wwPDB X-ray Structure Validation Summary Report ⓘ

Aug 23, 2023 – 02:37 PM EDT

PDB ID	:	3DIN
Title	:	Crystal structure of the protein-translocation complex formed by the SecY channel and the SecA ATPase
Authors	:	Zimmer, J.; Nam, Y.; Rapoport, T.A.
Deposited on	:	2008-06-20
Resolution	:	4.50 Å(reported)

The following versions of software and data (see references ⓘ) 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	:	2.35
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)	:	2.35

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 4.50 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.
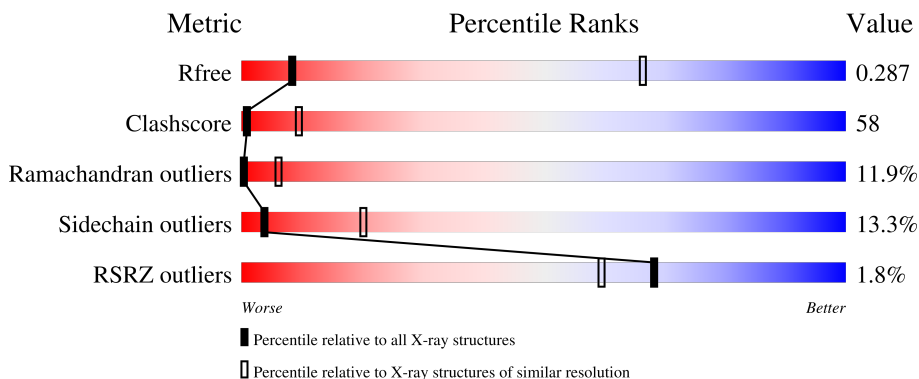
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1055 (5.20-3.80)
Clashscore	141614	1123 (5.20-3.80)
Ramachandran outliers	138981	1069 (5.20-3.80)
Sidechain outliers	138945	1050 (5.20-3.80)
RSRZ outliers	127900	1101 (5.30-3.70)

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	871	.% 21% 55% 17% • 6%
1	B	871	.% 21% 54% 17% • 6%
2	C	431	3% 27% 50% 13% • 8%
2	F	431	3% 27% 51% 12% • 8%
3	D	65	32% 51% • • 14%

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Mol	Chain	Length	Quality of chain
3	G	65	3% / 34% / 49% / ·· / 14%
4	E	76	3% / 41% / 38% / 5% · / 14%
4	H	76	3% / 41% / 38% / 5% · / 14%

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
6	ADP	A	873	-	-	X	-
6	ADP	B	873	-	-	X	-
7	BEF	A	874	-	-	X	-
7	BEF	B	874	-	-	X	-

2 Entry composition ⓘ

There are 7 unique types of molecules in this entry. The entry contains 21368 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Protein translocase subunit secA.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	816	Total 6613	C 4215	N 1131	O 1239	S 28	0	0	0
1	B	816	Total 6613	C 4215	N 1131	O 1239	S 28	0	0	0

- Molecule 2 is a protein called Preprotein translocase subunit SecY.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	C	396	Total 3124	C 2071	N 518	O 524	S 11	0	0	0
2	F	396	Total 3124	C 2071	N 518	O 524	S 11	0	0	0

- Molecule 3 is a protein called Preprotein translocase subunit secE.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	D	56	Total 431	C 294	N 64	O 73	0	0	0
3	G	56	Total 431	C 294	N 64	O 73	0	0	0

- Molecule 4 is a protein called Preprotein translocase subunit SecG.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	E	65	Total 484	C 318	N 80	O 83	S 3	0	0	0
4	H	65	Total 484	C 318	N 80	O 83	S 3	0	0	0

- Molecule 5 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	1	Total 1	Mg 1	0	0
5	B	1	Total 1	Mg 1	0	0

- Molecule 6 is ADENOSINE-5'-DIPHOSPHATE (three-letter code: ADP) (formula: $C_{10}H_{15}N_5O_{10}P_2$).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
6	A	1	Total 27	C 10	N 5	O 10	P 2	0	0
6	B	1	Total 27	C 10	N 5	O 10	P 2	0	0

- Molecule 7 is BERYLLIUM TRIFLUORIDE ION (three-letter code: BEF) (formula: BeF_3).

BEF

F3

F

BE Be⁻ — F F1

F

F2
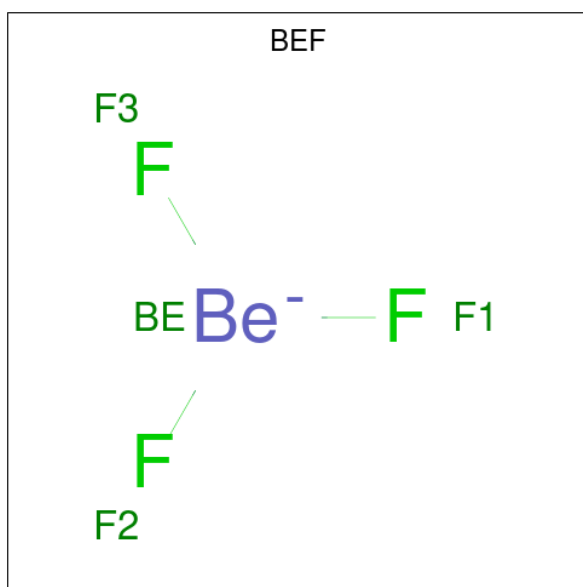
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	A	1	Total 4	Be 1	F 3	0	0
7	B	1	Total 4	Be 1	F 3	0	0

W O R L D W I D E
PDB
PROTEIN DATA BANK

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 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: Protein translocase subunit secA

• Molecule 1: Protein translocase subunit secA

%

Chain B:　21%　　54%　　17%　• 6%

D694 I695 E696 S697 L698 K699 N700 S701 L702 L709 F710 D711 L712 S718 L723 H724 L727 F728 N729 R730 L731 W732 E733 E734 Y735 Q736 R737 K738 K739 Q740 E741 I742 G743 E744 D745 Y746 V749 I750 R751 F752 L753 M754 L755 R756 I757 I758 D759 D760 H761 W762 Y765 L766 E767 E768

V769 E770 H771 V772 K773 E774 A775 V776 Q777 L778 R779 S780 Q783 K784 D785 P786 I787 V788 E789 F790 K791 K792 E793 T794 M797 F798 M801 M802 R803 R804 I805 N806 D807 T808 I809 A810 N811 Y812 V813 L814 R815 V816 VAL LYS SER GLU ASP GLU GLU ALA LYS GLU GLU LEU

GLY LYS ILE ARG LEU VAL HIS GLU GLU PHE ASN LEU VAL ASN ARG ALA MET ARG ARG ALA THR GLU LYS LYS LYS LYS ASP GLY LEU HIS SER PHE GLY ARG ILE ARG VAL LYS ARG

• **Molecule 2: Preprotein translocase subunit SecY**

Chain C:

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3%
┤▌───────────────────────────────────────────┤
   27%                    50%                13%    •    8%
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MET TRP GLN ALA PHE LYS ASN A8 P12 E13 L14 R15 D16 R17 I18 I19 F20 T21 F22 L23 A24 L25 I26 V27 F28 R29 M30 G31 I32 Y33 I34 P35 V36 P37 G38 L39 N40 L41 GLU ALA TRP GLY GLU ILE PHE ARG ARG ILE ALA GLU THR ALA GLY VAL ALA GLY ILE LEU S62

F63 Y64 D65 V66 F67 T68 G69 G70 A71 L72 S73 R74 F75 S76 V77 F78 T79 M80 S81 V82 T83 P84 Y85 I86 T87 A88 S89 I90 I91 L92 Q93 L94 L95 A96 S97 P100 S101 E104 M105 L106 R107 E108 G112 R113 A117 K118 Y119 T120 R121 R122 L123 T124 L125 L126 I127

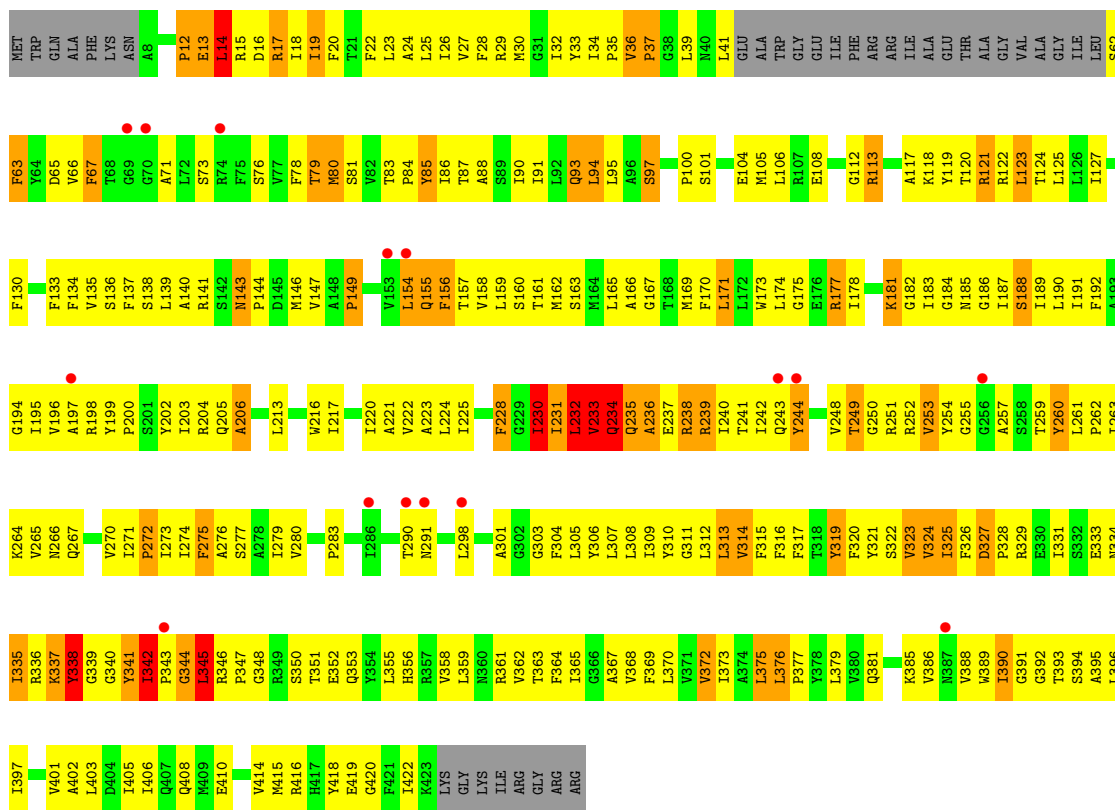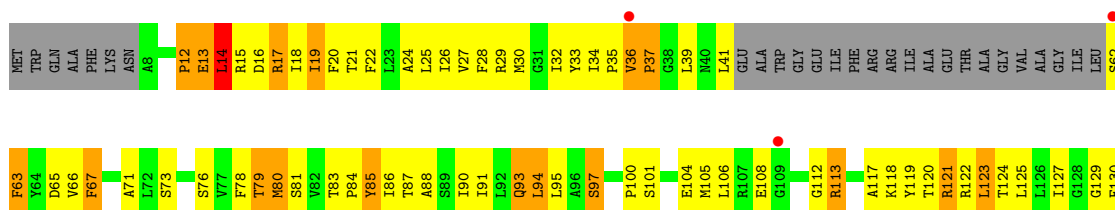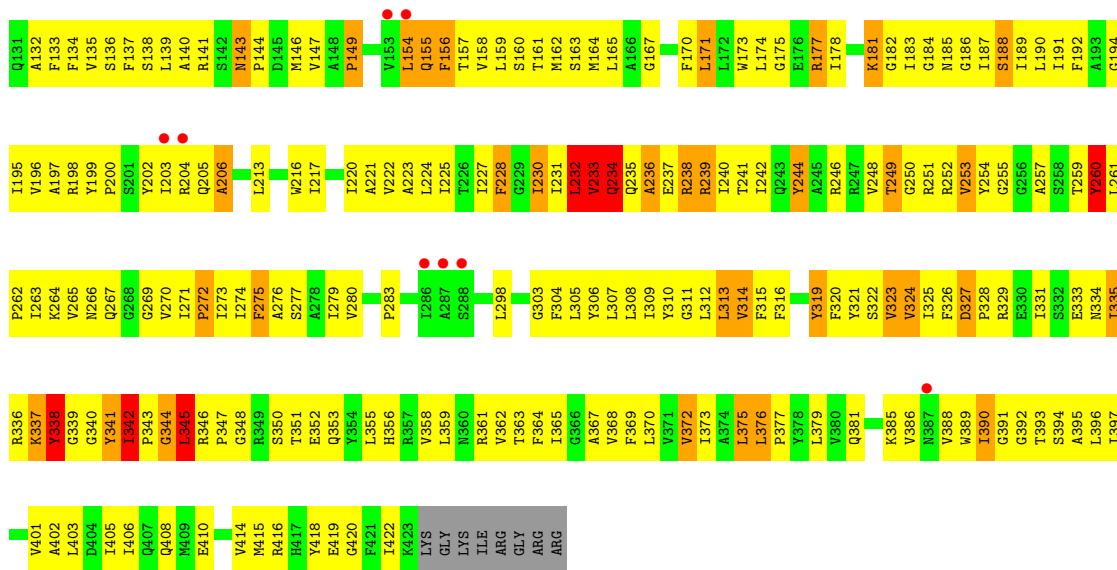F130 F133 F134 V135 S136 F137 S138 L139 A140 R141 S142 N143 P144 D145 M146 V147 A148 P149 V153 L154 Q155 F156 T157 V158 L159 S160 T161 M162 S163 M164 L165 A166 G167 T168 M169 F170 L171 L172 W173 L174 G175 E176 R177 I178 K181 G182 I183 G184 N185 G186 I187 S188 I189 L190 I191 F192 A193

G194 I195 V196 A197 R198 Y199 P200 S201 Y202 I203 R204 Q205 A206 L213 W216 I217 I220 A221 V222 A223 L224 I225 F228 G229 I230 I231 L232 V233 Q234 Q235 A236 E237 R238 R239 I240 T241 I242 Q243 Y244 V248 T249 G250 R251 R252 V253 Y254 G255 G256 A257 S258 T259 Y260 L261 P262 I263

K264 V265 N266 Q267 V270 I271 P272 T273 I274 F275 A276 S277 A278 T279 V280 P283 I286 T290 N291 L298 A301 G302 G303 F304 L305 Y306 L307 L308 L309 Y310 G311 L312 L313 V314 F315 F316 F317 T318 Y319 F320 Y321 S322 V323 S324 I325 F326 D327 P328 R329 E330 I331 S332 E333 N334

I335 R336 K337 Y338 G339 G340 Y341 I342 P343 G344 L345 R346 P347 G348 R349 S350 T351 E352 Q353 Y354 L355 H356 R357 V358 L359 N360 R361 V362 T363 F364 I365 G366 A367 V368 F369 L370 V371 V372 I373 A374 L375 L376 P377 Y378 L379 V380 Q381 K385 V386 N387 V388 W389 I390 G391 T393 S394 A395 L396

I397 V401 A402 L403 D404 I405 I406 Q407 Q408 M409 E410 V414 M415 R416 H417 V418 E419 G420 F421 I422 K423 LYS GLY LYS ILE ARG GLY ARG ARG

• **Molecule 2: Preprotein translocase subunit SecY**

Chain F:

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3%
┤▌───────────────────────────────────────────┤
   27%                    51%                12%    •    8%
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MET TRP GLN ALA PHE LYS ASN A8 P12 E13 L14 R15 D16 R17 I18 I19 F20 T21 F22 L23 A24 L25 I26 V27 F28 R29 M30 G31 I32 Y33 I34 P35 V36 P37 G38 L39 N40 L41 GLU ALA TRP GLY GLU ILE PHE ARG ARG ILE ALA GLU THR ALA GLY VAL ALA GLY ILE LEU S62

F63 Y64 D65 V66 F67 A71 L72 S73 S76 V77 F78 T79 M80 S81 V82 T83 P84 Y85 I86 T87 A88 S89 I90 I91 L92 Q93 L94 L95 A96 S97 P100 S101 E104 M105 L106 R107 E108 G109 G112 R113 A117 K118 Y119 T120 R121 R122 L123 T124 L125 L126 I127 G128 G129 F130

Q131 A132 K133 F133 F134 V135 S136 F137 S138 L139 A140 R141 S142 N143 P144 D145 M146 V147 A148 P149 V153 L154 Q155 F156 T157 V158 L159 S160 T161 M162 S163 M164 L165 A166 G167 F170 L171 L172 L173 L174 G175 E176 R177 I178 K181 G182 I183 G184 N185 G186 I187 S188 I189 L190 I191 F192 A193 G194

I195 V196 A197 R198 Y199 P200 S201 Y202 I203 R204 Q205 A206 L213 W216 I217 I220 A221 V222 A223 L224 I225 T226 I227 F228 G229 I230 I231 L232 V233 Q234 Q235 A236 E237 R238 R239 I240 T241 I242 Q243 Y244 A245 R246 R247 V248 T249 G250 R251 R252 V253 Y254 G255 G256 A257 S258 T259 Y260 L261

P262 I263 K264 V265 N266 Q267 G268 G269 V270 I271 P272 I273 I274 F275 A276 S277 A278 I279 V280 P283 I286 A287 S288 L298 G303 F304 L305 Y306 L307 L308 Y310 G311 L312 L313 V314 F315 F316 Y319 F320 Y321 S322 V323 V324 I325 F326 D327 P328 R329 E330 I331 S332 E333 N334 I335

R336 K337 Y338 G339 G340 Y341 I342 P343 G344 L345 R346 P347 G348 R349 S350 T351 E352 Q353 Y354 L355 H356 R357 V358 L359 N360 R361 V362 T363 F364 I365 G366 A367 V368 F369 L370 V371 V372 I373 A374 L375 L376 P377 Y378 L379 V380 Q381 K385 V386 N387 V388 W389 I390 G391 G392 T393 S394 A395 L396 I397

V401 A402 L403 D404 I405 I406 Q407 Q408 M409 E410 V414 M415 R416 H417 Y418 E419 G420 F421 I422 K423 LYS GLY LYS ILE ARG ARG ARG

• Molecule 3: Preprotein translocase subunit secE

Chain D:

MET GLU LYS LEU ARG LYS PHE ARG E10 V11 I12 A13 K16 K17 I18 S19 W20 P21 S22 R23 K24 E25 L26 L27 F30 G31 V32 V33 L34 V35 I36 L37 A38 V39 T40 S41 V42 Y43 V46 L47 D48 F49 I50 F51 V55 I58 F59 K60 A61 L62 G63 T64 G65

• Molecule 3: Preprotein translocase subunit secE

Chain G:

MET GLU LYS LEU ARG LYS PHE ARG E10 V11 I12 A13 K16 K17 I18 S19 W20 P21 S22 R23 K24 E25 L26 L27 F30 G31 V32 V33 L34 V35 I36 L37 A38 V39 T40 S41 V42 Y43 V46 L47 D48 F49 I50 F51 V55 I58 F59 K60 A61 L62 G63 T64 G65

• Molecule 4: Preprotein translocase subunit SecG

Chain E:

MET LYS THR PHE PHE LEU ILE VAL H9 T10 I11 A15 L16 I17 Y18 M19 V20 Q21 V22 S25 K26 F27 L30 A33 F34 G35 S36 H40 T41 V42 F43 G44 R45 R46 K47 D50 T51 G52 G53 K54 L57 V58 L62 F63 F64 V65 V68 F72 V73 LEU

THR ARG

• Molecule 4: Preprotein translocase subunit SecG

Chain H:

MET LYS THR PHE PHE LEU ILE VAL H9 T10 I11 A15 L16 I17 Y18 M19 V20 Q21 V22 S25 K26 F27 L30 A33 F34 G35 S36 H40 T41 V42 F43 G44 R45 R46 K47 D50 T51 G52 G53 K54 L57 V58 L62 F63 F64 V65 V68 V69 F72 V73

LEU
THR
ARG

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	101.62Å 156.00Å 358.15Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	15.00 – 4.50 19.97 – 4.50	Depositor EDS
% Data completeness (in resolution range)	97.7 (15.00-4.50) 97.2 (19.97-4.50)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.07	Depositor
$< I/\sigma(I) >$ [1]	2.26 (at 4.54Å)	Xtriage
Refinement program	CNS	Depositor
R, R_{free}	0.279 , 0.303 0.286 , 0.287	Depositor DCC
R_{free} test set	1678 reflections (5.04%)	wwPDB-VP
Wilson B-factor (Å^2)	205.7	Xtriage
Anisotropy	0.402	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.17 , 253.1	EDS
L-test for twinning[2]	$< |L| > = 0.44$, $< L^2 > = 0.27$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.90	EDS
Total number of atoms	21368	wwPDB-VP
Average B, all atoms (Å^2)	356.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.72% of the height of the origin peak. No significant pseudotranslation is detected.*

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[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: ADP, BEF, 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	0.31	0/6730	0.62	1/9048 (0.0%)
1	B	0.31	0/6730	0.62	1/9048 (0.0%)
2	C	0.44	1/3194 (0.0%)	0.68	1/4329 (0.0%)
2	F	0.42	0/3194	0.69	2/4329 (0.0%)
3	D	0.32	0/440	0.54	0/596
3	G	0.33	0/440	0.54	0/596
4	E	0.31	0/492	0.55	0/662
4	H	0.31	0/492	0.55	0/662
All	All	0.35	1/21712 (0.0%)	0.63	5/29270 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
2	F	0	1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	235	GLN	N-CA	5.64	1.57	1.46

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	F	236	ALA	N-CA-C	5.62	126.17	111.00
2	F	228	PHE	CB-CG-CD1	5.53	124.67	120.80
2	C	236	ALA	N-CA-C	5.37	125.50	111.00
1	A	94	GLU	CB-CA-C	-5.18	100.04	110.40

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	94	GLU	CB-CA-C	-5.18	100.05	110.40

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	F	260	TYR	Sidechain

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	6613	0	6689	906	2
1	B	6613	0	6689	891	2
2	C	3124	0	3275	347	0
2	F	3124	0	3275	336	0
3	D	431	0	460	29	0
3	G	431	0	460	33	0
4	E	484	0	508	29	0
4	H	484	0	508	28	0
5	A	1	0	0	0	0
5	B	1	0	0	0	0
6	A	27	0	12	40	0
6	B	27	0	12	38	0
7	A	4	0	0	4	0
7	B	4	0	0	5	0
All	All	21368	0	21888	2490	2

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 58.

The worst 5 of 2490 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:76:PRO:HD2	6:A:873:ADP:N6	1.34	1.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:76:PRO:CD	6:A:873:ADP:HN62	1.40	1.34
1:B:76:PRO:HD2	6:B:873:ADP:N6	1.45	1.30
1:B:76:PRO:CD	6:B:873:ADP:HN62	1.50	1.25
1:B:101:LYS:HE2	7:B:874:BEF:F2	1.31	1.21

All (2) 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:498:GLY:O	1:B:518:LYS:NZ[1_455]	2.07	0.13
1:A:518:LYS:NZ	1:B:498:GLY:O[1_455]	2.17	0.03

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	814/871 (94%)	510 (63%)	207 (25%)	97 (12%)	0	6
1	B	814/871 (94%)	511 (63%)	206 (25%)	97 (12%)	0	6
2	C	392/431 (91%)	260 (66%)	80 (20%)	52 (13%)	0	5
2	F	392/431 (91%)	262 (67%)	78 (20%)	52 (13%)	0	5
3	D	54/65 (83%)	41 (76%)	9 (17%)	4 (7%)	1	16
3	G	54/65 (83%)	41 (76%)	9 (17%)	4 (7%)	1	16
4	E	63/76 (83%)	46 (73%)	12 (19%)	5 (8%)	1	14
4	H	63/76 (83%)	46 (73%)	12 (19%)	5 (8%)	1	14
All	All	2646/2886 (92%)	1717 (65%)	613 (23%)	316 (12%)	0	6

5 of 316 Ramachandran outliers are listed below:

WORLDWIDE
wwPDB
PROTEIN DATA BANK

Mol	Chain	Res	Type
1	A	75	ARG
1	A	95	MET
1	A	131	ARG
1	A	152	SER
1	A	178	TRP

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	717/766 (94%)	610 (85%)	107 (15%)	3	17
1	B	717/766 (94%)	610 (85%)	107 (15%)	3	17
2	C	331/356 (93%)	293 (88%)	38 (12%)	5	23
2	F	331/356 (93%)	294 (89%)	37 (11%)	6	24
3	D	47/56 (84%)	44 (94%)	3 (6%)	17	44
3	G	47/56 (84%)	44 (94%)	3 (6%)	17	44
4	E	53/64 (83%)	48 (91%)	5 (9%)	8	30
4	H	53/64 (83%)	48 (91%)	5 (9%)	8	30
All	All	2296/2484 (92%)	1991 (87%)	305 (13%)	4	20

5 of 305 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	612	GLN
2	F	249	THR
1	B	646	ASP
2	F	14	LEU
4	H	21	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 50 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	163	ASN

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Mol	Chain	Res	Type
1	B	403	GLN
2	F	407	GLN
1	B	183	ASN
1	B	223	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 6 ligands modelled in this entry, 2 are monoatomic - leaving 4 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	$\#|Z| > 2$
7	BEF	B	874	6	0,3,3	-	-	-		
7	BEF	A	874	6	0,3,3	-	-	-		
6	ADP	B	873	7	24,29,29	1.59	3 (12%)	29,45,45	1.47	4 (13%)
6	ADP	A	873	7	24,29,29	1.59	3 (12%)	29,45,45	1.46	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
6	ADP	B	873	7	-	0/12/32/32	0/3/3/3
6	ADP	A	873	7	-	0/12/32/32	0/3/3/3

The worst 5 of 6 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	A	873	ADP	C8-N7	5.58	1.44	1.34
6	B	873	ADP	C8-N7	5.58	1.44	1.34
6	A	873	ADP	PB-O1B	2.27	1.57	1.50
6	B	873	ADP	PB-O1B	2.26	1.57	1.50
6	B	873	ADP	C2-N3	2.20	1.35	1.32

The worst 5 of 8 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
6	B	873	ADP	N3-C2-N1	-4.21	122.11	128.68
6	A	873	ADP	N3-C2-N1	-4.19	122.13	128.68
6	B	873	ADP	C1'-N9-C4	-2.68	121.94	126.64
6	A	873	ADP	C1'-N9-C4	-2.67	121.96	126.64
6	A	873	ADP	O3B-PB-O2B	2.50	117.19	107.64

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

4 monomers are involved in 87 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	B	874	BEF	5	0
7	A	874	BEF	4	0
6	B	873	ADP	38	0
6	A	873	ADP	40	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 B 873

Bond lengths   Bond angles

Torsions   Rings

Ligand ADP A 873

Bond lengths   Bond angles

Torsions   Rings
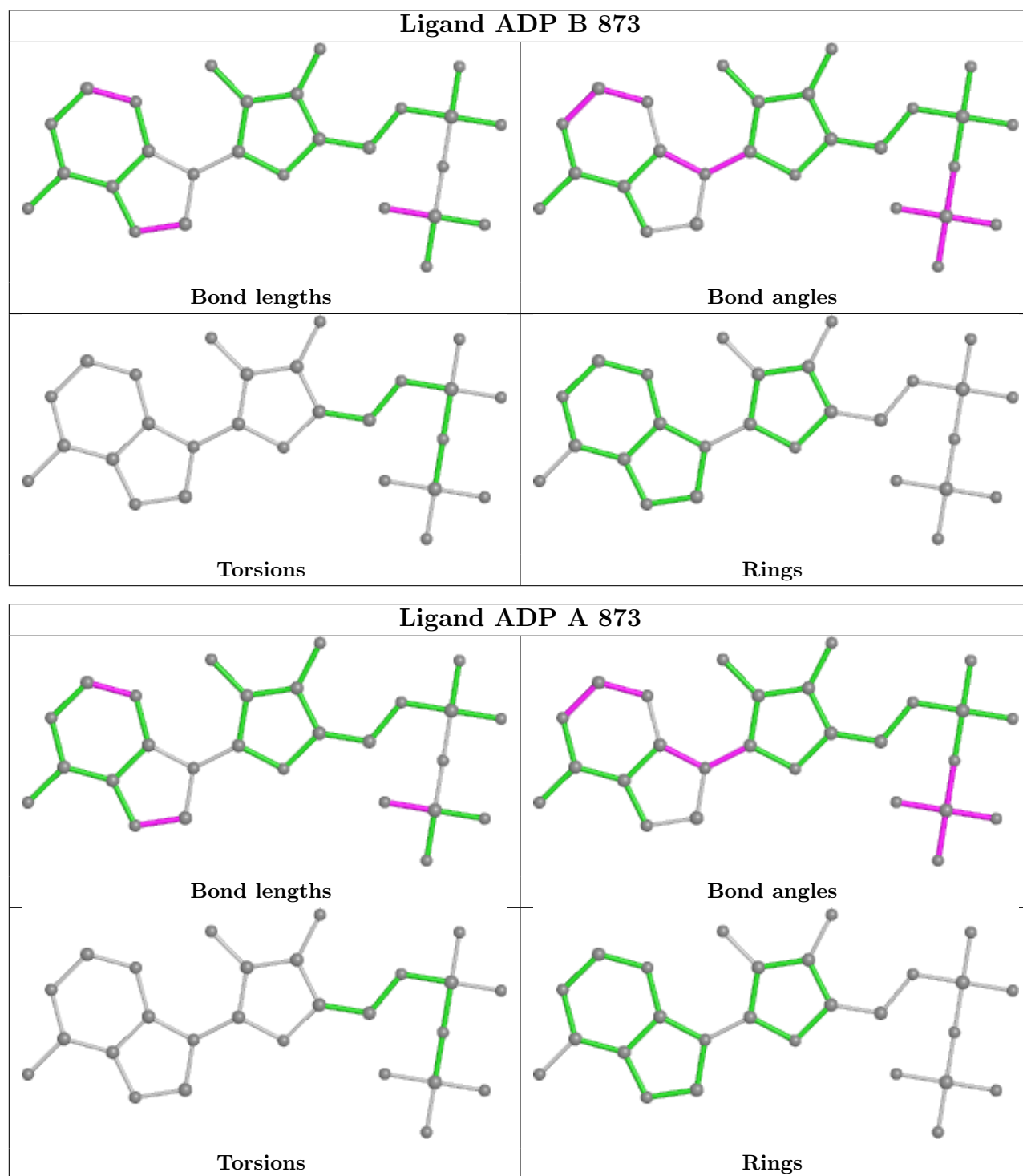
5.7 Other polymers (i)

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 ⓘ

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(Å²)	Q<0.9
1	A	816/871 (93%)	-0.49	5 (0%)	89	84	108, 306, 457, 500	0
1	B	816/871 (93%)	-0.45	10 (1%)	79	70	108, 306, 457, 500	0
2	C	396/431 (91%)	-0.13	15 (3%)	40	32	223, 429, 500, 500	0
2	F	396/431 (91%)	-0.18	11 (2%)	53	43	223, 429, 500, 500	0
3	D	56/65 (86%)	-0.43	0	100	100	322, 414, 500, 500	0
3	G	56/65 (86%)	-0.43	2 (3%)	42	35	322, 414, 500, 500	0
4	E	65/76 (85%)	-0.05	2 (3%)	49	39	326, 444, 490, 500	0
4	H	65/76 (85%)	-0.09	2 (3%)	49	39	326, 444, 490, 500	0
All	All	2666/2886 (92%)	-0.36	47 (1%)	68	59	108, 365, 489, 500	0

The worst 5 of 47 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	162	LYS	5.7
2	C	69	GLY	5.4
1	A	98	GLY	5.2
1	B	572	GLY	5.0
2	C	197	ALA	4.6

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

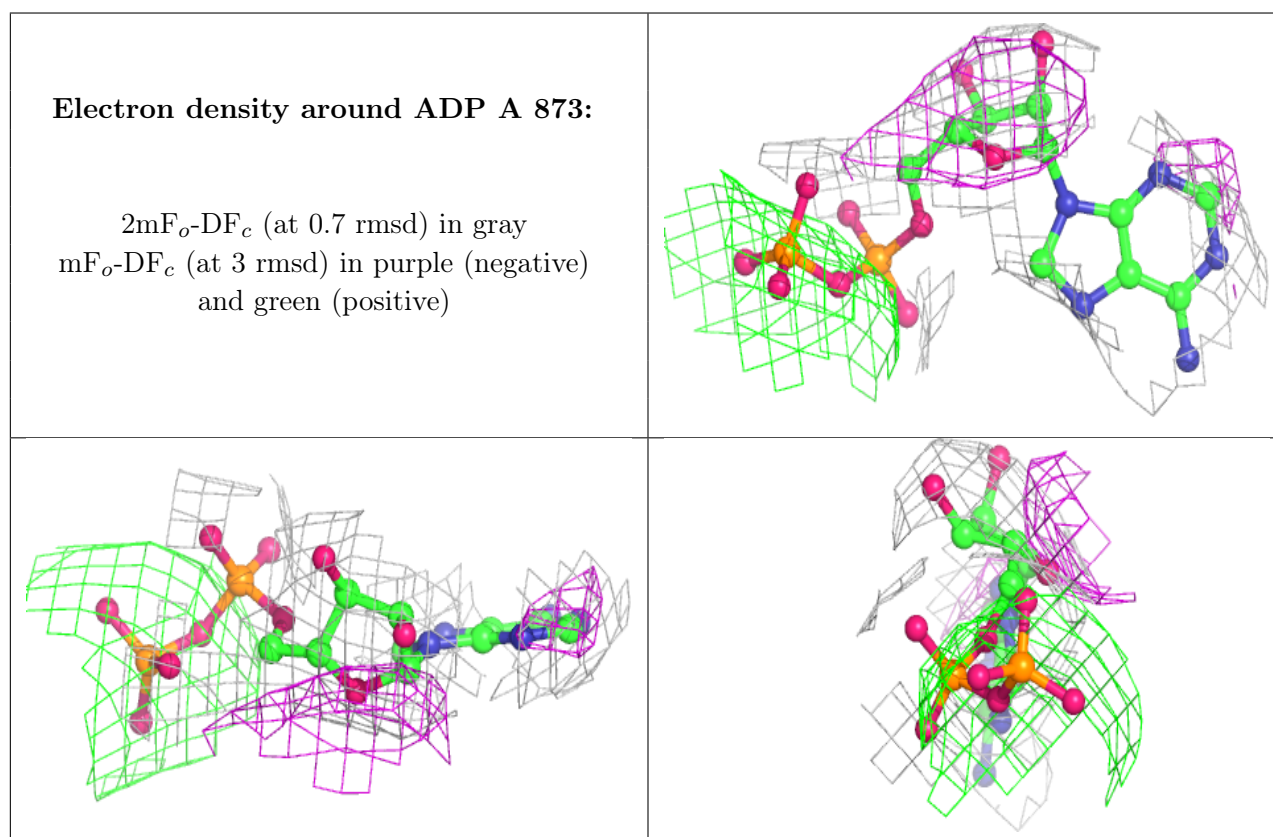There are no non-standard protein/DNA/RNA residues in this entry.

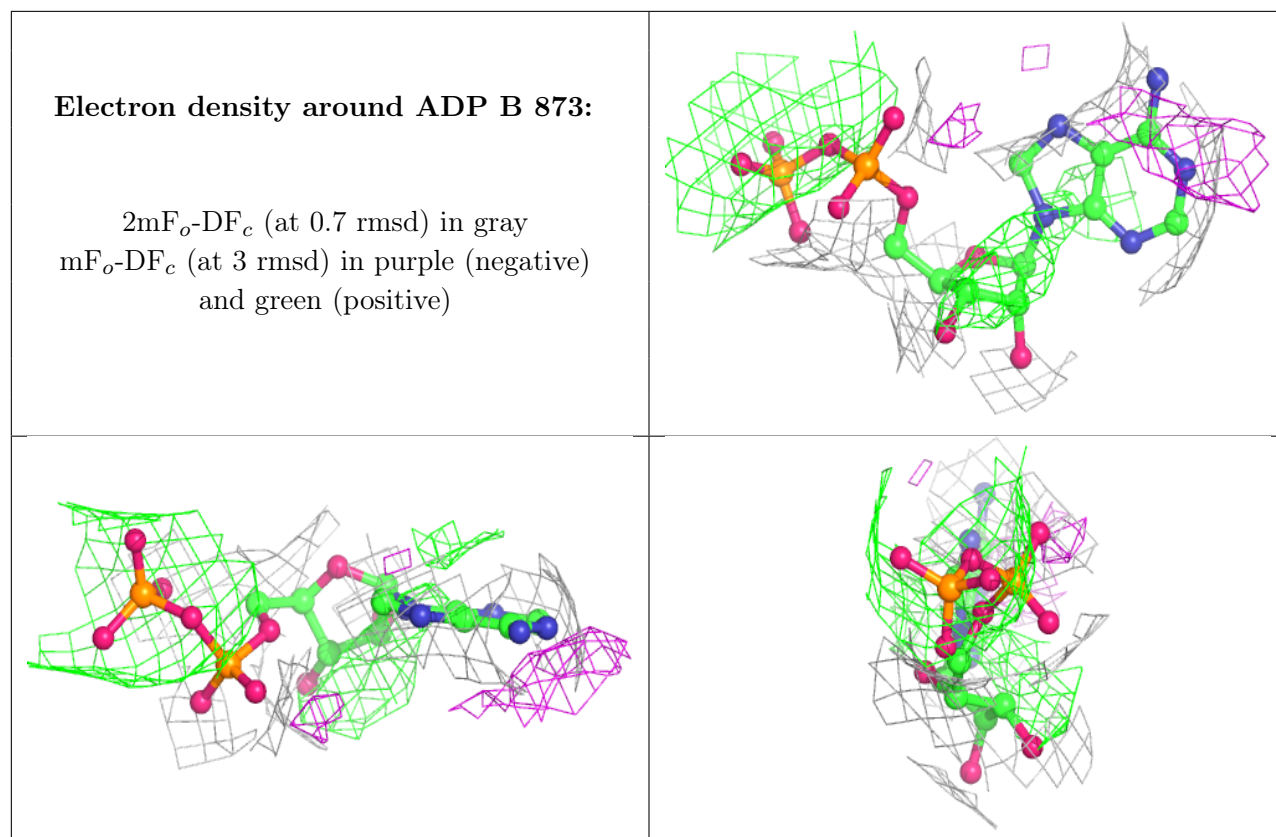## 6.3 Carbohydrates ⓘ

There are no monosaccharides in this entry.

6.4 Ligands ⓘ

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
7	BEF	A	874	4/4	0.64	0.30	112,134,154,241	0
6	ADP	A	873	27/27	0.69	0.34	134,186,192,399	0
6	ADP	B	873	27/27	0.79	0.27	134,186,192,399	0
7	BEF	B	874	4/4	0.84	0.22	112,134,154,241	0
5	MG	A	872	1/1	0.90	0.29	130,130,130,130	0
5	MG	B	872	1/1	0.90	0.18	130,130,130,130	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 A 873:

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

Electron density around ADP B 873:

$2mF_o$-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 ⓘ

There are no such residues in this entry.