BIEN 500- Fall 2023

Best answers for Homework 2

1.

Diffusion	Active Transport
1. Random movement of molecule through intermolecular spaces in the membrane or in combination with a carrier protein. 2. Energy for diffusion is derived from normal kinetic energy of matter.	Movement of ions or other substances in combination with a carrier protein against a concentration gradient. Additional energy source, eg. ATP is required.

2.

Simple Diffusion	Facilitated Diffusion
1. Kinetic movement of molecules through membrane openings or intermolecular spaces without the interaction of carrier proteins. 2. Rate of diffusion is limited by amount of substance available, velocity of kinetic motion, number and size of openings.	Carrier protein aids in the passage of molecules or ions through the membrane by chemical binding or shuttling through the membrane. Rate of diffusion is dependent on the channel characteristics such as its diameter, shape, nature of electrical charges, lipid solubility and chemical bonds along its surface.

3. The rate limiting factor for the diffusion in facilitated diffusion is the rate at which the carriers can undergo changes back and forth between binding and released state.

4. The three determining factors for ionic channel permeability are size and shape, nature of electrical charges and chemical bonds along the inside surfaces of the ion channel.
5. The three driving forces for diffusion are:
    a. Concentration gradient
    b. Electrical potential and
    c. Pressure
6. The binding of a ligand to a ligand-gated channel affects channel protein confirmation by causing a conformational change in chemical bonds, causing the opening or closing of the gates.
7. +70.29 mV, -94.29 mV, -86.06 mV
8. Mechanisms are:
    a. Sodium channels close quickly
    b. Potassium channels open
9. Two major factors are:
    a. Nerve fiber diameter
    b. Myelination of fibers

10. The concentration difference of Na^+ and K^+ should be sufficiently established for the action potential to be elicited. This is the role of Na-K pumps in maintaining the resting potential of excitable cells after an action potential.
11. Repolarize, below
12. Formation of large quantities of ATP by oxidation of hydrogen, occurs in mitochondria
13. Two
14. Adds phosphate
15. Carbon dioxide, expired from the body (lungs)

16. The inner membrane (the shelf membrane) of the mitochondria
17. True (water channels called aquaporins)
18. Positive feedback
19. Negative feedback, already have a lot so do not need more
20. Synthesis of fats from carbohydrates and synthesis of some other substances
21. Three
22. Albumin
23. LDL (low density lipoproteins)
24. Unsaturated has more fluidity
25. True
26. Negative
27. False
28. To bring the discrepancy between temperature of coffee and room temperature to zero
29. Positive
30. Both
31. True
32. Lack of rain causes scarcity of grass, causing sheep to wander around, thus wolves have easy accessibility for sheep
33. Sheep-grass, the more the grass, the more will be sheep population
34. False
35. False
36. It is flow limited by rate of glucose and oxygen availability via the blood