



wwPDB X-ray Structure Validation Summary Report ⓘ

May 15, 2020 – 02:51 pm BST

PDB ID : 206D
Title : BASE-PAIR OPENING AND SPERMINE BINDING-B-DNA FEATURES
DISPLAYED IN THE CRYSTAL STRUCTURE OF A GAL OPERON
FRAGMENT: IMPLICATIONS FOR PROTEIN-DNA RECOGNITION
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Deposited on : 1995-04-19
Resolution : 2.50 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 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)
Xtrriage (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) : 2.11

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 310 atoms, of which 32 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.

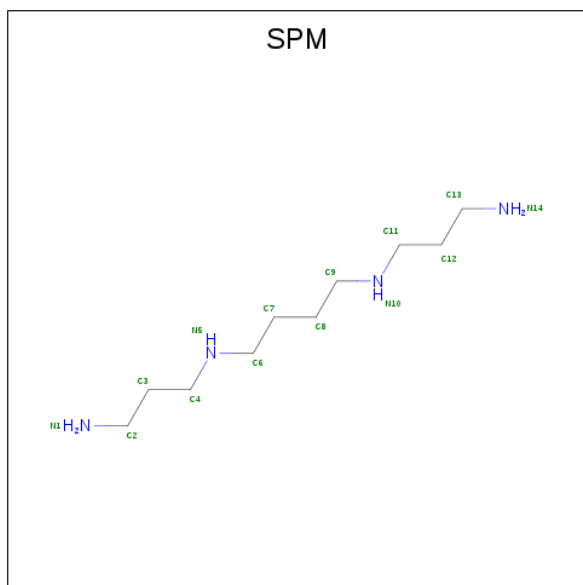
- Molecule 1 is a DNA chain called DNA (5'-D(*CP*GP*GP*TP*GP*G)-3').

| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf | Trace | |
|-----|-------|----------|-------|----|----|----|----|---------|---------|-------|---|
| | | | Total | C | H | N | O | | | | P |
| 1 | A | 6 | 141 | 59 | 17 | 25 | 35 | 5 | 0 | 0 | 0 |

- Molecule 2 is a DNA chain called DNA (5'-D(*CP*CP*AP*CP*CP*G)-3').

| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf | Trace | |
|-----|-------|----------|-------|----|----|----|----|---------|---------|-------|---|
| | | | Total | C | H | N | O | | | | P |
| 2 | B | 6 | 131 | 56 | 15 | 22 | 33 | 5 | 0 | 0 | 0 |

- Molecule 3 is SPERMINE (three-letter code: SPM) (formula: C₁₀H₂₆N₄).



| Mol | Chain | Residues | Atoms | | ZeroOcc | AltConf |
|-----|-------|----------|-------|------|---------|---------|
| | | | Total | C N | | |
| 3 | A | 1 | 14 | 10 4 | 0 | 0 |
| 3 | A | 1 | 7 | 5 2 | 0 | 0 |

- Molecule 4 is water.

| Mol | Chain | Residues | Atoms | | ZeroOcc | AltConf |
|------------|--------------|-----------------|--------------|---------|----------------|----------------|
| 4 | A | 14 | Total 14 | O 14 | 0 | 0 |
| 4 | B | 3 | Total 3 | O 3 | 0 | 0 |

3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA 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: DNA (5'-D(*CP*GP*GP*TP*GP*G)-3')

Chain A:  33% 67%



- Molecule 2: DNA (5'-D(*CP*CP*AP*CP*CP*G)-3')

Chain B:  67% 33%



4 Data and refinement statistics

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

| Property | Value | Source |
|--|---|-----------|
| Space group | P 61 2 2 | Depositor |
| Cell constants a, b, c, α , β , γ | 54.45Å 54.45Å 42.10Å 90.00° 90.00° 120.00° | Depositor |
| Resolution (Å) | 20.00 – 2.50 | Depositor |
| % Data completeness (in resolution range) | (Not available) (20.00-2.50) | Depositor |
| R_{merge} | (Not available) | Depositor |
| R_{sym} | (Not available) | Depositor |
| Refinement program | X-PLOR | Depositor |
| R, R_{free} | 0.221 , (Not available) | Depositor |
| Estimated twinning fraction | No twinning to report. | Xtriage |
| Total number of atoms | 310 | wwPDB-VP |
| Average B, all atoms (Å ²) | 12.0 | wwPDB-VP |

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: SPM

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 | 3.11 | 14/139 (10.1%) | 4.46 | 42/214 (19.6%) |
| 2 | B | 3.16 | 15/129 (11.6%) | 4.54 | 44/196 (22.4%) |
| All | All | 3.13 | 29/268 (10.8%) | 4.50 | 86/410 (21.0%) |

The worst 5 of 29 bond length outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed(Å) | Ideal(Å) |
|-----|-------|-----|------|---------|-------|-------------|----------|
| 2 | B | 8 | DC | C5'-C4' | 11.95 | 1.64 | 1.51 |
| 2 | B | 8 | DC | P-O5' | 11.30 | 1.71 | 1.59 |
| 1 | A | 1 | DC | O3'-P | 11.15 | 1.74 | 1.61 |
| 1 | A | 3 | DG | C5'-C4' | 9.07 | 1.61 | 1.51 |
| 1 | A | 5 | DG | N9-C4 | -7.87 | 1.31 | 1.38 |

The worst 5 of 86 bond angle outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed(°) | Ideal(°) |
|-----|-------|-----|------|-------------|--------|-------------|----------|
| 1 | A | 1 | DC | O4'-C1'-N1 | 21.65 | 123.16 | 108.00 |
| 2 | B | 10 | DC | O4'-C1'-C2' | -20.42 | 89.56 | 105.90 |
| 1 | A | 3 | DG | O4'-C1'-N9 | 20.36 | 122.25 | 108.00 |
| 2 | B | 12 | DG | O4'-C1'-C2' | -16.46 | 92.73 | 105.90 |
| 2 | B | 8 | DC | O4'-C1'-C2' | -13.02 | 95.48 | 105.90 |

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

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 | 124 | 17 | 69 | 6 | 0 |
| 2 | B | 116 | 15 | 66 | 1 | 0 |
| 3 | A | 21 | 0 | 37 | 0 | 0 |
| 4 | A | 14 | 0 | 0 | 1 | 0 |
| 4 | B | 3 | 0 | 0 | 0 | 0 |
| All | All | 278 | 32 | 172 | 7 | 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 16.

The worst 5 of 7 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:A:5:DG:H2'' | 1:A:6:DG:H8 | 1.69 | 0.58 |
| 2:B:10:DC:H2'' | 2:B:11:DC:C5 | 2.43 | 0.54 |
| 1:A:2:DG:H5' | 1:A:2:DG:C8 | 2.45 | 0.52 |
| 1:A:2:DG:H5' | 1:A:2:DG:H8 | 1.76 | 0.51 |
| 1:A:5:DG:H2'' | 1:A:6:DG:C8 | 2.46 | 0.50 |

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

There are no protein molecules in this entry.

5.3.2 Protein sidechains [i](#)

There are no protein molecules in this entry.

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 carbohydrates in this entry.

5.6 Ligand geometry [i](#)

2 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 | SPM | A | 14 | - | 6,6,13 | 1.11 | 0 | 5,5,12 | 2.79 | 3 (60%) |
| 3 | SPM | A | 13 | - | 13,13,13 | 1.46 | 1 (7%) | 12,12,12 | 2.34 | 5 (41%) |

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 | SPM | A | 14 | - | - | 2/4/4/11 | - |
| 3 | SPM | A | 13 | - | - | 4/11/11/11 | - |

All (1) bond length outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed(Å) | Ideal(Å) |
|-----|-------|-----|------|-------|------|-------------|----------|
| 3 | A | 13 | SPM | C6-N5 | 2.75 | 1.56 | 1.46 |

The worst 5 of 8 bond angle outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed($^{\circ}$) | Ideal($^{\circ}$) |
|-----|-------|-----|------|-------------|-------|------------------------|---------------------|
| 3 | A | 13 | SPM | C8-C9-N10 | -4.35 | 100.41 | 112.14 |
| 3 | A | 14 | SPM | C4-N5-C6 | -4.22 | 104.45 | 113.43 |
| 3 | A | 14 | SPM | C3-C4-N5 | -3.94 | 101.50 | 112.14 |
| 3 | A | 13 | SPM | C11-C12-C13 | -3.58 | 101.17 | 114.28 |
| 3 | A | 13 | SPM | C4-C3-C2 | -3.23 | 102.45 | 114.28 |

There are no chirality outliers.

5 of 6 torsion outliers are listed below:

| Mol | Chain | Res | Type | Atoms |
|-----|-------|-----|------|--------------|
| 3 | A | 13 | SPM | C7-C8-C9-N10 |
| 3 | A | 13 | SPM | N5-C6-C7-C8 |
| 3 | A | 14 | SPM | C2-C3-C4-N5 |
| 3 | A | 14 | SPM | N1-C2-C3-C4 |
| 3 | A | 13 | SPM | C7-C6-N5-C4 |

There are no ring outliers.

No monomer is involved in short contacts.

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

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.