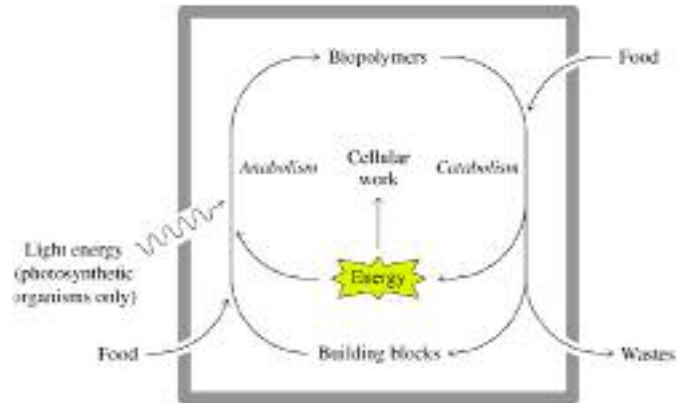


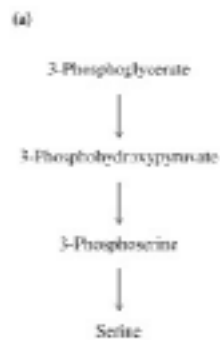
Metabolism

Anabolism and catabolism

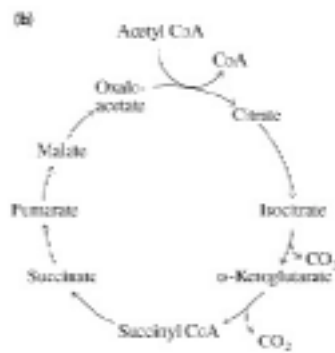


Forms of metabolic pathways

Linear



Cyclic



- Single-step vs multi-step pathways
- A multistep enzyme pathway releases energy in smaller amounts that can be used by the cell

Glucose + 6O₂

Disallowed Allowed

Energy Energy

Energy Energy

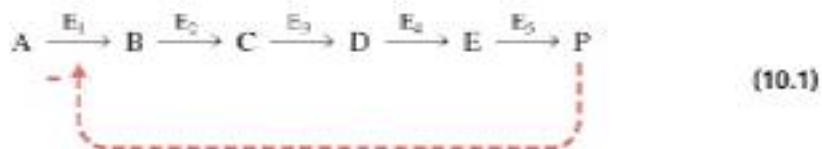
Energy Energy

Energy Energy

6CO₂ + 6H₂O

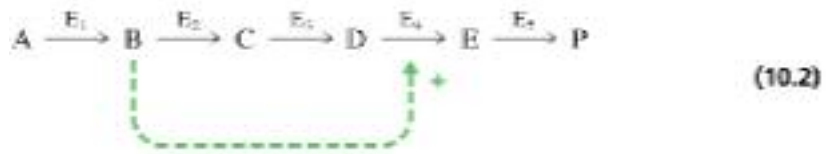
Feedback inhibition

- Product of a pathway controls the rate of its own synthesis by inhibiting an early step (usually the first “committed” step (unique to the pathway))

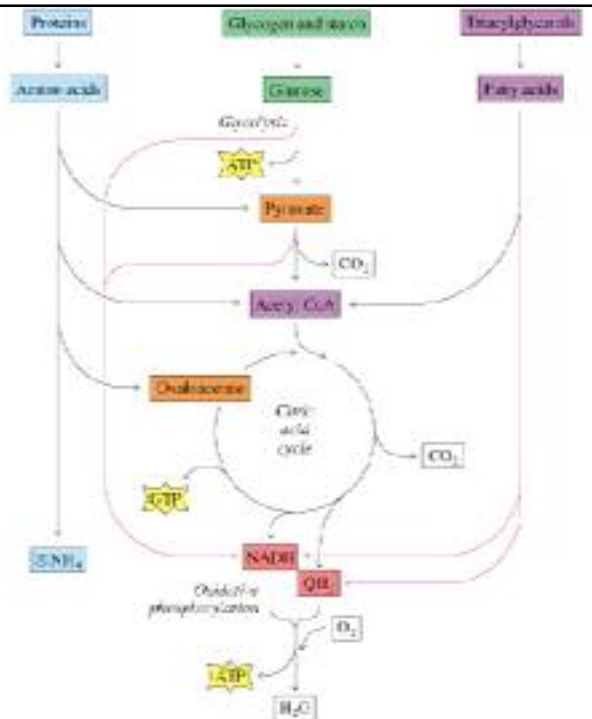


Feed-forward activation

- Metabolite early in the pathway activates an enzyme further down the pathway

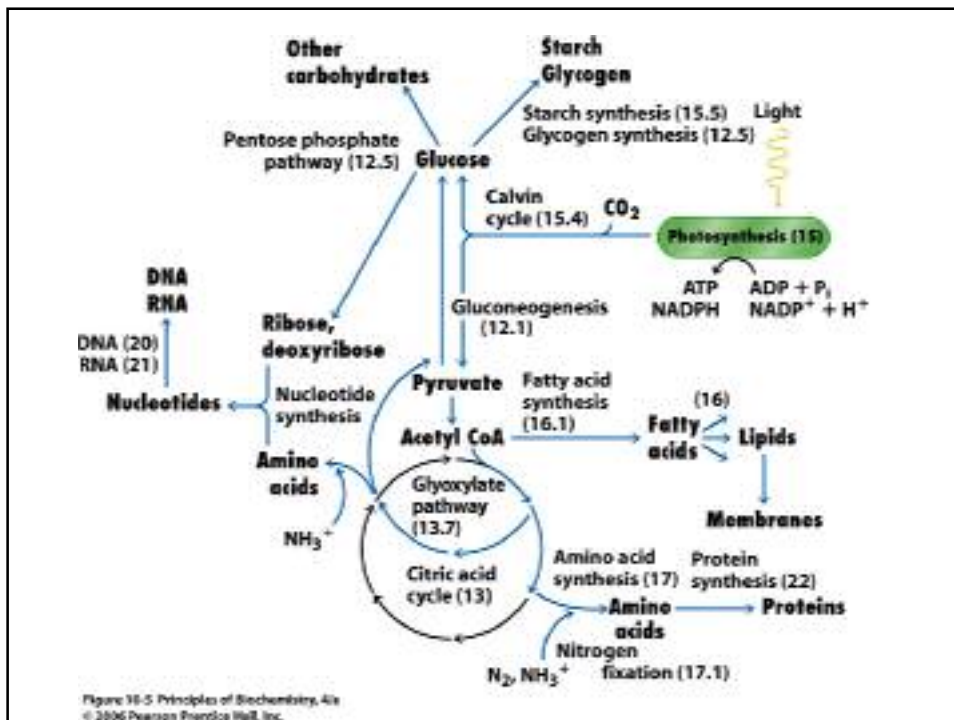


- Overview of catabolic pathways



Catabolism produces compounds for energy utilization

- Two types of compounds are produced that mediate the release of energy
 - (1) **Nucleoside triphosphates** (e.g. ATP)
 - (2) **Reduced coenzymes** (NADH, FADH₂, QH₂)



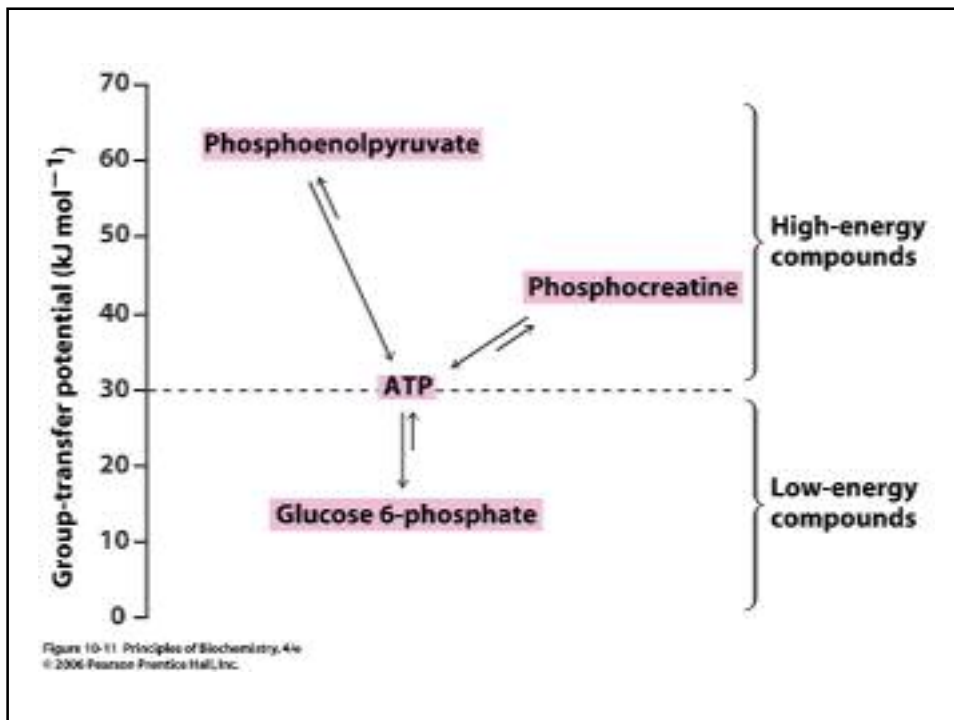
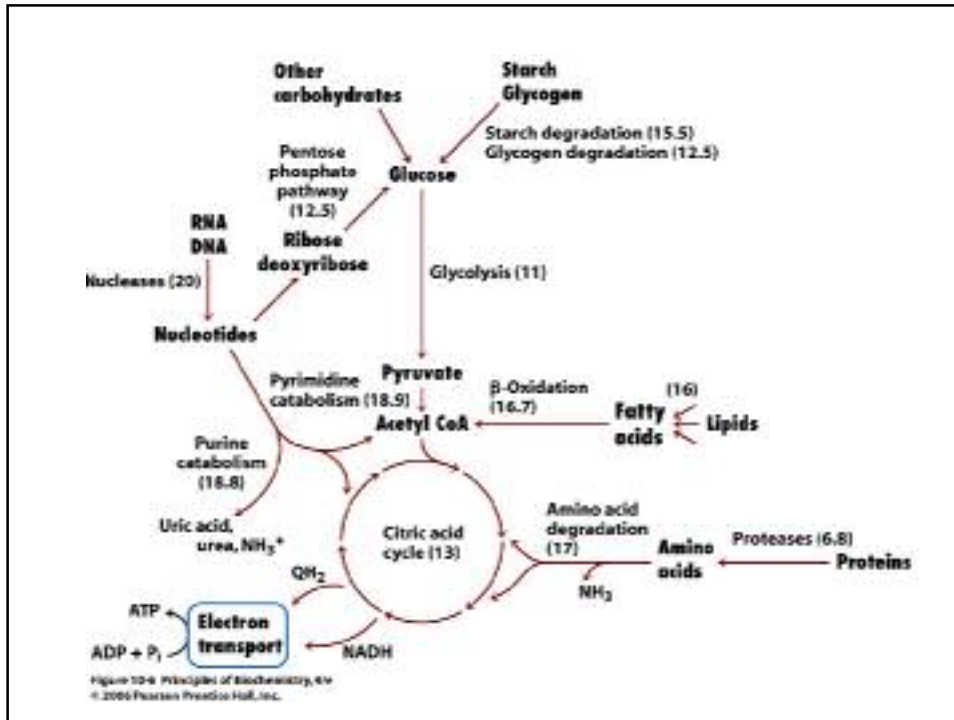
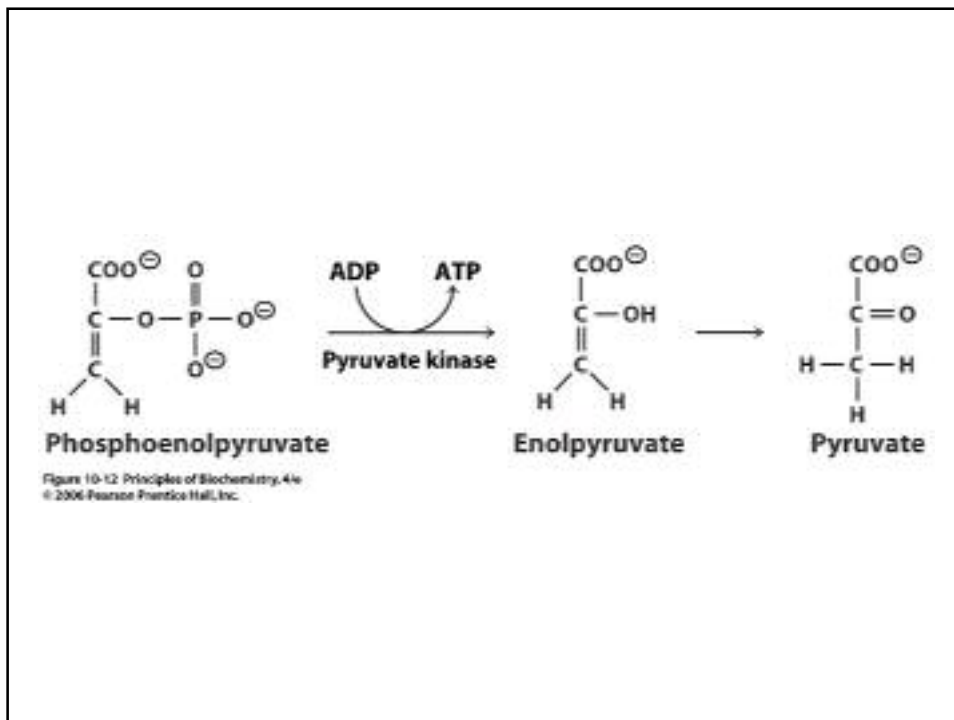


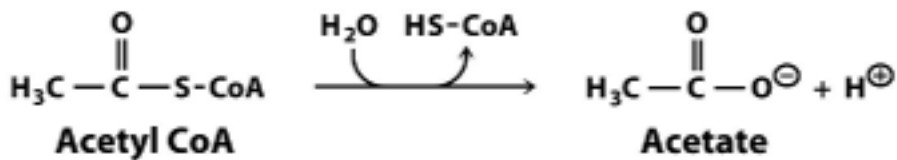
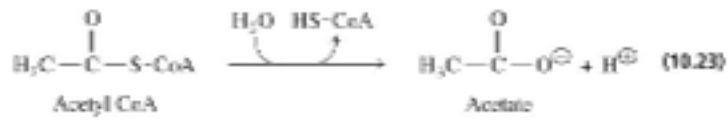
Table 15.1		
Free Energies of Hydrolysis of Selected Organophosphates		
Compound	$\Delta G^{\circ'}$	
	kJ mol^{-1}	kcal mol^{-1}
Phosphoenolpyruvate	-61.9	-14.8
Carbamoyl phosphate	-51.4	-12.3
Creatine phosphate	-43.1	-10.3
Acetyl phosphate	-42.2	-10.1
ATP (to ADP)	-30.5	-7.3
Glucose-1-phosphate	-20.9	-5.0
Glucose-6-phosphate	-12.5	-3.0
Glycerol-3-phosphate	-9.7	-2.3

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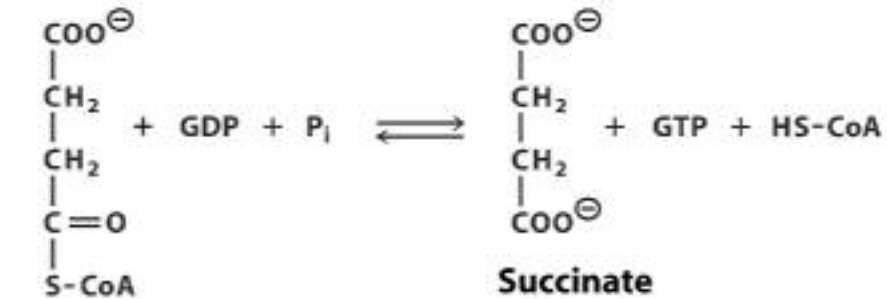


Thioesters Have High Free Energies of Hydrolysis

- Thioesters are energy-rich compounds
- Acetyl CoA has a $\Delta G^{\circ} = -31 \text{ kJ mol}^{-1}$



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