



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 16, 2026 – 10:30 AM UTC

PDB ID : 3ABS / pdb_00003abs
Title : Crystal structure of ethanolamine ammonia-lyase from Escherichia coli complexed with adeninylpentylcobalamin and ethanolamine
Authors : Shibata, N.
Deposited on : 2009-12-21
Resolution : 2.25 Å(reported)

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

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ 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 ⓘ](#)) were used in the production of this report:

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

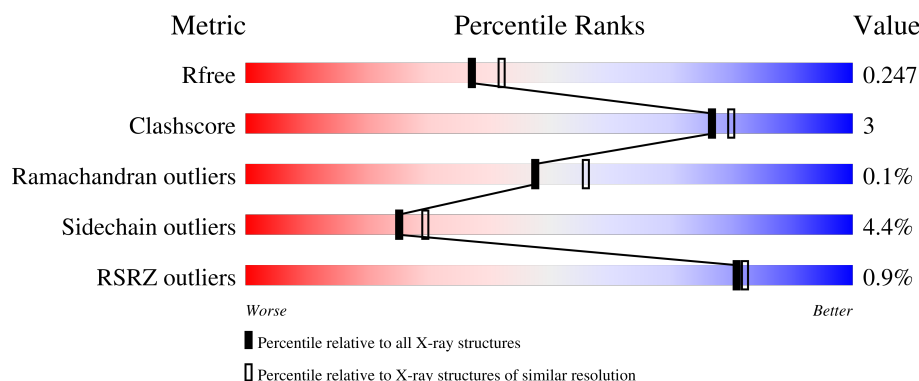
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

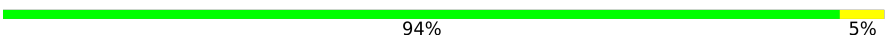
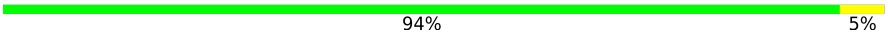
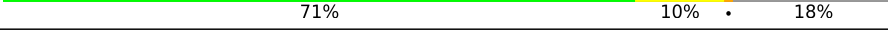
The reported resolution of this entry is 2.25 Å.

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}	180053	1898 (2.26-2.26)
Clashscore	190562	2005 (2.26-2.26)
Ramachandran outliers	187476	1965 (2.26-2.26)
Sidechain outliers	187428	1966 (2.26-2.26)
RSRZ outliers	180081	1898 (2.26-2.26)

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 $\leq 5\%$. 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	453	 94% 5%
1	C	453	 94% 5%
2	B	306	 71% 10% • 18%
2	D	306	 4% 71% 10% • 18%

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
3	COY	A	601	X	-	-	-
3	COY	C	601	X	-	-	-

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 11720 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 Ethanolamine ammonia-lyase heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	453	Total	C	N	O	S	0	1	0
			3467	2172	593	680	22			
1	C	453	Total	C	N	O	S	0	5	0
			3491	2189	597	683	22			

- Molecule 2 is a protein called Ethanolamine ammonia-lyase light chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	252	Total	C	N	O	S	3	2	0
			1925	1203	347	365	10			
2	D	252	Total	C	N	O	S	0	0	0
			1916	1197	347	362	10			

There are 22 discrepancies between the modelled and reference sequences:

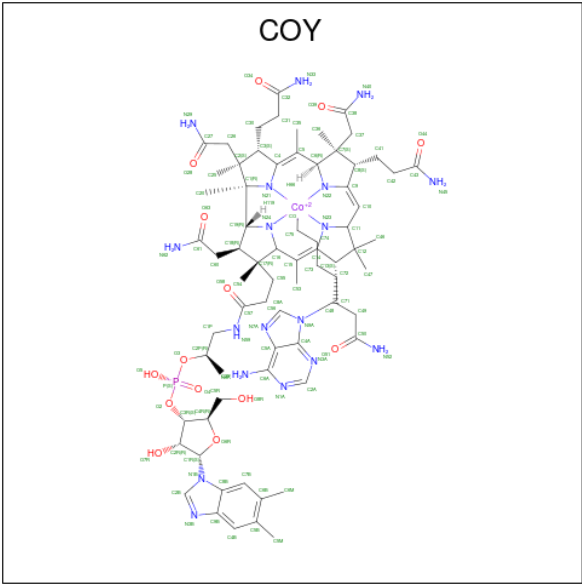
Chain	Residue	Modelled	Actual	Comment	Reference
B	-10	MET	-	expression tag	UNP P19636
B	-9	ASP	-	expression tag	UNP P19636
B	-8	GLN	-	expression tag	UNP P19636
B	-7	SER	-	expression tag	UNP P19636
B	-6	SER	-	expression tag	UNP P19636
B	-5	HIS	-	expression tag	UNP P19636
B	-4	HIS	-	expression tag	UNP P19636
B	-3	HIS	-	expression tag	UNP P19636
B	-2	HIS	-	expression tag	UNP P19636
B	-1	HIS	-	expression tag	UNP P19636
B	0	HIS	-	expression tag	UNP P19636
D	-10	MET	-	expression tag	UNP P19636
D	-9	ASP	-	expression tag	UNP P19636
D	-8	GLN	-	expression tag	UNP P19636
D	-7	SER	-	expression tag	UNP P19636
D	-6	SER	-	expression tag	UNP P19636

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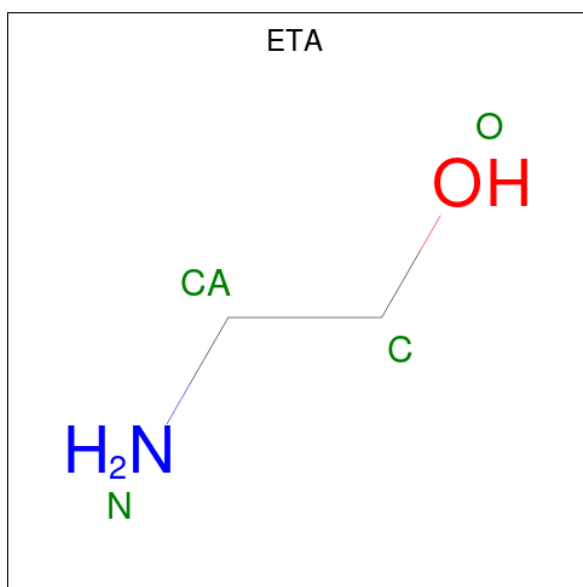
Chain	Residue	Modelled	Actual	Comment	Reference
D	-5	HIS	-	expression tag	UNP P19636
D	-4	HIS	-	expression tag	UNP P19636
D	-3	HIS	-	expression tag	UNP P19636
D	-2	HIS	-	expression tag	UNP P19636
D	-1	HIS	-	expression tag	UNP P19636
D	0	HIS	-	expression tag	UNP P19636

- Molecule 3 is CO-(ADENIN-9-YL-PENTYL)-COBALAMIN (CCD ID: COY) (formula: C₇₂H₁₀₆CoN₁₈O₁₄P).



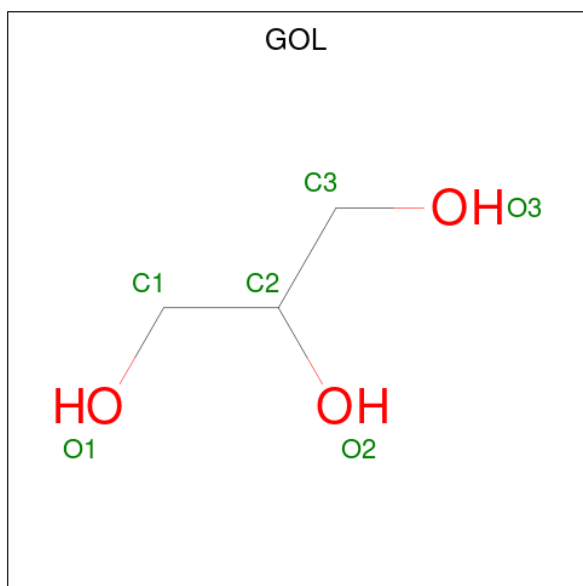
Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
3	A	1	Total 106	C 72	Co 1	N 18	O 14	P 1	0	0
3	C	1	Total 106	C 72	Co 1	N 18	O 14	P 1	0	0

- Molecule 4 is ETHANOLAMINE (CCD ID: ETA) (formula: C₂H₇NO).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	N	O	0	0
			4	2	1	1		
4	C	1	Total	C	N	O	0	0
			4	2	1	1		

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



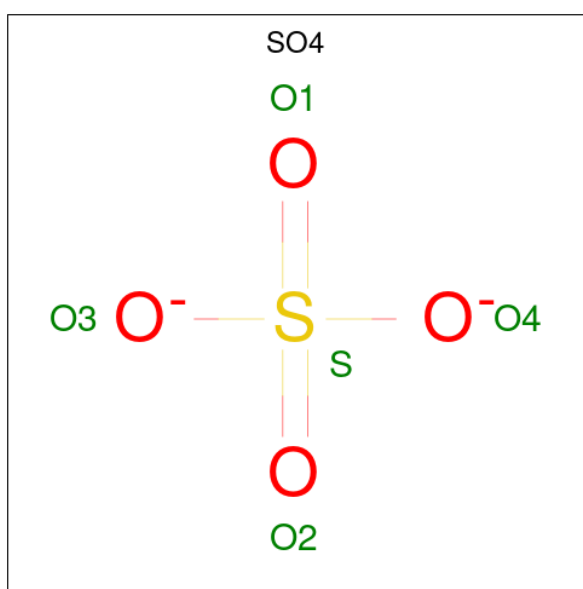
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	O	0	0
			6	3	3		
5	A	1	Total	C	O	0	0
			6	3	3		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	O	0	0
			6	3	3		
5	A	1	Total	C	O	0	0
			6	3	3		
5	C	1	Total	C	O	0	0
			6	3	3		
5	C	1	Total	C	O	0	0
			6	3	3		

- Molecule 6 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	C	1	Total	O	S	0	0
			5	4	1		

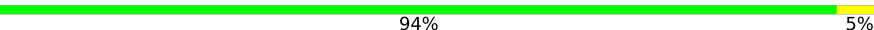
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	257	Total	O	0	0
			257	257		
7	B	77	Total	O	0	0
			77	77		
7	C	259	Total	O	0	0
			259	259		
7	D	67	Total	O	0	0
			67	67		

3 Residue-property plots [i](#)

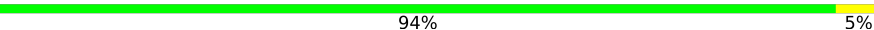
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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.

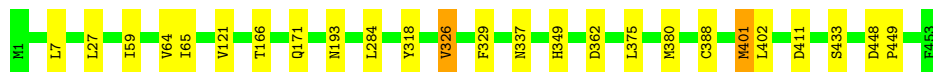
- Molecule 1: Ethanolamine ammonia-lyase heavy chain

Chain A: 



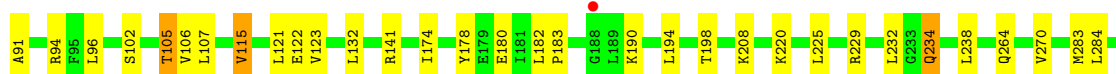
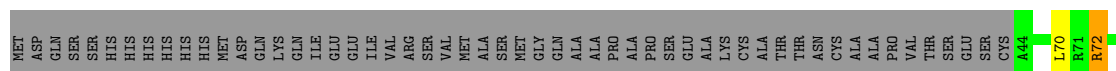
- Molecule 1: Ethanolamine ammonia-lyase heavy chain

Chain C: 



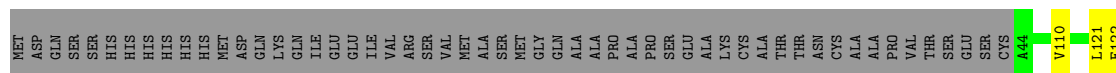
- Molecule 2: Ethanolamine ammonia-lyase light chain

Chain B: 



- Molecule 2: Ethanolamine ammonia-lyase light chain

Chain D: 





4 Data and refinement statistics

Property	Value	Source
Space group	P 63	Depositor
Cell constants a, b, c, α , β , γ	242.73Å 242.73Å 76.66Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	50.00 – 2.25 50.00 – 2.25	Depositor EDS
% Data completeness (in resolution range)	98.2 (50.00-2.25) 98.2 (50.00-2.25)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.53 (at 2.24Å)	Xtriage
Refinement program	REFMAC 5.5.0088	Depositor
R, R_{free}	0.214 , 0.244 0.232 , 0.247	Depositor DCC
R_{free} test set	6020 reflections (4.93%)	wwPDB-VP
Wilson B-factor (Å ²)	33.7	Xtriage
Anisotropy	0.405	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 30.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.39$, $\langle L^2 \rangle = 0.22$	Xtriage
Estimated twinning fraction	0.085 for h,-h-k,-l	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	11720	wwPDB-VP
Average B, all atoms (Å ²)	50.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.07% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ 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: ETA, GOL, COY, SO4

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	0.42	0/3524	0.81	4/4772 (0.1%)
1	C	0.41	0/3560	0.81	1/4821 (0.0%)
2	B	0.44	0/1958	0.80	1/2653 (0.0%)
2	D	0.46	0/1943	0.85	4/2633 (0.2%)
All	All	0.43	0/10985	0.81	10/14879 (0.1%)

There are no bond length outliers.

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	331	GLY	CA-C-N	7.13	126.83	119.56
1	A	331	GLY	C-N-CA	7.13	126.83	119.56
2	B	183	PRO	N-CA-C	5.72	117.68	110.70
1	A	327	VAL	N-CA-C	5.52	115.72	110.42
2	D	195	LYS	CA-C-N	5.48	131.57	121.70
2	D	195	LYS	C-N-CA	5.48	131.57	121.70
1	C	337	ASN	N-CA-C	5.05	114.96	108.34
2	D	268	PRO	CA-C-N	5.05	125.08	119.32
2	D	268	PRO	C-N-CA	5.05	125.08	119.32
1	A	337	ASN	N-CA-C	5.01	114.90	108.34

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen

atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3467	0	3424	12	0
1	C	3491	0	3460	9	0
2	B	1925	0	1984	13	0
2	D	1916	0	1973	13	0
3	A	106	0	100	9	0
3	C	106	0	100	11	0
4	A	4	0	0	0	0
4	C	4	0	0	0	0
5	A	24	0	32	1	0
5	C	12	0	16	0	0
6	C	5	0	0	0	0
7	A	257	0	0	0	0
7	B	77	0	0	0	0
7	C	259	0	0	0	0
7	D	67	0	0	0	0
All	All	11720	0	11089	63	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 3.

All (63) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:195:LYS:HA	2:D:196:VAL:HB	1.29	1.11
2:D:195:LYS:CA	2:D:196:VAL:HB	2.03	0.87
3:C:601:COY:H533	3:C:601:COY:H492	1.64	0.80
3:A:601:COY:H552	3:A:601:COY:H531	1.64	0.79
3:C:601:COY:H552	3:C:601:COY:H531	1.67	0.77
1:A:368:HIS:HB3	2:B:106:VAL:HG21	1.67	0.77
3:A:601:COY:H2B	3:A:601:COY:H482	1.72	0.72
2:D:195:LYS:HA	2:D:196:VAL:CB	2.14	0.71
3:A:601:COY:H362	3:A:601:COY:H351	1.79	0.62
3:A:601:COY:H492	3:A:601:COY:H533	1.82	0.62
2:B:180:GLU:HG2	2:B:270:VAL:HG23	1.85	0.58
2:B:72:ARG:CG	2:B:72:ARG:HH21	2.17	0.57
2:B:72:ARG:HH21	2:B:72:ARG:HG3	1.69	0.55
1:A:355:SER:HA	5:A:2005:GOL:H11	1.88	0.55
3:C:601:COY:H2B	3:C:601:COY:H482	1.91	0.52
1:A:232:ILE:HG23	1:A:271:VAL:HG21	1.92	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:326:VAL:HA	1:C:362:ASP:HB3	1.91	0.51
2:D:240:CYS:HB3	2:D:259:ILE:HG23	1.91	0.51
3:A:601:COY:H482	3:A:601:COY:C2B	2.41	0.50
1:C:380:MET:SD	1:C:411:ASP:HB3	2.52	0.50
3:C:601:COY:H362	3:C:601:COY:H351	1.94	0.50
1:A:326:VAL:HA	1:A:362:ASP:HB3	1.93	0.50
2:B:102:SER:O	2:B:105:THR:HG22	2.12	0.50
2:B:174:ILE:O	2:B:178:TYR:HB2	2.12	0.49
2:D:174:ILE:O	2:D:178:TYR:HB2	2.13	0.49
1:C:349:HIS:CE1	1:C:388:CYS:HA	2.48	0.48
2:D:214:GLY:HA3	2:D:246:PRO:HG2	1.96	0.47
2:B:115:VAL:HG11	2:B:122:GLU:OE2	2.14	0.47
1:A:308:GLU:O	1:A:311:ASN:HB2	2.14	0.47
2:B:225:LEU:HB3	2:B:238:LEU:HD21	1.96	0.47
2:B:141:ARG:HG2	2:B:208:LYS:HB2	1.96	0.46
1:A:396:LEU:HD21	2:B:91:ALA:HB1	1.98	0.46
3:C:601:COY:H601	3:C:601:COY:H262	1.97	0.46
2:B:283:MET:HE3	2:B:289:SER:HB3	1.97	0.46
2:B:72:ARG:CG	2:B:72:ARG:NH2	2.79	0.46
2:D:127:ILE:HG21	2:D:133:TYR:HB2	1.97	0.46
2:D:137:PRO:O	2:D:141:ARG:HG2	2.17	0.45
3:A:601:COY:H601	3:A:601:COY:H262	1.99	0.45
3:C:601:COY:H253	3:C:601:COY:H301	1.89	0.44
1:C:193:ASN:O	1:C:401:MET:HE1	2.18	0.44
2:D:225:LEU:HB3	2:D:238:LEU:HD21	2.00	0.44
3:C:601:COY:H541	3:C:601:COY:H602	1.69	0.44
2:D:140:GLY:HA3	2:D:206:ARG:HG3	2.00	0.43
1:A:193:ASN:O	1:A:401:MET:HE1	2.18	0.43
1:C:284:LEU:HD12	1:C:318:TYR:HB3	2.01	0.43
1:A:187:ASP:HB3	1:A:427:PHE:CG	2.54	0.43
2:D:122:GLU:HG3	2:D:201:PHE:HD1	1.84	0.43
1:A:326:VAL:HG12	1:A:329:PHE:HB2	2.01	0.43
1:A:258:PHE:CD1	3:A:601:COY:H411	2.55	0.42
3:C:601:COY:H1P2	2:D:228:GLU:HA	2.00	0.42
1:A:206:LEU:HB3	1:A:240:PRO:HG2	2.02	0.42
1:C:59:ILE:HB	1:C:121:VAL:HG22	2.02	0.42
1:C:64:VAL:HG23	1:C:65:ILE:HG13	2.02	0.42
3:C:601:COY:HM53	3:C:601:COY:HM61	1.88	0.41
3:C:601:COY:H261	3:C:601:COY:H119	1.83	0.41
1:C:329:PHE:HZ	1:C:402:LEU:HD22	1.84	0.41
1:A:380:MET:SD	1:A:411:ASP:HB3	2.61	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:448:ASP:HA	1:C:449:PRO:HD2	1.97	0.41
3:A:601:COY:H253	3:A:601:COY:H301	1.70	0.40
2:B:234:GLN:HE21	2:B:234:GLN:HB3	1.64	0.40
3:A:601:COY:H531	3:A:601:COY:C55	2.42	0.40
3:C:601:COY:H552	3:C:601:COY:C53	2.45	0.40
2:D:161:VAL:HG21	2:D:189:LEU:HD22	2.04	0.40

There are no symmetry-related clashes.

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	452/453 (100%)	438 (97%)	14 (3%)	0	100	100
1	C	456/453 (101%)	440 (96%)	16 (4%)	0	100	100
2	B	252/306 (82%)	245 (97%)	7 (3%)	0	100	100
2	D	250/306 (82%)	240 (96%)	8 (3%)	2 (1%)	16	14
All	All	1410/1518 (93%)	1363 (97%)	45 (3%)	2 (0%)	48	56

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	D	196	VAL
2	D	192	ALA

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	371/370 (100%)	365 (98%)	6 (2%)	55	66
1	C	375/370 (101%)	367 (98%)	8 (2%)	47	58
2	B	208/251 (83%)	187 (90%)	21 (10%)	7	5
2	D	206/251 (82%)	190 (92%)	16 (8%)	11	10
All	All	1160/1242 (93%)	1109 (96%)	51 (4%)	25	29

All (51) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	75	LEU
1	A	217	ASN
1	A	262	LEU
1	A	281	GLU
1	A	396	LEU
1	A	401	MET
2	B	70	LEU
2	B	72	ARG
2	B	94	ARG
2	B	96	LEU
2	B	105	THR
2	B	107	LEU
2	B	115	VAL
2	B	121	LEU
2	B	123	VAL
2	B	132	LEU
2	B	182	LEU
2	B	190	LYS
2	B	194	LEU
2	B	198	THR
2	B	220	LYS
2	B	229	ARG
2	B	232	LEU
2	B	234	GLN
2	B	264	GLN
2	B	284	LEU
2	B	287	LYS
1	C	7	LEU
1	C	27	LEU
1	C	166	THR

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Mol	Chain	Res	Type
1	C	171	GLN
1	C	326	VAL
1	C	375	LEU
1	C	401	MET
1	C	433	SER
2	D	110	VAL
2	D	121	LEU
2	D	123	VAL
2	D	141	ARG
2	D	161	VAL
2	D	181	ILE
2	D	182	LEU
2	D	191	GLN
2	D	196	VAL
2	D	229	ARG
2	D	243	VAL
2	D	251	THR
2	D	259	ILE
2	D	267	THR
2	D	275	VAL
2	D	283	MET

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (15) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	367	ASN
1	A	405	GLN
2	B	99	HIS
2	B	118	GLN
2	B	131	ASN
2	B	158	ASN
2	B	234	GLN
2	B	261	ASN
1	C	10	ASN
1	C	86	ASN
1	C	349	HIS
2	D	118	GLN
2	D	131	ASN
2	D	191	GLN
2	D	261	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 oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

11 ligands 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	$\# Z > 2$
5	GOL	A	2001	-	5,5,5	0.41	0	5,5,5	0.29	0
5	GOL	C	2006	-	5,5,5	0.38	0	5,5,5	0.28	0
5	GOL	A	2004	-	5,5,5	0.38	0	5,5,5	0.24	0
3	COY	A	601	-	102,118,118	2.05	11 (10%)	137,192,192	1.68	23 (16%)
4	ETA	C	602	-	3,3,3	0.82	0	2,2,2	0.71	0
5	GOL	C	2003	-	5,5,5	0.42	0	5,5,5	0.21	0
4	ETA	A	602	-	3,3,3	0.83	0	2,2,2	0.55	0
3	COY	C	601	-	102,118,118	2.04	12 (11%)	137,192,192	1.68	22 (16%)
5	GOL	A	2002	-	5,5,5	0.38	0	5,5,5	0.47	0
6	SO4	C	2000	-	4,4,4	0.26	0	6,6,6	0.12	0
5	GOL	A	2005	-	5,5,5	0.36	0	5,5,5	0.43	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
5	GOL	A	2001	-	-	0/4/4/4	-
5	GOL	C	2006	-	-	2/4/4/4	-
5	GOL	A	2004	-	-	0/4/4/4	-
3	COY	A	601	-	6/6/36/38	22/61/241/241	0/5/13/13
4	ETA	C	602	-	-	0/1/1/1	-
5	GOL	C	2003	-	-	1/4/4/4	-
4	ETA	A	602	-	-	0/1/1/1	-
3	COY	C	601	-	6/6/36/38	23/61/241/241	0/5/13/13
5	GOL	A	2002	-	-	4/4/4/4	-
5	GOL	A	2005	-	-	0/4/4/4	-

All (23) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	601	COY	C6-C5	-14.27	1.35	1.51
3	C	601	COY	C6-C5	-14.26	1.35	1.51
3	A	601	COY	C11-C10	-7.45	1.33	1.50
3	C	601	COY	C11-C10	-7.40	1.33	1.50
3	C	601	COY	CO-N24	-6.60	1.83	2.10
3	A	601	COY	CO-N24	-6.52	1.83	2.10
3	A	601	COY	CO-N23	-5.40	1.83	1.95
3	C	601	COY	CO-N23	-5.38	1.83	1.95
3	A	601	COY	CO-N22	-4.77	1.84	1.95
3	C	601	COY	CO-N22	-4.64	1.85	1.95
3	A	601	COY	C9B-N3B	-3.43	1.33	1.39
3	C	601	COY	C9B-N3B	-3.18	1.33	1.39
3	A	601	COY	C4A-N9A	-2.65	1.34	1.37
3	C	601	COY	C4A-N9A	-2.58	1.34	1.37
3	A	601	COY	C2B-N1B	-2.38	1.33	1.37
3	C	601	COY	C8A-N7A	2.16	1.35	1.31
3	C	601	COY	C2B-N1B	-2.15	1.33	1.37
3	A	601	COY	C8A-N7A	2.11	1.35	1.31
3	A	601	COY	C5A-N7A	-2.11	1.35	1.39
3	C	601	COY	C5A-N7A	-2.11	1.35	1.39
3	A	601	COY	C7-C8	-2.08	1.52	1.56
3	C	601	COY	C8B-N1B	-2.06	1.35	1.39
3	C	601	COY	C7-C8	-2.04	1.52	1.56

All (45) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	601	COY	C9B-C8B-N1B	5.90	107.92	105.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	601	COY	C9B-C8B-N1B	5.79	107.87	105.30
3	C	601	COY	C9B-N3B-C2B	5.40	111.03	104.40
3	C	601	COY	C5A-C4A-N3A	-5.35	119.35	126.72
3	A	601	COY	C9B-N3B-C2B	5.34	110.96	104.40
3	A	601	COY	C5A-C4A-N3A	-5.27	119.46	126.72
3	A	601	COY	N9A-C8A-N7A	-5.15	109.40	114.16
3	C	601	COY	N9A-C8A-N7A	-4.90	109.63	114.16
3	C	601	COY	N1A-C2A-N3A	-4.79	121.33	128.58
3	A	601	COY	N1A-C2A-N3A	-4.75	121.39	128.58
3	C	601	COY	C8B-C9B-N3B	-4.73	104.88	110.00
3	A	601	COY	N3A-C4A-N9A	4.67	132.65	126.87
3	A	601	COY	C8B-C9B-N3B	-4.64	104.98	110.00
3	C	601	COY	N3A-C4A-N9A	4.49	132.42	126.87
3	C	601	COY	N1B-C2B-N3B	-4.05	108.19	113.94
3	C	601	COY	C2P-C1P-N59	-3.86	107.25	112.92
3	A	601	COY	N1B-C2B-N3B	-3.83	108.50	113.94
3	A	601	COY	C1-C19-N24	-3.74	104.47	109.15
3	C	601	COY	C2A-N3A-C4A	3.48	120.33	111.83
3	C	601	COY	C1-C19-N24	-3.46	104.81	109.15
3	A	601	COY	C2A-N3A-C4A	3.40	120.14	111.83
3	A	601	COY	C7B-C8B-C9B	-3.08	118.78	122.47
3	C	601	COY	C4A-C5A-N7A	-3.01	107.14	110.58
3	A	601	COY	C4A-N9A-C8A	2.89	107.82	105.75
3	A	601	COY	C2P-C1P-N59	-2.89	108.68	112.92
3	C	601	COY	C7B-C8B-C9B	-2.68	119.27	122.47
3	A	601	COY	C4A-C5A-N7A	-2.67	107.53	110.58
3	C	601	COY	C5A-N7A-C8A	2.56	107.48	103.45
3	A	601	COY	C5A-N7A-C8A	2.49	107.36	103.45
3	C	601	COY	C4A-N9A-C8A	2.48	107.53	105.75
3	A	601	COY	C30-C3-C2	-2.41	113.67	119.00
3	C	601	COY	C4B-C9B-N3B	2.35	134.47	130.51
3	C	601	COY	C11-N23-C14	-2.33	108.10	111.89
3	A	601	COY	C11-N23-C14	-2.27	108.19	111.89
3	C	601	COY	C5A-C4A-N9A	2.20	108.23	105.98
3	A	601	COY	C4B-C9B-N3B	2.18	134.18	130.51
3	A	601	COY	C30-C3-C4	2.12	113.77	108.51
3	C	601	COY	C30-C3-C4	2.11	113.76	108.51
3	A	601	COY	C54-C17-C18	-2.05	107.95	111.68
3	C	601	COY	C1P-N59-C57	2.05	127.09	122.69
3	A	601	COY	C1P-N59-C57	2.04	127.08	122.69
3	C	601	COY	C54-C17-C18	-2.03	108.00	111.68
3	A	601	COY	C20-C1-N21	2.01	114.70	109.23

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	601	COY	C2R-C1R-N1B	2.00	118.28	113.30
3	C	601	COY	C48-C13-C14	2.00	113.49	108.51

All (12) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
3	A	601	COY	C16
3	A	601	COY	N22
3	A	601	COY	C11
3	A	601	COY	C6
3	A	601	COY	N21
3	A	601	COY	N23
3	C	601	COY	C16
3	C	601	COY	N22
3	C	601	COY	C11
3	C	601	COY	C6
3	C	601	COY	N21
3	C	601	COY	N23

All (52) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	601	COY	C38-C37-C7-C6
3	A	601	COY	C38-C37-C7-C36
3	A	601	COY	C38-C37-C7-C8
3	A	601	COY	C42-C41-C8-C9
3	A	601	COY	C14-C13-C48-C49
3	A	601	COY	C1P-C2P-O3-P
3	A	601	COY	C3P-C2P-O3-P
3	A	601	COY	C2P-O3-P-O5
3	A	601	COY	C2P-O3-P-O2
3	C	601	COY	C38-C37-C7-C6
3	C	601	COY	C38-C37-C7-C36
3	C	601	COY	C38-C37-C7-C8
3	C	601	COY	C42-C41-C8-C9
3	C	601	COY	C1P-C2P-O3-P
3	C	601	COY	C3P-C2P-O3-P
3	C	601	COY	C2P-O3-P-O5
3	C	601	COY	C2P-O3-P-O2
3	C	601	COY	C2R-C1R-N1B-C8B
3	C	601	COY	O6R-C1R-N1B-C8B
5	A	2002	GOL	O1-C1-C2-O2

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Mol	Chain	Res	Type	Atoms
5	A	2002	GOL	O1-C1-C2-C3
5	A	2002	GOL	C1-C2-C3-O3
5	C	2006	GOL	O1-C1-C2-C3
3	C	601	COY	O6R-C4R-C5R-O8R
3	A	601	COY	C13-C48-C49-C50
3	C	601	COY	C3R-C4R-C5R-O8R
3	A	601	COY	C4-C3-C30-C31
3	C	601	COY	C13-C48-C49-C50
3	A	601	COY	C12-C13-C48-C49
5	C	2003	GOL	C1-C2-C3-O3
3	A	601	COY	C2R-C1R-N1B-C8B
3	A	601	COY	O6R-C1R-N1B-C8B
5	C	2006	GOL	O1-C1-C2-O2
3	A	601	COY	C2-C3-C30-C31
3	C	601	COY	C4-C3-C30-C31
5	A	2002	GOL	O2-C2-C3-O3
3	C	601	COY	C2-C3-C30-C31
3	A	601	COY	C72-C71-N9A-C4A
3	C	601	COY	C72-C71-N9A-C4A
3	A	601	COY	C2P-O3-P-O4
3	A	601	COY	C72-C73-C74-C75
3	A	601	COY	C72-C71-N9A-C8A
3	C	601	COY	C14-C13-C48-C49
3	A	601	COY	C48-C49-C50-N52
3	C	601	COY	C48-C49-C50-N52
3	C	601	COY	C17-C18-C60-C61
3	C	601	COY	C19-C18-C60-C61
3	C	601	COY	C2P-O3-P-O4
3	C	601	COY	C72-C71-N9A-C8A
3	A	601	COY	C48-C49-C50-O51
3	C	601	COY	C48-C49-C50-O51
3	A	601	COY	C18-C60-C61-O63

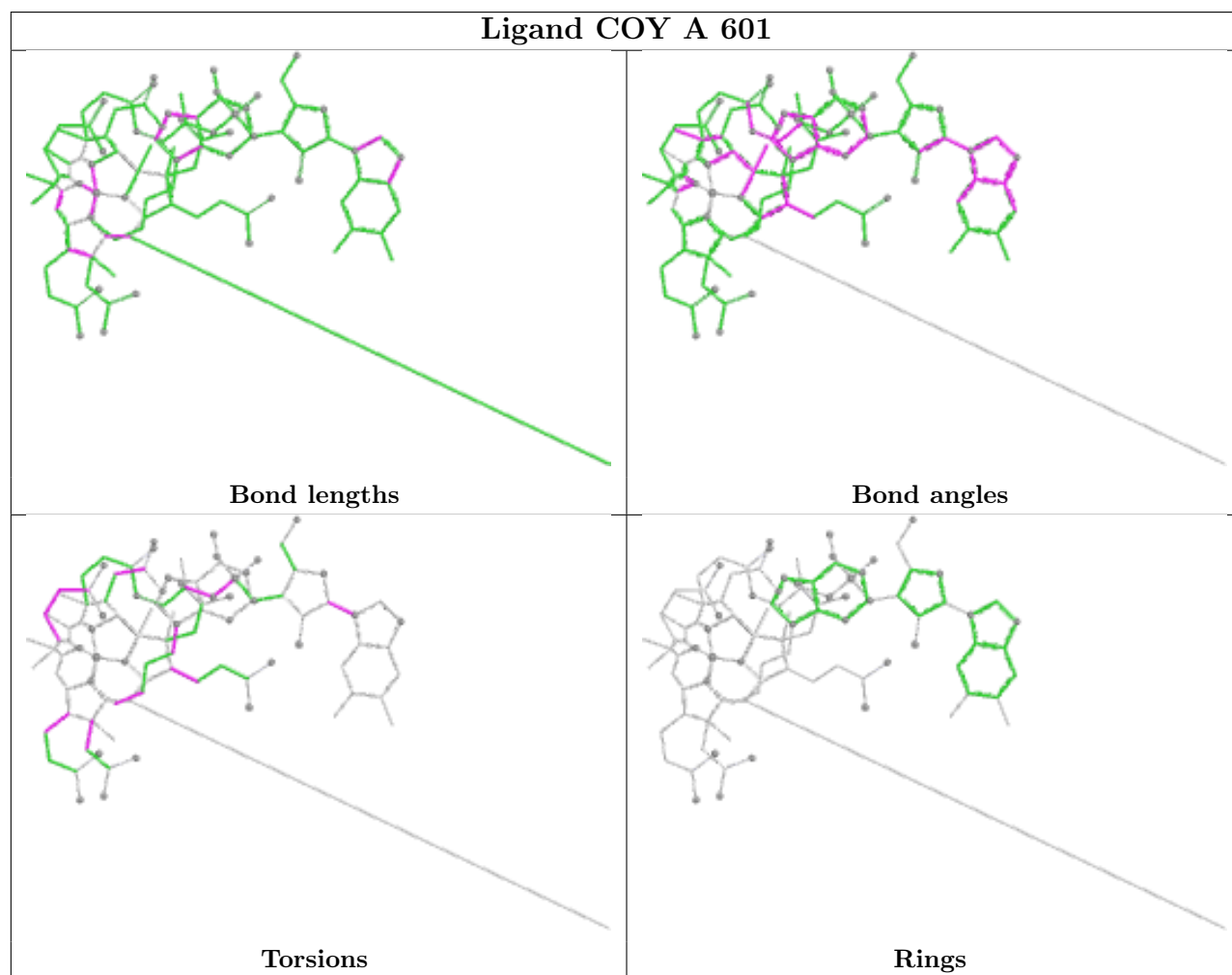
There are no ring outliers.

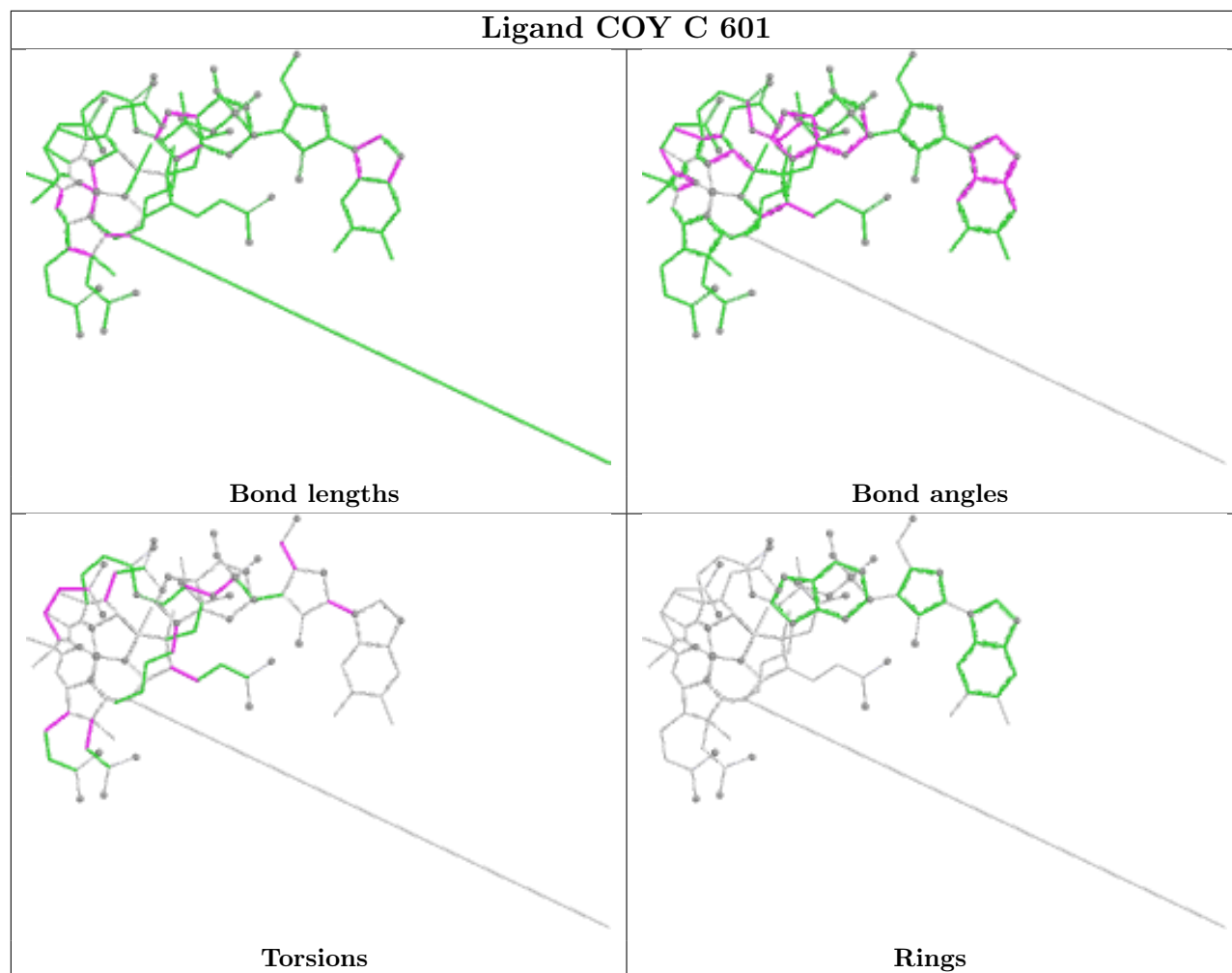
3 monomers are involved in 21 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	601	COY	9	0
3	C	601	COY	11	0
5	A	2005	GOL	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 than 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.





5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data [i](#)

6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	453/453 (100%)	-1.12	0 100 100	24, 37, 56, 75	1 (0%)
1	C	453/453 (100%)	-1.08	0 100 100	16, 38, 61, 82	5 (1%)
2	B	252/306 (82%)	-0.30	1 (0%) 88 89	31, 66, 88, 115	2 (0%)
2	D	252/306 (82%)	0.10	11 (4%) 39 38	24, 77, 115, 128	0
All	All	1410/1518 (92%)	-0.74	12 (0%) 81 82	16, 45, 96, 128	8 (0%)

All (12) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	D	153	ALA	3.3
2	D	147	ALA	3.2
2	D	192	ALA	3.2
2	D	197	GLY	2.7
2	D	143	LEU	2.5
2	D	198	THR	2.4
2	D	217	LEU	2.4
2	D	161	VAL	2.3
2	B	188	GLY	2.2
2	D	145	ALA	2.2
2	D	216	ILE	2.1
2	D	157	ALA	2.1

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

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

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands

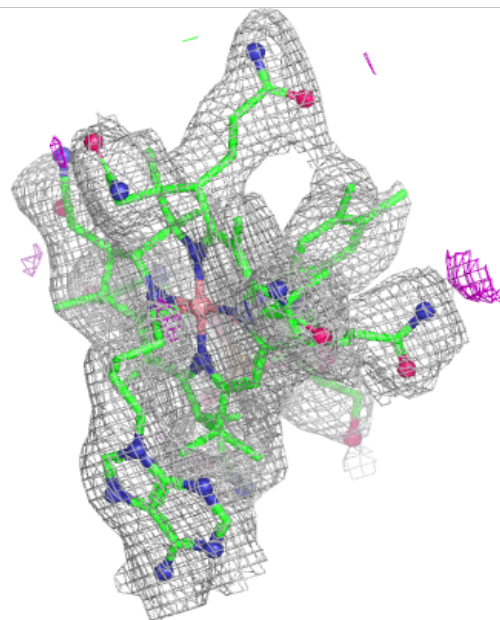
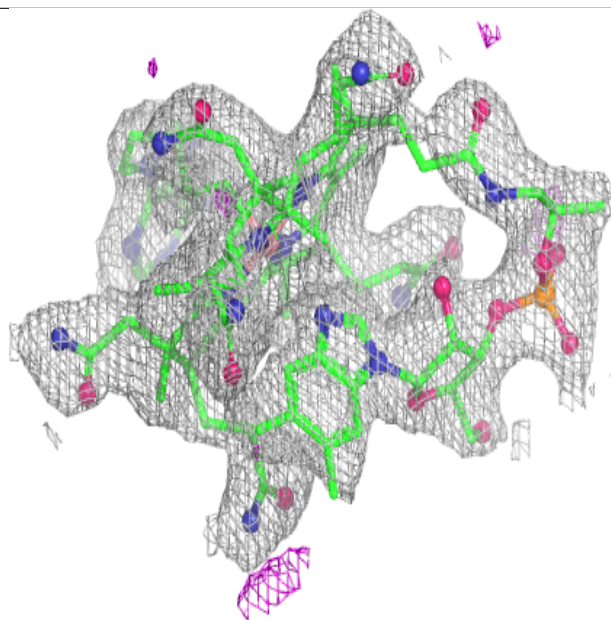
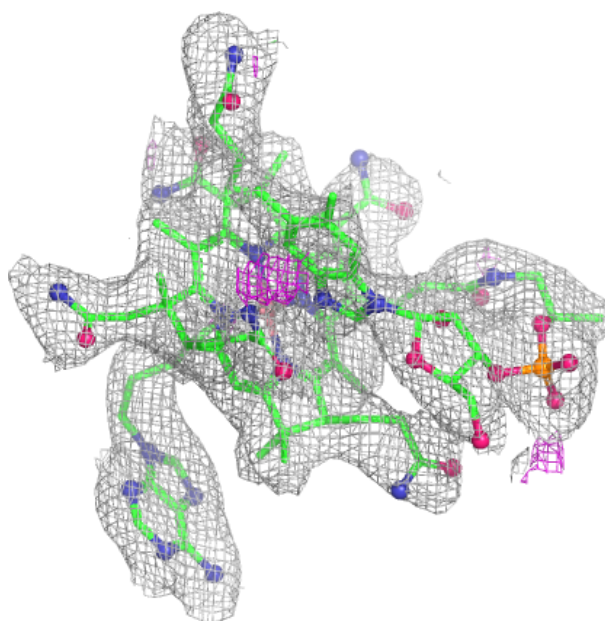
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
5	GOL	C	2006	6/6	0.97	0.09	59,69,72,74	0
4	ETA	A	602	4/4	0.99	0.04	32,33,35,35	0
4	ETA	C	602	4/4	0.99	0.05	35,35,35,37	0
5	GOL	A	2001	6/6	0.99	0.05	29,47,50,55	0
5	GOL	A	2002	6/6	0.99	0.07	43,46,48,50	0
5	GOL	A	2004	6/6	0.99	0.07	42,58,62,62	0
5	GOL	A	2005	6/6	0.99	0.08	42,45,48,55	0
5	GOL	C	2003	6/6	0.99	0.06	46,60,66,76	0
3	COY	C	601	106/106	0.99	0.04	23,44,62,75	0
6	SO4	C	2000	5/5	0.99	0.07	52,55,72,78	5
3	COY	A	601	106/106	1.00	0.04	13,38,51,70	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.

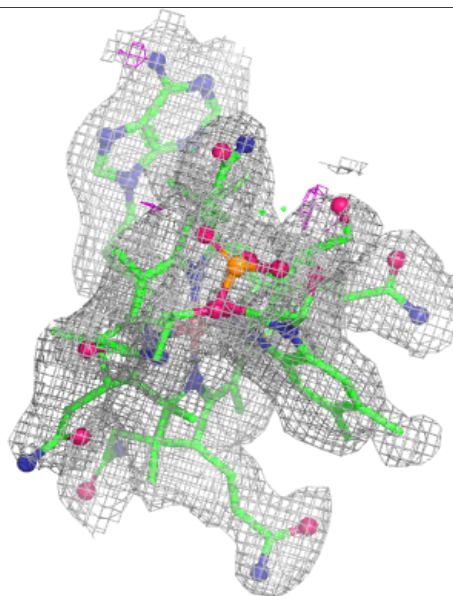
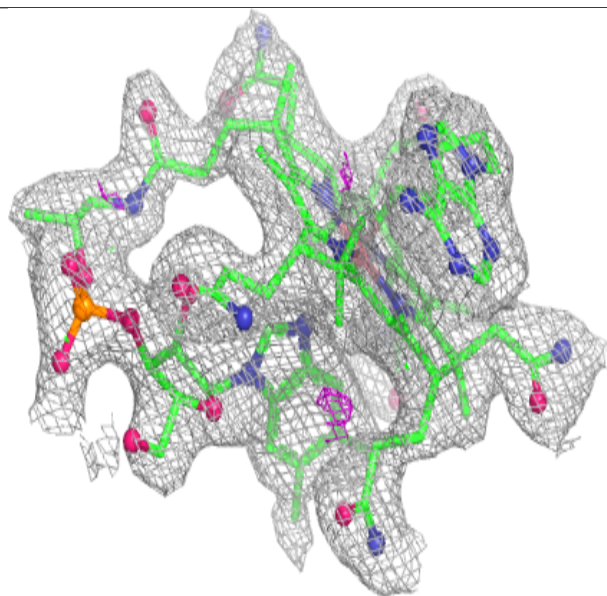
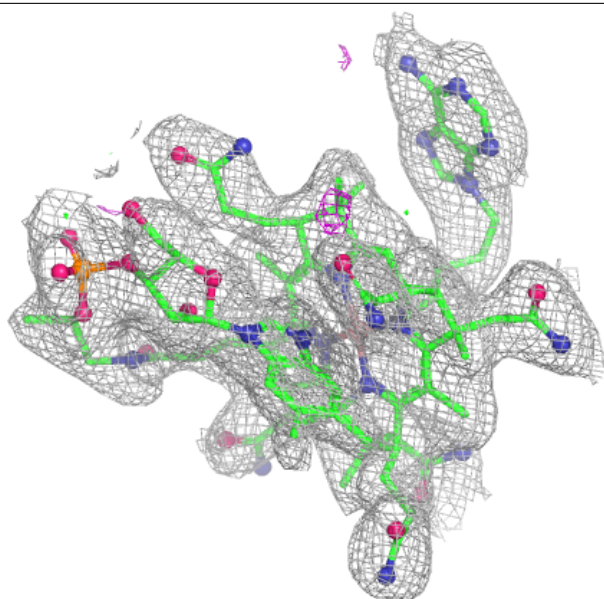
Electron density around COY C 601:

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



Electron density around COY A 601:

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



6.5 Other polymers [i](#)

There are no such residues in this entry.