Full wwPDB X-ray Structure Validation Report (i)

Jun 13, 2024 – 10:18 AM EDT

PDB ID	:	4J0Q
Title	:	Crystal structure of Pseudomonas putida elongation factor Tu (EF-Tu)
Authors	:	Scotti, J.S.; McDonough, M.A.; Schofield, C.J.
Deposited on	:	2013-01-31
Resolution	:	2.29 Å(reported)

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

|		
MolProbity	:	4.02b-467
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.20.1
EDS	:	2.36.2
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)	:	2.36.2

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 2.29 Å.

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

Metric	Percentile Ranks	Value
Rfree		0.219
Clashscore		10
Ramachandran outliers		0.4%
Sidechain outliers		1.6%
RSRZ outliers		1.5%

Worse — *Better*

▌ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution
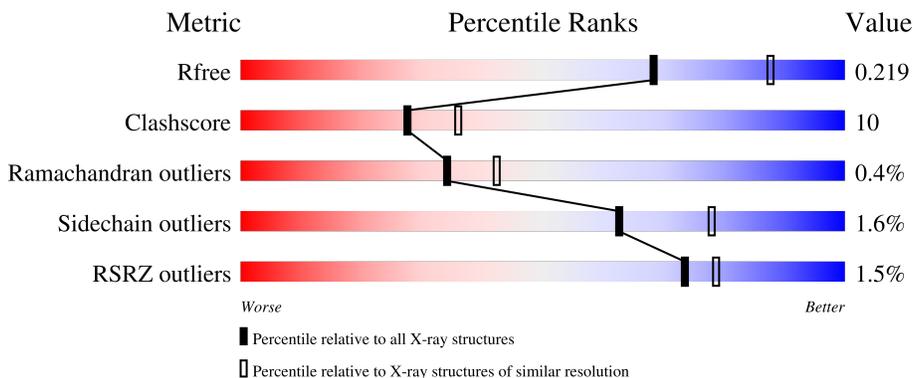
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	5042 (2.30-2.30)
Clashscore	141614	5643 (2.30-2.30)
Ramachandran outliers	138981	5575 (2.30-2.30)
Sidechain outliers	138945	5575 (2.30-2.30)
RSRZ outliers	127900	4938 (2.30-2.30)

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	433	% — 69% 17% 14%
1	B	433	% — 69% 17% 14%
1	C	433	% — 67% 18% • 14%
1	D	433	% — 71% 14% • 14%
1	E	433	3% — 69% 16% 15%

2 Entry composition ⓘ

There are 6 unique types of molecules in this entry. The entry contains 14584 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 Elongation factor Tu-A.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	373	Total 2837	C 1782	N 489	O 548	S 18	0	2	0
1	B	374	Total 2836	C 1779	N 491	O 548	S 18	0	1	0
1	C	373	Total 2834	C 1775	N 492	O 549	S 18	0	2	0
1	D	371	Total 2793	C 1753	N 482	O 541	S 17	0	1	0
1	E	370	Total 2747	C 1714	N 480	O 537	S 16	0	0	0

There are 180 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-35	MET	-	expression tag	UNP Q88QP8
A	-34	GLY	-	expression tag	UNP Q88QP8
A	-33	SER	-	expression tag	UNP Q88QP8
A	-32	SER	-	expression tag	UNP Q88QP8
A	-31	HIS	-	expression tag	UNP Q88QP8
A	-30	HIS	-	expression tag	UNP Q88QP8
A	-29	HIS	-	expression tag	UNP Q88QP8
A	-28	HIS	-	expression tag	UNP Q88QP8
A	-27	HIS	-	expression tag	UNP Q88QP8
A	-26	HIS	-	expression tag	UNP Q88QP8
A	-25	SER	-	expression tag	UNP Q88QP8
A	-24	SER	-	expression tag	UNP Q88QP8
A	-23	GLY	-	expression tag	UNP Q88QP8
A	-22	LEU	-	expression tag	UNP Q88QP8
A	-21	VAL	-	expression tag	UNP Q88QP8
A	-20	PRO	-	expression tag	UNP Q88QP8
A	-19	ARG	-	expression tag	UNP Q88QP8
A	-18	GLY	-	expression tag	UNP Q88QP8
A	-17	SER	-	expression tag	UNP Q88QP8

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Chain	Residue	Modelled	Actual	Comment	Reference
A	-16	HIS	-	expression tag	UNP Q88QP8
A	-15	MET	-	expression tag	UNP Q88QP8
A	-14	ALA	-	expression tag	UNP Q88QP8
A	-13	SER	-	expression tag	UNP Q88QP8
A	-12	MET	-	expression tag	UNP Q88QP8
A	-11	THR	-	expression tag	UNP Q88QP8
A	-10	GLY	-	expression tag	UNP Q88QP8
A	-9	GLY	-	expression tag	UNP Q88QP8
A	-8	GLN	-	expression tag	UNP Q88QP8
A	-7	GLN	-	expression tag	UNP Q88QP8
A	-6	MET	-	expression tag	UNP Q88QP8
A	-5	GLY	-	expression tag	UNP Q88QP8
A	-4	ARG	-	expression tag	UNP Q88QP8
A	-3	GLY	-	expression tag	UNP Q88QP8
A	-2	SER	-	expression tag	UNP Q88QP8
A	-1	GLU	-	expression tag	UNP Q88QP8
A	0	PHE	-	expression tag	UNP Q88QP8
B	-35	MET	-	expression tag	UNP Q88QP8
B	-34	GLY	-	expression tag	UNP Q88QP8
B	-33	SER	-	expression tag	UNP Q88QP8
B	-32	SER	-	expression tag	UNP Q88QP8
B	-31	HIS	-	expression tag	UNP Q88QP8
B	-30	HIS	-	expression tag	UNP Q88QP8
B	-29	HIS	-	expression tag	UNP Q88QP8
B	-28	HIS	-	expression tag	UNP Q88QP8
B	-27	HIS	-	expression tag	UNP Q88QP8
B	-26	HIS	-	expression tag	UNP Q88QP8
B	-25	SER	-	expression tag	UNP Q88QP8
B	-24	SER	-	expression tag	UNP Q88QP8
B	-23	GLY	-	expression tag	UNP Q88QP8
B	-22	LEU	-	expression tag	UNP Q88QP8
B	-21	VAL	-	expression tag	UNP Q88QP8
B	-20	PRO	-	expression tag	UNP Q88QP8
B	-19	ARG	-	expression tag	UNP Q88QP8
B	-18	GLY	-	expression tag	UNP Q88QP8
B	-17	SER	-	expression tag	UNP Q88QP8
B	-16	HIS	-	expression tag	UNP Q88QP8
B	-15	MET	-	expression tag	UNP Q88QP8
B	-14	ALA	-	expression tag	UNP Q88QP8
B	-13	SER	-	expression tag	UNP Q88QP8
B	-12	MET	-	expression tag	UNP Q88QP8
B	-11	THR	-	expression tag	UNP Q88QP8

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Chain	Residue	Modelled	Actual	Comment	Reference
B	-10	GLY	-	expression tag	UNP Q88QP8
B	-9	GLY	-	expression tag	UNP Q88QP8
B	-8	GLN	-	expression tag	UNP Q88QP8
B	-7	GLN	-	expression tag	UNP Q88QP8
B	-6	MET	-	expression tag	UNP Q88QP8
B	-5	GLY	-	expression tag	UNP Q88QP8
B	-4	ARG	-	expression tag	UNP Q88QP8
B	-3	GLY	-	expression tag	UNP Q88QP8
B	-2	SER	-	expression tag	UNP Q88QP8
B	-1	GLU	-	expression tag	UNP Q88QP8
B	0	PHE	-	expression tag	UNP Q88QP8
C	-35	MET	-	expression tag	UNP Q88QP8
C	-34	GLY	-	expression tag	UNP Q88QP8
C	-33	SER	-	expression tag	UNP Q88QP8
C	-32	SER	-	expression tag	UNP Q88QP8
C	-31	HIS	-	expression tag	UNP Q88QP8
C	-30	HIS	-	expression tag	UNP Q88QP8
C	-29	HIS	-	expression tag	UNP Q88QP8
C	-28	HIS	-	expression tag	UNP Q88QP8
C	-27	HIS	-	expression tag	UNP Q88QP8
C	-26	HIS	-	expression tag	UNP Q88QP8
C	-25	SER	-	expression tag	UNP Q88QP8
C	-24	SER	-	expression tag	UNP Q88QP8
C	-23	GLY	-	expression tag	UNP Q88QP8
C	-22	LEU	-	expression tag	UNP Q88QP8
C	-21	VAL	-	expression tag	UNP Q88QP8
C	-20	PRO	-	expression tag	UNP Q88QP8
C	-19	ARG	-	expression tag	UNP Q88QP8
C	-18	GLY	-	expression tag	UNP Q88QP8
C	-17	SER	-	expression tag	UNP Q88QP8
C	-16	HIS	-	expression tag	UNP Q88QP8
C	-15	MET	-	expression tag	UNP Q88QP8
C	-14	ALA	-	expression tag	UNP Q88QP8
C	-13	SER	-	expression tag	UNP Q88QP8
C	-12	MET	-	expression tag	UNP Q88QP8
C	-11	THR	-	expression tag	UNP Q88QP8
C	-10	GLY	-	expression tag	UNP Q88QP8
C	-9	GLY	-	expression tag	UNP Q88QP8
C	-8	GLN	-	expression tag	UNP Q88QP8
C	-7	GLN	-	expression tag	UNP Q88QP8
C	-6	MET	-	expression tag	UNP Q88QP8
C	-5	GLY	-	expression tag	UNP Q88QP8

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Chain	Residue	Modelled	Actual	Comment	Reference
C	-4	ARG	-	expression tag	UNP Q88QP8
C	-3	GLY	-	expression tag	UNP Q88QP8
C	-2	SER	-	expression tag	UNP Q88QP8
C	-1	GLU	-	expression tag	UNP Q88QP8
C	0	PHE	-	expression tag	UNP Q88QP8
D	-35	MET	-	expression tag	UNP Q88QP8
D	-34	GLY	-	expression tag	UNP Q88QP8
D	-33	SER	-	expression tag	UNP Q88QP8
D	-32	SER	-	expression tag	UNP Q88QP8
D	-31	HIS	-	expression tag	UNP Q88QP8
D	-30	HIS	-	expression tag	UNP Q88QP8
D	-29	HIS	-	expression tag	UNP Q88QP8
D	-28	HIS	-	expression tag	UNP Q88QP8
D	-27	HIS	-	expression tag	UNP Q88QP8
D	-26	HIS	-	expression tag	UNP Q88QP8
D	-25	SER	-	expression tag	UNP Q88QP8
D	-24	SER	-	expression tag	UNP Q88QP8
D	-23	GLY	-	expression tag	UNP Q88QP8
D	-22	LEU	-	expression tag	UNP Q88QP8
D	-21	VAL	-	expression tag	UNP Q88QP8
D	-20	PRO	-	expression tag	UNP Q88QP8
D	-19	ARG	-	expression tag	UNP Q88QP8
D	-18	GLY	-	expression tag	UNP Q88QP8
D	-17	SER	-	expression tag	UNP Q88QP8
D	-16	HIS	-	expression tag	UNP Q88QP8
D	-15	MET	-	expression tag	UNP Q88QP8
D	-14	ALA	-	expression tag	UNP Q88QP8
D	-13	SER	-	expression tag	UNP Q88QP8
D	-12	MET	-	expression tag	UNP Q88QP8
D	-11	THR	-	expression tag	UNP Q88QP8
D	-10	GLY	-	expression tag	UNP Q88QP8
D	-9	GLY	-	expression tag	UNP Q88QP8
D	-8	GLN	-	expression tag	UNP Q88QP8
D	-7	GLN	-	expression tag	UNP Q88QP8
D	-6	MET	-	expression tag	UNP Q88QP8
D	-5	GLY	-	expression tag	UNP Q88QP8
D	-4	ARG	-	expression tag	UNP Q88QP8
D	-3	GLY	-	expression tag	UNP Q88QP8
D	-2	SER	-	expression tag	UNP Q88QP8
D	-1	GLU	-	expression tag	UNP Q88QP8
D	0	PHE	-	expression tag	UNP Q88QP8
E	-35	MET	-	expression tag	UNP Q88QP8

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Chain	Residue	Modelled	Actual	Comment	Reference
E	-34	GLY	-	expression tag	UNP Q88QP8
E	-33	SER	-	expression tag	UNP Q88QP8
E	-32	SER	-	expression tag	UNP Q88QP8
E	-31	HIS	-	expression tag	UNP Q88QP8
E	-30	HIS	-	expression tag	UNP Q88QP8
E	-29	HIS	-	expression tag	UNP Q88QP8
E	-28	HIS	-	expression tag	UNP Q88QP8
E	-27	HIS	-	expression tag	UNP Q88QP8
E	-26	HIS	-	expression tag	UNP Q88QP8
E	-25	SER	-	expression tag	UNP Q88QP8
E	-24	SER	-	expression tag	UNP Q88QP8
E	-23	GLY	-	expression tag	UNP Q88QP8
E	-22	LEU	-	expression tag	UNP Q88QP8
E	-21	VAL	-	expression tag	UNP Q88QP8
E	-20	PRO	-	expression tag	UNP Q88QP8
E	-19	ARG	-	expression tag	UNP Q88QP8
E	-18	GLY	-	expression tag	UNP Q88QP8
E	-17	SER	-	expression tag	UNP Q88QP8
E	-16	HIS	-	expression tag	UNP Q88QP8
E	-15	MET	-	expression tag	UNP Q88QP8
E	-14	ALA	-	expression tag	UNP Q88QP8
E	-13	SER	-	expression tag	UNP Q88QP8
E	-12	MET	-	expression tag	UNP Q88QP8
E	-11	THR	-	expression tag	UNP Q88QP8
E	-10	GLY	-	expression tag	UNP Q88QP8
E	-9	GLY	-	expression tag	UNP Q88QP8
E	-8	GLN	-	expression tag	UNP Q88QP8
E	-7	GLN	-	expression tag	UNP Q88QP8
E	-6	MET	-	expression tag	UNP Q88QP8
E	-5	GLY	-	expression tag	UNP Q88QP8
E	-4	ARG	-	expression tag	UNP Q88QP8
E	-3	GLY	-	expression tag	UNP Q88QP8
E	-2	SER	-	expression tag	UNP Q88QP8
E	-1	GLU	-	expression tag	UNP Q88QP8
E	0	PHE	-	expression tag	UNP Q88QP8

- Molecule 2 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

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

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WORLDWIDE
PDB
PROTEIN DATA BANK

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	C	1	Total 1	Mg 1	0	0
2	D	1	Total 1	Mg 1	0	0
2	E	1	Total 1	Mg 1	0	0

- Molecule 3 is GUANOSINE-5'-DIPHOSPHATE (three-letter code: GDP) (formula: $C_{10}H_{15}N_5O_{11}P_2$).
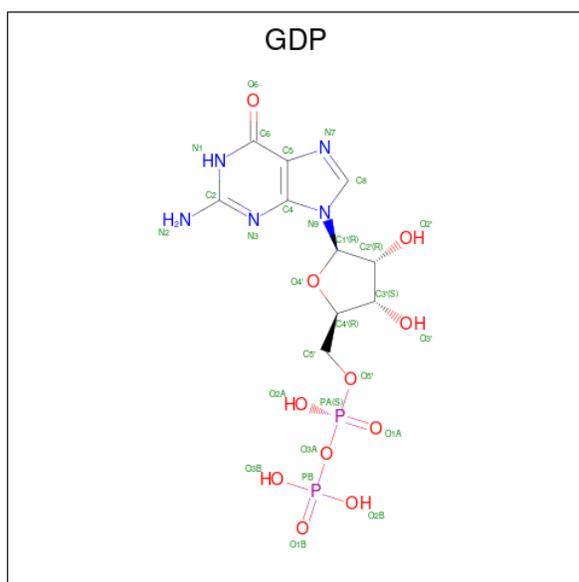
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total 28	C 10	N 5	O 11	P 2	0	0
3	B	1	Total 28	C 10	N 5	O 11	P 2	0	0
3	C	1	Total 28	C 10	N 5	O 11	P 2	0	0
3	D	1	Total 28	C 10	N 5	O 11	P 2	0	0
3	E	1	Total 28	C 10	N 5	O 11	P 2	0	0

- Molecule 4 is 2-(N-MORPHOLINO)-ETHANESULFONIC ACID (three-letter code: MES) (formula: $C_6H_{13}NO_4S$).
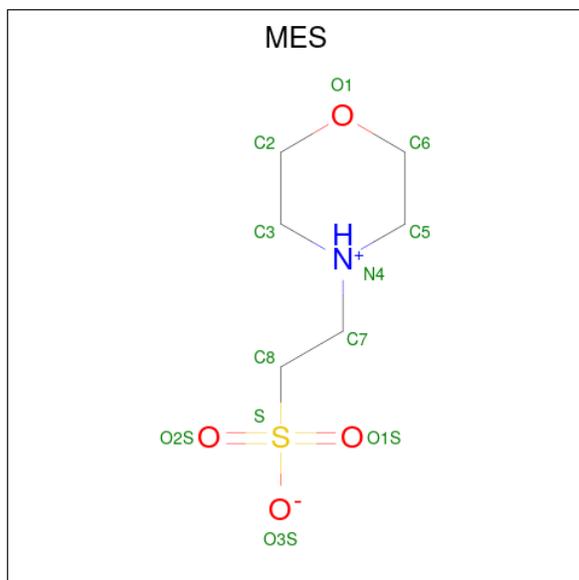
MES

O1

C2   O   C6

C3   H   C5
      N+
         N4

      C7

C8

O2S   S   O1S
       O-
       O3S

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total	C	N	O	S	0	0
			12	6	1	4	1		
4	B	1	Total	C	N	O	S	0	0
			12	6	1	4	1		
4	E	1	Total	C	N	O	S	0	0
			12	6	1	4	1		

- Molecule 5 is (4S)-2-METHYL-2,4-PENTANEDIOL (three-letter code: MPD) (formula: $C_6H_{14}O_2$).

MPD

O4
OH
      C1

C5
C4(S)
      C2
C3   CM

OH
O2
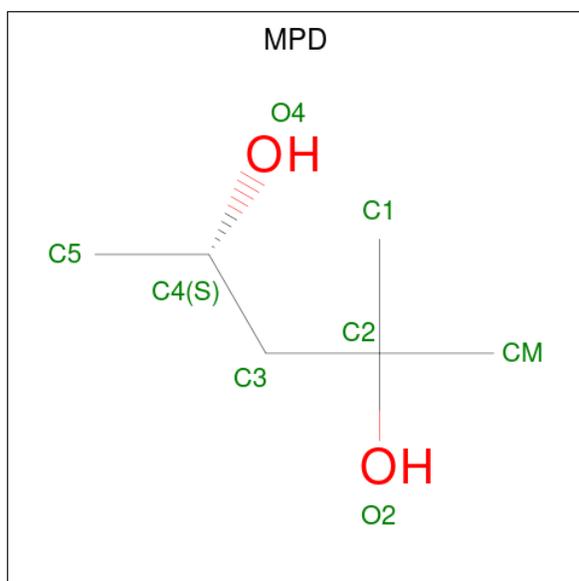
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total 8	C 6	O 2	0	0
5	A	1	Total 8	C 6	O 2	0	0
5	C	1	Total 8	C 6	O 2	0	0
5	D	1	Total 8	C 6	O 2	0	0
5	E	1	Total 8	C 6	O 2	0	0

• Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	80	Total 80	O 80	0	0
6	B	68	Total 68	O 68	0	0
6	C	88	Total 88	O 88	0	0
6	D	57	Total 57	O 57	0	0
6	E	23	Total 23	O 23	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: Elongation factor Tu-A
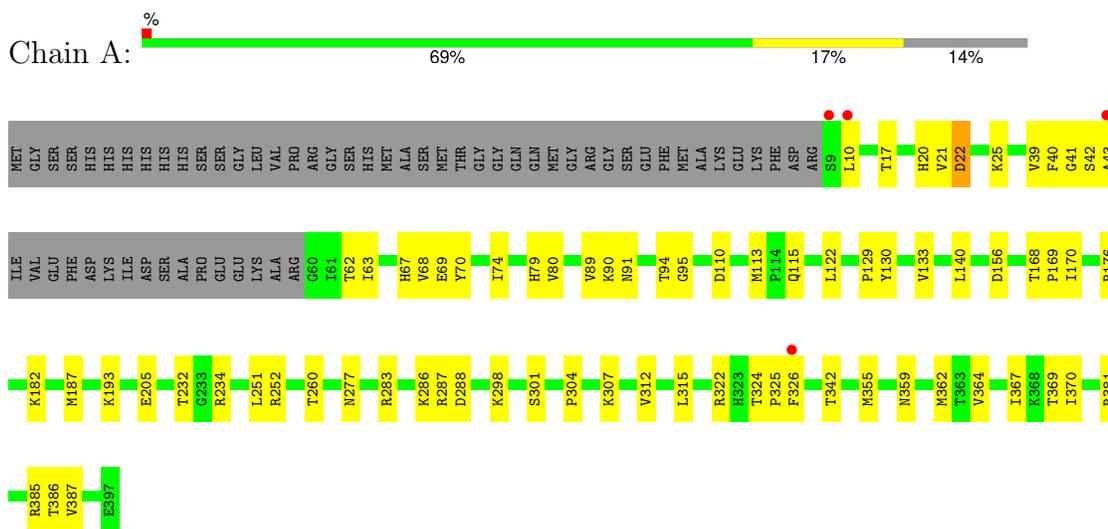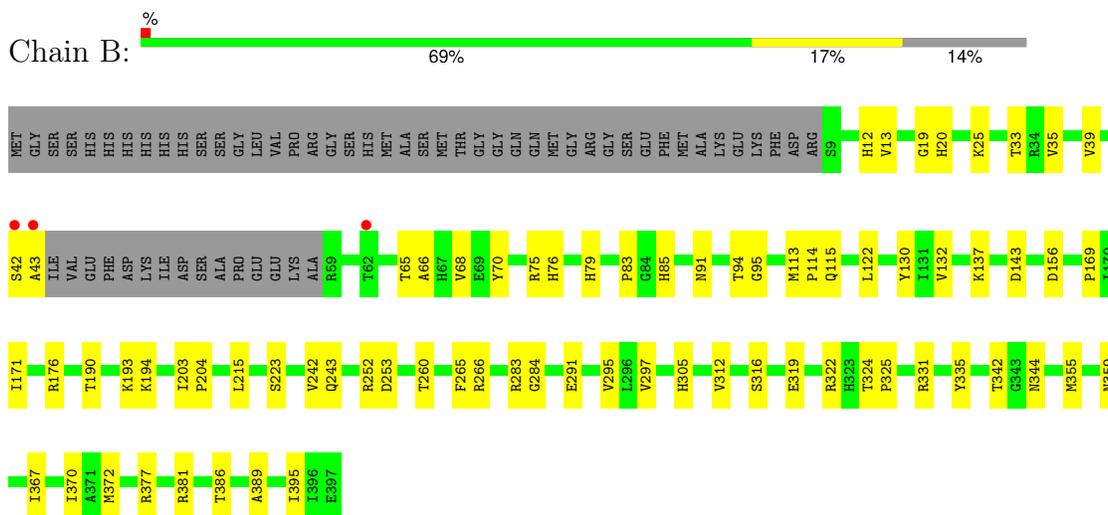
- Molecule 1: Elongation factor Tu-A

- Molecule 1: Elongation factor Tu-A

• Molecule 1: Elongation factor Tu-A

Chain D:

• Molecule 1: Elongation factor Tu-A

Chain E:
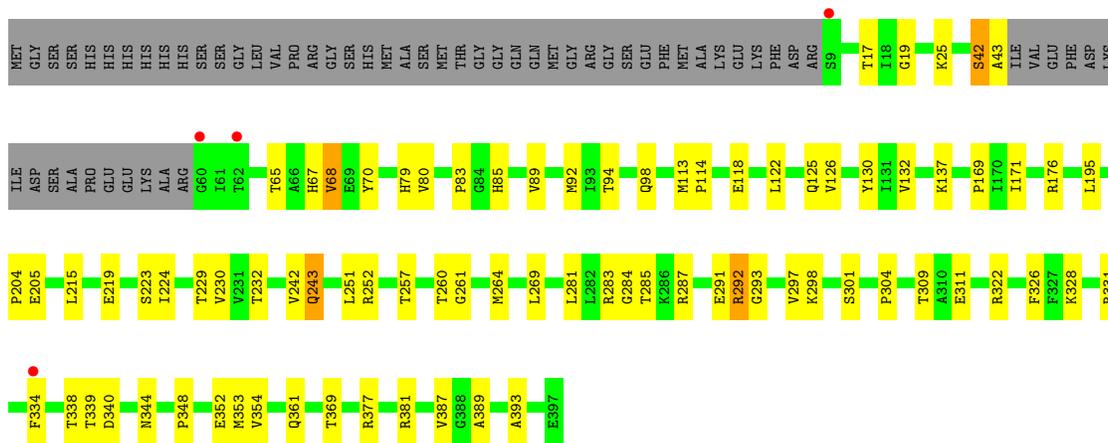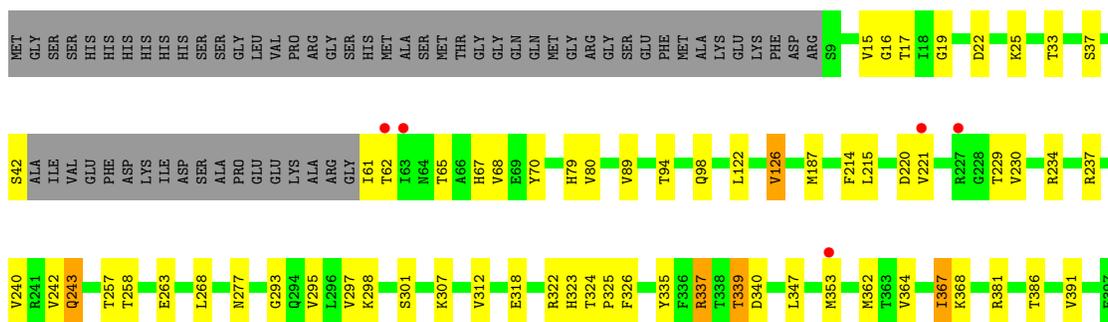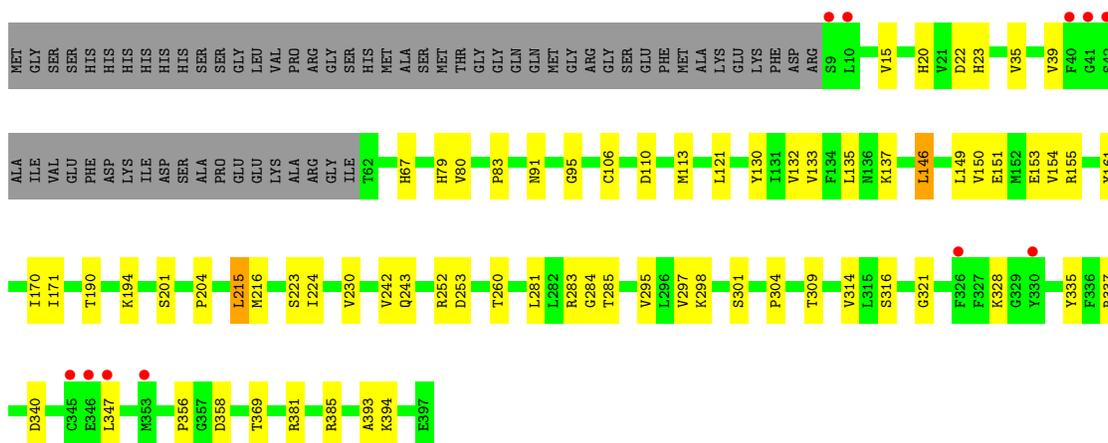
4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	212.50Å 155.62Å 99.30Å 90.00° 114.76° 90.00°	Depositor
Resolution (Å)	48.24 – 2.29 48.24 – 2.29	Depositor EDS
% Data completeness (in resolution range)	100.0 (48.24-2.29) 93.1 (48.24-2.29)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.70 (at 2.29Å)	Xtriage
Refinement program	PHENIX 1.8.1_1168	Depositor
R, R_{free}	0.174 , 0.213 0.185 , 0.219	Depositor DCC
R_{free} test set	2006 reflections (1.55%)	wwPDB-VP
Wilson B-factor (Å^2)	60.9	Xtriage
Anisotropy	0.042	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.29 , 41.2	EDS
L-test for twinning[2]	$< |L| > = 0.49, < L^2 > = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.97	EDS
Total number of atoms	14584	wwPDB-VP
Average B, all atoms (Å^2)	67.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.31% 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 ⓘ

5.1 Standard geometry ⓘ

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

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	0.46	0/2891	0.63	0/3924
1	B	0.45	0/2887	0.65	0/3919
1	C	0.47	0/2886	0.65	0/3916
1	D	0.42	0/2844	0.61	0/3868
1	E	0.35	0/2791	0.56	0/3797
All	All	0.43	0/14299	0.62	0/19424

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 ⓘ

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	2837	0	2820	57	0
1	B	2836	0	2814	64	1
1	C	2834	0	2821	65	0
1	D	2793	0	2745	49	0
1	E	2747	0	2669	43	1
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	D	1	0	0	0	0
2	E	1	0	0	0	0
3	A	28	0	12	2	0
3	B	28	0	12	3	0
3	C	28	0	12	2	0
3	D	28	0	12	0	0
3	E	28	0	12	0	0
4	A	12	0	13	1	0
4	B	12	0	12	0	0
4	E	12	0	13	0	0
5	A	16	0	28	3	0
5	C	8	0	14	5	0
5	D	8	0	14	2	0
5	E	8	0	14	3	0
6	A	80	0	0	6	0
6	B	68	0	0	5	0
6	C	88	0	0	2	0
6	D	57	0	0	2	0
6	E	23	0	0	0	0
All	All	14584	0	14037	284	1

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 10.

All (284) 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)
5:E:404:MPD:HM2	5:E:404:MPD:H53	1.35	1.06
1:A:252:ARG:NH1	1:A:288:ASP:O	2.00	0.94
1:E:340:ASP:OD1	1:E:381:ARG:NH1	2.10	0.85
1:D:322:ARG:NH2	1:D:324:THR:O	2.11	0.84
1:E:20:HIS:HB3	1:E:23:HIS:CD2	2.19	0.77
5:A:404:MPD:O2	5:A:404:MPD:H53	1.84	0.76
1:E:35:VAL:O	1:E:39:VAL:HG12	1.85	0.75
1:D:234:ARG:NH2	1:D:277:ASN:OD1	2.22	0.73
1:D:214:PHE:CE1	1:D:240:VAL:HG13	2.25	0.72
1:D:214:PHE:CE1	1:D:240:VAL:CG1	2.73	0.71
5:C:403:MPD:H52	5:C:403:MPD:HM1	1.70	0.71
1:C:94:THR:HG21	1:C:389:ALA:HB1	1.73	0.71
1:A:260:THR:HG21	1:A:283:ARG:HG3	1.74	0.69
5:C:403:MPD:H53	5:C:403:MPD:O2	1.92	0.69

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:110:ASP:HB3	1:A:113:MET:CE	2.23	0.69
1:D:312:VAL:HG21	1:D:362:MET:HE2	1.73	0.69
1:A:140:LEU:HB3	1:B:266:ARG:HD3	1.75	0.69
1:A:187:MET:HE2	6:A:572:HOH:O	1.92	0.68
1:C:339:THR:HG22	1:C:340:ASP:N	2.09	0.68
1:B:215:LEU:HD13	1:B:297:VAL:HG12	1.78	0.66
1:B:319:GLU:N	6:B:546:HOH:O	2.28	0.65
1:E:215:LEU:HD12	1:E:216:MET:N	2.12	0.65
1:C:94:THR:CG2	1:C:389:ALA:HB1	2.27	0.65
5:C:403:MPD:HM1	5:C:403:MPD:C5	2.28	0.64
1:D:214:PHE:CZ	1:D:240:VAL:CG1	2.80	0.64
1:B:94:THR:HG21	1:B:389:ALA:CB	2.28	0.63
1:E:91:ASN:O	1:E:95:GLY:N	2.31	0.63
1:A:260:THR:HG21	1:A:283:ARG:CG	2.29	0.63
1:C:19:GLY:O	1:C:25:LYS:HE3	1.97	0.63
1:A:140:LEU:O	1:B:266:ARG:HD3	1.99	0.63
1:D:65:THR:HG21	1:D:67:HIS:CE1	2.34	0.63
1:E:314:VAL:HG22	1:E:358:ASP:O	1.98	0.62
1:D:325:PRO:HB2	1:D:353:MET:SD	2.39	0.62
1:C:242:VAL:HG12	1:C:260:THR:C	2.21	0.62
1:C:298:LYS:O	1:C:301:SER:HB3	1.99	0.61
1:C:322:ARG:HG3	1:C:387:VAL:CG2	2.31	0.61
1:C:292:ARG:NH1	1:C:338:THR:O	2.33	0.61
1:A:325:PRO:HG3	1:A:355:MET:SD	2.42	0.60
1:A:63:ILE:HD11	1:A:91:ASN:CA	2.32	0.60
1:E:121:LEU:HD13	1:E:161:TYR:CE2	2.37	0.59
1:D:214:PHE:CZ	1:D:240:VAL:HG11	2.37	0.59
5:E:404:MPD:H53	5:E:404:MPD:CM	2.16	0.59
1:E:316:SER:HA	1:E:356:PRO:HB3	1.85	0.59
1:E:230:VAL:HG22	1:E:281:LEU:HD22	1.83	0.59
1:B:85:HIS:CD2	1:B:115:GLN:HG2	2.37	0.58
1:B:342:THR:HB	1:B:367:ILE:HD12	1.84	0.58
1:B:25:LYS:NZ	6:B:509:HOH:O	2.36	0.58
1:E:304:PRO:HB2	1:E:369:THR:OG1	2.03	0.58
1:A:25:LYS:NZ	6:A:510:HOH:O	2.35	0.58
1:D:65:THR:HG21	1:D:67:HIS:NE2	2.19	0.58
1:D:19:GLY:O	1:D:25:LYS:HE3	2.03	0.57
1:B:70:TYR:OH	1:B:79:HIS:HD2	1.86	0.57
1:D:318:GLU:N	1:D:318:GLU:OE1	2.37	0.57
1:C:264:MET:HG3	1:C:269:LEU:HD12	1.86	0.57
1:E:298:LYS:O	1:E:301:SER:HB3	2.05	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:67:HIS:CD2	1:E:80:VAL:HG22	2.39	0.57
1:B:322:ARG:NH1	1:B:324:THR:O	2.37	0.56
1:C:264:MET:HG3	1:C:269:LEU:CD1	2.36	0.56
1:D:15:VAL:HG12	1:D:16:GLY:N	2.19	0.56
1:D:215:LEU:HD13	1:D:297:VAL:HG12	1.88	0.56
1:A:156:ASP:OD1	1:B:223:SER:OG	2.23	0.56
1:B:39:VAL:HG21	1:B:193:LYS:HE3	1.87	0.56
1:D:325:PRO:CB	1:D:353:MET:SD	2.94	0.56
1:B:215:LEU:HD13	1:B:297:VAL:CG1	2.35	0.56
1:E:297:VAL:HG12	1:E:298:LYS:O	2.06	0.56
1:A:304:PRO:HB2	1:A:369:THR:OG1	2.06	0.56
1:C:65:THR:HG23	1:C:80:VAL:HG13	1.86	0.56
1:B:265:PHE:O	1:B:266:ARG:HB2	2.06	0.55
1:C:257:THR:HG1	1:C:285:THR:HG1	1.52	0.55
1:B:335:TYR:CD1	1:B:381:ARG:NH2	2.74	0.55
1:C:242:VAL:HG12	1:C:261:GLY:N	2.20	0.55
1:C:176:ARG:HD2	6:C:548:HOH:O	2.06	0.55
1:D:322:ARG:NH2	1:D:326:PHE:HB3	2.21	0.55
1:A:232:THR:HB	5:A:404:MPD:H12	1.86	0.55
1:D:15:VAL:CG1	1:D:16:GLY:N	2.70	0.54
1:D:242:VAL:O	1:D:243:GLN:HB2	2.08	0.54
1:E:224:ILE:HD11	1:E:230:VAL:HG23	1.89	0.54
1:A:176:ARG:CD	6:A:549:HOH:O	2.56	0.54
1:A:10:LEU:HD22	1:A:74:ILE:C	2.28	0.54
1:D:215:LEU:HD21	1:D:337:ARG:NH2	2.23	0.54
1:D:61:ILE:HG22	1:D:62:THR:N	2.23	0.53
1:C:251:LEU:N	1:C:369:THR:HG23	2.23	0.53
1:E:15:VAL:O	1:E:79:HIS:HA	2.07	0.53
1:C:304:PRO:HB2	1:C:369:THR:OG1	2.08	0.53
1:A:110:ASP:HB3	1:A:113:MET:HE3	1.91	0.53
1:C:229:THR:OG1	1:C:285:THR:O	2.23	0.53
1:A:42:SER:O	1:A:43:ALA:HB3	2.09	0.52
1:C:322:ARG:CG	1:C:387:VAL:CG2	2.87	0.52
1:D:367:ILE:HG22	1:D:368:LYS:N	2.24	0.52
1:B:252:ARG:HG2	1:B:253:ASP:N	2.25	0.52
1:E:242:VAL:O	1:E:243:GLN:HB2	2.09	0.52
1:E:146:LEU:O	1:E:150:VAL:HG23	2.10	0.52
1:C:334:PHE:O	1:C:340:ASP:HA	2.09	0.52
1:C:339:THR:CG2	1:C:340:ASP:N	2.72	0.52
1:E:133:VAL:HB	1:E:170:ILE:HG12	1.91	0.52
1:A:21:VAL:HG23	1:A:115[B]:GLN:OE1	2.09	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:325:PRO:HG3	1:B:355:MET:CE	2.39	0.52
1:D:277:ASN:HB3	5:D:403:MPD:H11	1.90	0.52
1:C:65:THR:HG21	1:C:67:HIS:CE1	2.44	0.52
1:B:35:VAL:O	1:B:39:VAL:HG12	2.10	0.52
1:B:171:ILE:N	1:B:171:ILE:HD12	2.25	0.52
1:D:340:ASP:OD1	1:D:381:ARG:NH2	2.41	0.52
1:B:20:HIS:CG	1:B:113:MET:HB2	2.44	0.51
1:A:385:ARG:O	1:A:387:VAL:HG13	2.11	0.51
1:B:113:MET:HB3	1:B:114:PRO:HD2	1.93	0.51
1:C:326:PHE:CZ	1:C:354:VAL:HG11	2.46	0.51
1:B:242:VAL:O	1:B:243:GLN:HB2	2.11	0.51
1:B:342:THR:HB	1:B:367:ILE:CD1	2.40	0.51
1:D:220:ASP:OD1	1:D:221:VAL:N	2.43	0.51
1:A:25:LYS:HE3	3:A:402:GDP:O2B	2.10	0.50
1:A:89:VAL:HA	1:A:122:LEU:HD21	1.93	0.50
1:B:260:THR:HG21	1:B:283:ARG:HB2	1.92	0.50
1:A:312:VAL:HG21	1:A:362:MET:HE2	1.93	0.50
1:C:322:ARG:NH1	1:C:326:PHE:HB3	2.26	0.50
1:E:260:THR:HG21	1:E:283:ARG:HG3	1.94	0.50
5:E:404:MPD:HM2	5:E:404:MPD:C5	2.21	0.50
1:B:143:ASP:OD2	6:B:568:HOH:O	2.19	0.50
1:C:293:GLY:HA3	1:C:339:THR:OG1	2.11	0.50
1:A:140:LEU:O	1:B:266:ARG:CD	2.59	0.50
1:E:309:THR:HG22	1:E:394:LYS:HB2	1.93	0.50
1:C:65:THR:CG2	1:C:67:HIS:NE2	2.75	0.49
1:C:230:VAL:HG22	1:C:281:LEU:HD22	1.94	0.49
1:C:283:ARG:O	1:C:284:GLY:C	2.51	0.49
1:D:214:PHE:CD1	1:D:240:VAL:HG13	2.46	0.49
1:E:297:VAL:CG1	1:E:298:LYS:O	2.61	0.49
1:D:94:THR:HG23	1:D:94:THR:O	2.12	0.49
1:C:176:ARG:HB2	3:C:402:GDP:C5	2.48	0.49
1:A:298:LYS:O	1:A:301:SER:HB3	2.13	0.49
1:E:252:ARG:HG2	1:E:253:ASP:N	2.28	0.49
1:C:328:LYS:CB	1:C:352:GLU:OE2	2.61	0.49
1:D:298:LYS:O	1:D:301:SER:HB3	2.12	0.49
1:E:321:GLY:O	1:E:385:ARG:NH1	2.46	0.48
1:B:33:THR:CG2	1:B:68:VAL:HG13	2.43	0.48
1:C:70:TYR:OH	1:C:79:HIS:HD2	1.95	0.48
1:C:251:LEU:H	1:C:369:THR:HG23	1.79	0.48
1:B:42:SER:OG	1:B:43:ALA:N	2.47	0.48
1:E:309:THR:HG23	1:E:393:ALA:HB3	1.96	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:328:LYS:N	1:E:347:LEU:HD11	2.29	0.48
1:E:171:ILE:N	1:E:171:ILE:HD12	2.27	0.48
1:A:91:ASN:O	1:A:95:GLY:HA3	2.13	0.48
1:C:125[B]:GLN:NE2	1:C:311:GLU:OE2	2.46	0.48
1:E:150:VAL:O	1:E:154:VAL:HG23	2.14	0.48
1:A:322:ARG:NH2	1:A:326:PHE:HB3	2.28	0.47
1:A:63:ILE:HD11	1:A:91:ASN:HB2	1.96	0.47
1:B:331:ARG:CD	1:B:344:ASN:OD1	2.62	0.47
1:E:22:ASP:O	1:E:137:LYS:NZ	2.39	0.47
1:C:331:ARG:CD	1:C:344:ASN:OD1	2.62	0.47
1:B:283:ARG:O	1:B:284:GLY:C	2.52	0.47
1:C:242:VAL:O	1:C:243:GLN:HB2	2.15	0.47
1:B:94:THR:HG21	1:B:389:ALA:HB1	1.95	0.47
1:C:132:VAL:HG22	1:C:169:PRO:HG2	1.97	0.47
1:C:224:ILE:HD12	1:C:224:ILE:N	2.30	0.47
1:D:61:ILE:CG2	1:D:62:THR:N	2.78	0.47
1:C:92:MET:HE1	1:C:122:LEU:HD23	1.96	0.47
1:D:89:VAL:HA	1:D:122:LEU:HD21	1.96	0.47
1:C:85:HIS:CE1	1:C:118:GLU:CD	2.89	0.47
1:C:65:THR:HG21	1:C:67:HIS:NE2	2.30	0.46
1:E:149:LEU:O	1:E:153:GLU:HG2	2.16	0.46
1:B:12[B]:HIS:CD2	1:B:76:HIS:CD2	3.02	0.46
1:C:130:TYR:CE2	1:C:204:PRO:HD2	2.50	0.46
1:A:129:PRO:HB2	1:A:130:TYR:CD2	2.50	0.46
1:B:19:GLY:O	1:B:25:LYS:HE2	2.15	0.46
1:C:230:VAL:HG22	1:C:281:LEU:CD2	2.45	0.46
1:B:377:ARG:HD3	6:B:565:HOH:O	2.14	0.46
1:C:98:GLN:O	6:C:563:HOH:O	2.20	0.46
1:C:113:MET:HB3	1:C:114:PRO:CD	2.46	0.46
1:E:110:ASP:HB3	1:E:113:MET:CE	2.45	0.46
1:C:252:ARG:NH2	1:C:291:GLU:OE2	2.49	0.46
1:D:242:VAL:O	1:D:243:GLN:CB	2.64	0.46
1:E:151:GLU:OE2	1:E:155:ARG:NH2	2.47	0.46
1:C:92:MET:CE	1:C:122:LEU:HD23	2.45	0.46
1:A:187:MET:CE	6:A:572:HOH:O	2.58	0.46
1:A:176:ARG:HD2	6:A:549:HOH:O	2.14	0.45
1:B:325:PRO:CG	1:B:355:MET:SD	3.04	0.45
1:C:113:MET:HB3	1:C:114:PRO:HD2	1.98	0.45
1:E:335:TYR:CE2	1:E:337:ARG:O	2.68	0.45
1:D:347:LEU:HD12	1:D:347:LEU:N	2.31	0.45
1:A:312:VAL:O	1:A:359:ASN:HA	2.15	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:252:ARG:NH2	1:B:291:GLU:OE2	2.47	0.45
1:E:130:TYR:CE2	1:E:204:PRO:HD2	2.51	0.45
1:A:91:ASN:O	1:A:95:GLY:N	2.49	0.45
1:E:281:LEU:HD23	1:E:281:LEU:N	2.32	0.45
1:D:229:THR:HG22	1:D:230:VAL:N	2.31	0.45
1:E:91:ASN:O	1:E:95:GLY:CA	2.64	0.45
1:A:342:THR:HB	1:A:367:ILE:CD1	2.47	0.45
1:B:91:ASN:O	1:B:95:GLY:N	2.49	0.45
1:B:132:VAL:HG22	1:B:169:PRO:HG2	1.99	0.45
1:B:137:LYS:HG2	3:B:402:GDP:C6	2.52	0.45
1:A:176:ARG:HD3	6:A:549:HOH:O	2.16	0.45
1:A:182:LYS:NZ	4:A:403:MES:H32	2.32	0.45
1:A:381:ARG:HG2	1:A:386:THR:HA	1.98	0.45
1:B:13:VAL:HG21	1:B:75:ARG:HD2	1.98	0.45
1:C:260:THR:HG21	1:C:283:ARG:HB2	1.98	0.45
5:C:403:MPD:C5	5:C:403:MPD:CM	2.94	0.45
1:A:67:HIS:CE1	1:A:80:VAL:HG22	2.52	0.44
1:B:381:ARG:HG2	1:B:386:THR:HA	1.98	0.44
1:C:223:SER:OG	1:C:287:ARG:CB	2.64	0.44
1:B:13:VAL:CG2	1:B:75:ARG:HD2	2.47	0.44
1:B:33:THR:CG2	1:B:68:VAL:CG1	2.96	0.44
1:D:381:ARG:HG2	1:D:386:THR:HA	1.99	0.44
1:E:171:ILE:N	1:E:171:ILE:CD1	2.80	0.44
1:A:286:LYS:O	1:A:287:ARG:C	2.55	0.44
1:A:133:VAL:HB	1:A:170:ILE:HG13	2.00	0.44
1:B:65:THR:HG22	1:B:66:ALA:N	2.32	0.44
1:E:149:LEU:O	1:E:153:GLU:CG	2.66	0.44
1:A:234:ARG:NH2	1:A:277:ASN:OD1	2.50	0.44
1:B:39:VAL:HG22	1:B:39:VAL:O	2.18	0.44
1:B:215:LEU:CD1	1:B:295:VAL:HB	2.48	0.44
1:B:190:THR:O	1:B:194:LYS:HG2	2.17	0.44
1:B:312:VAL:O	1:B:359:ASN:HA	2.18	0.44
1:E:190:THR:O	1:E:194:LYS:HG2	2.17	0.44
1:D:257:THR:OG1	1:D:258:THR:N	2.49	0.43
1:A:63:ILE:HD11	1:A:91:ASN:N	2.34	0.43
1:C:322:ARG:CG	1:C:387:VAL:HG21	2.47	0.43
1:E:150:VAL:HA	1:E:153:GLU:HG3	2.00	0.43
1:D:126:VAL:HG22	1:D:391:VAL:HG11	1.99	0.43
1:B:176:ARG:HB2	3:B:402:GDP:C5	2.54	0.43
1:B:242:VAL:HG12	1:B:243:GLN:HG2	2.01	0.43
1:C:19:GLY:O	1:C:25:LYS:CE	2.66	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:171:ILE:HD13	1:C:195:LEU:HA	2.01	0.43
1:D:98:GLN:NE2	6:D:555:HOH:O	2.48	0.43
1:A:168:THR:O	1:A:170:ILE:HD13	2.17	0.43
1:C:68:VAL:HG12	1:C:79:HIS:HB3	2.00	0.43
1:A:63:ILE:HD11	1:A:91:ASN:HA	2.01	0.43
1:A:70:TYR:OH	1:A:79:HIS:HD2	2.02	0.43
1:B:325:PRO:HG3	1:B:355:MET:SD	2.59	0.43
1:C:215:LEU:HD12	1:C:297:VAL:HG12	2.01	0.43
1:D:263:GLU:HA	1:D:268:LEU:HD12	2.01	0.43
1:C:322:ARG:HG2	1:C:387:VAL:HG21	2.01	0.43
1:B:94:THR:CG2	1:B:389:ALA:HB1	2.49	0.42
1:D:33:THR:CG2	1:D:68:VAL:CG1	2.97	0.42
1:B:113:MET:HB3	1:B:114:PRO:CD	2.49	0.42
1:B:331:ARG:HD2	1:B:344:ASN:OD1	2.18	0.42
1:C:94:THR:HA	1:C:377:ARG:NH1	2.34	0.42
1:B:130:TYR:CE2	1:B:204:PRO:HD2	2.54	0.42
1:B:316:SER:HB3	6:B:546:HOH:O	2.19	0.42
1:C:125[A]:GLN:NE2	1:C:361:GLN:NE2	2.67	0.42
1:E:283:ARG:O	1:E:285:THR:N	2.53	0.42
1:A:20:HIS:HA	1:A:115[B]:GLN:HB2	2.02	0.42
1:A:251:LEU:H	1:A:369:THR:HG23	1.84	0.42
1:D:65:THR:HG23	1:D:80:VAL:HG13	2.02	0.42
1:B:372:MET:HG3	1:B:395:ILE:CD1	2.48	0.42
1:D:293:GLY:CA	1:D:339:THR:OG1	2.67	0.42
1:A:42:SER:O	1:A:43:ALA:CB	2.67	0.42
1:A:234:ARG:CZ	1:A:277:ASN:OD1	2.68	0.42
1:C:340:ASP:HB3	1:C:381:ARG:HH12	1.83	0.42
1:E:106:CYS:O	1:E:135:LEU:HA	2.20	0.42
1:A:169:PRO:C	1:A:170:ILE:HD12	2.40	0.42
1:D:214:PHE:HA	1:D:237:ARG:O	2.20	0.42
1:E:215:LEU:CD1	1:E:295:VAL:HB	2.49	0.42
5:A:404:MPD:O2	5:A:404:MPD:C5	2.59	0.42
1:C:219:GLU:HG2	1:C:338:THR:HG21	2.02	0.42
1:A:63:ILE:O	1:A:63:ILE:HG23	2.18	0.41
1:A:307:LYS:HA	1:A:364:VAL:O	2.20	0.41
1:B:25:LYS:HE3	3:B:402:GDP:O2B	2.19	0.41
1:D:293:GLY:HA3	1:D:339:THR:OG1	2.19	0.41
5:D:403:MPD:H11	5:D:403:MPD:H4	1.82	0.41
1:A:39:VAL:HG11	1:A:193:LYS:HE2	2.03	0.41
1:A:176:ARG:HB2	3:A:402:GDP:C5	2.54	0.41
1:A:21:VAL:O	1:A:22:ASP:CB	2.68	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:309:THR:HG22	1:C:393:ALA:HB3	2.00	0.41
1:D:215:LEU:CD1	1:D:297:VAL:HG12	2.50	0.41
1:A:68:VAL:CG1	1:A:69:GLU:N	2.82	0.41
1:D:295:VAL:HG23	1:D:297:VAL:HG13	2.02	0.41
1:B:94:THR:HG21	1:B:389:ALA:HB3	2.03	0.41
1:C:125[A]:GLN:HE22	1:C:361:GLN:NE2	2.18	0.41
1:B:260:THR:CG2	1:B:283:ARG:HB2	2.50	0.41
1:C:348:PRO:HG3	1:C:361:GLN:O	2.20	0.41
1:C:137:LYS:HE2	3:C:402:GDP:C4	2.55	0.41
1:C:232:THR:HG21	5:C:403:MPD:H51	2.03	0.41
1:D:37:SER:OG	1:D:42:SER:HB2	2.21	0.41
1:C:89:VAL:HA	1:C:122:LEU:HD21	2.01	0.41
1:D:307:LYS:HA	1:D:364:VAL:O	2.20	0.41
1:A:90:LYS:O	1:A:94:THR:HG22	2.20	0.41
1:B:75:ARG:NH1	1:B:203:ILE:O	2.50	0.41
1:B:215:LEU:HD11	1:B:295:VAL:HB	2.02	0.41
1:A:324:THR:HA	1:A:325:PRO:HD3	1.95	0.41
1:C:42:SER:O	1:C:43:ALA:C	2.58	0.41
1:D:187:MET:HB2	6:D:528:HOH:O	2.21	0.41
1:E:132:VAL:CG1	1:E:133:VAL:N	2.83	0.40
1:D:335:TYR:HA	1:D:339:THR:O	2.22	0.40
1:B:370:ILE:HG22	1:B:372:MET:HE3	2.03	0.40
1:D:70:TYR:OH	1:D:79:HIS:HD2	2.04	0.40
1:B:305:HIS:HB2	1:B:372:MET:HG2	2.02	0.40

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

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:156:ASP:OD1	1:E:223:SER:OG[4_655]	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	371/433 (86%)	353 (95%)	17 (5%)	1 (0%)	41	50
1	B	371/433 (86%)	354 (95%)	16 (4%)	1 (0%)	41	50
1	C	371/433 (86%)	354 (95%)	15 (4%)	2 (0%)	29	35
1	D	368/433 (85%)	347 (94%)	19 (5%)	2 (0%)	29	35
1	E	366/433 (84%)	339 (93%)	25 (7%)	2 (0%)	29	35
All	All	1847/2165 (85%)	1747 (95%)	92 (5%)	8 (0%)	34	42

All (8) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	243	GLN
1	D	337	ARG
1	B	83	PRO
1	E	83	PRO
1	E	284	GLY
1	C	243	GLN
1	C	83	PRO
1	A	41	GLY

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	309/362 (85%)	302 (98%)	7 (2%)	50	67
1	B	308/362 (85%)	307 (100%)	1 (0%)	92	97
1	C	309/362 (85%)	302 (98%)	7 (2%)	50	67
1	D	301/362 (83%)	295 (98%)	6 (2%)	55	72
1	E	290/362 (80%)	287 (99%)	3 (1%)	76	87
All	All	1517/1810 (84%)	1493 (98%)	24 (2%)	62	78

All (24) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	17	THR
1	A	22	ASP
1	A	40	PHE
1	A	62	THR
1	A	205	GLU
1	A	315	LEU
1	A	370	ILE
1	B	122	LEU
1	C	17	THR
1	C	42	SER
1	C	68	VAL
1	C	126	VAL
1	C	205	GLU
1	C	292	ARG
1	C	353	MET
1	D	17	THR
1	D	22	ASP
1	D	126	VAL
1	D	323	HIS
1	D	339	THR
1	D	367	ILE
1	E	146	LEU
1	E	201	SER
1	E	215	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (17) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	79	HIS
1	A	85	HIS
1	A	91	ASN
1	A	125	GLN
1	B	79	HIS
1	B	85	HIS
1	B	91	ASN
1	B	125	GLN
1	B	212	GLN
1	C	79	HIS
1	D	79	HIS
1	D	85	HIS
1	E	23	HIS
1	E	67	HIS
1	E	79	HIS

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Mol	Chain	Res	Type
1	E	125	GLN
1	E	361	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 18 ligands modelled in this entry, 5 are monoatomic - leaving 13 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	#$|Z| > 2$
3	GDP	B	402	2	25,30,30	1.06	2 (8%)	30,47,47	1.14	4 (13%)
4	MES	E	403	-	12,12,12	2.24	1 (8%)	15,16,16	1.58	3 (20%)
4	MES	A	403	-	12,12,12	2.36	1 (8%)	15,16,16	1.91	4 (26%)
3	GDP	A	402	2	25,30,30	1.03	2 (8%)	30,47,47	1.34	3 (10%)
4	MES	B	403	-	12,12,12	2.19	1 (8%)	15,16,16	2.27	5 (33%)
3	GDP	C	402	2	25,30,30	1.12	3 (12%)	30,47,47	1.03	2 (6%)
5	MPD	E	404	-	7,7,7	0.41	0	9,10,10	0.65	0
5	MPD	A	404	-	7,7,7	0.30	0	9,10,10	0.81	0
5	MPD	C	403	-	7,7,7	0.42	0	9,10,10	0.77	0
3	GDP	E	402	2	25,30,30	0.90	1 (4%)	30,47,47	1.21	3 (10%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#|Z| > 2	Counts	RMSZ	#|Z| > 2
5	MPD	D	403	-	7,7,7	0.27	0	9,10,10	0.41	0
5	MPD	A	405	-	7,7,7	0.44	0	9,10,10	0.60	0
3	GDP	D	402	2	25,30,30	1.25	3 (12%)	30,47,47	1.33	3 (10%)

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
3	GDP	B	402	2	-	1/12/32/32	0/3/3/3
4	MES	E	403	-	-	0/6/14/14	0/1/1/1
4	MES	A	403	-	-	3/6/14/14	0/1/1/1
3	GDP	A	402	2	-	1/12/32/32	0/3/3/3
4	MES	B	403	-	-	2/6/14/14	0/1/1/1
3	GDP	C	402	2	-	1/12/32/32	0/3/3/3
5	MPD	E	404	-	-	3/5/5/5	-
5	MPD	A	404	-	-	4/5/5/5	-
5	MPD	C	403	-	-	2/5/5/5	-
3	GDP	E	402	2	-	2/12/32/32	0/3/3/3
5	MPD	D	403	-	-	3/5/5/5	-
5	MPD	A	405	-	-	3/5/5/5	-
3	GDP	D	402	2	-	1/12/32/32	0/3/3/3

All (14) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	403	MES	C8-S	-7.90	1.66	1.77
4	E	403	MES	C8-S	-7.46	1.67	1.77
4	B	403	MES	C8-S	-7.23	1.67	1.77
3	D	402	GDP	PA-O3A	3.46	1.63	1.59
3	D	402	GDP	C6-N1	-2.90	1.33	1.37
3	A	402	GDP	PA-O3A	2.79	1.62	1.59
3	C	402	GDP	C6-N1	-2.68	1.33	1.37
3	A	402	GDP	C6-N1	-2.67	1.33	1.37
3	B	402	GDP	PA-O3A	2.43	1.62	1.59
3	C	402	GDP	PA-O3A	2.39	1.62	1.59
3	B	402	GDP	C6-N1	-2.29	1.34	1.37
3	E	402	GDP	C6-N1	-2.08	1.34	1.37
3	D	402	GDP	C5-C4	2.02	1.48	1.43

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	402	GDP	C5-C4	2.02	1.48	1.43

All (27) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	B	403	MES	C2-C3-N4	-5.17	102.27	110.12
3	D	402	GDP	O4'-C1'-N9	4.91	115.25	108.75
4	B	403	MES	C6-C5-N4	-4.50	103.28	110.12
4	A	403	MES	C2-C3-N4	-4.27	103.63	110.12
3	A	402	GDP	O4'-C1'-N9	4.00	114.05	108.75
3	E	402	GDP	C8-N7-C5	3.15	107.92	102.55
3	A	402	GDP	C8-N7-C5	3.10	107.83	102.55
4	E	403	MES	C2-C3-N4	-3.01	105.55	110.12
4	A	403	MES	C6-C5-N4	-2.78	105.89	110.12
4	B	403	MES	C7-N4-C3	2.63	118.25	111.24
4	E	403	MES	C5-N4-C3	2.57	114.39	108.84
3	D	402	GDP	C8-N7-C5	2.54	106.87	102.55
3	B	402	GDP	C8-N7-C5	2.50	106.80	102.55
3	B	402	GDP	O3B-PB-O3A	2.46	112.87	104.64
3	B	402	GDP	O4'-C1'-N9	2.45	111.99	108.75
4	B	403	MES	O1S-S-C8	2.41	110.37	106.73
4	A	403	MES	O2S-S-C8	2.33	110.25	106.73
3	B	402	GDP	O2A-PA-O5'	2.28	117.91	107.57
4	B	403	MES	O3S-S-C8	2.20	110.31	106.00
3	A	402	GDP	O2A-PA-O5'	2.20	117.54	107.57
3	D	402	GDP	O3B-PB-O3A	2.13	111.79	104.64
4	E	403	MES	O1S-S-C8	2.12	109.93	106.73
3	C	402	GDP	O4'-C1'-N9	2.11	111.54	108.75
3	C	402	GDP	C8-N7-C5	2.10	106.13	102.55
3	E	402	GDP	O4'-C1'-N9	2.10	111.53	108.75
3	E	402	GDP	C5-C6-N1	2.08	118.05	114.07
4	A	403	MES	C8-C7-N4	-2.02	104.72	112.36

There are no chirality outliers.

All (26) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	402	GDP	PA-O3A-PB-O2B
3	B	402	GDP	PA-O3A-PB-O2B
4	A	403	MES	C7-C8-S-O1S
4	A	403	MES	C7-C8-S-O3S
5	A	404	MPD	C2-C3-C4-C5

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Mol	Chain	Res	Type	Atoms
5	C	403	MPD	C2-C3-C4-C5
4	B	403	MES	N4-C7-C8-S
4	A	403	MES	C7-C8-S-O2S
3	C	402	GDP	PA-O3A-PB-O2B
5	A	404	MPD	CM-C2-C3-C4
5	A	405	MPD	C1-C2-C3-C4
5	E	404	MPD	CM-C2-C3-C4
3	E	402	GDP	O4'-C4'-C5'-O5'
5	D	403	MPD	C2-C3-C4-C5
5	E	404	MPD	C2-C3-C4-C5
4	B	403	MES	C8-C7-N4-C3
3	D	402	GDP	PA-O3A-PB-O2B
5	A	404	MPD	O2-C2-C3-C4
5	C	403	MPD	O2-C2-C3-C4
5	D	403	MPD	O2-C2-C3-C4
5	A	405	MPD	C2-C3-C4-O4
5	A	404	MPD	C1-C2-C3-C4
5	A	405	MPD	CM-C2-C3-C4
5	D	403	MPD	CM-C2-C3-C4
5	E	404	MPD	C1-C2-C3-C4
3	E	402	GDP	C3'-C4'-C5'-O5'

There are no ring outliers.

8 monomers are involved in 21 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	402	GDP	3	0
4	A	403	MES	1	0
3	A	402	GDP	2	0
3	C	402	GDP	2	0
5	E	404	MPD	3	0
5	A	404	MPD	3	0
5	C	403	MPD	5	0
5	D	403	MPD	2	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 GDP B 402

Bond lengths

Bond angles

Torsions

Rings

Ligand GDP A 402

Bond lengths

Bond angles

Torsions

Rings

Ligand GDP C 402

Bond lengths

Bond angles

Torsions

Rings

Ligand GDP E 402

Bond lengths

Bond angles

Torsions

Rings

Ligand GDP D 402

Bond lengths

Bond angles

Torsions

Rings
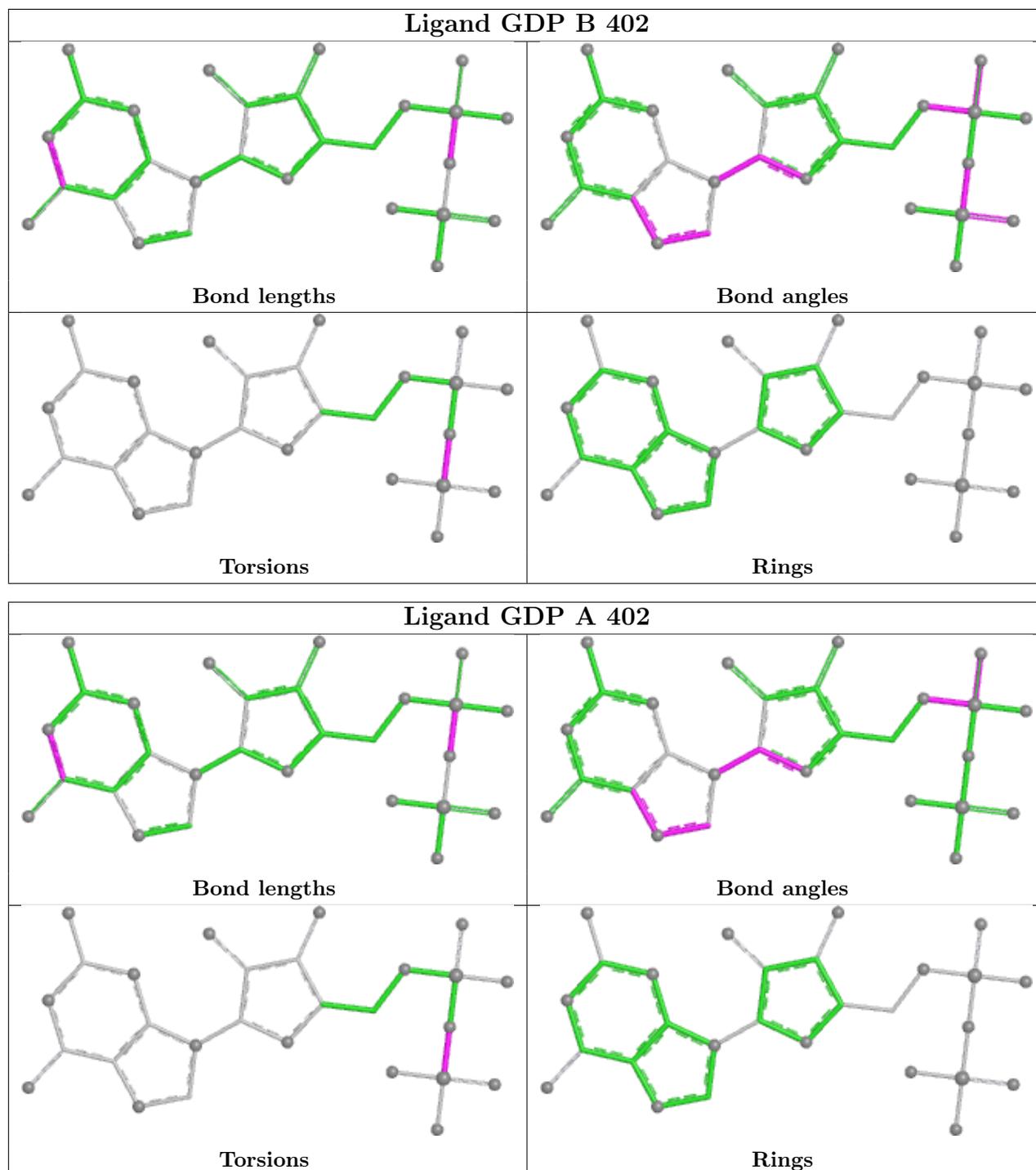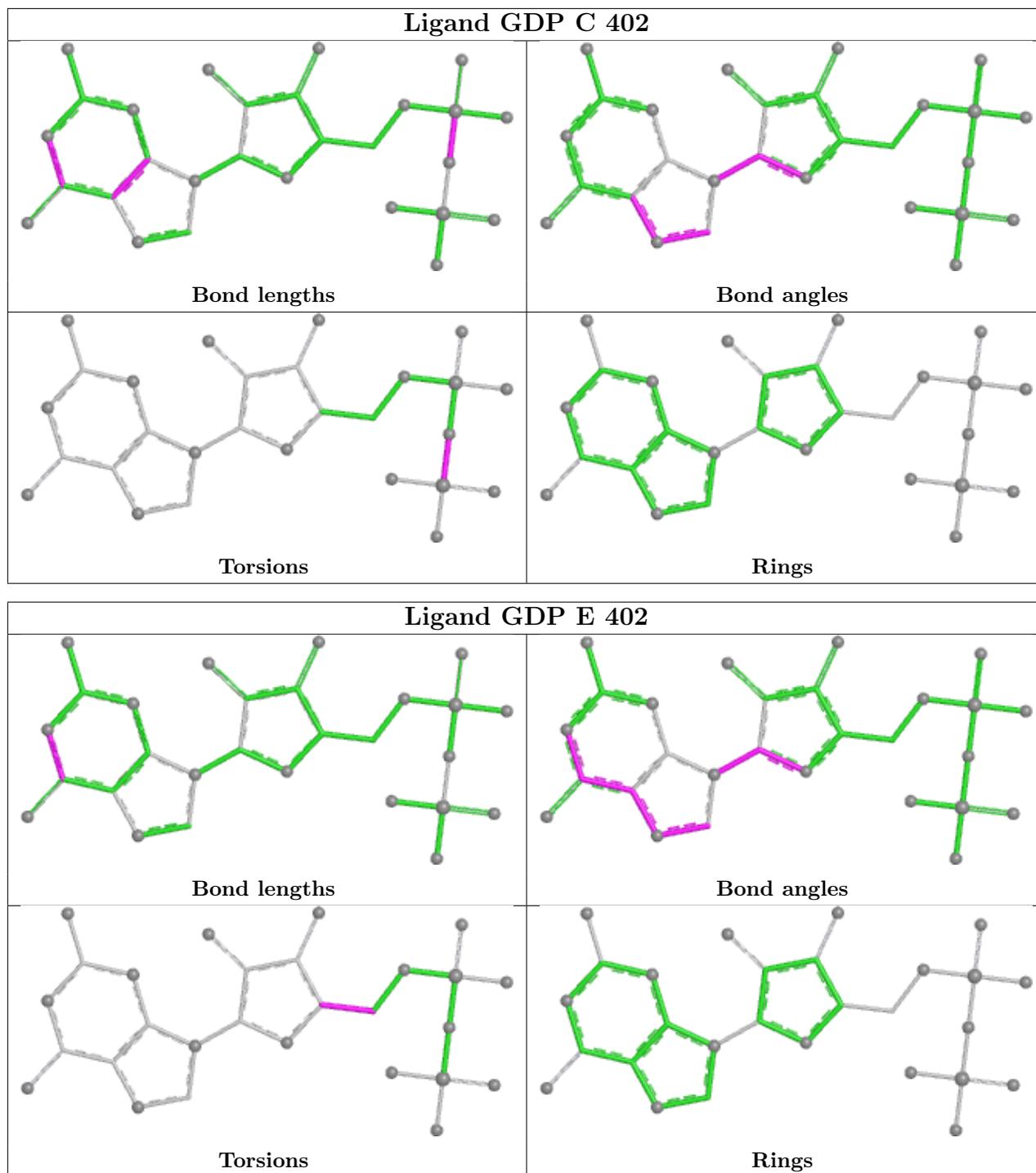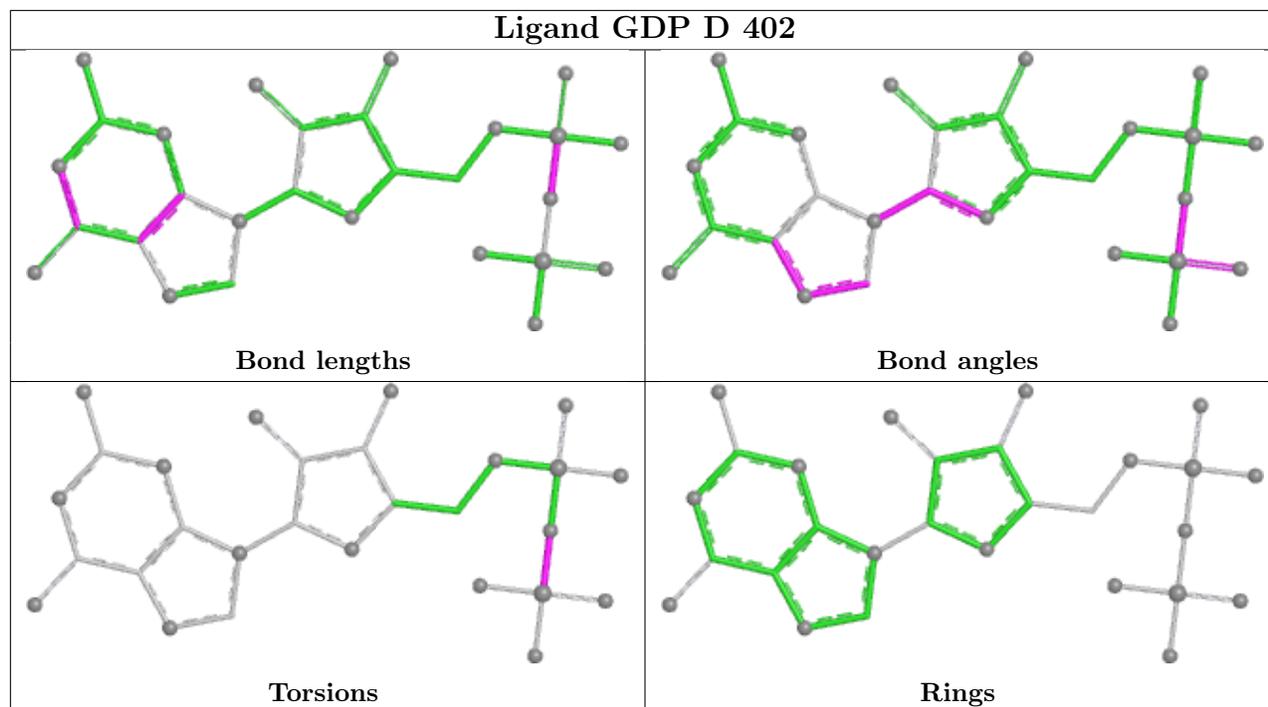
5.7 Other polymers ⓘ

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	373/433 (86%)	-0.05	4 (1%) 80	85	33, 50, 99, 127	0
1	B	374/433 (86%)	-0.20	3 (0%) 86	89	34, 55, 106, 131	0
1	C	373/433 (86%)	-0.06	4 (1%) 80	85	30, 58, 107, 138	0
1	D	371/433 (85%)	-0.11	5 (1%) 77	81	32, 75, 122, 156	0
1	E	370/433 (85%)	-0.00	11 (2%) 50	57	47, 84, 121, 145	0
All	All	1861/2165 (85%)	-0.08	27 (1%) 73	79	30, 61, 115, 156	0

All (27) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	E	40	PHE	3.9
1	B	62	THR	3.6
1	C	60	GLY	3.5
1	D	62	THR	3.4
1	E	41	GLY	3.3
1	E	10	LEU	3.1
1	E	353	MET	3.1
1	E	345	CYS	3.1
1	A	326	PHE	3.0
1	D	63	ILE	2.7
1	B	42	SER	2.6
1	B	43	ALA	2.6
1	D	353	MET	2.6
1	E	347	LEU	2.5
1	D	221	VAL	2.4
1	E	326	PHE	2.4
1	A	10	LEU	2.4
1	C	9	SER	2.4
1	A	43	ALA	2.4
1	E	42	SER	2.4

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Mol	Chain	Res	Type	RSRZ
1	E	346	GLU	2.3
1	C	334	PHE	2.3
1	E	9	SER	2.3
1	C	62	THR	2.2
1	D	227	ARG	2.2
1	A	9	SER	2.2
1	E	330	TYR	2.2

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(Å²)	Q<0.9
4	MES	E	403	12/12	0.87	0.17	101,110,161,161	12
4	MES	A	403	12/12	0.88	0.27	60,93,181,181	0
4	MES	B	403	12/12	0.89	0.19	58,81,138,145	0
5	MPD	E	404	8/8	0.89	0.25	38,60,74,77	0
5	MPD	D	403	8/8	0.92	0.28	91,97,102,106	0
5	MPD	A	404	8/8	0.93	0.22	30,42,54,89	0
5	MPD	C	403	8/8	0.95	0.23	46,56,63,76	0
3	GDP	E	402	28/28	0.97	0.14	54,82,99,101	0
2	MG	E	401	1/1	0.97	0.14	77,77,77,77	0
2	MG	C	401	1/1	0.98	0.09	39,39,39,39	0
5	MPD	A	405	8/8	0.98	0.22	41,49,52,56	0
2	MG	D	401	1/1	0.98	0.07	42,42,42,42	0
2	MG	A	401	1/1	0.98	0.14	39,39,39,39	0
3	GDP	B	402	28/28	0.98	0.13	28,36,42,51	0
2	MG	B	401	1/1	0.99	0.07	49,49,49,49	0
3	GDP	C	402	28/28	0.99	0.13	25,33,40,42	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($Å^2$)	Q<0.9
3	GDP	D	402	28/28	0.99	0.11	18,33,43,46	0
3	GDP	A	402	28/28	0.99	0.15	27,36,43,48	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 GDP E 402:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)
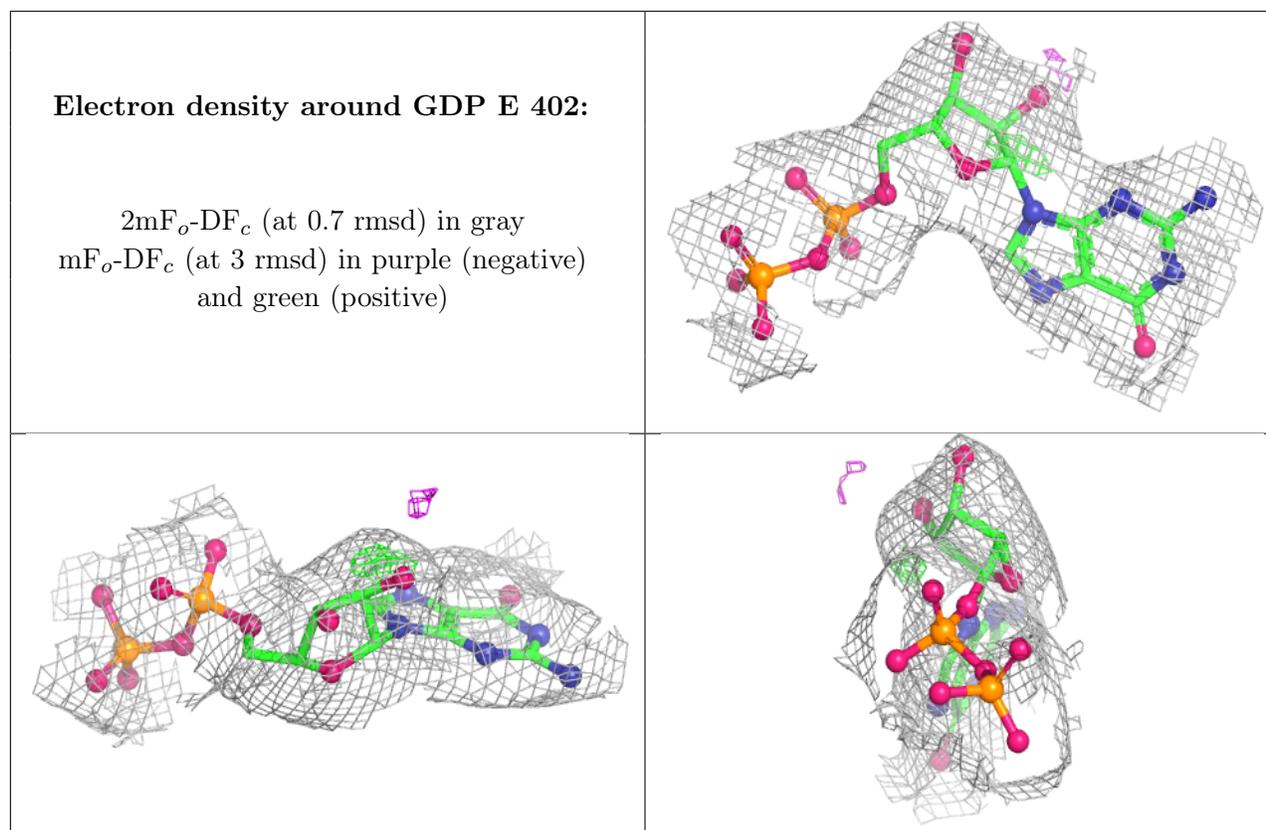
Electron density around GDP B 402:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
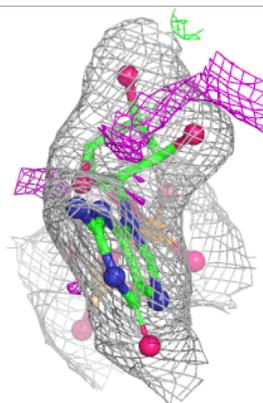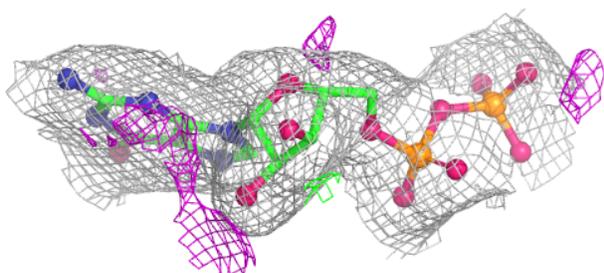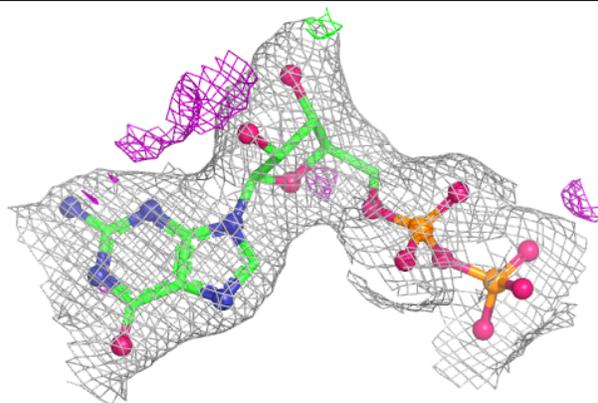
Electron density around GDP C 402:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
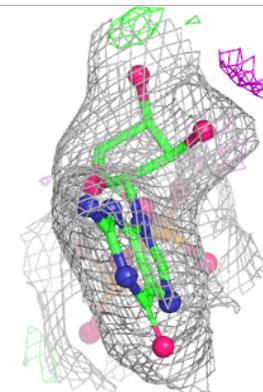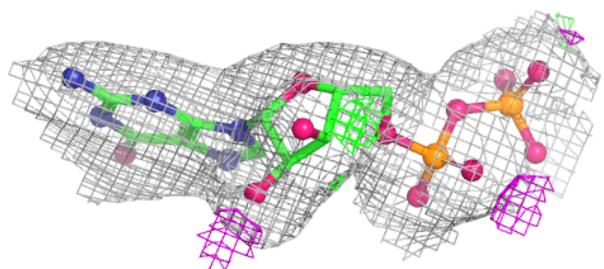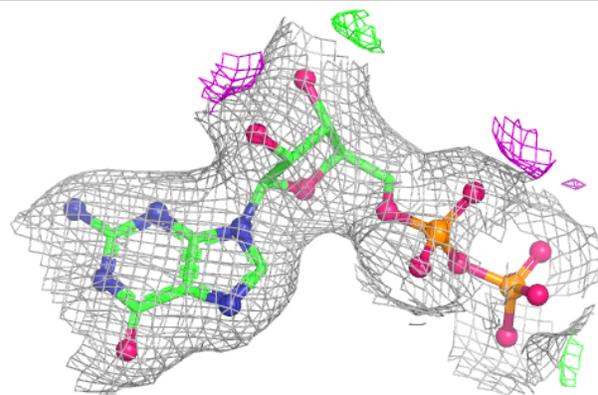
Electron density around GDP D 402:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
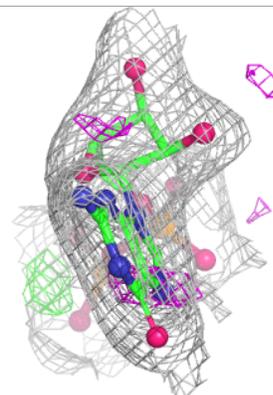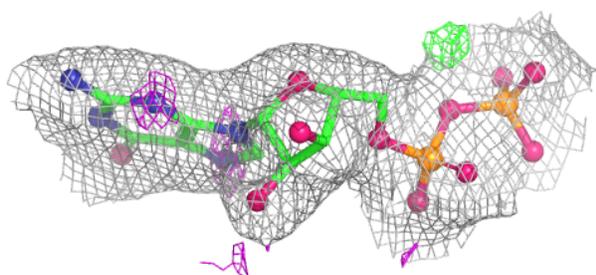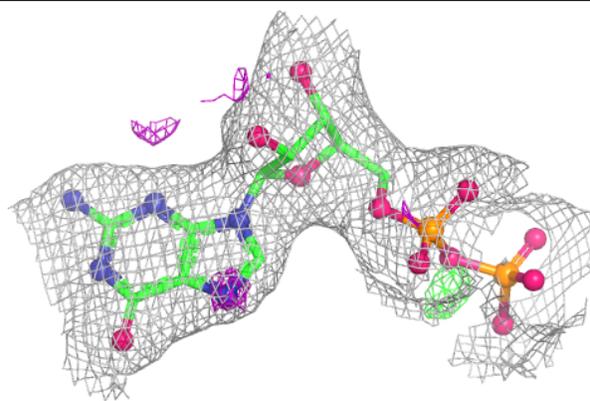
Electron density around GDP A 402:

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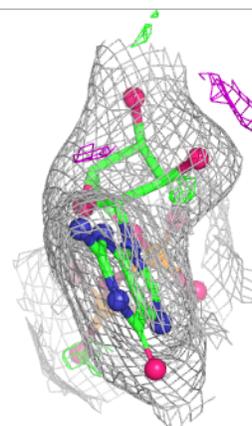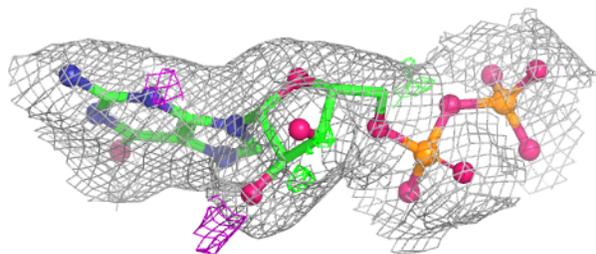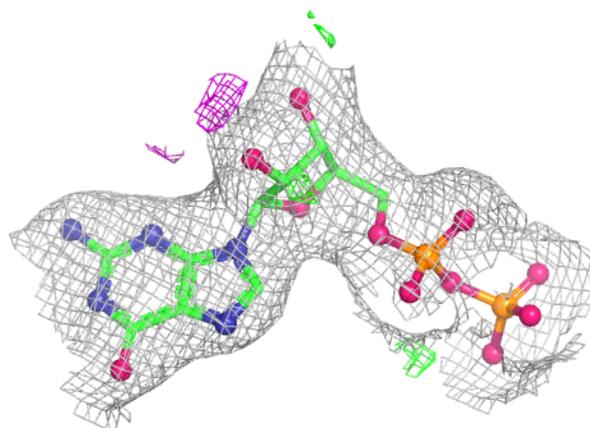
6.5 Other polymers (i)

There are no such residues in this entry.