Full wwPDB X-ray Structure Validation Report ⓘ

Jun 11, 2024 – 07:02 PM EDT

PDB ID	:	1QWJ
Title	:	The Crystal Structure of Murine CMP-5-N-Acetylneuraminic Acid Synthetase
Authors	:	Krapp, S.; Muenster-Kuehnel, A.K.; Kaiser, J.T.; Huber, R.; Tiralongo, J.; Gerardy-Schahn, R.; Jacob, U.
Deposited on	:	2003-09-02
Resolution	:	2.80 Å(reported)

The following versions of software and data (see references ⓘ) were used in the production of this report:
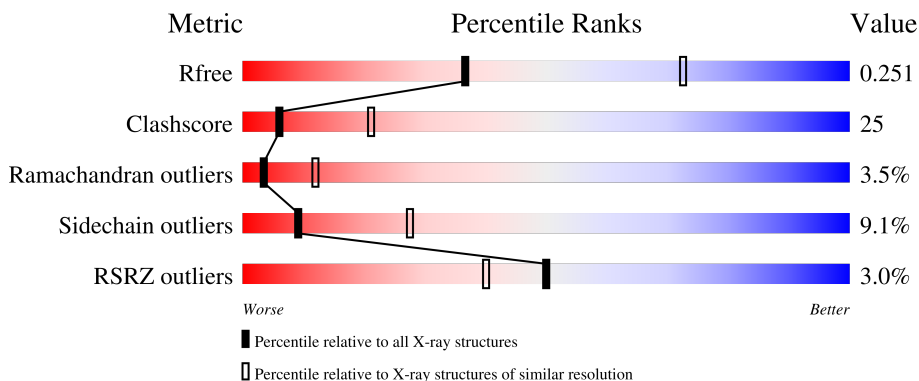
1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.80 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		0.251
Clashscore		25
Ramachandran outliers		3.5%
Sidechain outliers		9.1%
RSRZ outliers		3.0%

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	3140 (2.80-2.80)
Clashscore	141614	3569 (2.80-2.80)
Ramachandran outliers	138981	3498 (2.80-2.80)
Sidechain outliers	138945	3500 (2.80-2.80)
RSRZ outliers	127900	3078 (2.80-2.80)

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.

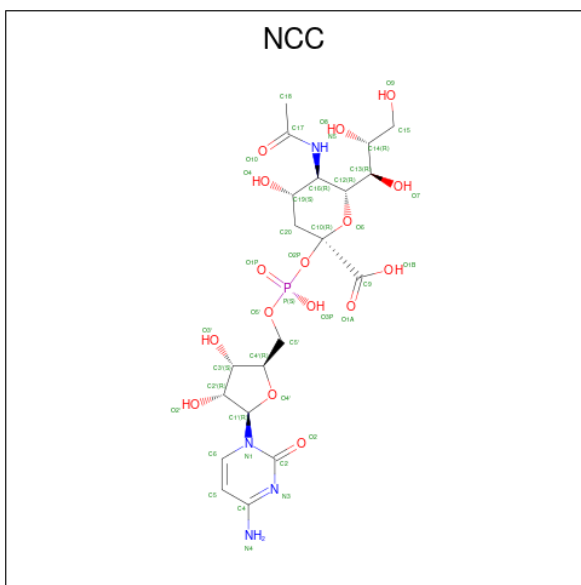| Mol	Chain	Length	Quality of chain
1	A	229	53% · 42% ·
1	B	229	59% · 35% · 6%
1	C	229	% · 51% · 42% · 7%
1	D	229	10% · 50% · 45% · 5%

2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 7611 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 cytidine monophospho-N-acetylneuraminic acid synthetase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	228	Total 1831	C 1160	N 329	O 337	S 5	37	0	0
1	B	229	Total 1840	C 1165	N 330	O 340	S 5	22	0	0
1	C	228	Total 1831	C 1160	N 329	O 337	S 5	118	0	0
1	D	228	Total 1831	C 1160	N 329	O 337	S 5	130	0	0

- Molecule 2 is CYTIDINE-5'-MONOPHOSPHATE-5-N-ACETYLNEURAMINIC ACID (three-letter code: NCC) (formula: $C_{20}H_{31}N_4O_{16}P$).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total 41	C 20	N 4	O 16	P 1	0	0
2	C	1	Total 41	C 20	N 4	O 16	P 1	0	0

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
2	D	1	41	20	4	16	1	0	0

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	52	Total 52	O 52	0	0
3	B	59	Total 59	O 59	0	0
3	C	26	Total 26	O 26	0	0
3	D	18	Total 18	O 18	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: cytidine monophospho-N-acetylneuraminic acid synthetase

Chain A:

- Molecule 1: cytidine monophospho-N-acetylneuraminic acid synthetase

Chain B:

- Molecule 1: cytidine monophospho-N-acetylneuraminic acid synthetase

Chain C:

Y210 E211 N212 G213 S214 F215 Y216 F217 A218 K219 R220 H221 L222 I223 E224 Y227 L228 Q229 A234 E241 H242 S243 V244 D245 I246 D247 V248 D249 I250 D251 W252 P253 R258 V259 F262 G266 K267 GLU

• Molecule 1: cytidine monophospho-N-acetylneuraminic acid synthetase

Chain D:

10%

50%   45%   5%

P40 P41 H42 L43 A44 A45 L46 V47 L48 A49 R50 G51 G52 S53 K54 G55 L58 K59 N60 I61 A65 G66 V67 P68 L69 I70 G71 W72 V73 L74 R75 A76 A77 L78 D79 A80 G81 V82 F83 Q84 S85 V86 S89 H92 D93 E94 I95 E96 N97 V98 A99 K100 Q101 R108 R109

S110 K115 S118 T119 S120 L121 D122 A123 I124 V125 E126 F127 L128 N129 Y130 H131 N132 E133 I136 I140 L147 H148 P149 L152 Q153 K154 V155 M158 E161 E162 G163 Y164 D165 S166 V167 V170 V171 R172 R173 H174 Q175 F176 R177 W178 S179 E180 I181 G184 V185 R186

E187 V188 T189 L192 N193 L194 N195 P196 R201 D204 Y210 E211 N212 G213 S214 F217 R220 H221 L222 I223 E224 Y227 L228 K232 M233 A234 Y235 R239 A240 E241 H242 S243 V244 D245 V248 D249 I250 D251 W252 P253 I254 A255 E256 Q257 R258 V259 L260 R261 K267

GLU

4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	74.05Å 79.94Å 170.25Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	50.00 – 2.80 42.56 – 2.70	Depositor EDS
% Data completeness (in resolution range)	(Not available) (50.00-2.80) 99.4 (42.56-2.70)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	0.10	Depositor
$<I/\sigma(I)>$ [1]	1.74 (at 2.69Å)	Xtriage
Refinement program	CNS	Depositor
R, R_{free}	0.240 , 0.304 0.219 , 0.251	Depositor DCC
R_{free} test set	2429 reflections (8.52%)	wwPDB-VP
Wilson B-factor (Å^2)	46.1	Xtriage
Anisotropy	0.143	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.33 , 78.7	EDS
L-test for twinning [2]	$<\|L\|> = 0.40, <L^2> = 0.23$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.90	EDS
Total number of atoms	7611	wwPDB-VP
Average B, all atoms (Å^2)	46.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.58% 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 ⓘ

5.1 Standard geometry ⓘ

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

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	0.41	0/1875	0.63	0/2537
1	B	0.42	0/1884	0.68	1/2549 (0.0%)
1	C	0.36	0/1875	0.58	0/2537
1	D	0.36	0/1875	0.58	0/2537
All	All	0.39	0/7509	0.62	1/10160 (0.0%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	206	ASP	N-CA-C	-5.50	96.16	111.00

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	186	ARG	Sidechain

5.2 Too-close contacts ⓘ

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1831	0	1794	90	0
1	B	1840	0	1800	79	0
1	C	1831	0	1794	91	0
1	D	1831	0	1794	101	0
2	A	41	0	29	2	0
2	C	41	0	29	0	0
2	D	41	0	29	0	0
3	A	52	0	0	5	0
3	B	59	0	0	9	0
3	C	26	0	0	2	0
3	D	18	0	0	0	0
All	All	7611	0	7269	347	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 25.

All (347) 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:B:92:HIS:HD2	1:B:94:GLU:H	1.12	0.98
1:C:228:LEU:H	1:C:228:LEU:HD23	1.31	0.93
1:D:177:ARG:H	1:D:193:ASN:ND2	1.67	0.93
1:D:43:LEU:H	1:D:84:GLN:HE21	1.11	0.92
1:B:92:HIS:CD2	1:B:94:GLU:H	1.93	0.87
1:D:212:ASN:ND2	1:D:214:SER:H	1.71	0.87
1:A:89:SER:OG	1:A:109:ARG:HD3	1.77	0.84
1:A:251:ASP:OD2	1:A:253:PRO:HG2	1.76	0.84
1:C:43:LEU:H	1:C:84:GLN:HE21	1.23	0.84
1:D:245:ASP:HB3	1:D:248:VAL:HG23	1.60	0.83
1:D:119:THR:HB	1:D:122:ASP:HB2	1.62	0.81
1:C:149:PRO:O	1:C:153:GLN:HG3	1.81	0.81
1:A:253:PRO:HG3	1:B:261:ARG:HH12	1.45	0.80
1:D:179:SER:O	1:D:189:THR:HG23	1.81	0.80
1:C:64:LEU:HD21	1:C:259:VAL:HG21	1.64	0.79
1:A:96:GLU:HG3	1:A:106:VAL:HG11	1.65	0.78

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:171:VAL:HG21	1:A:243:SER:HB3	1.64	0.78
1:D:212:ASN:HD22	1:D:214:SER:H	1.30	0.76
1:B:119:THR:HG22	1:B:122:ASP:CG	2.07	0.75
1:B:119:THR:HG23	1:B:122:ASP:H	1.51	0.75
1:B:143:THR:HB	3:B:298:HOH:O	1.85	0.75
1:D:177:ARG:H	1:D:193:ASN:HD21	1.31	0.75
1:A:63:ARG:HG2	1:A:63:ARG:HH21	1.50	0.75
1:A:245:ASP:HB3	1:A:248:VAL:HG23	1.68	0.75
1:B:171:VAL:HG21	1:B:243:SER:HB3	1.68	0.75
1:A:176:PHE:HA	1:A:193:ASN:HD22	1.51	0.74
1:A:149:PRO:O	1:A:153:GLN:HG3	1.87	0.73
1:D:58:LEU:HD23	1:D:61:ILE:HG21	1.68	0.73
1:B:143:THR:HA	1:B:246:ILE:HD12	1.70	0.73
1:C:195:ASN:ND2	1:C:198:LYS:H	1.86	0.73
1:B:92:HIS:HD2	1:B:94:GLU:N	1.87	0.72
1:A:50:ARG:HB3	1:A:109:ARG:NH2	2.05	0.72
1:B:149:PRO:O	1:B:153:GLN:HG3	1.91	0.70
1:C:157:GLU:HG3	1:C:160:ARG:HH11	1.56	0.70
1:A:171:VAL:HG21	1:A:243:SER:CB	2.22	0.70
1:D:212:ASN:HD22	1:D:212:ASN:C	1.94	0.70
1:C:228:LEU:HD23	1:C:228:LEU:N	2.04	0.70
1:D:252:TRP:HB3	1:D:253:PRO:HD3	1.72	0.69
1:B:195:ASN:HD21	1:B:197:ALA:HB3	1.56	0.69
1:C:195:ASN:HD21	1:C:197:ALA:HB3	1.59	0.68
1:D:212:ASN:HD21	1:D:214:SER:HB2	1.57	0.68
1:B:171:VAL:HG21	1:B:243:SER:CB	2.23	0.68
1:A:251:ASP:HB3	1:A:254:ILE:HG13	1.76	0.68
1:C:43:LEU:H	1:C:84:GLN:NE2	1.91	0.68
1:B:69:LEU:HD11	1:B:246:ILE:HD11	1.74	0.68
1:D:181:ILE:HG21	1:D:187:GLU:HA	1.74	0.67
1:B:171:VAL:HG23	1:B:212:ASN:HB3	1.76	0.67
1:A:201:ARG:H	1:A:204:ASP:HB2	1.59	0.67
1:B:246:ILE:HB	3:B:298:HOH:O	1.94	0.66
1:A:91:ASP:HA	3:A:2011:HOH:O	1.95	0.66
1:A:229:GLN:NE2	1:B:178:TRP:CZ2	2.63	0.66
1:A:171:VAL:HG23	1:A:212:ASN:HB3	1.76	0.66
1:C:64:LEU:CD2	1:C:259:VAL:HG21	2.24	0.66
1:C:171:VAL:HG21	1:C:243:SER:CB	2.26	0.66
1:A:250:ILE:HA	3:A:2032:HOH:O	1.95	0.65
1:B:245:ASP:HB3	1:B:248:VAL:HG23	1.77	0.65
1:C:171:VAL:HG23	1:C:212:ASN:HB3	1.79	0.65

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:171:VAL:CG2	1:C:212:ASN:HB3	2.27	0.65
1:C:92:HIS:HD2	1:C:94:GLU:H	1.44	0.64
1:D:96:GLU:O	1:D:100:LYS:HG3	1.97	0.64
1:C:169:SER:OG	1:C:214:SER:HB2	1.96	0.64
1:D:149:PRO:O	1:D:153:GLN:HG3	1.98	0.64
1:B:245:ASP:HB3	1:B:248:VAL:CG2	2.28	0.64
1:D:129:ASN:ND2	1:D:130:TYR:HD1	1.96	0.63
1:A:58:LEU:O	1:A:61:ILE:HG22	1.99	0.63
1:C:177:ARG:H	1:C:193:ASN:HD21	1.45	0.63
1:B:69:LEU:HD11	1:B:246:ILE:CD1	2.29	0.63
1:A:249:ASP:HA	1:B:258:ARG:HH22	1.64	0.63
1:B:164:TYR:CE1	1:B:234:ALA:HB2	2.34	0.62
1:C:219:LYS:O	1:C:223:ILE:HD12	1.99	0.62
1:C:43:LEU:HD23	1:C:136:ILE:O	2.00	0.62
1:D:61:ILE:HG13	1:D:98:VAL:HG21	1.81	0.62
1:C:158:MET:HE3	3:C:3018:HOH:O	1.99	0.62
1:D:61:ILE:CD1	1:D:94:GLU:HG3	2.29	0.61
1:D:179:SER:HB3	1:D:192:LEU:HD21	1.82	0.61
1:D:201:ARG:H	1:D:204:ASP:HB2	1.65	0.61
1:D:121:LEU:HD11	1:D:223:ILE:HG23	1.83	0.61
1:C:175:GLN:NE2	1:D:175:GLN:NE2	2.48	0.61
1:D:73:VAL:HG13	1:D:140:ILE:HG21	1.81	0.61
1:C:171:VAL:HG21	1:C:243:SER:HB3	1.83	0.60
1:C:177:ARG:H	1:C:193:ASN:ND2	1.98	0.60
1:D:245:ASP:HB3	1:D:248:VAL:CG2	2.29	0.60
1:D:40:PRO:N	1:D:41:PRO:HA	2.17	0.60
1:A:195:ASN:OD1	1:A:197:ALA:HB3	2.02	0.60
1:D:164:TYR:CE1	1:D:234:ALA:HB2	2.36	0.60
1:D:121:LEU:HB2	1:D:228:LEU:HD12	1.84	0.60
1:D:239:ARG:HB3	1:D:241:GLU:OE2	2.01	0.60
1:A:82:VAL:HG21	1:A:156:ALA:CB	2.32	0.59
1:B:171:VAL:CG2	1:B:212:ASN:HB3	2.31	0.59
1:C:73:VAL:HG13	1:C:140:ILE:HG21	1.84	0.59
1:B:173:ARG:HG2	1:B:173:ARG:HH11	1.68	0.59
1:A:173:ARG:HB2	1:A:210:TYR:CE1	2.37	0.59
1:C:252:TRP:HB3	1:C:253:PRO:HD3	1.85	0.59
1:D:171:VAL:HG21	1:D:243:SER:CB	2.33	0.59
1:C:175:GLN:HE22	1:D:175:GLN:NE2	2.01	0.59
1:C:195:ASN:ND2	1:C:197:ALA:HB3	2.16	0.59
1:C:218:ALA:HB3	1:C:223:ILE:HD11	1.85	0.59
1:D:171:VAL:HG23	1:D:212:ASN:HB3	1.83	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:63:ARG:HG2	1:A:63:ARG:NH2	2.18	0.58
1:B:177:ARG:CZ	1:B:193:ASN:HD21	2.16	0.58
1:D:40:PRO:HB2	1:D:41:PRO:O	2.03	0.58
1:C:159:ILE:O	1:C:163:GLY:HA2	2.04	0.58
1:A:201:ARG:HB3	1:A:203:GLN:HE22	1.69	0.58
1:B:122:ASP:O	1:B:125:VAL:HG22	2.03	0.58
1:A:43:LEU:H	1:A:84:GLN:NE2	2.02	0.58
1:D:181:ILE:HD11	1:D:188:VAL:C	2.23	0.58
1:A:171:VAL:CG2	1:A:212:ASN:HB3	2.33	0.57
1:D:58:LEU:HB3	1:D:61:ILE:CG2	2.33	0.57
1:D:96:GLU:OE2	1:D:108:ARG:HD3	2.04	0.57
1:A:121:LEU:HD11	1:A:226:GLY:HA2	1.85	0.57
1:B:239:ARG:HB3	1:B:239:ARG:HH21	1.68	0.57
1:C:175:GLN:NE2	1:D:175:GLN:HE22	2.03	0.57
1:A:201:ARG:HB3	1:A:203:GLN:NE2	2.20	0.56
1:A:260:LEU:O	1:A:265:PHE:HZ	1.87	0.56
1:C:223:ILE:HD12	1:C:223:ILE:H	1.70	0.56
1:D:171:VAL:CG2	1:D:212:ASN:HB3	2.35	0.56
1:D:212:ASN:HD22	1:D:213:GLY:N	2.03	0.56
1:C:245:ASP:HB3	1:C:248:VAL:HG23	1.86	0.56
1:D:43:LEU:HB3	1:D:83:PHE:HA	1.86	0.56
1:D:92:HIS:HD2	1:D:94:GLU:H	1.53	0.56
1:C:43:LEU:N	1:C:84:GLN:HE21	2.00	0.56
1:D:93:ASP:OD1	1:D:108:ARG:NH2	2.38	0.56
1:C:61:ILE:O	1:C:68:PRO:HB3	2.06	0.56
1:D:129:ASN:N	1:D:129:ASN:HD22	2.04	0.56
1:C:58:LEU:HD11	1:C:92:HIS:CE1	2.42	0.55
1:B:198:LYS:HA	3:B:308:HOH:O	2.05	0.55
1:C:97:ASN:O	1:C:101:GLN:HG3	2.06	0.55
1:C:195:ASN:O	1:C:197:ALA:N	2.39	0.55
1:D:173:ARG:HB2	1:D:210:TYR:CE1	2.42	0.55
1:C:96:GLU:OE2	1:C:108:ARG:HD3	2.07	0.55
1:A:182:GLN:O	1:A:187:GLU:HG3	2.06	0.55
1:A:73:VAL:HG13	1:A:140:ILE:HG21	1.89	0.54
1:A:251:ASP:HB3	1:A:254:ILE:CG1	2.37	0.54
1:B:177:ARG:NH1	1:B:193:ASN:HD21	2.05	0.54
1:D:165:ASP:HB3	1:D:222:LEU:HD11	1.88	0.54
1:A:128:LEU:HD22	1:A:220:ARG:NH2	2.22	0.54
1:A:164:TYR:CD2	1:A:232:LYS:HG2	2.42	0.54
1:C:201:ARG:HH11	1:C:203:GLN:HB3	1.71	0.54
1:D:177:ARG:N	1:D:193:ASN:HD21	2.01	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:195:ASN:ND2	1:B:197:ALA:HB3	2.20	0.54
1:C:247:ASP:OD2	1:C:247:ASP:N	2.40	0.54
1:A:75:ARG:HB3	3:A:2005:HOH:O	2.08	0.54
1:A:58:LEU:HB3	1:A:61:ILE:HG22	1.89	0.54
1:D:121:LEU:HD13	1:D:228:LEU:HG	1.88	0.54
1:A:253:PRO:HG3	1:B:261:ARG:NH1	2.20	0.54
1:B:121:LEU:HD23	1:B:228:LEU:HG	1.91	0.53
1:C:167:VAL:HA	1:C:234:ALA:O	2.09	0.53
1:C:169:SER:HB3	1:C:215:PHE:CE1	2.44	0.53
1:D:220:ARG:O	1:D:224:GLU:HB2	2.09	0.53
1:B:121:LEU:CD2	1:B:228:LEU:HG	2.39	0.53
1:D:249:ASP:CG	1:D:258:ARG:HH21	2.12	0.53
1:B:70:ILE:O	1:B:74:LEU:HG	2.08	0.53
1:D:120:SER:O	1:D:124:ILE:HG13	2.09	0.53
1:B:160:ARG:HH11	1:B:161:GLU:CG	2.22	0.53
1:C:96:GLU:HG3	1:C:106:VAL:HG11	1.91	0.53
1:C:121:LEU:HD13	1:C:125:VAL:HG23	1.91	0.53
1:A:250:ILE:HD13	1:B:241:GLU:HG3	1.90	0.52
1:A:45:ALA:HB3	1:A:86:VAL:HA	1.92	0.52
1:C:64:LEU:HD21	1:C:259:VAL:CG2	2.38	0.52
1:C:168:PHE:CD2	1:C:229:GLN:HG2	2.45	0.52
1:A:141:GLN:HG3	1:A:213:GLY:O	2.09	0.52
1:C:175:GLN:HE22	1:D:175:GLN:HE22	1.58	0.52
1:A:166:SER:OG	1:A:233:MET:HG2	2.10	0.52
1:B:47:VAL:HG22	1:B:140:ILE:O	2.10	0.52
1:B:97:ASN:O	1:B:101:GLN:HG3	2.10	0.52
1:C:78:LEU:HG	1:C:86:VAL:HG21	1.91	0.52
1:C:178:TRP:HE3	1:C:189:THR:HG22	1.75	0.52
1:A:249:ASP:O	1:A:250:ILE:HB	2.10	0.51
1:D:92:HIS:CD2	1:D:94:GLU:H	2.29	0.51
1:D:173:ARG:HG2	1:D:173:ARG:HH11	1.74	0.51
1:A:50:ARG:HB3	1:A:109:ARG:HH22	1.75	0.51
1:A:92:HIS:CD2	1:A:94:GLU:HB2	2.45	0.51
1:B:139:ASN:ND2	3:B:299:HOH:O	2.41	0.51
1:A:176:PHE:CD1	1:A:194:LEU:HD13	2.45	0.51
1:D:43:LEU:O	1:D:84:GLN:N	2.44	0.51
1:D:176:PHE:HB3	1:D:194:LEU:HD22	1.93	0.51
1:A:165:ASP:HA	1:A:219:LYS:HD2	1.92	0.51
1:C:169:SER:HB3	1:C:215:PHE:CZ	2.46	0.51
1:C:251:ASP:CG	1:C:253:PRO:HD2	2.31	0.51
1:D:58:LEU:HB3	1:D:61:ILE:HG22	1.92	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:48:LEU:HD23	1:A:89:SER:HB3	1.92	0.51
1:C:74:LEU:HD21	1:C:88:VAL:CG2	2.41	0.51
1:D:43:LEU:HB2	1:D:84:GLN:NE2	2.25	0.51
1:B:160:ARG:HH11	1:B:161:GLU:HG2	1.76	0.51
1:D:181:ILE:HD11	1:D:189:THR:N	2.26	0.51
1:A:255:ALA:O	1:A:259:VAL:HG22	2.11	0.51
1:B:125:VAL:HG23	1:B:126:GLU:N	2.26	0.51
1:A:220:ARG:O	1:A:224:GLU:HG3	2.11	0.50
1:A:167:VAL:HG22	1:A:234:ALA:HB3	1.93	0.50
1:C:245:ASP:OD2	1:C:246:ILE:N	2.44	0.50
1:D:119:THR:O	1:D:122:ASP:HB3	2.12	0.50
1:D:185:VAL:C	1:D:187:GLU:H	2.15	0.50
1:B:42:HIS:H	1:B:135:ASP:HB2	1.76	0.49
1:B:241:GLU:OE2	1:B:241:GLU:N	2.44	0.49
1:A:168:PHE:CD2	1:A:229:GLN:HG2	2.46	0.49
1:D:177:ARG:HG2	1:D:192:LEU:HD12	1.93	0.49
1:C:45:ALA:HB3	1:C:86:VAL:HA	1.92	0.49
1:D:121:LEU:CD1	1:D:223:ILE:HG23	2.43	0.49
1:A:221:HIS:O	1:A:225:MET:HG2	2.12	0.49
1:B:219:LYS:NZ	3:B:321:HOH:O	2.46	0.49
1:C:69:LEU:HD11	1:C:246:ILE:HD11	1.95	0.49
1:C:253:PRO:HG2	1:D:261:ARG:NH1	2.28	0.49
1:D:93:ASP:HA	1:D:108:ARG:HH22	1.77	0.49
1:D:131:HIS:HB3	1:D:133:GLU:OE1	2.13	0.48
1:A:239:ARG:HH21	1:A:239:ARG:HG2	1.78	0.48
1:B:147:LEU:HD13	1:B:152:LEU:HD11	1.95	0.48
1:D:167:VAL:HA	1:D:234:ALA:O	2.12	0.48
1:A:248:VAL:HG12	3:A:2037:HOH:O	2.12	0.48
1:B:186:ARG:HG3	1:B:188:VAL:HG12	1.95	0.48
1:C:201:ARG:HH21	1:C:201:ARG:HG3	1.79	0.48
1:A:167:VAL:HA	1:A:234:ALA:O	2.14	0.48
1:C:179:SER:O	1:C:189:THR:HG23	2.13	0.48
1:A:170:VAL:HG22	1:A:210:TYR:O	2.13	0.48
1:A:132:ASN:HA	1:A:220:ARG:NH2	2.28	0.47
1:C:218:ALA:HB2	1:C:228:LEU:O	2.14	0.47
1:D:70:ILE:O	1:D:74:LEU:HG	2.14	0.47
1:D:178:TRP:HB3	1:D:189:THR:CG2	2.44	0.47
1:C:42:HIS:CD2	1:C:84:GLN:HB2	2.50	0.47
1:C:220:ARG:O	1:C:224:GLU:HG3	2.14	0.47
1:A:58:LEU:HB3	1:A:61:ILE:CG2	2.44	0.47
1:C:119:THR:HB	1:C:122:ASP:OD1	2.14	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:166:SER:HB3	1:C:222:LEU:CD1	2.44	0.47
1:A:264:TYR:CE2	1:A:266:GLY:HA2	2.49	0.47
1:B:121:LEU:HB2	3:B:297:HOH:O	2.14	0.47
1:C:249:ASP:OD1	1:C:258:ARG:NH2	2.47	0.47
1:D:193:ASN:N	1:D:193:ASN:HD22	2.13	0.47
1:D:257:GLN:OE1	1:D:260:LEU:HD12	2.14	0.47
1:A:216:TYR:HB3	3:A:2008:HOH:O	2.14	0.47
1:C:179:SER:OG	1:C:190:GLU:N	2.43	0.47
1:A:53:SER:O	1:A:55:GLY:N	2.48	0.47
1:A:53:SER:OG	1:A:57:PRO:HA	2.14	0.47
1:B:182:GLN:HG2	1:B:186:ARG:CD	2.45	0.47
1:D:43:LEU:N	1:D:84:GLN:HE21	1.94	0.47
1:D:60:ASN:O	1:D:69:LEU:HB3	2.15	0.47
1:A:109:ARG:HG2	1:A:113:THR:OG1	2.15	0.46
1:A:172:ARG:NH1	1:B:180:GLU:OE2	2.33	0.46
1:B:128:LEU:C	1:B:130:TYR:H	2.19	0.46
1:C:178:TRP:HB3	1:C:189:THR:CG2	2.46	0.46
1:D:65:ALA:HB3	1:D:72:TRP:HZ2	1.81	0.46
1:B:74:LEU:O	1:B:77:ALA:HB3	2.16	0.46
1:B:252:TRP:O	1:B:255:ALA:HB3	2.14	0.46
1:C:228:LEU:N	1:C:228:LEU:CD2	2.75	0.46
1:D:245:ASP:O	1:D:248:VAL:HB	2.16	0.46
1:B:98:VAL:O	1:B:102:PHE:HD1	1.99	0.46
1:C:48:LEU:HD23	1:C:89:SER:HB3	1.97	0.46
1:C:58:LEU:HD11	1:C:92:HIS:NE2	2.31	0.45
1:D:193:ASN:HD22	1:D:193:ASN:H	1.63	0.45
1:D:212:ASN:ND2	1:D:212:ASN:C	2.67	0.45
1:B:173:ARG:HG2	1:B:173:ARG:NH1	2.29	0.45
1:D:129:ASN:HD22	1:D:130:TYR:N	2.14	0.45
1:B:249:ASP:O	1:B:250:ILE:HB	2.16	0.45
1:C:58:LEU:HD21	1:C:92:HIS:CE1	2.51	0.45
1:B:40:PRO:CA	3:B:314:HOH:O	2.64	0.45
1:A:96:GLU:CG	1:A:106:VAL:HG11	2.42	0.45
1:B:151:ASP:O	1:B:155:VAL:HG23	2.17	0.45
1:C:158:MET:O	1:C:162:GLU:HB2	2.17	0.45
1:C:176:PHE:HB3	1:C:194:LEU:HD22	1.99	0.45
1:B:148:HIS:CE1	1:B:242:HIS:CE1	3.04	0.45
1:C:157:GLU:HG3	1:C:160:ARG:NH1	2.26	0.45
1:C:171:VAL:HG21	1:C:212:ASN:HB3	1.99	0.45
1:A:245:ASP:HB3	1:A:248:VAL:CG2	2.44	0.45
1:C:121:LEU:HD23	1:C:228:LEU:HD22	1.98	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:203:GLN:NE2	1:A:203:GLN:H	2.15	0.44
1:C:61:ILE:HG21	1:C:95:ILE:HA	1.98	0.44
1:C:171:VAL:CG2	1:C:212:ASN:HD22	2.31	0.44
1:D:221:HIS:CE1	1:D:222:LEU:HG	2.53	0.44
1:B:235:TYR:CD1	1:B:235:TYR:C	2.90	0.44
1:B:119:THR:HG22	1:B:122:ASP:OD1	2.17	0.44
1:B:148:HIS:HE1	1:B:262:PHE:O	2.01	0.44
1:A:201:ARG:H	1:A:204:ASP:CB	2.29	0.44
1:D:92:HIS:HB3	1:D:95:ILE:HG13	1.99	0.44
1:D:121:LEU:HA	1:D:124:ILE:HD12	2.00	0.43
1:C:155:VAL:HG11	1:C:217:PHE:CD2	2.53	0.43
1:D:45:ALA:HB2	1:D:83:PHE:CD2	2.53	0.43
1:A:133:GLU:H	1:A:133:GLU:HG3	1.40	0.43
1:C:42:HIS:HB3	1:C:133:GLU:O	2.17	0.43
1:C:168:PHE:HB3	3:C:3008:HOH:O	2.18	0.43
1:A:92:HIS:CD2	1:A:94:GLU:H	2.37	0.43
1:C:219:LYS:O	1:C:223:ILE:CD1	2.65	0.43
1:A:148:HIS:HE1	1:A:262:PHE:O	2.01	0.43
1:A:177:ARG:HD3	3:B:292:HOH:O	2.18	0.43
1:B:47:VAL:HG21	1:B:73:VAL:CG1	2.49	0.43
1:D:252:TRP:N	1:D:253:PRO:CD	2.81	0.43
1:D:166:SER:HB3	1:D:222:LEU:CD1	2.49	0.43
1:D:249:ASP:OD2	1:D:258:ARG:NH2	2.48	0.43
1:A:252:TRP:N	1:A:253:PRO:HD2	2.34	0.42
1:B:62:LYS:O	1:B:68:PRO:HA	2.18	0.42
1:B:65:ALA:HB3	1:B:72:TRP:HZ2	1.84	0.42
1:B:166:SER:HB3	1:B:222:LEU:CD1	2.49	0.42
1:A:249:ASP:CA	1:B:258:ARG:HH22	2.30	0.42
1:B:129:ASN:N	1:B:129:ASN:HD22	2.17	0.42
1:A:175:GLN:HE22	1:B:175:GLN:NE2	2.18	0.42
1:C:120:SER:O	1:C:124:ILE:HG13	2.20	0.42
1:A:253:PRO:O	1:A:256:GLU:HB2	2.19	0.42
1:C:50:ARG:HH12	1:C:116:ASP:HA	1.85	0.42
1:C:193:ASN:ND2	1:C:193:ASN:C	2.73	0.42
1:D:154:LYS:O	1:D:158:MET:HG3	2.18	0.42
1:A:61:ILE:CG1	1:A:98:VAL:HG21	2.50	0.42
1:A:183:LYS:HB2	1:A:183:LYS:HE3	1.76	0.42
1:B:229:GLN:N	3:B:272:HOH:O	2.49	0.42
1:C:173:ARG:HB2	1:C:210:TYR:CE1	2.55	0.42
1:D:70:ILE:HD11	1:D:98:VAL:HB	2.02	0.42
1:D:129:ASN:HD22	1:D:130:TYR:H	1.68	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:198:LYS:HD3	1:B:198:LYS:C	2.38	0.42
1:D:78:LEU:HG	1:D:86:VAL:HG21	2.01	0.42
1:B:92:HIS:CD2	1:B:94:GLU:HB2	2.55	0.42
1:B:182:GLN:HG2	1:B:186:ARG:HD2	2.01	0.42
1:B:166:SER:OG	1:B:233:MET:HG2	2.20	0.42
1:D:223:ILE:HA	1:D:227:TYR:O	2.20	0.42
1:D:48:LEU:HB3	1:D:109:ARG:NH2	2.34	0.41
1:A:206:ASP:O	1:A:207:GLY:O	2.38	0.41
1:A:266:GLY:O	1:A:267:LYS:HB3	2.20	0.41
1:C:148:HIS:HE1	1:C:262:PHE:O	2.03	0.41
1:A:164:TYR:HD2	1:A:232:LYS:HG2	1.85	0.41
1:B:40:PRO:HB2	1:B:41:PRO:HD2	2.01	0.41
1:C:121:LEU:HD22	1:C:121:LEU:HA	1.84	0.41
1:D:67:VAL:HA	1:D:68:PRO:HD3	1.92	0.41
1:D:94:GLU:O	1:D:98:VAL:HG23	2.21	0.41
1:D:164:TYR:CZ	1:D:234:ALA:HB2	2.55	0.41
1:A:92:HIS:HD2	1:A:94:GLU:N	2.17	0.41
1:A:216:TYR:CE1	2:A:2002:NCC:H182	2.55	0.41
1:C:92:HIS:CD2	1:C:94:GLU:HB2	2.55	0.41
1:A:50:ARG:HD3	2:A:2002:NCC:C2	2.50	0.41
1:A:125:VAL:O	1:A:125:VAL:CG1	2.66	0.41
1:B:178:TRP:O	1:B:179:SER:O	2.38	0.41
1:C:193:ASN:C	1:C:193:ASN:HD22	2.24	0.41
1:C:249:ASP:C	1:C:251:ASP:H	2.23	0.41
1:D:163:GLY:O	1:D:232:LYS:HD3	2.21	0.41
1:B:124:ILE:HG22	1:B:223:ILE:HG21	2.02	0.41
1:B:128:LEU:C	1:B:130:TYR:N	2.74	0.41
1:A:101:GLN:NE2	1:C:267:LYS:HB3	2.35	0.41
1:A:109:ARG:HH21	1:A:114:SER:HA	1.86	0.41
1:B:125:VAL:CG2	1:B:126:GLU:N	2.84	0.41
1:D:50:ARG:HG2	1:D:51:GLY:H	1.86	0.41
1:D:152:LEU:HD23	1:D:152:LEU:HA	1.96	0.41
1:D:255:ALA:O	1:D:258:ARG:HB3	2.20	0.41
1:A:253:PRO:HA	1:A:256:GLU:HG3	2.03	0.41
1:D:97:ASN:O	1:D:101:GLN:HG3	2.21	0.41
1:D:119:THR:HB	1:D:122:ASP:CB	2.41	0.41
1:D:158:MET:O	1:D:162:GLU:HB2	2.21	0.40
1:A:163:GLY:O	1:A:232:LYS:HD3	2.21	0.40
1:A:170:VAL:HG13	1:A:171:VAL:N	2.35	0.40
1:B:241:GLU:HG2	1:B:262:PHE:CE2	2.56	0.40
1:D:166:SER:OG	1:D:233:MET:HG2	2.21	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:121:LEU:CD1	1:B:223:ILE:HG23	2.51	0.40
1:D:155:VAL:HG11	1:D:217:PHE:CD2	2.56	0.40
1:C:251:ASP:OD2	1:C:253:PRO:HD2	2.21	0.40

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	226/229 (99%)	208 (92%)	14 (6%)	4 (2%)	8	28
1	B	227/229 (99%)	200 (88%)	18 (8%)	9 (4%)	3	9
1	C	226/229 (99%)	194 (86%)	23 (10%)	9 (4%)	3	9
1	D	226/229 (99%)	189 (84%)	27 (12%)	10 (4%)	2	8
All	All	905/916 (99%)	791 (87%)	82 (9%)	32 (4%)	3	12

All (32) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	54	LYS
1	A	185	VAL
1	A	207	GLY
1	B	179	SER
1	B	185	VAL
1	B	186	ARG
1	B	194	LEU
1	C	200	PRO
1	C	266	GLY
1	D	110	SER
1	D	184	GLY
1	B	187	GLU

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Mol	Chain	Res	Type
1	B	188	VAL
1	C	58	LEU
1	C	187	GLU
1	C	204	ASP
1	D	53	SER
1	C	55	GLY
1	D	41	PRO
1	D	109	ARG
1	A	184	GLY
1	B	69	LEU
1	C	188	VAL
1	C	196	PRO
1	D	115	LYS
1	D	118	SER
1	B	55	GLY
1	D	161	GLU
1	D	196	PRO
1	D	250	ILE
1	C	250	ILE
1	B	250	ILE

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	194/195 (100%)	179 (92%)	15 (8%)	13	35
1	B	195/195 (100%)	179 (92%)	16 (8%)	11	33
1	C	194/195 (100%)	169 (87%)	25 (13%)	4	13
1	D	194/195 (100%)	179 (92%)	15 (8%)	13	35
All	All	777/780 (100%)	706 (91%)	71 (9%)	9	27

All (71) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	43	LEU

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Mol	Chain	Res	Type
1	A	46	LEU
1	A	67	VAL
1	A	75	ARG
1	A	121	LEU
1	A	126	GLU
1	A	133	GLU
1	A	147	LEU
1	A	170	VAL
1	A	179	SER
1	A	187	GLU
1	A	192	LEU
1	A	203	GLN
1	A	214	SER
1	A	259	VAL
1	B	43	LEU
1	B	46	LEU
1	B	73	VAL
1	B	82	VAL
1	B	121	LEU
1	B	129	ASN
1	B	147	LEU
1	B	170	VAL
1	B	189	THR
1	B	192	LEU
1	B	206	ASP
1	B	214	SER
1	B	228	LEU
1	B	239	ARG
1	B	251	ASP
1	B	258	ARG
1	C	43	LEU
1	C	46	LEU
1	C	56	ILE
1	C	75	ARG
1	C	90	THR
1	C	113	THR
1	C	119	THR
1	C	121	LEU
1	C	122	ASP
1	C	136	ILE
1	C	147	LEU
1	C	170	VAL

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Mol	Chain	Res	Type
1	C	182	GLN
1	C	188	VAL
1	C	190	GLU
1	C	193	ASN
1	C	201	ARG
1	C	205	TRP
1	C	227	TYR
1	C	228	LEU
1	C	241	GLU
1	C	243	SER
1	C	247	ASP
1	C	258	ARG
1	C	259	VAL
1	D	43	LEU
1	D	46	LEU
1	D	67	VAL
1	D	82	VAL
1	D	126	GLU
1	D	129	ASN
1	D	133	GLU
1	D	147	LEU
1	D	170	VAL
1	D	193	ASN
1	D	194	LEU
1	D	212	ASN
1	D	224	GLU
1	D	243	SER
1	D	251	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (42) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	60	ASN
1	A	84	GLN
1	A	92	HIS
1	A	101	GLN
1	A	139	ASN
1	A	148	HIS
1	A	175	GLN
1	A	193	ASN
1	A	203	GLN
1	A	229	GLN

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Mol	Chain	Res	Type
1	A	242	HIS
1	B	84	GLN
1	B	92	HIS
1	B	101	GLN
1	B	129	ASN
1	B	131	HIS
1	B	139	ASN
1	B	141	GLN
1	B	148	HIS
1	B	153	GLN
1	B	193	ASN
1	B	195	ASN
1	B	242	HIS
1	C	42	HIS
1	C	60	ASN
1	C	84	GLN
1	C	92	HIS
1	C	101	GLN
1	C	139	ASN
1	C	148	HIS
1	C	175	GLN
1	C	193	ASN
1	C	195	ASN
1	C	242	HIS
1	D	84	GLN
1	D	92	HIS
1	D	129	ASN
1	D	139	ASN
1	D	175	GLN
1	D	193	ASN
1	D	203	GLN
1	D	212	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 (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

3 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	#$|Z| > 2$
2	NCC	C	3002	-	39,43,43	1.71	9 (23%)	50,65,65	1.34	5 (10%)
2	NCC	D	4002	-	39,43,43	1.78	11 (28%)	50,65,65	1.39	6 (12%)
2	NCC	A	2002	-	39,43,43	1.77	9 (23%)	50,65,65	1.57	5 (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
2	NCC	C	3002	-	-	8/30/70/70	0/3/3/3
2	NCC	D	4002	-	-	8/30/70/70	0/3/3/3
2	NCC	A	2002	-	-	6/30/70/70	0/3/3/3

All (29) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	2002	NCC	C20-C10	4.71	1.58	1.52
2	D	4002	NCC	C17-N5	4.06	1.47	1.34
2	C	3002	NCC	C17-N5	3.98	1.47	1.34
2	A	2002	NCC	C12-C16	3.95	1.59	1.53
2	C	3002	NCC	O1A-C9	3.84	1.34	1.22
2	D	4002	NCC	C20-C10	3.68	1.57	1.52
2	D	4002	NCC	O1A-C9	3.68	1.33	1.22
2	A	2002	NCC	O1A-C9	3.65	1.33	1.22

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	4002	NCC	O6-C10	3.57	1.47	1.42
2	C	3002	NCC	C20-C10	3.50	1.57	1.52
2	A	2002	NCC	C17-N5	3.39	1.45	1.34
2	A	2002	NCC	C19-C16	3.27	1.56	1.53
2	C	3002	NCC	C13-C12	3.17	1.56	1.52
2	C	3002	NCC	C12-C16	3.11	1.58	1.53
2	D	4002	NCC	C19-C16	3.00	1.55	1.53
2	C	3002	NCC	O4'-C1'	2.98	1.44	1.40
2	C	3002	NCC	O6-C10	2.96	1.46	1.42
2	A	2002	NCC	O6-C10	2.90	1.46	1.42
2	D	4002	NCC	C12-C16	2.74	1.57	1.53
2	D	4002	NCC	C13-C12	2.61	1.56	1.52
2	D	4002	NCC	O4'-C1'	2.61	1.44	1.40
2	A	2002	NCC	O4'-C1'	2.56	1.44	1.40
2	D	4002	NCC	O1B-C9	-2.35	1.22	1.30
2	C	3002	NCC	C6-N1	2.30	1.39	1.36
2	D	4002	NCC	C6-N1	2.20	1.38	1.36
2	D	4002	NCC	O6-C12	2.16	1.47	1.44
2	A	2002	NCC	C6-C5	2.16	1.42	1.38
2	A	2002	NCC	O1B-C9	-2.15	1.22	1.30
2	C	3002	NCC	O1B-C9	-2.11	1.22	1.30

All (16) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	2002	NCC	C4-N3-C2	6.04	122.46	116.34
2	D	4002	NCC	C4-N3-C2	5.29	121.70	116.34
2	C	3002	NCC	C4-N3-C2	4.92	121.32	116.34
2	A	2002	NCC	O4'-C1'-N1	4.43	114.63	108.75
2	D	4002	NCC	C16-N5-C17	-4.34	112.95	123.11
2	C	3002	NCC	C16-N5-C17	-4.13	113.43	123.11
2	A	2002	NCC	C16-N5-C17	-3.70	114.44	123.11
2	A	2002	NCC	O1A-C9-C10	-2.90	115.04	123.79
2	D	4002	NCC	O6-C12-C13	2.73	110.91	106.65
2	C	3002	NCC	O1A-C9-C10	-2.60	115.95	123.79
2	D	4002	NCC	O1A-C9-C10	-2.48	116.31	123.79
2	C	3002	NCC	O4'-C1'-N1	2.38	111.90	108.75
2	C	3002	NCC	N4-C4-N3	2.18	120.09	116.59
2	D	4002	NCC	O4'-C1'-N1	2.10	111.53	108.75
2	D	4002	NCC	N4-C4-N3	2.07	119.92	116.59
2	A	2002	NCC	N4-C4-N3	2.04	119.88	116.59

There are no chirality outliers.

All (22) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	2002	NCC	O6-C10-C9-O1B
2	A	2002	NCC	O8-C14-C15-O9
2	C	3002	NCC	C10-O2P-P-O5'
2	C	3002	NCC	O6-C10-C9-O1B
2	C	3002	NCC	O8-C14-C15-O9
2	D	4002	NCC	O4'-C1'-N1-C6
2	D	4002	NCC	O6-C10-C9-O1B
2	D	4002	NCC	O6-C12-C13-O7
2	D	4002	NCC	C13-C14-C15-O9
2	D	4002	NCC	O8-C14-C15-O9
2	A	2002	NCC	C13-C14-C15-O9
2	C	3002	NCC	C13-C14-C15-O9
2	C	3002	NCC	C10-O2P-P-O1P
2	A	2002	NCC	O2P-C10-C9-O1A
2	A	2002	NCC	O6-C10-C9-O1A
2	C	3002	NCC	O2P-C10-C9-O1A
2	C	3002	NCC	O6-C10-C9-O1A
2	D	4002	NCC	O2P-C10-C9-O1A
2	D	4002	NCC	O6-C10-C9-O1A
2	D	4002	NCC	C16-C12-C13-O7
2	C	3002	NCC	C10-O2P-P-O3P
2	A	2002	NCC	C20-C10-C9-O1A

There are no ring outliers.

1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	2002	NCC	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 NCC C 3002
Bond lengths / Bond angles / Torsions / Rings

Ligand NCC D 4002
Bond lengths / Bond angles / Torsions / Rings

Ligand NCC A 2002	
\nBond lengths	\nBond angles
\nTorsions	\nRings
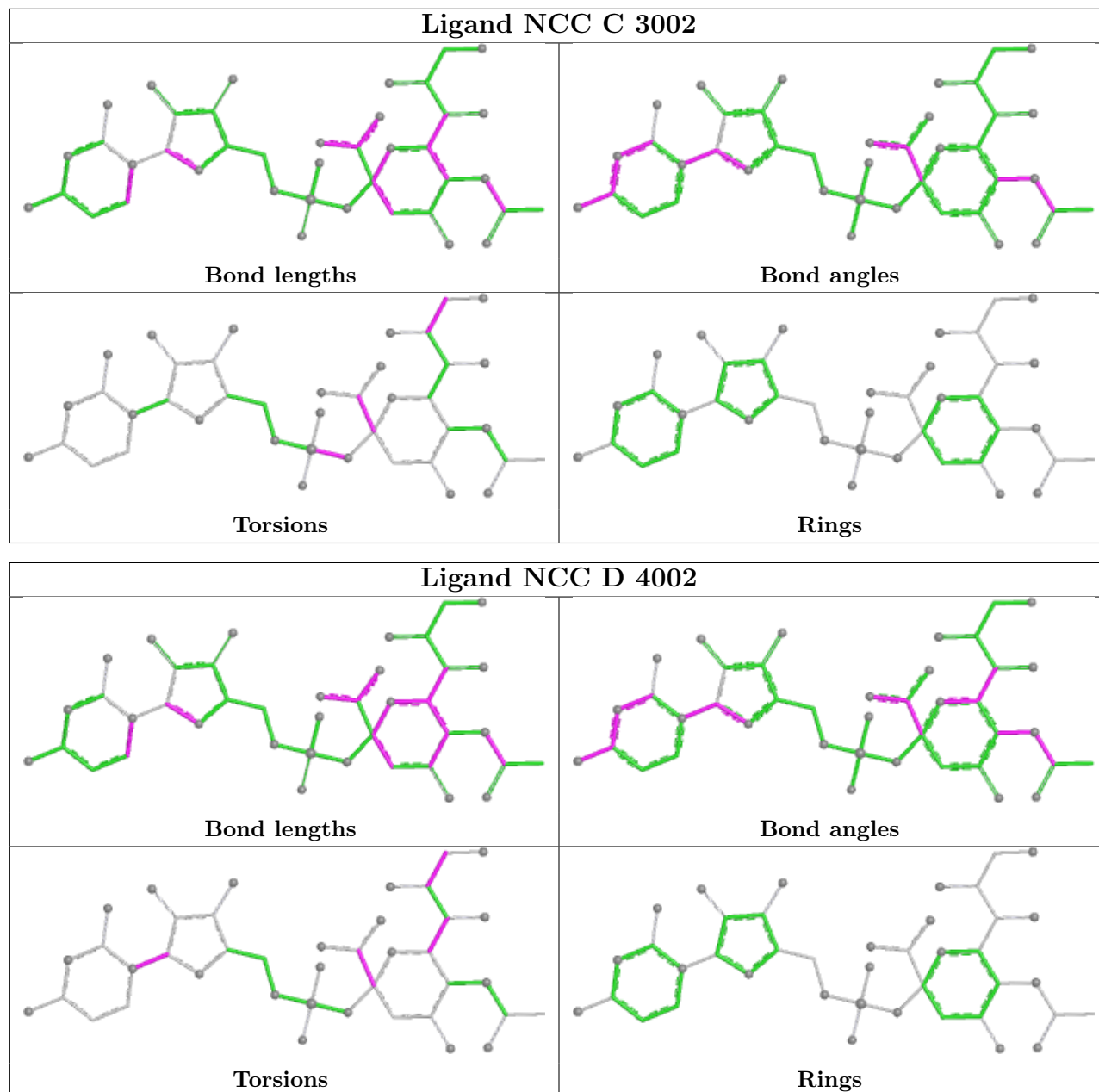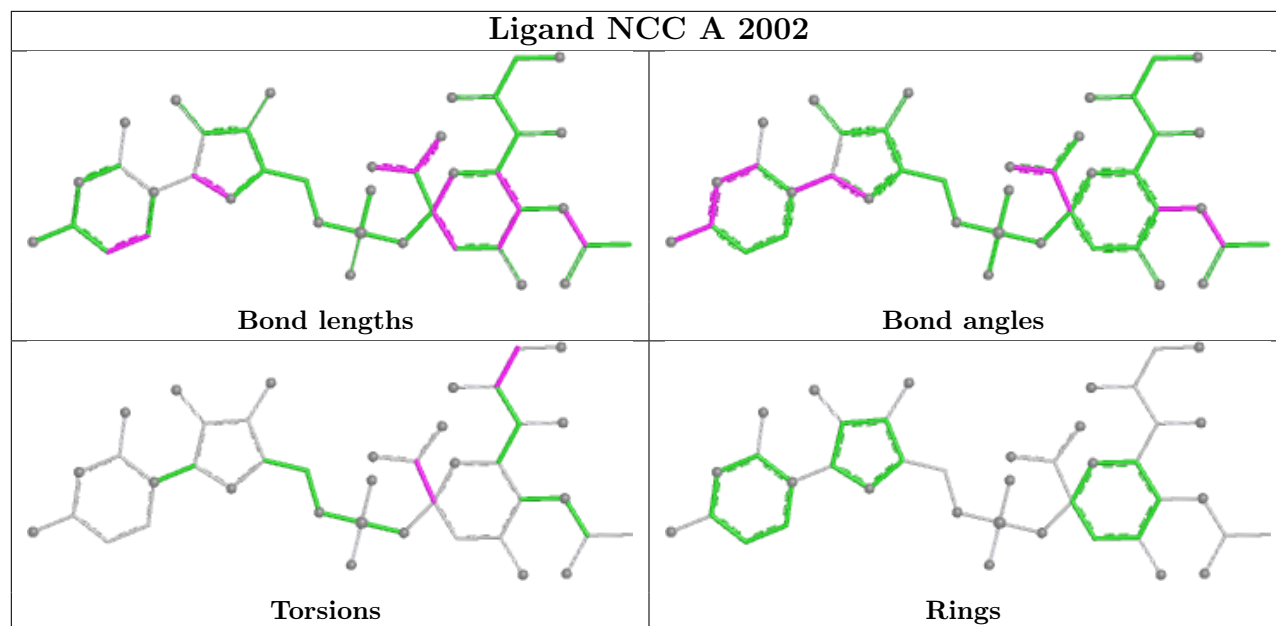
5.7 Other polymers (i)

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(Å²)	Q<0.9
1	A	227/229 (99%)	-0.46	1 (0%)	92	91	15, 32, 58, 95	8 (3%)
1	B	227/229 (99%)	-0.48	0	100	100	11, 30, 62, 112	3 (1%)
1	C	218/229 (95%)	-0.13	3 (1%)	75	70	20, 49, 93, 111	12 (5%)
1	D	219/229 (95%)	0.37	23 (10%)	6	3	25, 58, 104, 121	16 (7%)
All	All	891/916 (97%)	-0.18	27 (3%)	50	40	11, 41, 91, 121	39 (4%)

All (27) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	51	GLY	5.1
1	C	95	ILE	4.4
1	D	234	ALA	4.4
1	D	120	SER	4.2
1	D	166	SER	4.1
1	D	136	ILE	3.8
1	D	89	SER	3.7
1	D	40	PRO	3.5
1	D	109	ARG	3.5
1	D	121	LEU	3.3
1	D	41	PRO	3.3
1	D	217	PHE	3.1
1	D	127	PHE	2.9
1	D	43	LEU	2.8
1	D	124	ILE	2.8
1	D	235	TYR	2.6
1	C	90	THR	2.5
1	D	76	ALA	2.5
1	D	163	GLY	2.5
1	D	131	HIS	2.3
1	D	162	GLU	2.3

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Mol	Chain	Res	Type	RSRZ
1	A	230	GLY	2.3
1	D	55	GLY	2.2
1	D	80	ALA	2.1
1	D	149	PRO	2.0
1	C	92	HIS	2.0
1	D	49	ALA	2.0

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

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

6.3 Carbohydrates ⓘ

There are no monosaccharides in this entry.

6.4 Ligands ⓘ

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
2	NCC	D	4002	41/41	0.79	0.29	64,73,92,93	41
2	NCC	C	3002	41/41	0.84	0.26	63,73,82,86	41
2	NCC	A	2002	41/41	0.96	0.17	15,29,38,43	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.
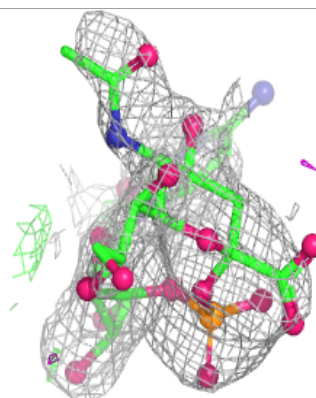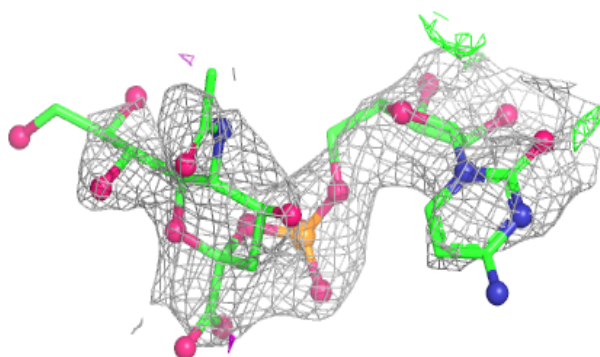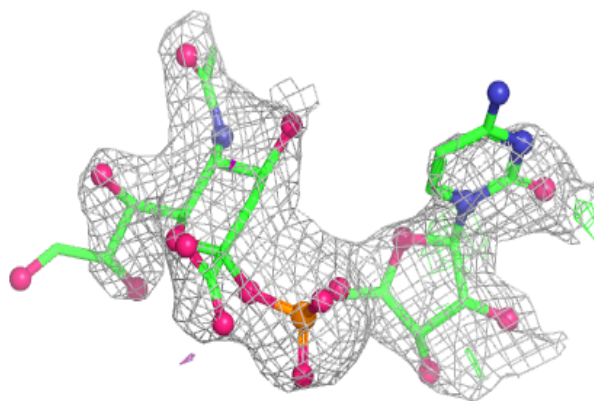
Electron density around NCC D 4002:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
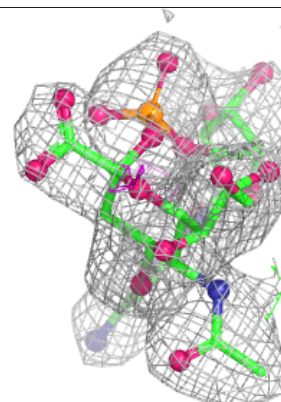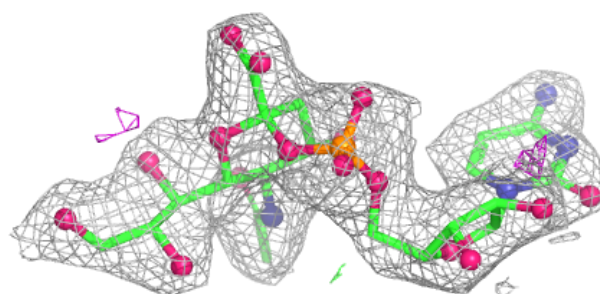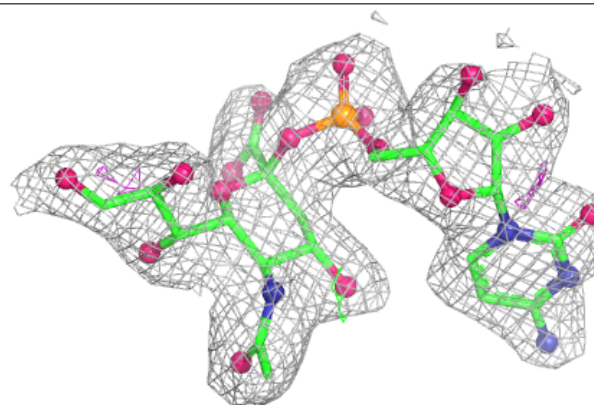$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
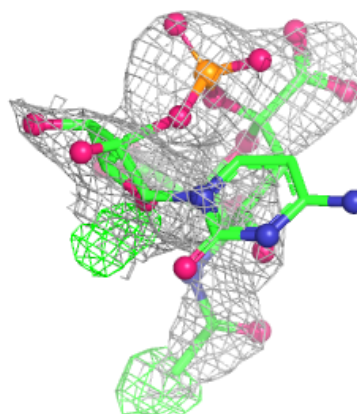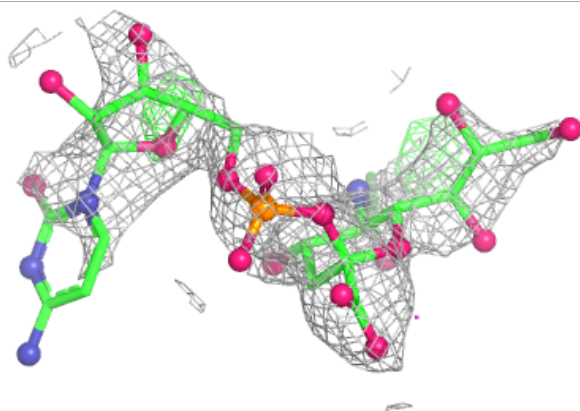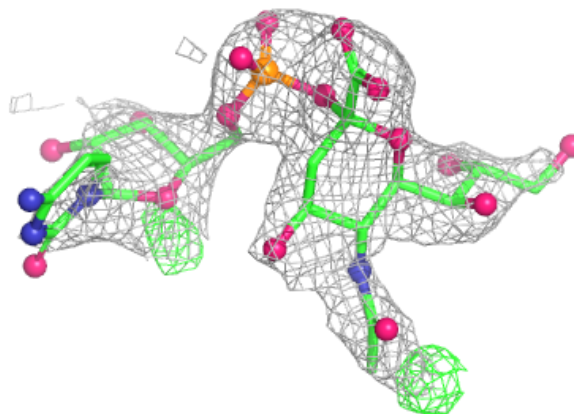
Electron density around NCC C 3002:

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

Electron density around NCC A 2002:

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

6.5 Other polymers ⓘ

There are no such residues in this entry.