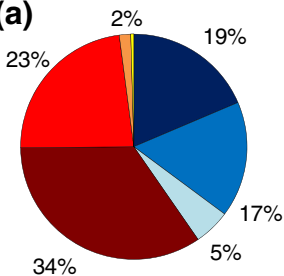


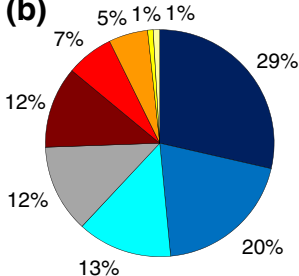
(a)

Irreversible (45%)

 $\Delta_r G'^{\circ} < 0$ $\Delta_r G'^m < 0$ & $S_{rev} < 0$

ABC transporter

Reversible (65%)

 $S_{rev} = 0$ $|\Delta_r G'^m| \leq 2mM$ $\Delta_r G'^m \cdot S_{rev} < 0$ Unknown $\Delta_r G'^{\circ}$ **(b)**

Involving phosphate

ATP hydrolysis

Involving diphosphate

Involving CO_2

Involving coenzyme A

Involving NH_3

Involving ACP

Involving dihydrolipoamide

Involving HCO_3^-