

DNA Worksheet

Questions

1. In the procedure for the isolation of DNA, EDTA is added to remove DNase, a natural cellular enzyme that catalyzes the breakdown of DNA. What are some possible reasons that a cell would need this type of function?
2. DNA is precipitated by adding ethyl alcohol, a solvent that is less polar than water. Based on its structure, explain why DNA is insoluble in alcohol.
3. Compare the structure and function of a eukaryotic chromosome to that of a prokaryotic chromosome.
4. How does the structure of DNA lend itself to being the genetic blueprint for life?
5. Describe the structural differences between chromatin and a chromosome and explain which structural form of DNA is dominant a) during mitosis and b) in nondividing cells.

Permeability Worksheet

Data Table

Neutral Red and Yeast	Color
Color of neutral red and sodium bicarbonate	
Color after adding hydrochloric acid	
Initial color of yeast suspension	
Yeast–Neutral Red Suspension	Color
Initial color	
Color after 5 minutes	
Filtered Yeast–Neutral Red Suspension	Color
Color of yeast cells	
Color of liquid	
Boiled Yeast–Neutral Red Suspension	Color
Initial color	
Color after boiling	
Yeast–Neutral Red Suspension with Bases	Color
Color with sodium hydroxide	
Color with potassium hydroxide	
Color with ammonium hydroxide	

Post-Lab and Discussion Questions *(Use a separate sheet of paper to answer the following questions.)*

1. Use the results from test tube 1 to explain the slow color change observed in the yeast–neutral red mixture in Filtered Yeast–Neutral Red Suspension section of the data table.
2. Explain the color change observed in the boiled yeast–neutral red solution in Boiled Yeast–Neutral Red Suspension section of the data table.
3. Based upon the observations in Yeast–Neutral Red Suspension with Bases section of the data table, is there any evidence for transport of the bases across the yeast cell membrane? Explain.
4. Discuss the structure and function of the following components of eukaryotic cell membrane. Cholesterol, glycolipids and glycoproteins, phospholipids, proteins.

Protein Denaturation Worksheet

Data Table

Chemical Added to Casein	Observations	Approximate pH
25 mL Sodium Hydroxide		
1–2 mL Hydrochloric Acid		
2–3 mL Hydrochloric Acid		
2–3 mL Sodium Hydroxide		
1–2 mL Sodium Hydroxide		

Post-Lab and Discussion Questions

1. Like most proteins, casein has both acidic ($-\text{CO}_2\text{H}$) and basic ($-\text{NH}_2$) side chains in its structure. What is the overall charge on a protein at a) high pH when the acidic side chains are ionized; and b) at low pH when the basic side chains are protonated? c) What is the relationship between the charge on a protein and its solubility in water? Explain.
2. The isoelectric point of a protein is defined as the pH at which the protein has a net charge of zero. Predict the approximate isoelectric point of casein based on the results of this demonstration.
3. Most enzymes are proteins. The pH value at which an enzyme is most active is called its optimum pH. Using the basic model of enzyme function, explain at least two main ways in which structural changes accompanying pH changes can influence the function of enzymes.
4. Describe the general structural features of fibrous and globular proteins, give one example of each, and relate the unique functional role of the protein to its structure.