

Extra Practice of Chargaff's Rule and Complimentary Base Pairing

Name: _____

Date: _____

1. What is Chargaff's Rule?
2. How do the nitrogenous bases pair?
____ pairs with ____
____ pairs with ____
3. If a strand of DNA has 20% C, what percent will be G? _____
4. If a strand of DNA has 35% A, what percent will be T? _____
5. If a strand of DNA has 10% G, what percent will be T? _____
6. If a strand of DNA has 45% A, what percent will be C? _____
7. If a strand of DNA has 24% T, what percent will be G? _____
8. Write the complimentary base pairs for the following DNA strands:

Original: ATC GCC CAT GTG CCA
Comp:

Original: TGA CAA CGA GGT ACT
Comp:

Original: AAA CCC TTT GGG ACG
Comp:

Extra Credit:

You have decided you want to see what you have in common with other species as far as your DNA goes. You were able to sequence the DNA in *E.coli*, a mouse, and your big brother's girlfriend (a human). Using Chargaff's rule, discover which two organisms have the most DNA in common.

Below is a chart of the different bases each organism has. Along the top of the chart, you will find the base pair and the numbers underneath represent the percentages of those found in the organisms.

Organism	Adenine (A)	Thymine (T)	Guanine (G)	Cytosine (C)
<i>Escherichia coli</i>	26.0	23.9	24.9	25.2
Mouse	29.2	29.4	21.7	19.7
Human	30.7	31.2	19.3	18.8

1. Which 2 organisms are most similar? Why do you think this? Please explain your answer using Chargaff's complimentary base pair rule.

What's in This Banana?!? Lab

Name _____ Date _____

Safety Precautions:

- Please do not eat or drink in the lab.
- Wear safety goggles during this lab.
- Wash your hands after you have finished the lab.

Materials:

1 heavy duty ziploc bag
2-3 cm banana
1 coffee filter
1 funnel
1 50mL vial / test tube
1 100 mL beaker
1 wooden coffee stirrer

Reagents:

20 mL ice-cold 91% isopropyl alcohol
10 mL DNA extraction buffer (soapy, salty water)

Pre-lab questions:

1. What are DNA molecules called? *Hint: humans have 23 pairs.*
2. Where is DNA found in the cells?
3. What do you think DNA would look like if you could see it with your own eyes? (Please provide a drawing with explanation)

Procedure:

1. Place your banana in a Ziploc bag.
2. Smash/grind up the banana using your fist and fingers for 2 minutes. *Careful not to break the bag!!*
3. Add the provided 10mL of extraction buffer (salt and soap solution) to the bag.
4. Knead/mush the banana and extraction buffer in the bag again for 1 minute.

5. Put your test tube into the beaker for support. Place a coffee filter into the funnel and set this into the test tube.
6. Pour the banana into the filtration apparatus and let it drip directly into your test tube.
7. **Watch the teacher demonstration of this step.** You must slowly pour the cold ethanol down the side of the tube! OBSERVE ☺
8. At the interface, you will see the DNA precipitate out of solution and float to the top
9. Dip the coffee stirrer into the tube where the banana extract and ethanol layers come into contact with each other. OBSERVE ☺

Conclusion and Analysis

1. Write the letter of the procedure step next to its function.

	Procedure Step		Function
A.	Filter strawberry solution through cheesecloth		To precipitate DNA from solution
B.	Squish and knead strawberry with DNA extraction buffer		To separate the components of the cell
C.	Squish and knead strawberry in the bag by itself		To break open the strawberry cells
D.	Add cold isopropyl alcohol to test tube		To break up histone proteins and dissolve the cell and nuclear membranes

1. What did the DNA look like? Relate its chemical structure to how it looks when lots of it is clumped together and what you observed today.
2. DNA is soluble in water, but not in ethanol. What does this fact have to do with our method of extraction? Explain what happened when the ethanol came in contact with the banana extract.

3. A person cannot see a single cotton thread 100 feet away, but if you wound thousands of threads together into a rope, it would be visible much further away. Is this statement analogous to our DNA extraction? Explain.

4. In order to study our genes, scientists must first extract the DNA from human tissue. Would you expect the method of DNA extraction to be the same for Human DNA? Why or why not?

5. If you wanted to extract DNA from a living person, what cells would you use and why?

6. List one reason why it is important for scientists to be able to remove DNA from an organism.

7. Is there DNA in your food? _____ How do you know?