

BSCS Biology Study Guide Chapter 3

1. What does the cell membrane regulate the flow of?
2. What can you tell me about the molecules of a cell membrane?
3. Is the ammonium ion (NH_4^+) an essential nutrient to the cell or is it a potentially toxic waste that must be converted to a specific form to exit the cell?
4. List the components of the cell membrane.
5. Give the name of the “tail” of the phospholipids molecules which tend to repel ions but will allow fat-soluble molecules pass through.
6. What regulates the passage of materials in and out of the cell?
7. What is the role of transport proteins?
8. What is the role of glycolipids and glycoproteins which are embedded in cell membranes?
9. Define: diffusion.
10. As diffusion occurs what happens to the entropy of the system?

11. Why do molecules diffuse across a concentration gradient?

12. What prevents bacterial cells from (too much) swelling?

13. Why can concentration gradients form across a cell membrane?

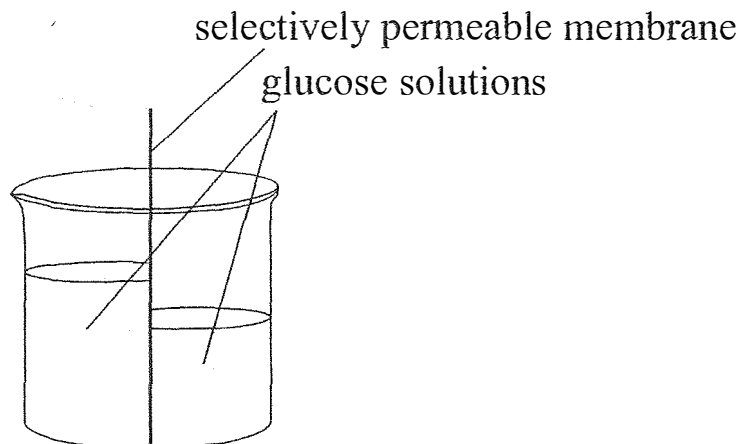
14. True/False:

- Nerve impulses rely on the buildup of electric potential caused by a concentration gradient of proteins.
- Nerve impulses rely on the buildup of electric potential caused by a concentration gradient of oxygen.
- Nerve impulses rely on the buildup of electric potential caused by a concentration gradient of osmosis.
- Nerve impulses rely on the buildup of electric potential caused by a concentration gradient of ionic substances.

15. If an animal cell is placed in pure water, osmosis will cause it to _____.

16. Why would plant roots, which are covered with fine root hairs, increase the ability of the plant to absorb water and nutrients from the soil?

17. Use the figure below to answer the following questions. Remember there is glucose on both sides of the selectively permeable membrane.



- a. If the original levels of the liquid were equal how would you describe the original glucose concentration on the left side?
- b. If the system is now at equilibrium how would you describe the glucose concentration on the left side?
- c. When at equilibrium the total amount of glucose on the left side would increase, decrease or stay the same.
- d. When at equilibrium how would you describe the total amount of glucose on the left and right hand side of the beaker?

18. Define: Passive transport.

19. Define: active transport.

20. Give an example from your text of passive transport.

21. Does facilitated diffusion move against, with or independent of a concentration gradient?

22. Does facilitated diffusion take place via active or passive transport?

23. Name the main source of energy for active transport.

24. How do very large cells (proteins) enter the cell?

25. What is the difference between endocytosis and exocytosis? What do they each need from the cell in order to carry out their functions?

26. Cystic fibrosis is a genetic disorder in which the movement of chloride ions through a cell membrane is disrupted. Why would the result of this disruption be a disruption of water regulation?

27. Why must water move quickly over the gills of fish?

28. Why would it be a disadvantage for a land animal to breath through gills?

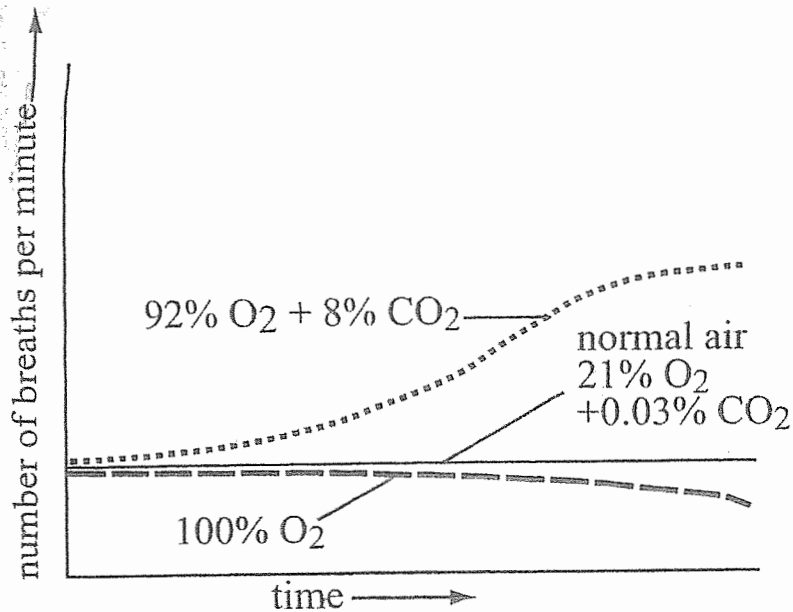
29. Describe the principle function of alveoli in the lungs.

30. What is the total surface area of all the alveoli in an average person's lungs?

31. Why would you suffocate when your lungs fill up with water?

32. True/False: A moist surface is necessary for gas exchange because functional diffusion cannot occur unless the gases are dissolved in water.

33. The graph below is on the exam. You will have 7 questions, which we will review in class, associated with this graph.



34. Describe the type of gas-exchange system birds would need for flight.

35. Why are oils and waxes found on the human skin helpful?

36. What happens to plants when they don't receive enough water from their roots?

37. How is the subcellular structure, contractile vacuole, used by the Paramecium?

38. Why can't organisms live in a salt solution more concentrated than seawater?

39. When high tides occur they often leave behind small areas of seawater which contain about 3% salt. When the water evaporates there is a 2-3 fold increase in the salt concentration in these small areas. Some organisms can live in these waters such as brine shrimp. Lab experiments using brine shrimp have shown

they survive in solutions which range from 0.5% to 25% salt and maintain a pretty constant concentration of salt in their body fluids no matter what the salt concentration in the water.

Based on this information answer the following questions using these responses:

- a restatement of the above information
- a logical hypothesis that might explain the observations and that could be tested
- an illogical hypothesis that does not explain the observations
- a statement that is unrelated to the above information

_____ Brine shrimp can live in water that has a different salt concentration than the salt concentration of their body fluids.

_____ In order to retain body water or pump out salt to maintain their body fluids at a consistent level, the brine shrimp constantly used energy.

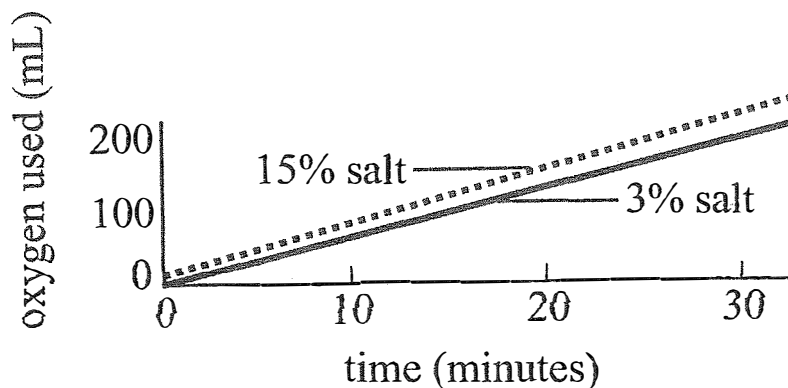
_____ Brine shrimp has a salt concentration that remains stable.

_____ In terms of excretion the brine shrimp will excrete not only their own wastes but actively release any excess substances taken in from their environment.

_____ Brine shrimp lay a lot of eggs and most of them will never develop.

_____ It does not matter if ponds have salt concentrations higher than that of seawater, brine shrimp can live in the pond water.

40. Use the table below to answer the following questions.



- Write a hypothesis for this investigation.

b. What conclusions could be drawn from the graph results?

41. Name the primary excretory organ of ocean fish.

42. How do ocean fish control the loss of body water to higher salt concentrations outside their bodies?

43. List the three major types of nitrogenous wastes that animals excrete.

44. How do grasshoppers and other animals that live on dry land conserve body water?

45. Ammonia unless diluted is a very toxic waste product. Less toxic is urea. Uric acid is nontoxic due to the fact it does not dissolve on the surface of moist cells or tissues. Urea and ammonia are water soluble. Uric acid is not and because of this requires little or no water for excretion to take place.

Answer the following questions based upon the above information.

a. An animal that excretes ammonia would live in what kind of environment?

b. An animal that excretes uric acid would live in what kind of environment?

c. An animal that excretes urea would live in what kind of environment?

d. An animal that excretes urea from kidneys and ammonia from respiratory organs would live in what kind of environment?

46. Describe the functions of the kidneys?

47. Why are human kidneys considered homeostatic organs?

48. You are stuck in a boat out at sea. Why would death occur if you drank only the seawater?

49. When an individual becomes dehydrated water volume of blood decreases as well as blood pressure. The hypothalamus detects these changes and stimulates the pituitary gland to release what hormone?

50. What is the function of the excretory tubules of humans, the nephrons?

- a. fluid filtration, reabsorption, and secretion.
- b. elimination of carbon dioxide and nitrogenous wastes.
- c. maintenance of water and oxygen balance in the body.
- d. filtration of fluid from the blood and elimination of urine.

51. The following diagram will be on your exam. There will be 7 questions associated with it.

You will need to know:

- structure in which filtrate is first collected.
- the structure which contains blood with the lowest concentration of urea.
- the structure which carries the urine toward a ureter.
- the area from where water is reabsorbed.
- substance found in structure 1 but typically not in structure 3
- name of the complete structure shown in diagram

