

1. Which of the following molecules is an electron carrier that carries both protons and electrons?

- A. Non-heme iron-sulfur proteins
- B. Cytochromes
- C. Carotenoids
- D. Phycobilins
- E. Quinones

2. Photosynthetic microorganism A absorbs light at wavelengths of 400-500 nm and 680-700 nm. Photosynthetic microorganism B absorbs light at wavelengths of 350-450 nm and 740-800 nm. Which statement is most likely correct?

- A. These microorganisms could probably coexist in an environment
- B. Organism B will greatly outnumber organism A because it absorbs the broadest absorption range
- C. Neither organism has sufficient light adsorption properties to survive
- D. Organism A will dominate over organism B because it will absorb most of the light energy
- E. Endosymbiosis is likely to occur within a few generations, giving organism C with a mix of these properties

The citric acid cycle:

- A. Is the most common method used by microorganisms to convert glucose to pyruvate
- B. Is primarily used by cells that decompose citric acid in the environment as a nutrient
- C. Is particularly important in photosynthesis
- D. Functions in cells to produce citric acid that is then incorporated into new cellular material (proteins, nucleic acids, lipids, peptidoglycan, etc.)
- E. Reduces 4 NAD and 1 FAD, while also making one GTP, per pyruvate oxidized

What is the calculated energy (ΔG°) available to cells that convert each molecule of glucose to two molecules of lactate? (Note: the ΔG°_f for glucose is -917.22 kJ/mol and that for lactate is -517.81 kJ/mol)

- A. Approximately -120 kJ/mol
- B. Approximately -1434 kJ/mol
- C. Approximately $+120$ kJ/mol
- D. Approximately -400 kJ/mol
- E. Approximately $+400$ kJ/mol