WORLDWIDE wwPDB PROTEIN DATA BANK

wwPDB X-ray Structure Validation Summary Report (i)

Jun 12, 2024 – 05:16 PM EDT

PDB ID	:	1DCE
Title	:	CRYSTAL STRUCTURE OF RAB GERANYLGERANYLTRANSFERASE FROM RAT BRAIN
Authors	:	Zhang, H.; Seabra, M.C.; Deisenhofer, H.
Deposited on	:	1999-11-04
Resolution	:	2.00 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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 (i) 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 (i)) were used in the production of this report:

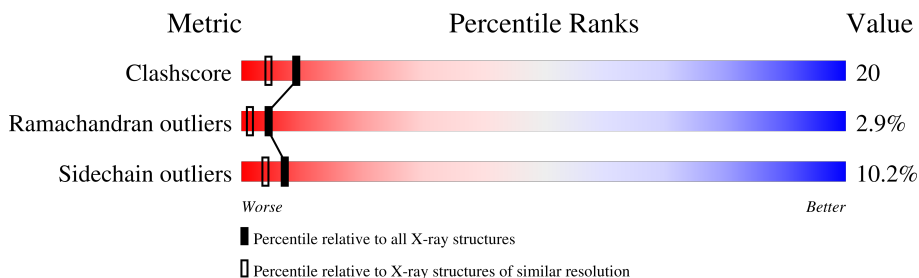|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et 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 2.00 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
Clashscore		20
Ramachandran outliers		2.9%
Sidechain outliers		10.2%

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))
Clashscore	141614	9178 (2.00-2.00)
Ramachandran outliers	138981	9054 (2.00-2.00)
Sidechain outliers	138945	9053 (2.00-2.00)

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%

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	567	51% · 33% · 11% ·
1	C	567	62% · 28% · 8% ·
2	B	331	60% · 28% · 10% ··
2	D	331	59% · 30% · 7% ··

WORLDWIDE
wwPDB
PROTEIN DATA BANK

2 Entry composition ⓘ

There are 4 unique types of molecules in this entry. The entry contains 14982 atoms, of which 0 are hydrogens and 0 are deuteriums.

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

- Molecule 1 is a protein called PROTEIN (RAB GERANYLGERANYLTRANSFERASE ALPHA SUBUNIT).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	567	Total	C	N	O	S	0	0	0
			4494	2833	794	838	29			
1	C	567	Total	C	N	O	S	0	0	0
			4509	2845	797	838	29			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	FME	MET	MODIFIED RESIDUE	UNP Q08602
C	1	FME	MET	MODIFIED RESIDUE	UNP Q08602

- Molecule 2 is a protein called PROTEIN (RAB GERANYLGERANYLTRANSFERASE BETA SUBUNIT).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	329	Total	C	N	O	S	0	0	0
			2574	1642	426	486	20			
2	D	329	Total	C	N	O	S	0	0	0
			2574	1642	426	486	20			

- Molecule 3 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	B	1	Total	Zn	0	0
			1	1		
3	D	1	Total	Zn	0	0
			1	1		

- Molecule 4 is water.

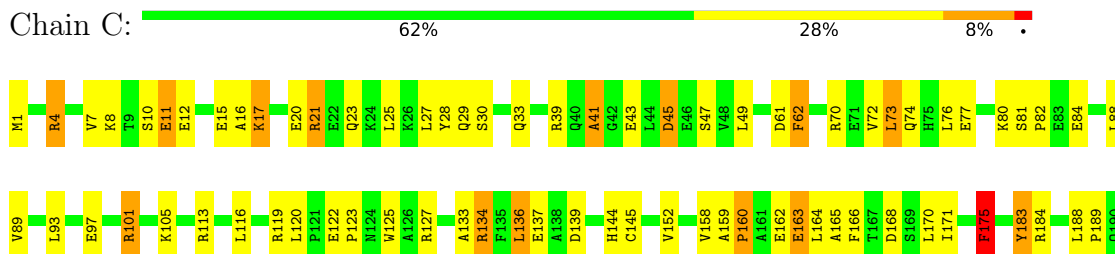| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	280	Total 280	O 280	0	0
4	B	165	Total 165	O 165	0	0
4	C	239	Total 239	O 239	0	0
4	D	145	Total 145	O 145	0	0

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. 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. 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.
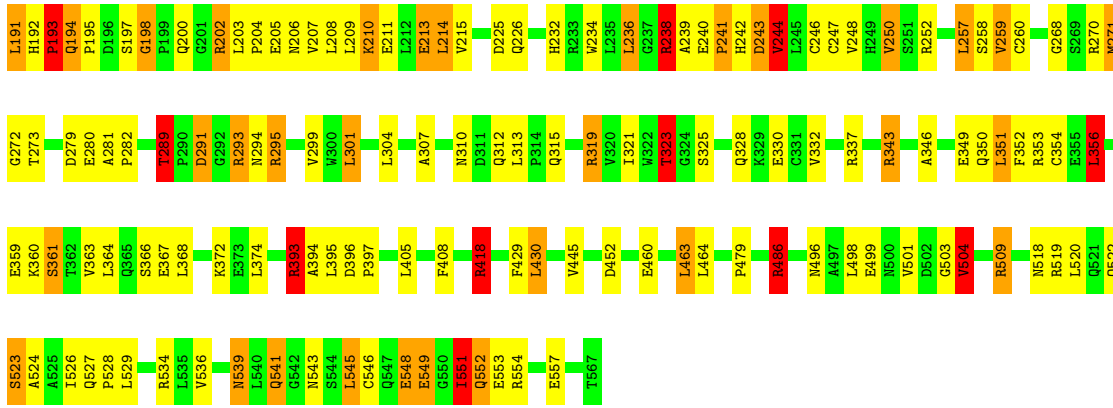
Note EDS was not executed.

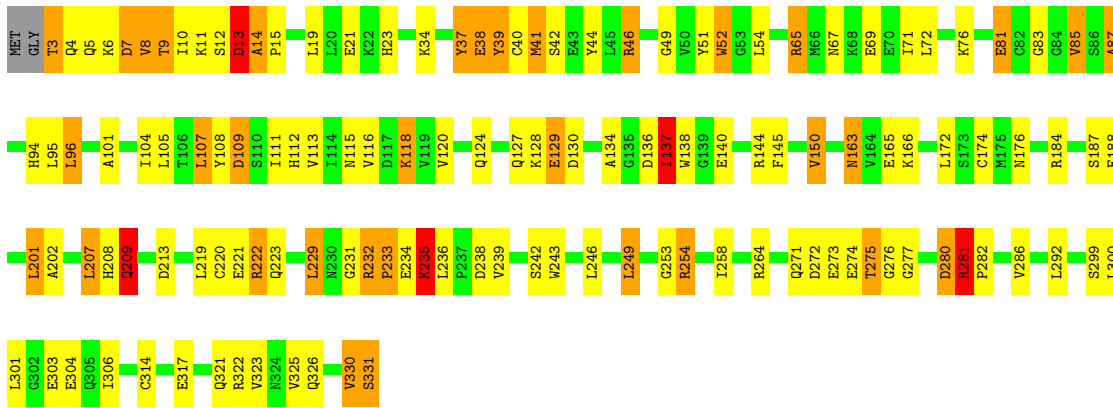• Molecule 1: PROTEIN (RAB GERANYLGERANYLTRANSFERASE ALPHA SUB-UNIT)

Chain A:

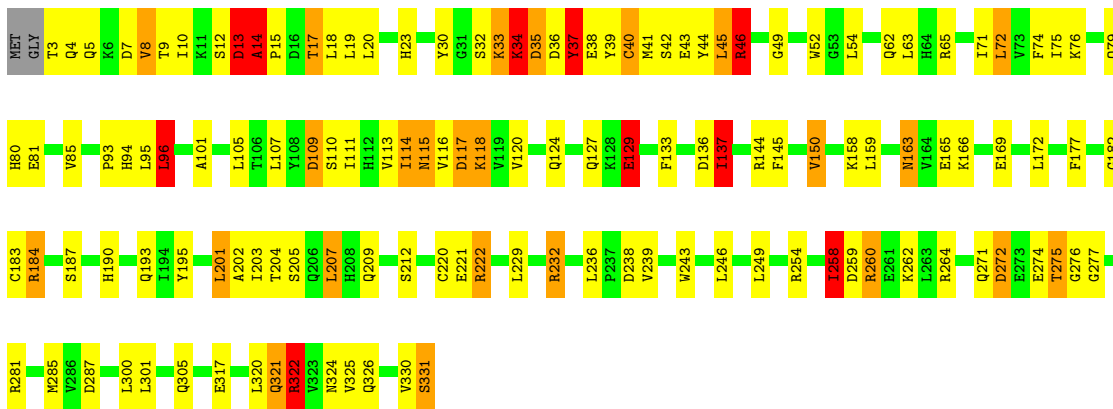• Molecule 1: PROTEIN (RAB GERANYLGERANYLTRANSFERASE ALPHA SUB-UNIT)

Chain C:

L191 H192 P193 Q194 P195 D196 S197 G198 P199 Q200 G201 R202 P204 A203 E205 N206 V207 L208 L209 K210 E211 L212 E213 L214 V215 D225 Q226 H232 R233 W234 L235 L236 G237 R238 A239 E240 P241 H242 D243 V244 L245 C246 C247 V248 H249 V250 S251 R252 L257 S258 V259 C260 G268 S269 R270 M271

G272 T273 D279 E280 A281 P282 I289 P290 D291 G292 R293 N294 R295 V299 W300 L301 L304 A307 N310 D311 Q312 L313 P314 Q315 R319 V320 I321 W322 I323 G324 S325 Q328 K329 E330 C331 V332 R337 R343 A346 E349 Q350 L351 F352 R353 C354 E355 L356

E359 K360 S361 T362 V363 L364 Q365 S366 E367 L368 K372 E373 L374 R393 A394 L395 D396 P397 L405 F408 R418 F429 L430 V445 D452 E460 L463 L464 P479 R486 N496 A497 L498 E499 N500 V501 D502 G503 V504 R509 N518 R519 L520 Q521 Q522

S523 A524 A525 I526 Q527 P528 L529 R534 L535 V536 N539 L540 Q541 G542 N543 S544 L545 C546 Q547 E548 E549 G550 I551 Q552 E553 R554 E557 T567

• Molecule 2: PROTEIN (RAB GERANYLGERANYLTRANSFERASE BETA SUBUNIT)

Chain B: 60% 28% 10% ··

MET GLY T3 Q4 Q5 K6 D7 V8 T9 I10 K11 S12 D13 A14 P15 L19 L20 E21 K22 H23 K34 Y37 E38 Y39 C40 M41 S42 E43 Y44 L45 R46 G49 V50 Y51 W52 G53 L54 R65 M66 N67 K68 E69 E70 I71 L72 K76 E81 C82 G83 G84 V85 S86 A87

H94 L95 L96 A101 I104 L105 T106 L107 Y108 D109 S110 I111 H112 V113 I114 N115 V116 D117 K118 V119 V120 Q124 Q127 K128 E129 D130 A134 G135 D136 I137 W138 G139 E140 R144 F145 V150 N163 V164 E165 K166 L172 S173 C174 M175 N176 R184 S187 E188

L201 A202 L207 H208 Q209 D213 L219 C220 E221 R222 Q223 L229 N230 G231 R232 P233 E234 K235 L236 P237 D238 V239 S242 W243 L246 L249 G253 R254 I258 R264 Q271 D272 E273 E274 T275 G276 G277 D280 R281 P282 V286 L292 S299 L300

L301 G302 E303 E304 Q305 I306 C314 E317 Q321 R322 V323 N324 V325 Q326 V330 S331

• Molecule 2: PROTEIN (RAB GERANYLGERANYLTRANSFERASE BETA SUBUNIT)

Chain D: 59% 30% 7% ··

MET GLY T3 Q4 Q5 K6 D7 V8 T9 I10 K11 S12 D13 A14 P15 D16 T17 L18 L19 L20 H23 Y30 G31 S32 K33 K34 D35 D36 Y37 E38 Y39 C40 M41 S42 E43 Y44 L45 R46 G49 W52 G53 L54 Q62 L63 H64 R65 I71 L72 V73 F74 I75 K76 Q79

H80 E81 V85 P93 H94 L95 L96 A101 L105 T106 L107 Y108 D109 S110 I111 H112 V113 I114 N115 V116 D117 K118 V119 V120 Q124 Q127 K128 E129 F133 D136 I137 R144 F145 V150 K158 L159 N163 V164 E165 K166 E169 L172 F177 G182

C183 R184 S187 H190 Q193 I194 Y195 L201 A202 I203 T204 S205 Q206 L207 H208 Q209 S212 C220 E221 R222 L229 R232 L236 P237 D238 V239 W243 L246 L249 R254 I258 D259 R260 E261 K262 L263 R264 Q271 D272 E273 E274 T275 G276 G277

R281 M285 V286 D287 L300 L301 Q305 E317 L320 Q321 R322 V323 N324 V325 Q326 V330 S331

4 Data and refinement statistics ⓘ

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α, β, γ	57.86Å 77.44Å 121.78Å 74.60° 79.91° 67.89°	Depositor
Resolution (Å)	20.00 – 2.00	Depositor
% Data completeness (in resolution range)	93.4 (20.00-2.00)	Depositor
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	REFMAC	Depositor
R, R_{free}	0.215 , 0.263	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	14982	wwPDB-VP
Average B, all atoms (Å^2)	41.0	wwPDB-VP

5 Model quality ⓘ

5.1 Standard geometry ⓘ

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

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	0.81	0/4581	1.92	135/6235 (2.2%)
1	C	0.73	0/4596	1.79	78/6251 (1.2%)
2	B	0.81	1/2633 (0.0%)	1.64	38/3568 (1.1%)
2	D	0.77	0/2633	1.69	49/3568 (1.4%)
All	All	0.78	1/14443 (0.0%)	1.79	300/19622 (1.5%)

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	9
1	C	0	8
2	B	0	5
2	D	0	4
All	All	0	26

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	220	CYS	CB-SG	-5.20	1.73	1.81

The worst 5 of 300 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	C	319	ARG	CD-NE-CZ	34.32	171.65	123.60
1	C	393	ARG	NE-CZ-NH2	-27.36	106.62	120.30
1	C	337	ARG	NE-CZ-NH1	25.95	133.27	120.30
1	A	393	ARG	NE-CZ-NH2	-22.51	109.04	120.30

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	C	486	ARG	NE-CZ-NH2	-20.90	109.85	120.30

There are no chirality outliers.

5 of 26 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	161	ALA	Mainchain
1	A	176	SER	Peptide
1	A	211	GLU	Mainchain
1	A	215	VAL	Mainchain
1	A	238	ARG	Peptide

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	4494	0	4406	222	0
1	C	4509	0	4448	150	0
2	B	2574	0	2521	102	0
2	D	2574	0	2521	103	0
3	B	1	0	0	0	0
3	D	1	0	0	0	0
4	A	280	0	0	35	0
4	B	165	0	0	13	0
4	C	239	0	0	20	0
4	D	145	0	0	14	0
All	All	14982	0	13896	563	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 20.

The worst 5 of 563 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:C:272:GLY:HA2	1:C:323:THR:HG22	1.40	1.00

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:203:LEU:HB3	1:A:207:VAL:HG13	1.48	0.93
1:A:242:HIS:HA	1:A:263:ARG:HH22	1.28	0.93
2:D:94:HIS:HD2	2:D:96:LEU:H	1.17	0.93
1:A:498:LEU:H	1:A:518:ASN:HD22	1.17	0.92

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	565/567 (100%)	492 (87%)	48 (8%)	25 (4%)	2	0
1	C	565/567 (100%)	503 (89%)	45 (8%)	17 (3%)	4	1
2	B	327/331 (99%)	310 (95%)	12 (4%)	5 (2%)	10	4
2	D	327/331 (99%)	309 (94%)	13 (4%)	5 (2%)	10	4
All	All	1784/1796 (99%)	1614 (90%)	118 (7%)	52 (3%)	4	1

5 of 52 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	17	LYS
1	A	158	VAL
1	A	174	ASN
1	A	176	SER
1	A	197	SER

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	490/507 (97%)	437 (89%)	53 (11%)	6	3
1	C	494/507 (97%)	453 (92%)	41 (8%)	11	7
2	B	283/284 (100%)	252 (89%)	31 (11%)	6	3
2	D	283/284 (100%)	250 (88%)	33 (12%)	5	3
All	All	1550/1582 (98%)	1392 (90%)	158 (10%)	7	4

5 of 158 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	366	SER
2	D	118	LYS
1	C	504	VAL
2	D	35	ASP
2	D	229	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 47 such sidechains are listed below:

Mol	Chain	Res	Type
1	C	298	HIS
1	C	543	ASN
1	C	312	GLN
1	C	517	ASN
2	D	4	GLN

5.3.3　RNA ⓘ

There are no RNA molecules in this entry.

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

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

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the

expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#$|Z| > 2$	Counts	RMSZ	#$|Z| > 2$
1	FME	A	1	1	8,9,10	0.83	0	7,9,11	2.05	2 (28%)
1	FME	C	1	1	8,9,10	0.92	0	7,9,11	2.15	2 (28%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	FME	A	1	1	-	2/7/9/11	-
1	FME	C	1	1	-	4/7/9/11	-

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	1	FME	O-C-CA	-4.63	112.65	124.78
1	C	1	FME	O-C-CA	-3.96	114.39	124.78
1	C	1	FME	CA-N-CN	-3.15	117.98	122.82
1	A	1	FME	CA-N-CN	-2.26	119.34	122.82

There are no chirality outliers.

5 of 6 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	1	FME	O1-CN-N-CA
1	C	1	FME	O1-CN-N-CA
1	C	1	FME	CB-CA-N-CN
1	C	1	FME	CA-CB-CG-SD
1	A	1	FME	CA-CB-CG-SD

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 2 ligands modelled in this entry, 2 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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 ⓘ

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates ⓘ

EDS was not executed - this section is therefore empty.

6.4 Ligands ⓘ

EDS was not executed - this section is therefore empty.

6.5 Other polymers ⓘ

EDS was not executed - this section is therefore empty.