



wwPDB X-ray Structure Validation Summary Report ⓘ

Aug 23, 2023 – 03:36 PM EDT

PDB ID : 3BX8
Title : Engineered Human Lipocalin 2 (LCN2), apo-form
Authors : Schonfeld, D.L.; Chatwell, L.; Skerra, A.
Deposited on : 2008-01-11
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 ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

MolProbity : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.35
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) : 2.35

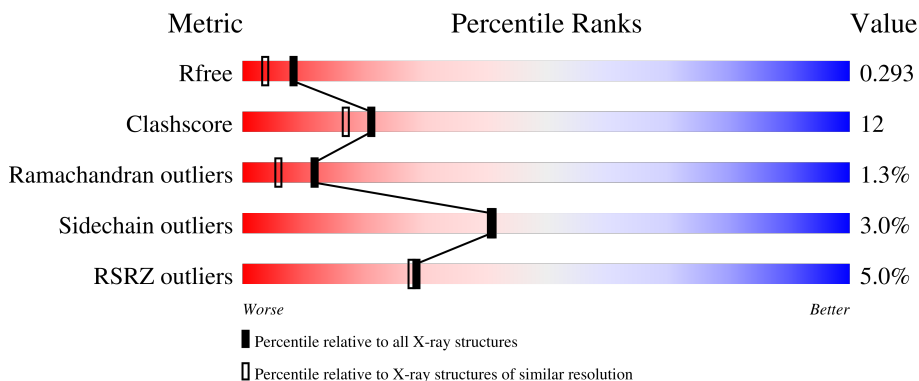
1 Overall quality at a glance

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.



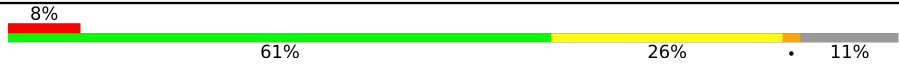

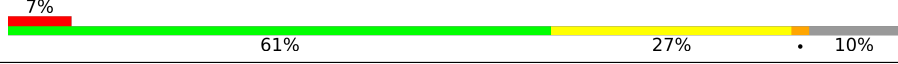
| Metric | Whole archive (#Entries) | Similar resolution (#Entries, resolution range(Å)) |
|-----------------------|-----------------------------|---|
| R_{free} | 130704 | 8085 (2.00-2.00) |
| Clashscore | 141614 | 9178 (2.00-2.00) |
| Ramachandran outliers | 138981 | 9054 (2.00-2.00) |
| Sidechain outliers | 138945 | 9053 (2.00-2.00) |
| RSRZ outliers | 127900 | 7900 (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 $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

| Mol | Chain | Length | Quality of chain |
|-----|-------|--------|------------------|
| 1 | A | 178 | |
| 1 | B | 178 | |
| 1 | C | 178 | |
| 1 | D | 178 | |
| 1 | E | 178 | |

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| Mol | Chain | Length | Quality of chain |
|-----|-------|--------|--|
| 1 | F | 178 |  |
| 1 | G | 178 |  |
| 1 | H | 178 |  |

2 Entry composition

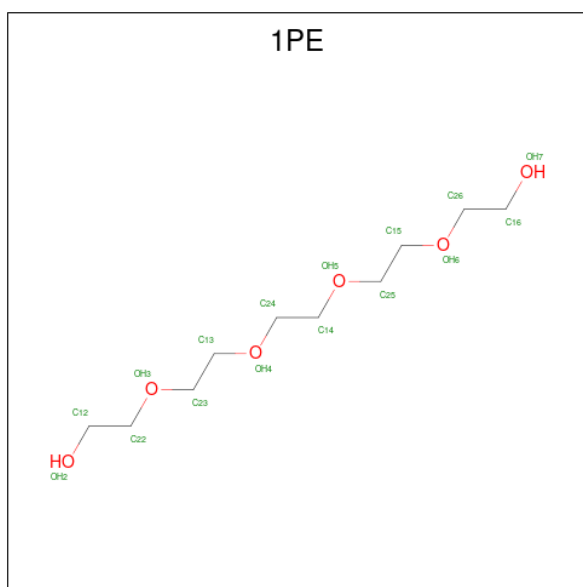
There are 4 unique types of molecules in this entry. The entry contains 11039 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 ENGINEERED HUMAN LIPOCALIN 2.

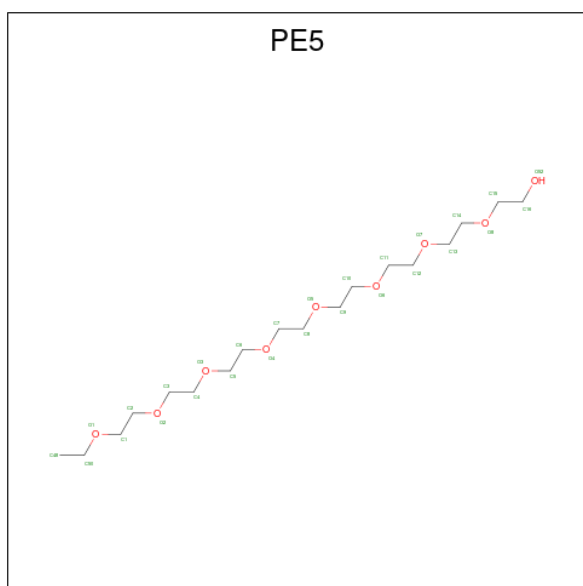
| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|---------|-------|
| | | | Total | C | N | O | S | | | |
| 1 | A | 167 | 1344 | 871 | 218 | 251 | 4 | 37 | 0 | 0 |
| 1 | B | 166 | 1333 | 860 | 218 | 251 | 4 | 40 | 0 | 0 |
| 1 | C | 167 | 1344 | 871 | 218 | 251 | 4 | 33 | 0 | 0 |
| 1 | D | 168 | 1350 | 871 | 220 | 255 | 4 | 44 | 0 | 0 |
| 1 | E | 162 | 1307 | 846 | 212 | 245 | 4 | 57 | 0 | 0 |
| 1 | F | 158 | 1270 | 825 | 204 | 237 | 4 | 60 | 0 | 0 |
| 1 | G | 161 | 1294 | 838 | 209 | 243 | 4 | 61 | 0 | 0 |
| 1 | H | 161 | 1298 | 842 | 210 | 242 | 4 | 64 | 0 | 0 |

- Molecule 2 is PENTAETHYLENE GLYCOL (three-letter code: 1PE) (formula: C₁₀H₂₂O₆).



| Mol | Chain | Residues | Atoms | | ZeroOcc | AltConf |
|-----|-------|----------|-------|------|---------|---------|
| 2 | A | 1 | Total | C O | 0 | 0 |
| | | | 14 | 10 4 | | |
| 2 | E | 1 | Total | C O | 0 | 0 |
| | | | 14 | 10 4 | | |
| 2 | G | 1 | Total | C O | 0 | 0 |
| | | | 14 | 10 4 | | |

- Molecule 3 is 3,6,9,12,15,18,21,24-OCTAOXAHEXACOSAN-1-OL (three-letter code: PE5) (formula: C₁₈H₃₈O₉).



| Mol | Chain | Residues | Atoms | | | ZeroOcc | AltConf |
|-----|-------|----------|-------|----|---|---------|---------|
| 3 | B | 1 | Total | C | O | 0 | 0 |
| | | | 26 | 18 | 8 | | |
| 3 | C | 1 | Total | C | O | 0 | 0 |
| | | | 26 | 18 | 8 | | |
| 3 | D | 1 | Total | C | O | 0 | 0 |
| | | | 26 | 18 | 8 | | |
| 3 | F | 1 | Total | C | O | 0 | 0 |
| | | | 26 | 18 | 8 | | |
| 3 | H | 1 | Total | C | O | 0 | 0 |
| | | | 26 | 18 | 8 | | |

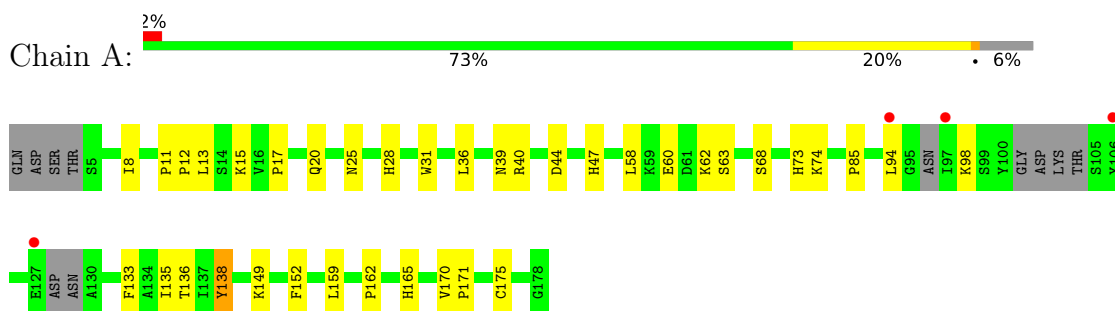
- Molecule 4 is water.

| Mol | Chain | Residues | Atoms | | ZeroOcc | AltConf |
|-----|-------|----------|-------|----|---------|---------|
| 4 | A | 69 | Total | O | 0 | 0 |
| | | | 69 | 69 | | |
| 4 | B | 78 | Total | O | 0 | 0 |
| | | | 78 | 78 | | |
| 4 | C | 60 | Total | O | 0 | 0 |
| | | | 60 | 60 | | |
| 4 | D | 78 | Total | O | 0 | 0 |
| | | | 78 | 78 | | |
| 4 | E | 10 | Total | O | 0 | 0 |
| | | | 10 | 10 | | |
| 4 | F | 9 | Total | O | 0 | 0 |
| | | | 9 | 9 | | |
| 4 | G | 15 | Total | O | 0 | 0 |
| | | | 15 | 15 | | |
| 4 | H | 8 | Total | O | 0 | 0 |
| | | | 8 | 8 | | |

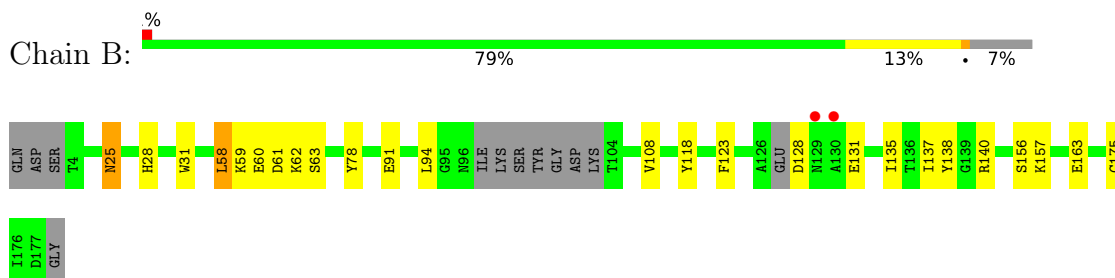
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

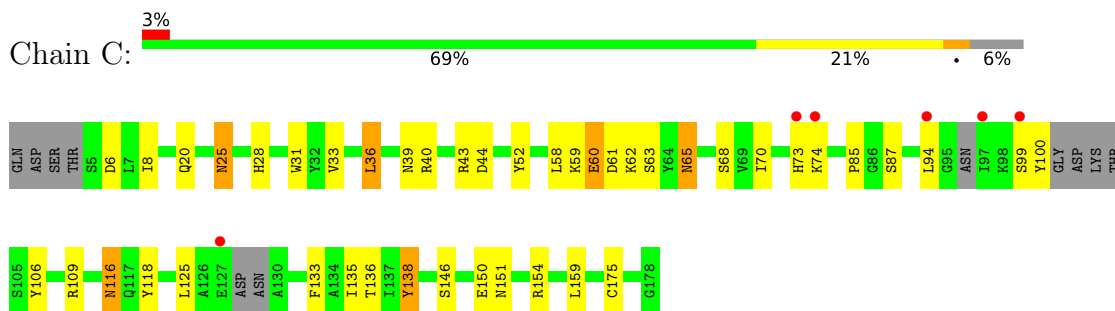
- Molecule 1: ENGINEERED HUMAN LIPOCALIN 2



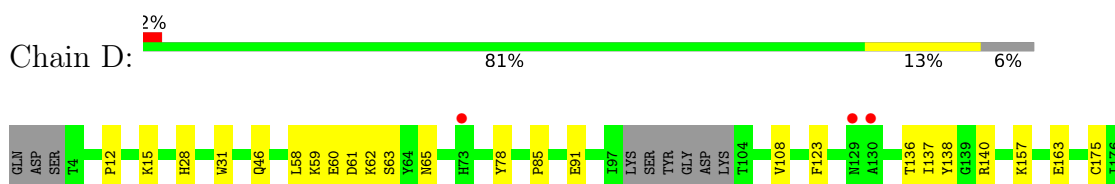
- Molecule 1: ENGINEERED HUMAN LIPOCALIN 2



- Molecule 1: ENGINEERED HUMAN LIPOCALIN 2



- Molecule 1: ENGINEERED HUMAN LIPOCALIN 2



D177
GLY

- Molecule 1: ENGINEERED HUMAN LIPOCALIN 2

Chain E: 6% 58% 30% 9%

GLN ASP ASP SER THR S5 D6 L7 A10 P12 P11 P12 P12 L13 L13 S14 K15 K15 Y16 V16 P17 P17 L18 L18 Q19 Q23 Q23 D24 N25 Q26 Q26 F27 F27 H28 W31 W31 Y32 Y32 V33 V33 V34 V34 G35 G35 L36 L36 A37 A37 G38 G38 N39 N39 R40 R40 I41 I41 N50 N50 M51 M51 Y52 Y52 L58 L58 K59 K59 E60 E60 D61 D61 K62 K62 M65 M65 V66 V66 V69 V69 I80 I80 D173 D173 F83 F83 V84 V84 F92 F92 T93 T93

L94 L94 GLY GLY ASN ASN LYS LYS TYR TYR LYS LYS ASP ASP T104 T104 S105 S105 Y106 Y106 R109 R109 V110 V110 V111 V111 D114 D114 Y115 Y115 M116 M116 Q117 Q117 Y118 Y118 A119 A119 L125 L125 A126 A126 E127 E127 ASP ASP ASN ASN E131 E131 F132 F132 F133 F133 A134 A134 N39 N39 T135 T135 I136 I136 I137 I137 Y138 Y138 L144 L144 A145 A145 K149 K149 F152 F152 S156 S156 L159 L159 G160 G160 L161 L161 I172 I172 I172 D173 D173 G174 G174 C175 C175 G178 G178

- Molecule 1: ENGINEERED HUMAN LIPOCALIN 2

Chain F: 8% 61% 26% 11%

GLN ASP ASP SER T4 T4 I8 I8 P12 P12 L13 L13 S14 S14 K15 K15 V16 V16 P17 P17 L18 L18 Q19 Q19 Q20 Q20 ASN ASN F22 F22 F27 F27 H28 H28 W31 W31 Y32 Y32 V33 V33 G34 G34 L36 L36 R43 R43 D44 D44 D45 D45 Y52 Y52 Y56 Y56 E57 E57 L58 L58 K59 K59 E60 E60 D61 D61 K62 K62 M65 M65 I70 I70 S71 S71 S72 S72 HIS HIS LYS LYS K75 K75 I80 I80 A81 A81 I172 I172 D173 D173 P85 P85 G86 G86 L94 L94 G95 G95

ASN ASN ILE ILE LYS LYS TYR TYR ASP ASP LYS LYS THR THR Y105 Y105 S106 S106 L107 L107 V108 V108 V111 V111 Q112 Q112 T113 T113 D114 D114 Y115 Y115 M116 M116 Q117 Q117 Y118 Y118 A119 A119 V120 V120 L125 L125 A126 A126 G127 G127 ASP ASP ASN ASN E131 E131 F132 F132 T136 T136 I137 I137 Y138 Y138 G139 G139 A145 A145 L148 L148 K149 K149 F152 F152 G160 G160 L161 L161 P162 P162 H165 H165 I172 I172 D173 D173 I176 I176 D177 D177 GLY GLY

- Molecule 1: ENGINEERED HUMAN LIPOCALIN 2

Chain G: 6% 57% 32% 10%

GLN ASP ASP SER T4 T4 I8 I8 P12 P12 L13 L13 S14 S14 K15 K15 V16 V16 P17 P17 L18 L18 Q19 Q19 Q20 Q20 ASN ASN F22 F22 Q23 Q23 D24 D24 F27 F27 H28 H28 Y32 Y32 V33 V33 G34 G34 L36 L36 R43 R43 D44 D44 D45 D45 M51 M51 Y52 Y52 Y56 Y56 E57 E57 L58 L58 K59 K59 E60 E60 D61 D61 K62 K62 S63 S63 Y64 Y64 M65 M65 H73 H73 LYS LYS K75 K75 I80 I80 A81 A81 S156 S156 A157 A157 S158 S158 L159 L159 G160 G160 P162 P162

L94 L94 G95 G95 ILE ILE LYS LYS TYR TYR ASP ASP LYS LYS THR THR S105 S105 Y106 Y106 T107 T107 V108 V108 R109 R109 V110 V110 T113 T113 D114 D114 Y115 Y115 M116 M116 Q117 Q117 Y118 Y118 A119 A119 V120 V120 L125 L125 A126 A126 F127 F127 ASP ASP ASN ASN E131 E131 F132 F132 I135 I135 T136 T136 I137 I137 Y138 Y138 K142 K142 A145 A145 L148 L148 K149 K149 F152 F152 I153 I153 R154 R154 F155 F155 S156 S156 K157 K157 S158 S158 L159 L159 G160 G160 P162 P162

H165 H165 I172 I172 D173 D173 I176 I176 D177 D177 G178 G178

- Molecule 1: ENGINEERED HUMAN LIPOCALIN 2

Chain H: 7% 61% 27% 10%

GLN ASP ASP THR THR S5 S5 D6 D6 L7 L7 P12 P12 L13 L13 S14 S14 K15 K15 V16 V16 P17 P17 L18 L18 Q19 Q19 Q20 Q20 ASN ASN F22 F22 Q23 Q23 Q26 Q26 F27 F27 H28 H28 W31 W31 Y32 Y32 V33 V33 L36 L36 A37 A37 G38 G38 N39 N39 R40 R40 I41 I41 Y52 Y52 Y56 Y56 E57 E57 L58 L58 D61 D61 K62 K62 S63 S63 Y64 Y64 M65 M65 V66 V66 H73 H73 F83 F83 W84 W84 P85 P85 T93 T93 L94 L94 G95 G95 ASN ASN ILE ILE

LYS LYS SER SER TYR TYR GLY GLY ASP ASP LYS LYS T104 T104 S105 S105 R109 R109 V110 V110 V111 V111 S112 S112 T113 T113 D114 D114 Y115 Y115 M116 M116 Q117 Q117 Y118 Y118 A119 A119 E127 E127 ASP ASP ASN ASN ALA ALA E131 E131 F132 F132 F133 F133 A134 A134 I135 I135 T136 T136 I137 I137 Y138 Y138 G139 G139 R140 R140 Y52 Y52 L144 L144 A145 A145 K149 K149 E150 E150 M151 M151 F152 F152 I153 I153 R154 R154 M65 M65 D173 D173 C175 C175 I176 I176 D177 D177 GLY GLY

4 Data and refinement statistics

| Property | Value | Source |
|---|---|------------------|
| Space group | P 1 | Depositor |
| Cell constants a, b, c, α , β , γ | 61.48Å 92.86Å 98.83Å 110.77° 90.00° 109.36° | Depositor |
| Resolution (Å) | 20.00 – 2.00 19.82 – 2.00 | Depositor EDS |
| % Data completeness (in resolution range) | 83.4 (20.00-2.00) 83.0 (19.82-2.00) | Depositor EDS |
| R_{merge} | (Not available) | Depositor |
| R_{sym} | 3.20 | Depositor |
| $\langle I/\sigma(I) \rangle$ ¹ | 1.81 (at 1.99Å) | Xtrriage |
| Refinement program | CNS | Depositor |
| R, R_{free} | 0.251 , 0.282 0.265 , 0.293 | Depositor DCC |
| R_{free} test set | 5538 reflections (5.13%) | wwPDB-VP |
| Wilson B-factor (Å ²) | 29.9 | Xtrriage |
| Anisotropy | 0.760 | Xtrriage |
| Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²) | 0.36 , 42.6 | EDS |
| L-test for twinning ² | $\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$ | Xtrriage |
| Estimated twinning fraction | 0.477 for h,-h-k,-l | Xtrriage |
| F_o, F_c correlation | 0.93 | EDS |
| Total number of atoms | 11039 | wwPDB-VP |
| Average B, all atoms (Å ²) | 43.0 | wwPDB-VP |

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.42% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality i

5.1 Standard geometry i

Bond lengths and bond angles in the following residue types are not validated in this section: PE5, 1PE

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

| Mol | Chain | Bond lengths | | Bond angles | |
|-----|-------|--------------|---------|-------------|----------------|
| | | RMSZ | # Z >5 | RMSZ | # Z >5 |
| 1 | A | 0.40 | 0/1377 | 0.66 | 0/1863 |
| 1 | B | 0.45 | 0/1366 | 0.66 | 0/1854 |
| 1 | C | 0.41 | 0/1377 | 0.66 | 1/1863 (0.1%) |
| 1 | D | 0.48 | 0/1384 | 0.66 | 0/1880 |
| 1 | E | 0.38 | 0/1340 | 0.59 | 2/1816 (0.1%) |
| 1 | F | 0.39 | 0/1300 | 0.62 | 2/1761 (0.1%) |
| 1 | G | 0.43 | 0/1325 | 0.62 | 2/1793 (0.1%) |
| 1 | H | 0.37 | 0/1330 | 0.59 | 2/1802 (0.1%) |
| All | All | 0.42 | 0/10799 | 0.63 | 9/14632 (0.1%) |

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 |
| 1 | B | 0 | 1 |
| 1 | C | 0 | 2 |
| All | All | 0 | 4 |

There are no bond length outliers.

The worst 5 of 9 bond angle outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed(°) | Ideal(°) |
|-----|-------|-----|------|-----------|-------|-------------|----------|
| 1 | F | 173 | ASP | CB-CG-OD2 | 5.23 | 123.01 | 118.30 |
| 1 | G | 173 | ASP | CB-CG-OD2 | 5.21 | 122.99 | 118.30 |
| 1 | E | 173 | ASP | CB-CG-OD2 | 5.18 | 122.96 | 118.30 |
| 1 | H | 173 | ASP | CB-CG-OD2 | 5.15 | 122.94 | 118.30 |
| 1 | G | 65 | ASN | N-CA-C | -5.09 | 97.25 | 111.00 |

There are no chirality outliers.

All (4) planarity outliers are listed below:

| Mol | Chain | Res | Type | Group |
|-----|-------|-----|------|-----------|
| 1 | A | 138 | TYR | Sidechain |
| 1 | B | 118 | TYR | Sidechain |
| 1 | C | 118 | TYR | Sidechain |
| 1 | C | 138 | TYR | 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 | 1344 | 0 | 1316 | 25 | 0 |
| 1 | B | 1333 | 0 | 1300 | 18 | 0 |
| 1 | C | 1344 | 0 | 1316 | 37 | 0 |
| 1 | D | 1350 | 0 | 1318 | 19 | 0 |
| 1 | E | 1307 | 0 | 1277 | 37 | 0 |
| 1 | F | 1270 | 0 | 1244 | 39 | 0 |
| 1 | G | 1294 | 0 | 1260 | 45 | 0 |
| 1 | H | 1298 | 0 | 1271 | 32 | 0 |
| 2 | A | 14 | 0 | 16 | 1 | 0 |
| 2 | E | 14 | 0 | 16 | 0 | 0 |
| 2 | G | 14 | 0 | 16 | 1 | 0 |
| 3 | B | 26 | 0 | 35 | 4 | 0 |
| 3 | C | 26 | 0 | 35 | 4 | 0 |
| 3 | D | 26 | 0 | 35 | 3 | 0 |
| 3 | F | 26 | 0 | 35 | 1 | 0 |
| 3 | H | 26 | 0 | 35 | 0 | 0 |
| 4 | A | 69 | 0 | 0 | 1 | 0 |
| 4 | B | 78 | 0 | 0 | 0 | 0 |
| 4 | C | 60 | 0 | 0 | 2 | 0 |
| 4 | D | 78 | 0 | 0 | 0 | 0 |
| 4 | E | 10 | 0 | 0 | 0 | 0 |
| 4 | F | 9 | 0 | 0 | 1 | 0 |
| 4 | G | 15 | 0 | 0 | 0 | 0 |
| 4 | H | 8 | 0 | 0 | 0 | 0 |
| All | All | 11039 | 0 | 10525 | 246 | 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 12.

The worst 5 of 246 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:70:ILE:HD11 | 3:C:179:PE5:H112 | 1.35 | 1.08 |
| 1:E:12:PRO:HG2 | 1:E:15:LYS:HG3 | 1.58 | 0.85 |
| 1:F:13:LEU:HD12 | 1:F:13:LEU:H | 1.41 | 0.83 |
| 3:C:179:PE5:H41 | 4:C:237:HOH:O | 1.81 | 0.81 |
| 1:G:145:ALA:HB3 | 1:G:148:LEU:HG | 1.67 | 0.75 |

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

| Mol | Chain | Analysed | Favoured | Allowed | Outliers | Percentiles | |
|-----|-------|-----------------|------------|---------|----------|-------------|----|
| 1 | A | 159/178 (89%) | 153 (96%) | 4 (2%) | 2 (1%) | 12 | 6 |
| 1 | B | 160/178 (90%) | 151 (94%) | 8 (5%) | 1 (1%) | 25 | 19 |
| 1 | C | 159/178 (89%) | 151 (95%) | 7 (4%) | 1 (1%) | 25 | 19 |
| 1 | D | 164/178 (92%) | 156 (95%) | 7 (4%) | 1 (1%) | 25 | 19 |
| 1 | E | 156/178 (88%) | 139 (89%) | 13 (8%) | 4 (3%) | 5 | 2 |
| 1 | F | 148/178 (83%) | 139 (94%) | 7 (5%) | 2 (1%) | 11 | 5 |
| 1 | G | 151/178 (85%) | 138 (91%) | 10 (7%) | 3 (2%) | 7 | 3 |
| 1 | H | 153/178 (86%) | 138 (90%) | 13 (8%) | 2 (1%) | 12 | 6 |
| All | All | 1250/1424 (88%) | 1165 (93%) | 69 (6%) | 16 (1%) | 12 | 6 |

5 of 16 Ramachandran outliers are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 1 | B | 175 | CYS |
| 1 | G | 115 | TYR |

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| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 1 | A | 175 | CYS |
| 1 | D | 175 | CYS |
| 1 | E | 19 | GLN |

5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

| Mol | Chain | Analysed | Rotameric | Outliers | Percentiles | |
|-----|-------|-----------------|------------|----------|-------------|----|
| 1 | A | 149/159 (94%) | 145 (97%) | 4 (3%) | 44 | 46 |
| 1 | B | 149/159 (94%) | 146 (98%) | 3 (2%) | 55 | 58 |
| 1 | C | 149/159 (94%) | 141 (95%) | 8 (5%) | 22 | 18 |
| 1 | D | 151/159 (95%) | 149 (99%) | 2 (1%) | 69 | 74 |
| 1 | E | 146/159 (92%) | 143 (98%) | 3 (2%) | 53 | 57 |
| 1 | F | 142/159 (89%) | 139 (98%) | 3 (2%) | 53 | 57 |
| 1 | G | 144/159 (91%) | 140 (97%) | 4 (3%) | 43 | 44 |
| 1 | H | 145/159 (91%) | 137 (94%) | 8 (6%) | 21 | 17 |
| All | All | 1175/1272 (92%) | 1140 (97%) | 35 (3%) | 41 | 41 |

5 of 35 residues with a non-rotameric sidechain are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 1 | H | 28 | HIS |
| 1 | H | 58 | LEU |
| 1 | H | 94 | LEU |
| 1 | C | 94 | LEU |
| 1 | C | 60 | GLU |

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 30 such sidechains are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 1 | D | 50 | ASN |
| 1 | H | 28 | HIS |

Continued on next page...

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| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 1 | E | 65 | ASN |
| 1 | H | 117 | GLN |
| 1 | G | 65 | ASN |

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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](#)

8 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 | $\# Z > 2$ |
| 3 | PE5 | C | 179 | - | 25,25,26 | 0.55 | 0 | 24,24,25 | 0.54 | 0 |
| 2 | 1PE | E | 179 | - | 13,13,15 | 0.56 | 0 | 12,12,14 | 0.53 | 0 |
| 2 | 1PE | A | 179 | - | 13,13,15 | 0.56 | 0 | 12,12,14 | 0.58 | 0 |
| 3 | PE5 | B | 179 | - | 25,25,26 | 0.55 | 0 | 24,24,25 | 0.51 | 0 |
| 3 | PE5 | D | 179 | - | 25,25,26 | 0.55 | 0 | 24,24,25 | 0.59 | 0 |
| 3 | PE5 | F | 179 | - | 25,25,26 | 0.55 | 0 | 24,24,25 | 0.45 | 0 |
| 3 | PE5 | H | 179 | - | 25,25,26 | 0.55 | 0 | 24,24,25 | 0.57 | 0 |
| 2 | 1PE | G | 179 | - | 13,13,15 | 0.57 | 0 | 12,12,14 | 0.45 | 0 |

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the

Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

| Mol | Type | Chain | Res | Link | Chirals | Torsions | Rings |
|-----|------|-------|-----|------|---------|-------------|-------|
| 3 | PE5 | C | 179 | - | - | 5/23/23/24 | - |
| 2 | 1PE | E | 179 | - | - | 1/11/11/13 | - |
| 2 | 1PE | A | 179 | - | - | 3/11/11/13 | - |
| 3 | PE5 | B | 179 | - | - | 10/23/23/24 | - |
| 3 | PE5 | D | 179 | - | - | 4/23/23/24 | - |
| 3 | PE5 | F | 179 | - | - | 6/23/23/24 | - |
| 3 | PE5 | H | 179 | - | - | 4/23/23/24 | - |
| 2 | 1PE | G | 179 | - | - | 5/11/11/13 | - |

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

5 of 38 torsion outliers are listed below:

| Mol | Chain | Res | Type | Atoms |
|-----|-------|-----|------|-----------------|
| 3 | B | 179 | PE5 | C11-C12-O7-C13 |
| 3 | B | 179 | PE5 | C13-C14-O8-C15 |
| 3 | D | 179 | PE5 | C11-C12-O7-C13 |
| 2 | A | 179 | 1PE | C23-C13-OH4-C24 |
| 2 | G | 179 | 1PE | C16-C26-OH6-C15 |

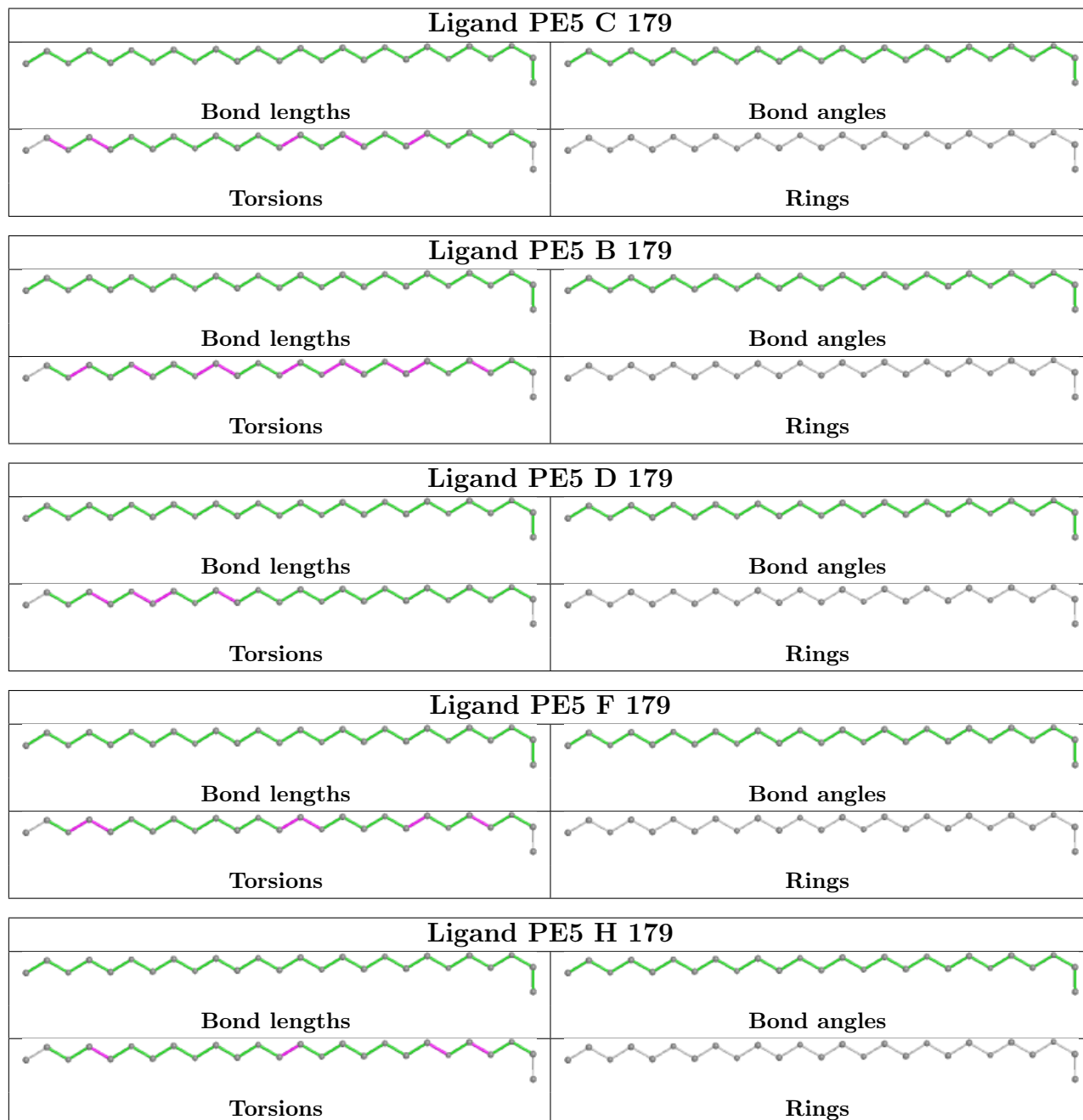
There are no ring outliers.

6 monomers are involved in 14 short contacts:

| Mol | Chain | Res | Type | Clashes | Symm-Clashes |
|-----|-------|-----|------|---------|--------------|
| 3 | C | 179 | PE5 | 4 | 0 |
| 2 | A | 179 | 1PE | 1 | 0 |
| 3 | B | 179 | PE5 | 4 | 0 |
| 3 | D | 179 | PE5 | 3 | 0 |
| 3 | F | 179 | PE5 | 1 | 0 |
| 2 | G | 179 | 1PE | 1 | 0 |

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be

highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



5.7 Other polymers [\(i\)](#)

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

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

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

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

| Mol | Chain | Analysed | <RSRZ> | #RSRZ>2 | OWAB(Å ²) | Q<0.9 |
|-----|-------|-----------------|--------|---------------|-----------------------|----------|
| 1 | A | 167/178 (93%) | 0.23 | 4 (2%) 59 57 | 23, 36, 54, 76 | 11 (6%) |
| 1 | B | 166/178 (93%) | 0.13 | 2 (1%) 79 78 | 20, 33, 52, 69 | 12 (7%) |
| 1 | C | 167/178 (93%) | 0.30 | 6 (3%) 42 42 | 23, 36, 54, 78 | 10 (5%) |
| 1 | D | 168/178 (94%) | 0.15 | 3 (1%) 68 66 | 21, 33, 53, 74 | 13 (7%) |
| 1 | E | 162/178 (91%) | 0.57 | 11 (6%) 17 16 | 25, 52, 72, 77 | 15 (9%) |
| 1 | F | 158/178 (88%) | 0.61 | 15 (9%) 8 7 | 26, 48, 76, 81 | 18 (11%) |
| 1 | G | 161/178 (90%) | 0.64 | 11 (6%) 17 16 | 26, 50, 78, 86 | 17 (10%) |
| 1 | H | 161/178 (90%) | 0.63 | 13 (8%) 12 11 | 25, 52, 71, 76 | 17 (10%) |
| All | All | 1310/1424 (91%) | 0.40 | 65 (4%) 28 28 | 20, 42, 71, 86 | 113 (8%) |

The worst 5 of 65 RSRZ outliers are listed below:

| Mol | Chain | Res | Type | RSRZ |
|-----|-------|-----|------|------|
| 1 | F | 86 | GLY | 4.7 |
| 1 | F | 94 | LEU | 4.6 |
| 1 | E | 106 | TYR | 4.4 |
| 1 | G | 94 | LEU | 3.6 |
| 1 | H | 27 | PHE | 3.5 |

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

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

6.3 Carbohydrates [i](#)

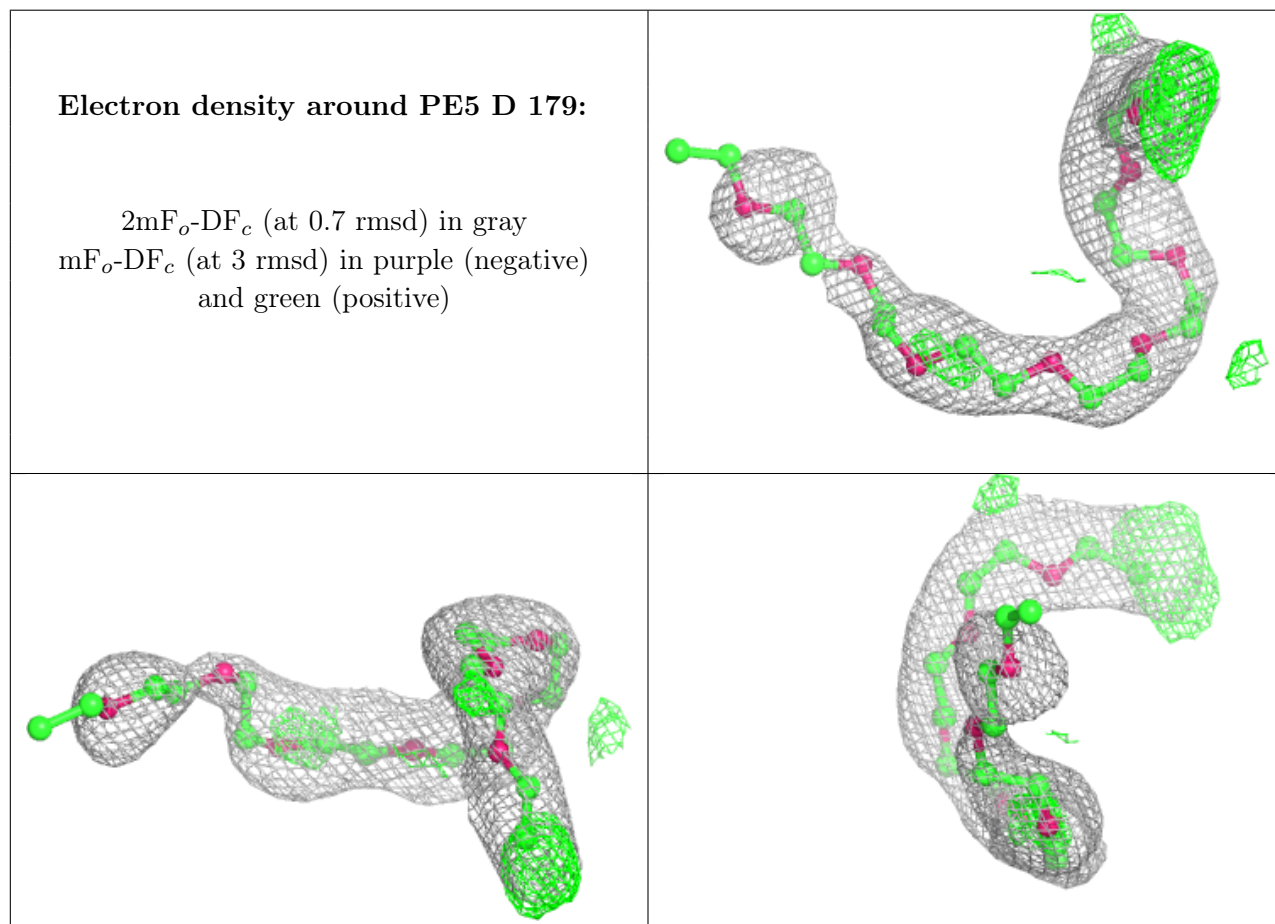
There are no monosaccharides in this entry.

6.4 Ligands [i](#)

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.

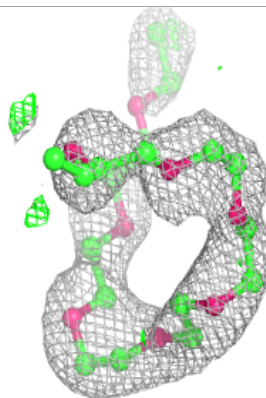
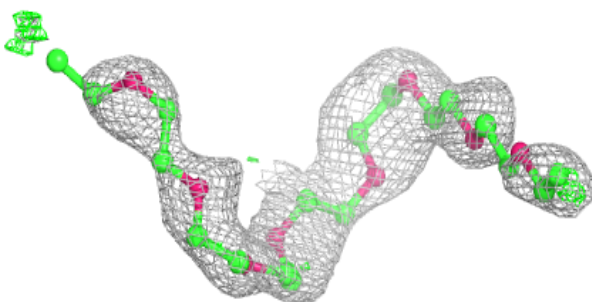
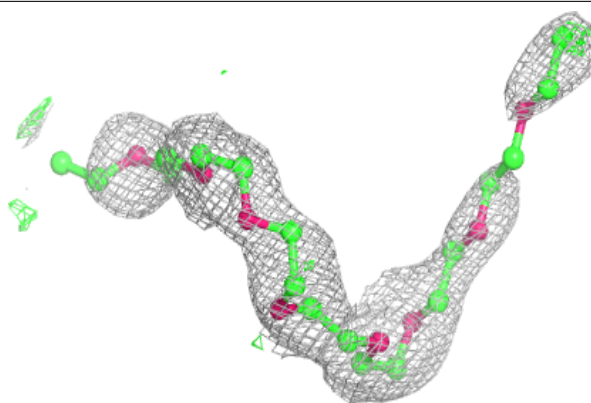
| Mol | Type | Chain | Res | Atoms | RSCC | RSR | B-factors(Å ²) | Q<0.9 |
|-----|------|-------|-----|-------|------|------|----------------------------|-------|
| 3 | PE5 | D | 179 | 26/27 | 0.75 | 0.22 | 64,70,83,85 | 0 |
| 3 | PE5 | F | 179 | 26/27 | 0.76 | 0.26 | 82,86,88,88 | 0 |
| 3 | PE5 | C | 179 | 26/27 | 0.80 | 0.20 | 59,77,94,94 | 0 |
| 2 | 1PE | G | 179 | 14/16 | 0.84 | 0.19 | 79,81,87,88 | 0 |
| 3 | PE5 | B | 179 | 26/27 | 0.85 | 0.17 | 61,66,70,71 | 0 |
| 3 | PE5 | H | 179 | 26/27 | 0.85 | 0.19 | 67,77,85,86 | 0 |
| 2 | 1PE | A | 179 | 14/16 | 0.87 | 0.18 | 57,65,70,71 | 0 |
| 2 | 1PE | E | 179 | 14/16 | 0.91 | 0.14 | 61,64,67,68 | 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.

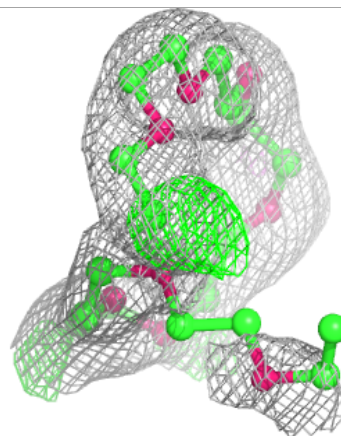
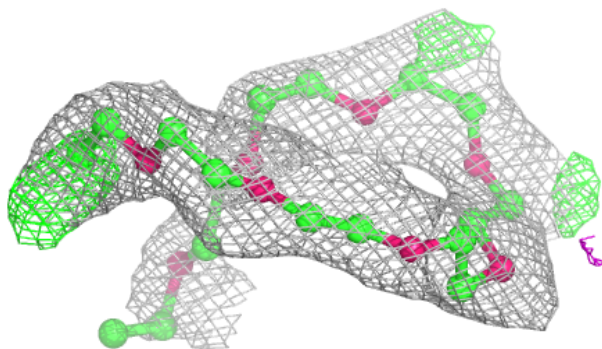
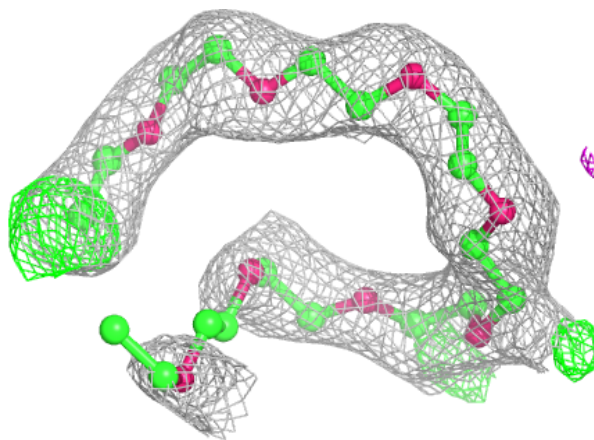


Electron density around PE5 F 179:

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

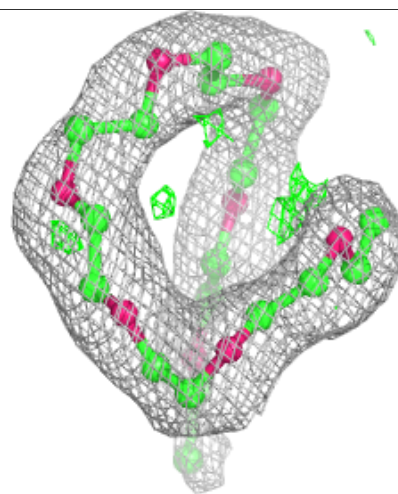
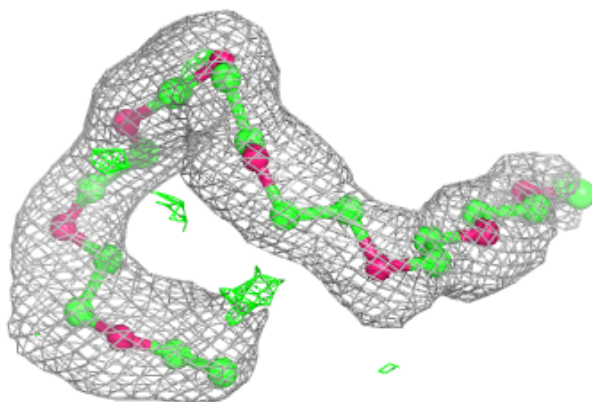
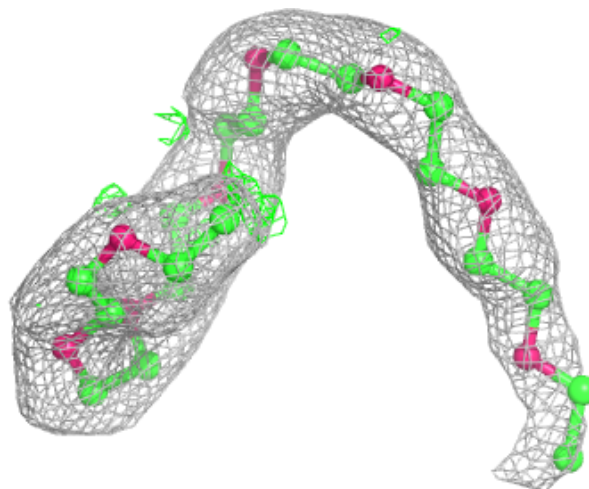
**Electron density around PE5 C 179:**

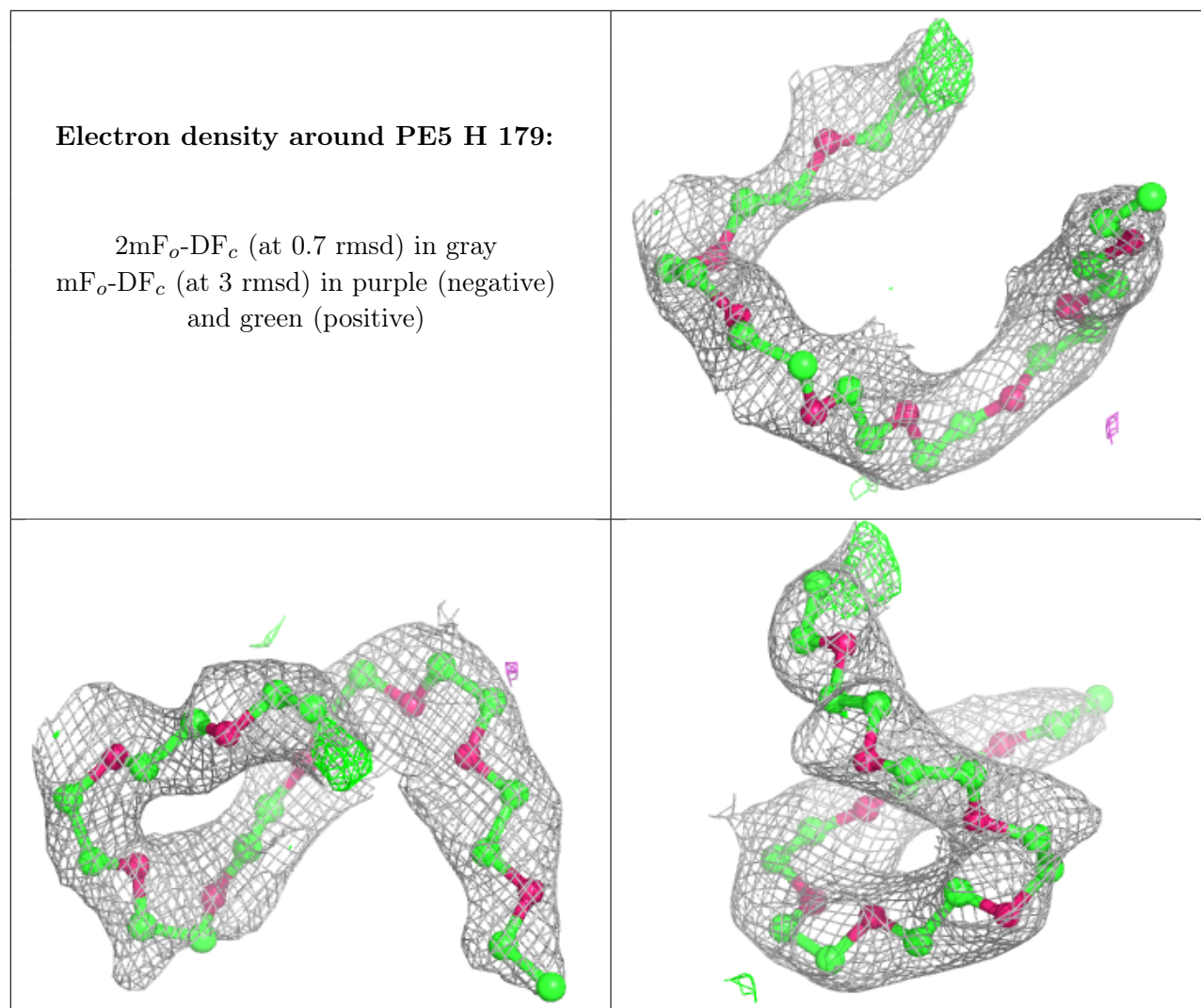
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around PE5 B 179:

$2mF_o-DF_c$ (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.