Synthesis, Structure, and Reactivities of Synthetic Analogues of three forms of Co(III)-Bleomycin: Proposed Mode of Light-Induced DNA Damage by the Co(III) Chelate of the Drug.

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1. Bleomycin (BLM) as an anticancer drug.
2. Using Cobalt(III) instead of Cu and Fe, cobalt(III) does not require oxygen activation and cobalt(III) does not damage the DNA.
3. Cobalt(III) does cleave DNA when illuminated with UV or visible light.
Structure of Bleomycin (BLM)

Metal Chelating Region
Synthesis

• Three cobalt(III)-BLM (PMAH) were synthesized: aqua-Brown, Green, and orange
• Orange- all six ligands were supplied by the BLM (PMAH) and one N donor
• Aqua-brown- H2O and the BLM (PMAH) ligand
• Green- -OOH and BLM(PMAH) ligand
Synthesis

Co(III) with different linkers:
- HN
- Npm
- NH$_2$
- X
- Nim
- Npep

Color codes:
- X=H$_2$O, Brown
- X= -OOH, Green
- X= N-donor, Orange
Synthesis

PMAH Structure
Results

- The addition of Co(II) salts to PMAH produced a brown solution in which all attempts to produce crystals from that failed.
- NMR, IR, DNA cleavage and spin-trapping experiments were also performed.
Results

• DNA Cleavage: application: Green and brown Co(III) analogues induce strand breakage under UV illumination.
• Decreasing order: Green>Brown>Orange
• Spin-Trapping: mechanism: produced OH radicals upon irradiation.
My Project

• Cobalt diluted in MeOH mixed with Eu-Pr diluted in 2:1 MeOH:EtOH
• No crystals
• Crystal Chromatography
• Colors bottom to top: blue-violet, pink-purple, orange, brown
• Colors: Brown, Orange, Pink-purple, Green
Crystal Chromatography: Uses silicon, sand and a solvent such as MeOH. This is not filtration.
My Project

• All portions of columns were put on the rotary evap. and then put on the vacuum
• Rinsed with MeOH
• Pink precipitate formed at the bottom of both first portions collected from both cobalt columns.
References