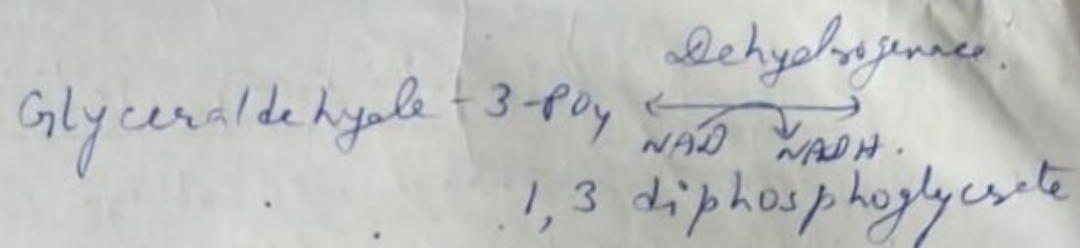


Metabolism of Carbohydrates: Glycolysis
Part I

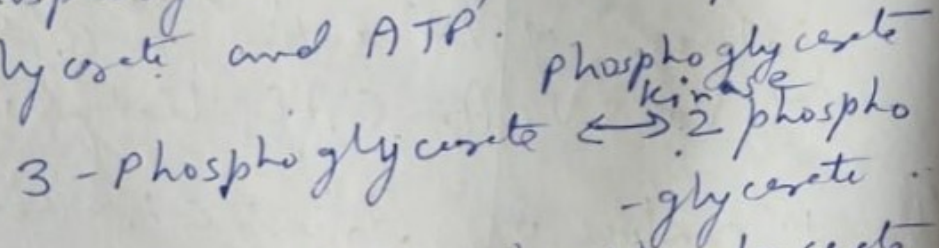
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Introduction :- Glycolysis is the first step of cellular Respiration. It is common pathway of ATP Synthesis by enzymatic oxidation of hexose, mainly glucose, leads to formation of pyruvate (in the presence of oxygen (aerobic) or absence (anaerobic) of oxygen). During this, a six-carbon mono saccharide molecule is degraded to two molecules of three carbon pyruvate. In Aerobic glycolysis pyruvate is further oxidised to CO₂ and water through Krebs's Cycle & respiratory chain for the synthesis of a large amount of ATP, whereas, anaerobic glycolysis, pyruvate gets reduced to lactate or is decarboxylated to acetaldehyde and finally to ethanol. Anaerobic glycolysis occurring in cytosol after lactate accumulates during intense muscular activity or exercise or running by athletes when ATP requirement of muscles exceeds



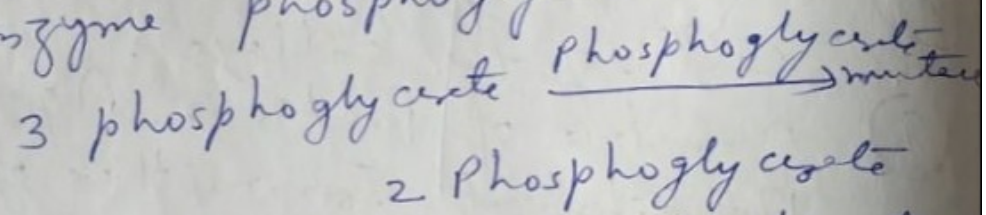
7. Transfer of energy-rich Poy from 1,3-biphosphoglycerate to ADP. →

This is a phosphorylation reaction, in which 1,3 diphosphoglycerate phosphorylates to form 3-phosphoglycerate and ATP.



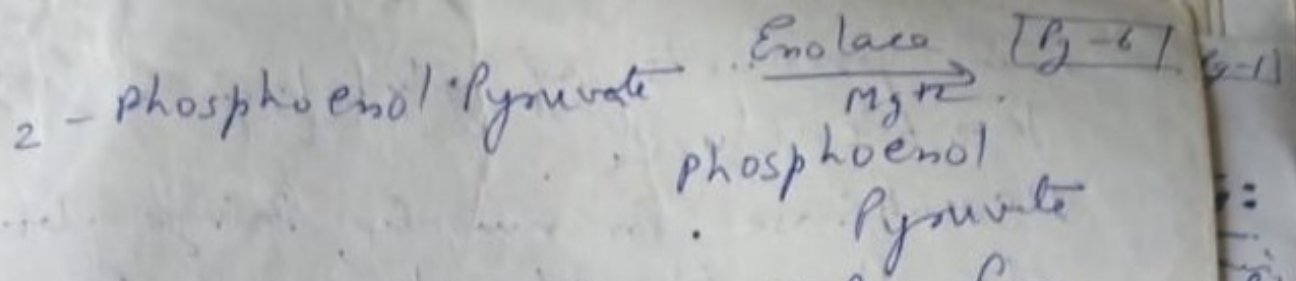
8. Conversion of 3-phosphoglycerate to 2-phosphoglycerate →

In this step, 3-phosphoglycerate isomerizes to form 2-phosphoglycerate under the action of enzyme phosphoglycerate mutase.



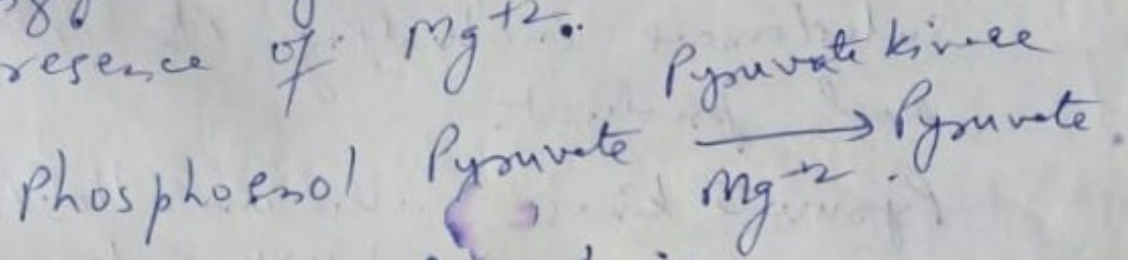
9. Dehydration of 2-phosphoglycerate →

A molecule of water is removed by enzyme Enolase, forming phosphoenolpyruvate in presence of Mg²⁺ ions.



10. Transfer of energy rich Poy form phosphoenolpyruvate to ADP →

This is virtually the last enzymatic step in glycolysis where energy rich Poy is shifted from phosphoenolpyruvate to ADP by enzyme Pyruvate kinase in the presence of Mg^{2+} .



Regulation of Glycolysis →

Glycolysis is the most primitive pathway of energy synthesizing system and remains linked to other pathways of ATP synthesis. It is influenced & mainly by energy requirement of the cell. However, three enzymes of glycolysis as Hexokinase, phosphofruktokinase and Pyruvate kinase are the main enzymes, which are allosteric and are regulated by reactants

and products of glycolysis and
Krebs's Cycle.

Hexokinase, in muscle, brings about
the formation of glucose-6-P₄, which
induces allosteric inhibition of its
activity. This keeps the concentrations
of glucose and glucose-6-P₄ in
equilibrium.

PFK (Phosphofruktokinase) activity is
muscle is regulated by relative
concentrations of a large no. of
substances including its reactants
and products.

Pyruvate kinase, also an allosteric
enzyme, is inhibited by high
concentrations of ATP, Acetyl Co-A
and long chain fatty acids;
oxidation of last two provides
ATP.