

Ficha 4 – Modulo de Biologia Molecular - 2022

1. Why do the fragments of DNA in gel electrophoresis travel away from the negative electrode?

- a. DNA is negatively charged so attracted to the positive end of the unit
- b. DNA is positively charged to attracted to the negative end of the unit
- c. the agarose gel is negatively charged
- d. the agarose gel is positively charged

2. Which of the following features of DNA is primarily responsible for movement of DNA molecules in an electrical field?

- a. Nitrogenous base
- b. Deoxyribose sugar
- c. Phosphate
- d. Complementary base pairing
- e. Antiparallel orientation

3. Gel electrophoresis enables scientists to

- a. separate DNA fragments.
- b. combine DNA fragments.
- c. count the genes in DNA.
- d. insert DNA in cells.

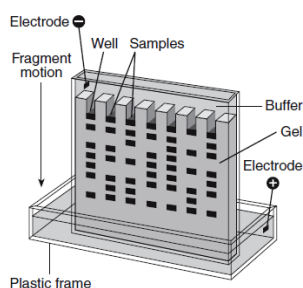
4. The rate at which DNA migrates through the gel is determined by:

- a. Molecular size of the DNA and the agarose gel concentration.
- b. Conformation of DNA and the applied voltage.
- c. The length of the agarose gel and the negativity of the DNA.
- d. Both (a) and (b)
- e. Both (a) and (c)

5. Which is the primary purpose of using restriction enzymes in gel electrophoresis?

- a. It allows the strands of DNA to be cut into various lengths for testing
- b. It restricts the number of base pairs that can be tested in a sample
- c. It makes the testing simpler by moving the strands into the gel faster
- d. It charges the DNA strands

6. A student performed a gel electrophoresis experiment. The results are represented in the diagram below. Compared to the fragments at the top of the gel, the fragments at the lower end are



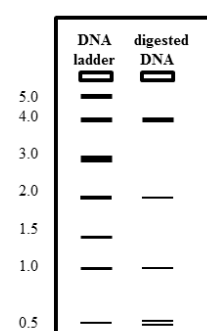
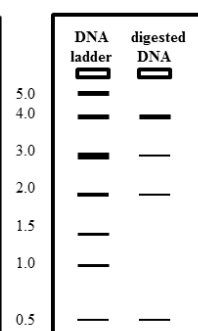
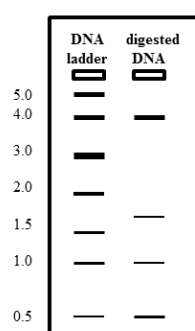
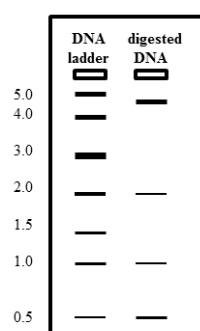
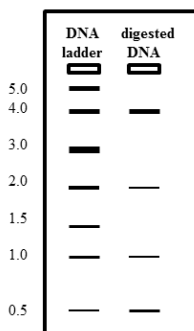
- a. larger, and move slower
- b. larger, and move faster
- c. smaller, and move faster
- d. smaller, and move slower

7. A scientist wishes to verify that a restriction digestion has successfully cut a linear DNA fragment. She decides to compare the cut and uncut DNA samples using agarose gel electrophoresis. Which of the following agarose gel results is a result that would indicate the linear piece of DNA was digested?

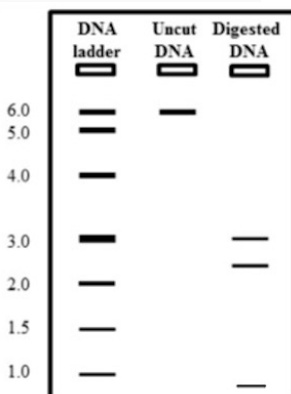
- One band in the uncut DNA lane and two smaller bands in the digested DNA lane
- One band in the uncut DNA lane and a single smaller band in the digested DNA lane
- One band in the uncut DNA lane and three smaller bands in the digested DNA lane
- Two of the answers are correct
- All of the answers are correct

8. The following image represents a map of a piece of DNA, where each vertical line represents a recognition site for restriction enzyme BamHI. The numbers refer to the size of the pieces of DNA after digestion by this restriction enzyme.

If this DNA was digested completely by BamHI, which of the following agarose gel results would you expect to see?



9. The following image represents the agarose gel results from the restriction digest of a 6 kb piece of DNA that possesses two restriction sites. Which of the following statements is true?



- The restriction digest was incomplete because the smallest DNA band is missing.
- It is impossible to determine if the digest was successful.
- The piece of DNA that was digested was not 6 kb long.
- The 6 kb piece of DNA was completely digested by the restriction enzyme.
- Two of the statements are true.

10. Plasmídeos são moléculas de DNA _____, unidades genéticas com _____ independente do cromossoma. Nativamente, existem sobretudo em _____ e podem existir em baixo ou elevado _____ (2 palavras) dentro da célula, uma característica que depende da sua _____ (2 palavras).

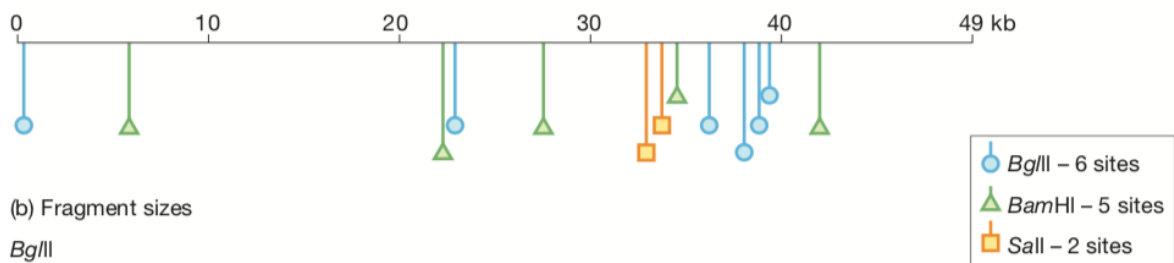
Os plasmídeos _____ são derivados de plasmídeos naturais, aos quais foram acrescentadas ou removidas sequências específicas e podem ser agrupados em _____ de plasmídeos. São ferramentas importantes para o processo de clonagem molecular, sendo dois elementos essenciais para este fim, a _____ (3 palavras) e um gene que permita _____ transformantes. Podem incluir outros elementos, como _____.

11. As enzimas de restrição são _____ do tipo II que reconhecem sequências de estrutura _____, devido facto de serem homodímeros. As enzimas de restrição fazem parte do sistema de _____ (2 palavras) das bactérias, que as protege da entrada de DNA exógeno, como no caso da infeção por _____. Assim, para cada enzima de restrição existe uma enzima _____ que reconhece a mesma sequência e adiciona um grupo _____ a uma das bases.

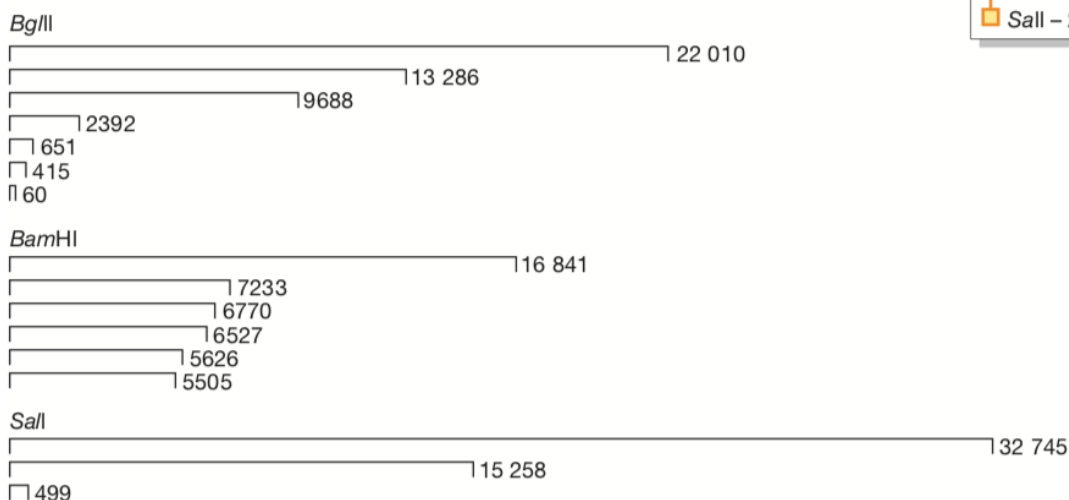
Uma enzima de restrição pode gerar extremidades _____ ou _____ e a sua _____ de corte _____ com o aumento do número de nucleótidos da sequência de reconhecimento.

12. Establishment of phage lambda physical map:

(a) Cleavage sites on λ DNA



(b) Fragment sizes



- how many restriction fragments did you theoretically expect for each enzyme (BglII, BamHI and Sall)?
- How can you explain the observed discrepancy?

13. Phage Lambda DNA was digested with 2 restriction enzymes (EcoRI and HindIII). The sample of lane 2 contains Phage Lambda DNA not treated. All the other samples (3 to 7) suffered digestion with 1 or 2 restriction enzymes. Two of these 5 samples (3 to 7) were previously treated with the metilase enzyme M.EcoRI (before suffering restriction). Fill the table with the legend for the gel (for some lanes, more than 1 hypothesis exists). Consider that NO samples are repeated.

Lane	M.EcoRI	EcoRI	HindIII
1	DNA ladder NZY III		
2	-	-	-
3			
4			
5			
6			
7			

