



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 3, 2023 – 03:53 AM EDT

PDB ID : 6OB3
Title : Crystal structure of G13D-KRAS (GMPPNP-bound) in complex with GAP-related domain (GRD) of neurofibromin (NF1)
Authors : Tran, T.H.; Dharmaiah, S.; Simanshu, D.K.
Deposited on : 2019-03-19
Resolution : 2.10 Å (reported)

This is a Full wwPDB X-ray Structure Validation 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 : **FAILED**
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtrriage (Phenix) : 1.13
EDS : **FAILED**
buster-report : 1.1.7 (2018)
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) : 2.35.1

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 2.10 Å.

There are no overall percentile quality scores available for this entry.

MolProbity and EDS failed to run properly - the sequence quality summary graphics cannot be shown.

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 7035 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 GTPase KRas.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	170	1358	850	233	267	8	0	1	0
1	C	166	1318	825	227	259	7	0	1	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	0	GLY	-	expression tag	UNP P01116
A	13	ASP	GLY	engineered mutation	UNP P01116
C	0	GLY	-	expression tag	UNP P01116
C	13	ASP	GLY	engineered mutation	UNP P01116

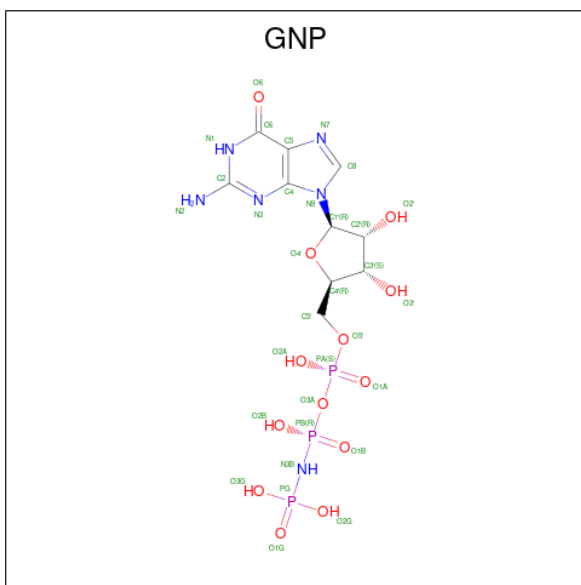
- Molecule 2 is a protein called Neurofibromin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	245	1948	1257	330	349	12	0	2	0
2	D	247	1969	1271	335	351	12	0	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	1208	GLY	-	expression tag	UNP P21359
D	1208	GLY	-	expression tag	UNP P21359

- Molecule 3 is PHOSPHOAMINOPHOSPHONIC ACID-GUANYLATE ESTER (three-letter code: GNP) (formula: $C_{10}H_{17}N_6O_{13}P_3$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
3	A	1	32	10	6	13	3	0	0
3	C	1	32	10	6	13	3	0	0

- Molecule 4 is MAGNESIUM ION (three-letter code: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Mg		
4	A	1	1	1	0	0
4	C	1	1	1	0	0

- Molecule 5 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Cl		
5	B	2	2	2	0	0
5	C	1	1	1	0	0

- Molecule 6 is 2-(N-MORPHOLINO)-ETHANESULFONIC ACID (three-letter code: MES) (formula: C₆H₁₃NO₄S).



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

- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
7	A	81	Total	O	0	0
			81	81		
7	B	100	Total	O	0	0
			100	100		
7	C	43	Total	O	0	0
			43	43		
7	D	89	Total	O	0	0
			89	89		

MolProbity and EDS failed to run properly - this section is therefore empty.

3 Data and refinement statistics

EDS failed to run properly - this section is therefore incomplete.

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	81.68Å 97.17Å 155.53Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	77.76 – 2.10	Depositor
% Data completeness (in resolution range)	99.7 (77.76-2.10)	Depositor
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.28 (at 2.02Å)	Xtrriage
Refinement program	PHENIX	Depositor
R, R_{free}	0.186 , 0.226	Depositor
Wilson B-factor (Å ²)	36.9	Xtrriage
Anisotropy	0.668	Xtrriage
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
Total number of atoms	7035	wwPDB-VP
Average B, all atoms (Å ²)	57.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.12% 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.

4 Model quality [i](#)

4.1 Standard geometry [i](#)

MolProbity failed to run properly - this section is therefore empty.

4.2 Too-close contacts [i](#)

MolProbity failed to run properly - this section is therefore empty.

4.3 Torsion angles [i](#)

4.3.1 Protein backbone [i](#)

MolProbity failed to run properly - this section is therefore empty.

4.3.2 Protein sidechains [i](#)

MolProbity failed to run properly - this section is therefore empty.

4.3.3 RNA [i](#)

MolProbity failed to run properly - this section is therefore empty.

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

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

4.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

4.6 Ligand geometry [i](#)

Of 12 ligands modelled in this entry, 5 are monoatomic - leaving 7 for Mogul analysis.

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

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
6	MES	D	1501	-	12,12,12	0.79	0	14,16,16	0.63	0
6	MES	B	1503	-	12,12,12	2.09	1 (8%)	14,16,16	2.54	6 (42%)
3	GNP	C	201	4	29,34,34	1.61	7 (24%)	33,54,54	2.13	8 (24%)
3	GNP	A	201	4	29,34,34	1.64	7 (24%)	33,54,54	2.19	7 (21%)
6	MES	B	1505	-	12,12,12	2.31	1 (8%)	14,16,16	1.83	3 (21%)
6	MES	D	1502	-	12,12,12	2.04	1 (8%)	14,16,16	1.88	4 (28%)
6	MES	B	1504	-	12,12,12	0.78	0	14,16,16	0.46	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
6	MES	D	1501	-	-	3/6/14/14	0/1/1/1
6	MES	B	1503	-	-	2/6/14/14	0/1/1/1
3	GNP	C	201	4	-	3/14/38/38	0/3/3/3
3	GNP	A	201	4	-	3/14/38/38	0/3/3/3
6	MES	B	1505	-	-	1/6/14/14	0/1/1/1
6	MES	D	1502	-	-	4/6/14/14	0/1/1/1
6	MES	B	1504	-	-	0/6/14/14	0/1/1/1

All (17) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	B	1505	MES	C8-S	-7.68	1.66	1.77
6	B	1503	MES	C8-S	-6.81	1.67	1.77
6	D	1502	MES	C8-S	-6.75	1.67	1.77
3	A	201	GNP	PB-O1B	4.30	1.53	1.46
3	C	201	GNP	PB-O3A	3.75	1.63	1.59
3	A	201	GNP	PG-N3B	3.47	1.72	1.63
3	A	201	GNP	PB-O3A	3.46	1.63	1.59
3	C	201	GNP	PG-N3B	3.24	1.71	1.63
3	C	201	GNP	PB-O1B	3.24	1.51	1.46
3	C	201	GNP	C6-N1	3.07	1.38	1.33
3	A	201	GNP	C6-N1	3.06	1.38	1.33

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	201	GNP	PG-O1G	2.83	1.50	1.46
3	A	201	GNP	PB-O2B	-2.16	1.50	1.56
3	A	201	GNP	PA-O2A	-2.14	1.45	1.55
3	C	201	GNP	C5-C6	2.11	1.45	1.41
3	A	201	GNP	C5-C6	2.07	1.44	1.41
3	C	201	GNP	PB-O2B	-2.02	1.51	1.56

All (28) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	201	GNP	C5-C6-N1	-8.45	111.87	123.43
3	A	201	GNP	C5-C6-N1	-8.44	111.88	123.43
3	A	201	GNP	C2-N1-C6	5.85	125.22	115.93
3	C	201	GNP	C2-N1-C6	5.80	125.14	115.93
6	B	1505	MES	C5-N4-C3	4.80	119.62	108.83
6	B	1503	MES	C5-N4-C3	4.18	118.25	108.83
6	D	1502	MES	C5-N4-C3	3.97	117.78	108.83
6	B	1503	MES	C7-N4-C5	3.97	121.39	111.23
6	B	1503	MES	C7-N4-C3	3.57	120.36	111.23
6	B	1503	MES	C2-C3-N4	-3.54	104.74	110.10
6	B	1503	MES	O2S-S-C8	3.45	111.07	106.92
6	D	1502	MES	O1S-S-C8	3.26	110.84	106.92
6	B	1503	MES	C6-C5-N4	-3.14	105.34	110.10
6	D	1502	MES	O2S-S-C8	2.80	110.29	106.92
3	C	201	GNP	N3-C2-N1	-2.74	123.57	127.22
3	A	201	GNP	N3-C2-N1	-2.73	123.58	127.22
3	A	201	GNP	C4-C5-C6	-2.71	118.21	120.80
3	C	201	GNP	C4-C5-C6	-2.60	118.32	120.80
3	A	201	GNP	O2G-PG-O1G	-2.59	106.94	113.45
6	B	1505	MES	O1S-S-C8	2.58	110.03	106.92
3	A	201	GNP	PB-O3A-PA	-2.48	123.90	132.62
6	B	1505	MES	O3S-S-C8	2.40	109.66	105.77
3	C	201	GNP	PB-O3A-PA	-2.35	124.35	132.62
3	C	201	GNP	O1G-PG-N3B	-2.31	108.37	111.77
3	C	201	GNP	C2-N3-C4	-2.19	112.85	115.36
3	C	201	GNP	O1B-PB-N3B	-2.16	108.58	111.77
3	A	201	GNP	C2-N3-C4	-2.16	112.89	115.36
6	D	1502	MES	C7-N4-C5	2.07	116.53	111.23

There are no chirality outliers.

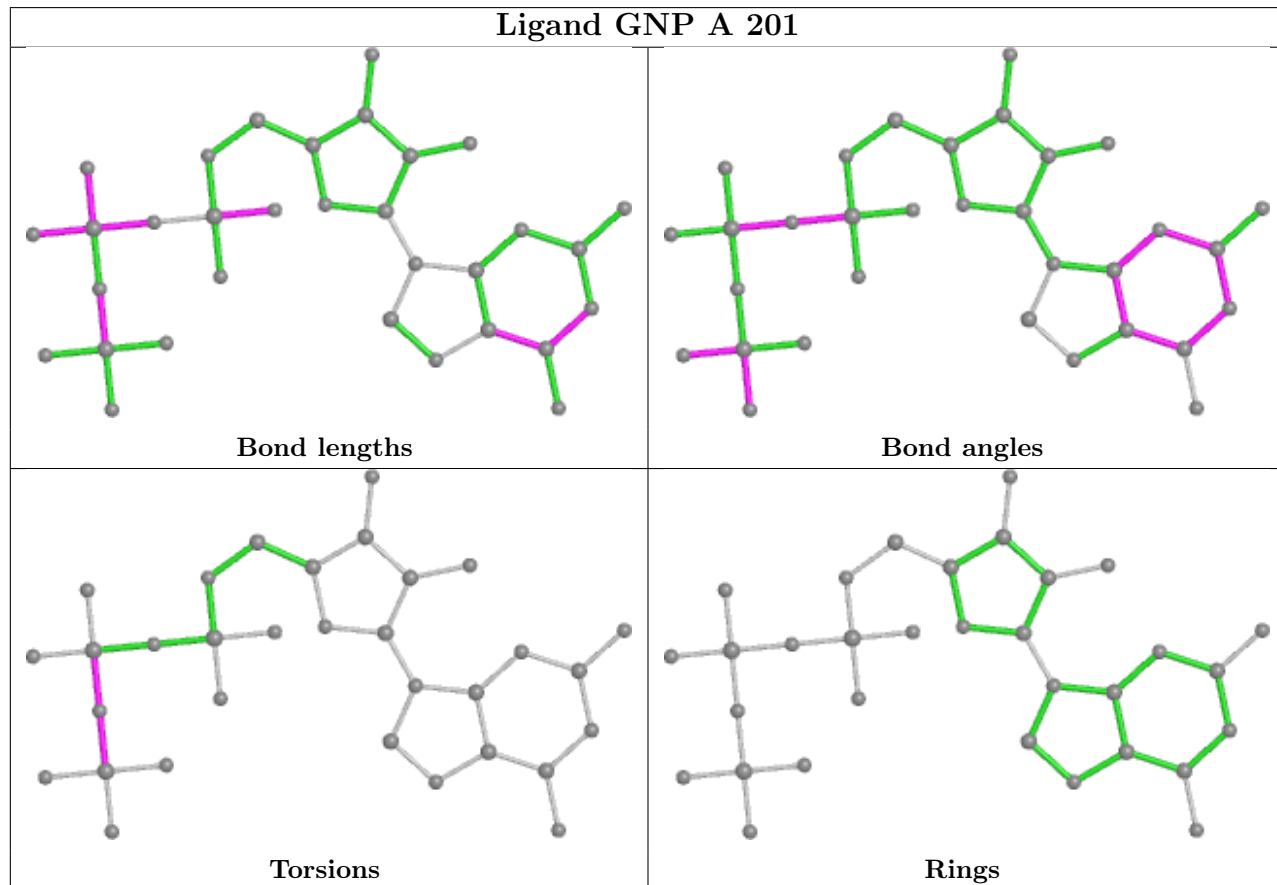
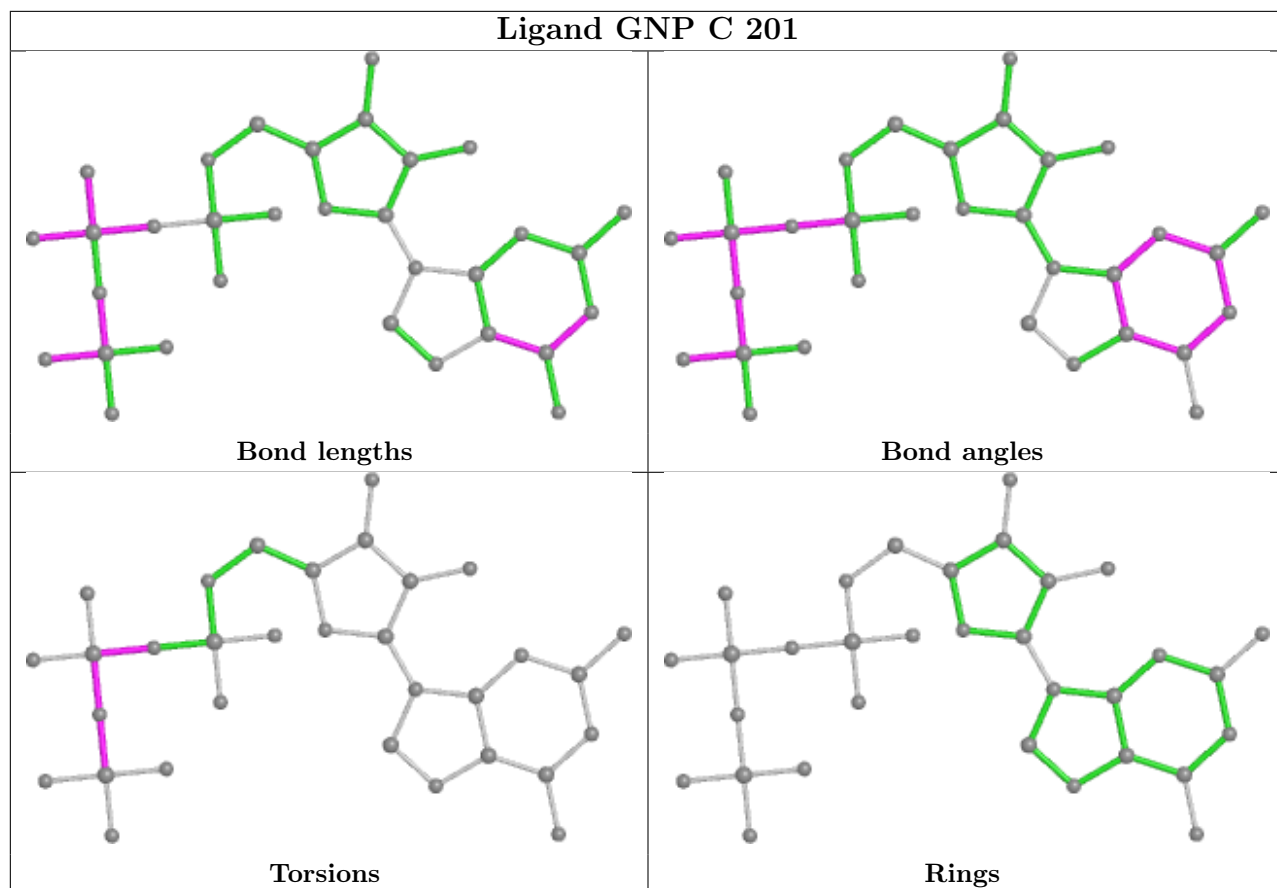
All (16) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	201	GNP	PB-N3B-PG-O1G
3	A	201	GNP	PG-N3B-PB-O1B
3	A	201	GNP	PG-N3B-PB-O3A
3	C	201	GNP	PB-N3B-PG-O1G
3	C	201	GNP	PG-N3B-PB-O1B
3	C	201	GNP	PA-O3A-PB-O1B
6	B	1505	MES	C8-C7-N4-C5
6	D	1501	MES	C7-C8-S-O1S
6	D	1501	MES	C7-C8-S-O3S
6	D	1502	MES	C7-C8-S-O3S
6	B	1503	MES	N4-C7-C8-S
6	B	1503	MES	C8-C7-N4-C5
6	D	1502	MES	C8-C7-N4-C3
6	D	1501	MES	C7-C8-S-O2S
6	D	1502	MES	C7-C8-S-O1S
6	D	1502	MES	C7-C8-S-O2S

There are no ring outliers.

No monomer is involved in short contacts.

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.



4.7 Other polymers [i](#)

There are no such residues in this entry.

4.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

5 Fit of model and data

5.1 Protein, DNA and RNA chains

EDS failed to run properly - this section is therefore empty.

5.2 Non-standard residues in protein, DNA, RNA chains

EDS failed to run properly - this section is therefore empty.

5.3 Carbohydrates

EDS failed to run properly - this section is therefore empty.

5.4 Ligands

EDS failed to run properly - this section is therefore empty.

5.5 Other polymers

EDS failed to run properly - this section is therefore empty.