Name:
Date:

QC2 -DNA Structure & Cisplatin

1. What are the components of a DNA nucleotide?
   Phosphate group, **deoxyribose sugar**, and DNA **base** (adenine, cytosine, guanine, thymine).

2. Which type of bonding forms the backbone of a polynucleotide?
   Covalent bonding between the deoxyribose sugar, and the phosphate groups. This forms the sugar-phosphate backbone, and is often called a phosphodiester bond.

3. Which type of bonding holds the two DNA chains together to form a double helix?
   Hydrogen bonding between the complementary DNA base pairs

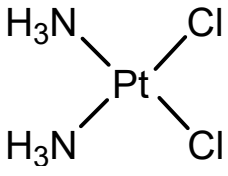
4. Describe how complementarity causes the two DNA strands to combine.
   The DNA **bases** in the polynucleotide chains show a specific complementarity. **Adenine bonds exclusively to thymine, and cytosine bonds to guanine only**. This DNA base pairing occurs through hydrogen bonding, and gives the DNA strands specificity.

5. Design a complementary base sequence for the polynucleotide strand below:

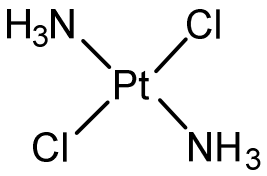
Strand 1	A	T	A	C	C	G	C	T	C	G	A	A
Strand 2	T	A	T	G	G	C	G	A	G	C	T	T

6. Cisplatin, $Pt(NH_3)_2Cl_2$, is a compound frequently used as an anticancer drug. Explain how cisplatin can treat cancers and tumours.
   Cisplatin **binds to the DNA**, and **prevents it from replicating**. It does this by **replacing the Cl ligands with bonds to the nitrogen atoms in guanine.**

7. Describe the difference between cisplatin and transplatin.
   Cisplatin has each of the Cl groups cis- to each other. In transplatin, they are trans.



Cisplatin



Transplatin

Produced by Adam Stubbs at Newcastle University as part of a summer outreach project.

8. Explain why transplatin may not be as effective as cisplatin.
   Because transplatin has a different structure, it **cannot bind as effectively** to the guanine bases.

9. Cisplatin also targets healthy cells, as well as cancerous ones. How can any dangerous side effects be reduced?
   By **targeting the therapy** to only the tumours, or by using the **smallest possible effective dose**.