WORLDWIDE PDB PROTEIN DATA BANK

wwPDB X-ray Structure Validation Summary Report (i)

Jan 7, 2024 – 08:32 am GMT

PDB ID	:	5OCH
Title	:	The crystal structure of human ABCB8 in an outward-facing state
Authors	:	Faust, B.; Pike, A.C.W.; Shintre, C.A.; Quiqley, A.M.; Chu, A.; Barr, A.; Shrestha, L.; Mukhopadhyay, S.; Borkowska, O.; Chalk, R.; Burgess-Brown, N.A.; Arrowsmith, C.H.; Edwards, A.M.; Bountra, C.; Carpenter, E.P.; Structural Genomics Consortium (SGC)
Deposited on	:	2017-06-30
Resolution	:	3.40 Å(reported)

The following versions of software and data (see references ①) 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 3.40 Å.

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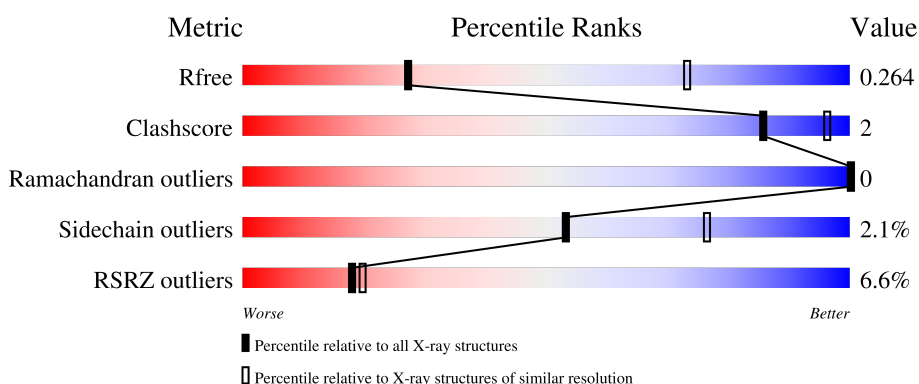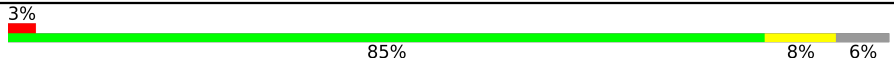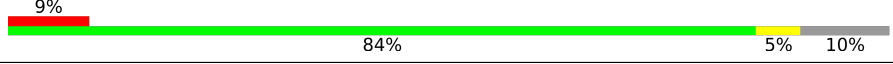

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1026 (3.48-3.32)
Clashscore	141614	1055 (3.48-3.32)
Ramachandran outliers	138981	1038 (3.48-3.32)
Sidechain outliers	138945	1038 (3.48-3.32)
RSRZ outliers	127900	2173 (3.50-3.30)

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	612	3% / 83% 7% 10%
1	C	612	10% / 84% · 12%
1	D	612	5% / 88% 6% 6%
2	B	612	3% / 88% 6% 6%
3	E	612	12% / 89% 5% 6%

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Mol	Chain	Length	Quality of chain
4	F	612	3% 85% 8% 6%
4	G	612	3% 85% 5% 10%
5	H	612	9% 84% 5% 10%

2 Entry composition ⓘ

There are 8 unique types of molecules in this entry. The entry contains 31278 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 ATP-binding cassette sub-family B member 8, mitochondrial.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	552	Total 3910	C 2479	N 676	O 733	S 22	0	0	0
1	C	537	Total 3541	C 2229	N 626	O 670	S 16	0	0	0
1	D	573	Total 3937	C 2502	N 682	O 731	S 22	0	0	0

There are 24 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	110	MET	-	initiating methionine	UNP Q9NUT2
A	715	ALA	-	expression tag	UNP Q9NUT2
A	716	GLU	-	expression tag	UNP Q9NUT2
A	717	ASN	-	expression tag	UNP Q9NUT2
A	718	LEU	-	expression tag	UNP Q9NUT2
A	719	TYR	-	expression tag	UNP Q9NUT2
A	720	PHE	-	expression tag	UNP Q9NUT2
A	721	GLN	-	expression tag	UNP Q9NUT2
C	110	MET	-	initiating methionine	UNP Q9NUT2
C	715	ALA	-	expression tag	UNP Q9NUT2
C	716	GLU	-	expression tag	UNP Q9NUT2
C	717	ASN	-	expression tag	UNP Q9NUT2
C	718	LEU	-	expression tag	UNP Q9NUT2
C	719	TYR	-	expression tag	UNP Q9NUT2
C	720	PHE	-	expression tag	UNP Q9NUT2
C	721	GLN	-	expression tag	UNP Q9NUT2
D	110	MET	-	initiating methionine	UNP Q9NUT2
D	715	ALA	-	expression tag	UNP Q9NUT2
D	716	GLU	-	expression tag	UNP Q9NUT2
D	717	ASN	-	expression tag	UNP Q9NUT2
D	718	LEU	-	expression tag	UNP Q9NUT2
D	719	TYR	-	expression tag	UNP Q9NUT2
D	720	PHE	-	expression tag	UNP Q9NUT2

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Chain	Residue	Modelled	Actual	Comment	Reference
D	721	GLN	-	expression tag	UNP Q9NUT2

- Molecule 2 is a protein called ATP-binding cassette sub-family B member 8, mitochondrial.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	573	4051	2562	715	753	21	0	0	0

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	110	MET	-	initiating methionine	UNP Q9NUT2
B	715	ALA	-	expression tag	UNP Q9NUT2
B	716	GLU	-	expression tag	UNP Q9NUT2
B	717	ASN	-	expression tag	UNP Q9NUT2
B	718	LEU	-	expression tag	UNP Q9NUT2
B	719	TYR	-	expression tag	UNP Q9NUT2
B	720	PHE	-	expression tag	UNP Q9NUT2
B	721	GLN	-	expression tag	UNP Q9NUT2

- Molecule 3 is a protein called ATP-binding cassette sub-family B member 8, mitochondrial.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	E	576	3947	2495	697	734	21	0	0	0

There are 8 discrepancies between the modelled and reference sequences:

| Chain	Residue	Modelled	Actual	Comment	Reference
E	110	MET	-	initiating methionine	UNP Q9NUT2
E	715	ALA	-	expression tag	UNP Q9NUT2
E	716	GLU	-	expression tag	UNP Q9NUT2
E	717	ASN	-	expression tag	UNP Q9NUT2
E	718	LEU	-	expression tag	UNP Q9NUT2
E	719	TYR	-	expression tag	UNP Q9NUT2
E	720	PHE	-	expression tag	UNP Q9NUT2
E	721	GLN	-	expression tag	UNP Q9NUT2

- Molecule 4 is a protein called ATP-binding cassette sub-family B member 8, mitochondrial.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	F	573	Total 4047	C 2567	N 700	O 756	S 24	0	0	0
4	G	552	Total 3812	C 2409	N 663	O 720	S 20	0	0	0

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
F	110	MET	-	initiating methionine	UNP Q9NUT2
F	715	ALA	-	expression tag	UNP Q9NUT2
F	716	GLU	-	expression tag	UNP Q9NUT2
F	717	ASN	-	expression tag	UNP Q9NUT2
F	718	LEU	-	expression tag	UNP Q9NUT2
F	719	TYR	-	expression tag	UNP Q9NUT2
F	720	PHE	-	expression tag	UNP Q9NUT2
F	721	GLN	-	expression tag	UNP Q9NUT2
G	110	MET	-	initiating methionine	UNP Q9NUT2
G	715	ALA	-	expression tag	UNP Q9NUT2
G	716	GLU	-	expression tag	UNP Q9NUT2
G	717	ASN	-	expression tag	UNP Q9NUT2
G	718	LEU	-	expression tag	UNP Q9NUT2
G	719	TYR	-	expression tag	UNP Q9NUT2
G	720	PHE	-	expression tag	UNP Q9NUT2
G	721	GLN	-	expression tag	UNP Q9NUT2

- Molecule 5 is a protein called ATP-binding cassette sub-family B member 8, mitochondrial.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
5	H	548	Total 3606	C 2255	N 639	O 691	S 21	0	0	0

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
H	110	MET	-	initiating methionine	UNP Q9NUT2
H	715	ALA	-	expression tag	UNP Q9NUT2
H	716	GLU	-	expression tag	UNP Q9NUT2
H	717	ASN	-	expression tag	UNP Q9NUT2
H	718	LEU	-	expression tag	UNP Q9NUT2
H	719	TYR	-	expression tag	UNP Q9NUT2
H	720	PHE	-	expression tag	UNP Q9NUT2
H	721	GLN	-	expression tag	UNP Q9NUT2

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

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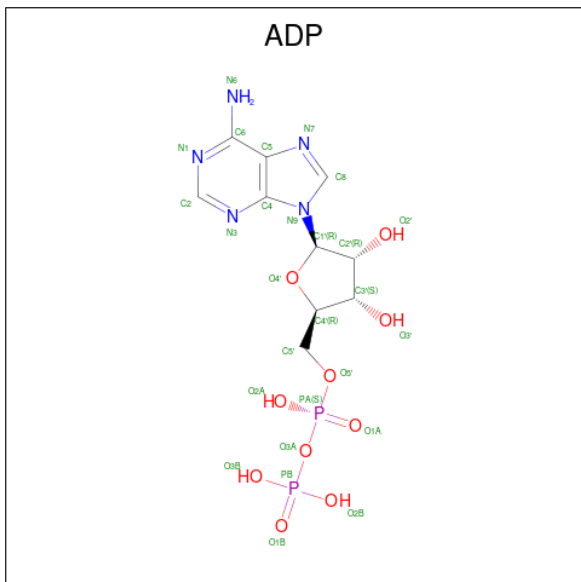
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
6	A	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
6	B	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
6	C	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
6	D	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
6	E	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
6	F	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
6	G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

- Molecule 7 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

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

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	C	1	Total 1	Mg 1	0	0
7	D	1	Total 1	Mg 1	0	0
7	E	1	Total 1	Mg 1	0	0
7	F	1	Total 1	Mg 1	0	0
7	G	1	Total 1	Mg 1	0	0
7	H	1	Total 1	Mg 1	0	0

- Molecule 8 is CHOLESTEROL HEMISUCCINATE (three-letter code: Y01) (formula: $C_{31}H_{50}O_4$).
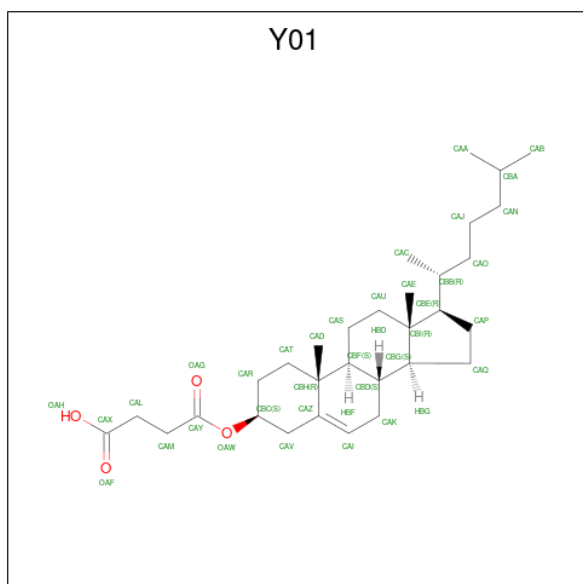
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
8	A	1	Total 30	C 26	O 4	0	0
8	B	1	Total 35	C 31	O 4	0	0
8	D	1	Total 26	C 24	O 2	0	0
8	E	1	Total 28	C 24	O 4	0	0
8	F	1	Total 35	C 31	O 4	0	0

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
8	G	1	Total 21	C 20	O 1	0	0
8	H	1	Total 28	C 24	O 4	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 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: ATP-binding cassette sub-family B member 8, mitochondrial
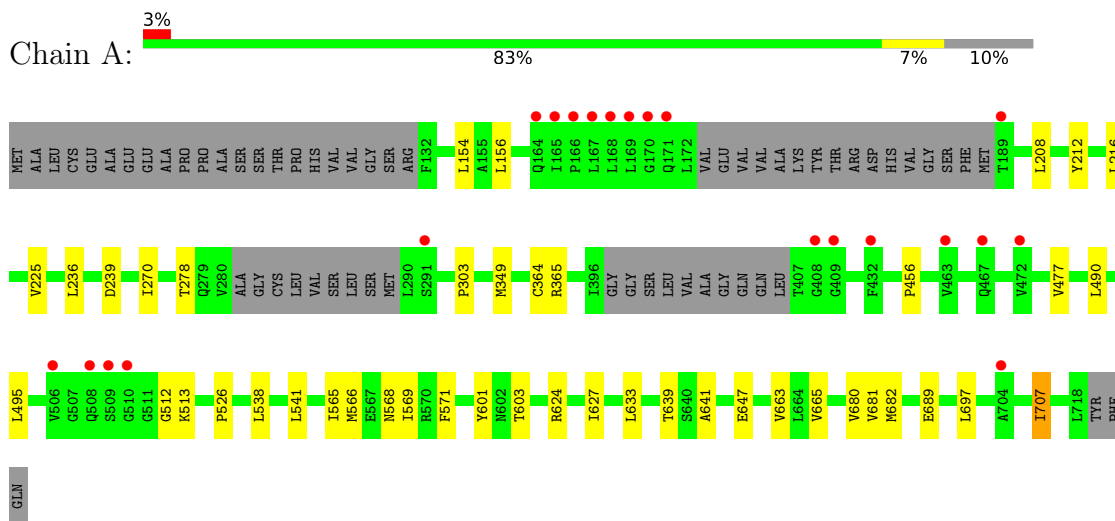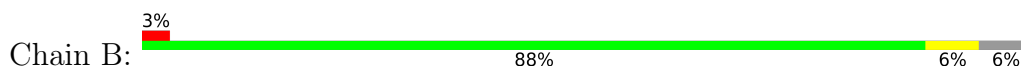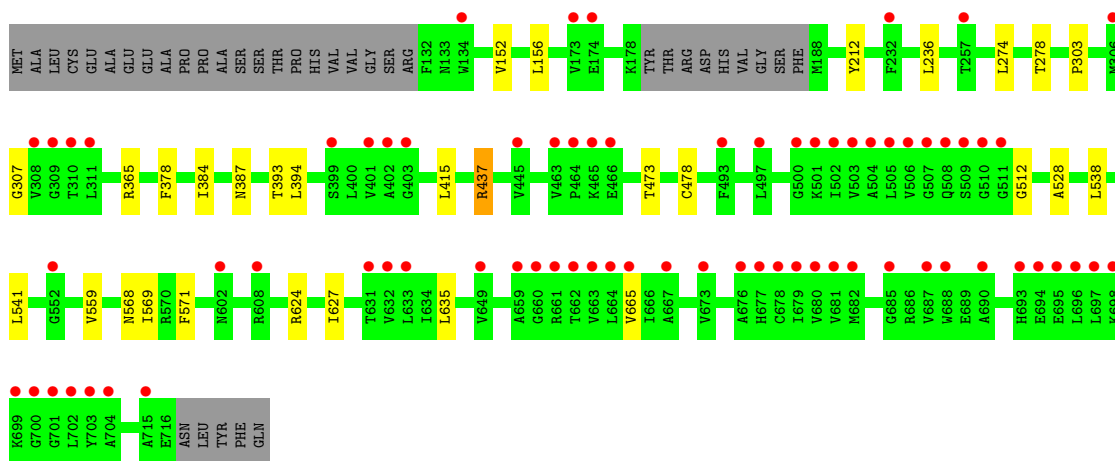
Chain A:

3%

83% 7% 10%

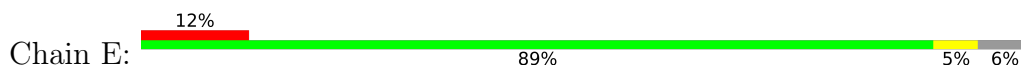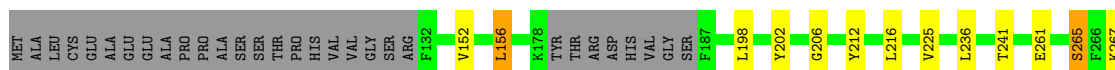- Molecule 1: ATP-binding cassette sub-family B member 8, mitochondrial

Chain C:

10%

84% 12%

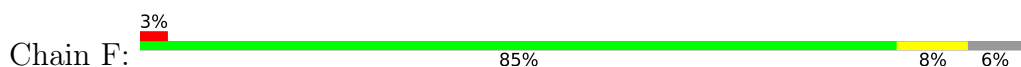- Molecule 1: ATP-binding cassette sub-family B member 8, mitochondrial

Chain D:

5%

88% 6% 6%
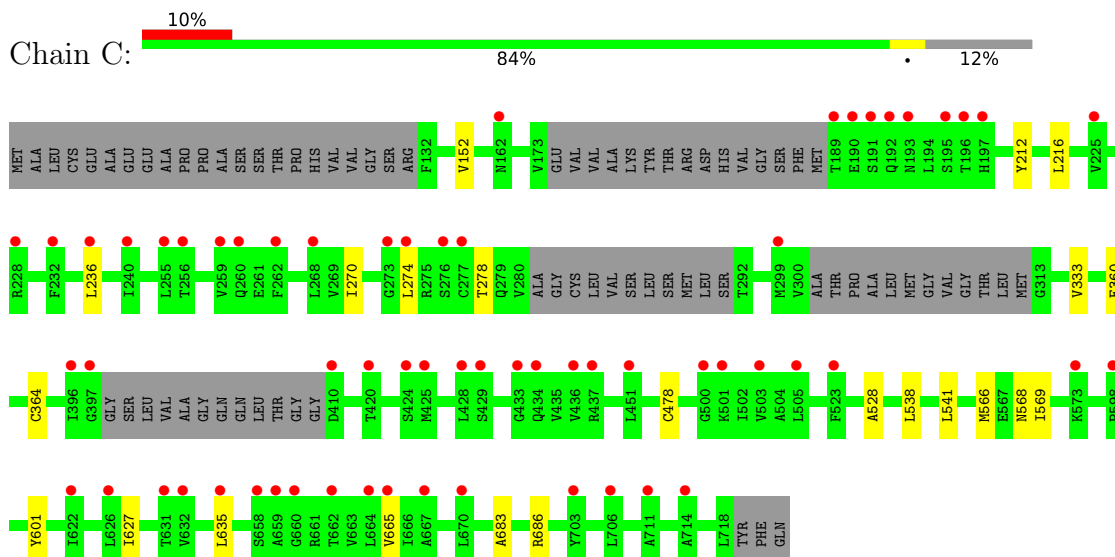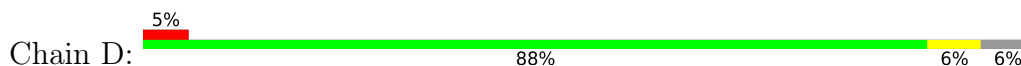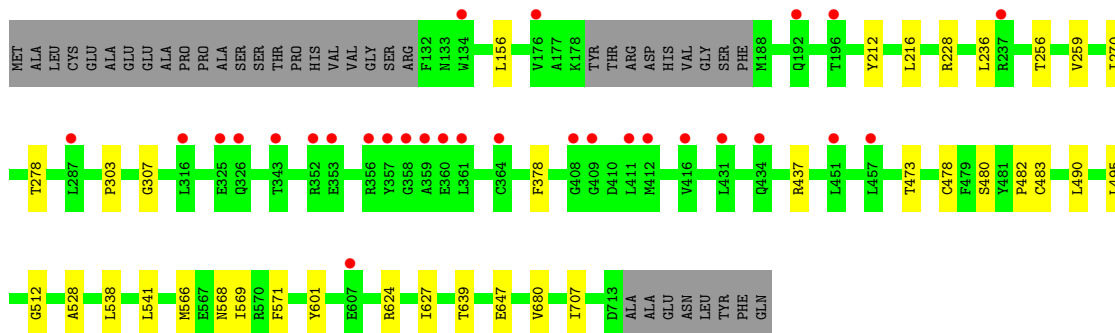
• Molecule 2: ATP-binding cassette sub-family B member 8, mitochondrial

Chain B:
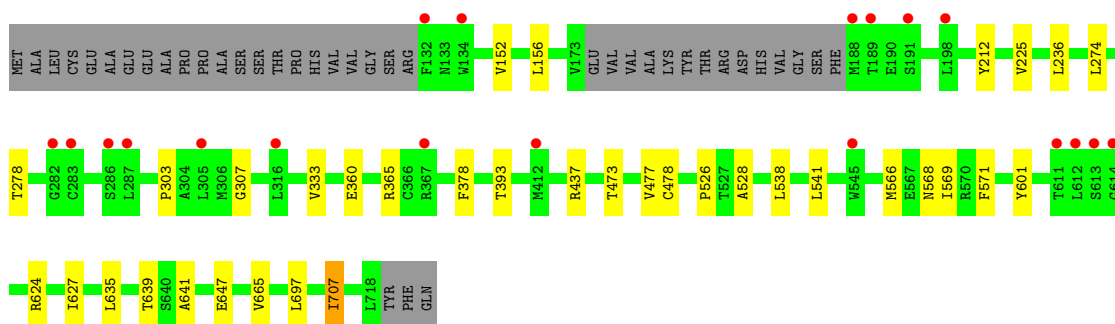
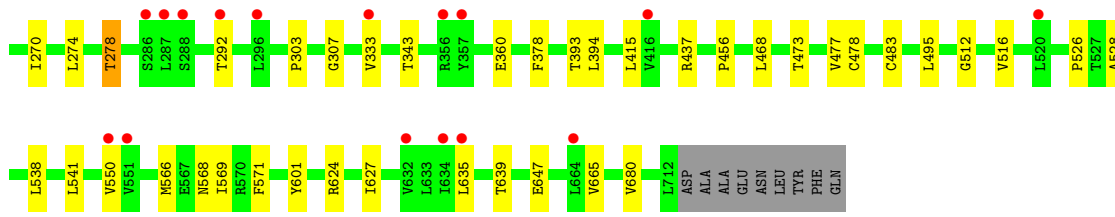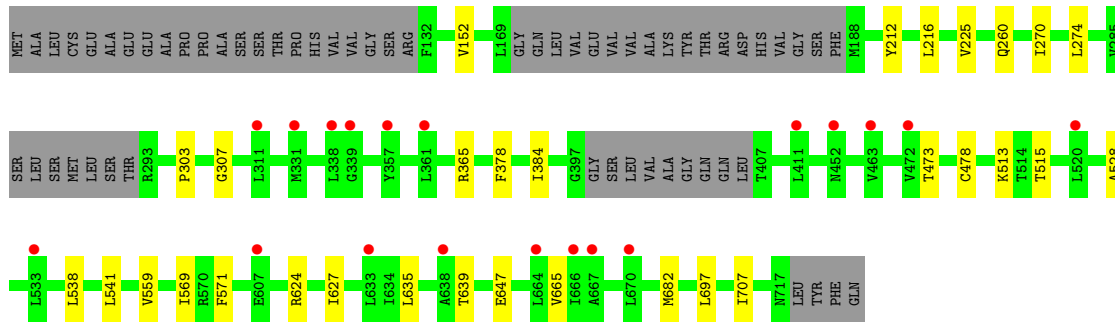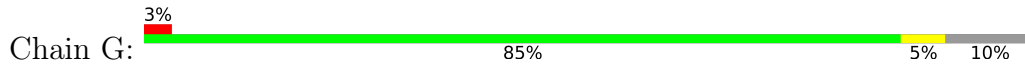• Molecule 3: ATP-binding cassette sub-family B member 8, mitochondrial

Chain E:

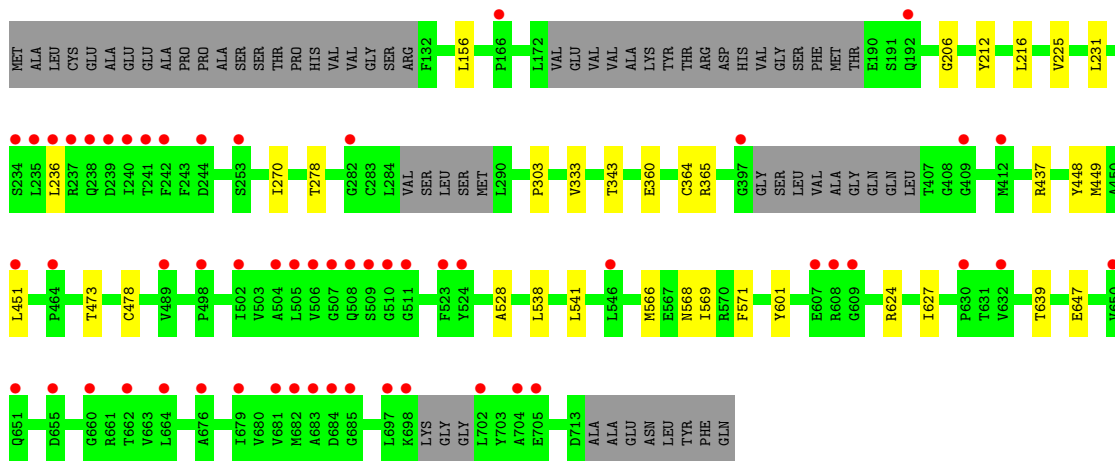• Molecule 4: ATP-binding cassette sub-family B member 8, mitochondrial

Chain F:

I270 L274 T278 S286 L287 S288 T292 L296 P303 G307 V333 T343 R356 Y357 E360 F378 T393 L394 L415 V416 R437 P456 L468 T473 V477 C478 C483 L495 G512 V516 L520 P526 T527 A528

L538 L541 V550 V551 M566 E567 N568 I569 R570 F571 Y601 R624 I627 V632 L633 I634 L635 T639 E647 L664 V665 V680 L712 ASP ALA GLU ASN LEU TYR PHE GLN

- Molecule 4: ATP-binding cassette sub-family B member 8, mitochondrial

Chain G:
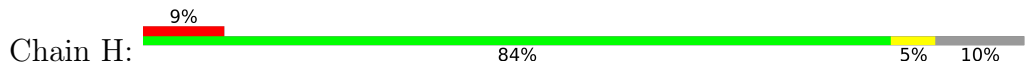
3%

85% 5% 10%

MET ALA LEU CYS GLU ALA GLU GLU ALA PRO PRO ALA SER SER THR PRO HIS VAL VAL GLY SER ARG F132 V152 L169 GLY GLN LEU VAL GLU VAL VAL ALA LYS TYR THR ARG ASP HIS VAL GLY SER PHE M188 Y212 L216 V225 Q260 I270 L274 V285

SER LEU SER MET LEU SER THR R293 P303 G307 L311 M331 L338 G339 Y357 L361 R365 F378 I384 G397 GLY SER LEU VAL ALA GLY GLN LEU LEU T407 L411 N452 V463 V472 T473 C478 K513 T514 T515 L520 A528

L533 L538 L541 V559 I569 R570 F571 E607 R624 I627 L633 I634 L635 A638 T639 E647 L664 V665 I666 A667 L670 M682 L697 I707 N717 LEU TYR PHE GLN

- Molecule 5: ATP-binding cassette sub-family B member 8, mitochondrial

Chain H:

9%

84% 5% 10%

MET ALA LEU CYS GLU ALA GLU GLU ALA PRO PRO ALA SER SER THR PRO HIS VAL VAL GLY SER ARG F132 L156 P166 L172 VAL GLU VAL VAL ALA LYS TYR THR ARG ASP HIS VAL GLY SER PHE MET THR E190 S191 Q192 G206 Y212 L216 V225 L231

S234 L235 L236 R237 Q238 D239 I240 T241 F242 F243 D244 S253 I270 T278 G282 C283 L284 VAL SER LEU SER MET L290 P303 V333 T343 E360 C364 R365 G397 GLY SER LEU VAL ALA GLY GLN GLN LEU T407 G408 G409 M412 R437 Y448 M449 A450

L461 P464 T473 C478 V489 P498 I502 V503 A504 L505 V506 G507 Q508 S509 G510 G511 F523 Y524 A528 L538 L541 L546 M566 E567 N568 I569 R570 F571 Y601 E607 R608 G609 R624 I627 P630 T631 V632 T639 E647 V650

Q651 D655 G660 R661 T662 V663 L664 A676 I679 V680 V681 M682 A683 D684 G685 L697 K698 LYS GLY GLY L702 Y703 A704 E705 D713 ALA ALA GLU ASN LEU TYR PHE GLN

4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	181.08Å 98.50Å 214.87Å 90.00° 90.50° 90.00°	Depositor
Resolution (Å)	72.61 – 3.40 72.60 – 3.40	Depositor EDS
% Data completeness (in resolution range)	61.9 (72.61-3.40) 60.6 (72.60-3.40)	Depositor EDS
R_{merge}	0.22	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.70 (at 3.41Å)	Xtriage
Refinement program	BUSTER 2.10.2	Depositor
R, R_{free}	0.231 , 0.251 0.249 , 0.264	Depositor DCC
R_{free} test set	3147 reflections (4.85%)	wwPDB-VP
Wilson B-factor (Å^2)	107.9	Xtriage
Anisotropy	0.150	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.27 , 98.9	EDS
L-test for twinning [2]	$< |L| > = 0.41, < L^2 > = 0.24$	Xtriage
Estimated twinning fraction	0.104 for h,-k,-l	Xtriage
F_o,F_c correlation	0.87	EDS
Total number of atoms	31278	wwPDB-VP
Average B, all atoms (Å^2)	137.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.58% 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: YCM, MG, Y01, ADP

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	0.40	0/3960	0.55	0/5387
1	C	0.40	0/3577	0.54	0/4893
1	D	0.40	0/3988	0.55	0/5443
2	B	0.39	0/4091	0.54	0/5565
3	E	0.41	0/3983	0.55	0/5429
4	F	0.40	0/4086	0.55	0/5561
4	G	0.40	0/3847	0.55	0/5243
5	H	0.40	0/3654	0.54	0/4986
All	All	0.40	0/31186	0.55	0/42507

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	3910	0	3649	23	0
1	C	3541	0	3039	9	0
1	D	3937	0	3601	15	0
2	B	4051	0	3806	19	0
3	E	3947	0	3630	18	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	F	4047	0	3827	27	0
4	G	3812	0	3478	17	0
5	H	3606	0	3072	16	0
6	A	27	0	12	1	0
6	B	27	0	12	0	0
6	C	27	0	12	0	0
6	D	27	0	12	1	0
6	E	27	0	12	1	0
6	F	27	0	12	1	0
6	G	27	0	12	0	0
6	H	27	0	12	0	0
7	A	1	0	0	0	0
7	B	1	0	0	0	0
7	C	1	0	0	0	0
7	D	1	0	0	0	0
7	E	1	0	0	0	0
7	F	1	0	0	0	0
7	G	1	0	0	0	0
7	H	1	0	0	0	0
8	A	30	0	36	1	0
8	B	35	0	49	1	0
8	D	26	0	32	1	0
8	E	28	0	32	1	0
8	F	35	0	49	1	0
8	G	21	0	28	1	0
8	H	28	0	32	1	0
All	All	31278	0	28456	131	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 2.

The worst 5 of 131 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:569:ILE:HG22	1:A:627:ILE:HD11	1.77	0.67
1:D:569:ILE:HG22	1:D:627:ILE:HD11	1.75	0.67
3:E:569:ILE:HG22	3:E:627:ILE:HD11	1.78	0.65
5:H:569:ILE:HG22	5:H:627:ILE:HD11	1.79	0.65
2:B:569:ILE:HG22	2:B:627:ILE:HD11	1.78	0.65

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	543/612 (89%)	525 (97%)	18 (3%)	0	100	100
1	C	526/612 (86%)	509 (97%)	17 (3%)	0	100	100
1	D	568/612 (93%)	550 (97%)	18 (3%)	0	100	100
2	B	567/612 (93%)	546 (96%)	21 (4%)	0	100	100
3	E	570/612 (93%)	549 (96%)	21 (4%)	0	100	100
4	F	567/612 (93%)	547 (96%)	20 (4%)	0	100	100
4	G	542/612 (89%)	524 (97%)	18 (3%)	0	100	100
5	H	538/612 (88%)	522 (97%)	16 (3%)	0	100	100
All	All	4421/4896 (90%)	4272 (97%)	149 (3%)	0	100	100

There are no Ramachandran outliers to report.

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	359/497 (72%)	351 (98%)	8 (2%)	52	75
1	C	271/497 (54%)	266 (98%)	5 (2%)	59	79
1	D	340/497 (68%)	331 (97%)	9 (3%)	46	72
2	B	368/496 (74%)	361 (98%)	7 (2%)	57	78
3	E	344/496 (69%)	338 (98%)	6 (2%)	60	80
4	F	375/496 (76%)	363 (97%)	12 (3%)	39	67

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
4	G	333/496 (67%)	329 (99%)	4 (1%)	71	85
5	H	280/498 (56%)	274 (98%)	6 (2%)	53	76
All	All	2670/3973 (67%)	2613 (98%)	57 (2%)	53	76

5 of 57 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	707	ILE
5	H	473	THR
4	F	156	LEU
5	H	437	ARG
4	G	473	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
3	E	387	ASN
3	E	422	GLN
4	F	162	ASN
4	F	205	GLN
4	G	238	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

11 non-standard protein/DNA/RNA residues are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#|Z| > 2	Counts	RMSZ	#|Z| > 2
1	YCM	A	483	1	7,9,10	0.40	0	4,10,12	0.26	0
4	YCM	F	478	4	7,9,10	0.51	0	4,10,12	0.26	0
2	YCM	B	461	2	7,9,10	0.42	0	4,10,12	0.54	0
2	YCM	B	483	2	7,9,10	0.38	0	4,10,12	0.29	0
4	YCM	G	478	4	7,9,10	0.43	0	4,10,12	0.38	0
3	YCM	E	483	3	7,9,10	0.40	0	4,10,12	0.24	0
1	YCM	D	483	1	7,9,10	0.40	0	4,10,12	0.35	0
3	YCM	E	366	3	7,9,10	0.41	0	4,10,12	0.23	0
4	YCM	F	483	4	7,9,10	0.38	0	4,10,12	0.46	0
1	YCM	C	483	1	7,9,10	0.40	0	4,10,12	0.26	0
4	YCM	G	483	4	7,9,10	0.40	0	4,10,12	0.25	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
1	YCM	A	483	1	-	1/6/8/10	-
4	YCM	F	478	4	-	1/6/8/10	-
2	YCM	B	461	2	-	3/6/8/10	-
2	YCM	B	483	2	-	1/6/8/10	-
4	YCM	G	478	4	-	0/6/8/10	-
3	YCM	E	483	3	-	1/6/8/10	-
1	YCM	D	483	1	-	1/6/8/10	-
3	YCM	E	366	3	-	1/6/8/10	-
4	YCM	F	483	4	-	3/6/8/10	-
1	YCM	C	483	1	-	1/6/8/10	-
4	YCM	G	483	4	-	1/6/8/10	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

5 of 14 torsion outliers are listed below:

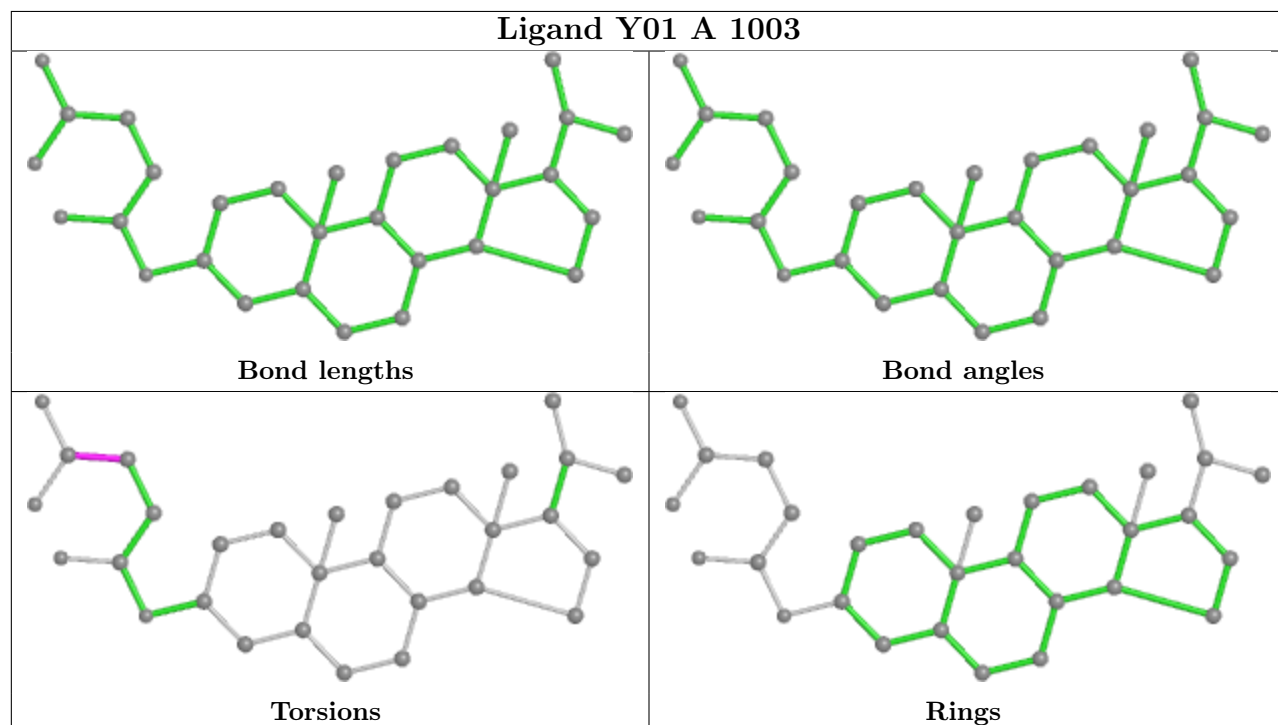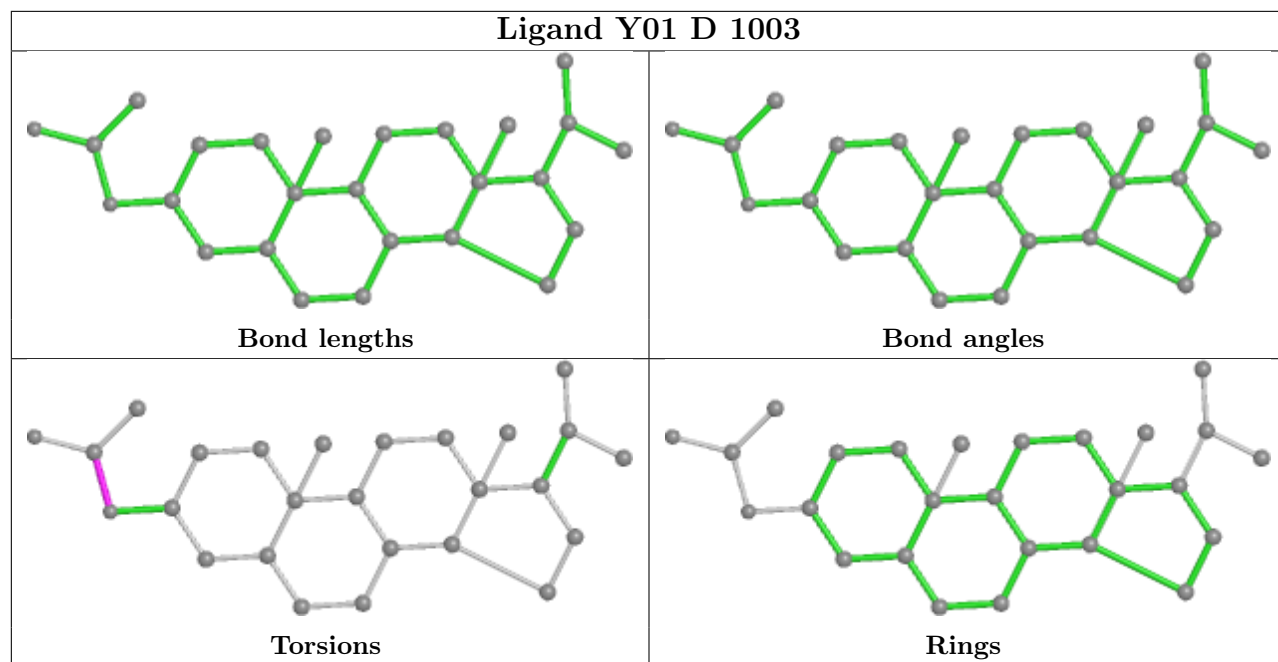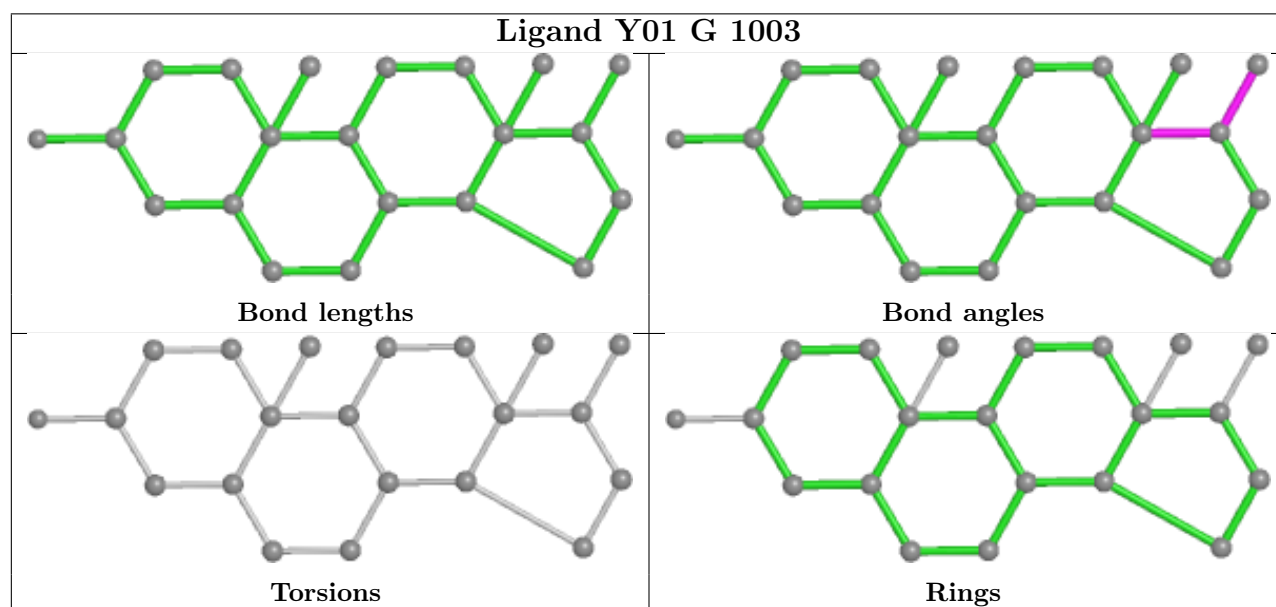| Mol	Chain	Res	Type	Atoms
1	A	483	YCM	SG-CD-CE-NZ2
2	B	461	YCM	SG-CD-CE-OZ1
2	B	461	YCM	SG-CD-CE-NZ2
2	B	483	YCM	SG-CD-CE-NZ2
1	C	483	YCM	SG-CD-CE-NZ2

There are no ring outliers.

4 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	F	478	YCM	1	0
4	G	478	YCM	1	0
1	D	483	YCM	1	0
4	F	483	YCM	1	0

5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 23 ligands modelled in this entry, 8 are monoatomic - leaving 15 for Mogul analysis.

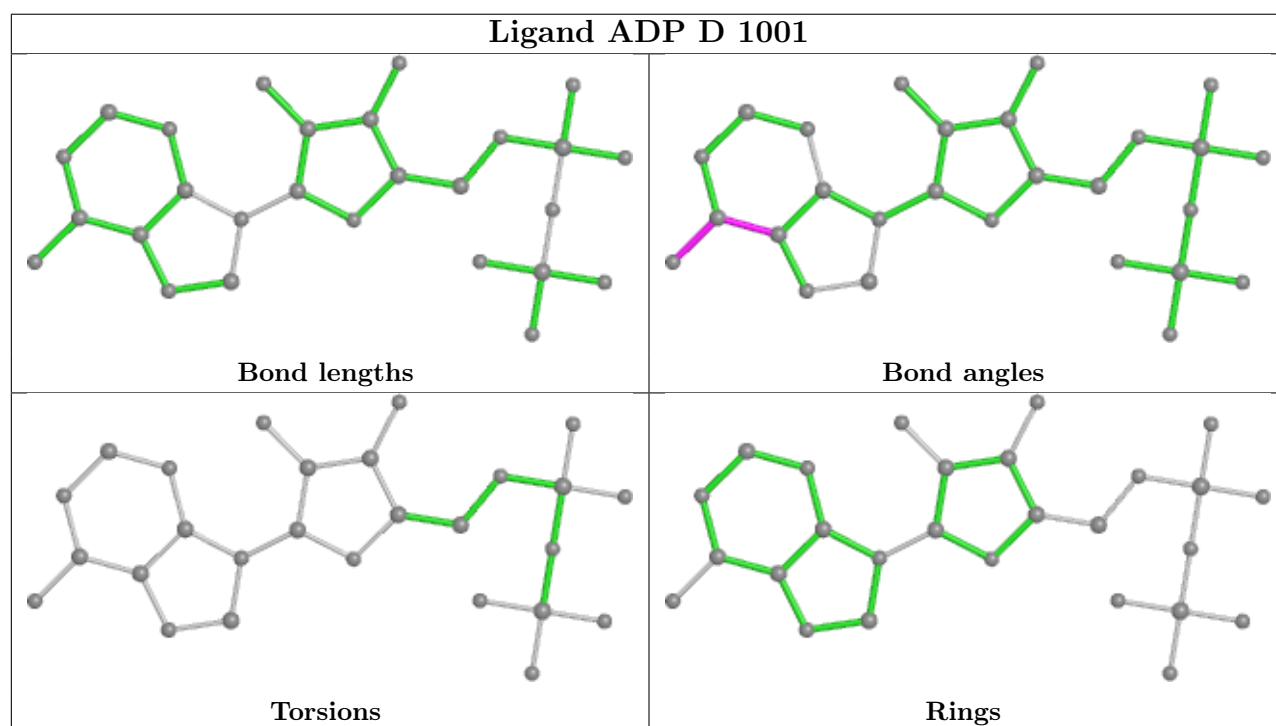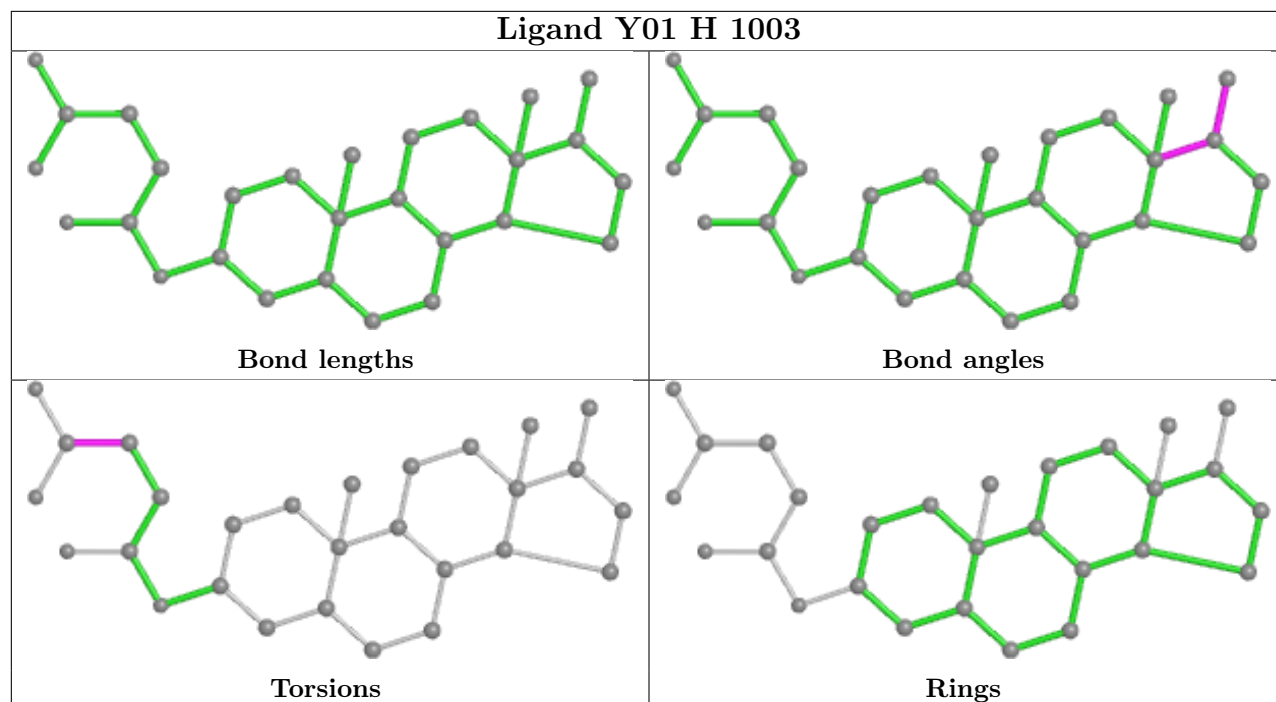In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#|Z| > 2$	Counts	RMSZ	$\#|Z| > 2$
6	ADP	E	1001	7	24,29,29	0.74	0	29,45,45	0.76	1 (3%)
8	Y01	D	1003	-	29,29,38	0.39	0	46,46,57	0.51	0
8	Y01	A	1003	-	33,33,38	0.35	0	51,51,57	0.47	0
8	Y01	B	1003	-	38,38,38	0.33	0	57,57,57	0.43	0
8	Y01	G	1003	-	24,24,38	0.46	0	37,39,57	0.64	1 (2%)
8	Y01	H	1003	-	31,31,38	0.36	0	46,48,57	0.55	1 (2%)
6	ADP	D	1001	7	24,29,29	0.57	0	29,45,45	0.71	1 (3%)
6	ADP	H	1001	7	24,29,29	0.61	0	29,45,45	0.65	1 (3%)
6	ADP	F	1001	7	24,29,29	0.72	0	29,45,45	0.79	1 (3%)
6	ADP	G	1001	7	24,29,29	0.55	0	29,45,45	0.67	1 (3%)
6	ADP	A	1001	7	24,29,29	0.59	0	29,45,45	0.67	1 (3%)
8	Y01	E	1003	-	31,31,38	0.37	0	46,48,57	0.51	1 (2%)
8	Y01	F	1003	-	38,38,38	0.32	0	57,57,57	0.43	0
6	ADP	B	1001	7	24,29,29	0.60	0	29,45,45	0.65	1 (3%)
6	ADP	C	1001	7	24,29,29	0.58	0	29,45,45	0.67	1 (3%)

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	E	1001	7	-	0/12/32/32	0/3/3/3
8	Y01	D	1003	-	-	1/8/66/77	0/4/4/4
8	Y01	A	1003	-	-	2/13/71/77	0/4/4/4
8	Y01	B	1003	-	-	7/19/77/77	0/4/4/4
8	Y01	G	1003	-	-	-	0/4/4/4
8	Y01	H	1003	-	-	2/9/67/77	0/4/4/4
6	ADP	D	1001	7	-	0/12/32/32	0/3/3/3
6	ADP	H	1001	7	-	0/12/32/32	0/3/3/3
6	ADP	F	1001	7	-	0/12/32/32	0/3/3/3
6	ADP	G	1001	7	-	0/12/32/32	0/3/3/3
6	ADP	A	1001	7	-	0/12/32/32	0/3/3/3
8	Y01	E	1003	-	-	2/9/67/77	0/4/4/4
8	Y01	F	1003	-	-	6/19/77/77	0/4/4/4
6	ADP	B	1001	7	-	0/12/32/32	0/3/3/3
6	ADP	C	1001	7	-	0/12/32/32	0/3/3/3

There are no bond length outliers.

The worst 5 of 11 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
6	D	1001	ADP	C5-C6-N6	2.44	124.07	120.35
8	H	1003	Y01	CBB-CBE-CBI	2.29	120.31	115.89
8	G	1003	Y01	CBB-CBE-CBI	2.28	120.28	115.89
6	C	1001	ADP	C5-C6-N6	2.27	123.80	120.35
6	A	1001	ADP	C5-C6-N6	2.27	123.80	120.35

There are no chirality outliers.

5 of 20 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
8	B	1003	Y01	CAJ-CAO-CBB-CBE
8	F	1003	Y01	CAJ-CAO-CBB-CBE
8	B	1003	Y01	CAJ-CAO-CBB-CAC
8	F	1003	Y01	CAJ-CAO-CBB-CAC
8	B	1003	Y01	CAJ-CAN-CBA-CAA

There are no ring outliers.

11 monomers are involved in 11 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	E	1001	ADP	1	0
8	D	1003	Y01	1	0
8	A	1003	Y01	1	0
8	B	1003	Y01	1	0
8	G	1003	Y01	1	0
8	H	1003	Y01	1	0
6	D	1001	ADP	1	0
6	F	1001	ADP	1	0
6	A	1001	ADP	1	0
8	E	1003	Y01	1	0
8	F	1003	Y01	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 E 1001

Bond lengths　　　　　Bond angles

Torsions　　　　　Rings

Ligand Y01 D 1003

Bond lengths

Bond angles

Torsions

Rings

Ligand Y01 A 1003

Bond lengths

Bond angles

Torsions

Rings

Ligand Y01 B 1003

Bond lengths

Bond angles

Torsions

Rings

Ligand Y01 G 1003

Bond lengths

Bond angles

Torsions

Rings

Ligand Y01 H 1003

Bond lengths

Bond angles

Torsions

Rings

Ligand ADP D 1001

Bond lengths

Bond angles

Torsions

Rings

Ligand ADP H 1001

Bond lengths

Bond angles

Torsions

Rings

Ligand ADP F 1001

Bond lengths

Bond angles

Torsions

Rings

Ligand ADP G 1001

Bond lengths

Bond angles

Torsions

Rings

Ligand ADP A 1001

Bond lengths

Bond angles

Torsions

Rings

Ligand Y01 E 1003

Bond lengths

Bond angles

Torsions

Rings

Ligand Y01 F 1003

Bond lengths

Bond angles

Torsions

Rings

Ligand ADP B 1001

Bond lengths

Bond angles

Torsions

Rings

Ligand ADP C 1001

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 ⓘ

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	551/612 (90%)	0.07	21 (3%)	40	39	63, 111, 196, 250	0
1	C	536/612 (87%)	0.30	62 (11%)	4	5	87, 172, 227, 255	0
1	D	572/612 (93%)	0.06	29 (5%)	28	28	57, 130, 213, 239	0
2	B	571/612 (93%)	0.18	19 (3%)	46	45	46, 102, 208, 253	0
3	E	574/612 (93%)	0.41	73 (12%)	3	4	76, 161, 214, 233	0
4	F	571/612 (93%)	-0.01	16 (2%)	53	51	62, 116, 183, 204	0
4	G	550/612 (89%)	0.05	19 (3%)	44	43	74, 134, 200, 244	0
5	H	548/612 (89%)	0.32	56 (10%)	6	8	85, 173, 234, 260	0
All	All	4473/4896 (91%)	0.17	295 (6%)	18	20	46, 137, 215, 260	0

The worst 5 of 295 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	189	THR	9.0
1	C	397	GLY	8.6
3	E	632	VAL	8.5
3	E	662	THR	8.5
3	E	700	GLY	8.4

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

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(Å²)	Q<0.9
1	YCM	C	483	10/11	0.85	0.17	169,172,178,178	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å²)	Q<0.9
4	YCM	G	483	10/11	0.87	0.26	105,113,114,114	0
3	YCM	E	483	10/11	0.88	0.15	159,162,171,171	0
1	YCM	A	483	10/11	0.88	0.30	116,122,125,126	0
4	YCM	G	478	10/11	0.90	0.25	93,100,118,119	0
4	YCM	F	478	10/11	0.91	0.18	93,102,124,124	0
2	YCM	B	461	10/11	0.92	0.18	95,104,116,116	0
1	YCM	D	483	10/11	0.92	0.21	95,99,104,106	0
2	YCM	B	483	10/11	0.93	0.19	83,85,91,93	0
3	YCM	E	366	10/11	0.94	0.17	101,111,126,129	0
4	YCM	F	483	10/11	0.97	0.17	96,99,105,107	0

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(Å²)	Q<0.9
8	Y01	G	1003	21/35	0.87	0.56	117,119,120,120	0
6	ADP	H	1001	27/27	0.88	0.24	195,196,201,201	0
8	Y01	B	1003	35/35	0.90	0.29	109,116,129,130	0
6	ADP	C	1001	27/27	0.91	0.17	151,160,165,166	0
8	Y01	D	1003	26/35	0.92	0.27	110,114,118,118	0
6	ADP	E	1001	27/27	0.92	0.26	144,153,160,160	0
7	MG	D	1002	1/1	0.93	0.26	48,48,48,48	0
6	ADP	D	1001	27/27	0.93	0.20	102,106,110,112	0
7	MG	H	1002	1/1	0.94	0.10	99,99,99,99	0
8	Y01	E	1003	28/35	0.94	0.34	102,106,116,117	0
6	ADP	G	1001	27/27	0.94	0.24	124,132,136,136	0
7	MG	C	1002	1/1	0.95	0.10	97,97,97,97	0
6	ADP	A	1001	27/27	0.95	0.21	94,105,114,114	0
6	ADP	F	1001	27/27	0.95	0.15	108,113,118,119	0
8	Y01	A	1003	30/35	0.95	0.27	96,101,115,116	0
8	Y01	F	1003	35/35	0.96	0.29	76,80,93,95	0
7	MG	G	1002	1/1	0.96	0.09	75,75,75,75	0
8	Y01	H	1003	28/35	0.96	0.23	96,100,110,112	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å²)	Q<0.9
6	ADP	B	1001	27/27	0.97	0.20	92,100,104,104	0
7	MG	B	1002	1/1	0.98	0.16	34,34,34,34	0
7	MG	E	1002	1/1	0.98	0.13	109,109,109,109	0
7	MG	F	1002	1/1	0.98	0.21	52,52,52,52	0
7	MG	A	1002	1/1	0.99	0.16	51,51,51,51	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 Y01 G 1003:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
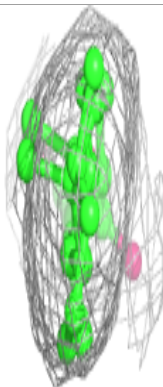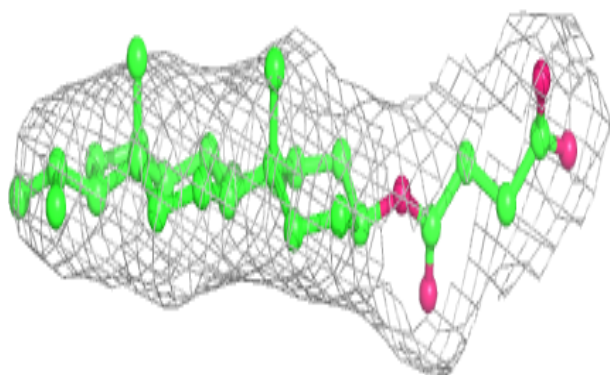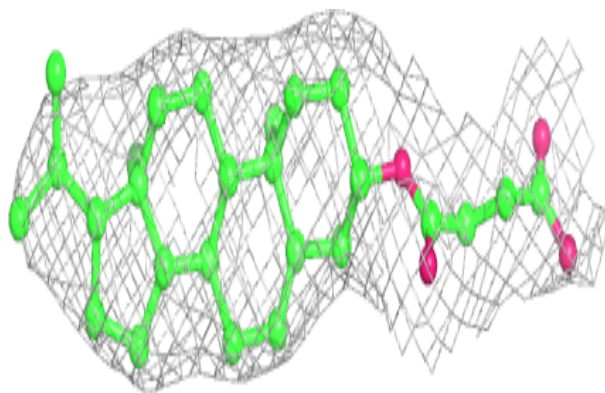and green (positive)
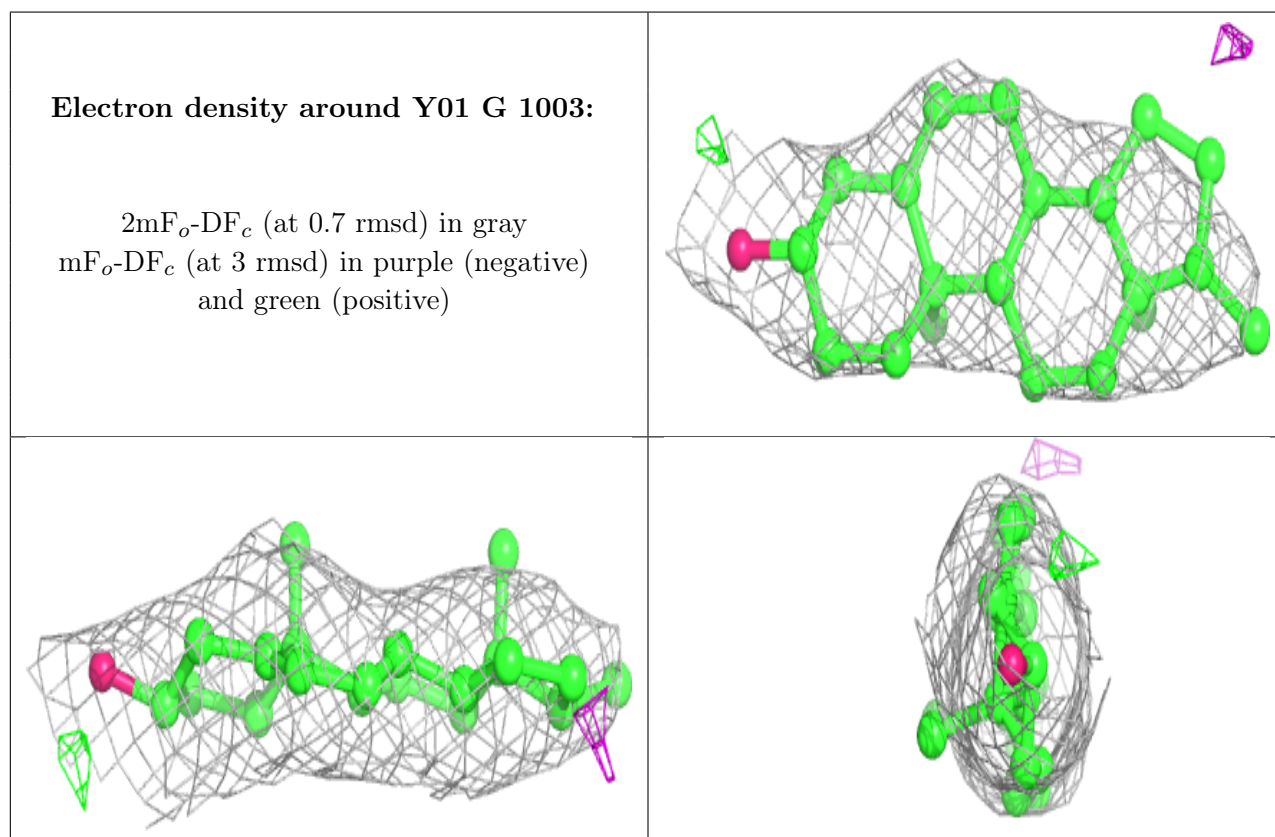
Electron density around ADP H 1001:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
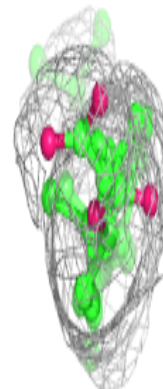mF_o-DF_c (at 3 rmsd) in purple (negative)
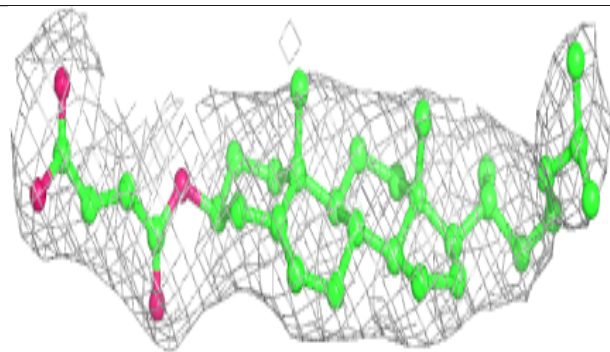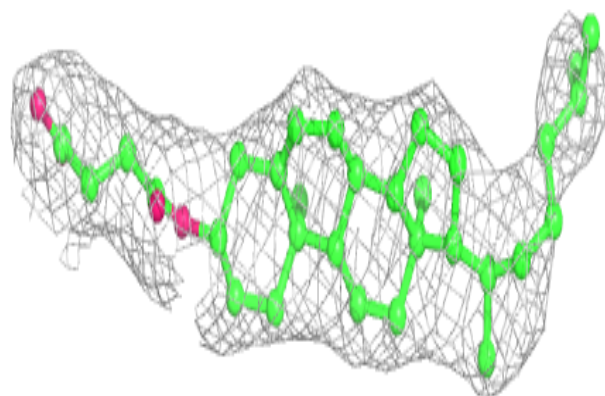and green (positive)
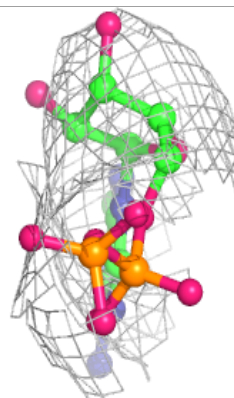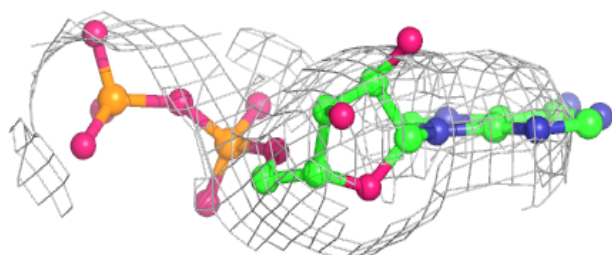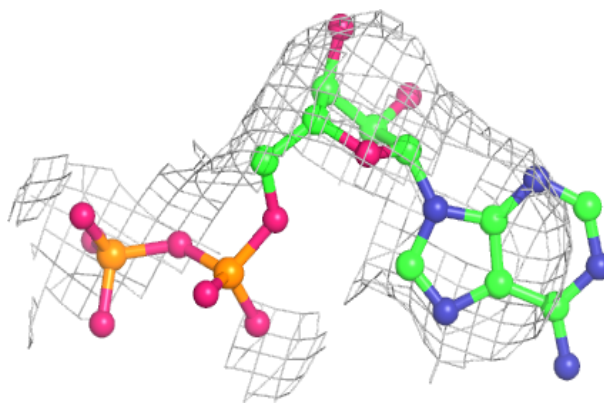
Electron density around Y01 B 1003:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
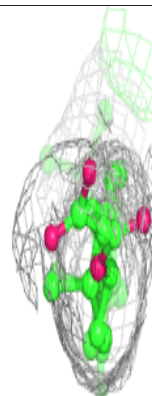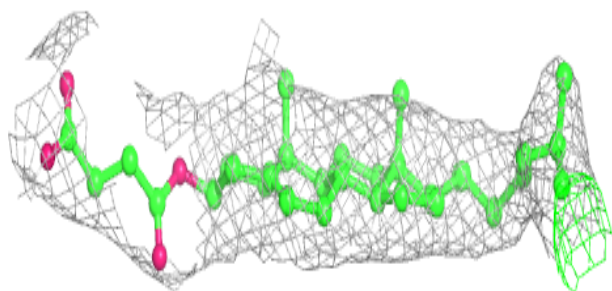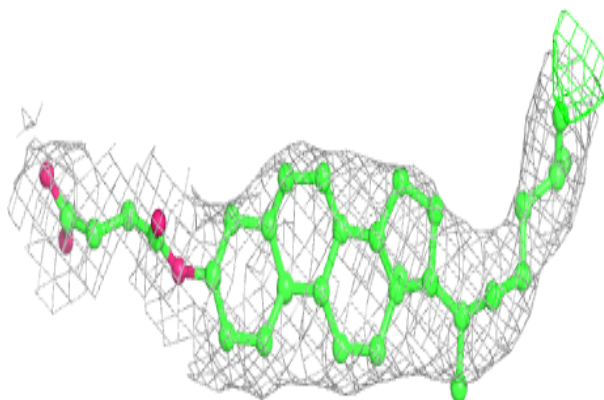
Electron density around ADP C 1001:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
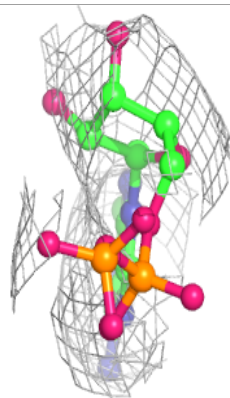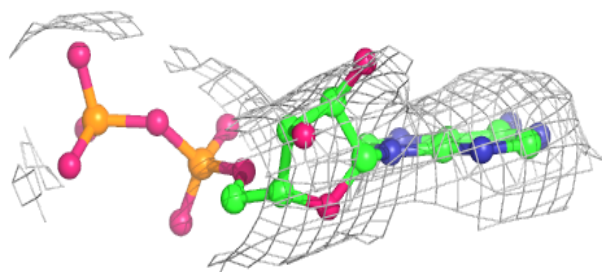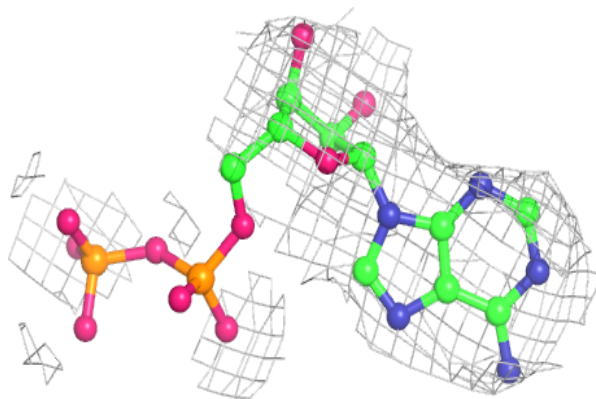
Electron density around Y01 D 1003:

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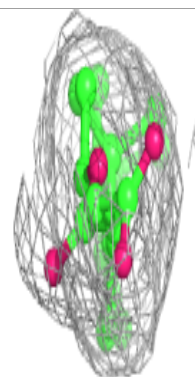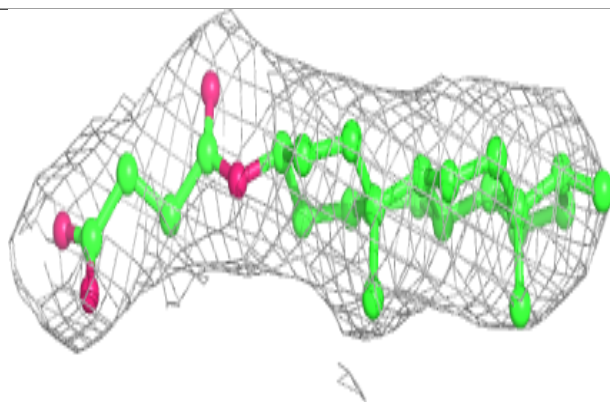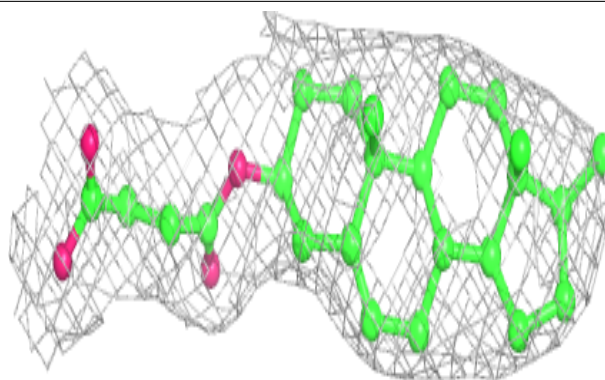and green (positive)

Electron density around ADP E 1001:

$2mF_o$-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 1001:

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

Electron density around Y01 E 1003:

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

Electron density around ADP G 1001:

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

Electron density around ADP A 1001:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
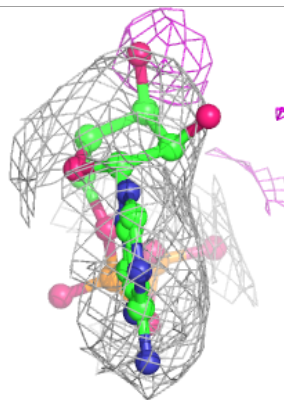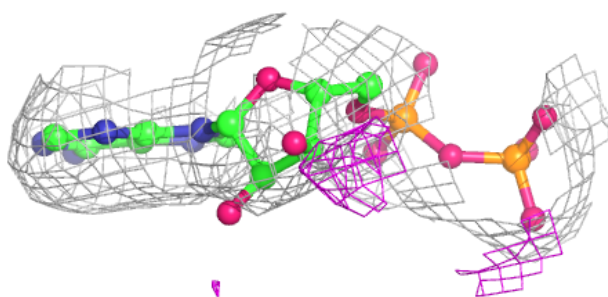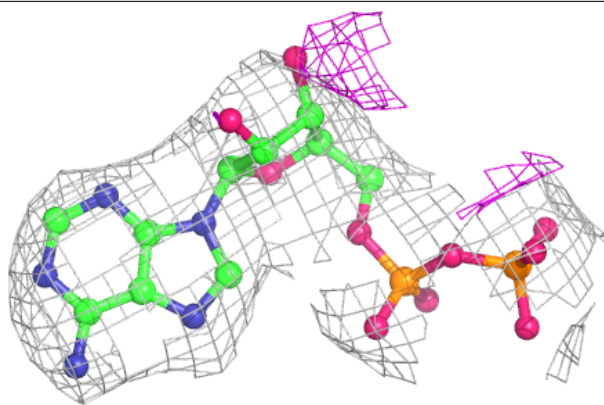
Electron density around ADP F 1001:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
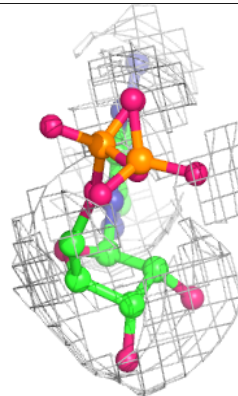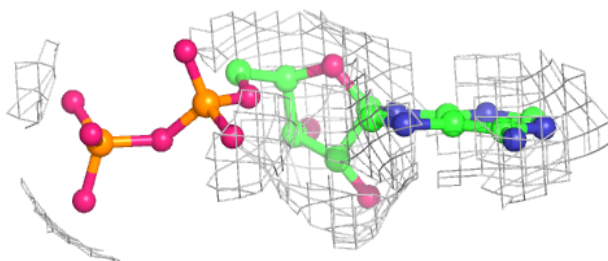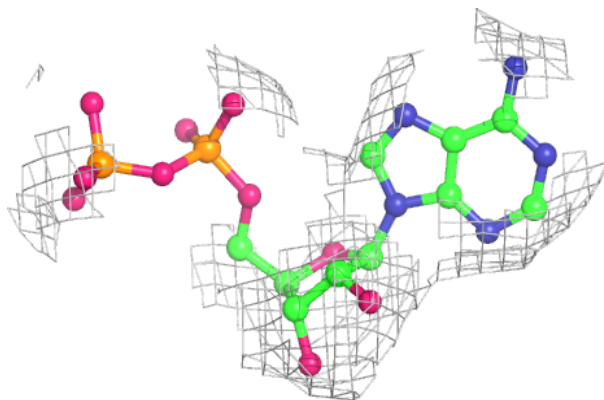
Electron density around Y01 A 1003:

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

Electron density around Y01 F 1003:

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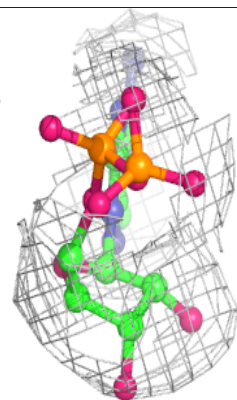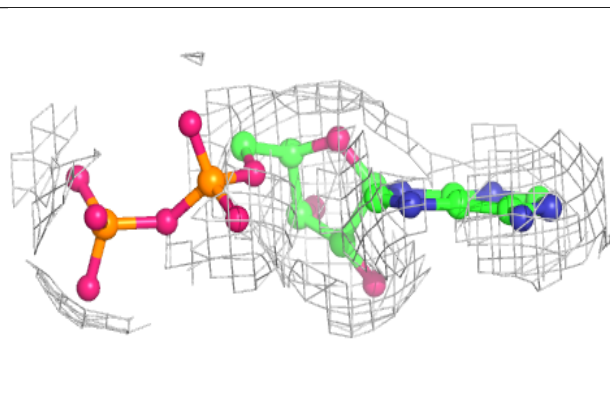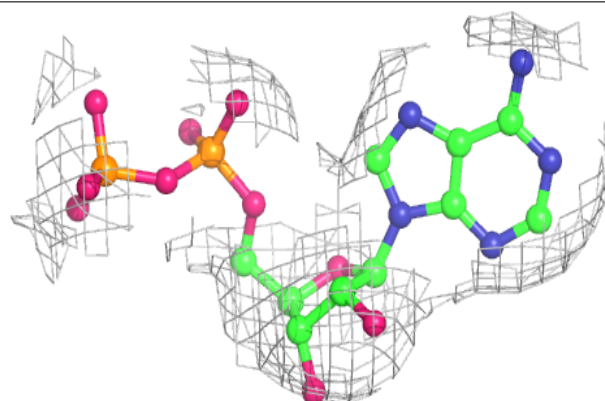mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

Electron density around Y01 H 1003:

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 B 1001:

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.