



MAKING A MODEL OF THE ATP ENERGY CYCLE

ATP (adenosine triphosphate) is the main energy molecule in living things.

It stores energy in the bonds between its phosphate groups.

When a bond is broken, energy is released for cells to use.

ADP (adenosine diphosphate) + Pi (inorganic phosphate) can be recharged with energy to make ATP again. This is called the ATP energy cycle.



OBJECTIVE

To build a model that shows how ATP stores and releases energy and is recycled in cells.

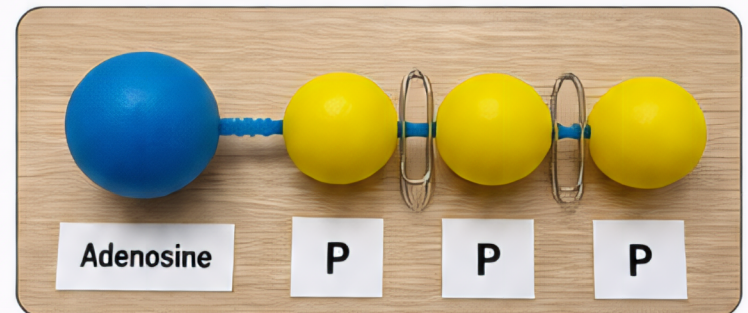


MATERIALS

- 3 foam balls or beads (phosphates)
- 1 craft shape or large bead (adenosine)
- Pipe cleaners or string
- 2 small paper clips or jump rings (to represent high-energy bonds)
- Scissors
- Labels or sticky notes
- Markers or colored pencils

YOUR MODEL SHOULD SHOW:

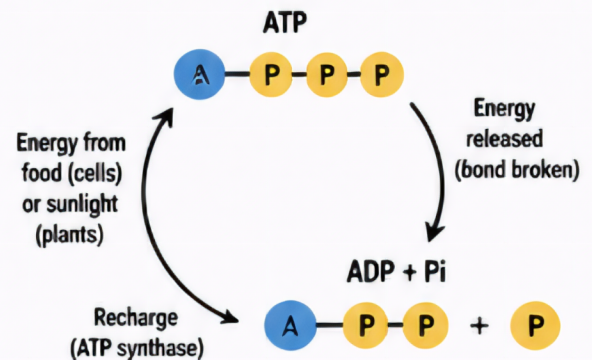
- ✓ Adenosine
- ✓ 3 phosphate groups
- ✓ High-energy bonds between phosphates
- ✓ Energy released when a bond is broken
- ✓ ADP + Pi recharging to make ATP again



PROCEDURE

1. **Build ATP:** Attach the 3 phosphate balls in a row using pipe cleaners or string. Connect them with paper clips to represent high-energy bonds. Attach the adenosine piece to the first phosphate.
2. **Label each part:** Adenosine (A) and the three phosphates (P, P, P).
3. **Show Energy Release:** Remove the last (outermost) phosphate. This breaks a high-energy bond and releases energy for the cell. You now have ADP (A-P-P) + Pi (P).
4. **Show Recharge:** Reattach the phosphate (Pi) to ADP using a paper clip and add "energy" (pretend ATP synthase and energy from food or sunlight) to reform ATP (A-P-P-P).
5. **Repeat the cycle** to show ATP can be used over and over.

THE ATP ENERGY CYCLE



OBSERVATIONS

What happened when a phosphate was removed? _____

What does the released energy do in a cell? _____

How is ATP recycled in your model? _____

Where do you think cells get the energy to recharge ATP? _____



THINK & EXTEND

1. What are some jobs that ATP might power in a cell?

2. Why is it helpful for cells to recycle ATP instead of making new ATP each time?



SCIENCE CONNECTION

Your body is constantly using and recycling ATP to power movement, thinking, growing, and staying alive—one tiny molecule at a time!