P218 F219 I220 L221 L222 A223 K226 I227 S228 N229 I230 R231 E232 M233 L234 P235 V236 L237 E238 A239 V240 A241 K245 P246 L247 L248 I249 I250 A251 E252 D253 V254 E255 G256 E257 A258 L259 A260 T261 L262 V263 V264 N265 T266 M267 R268 G269 I270 V271 K272 V273 A274 A275 V276 K277

G282 D283 R284 R285 K286 A287 M288 L289 Q290 D291 I292 A293 T294 L295 G298 T299 V300 I301 S302 E303 E304 I305 G306 M307 E308 L309 E310 K311 A312 T313 L314 E315 D316 L317 G318 Q319 A320 K321 R322 V323 V324 I325 N326 K327 D328 T329 T330 I331 I332 I333 D334 G335 V336 E339 I342 Q343 G344

R345 V346 A347 Q348 I349 R350 Q351 Q352 I353 E354 E355 A356 T357 S358 D359 Y360 D361 R362 E363 K364 L365 Q366 E367 R368 V369 A370 V376 I379 K380 V381 G382 A383 A384 T385 E386 V387 E388 M389 K390 E391 K392 K393 A394 R395 V396 E397 D398 A399 L400 H401 A402 T403 R404 A405 A406 V407 E408 E409

G410 V411 V412 A413 G414 G415 G416 V417 A418 L419 I420 R421 V422 A423 S424 K425 L426 A427 D428 L429 Q432 N433 E434 D435 Q436 N437 V438 G439 I440 K441 V442 E448 A449 P450 L451 R452 Q453 I454 V455 C458 G459 E460 E461 P462 S463 V464 V465 V469 G474 N475 Y476 G477 Y478 N479

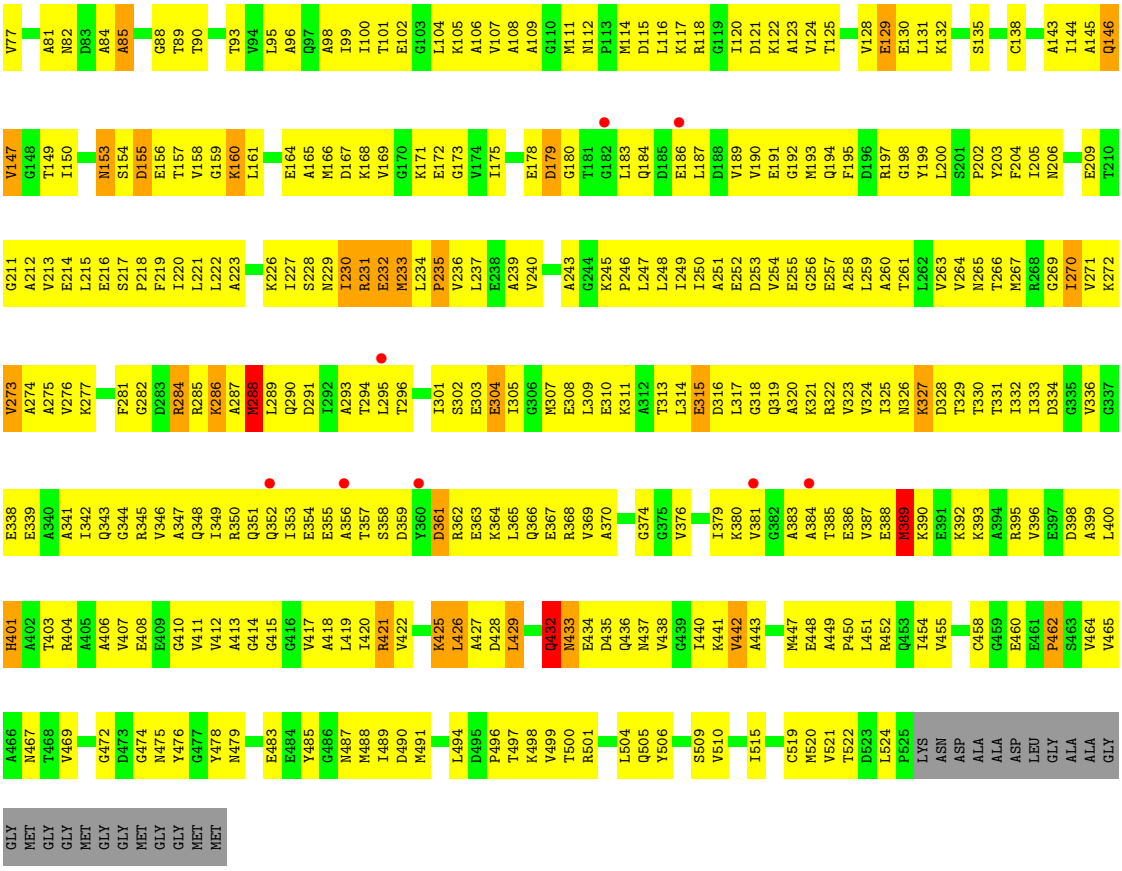
E483 E484 Y485 G486 N487 M488 I489 D490 L494 D495 P496 T497 K498 V499 T500 R501 S502 A503 L504 Q505 Y506 S509 V510 A511 G512 L513 M514 I515 T516 C519 M520 V521 T522 D523 L524 P525 LYS ASN ASP ALA ALA ASP LEU GLY ALA ALA GLY GLY MET GLY GLY MET GLY GLY MET GLY GLY

MET MET

- Molecule 1: GROEL

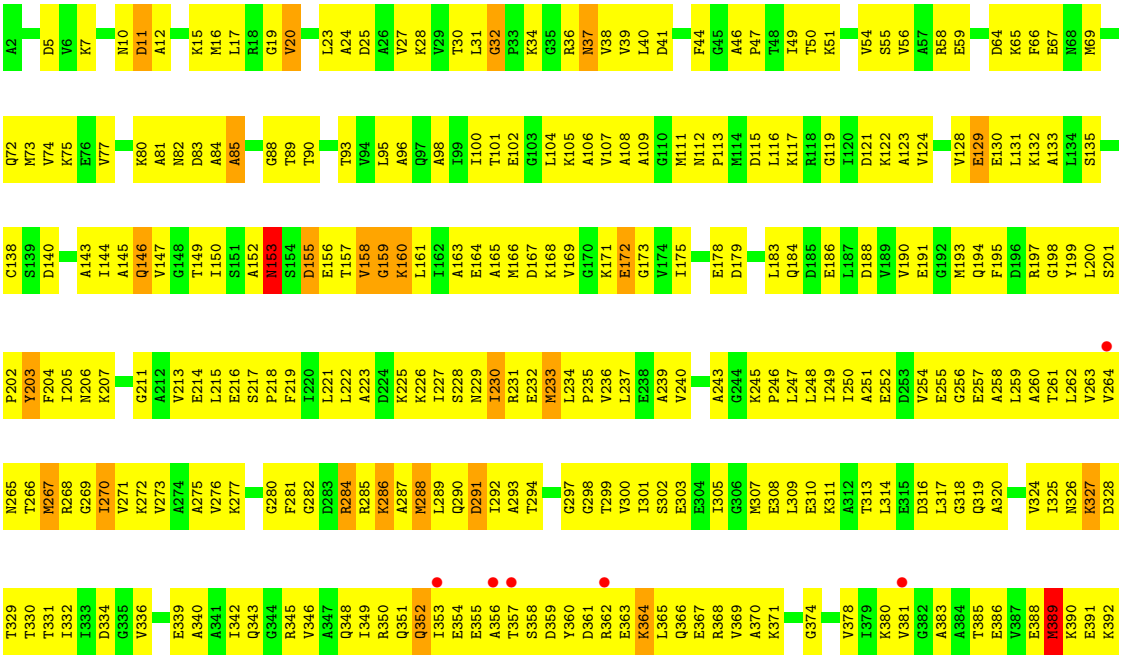
Chain K: 2% 28% 61% 6% • •

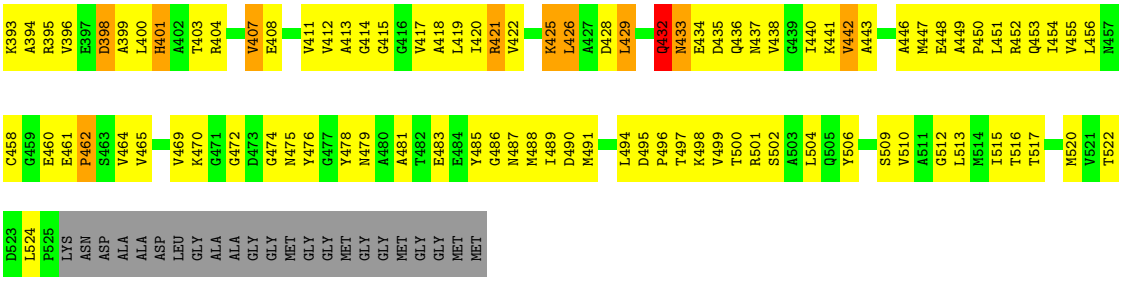
A2 D5 V6 K7 N10 D11 K15 M16 L17 R18 G19 V20 L23 A24 D25 A26 V27 K28 V29 T30 L31 G32 P33 K34 G35 R36 N37 V38 V39 L40 D41 F44 I49 T50 K51 S55 V56 A57 R58 E59 D64 K65 F66 E67 N68 M69 Q72 M73 V74 K75 E76



• Molecule 1: GROEL

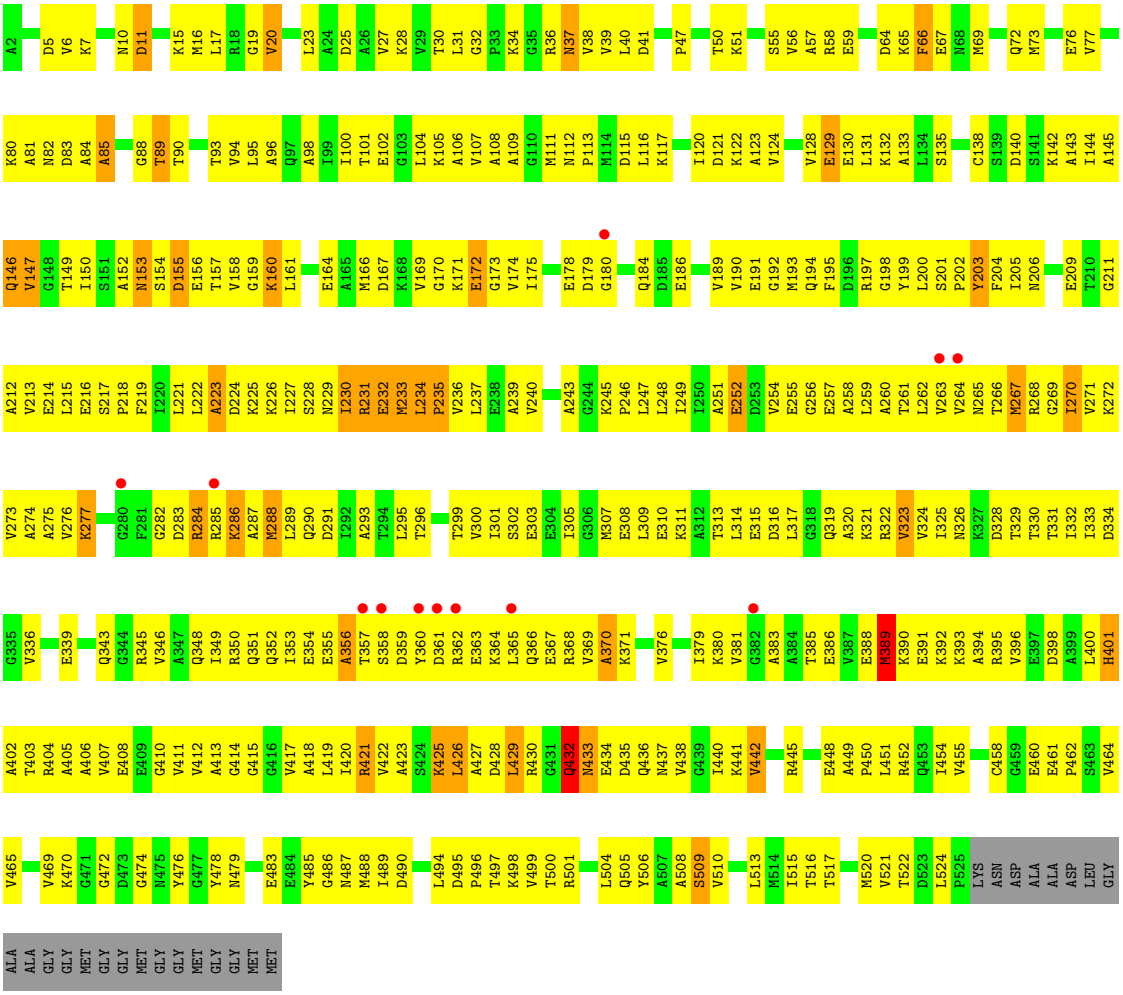
Chain L:





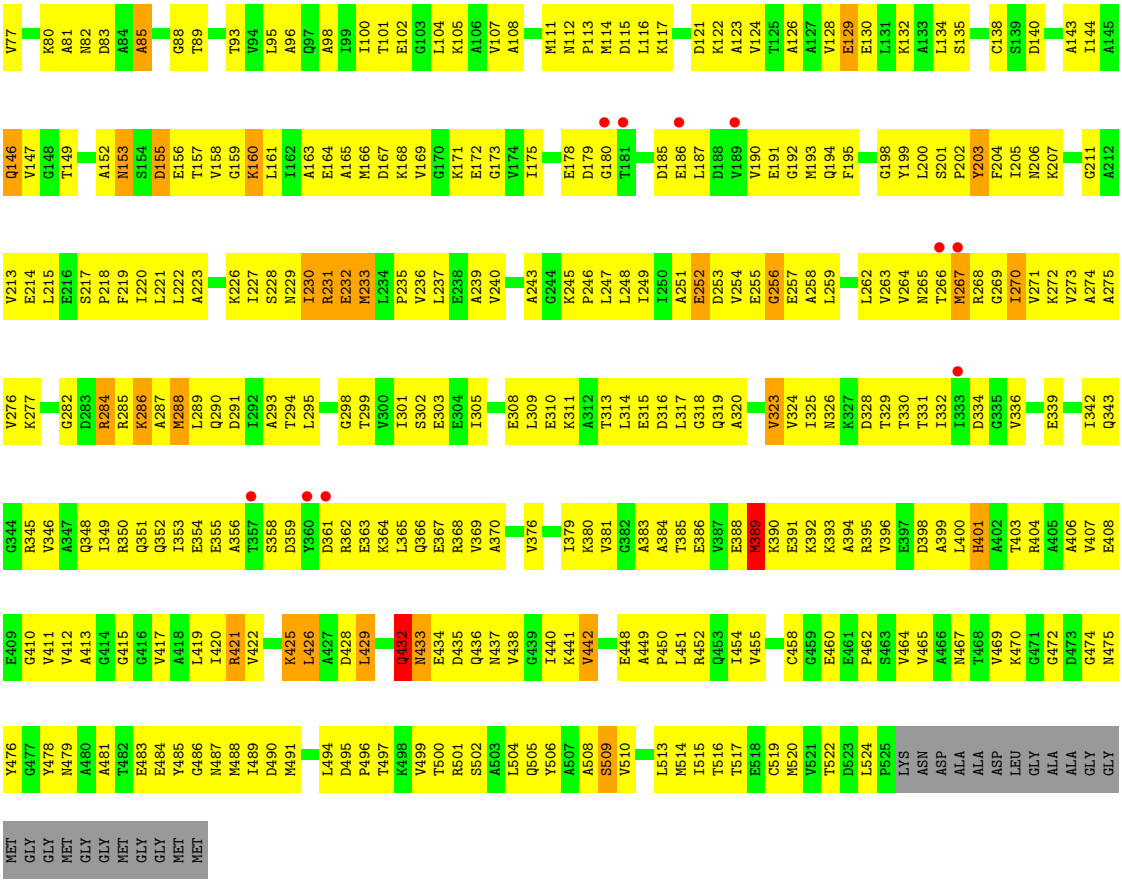
• Molecule 1: GROEL

Chain M:



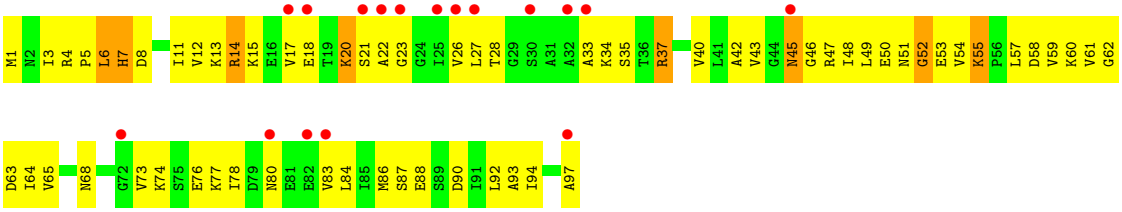
• Molecule 1: GROEL

Chain N:



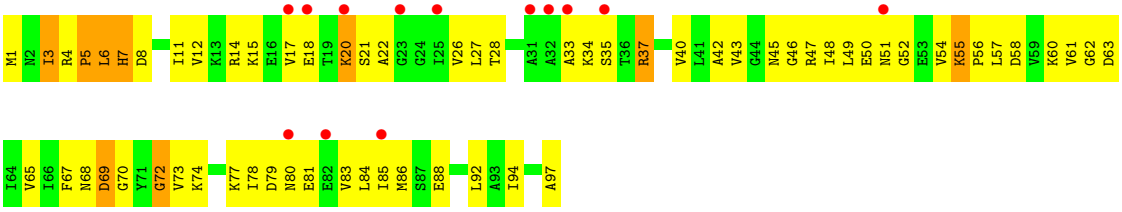
• Molecule 2: GROEL/GROES COMPLEX

Chain O:



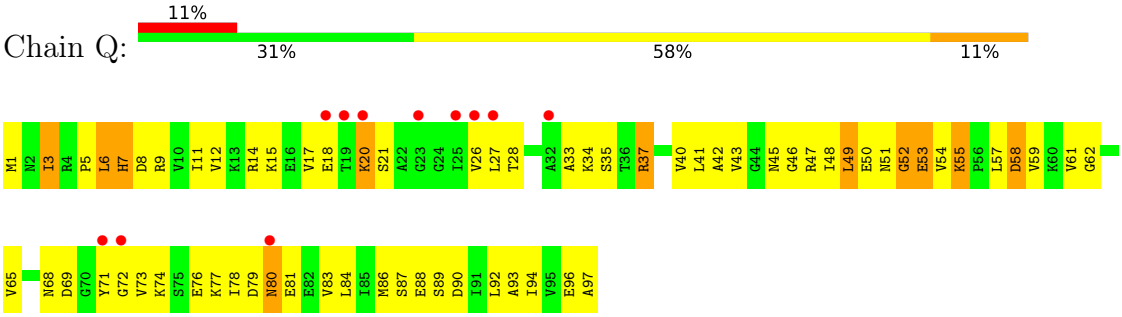
• Molecule 2: GROEL/GROES COMPLEX

Chain P:



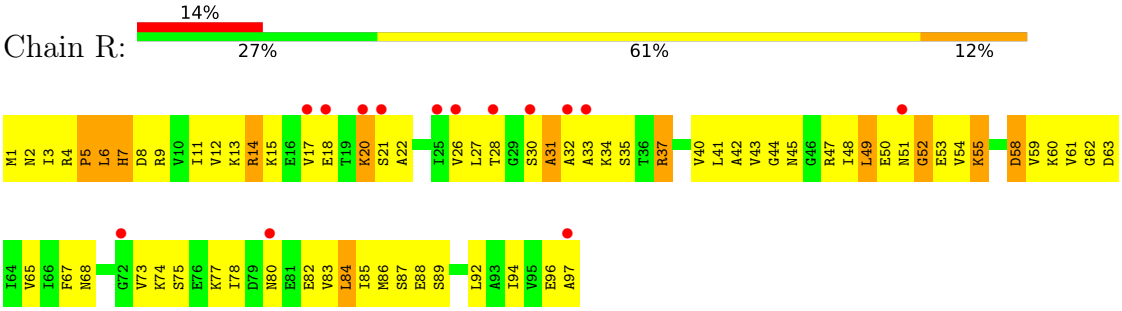
• Molecule 2: GROEL/GROES COMPLEX

Chain Q:



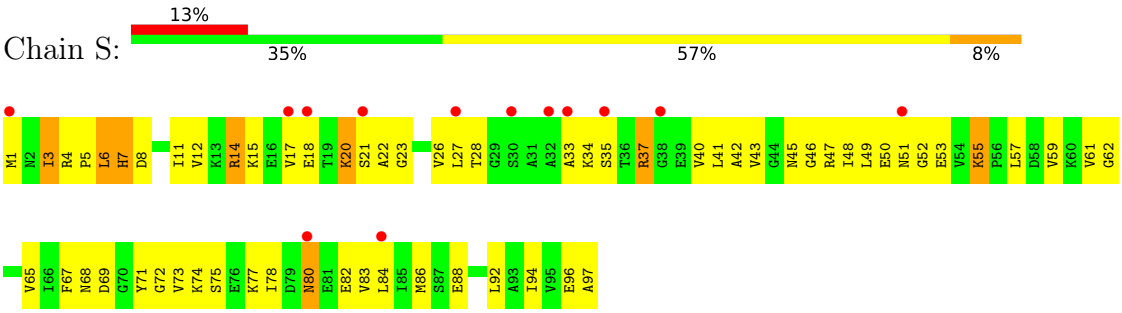
• Molecule 2: GROEL/GROES COMPLEX

Chain R:



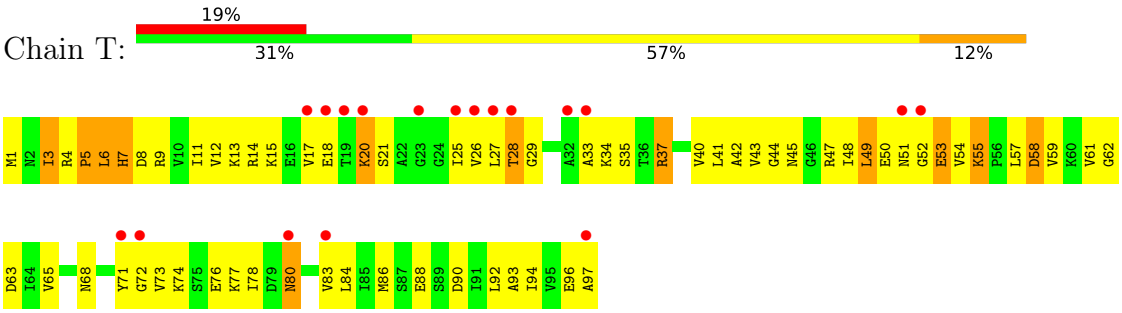
• Molecule 2: GROEL/GROES COMPLEX

Chain S:



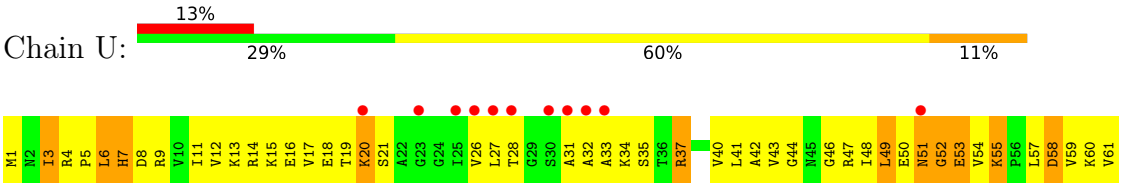
• Molecule 2: GROEL/GROES COMPLEX

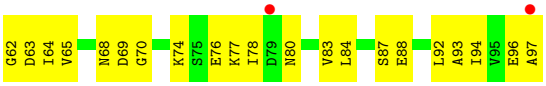
Chain T:



• Molecule 2: GROEL/GROES COMPLEX

Chain U:




G62
D63
I64
V65
N68
D69
G70
K74
S75
E76
K77
I78
D79
N80
V83
L84
S87
E88
L92
A93
I94
V95
E96
A97

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, α, β, γ	255.26Å 265.25Å 184.40Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	40.00 – 3.00 40.07 – 2.99	Depositor EDS
% Data completeness (in resolution range)	79.7 (40.00-3.00) 96.7 (40.07-2.99)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.12	Depositor
$< I/\sigma(I) >$ [1]	2.25 (at 3.01Å)	Xtriage
Refinement program	X-PLOR	Depositor
R, R_{free}	0.248 , 0.291 0.271 , 0.305	Depositor DCC
R_{free} test set	12081 reflections (4.98%)	wwPDB-VP
Wilson B-factor (Å^2)	50.3	Xtriage
Anisotropy	0.614	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.31 , 70.3	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	0.003 for k,h,-l	Xtriage
F_o,F_c correlation	0.89	EDS
Total number of atoms	58870	wwPDB-VP
Average B, all atoms (Å^2)	61.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.22% 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

5.1 Standard geometry

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

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	0.52	0/3835	0.76	0/5186
1	B	0.52	0/3835	0.75	0/5186
1	C	0.52	0/3835	0.74	0/5186
1	D	0.53	0/3835	0.74	0/5186
1	E	0.52	0/3835	0.76	0/5186
1	F	0.52	0/3835	0.75	0/5186
1	G	0.52	0/3835	0.75	0/5186
1	H	0.48	0/3877	0.73	0/5236
1	I	0.49	0/3877	0.71	0/5236
1	J	0.47	0/3877	0.72	0/5236
1	K	0.47	0/3877	0.72	0/5236
1	L	0.46	0/3877	0.72	0/5236
1	M	0.47	0/3877	0.71	0/5236
1	N	0.48	0/3877	0.73	0/5236
2	O	0.39	0/729	0.68	0/980
2	P	0.36	0/729	0.68	0/980
2	Q	0.37	0/729	0.69	0/980
2	R	0.40	0/729	0.69	0/980
2	S	0.37	0/729	0.69	0/980
2	T	0.39	0/729	0.69	0/980
2	U	0.36	0/729	0.68	0/980
All	All	0.49	0/59087	0.73	0/79814

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	3808	0	3890	563	1
1	B	3808	0	3890	513	0
1	C	3808	0	3890	525	0
1	D	3808	0	3890	527	0
1	E	3808	0	3890	537	0
1	F	3808	0	3890	556	0
1	G	3808	0	3890	535	0
1	H	3849	0	3965	479	0
1	I	3849	0	3965	439	0
1	J	3849	0	3965	444	1
1	K	3849	0	3965	479	0
1	L	3849	0	3965	504	0
1	M	3849	0	3965	486	0
1	N	3849	0	3965	435	0
2	O	725	0	755	119	0
2	P	725	0	755	98	0
2	Q	725	0	755	106	0
2	R	725	0	755	104	0
2	S	725	0	755	98	0
2	T	725	0	755	112	0
2	U	725	0	755	101	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
3	C	1	0	0	0	0
3	D	1	0	0	0	0
3	E	1	0	0	0	0
3	F	1	0	0	0	0
3	G	1	0	0	0	0
4	A	27	0	12	2	0
4	B	27	0	12	5	0
4	C	27	0	12	5	0
4	D	27	0	12	1	0
4	E	27	0	12	1	0
4	F	27	0	12	6	0
4	G	27	0	12	2	0
All	All	58870	0	60354	7568	1

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 63.

The worst 5 of 7568 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:G:233:MET:HA	1:G:310:GLU:HG3	1.20	1.19
1:F:322:ARG:HB3	1:F:333:ILE:HD12	1.24	1.18
1:B:228:SER:HA	1:B:255:GLU:HB2	1.27	1.13
1:D:214:GLU:HB3	1:D:322:ARG:HD3	1.30	1.13
2:O:55:LYS:H	2:O:55:LYS:HE2	1.15	1.12

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:425:LYS:NZ	1:J:484:GLU:OE2[4_445]	2.13	0.07

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	522/547 (95%)	396 (76%)	92 (18%)	34 (6%)	1 7
1	B	522/547 (95%)	399 (76%)	94 (18%)	29 (6%)	2 10
1	C	522/547 (95%)	397 (76%)	88 (17%)	37 (7%)	1 5
1	D	522/547 (95%)	395 (76%)	95 (18%)	32 (6%)	1 8
1	E	522/547 (95%)	390 (75%)	98 (19%)	34 (6%)	1 7
1	F	522/547 (95%)	399 (76%)	93 (18%)	30 (6%)	1 10
1	G	522/547 (95%)	390 (75%)	98 (19%)	34 (6%)	1 7
1	H	522/547 (95%)	377 (72%)	115 (22%)	30 (6%)	1 10
1	I	522/547 (95%)	384 (74%)	113 (22%)	25 (5%)	2 13

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	J	522/547 (95%)	387 (74%)	110 (21%)	25 (5%)	2 13
1	K	522/547 (95%)	376 (72%)	121 (23%)	25 (5%)	2 13
1	L	522/547 (95%)	372 (71%)	124 (24%)	26 (5%)	2 12
1	M	522/547 (95%)	383 (73%)	110 (21%)	29 (6%)	2 10
1	N	522/547 (95%)	384 (74%)	112 (22%)	26 (5%)	2 12
2	O	95/97 (98%)	69 (73%)	20 (21%)	6 (6%)	1 7
2	P	95/97 (98%)	65 (68%)	24 (25%)	6 (6%)	1 7
2	Q	95/97 (98%)	67 (70%)	21 (22%)	7 (7%)	1 5
2	R	95/97 (98%)	68 (72%)	18 (19%)	9 (10%)	0 3
2	S	95/97 (98%)	73 (77%)	16 (17%)	6 (6%)	1 7
2	T	95/97 (98%)	67 (70%)	20 (21%)	8 (8%)	1 4
2	U	95/97 (98%)	64 (67%)	25 (26%)	6 (6%)	1 7
All	All	7973/8337 (96%)	5902 (74%)	1607 (20%)	464 (6%)	1 10

5 of 464 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	29	VAL
1	A	44	PHE
1	A	233	MET
1	A	279	PRO
1	A	309	LEU

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	393/414 (95%)	369 (94%)	24 (6%)	18 53
1	B	393/414 (95%)	368 (94%)	25 (6%)	17 51
1	C	393/414 (95%)	369 (94%)	24 (6%)	18 53
1	D	393/414 (95%)	369 (94%)	24 (6%)	18 53

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	E	393/414 (95%)	368 (94%)	25 (6%)	17 51
1	F	393/414 (95%)	368 (94%)	25 (6%)	17 51
1	G	393/414 (95%)	367 (93%)	26 (7%)	16 49
1	H	403/414 (97%)	385 (96%)	18 (4%)	27 64
1	I	403/414 (97%)	383 (95%)	20 (5%)	24 60
1	J	403/414 (97%)	385 (96%)	18 (4%)	27 64
1	K	403/414 (97%)	387 (96%)	16 (4%)	31 68
1	L	403/414 (97%)	386 (96%)	17 (4%)	30 66
1	M	403/414 (97%)	386 (96%)	17 (4%)	30 66
1	N	403/414 (97%)	386 (96%)	17 (4%)	30 66
2	O	79/80 (99%)	73 (92%)	6 (8%)	13 43
2	P	79/80 (99%)	74 (94%)	5 (6%)	18 51
2	Q	79/80 (99%)	72 (91%)	7 (9%)	9 35
2	R	79/80 (99%)	70 (89%)	9 (11%)	5 24
2	S	79/80 (99%)	73 (92%)	6 (8%)	13 43
2	T	79/80 (99%)	71 (90%)	8 (10%)	7 29
2	U	79/80 (99%)	72 (91%)	7 (9%)	9 35
All	All	6125/6356 (96%)	5781 (94%)	344 (6%)	21 56

5 of 344 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	K	129	GLU
1	N	230	ILE
1	K	284	ARG
1	L	432	GLN
2	O	53	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 187 such sidechains are listed below:

Mol	Chain	Res	Type
1	I	433	ASN
1	L	348	GLN
1	J	72	GLN
1	K	146	GLN

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	M	146	GLN

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, 7 are monoatomic - leaving 7 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	ADP	D	1	3	24,29,29	0.79	1 (4%)	29,45,45	1.26	4 (13%)
4	ADP	G	1	3	24,29,29	0.76	0	29,45,45	1.20	3 (10%)
4	ADP	A	1	3	24,29,29	0.76	0	29,45,45	1.24	4 (13%)
4	ADP	F	1	3	24,29,29	0.75	0	29,45,45	1.19	3 (10%)
4	ADP	B	1	3	24,29,29	0.77	0	29,45,45	1.23	3 (10%)
4	ADP	C	1	3	24,29,29	0.75	0	29,45,45	1.19	3 (10%)
4	ADP	E	1	3	24,29,29	0.76	0	29,45,45	1.32	4 (13%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns.

'-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	ADP	D	1	3	-	4/12/32/32	0/3/3/3
4	ADP	G	1	3	-	4/12/32/32	0/3/3/3
4	ADP	A	1	3	-	4/12/32/32	0/3/3/3
4	ADP	F	1	3	-	3/12/32/32	0/3/3/3
4	ADP	B	1	3	-	3/12/32/32	0/3/3/3
4	ADP	C	1	3	-	4/12/32/32	0/3/3/3
4	ADP	E	1	3	-	2/12/32/32	0/3/3/3

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	D	1	ADP	PB-O2B	-2.08	1.46	1.54

The worst 5 of 24 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	D	1	ADP	PA-O3A-PB	-3.80	119.78	132.83
4	A	1	ADP	PA-O3A-PB	-3.63	120.37	132.83
4	B	1	ADP	PA-O3A-PB	-3.24	121.71	132.83
4	G	1	ADP	PA-O3A-PB	-3.23	121.74	132.83
4	E	1	ADP	PA-O3A-PB	-3.14	122.05	132.83

There are no chirality outliers.

5 of 24 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	1	ADP	C5'-O5'-PA-O1A
4	A	1	ADP	C5'-O5'-PA-O2A
4	B	1	ADP	C5'-O5'-PA-O2A
4	B	1	ADP	C5'-O5'-PA-O3A
4	C	1	ADP	C5'-O5'-PA-O1A

There are no ring outliers.

7 monomers are involved in 22 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	D	1	ADP	1	0
4	G	1	ADP	2	0
4	A	1	ADP	2	0

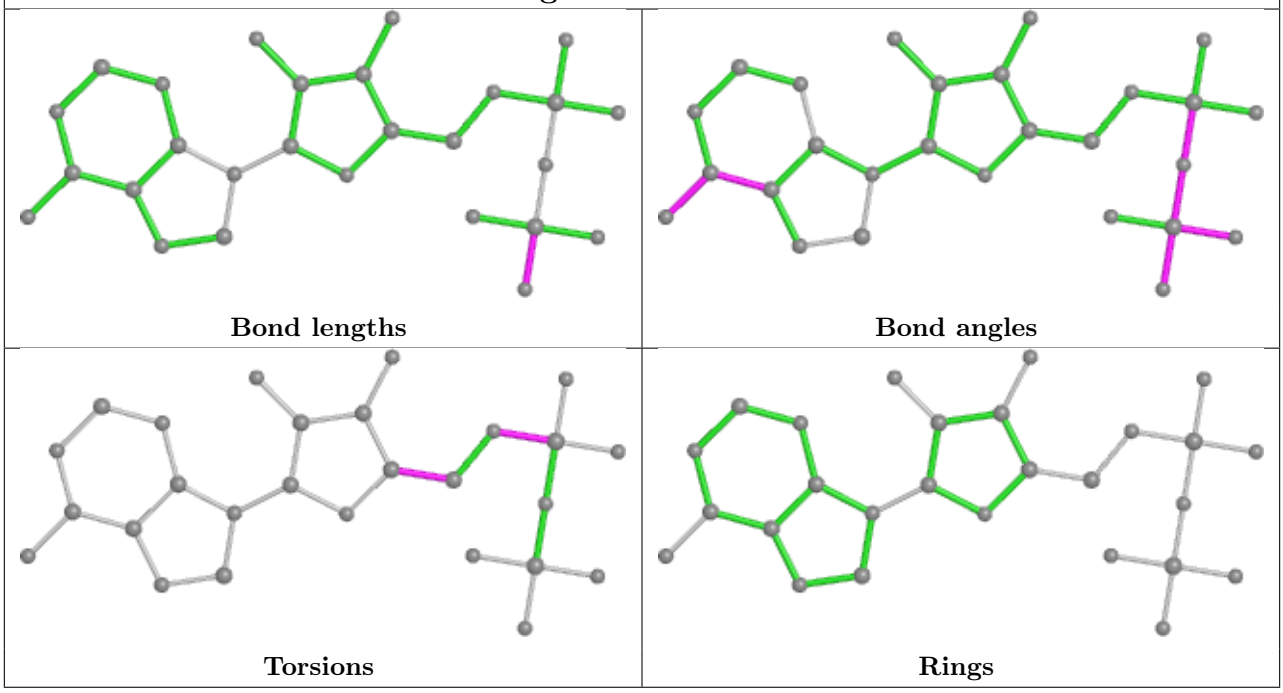
Continued on next page...

Continued from previous page...

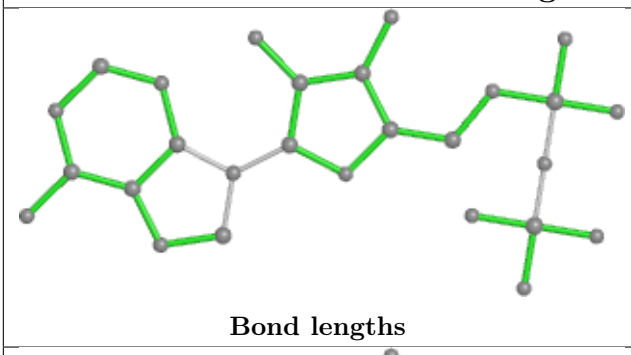
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	F	1	ADP	6	0
4	B	1	ADP	5	0
4	C	1	ADP	5	0
4	E	1	ADP	1	0

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.

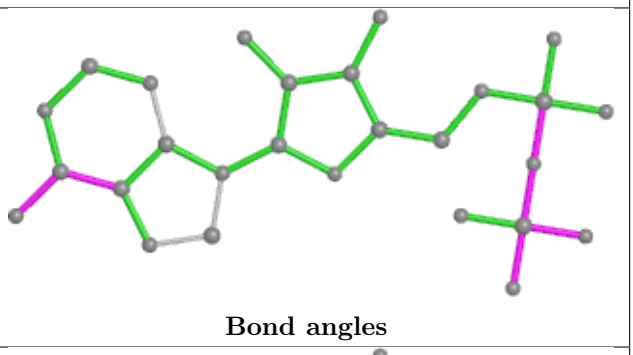
Ligand ADP D 1



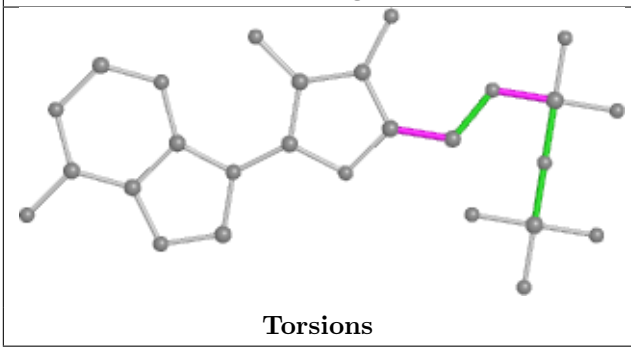
Ligand ADP G 1



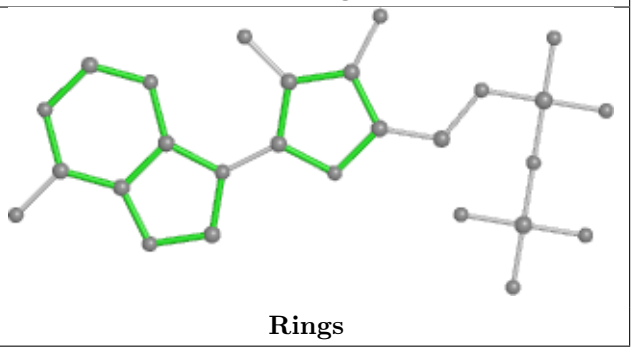
Bond lengths



Bond angles

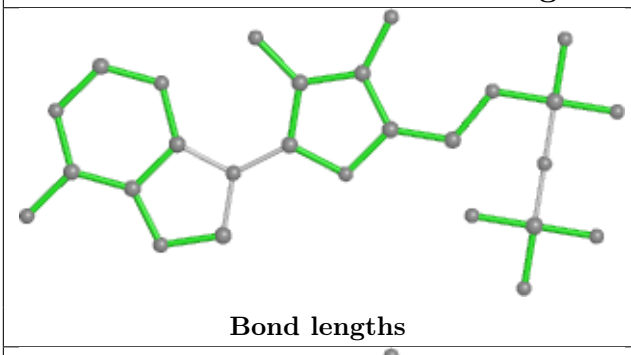


Torsions

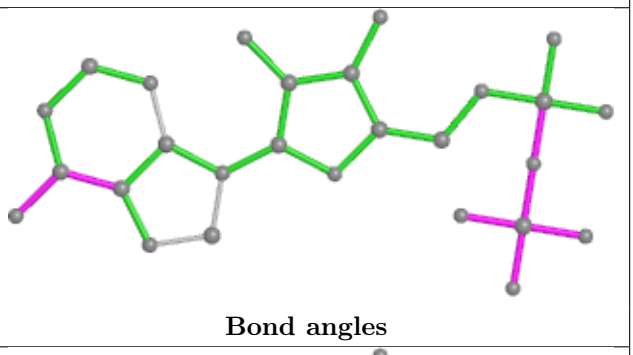


Rings

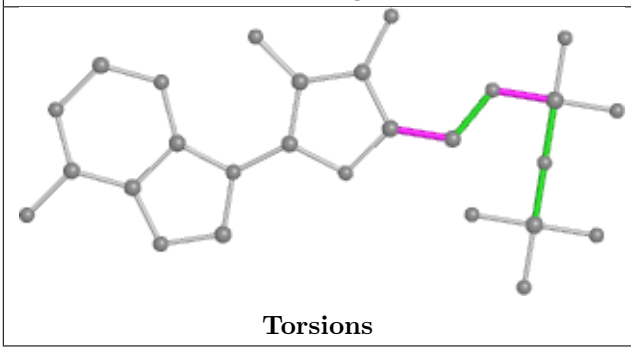
Ligand ADP A 1



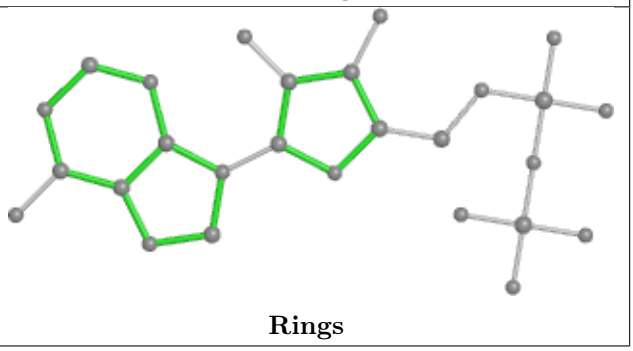
Bond lengths



Bond angles

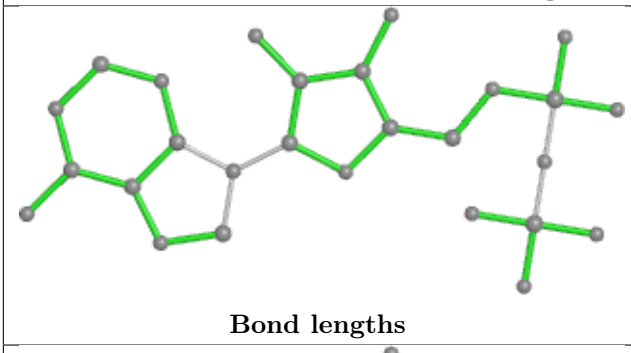


Torsions

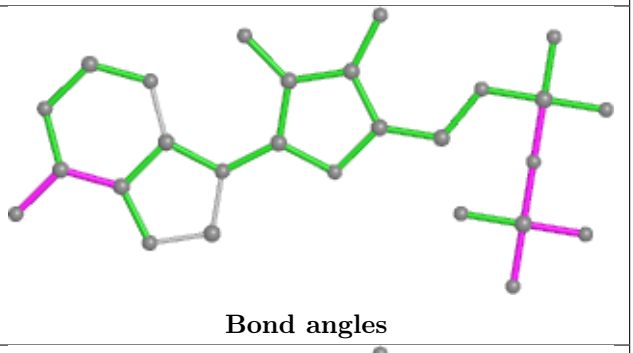


Rings

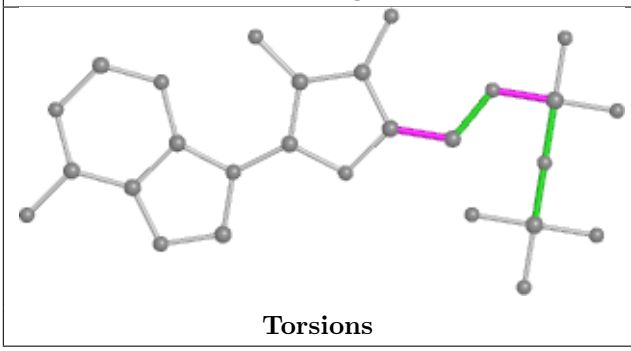
Ligand ADP F 1



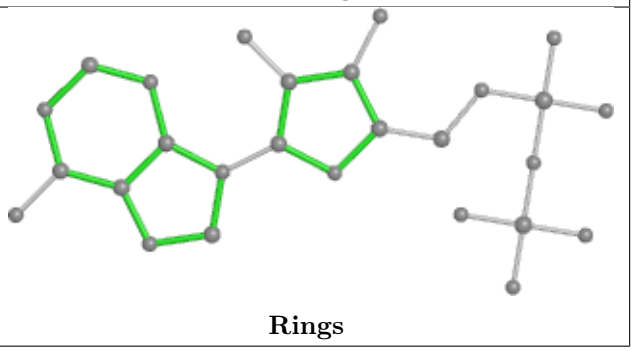
Bond lengths



Bond angles

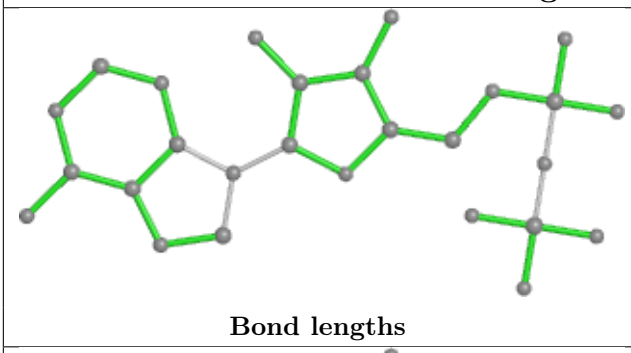


Torsions

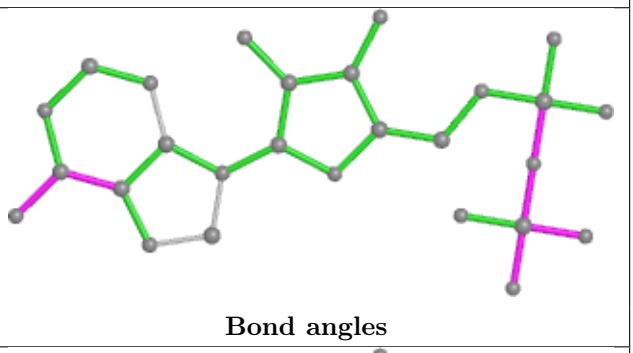


Rings

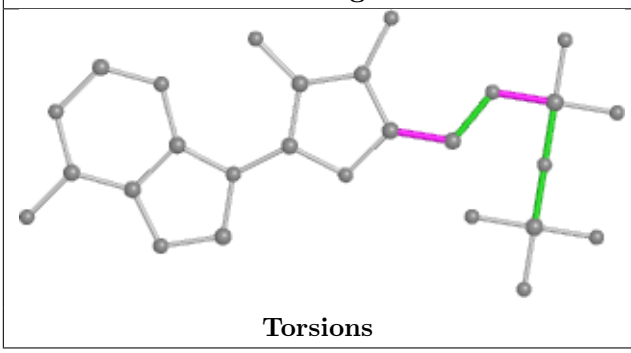
Ligand ADP B 1



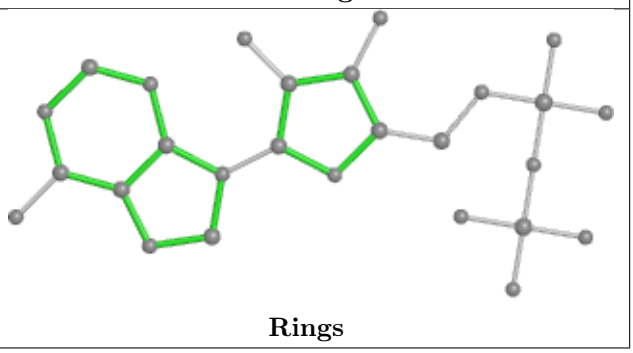
Bond lengths



Bond angles

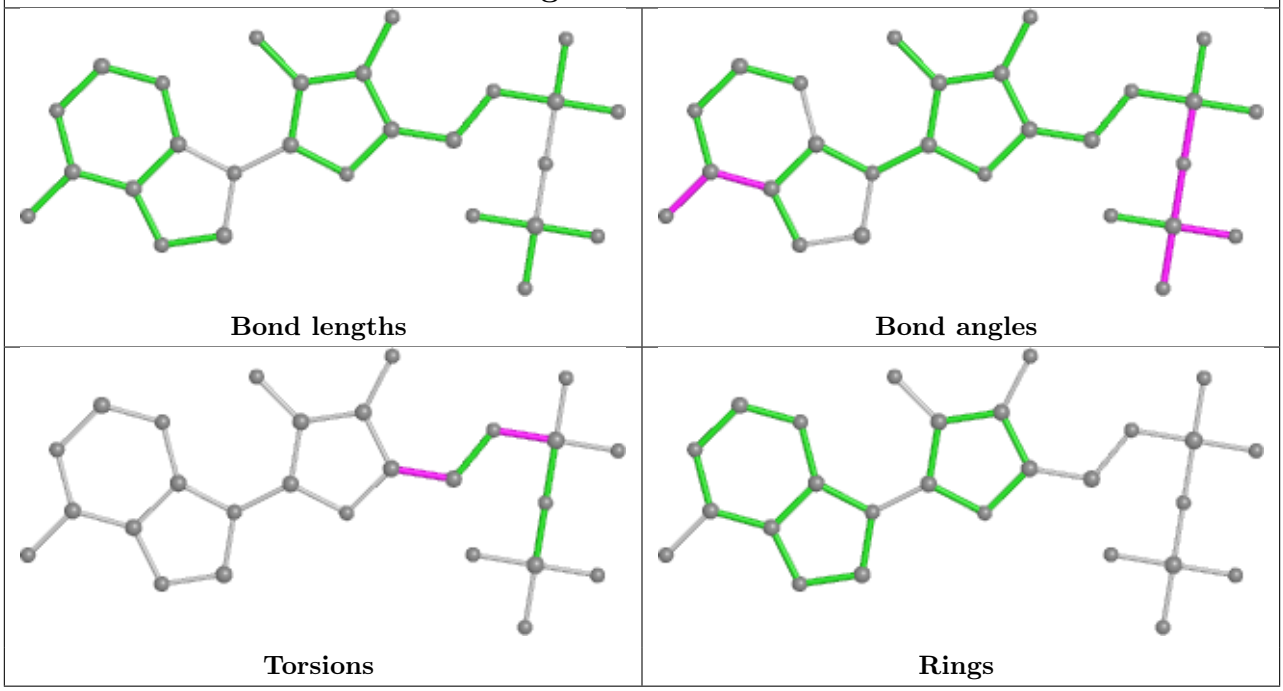


Torsions

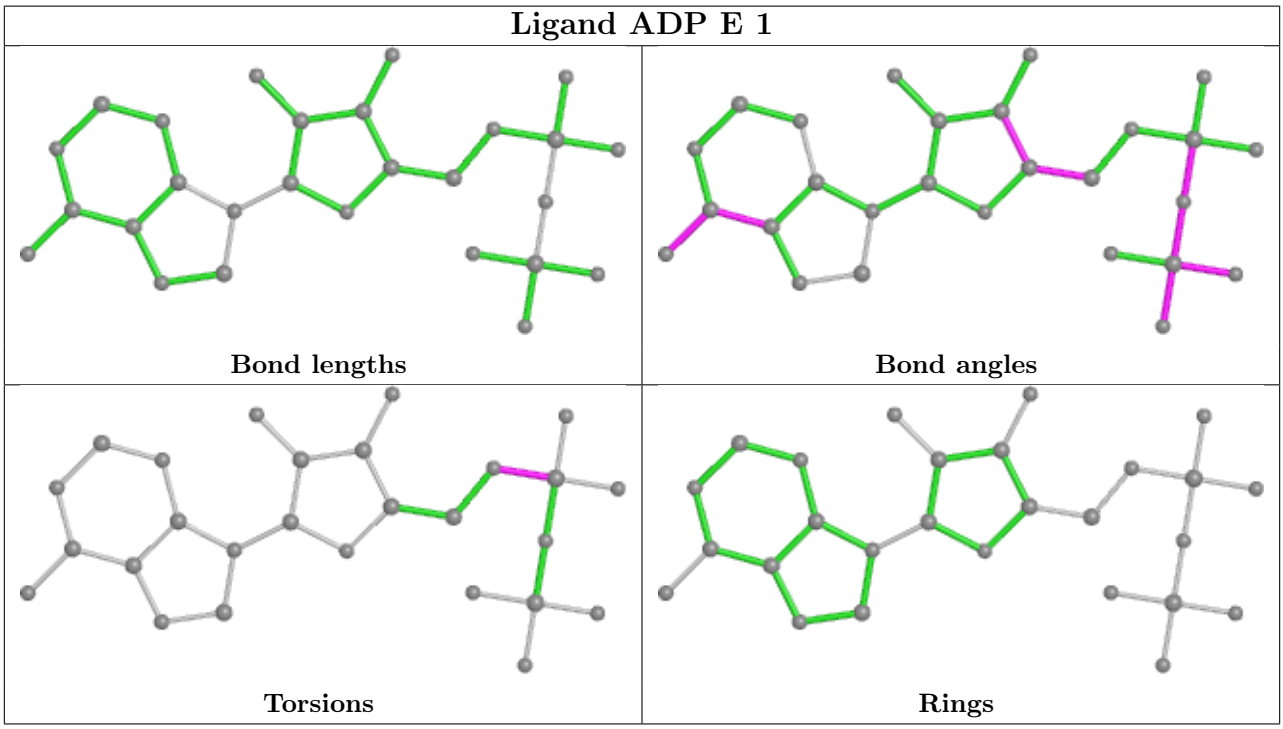


Rings

Ligand ADP C 1



Ligand ADP E 1



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, 95^{th} 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	524/547 (95%)	0.11	19 (3%)	42	17	4, 43, 100, 100	0
1	B	524/547 (95%)	0.08	16 (3%)	49	21	6, 44, 100, 100	0
1	C	524/547 (95%)	0.03	16 (3%)	49	21	3, 44, 100, 100	0
1	D	524/547 (95%)	0.09	19 (3%)	42	17	5, 43, 100, 100	0
1	E	524/547 (95%)	0.18	32 (6%)	21	7	6, 46, 100, 100	0
1	F	524/547 (95%)	0.20	32 (6%)	21	7	6, 47, 100, 100	0
1	G	524/547 (95%)	0.12	26 (4%)	28	10	6, 44, 100, 100	0
1	H	524/547 (95%)	-0.07	1 (0%)	95	87	6, 61, 99, 100	0
1	I	524/547 (95%)	-0.07	1 (0%)	95	87	6, 61, 99, 100	0
1	J	524/547 (95%)	-0.02	5 (0%)	82	59	7, 61, 99, 100	0
1	K	524/547 (95%)	-0.00	9 (1%)	70	41	7, 63, 99, 100	0
1	L	524/547 (95%)	0.03	6 (1%)	80	56	9, 64, 99, 100	0
1	M	524/547 (95%)	0.03	12 (2%)	60	31	7, 63, 99, 100	0
1	N	524/547 (95%)	0.07	10 (1%)	66	37	6, 62, 99, 100	0
2	O	97/97 (100%)	0.93	17 (17%)	1	0	74, 96, 100, 100	0
2	P	97/97 (100%)	0.80	13 (13%)	3	1	71, 96, 100, 100	0
2	Q	97/97 (100%)	0.68	11 (11%)	5	1	71, 96, 100, 100	0
2	R	97/97 (100%)	0.84	14 (14%)	2	1	73, 96, 100, 100	0
2	S	97/97 (100%)	0.79	13 (13%)	3	1	72, 96, 100, 100	0
2	T	97/97 (100%)	0.89	18 (18%)	1	0	74, 96, 100, 100	0
2	U	97/97 (100%)	0.68	13 (13%)	3	1	73, 96, 100, 100	0
All	All	8015/8337 (96%)	0.12	303 (3%)	40	16	3, 64, 100, 100	0

The worst 5 of 303 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	212	ALA	5.6
1	F	211	GLY	5.2
1	A	361	ASP	5.0
2	T	27	LEU	4.9
2	R	33	ALA	4.8

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

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

6.3 Carbohydrates (i)

There are no monosaccharides in this entry.

6.4 Ligands (i)

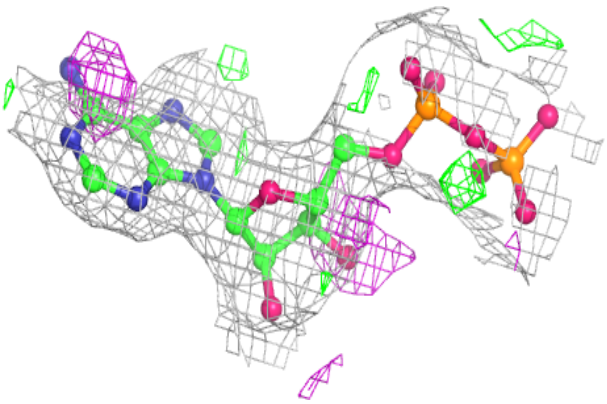
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

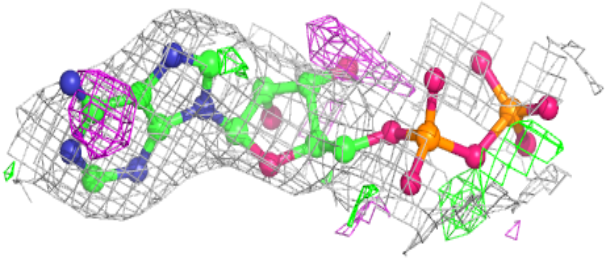
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	MG	D	550	1/1	0.77	0.32	5,5,5,5	0
3	MG	F	550	1/1	0.82	0.35	13,13,13,13	0
4	ADP	B	1	27/27	0.89	0.29	13,34,39,49	0
3	MG	G	550	1/1	0.90	0.27	12,12,12,12	0
3	MG	C	550	1/1	0.90	0.32	13,13,13,13	0
4	ADP	E	1	27/27	0.90	0.26	8,32,39,50	0
4	ADP	F	1	27/27	0.90	0.26	20,35,41,47	0
3	MG	A	550	1/1	0.92	0.33	2,2,2,2	0
4	ADP	D	1	27/27	0.92	0.26	11,31,36,48	0
3	MG	E	550	1/1	0.92	0.30	9,9,9,9	0
4	ADP	A	1	27/27	0.92	0.29	14,31,39,48	0
4	ADP	C	1	27/27	0.93	0.26	16,31,38,47	0
3	MG	B	550	1/1	0.93	0.28	14,14,14,14	0
4	ADP	G	1	27/27	0.94	0.26	15,31,39,49	0

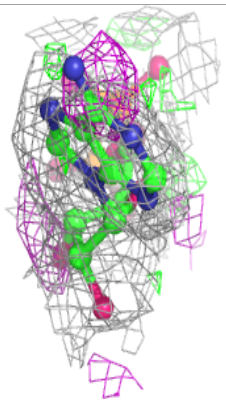
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around ADP B 1:

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

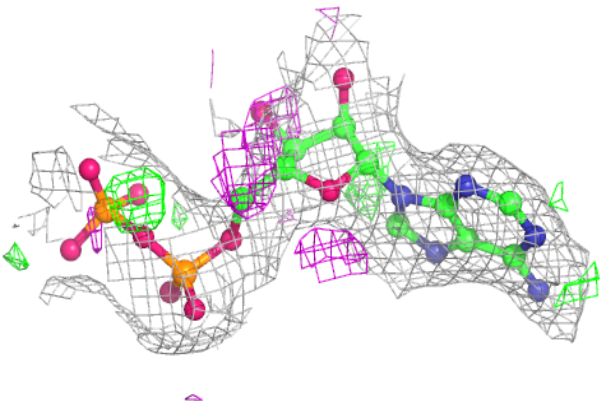


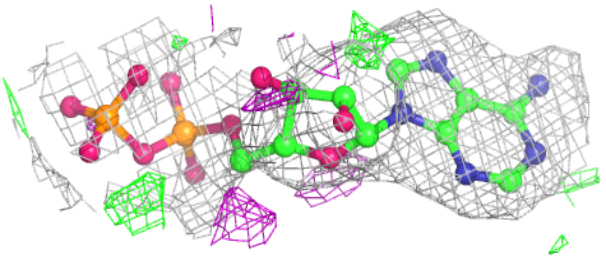


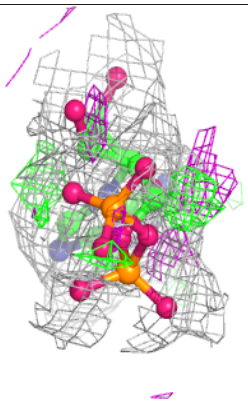


Electron density around ADP E 1:

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

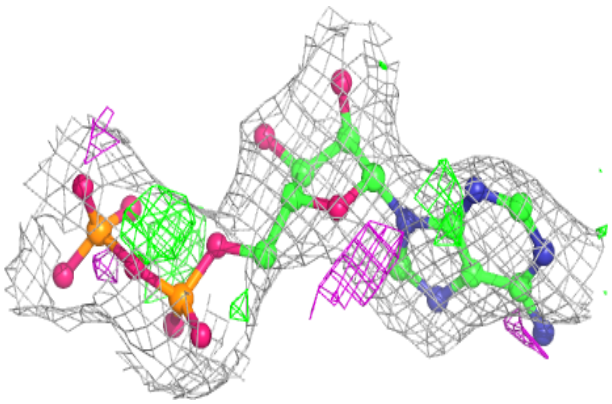


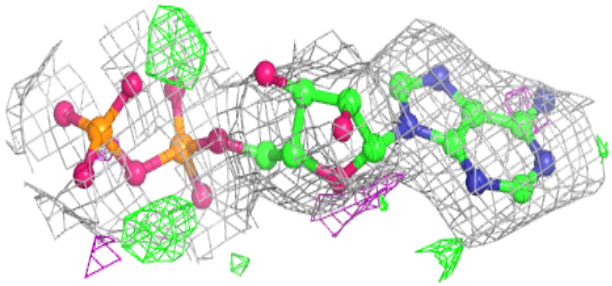


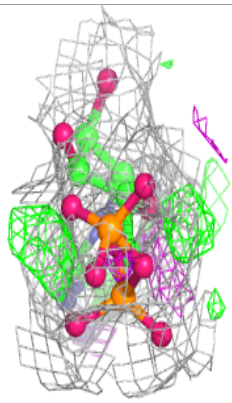


Electron density around ADP F 1:

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

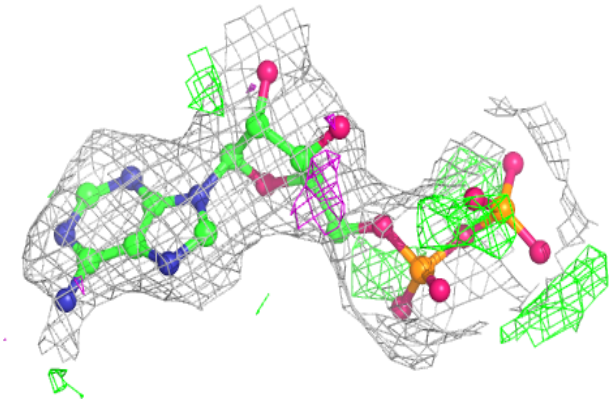


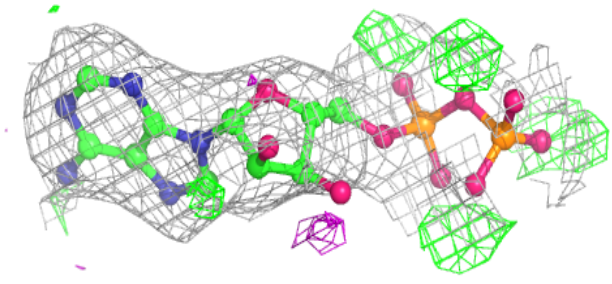


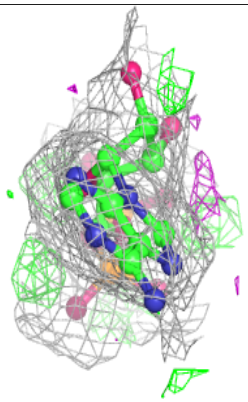


Electron density around ADP D 1:

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

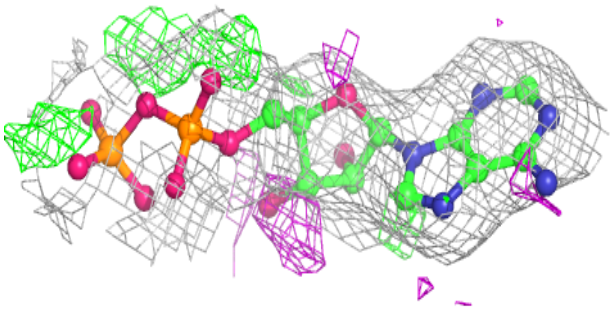


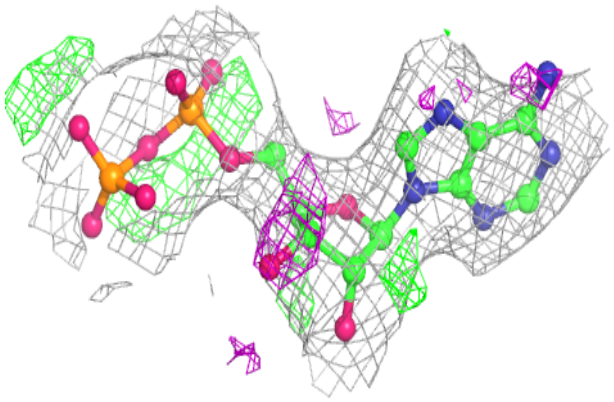


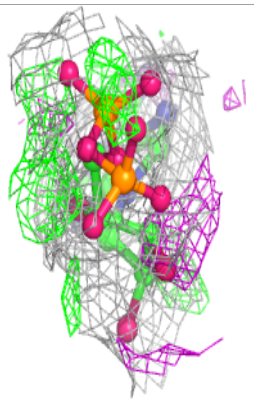


Electron density around ADP A 1:

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

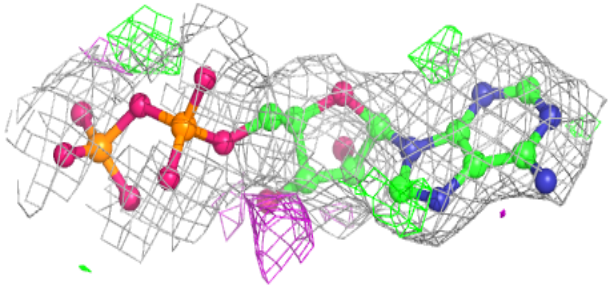


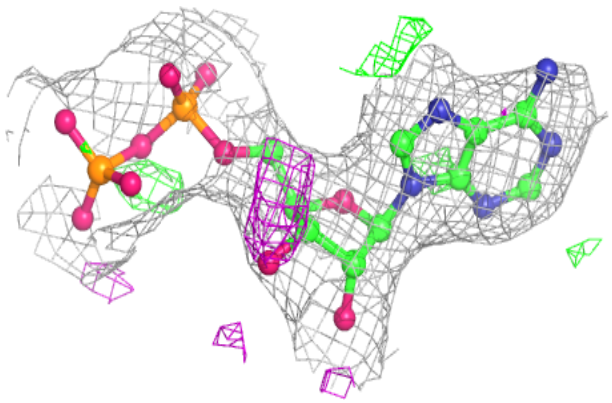


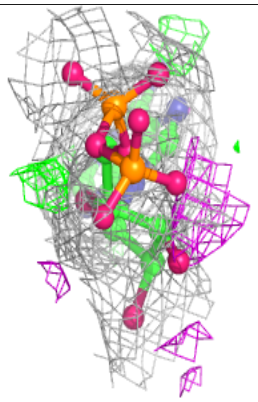


Electron density around ADP C 1:

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

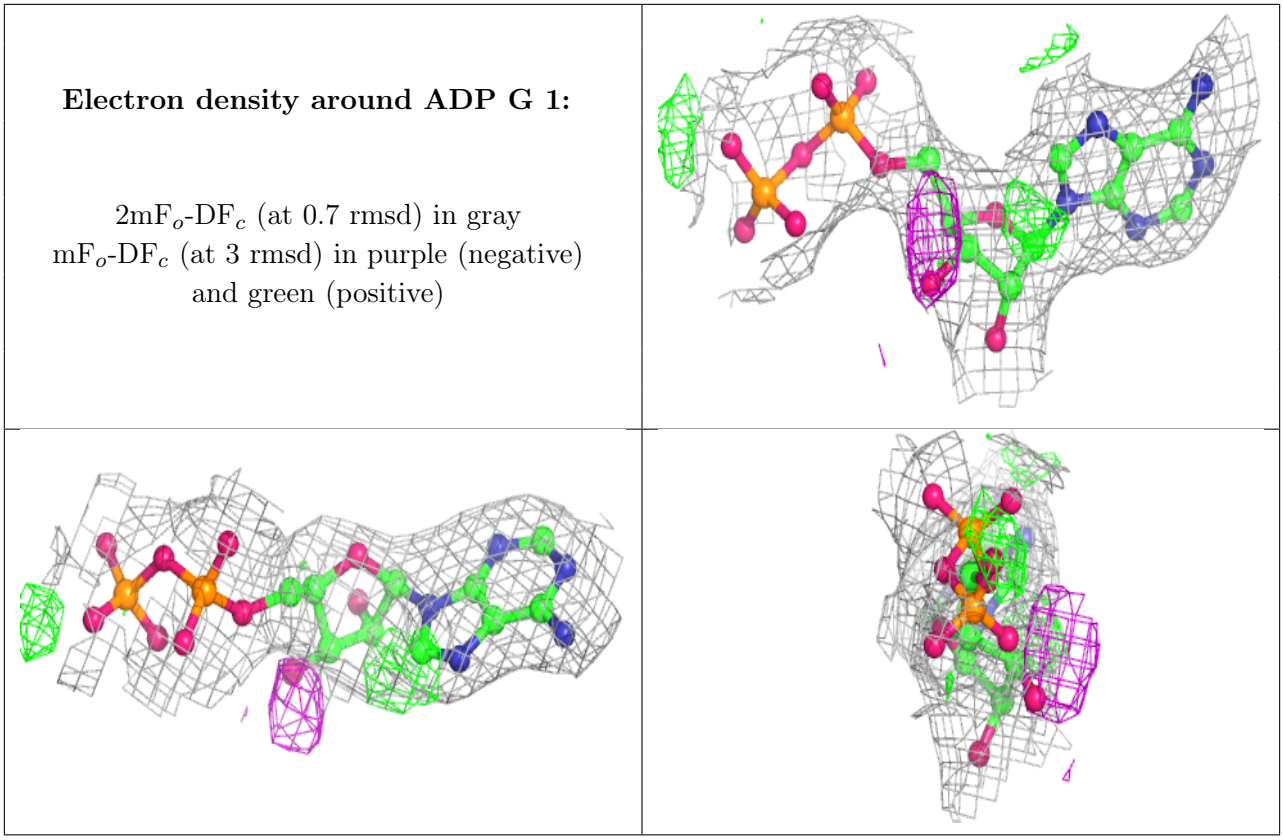






Electron density around ADP G 1:

$2mF_o$-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.