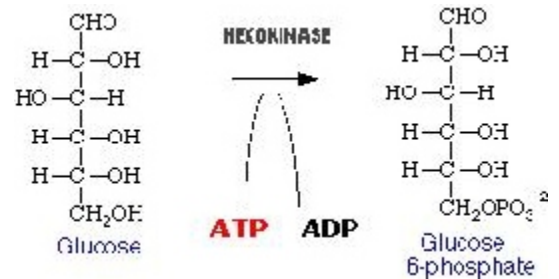


GLYCOLYSIS

10/30/91, rvsd 11/3/93, 11/8/94, 5 Nov 99, 6 Nov 00, 5 Nov 01, 7 Nov 03, 5 Nov 04, 27Oct08
 BKH: pp. 382-401, BKH 5th: 378-393, bkhh 7th: PP229-246

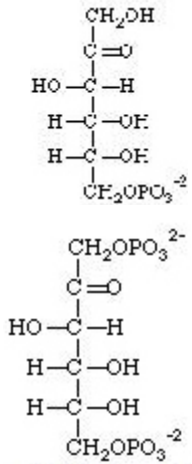
Contrast **fermentation** with **respiration**. (Review table 9-1 for energy in bonds.)
 Embden & Meyerhof in 1930s: Glycolysis generates ATP without any net oxidation.
 Glycolysis also called Embden-Meyerhof pathway. Overview: figure 9-6, p 232



PREPARATION AND CLEAVAGE

phosphorylation Hexokinase (p. 233)
isomerization Phosphoglucosomerase
phosphorylation Phosphofruktokinase
cleavage Aldolase

Glucose to Glucose-6-PO₄ (and other hexoses)
G-6-PO₄ to Fructose-6-PO₄ (easy interconversion)
F-6-PO₄ to fructose 1,6 bis PO₄ (allosterically regulated)
 F-1,6,-bis PO₄ split into two trioses:
glyceraldehyde-3-PO₄
dihydroxyacetone PO₄



OXIDATION AND ATP GENERATION:

isomerization Triose phosphate isomerase

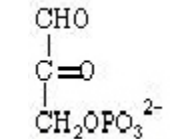
dihydroxyacetone PO₄ converted to **glyceraldehyde-3-PO₄**
 (easy interconversion, as with G-6-P to F-6-P above)

oxidation (p 382) Glyceraldehyde-3-phosphate dehydrogenase

G-3-PO₄ is oxidized via an enzyme-linked **thioester** (making NADH) and **phosphorylating** (add PO₄) to make a high energy (phosphoanhydride), yields **1,3-bisphosphoglycerate**

ATP generation Phosphoglycerokinase

Substrate-level phosphorylation: High energy PO₄ transferred to ADP, makes **3 phosphoglycerate** and **ATP**



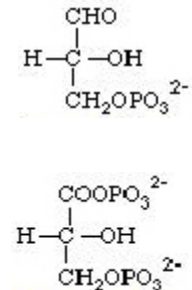
PYRUVATE FORMATION AND ATP GENERATION:

isomerization Phosphoglyceromutase

PO₄ transferred to #2 carbon to make **2 phosphoglycerate**

dehydration Enolase

produces **phosphoenolpyruvate:** energy rich, highly unstable, because not only **delocalization prevented**, but held in stressed **enol** form instead of relaxed **keto** form. I.e., **tautomerization** is prevented



ATP generation Pyruvate kinase

Substrate-level phosphorylation: PEP transfers PO₄ to ADP producing **pyruvic acid** (tautomerization allowed) and **ATP**

Distinguishing feature of high energy bond in PEP: PO₄ adjacent to double bond

