House-cooling system
Group 7

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Purpose of the Project:
- Redesign of the central-cooling system
- Make it more efficient without using large amounts of electricity

Evaporative Cooling
- Evaporating water cools off the surface
- During evaporation heat is transferred
- The endothermic reaction causes the environment to become colder
History
- Early civilizations used many methods to combat the heat
  - The Persians used an air-cooling system called “the Wind catcher”
  - Passed the air through water to produce cool air
  - Thousands of years later, we have improved the method

Equation of Vaporization
$q = \Delta H_{\text{vap}} \left( \frac{\text{mass}}{\text{molar mass}} \right)$

The meanings are as follows:
1) $q$ is the total amount of heat involved
2) $\Delta H_{\text{vap}}$ is the symbol for the molar heat of vaporization. This value is a constant for a given substance.
3) $(\text{mass} / \text{molar mass})$ is the calculation to get the number of moles of substance
Evaporative Coolers

Direct Coolers
- Uses Latent heat of evaporation of water
- Warm Dry air -> Cool moist air
- Heat from outside air used to evaporate water

Indirect Coolers
- Similar to direct, but uses a heat exchange
- Unlike direct, indirect does not produce as much humidity
- Warm air passes through exchange while cooled by evaporation on the outside
Design
Central Air vs. Evaporative Cooling

**Central Air**
- 15 Year Lifespan
- Cost: $10000 + Installation
- **Maintenance:**
  - Technician
  - Repair
  - Repair Costs (Simple Parts $100-500)
  - Repair Costs (Complex Parts $1000 – 5000)
- Uses Freon

**Evaporative Cooling**
- No Corrosion
- Cost: $2,000 + Installation
- Uses Water, No Chemicals
- Repairs completed by Home owner
- Pump will need replacement (10 years)
Details

- This design: conserves the most water and gives greatest cooling effect

- Cooling system is a useful appliance and energy efficient

- Approximate cost is about $2,000.00

- Made of aluminum = Lifetime warranty against corrosion!

- 10 year warranty on water-pump

- The actual size of the appliance is approximately a 6-foot cube

- Uses 2 gallons of water an hour

- Air circulates 12.5 times an hour
Thank You

Questions?