

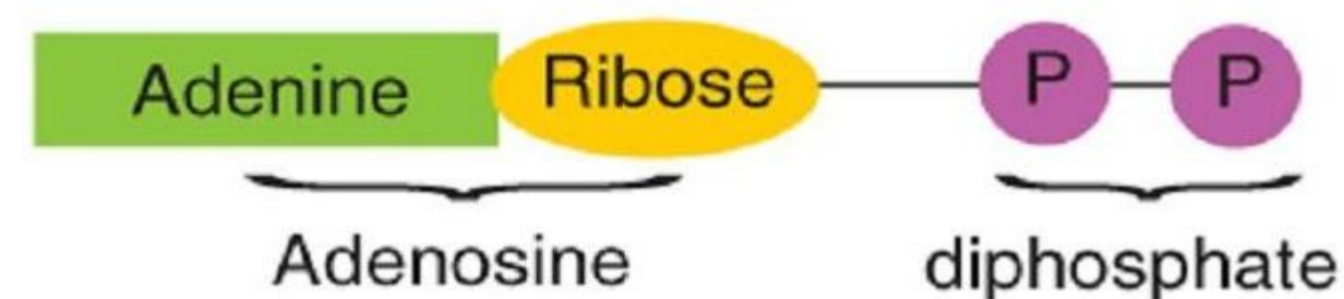
## 2.2.8.H Role of ATP and NAD

### Energy Carriers

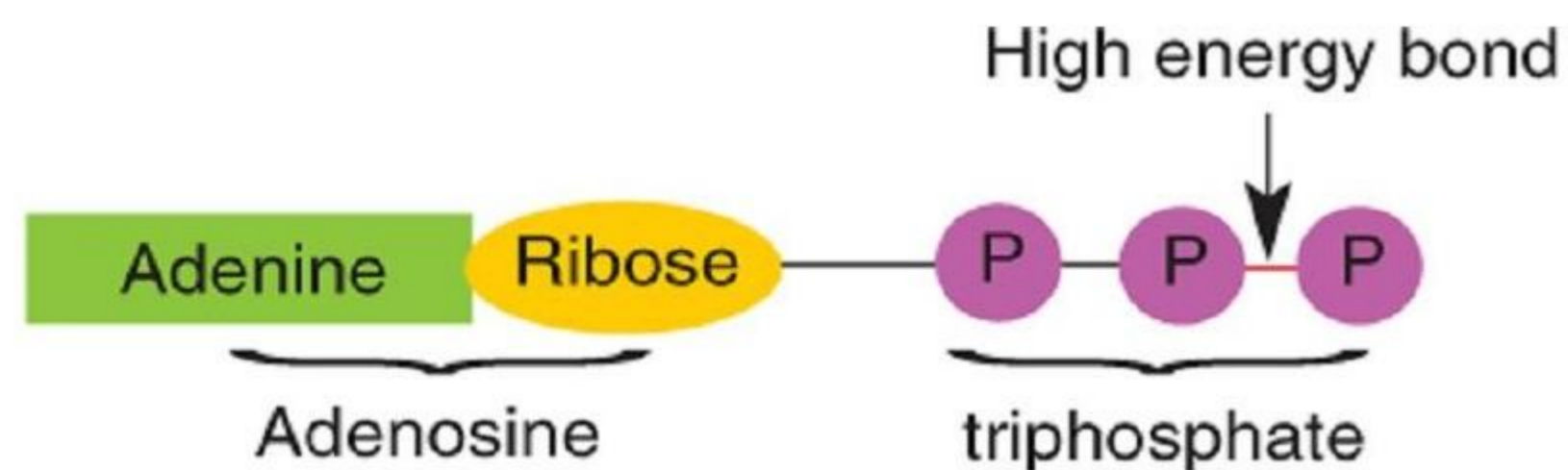
ADP, ATP, NADP<sup>+</sup> and NADH play a vital role in trapping and transferring energy in cellular activities

#### ADP and ATP

- ADP is an abbreviation for Adenosine Diphosphate this is a molecule found in the cells of all organisms
- It is made of the base adenine, a 5 carbon sugar called ribose and two phosphate groups

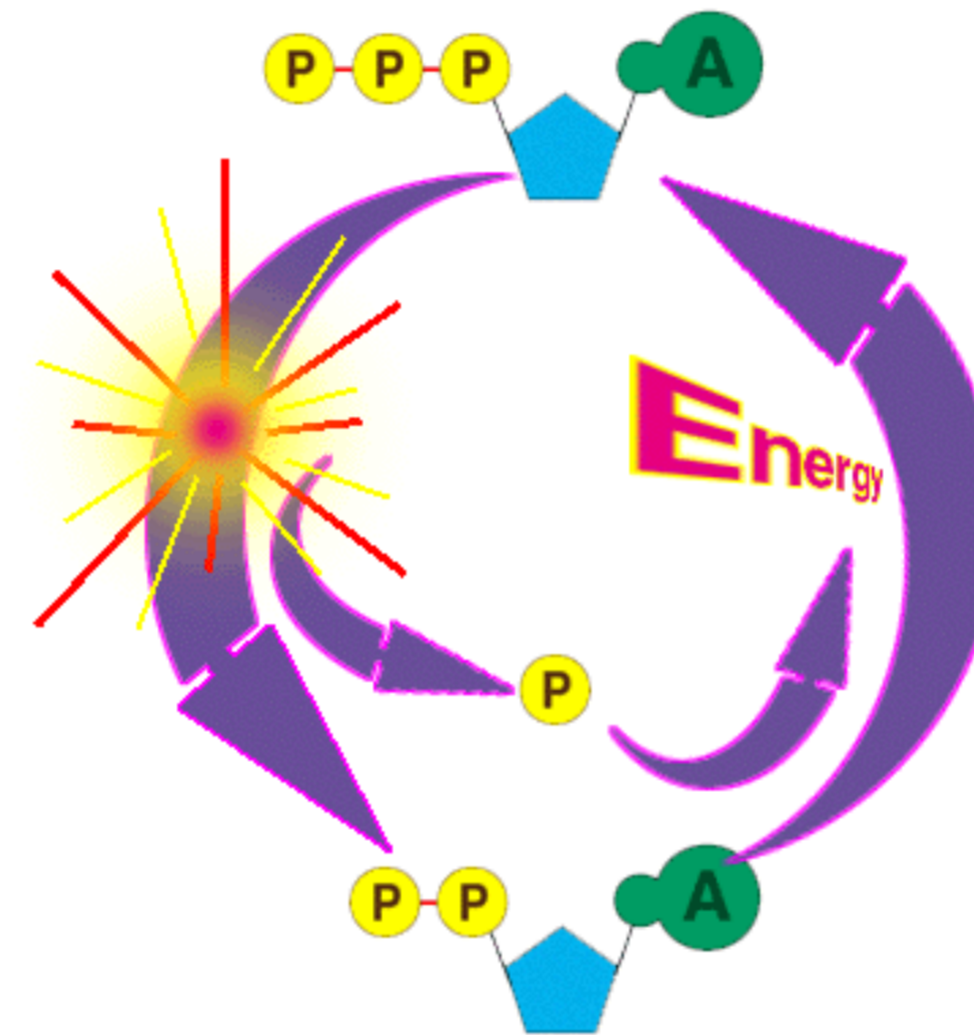


- ADP is a low energy molecule
- If another phosphate is added to ADP it forms ATP (Adenosine Triphosphate)



- Extra energy is also added as there is an extra bond between the last two phosphate groups
- Addition of a phosphate like this is called **Phosphorylation**

- ATP is rich in energy and stores this energy carrying it around in the cell
- ATP cannot store energy for very long it breaks down releasing energy and converting back to ADP
- Most cells release energy from ATP 10 million times every second! This energy is used for cellular reactions



#### NADP<sup>+</sup> and NADPH

- NADP<sup>+</sup> is a low energy molecule involved in photosynthesis
- NADP<sup>+</sup> can combine with two high energy electrons and a proton to form NADPH
- NADPH is a very high energy molecule
- It's energy is used to form glucose in photosynthesis

#### NADP<sup>+</sup> and NADH

- NAD<sup>+</sup> is used in respiration
- It can combine with two high energy electrons and a proton to form NADH which is very high in energy
- NADP<sup>+</sup> is used in photosynthesis (Remember P for photosynthesis)
- Both NADH and NADPH release energy and protons when they break down into NAD<sup>+</sup> and NADP<sup>+</sup>
- These electrons, protons and energy are used by cells

