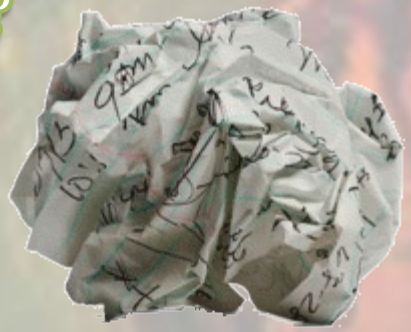
Chemical Change

Classifying Change

Are each of the changes to paper described below chemical or physical only?

- Crumpled paper



Physical

- Folded paper

Physical

- Burned paper

Chemical

The Critical Distinction

- In the previous three examples you started with paper:
  - What did you have after you crumpled it? Paper
  - What did you have after you folded it? Paper
  - What did you have after you burned it? Not paper
- After a physical change, the same substances remain.
- During a chemical change, new substances form.

Identifying Chemical Changes

Characteristics of Chemical Changes

- Change in temperature
  - exothermic — give off heat [video]
  - endothermic — absorb heat
- Release of a gas [video]
- Formation of a precipitate (solid that comes out of solution) [video]
- Change in color [video]
- Change in odor

Examples

- $AgNO_3(aq) + NaCl(aq) \rightarrow NaNO_3(aq) + AgCl(s)$
  - AgCl is a white precipitate
- $Zn(s) + HCl(aq) \rightarrow ZnCl_2(aq) + H_2(g)$
  - H_2 is a gas
  - The reaction is exothermic
- $Zn(s) + CuSO_4(aq) \rightarrow Cu(s) + ZnSO_4(aq)$
  - Cu is a metallic orange precipitate
  - When $CuSO_4$ is present the solution is blue , but when only $ZnSO_4$ is present the solution is colorless.