

1. The DNA of bacteriophages T2 contains  $2 \times 10^5$  base pairs. How many genes of average size (encoding proteins of about 40,000 molecular weight) can this phage contain? (10%)
2. What is the molar concentration of 80 g of glucose dissolved in sufficient water to make 2 liters of solution? (10%)
3. Where are the enzymes for the Krebs cycle located? The enzymes of oxidative phosphorylation? The enzymes for glycolysis? (20%)
4. Describe the origin and effects of reactive oxygen molecules. (20%)
5. A mixture of different proteins is subjected to electrophoresis in three polyacrylamide gels, each having a different pH value. In each gel five bands are seen. (a) Can one reasonably conclude that there are only five proteins in the mixture? Explain. (b) Would the conclusion be different if a mixture of linear DNA fragments were being sized? (20%)
6. The DNA molecules below are denatured and then allowed to reanneal. Which of the two is least likely to re-form the original structure? (10%)
  - (a) ATATGTATATATAGAT  
TATACATATATATCTA
  - (b) GCCTATACGTGCACCA  
CGGATATGCACGTGGT
7. Which of the two molecules shown above would have the highest  $T_m$ ? Why? Which would require a higher temperature for renaturation? (10%)