Bioenergetics ale.co.uk

total energy in the universe remains constant.

- 2nd Law- the universe always tends towards increasing disorder; Entropy increases.
- However, any change in the system requires an equal & opposite change in surroundings

System, surroundings and the universe 4 Notesale.co.uk • Where We look at a bonfire as a "system" we

- Where we looked a bonfire as a "system" we can see that the bonfire gives off energy and the "surroundings" gain energy.
- The two changes are mirror images of one another.
- The system can be as small as one atom or as big as a galaxy. The only restriction is that the two pieces system and surroundings must add up to equal the universe.

Entropy 3 Notesale.co.uk iew from 15 of 46 prehe dipartier you generated exceeds the order you made. This is nature's version of "heads I win, tails you lose".

- If you see a process that has an increase in entropy it will usually be spontaneous.
- Evaporation of a liquid is spontaneous and the particles are more disordered in the vapor than in the liquid.

Predicting speateneity 5

provide a positive free energy change, ΔG is positive or greater than zero.

- The system must take in energy from the surroundings for the process to occur.
- This is an Endergonic process, $\Delta G = +$.

Calculation of free energy changes 1, otesale.co.uk • Consider the equation:

- Oxaloacetate² + H⁺ CO2(g) +pyruvate
- $\Delta G^{\circ} = -113.44 94.45 (-9.87 190.62) \\= -7.4 \text{Kcal/mole}$
- The negative indicates the reaction would proceed spontaneously.
- However, some concentrations are not realistic.

Calculation of free energy changes 2, otesale.co.uk • Atpreview from 34 of 46 • Atpreview from 34 of 46

- bicarbonate rather than gas.
- We can add the std free energy change for this reaction of: CO2 + H2O \rightarrow HCO3 + H⁺
- The calculation thus yields a correction of -140.49 - 9.87 - (-56.69 - 94.45) = 0.8Kcal
- -7.4 + 0.8 = -6.6Kcal/mole.

Energy Coupling 6.uk refle Apagnat remains is recycled to ATP at the expense of either chemical or solar energy.

- As noticed already, an Exergonic reaction does not necessarily proceed rapidly.
- The path from reactants to products almost invariably involve an energy barrier (activation barrier).