Microbiology Ch 5-6-7 Review

Photoautotroph – organisms that produce their own food from the sun and CO_2

Photoheterotroph – organism that obtains its energy and food from the sun and other organic compounds

Chemoautotroph – organism that obtains its energy from inorganic compounds and uses CO_2 for its carbon source

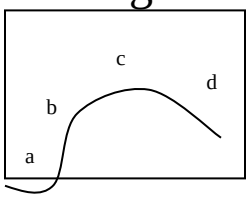
Chemoheterotroph – organisms that obtain its energy and carbon sources from organic compounds

1. What are some (list three) factors that affect the efficiency of enzymes in reactions?
   -inhibitors, substrate concentration, temperature, pH, ionic strength, cofactors

2. List and describe the four pathways of energy use.
   -carbohydrate biosynthesis
   -protein and amino acid biosynthesis
   -purine and pyrimidine biosynthesis
   -lipid biosynthesis

3. Name 3 of the 6 important micronutrients and their function.
   -potassium
   -sodium
   -calcium
   -magnesium
   -iron
   -zinc

4. Draw a graph of the four stages of bacterial growth, label and define the stages.



a. lag phase: no growth, high rate of metabolism
b. exponential growth phase: growth/reproduction
c. stationary phase: leveling off
d. death phase: more organisms die than are formed

5. What are 5 ways to directly measure microbial growth?
   - colony count – metered loop
   - direct microscopic count
   - serial dilution
   - pour plate/ spread plate
   - filtration
   - most probable number

6. Differentiate competitive – competition for the active site
   non-competitive inhibition – allosteric – inhibitor binds to site other than the active site.

7. Describe and relate catabolism – break down and release energy
   Anabolism – building it up and using energy.

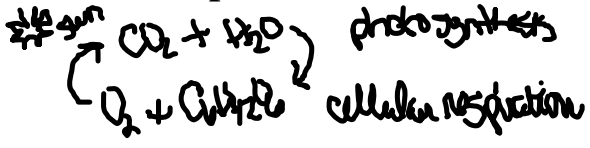
8. Define: colony – a pure "mound" or growth of organisms that formed from **one mother cell**

9. Differentiate differential – allows organisms to grow differently on the media
   Selective – only allows specific organisms to grow
   Enrichment – enhances the growth of specific bacteria

10. Is O_2 required for fermentation? No What are the possible products of fermentation? Alcohol and lactic acid

11. Describe and differentiate catalase – $H_2O_2 \rightarrow H_2O$ and O_2 peroxidase – $H_2O_2 + H_2 \rightarrow H_2O$.

12. Capnophiles have what type of environmental requirement? CO_2
13. What does indole test for? The production of tryptophanase
14. In terms of microbiology "immediate" can be how long? A few seconds to four hours
15. What is a catalyst? A substance that reduces the activation energy requirement for a chemical reaction
16. Differentiate between aerobe – needs oxygen
    obligate anaerobe – can not grow in the presence of oxygen
    facultative anaerobe – prefers anaerobic conditions but can grow in O_2
17. How many ATP are produced through the full oxidation of glucose? - 38
18. What are the main organic elements? CHONPS and halogens
19. List and describe the names of bacteria based on their optimum temperatures. – psychrophiles 0C to 20C
    Mesophiles – 20-45C
    Thermophiles 45C+
20. Give the classifications of a.) Acidophile - an organism that thrives in acidic conditions b.) Halophile - an organism that thrives in high salt environments and c.) Barophile - an organism that thrives in high pressure environments.
21. What type of organism(s) use CO_2 for their carbon source? Chemoautotroph (methanogens)
22. What does an organism use oxygen for? Cellular respiration
23. Describe binary fission. – reproduction – replication of bacterial nucleic acid – cell then splits into to 2 new cells
24. What is the optimum pH for most bacteria? 6.5-7.5
25. What substances can be used to dehydrate bacteria? Salt/sugar
26. Write the chemical reactions (summary) for photosynthesis and cellular respiration.



27. How do you test to see if an organism produces catalase? Place a small amount in H_2O_2 and watch for formation of oxygen bubbles.
28. List the seven classes of enzyme and a quick way to remember what each one does.
    - Hydrolases – addition of water for hydrolysis
    - Hydrases – dehydration synthesis
    - Oxidases - redox
    - Transferases – transfer of free radicals
    - Demolases – form or break carbon to carbon bonds
    - Isomerases – structural changes
    - Ligases – formation of a bond

29. Define metabolism. – sum of all chemical reactions within a cell or organism
30. List and describe the three "types" of air conditions.
    Aerobic – oxygen
    Anaerobic – no oxygen – obligate cannot tolerate oxygen or facultative can tolerate oxygen
    CO_2 - capnophiles
31. What are lithotrophs - organisms using inorganic substrates to obtain reducing equivalents for use in biosynthesis (e.g., carbon dioxide fixation) or energy conservation (i.e., ATP production) via aerobic or anaerobic respiration.
32. Disinfectant – removing/reducing the presence of bacteria on a nonliving surface
    Sterilization – kills the bacteria present in/on nonliving objects.
33. Any organism that can form an endospore – typically a gpr
34. Clostridium
35. 4 hours or less