

Test 3 Review

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Definition 1 (Second Law of Thermodynamics). *When energy gets converted from one to another, the amount of useful energy decreases.*

An example would be that gasoline cars have only 20% efficiency.

Definition 2 (Entropy). *Tendency towards the loss of orderliness and the loss of useful energy.*

1 ATP

Definition 3 (ATP). *Nitrogen containing base adenine + sugar ribose base + 3 phosphate groups*

Why is breaking ATP exergonic overall? Shouldn't breaking bonds consume energy? Remember that we're breaking it through hydrolysis. It's true that breaking bonds take some energy, but the more stable products that from (ADP and Pi) are much more stable, thus releasing a ton of energy.

Kinase P transfer enzyme. Just remember it.

1.1 3 ways ATP does work in cell

2 Coupled reaction

An example would be

3 Enzymes

3.1 How does it work

1. Induced fit model. The active site is a pocket on the protein that has projecting R groups (from the amino acid backbone) that forms H bonds, ionic bonds, or temporary covalent bonds with the substrate. The enzyme slightly changes shape as the substrate enters the active site, putting strain on its bonds, therefore reducing the activation energy.
2. Orientation: The enzyme helps position the substrates in their right 3D orientations, increasing the number of productive collisions.

3.2 Specificity

The substrate must fit the active site in terms of size, shape, and charge compatibility.

3.3 5 ways cells regulate enzyme activity

1. Turn on/off genes that code enzymes.
2. Synthesized in inactive forms.
3. Competitive inhibition
4. Non-competitive inhibition (also known as allosteric regulation I think?)
5. Degradation

3.4 Environment

pH affects enzymes since the h-bonds crucial to their 3D structure are stable in only narrow ranges of pH.

Moderately high temperatures optimize rxns. If the temp is too low, molecular motion decreases. If temp too high, h-bonds might be broken due to excessive motion, causing denaturation.

4 Peroxisomes

They produce H_2O_2 as part of its natural metabolic reactions. However it also breaks them down instantly, to prevent harm to the cells.

5 Fermentation

5.1 CH Bonds

Chisholm calls them "high energy bonds" not because they're hard to break. They are actually unstable; thus when broken they have the potential to form more stable bonds and release a lot of energy.