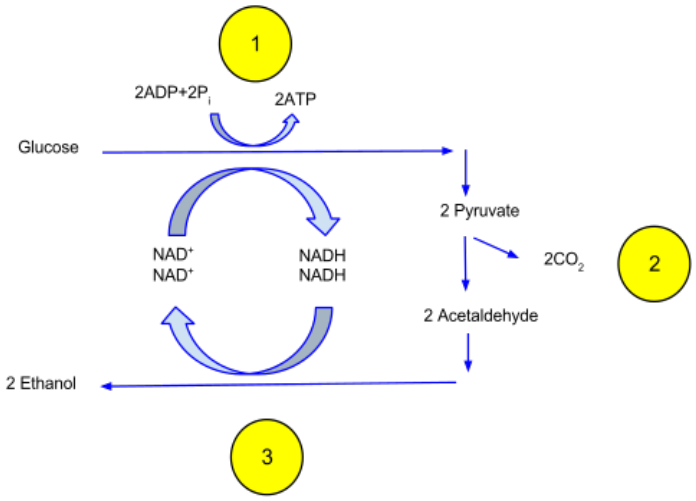
CONCEPT: FERMENTATION

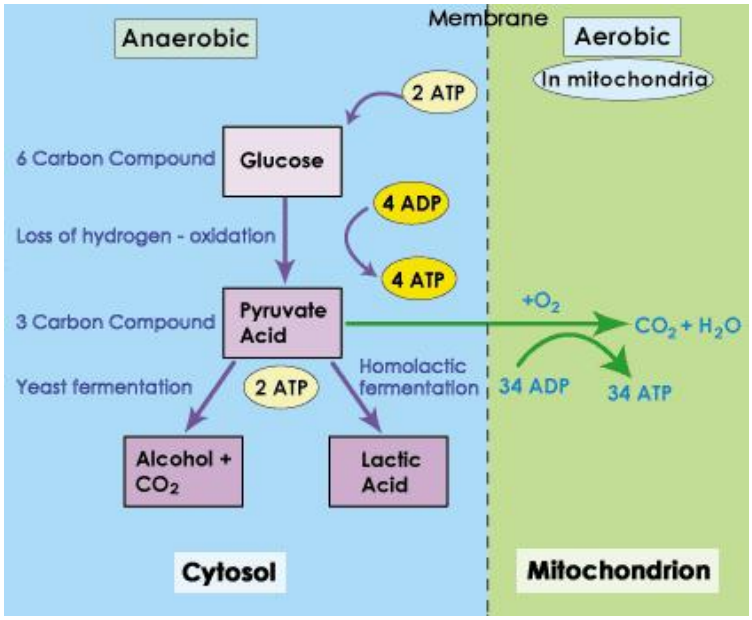
- **Fermentation** is the process that breaks down sugar to produce ATP in the _____ of oxygen
  - □ Glycolysis needs a constant supple of NAD^+
    - Without oxygen NADH can't be oxidized to NAD^+ so it can be reused
  - □ Fermentation regenerates NAD^+ so it can be reused in glycolysis
    - Electrons are transferred from NADH to pyruvate (end product of glycolysis) to create NAD^+

EXAMPLE: Electron transfer from NADH to pyruvate



  - □ The use of pyruvate as an electron acceptor limits its use in other metabolic pathways
    - In presence of oxygen it goes into other pathways to produce lots of ATP (Glucose ΔG = -686kcal/mol)
    - Without oxygen is it used to make various byproducts that do not go on to create ATP (ΔG = -47kcal/mol)
  - □ Pyruvate conversion results in numerous _____
    - Lactate fermentation: produces lactate (Found in muscle, cheese, and milk)
    - Alcoholic fermentation: produces ethanol and CO_2 (Found in bread, baking, and brewing)

EXAMPLE: Fermentation pathways compared to the aerobic pathway



PRACTICE

1. Which of the following is not associated with fermentation?
    a. It occurs in the absence of oxygen
    b. It results in a variety of byproducts
    c. It regenerates NAD^+
    d. It uses ATP

2. The purpose of fermentation is to produce what?
    a. ATP
    b. NADH
    c. NAD^+
    d. H_2O

3. True or False: The creation of pyruvate in the absence of oxygen is more energetically favorable than the creation of pyruvate in the presence of oxygen.
    a. True
    b. False