Pretest 3.1

1st Version

(2nd Version =handout; answers on web site)

1. Given: X + 2Y→ Z

- A) If this reaction occurs in a single step, what is the rate expression for the formation of Z?
- B) For the rate to change by a factor of 0.75 while doubling(2.0) the concentration of Y, what must also change?

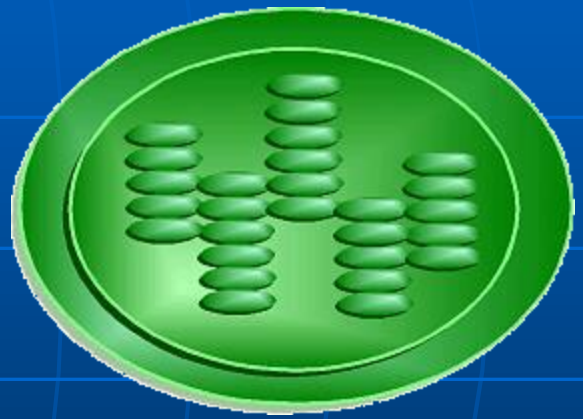
- **2. Given:**
  - 1)$Cl_2 \rightarrow 2\ Cl$
  - 2)$Cl + CHCl_3 \rightarrow HCl + CCl_3$
  - 3)$CCl_3 + Cl \rightarrow CCl_4$

If step 1 is the slow step, what is the rate expression for the overall reaction?

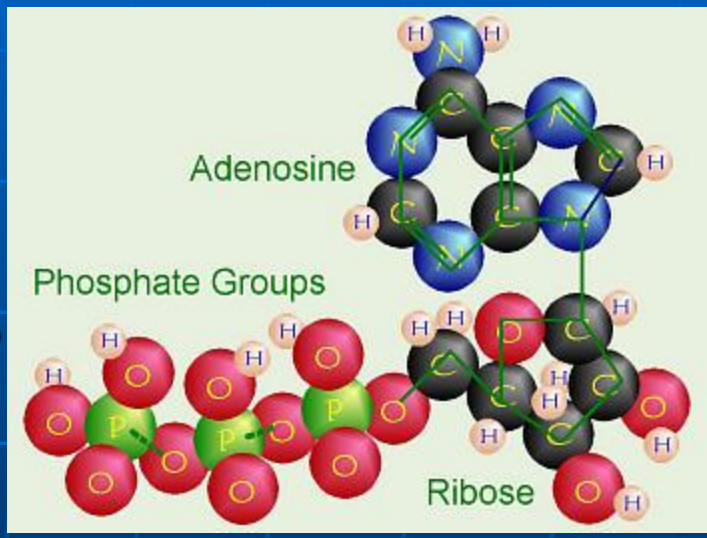
3. The overall reaction of photosynthesis is

$6\ CO_2 + 6\ H_2O$ (+ light energy)→ $C_6H_{12}O_6 + 6\ O_2$.

But this is only the overall reaction. Describe in words at least three reactions from its actual mechanism.

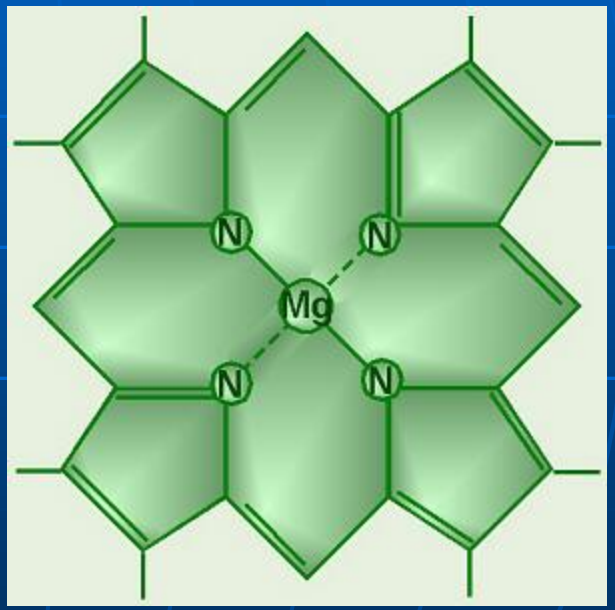


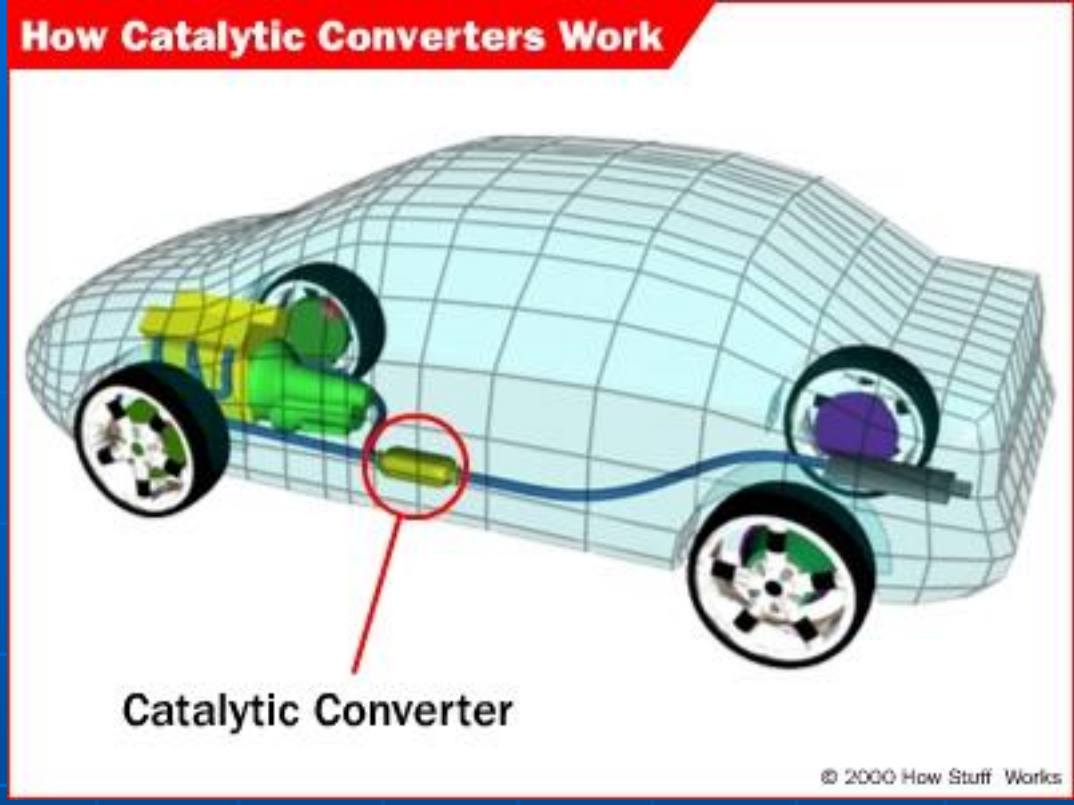
- 4. The energy harvested via the light reaction is stored by forming a chemical called **ATP (adenosine triphosphate)**, a compound used by cells for energy storage. This chemical is made of the nucleotide adenine bonded to a ribose sugar, and that is bonded to three phosphate groups. This molecule is very similar to the building blocks for our DNA.



- A)What role does water play in its production?
- B) Why is ATP needed to produce sugars?

- 5. What is this molecule and how is it recycled after absorbing light during photosynthesis?





6. Catalytic converters are very expensive to replace, yet Toyota extends the warranty for these components to 7 years. Use chemistry to convince management to maintain this policy.

7. Given $2\ SO_{2(g)} + O_{2(g)} = 2\ SO_{3(g)}$

a) What would you see change if equilibrium is maintained?

b) What factor has to remain constant to maintain equilibrium?

c) Why is this not steady state?

d) How can you tell it's not irreversible?

e) Describe the reaction at the molecular level.