**SPONTANIETY WITH RESPECT TO FREE ENERGY**

∆**G =** ∆**H - T** ∆**S (all variables refer to the system)**

1. Burning of ethanol. Place a few drops of ethanol on the lab table and ignite. (be sure to remove all flammable materials from the area)

Balanced Equation:

Sign of ∆H :

Explanation:

Sign of ∆S:

Explanation:

Sign of ∆G

Spontaneity:

1. Burning magnesium. Place a small piece of magnesium in the burner flame. Do not look directly at the metal!

Balanced Equation:

Sign of ∆H :

Explanation:

Sign of ∆S:

Explanation:

Sign of ∆G

Spontaneity:

1. Ca metal and water. Place a small piece of Ca metal into 100 mL of water in a 250 mL beaker.

Balanced Equation:

Sign of ∆H :

Explanation:

Sign of ∆S:

Explanation:

Sign of ∆G

Spontaneity:

4. Heating (NH4)2CO3. Heat a small amount of (NH4)2CO3 in a clean, dry test-tube over a Bunsen burner.

Balanced Equation:

Sign of ∆H :

Explanation:

Sign of ∆S:

Explanation:

Sign of ∆G

Spontaneity:

5. Crystallization of sodium thiosulfate. Fill a test-tube ¾ full of sodium thiosulfate and heat until melted. Cool to room temperature. When completely cooled add a few crystals of sodium thiosulfate to the test-tube.

Balanced Equation:

Sign of ∆H :

Explanation:

Sign of ∆S:

Explanation:

Sign of ∆G

Spontaneity:

6. Dissolving NH4Cl. Dissolve a small amount (1.00 g) of NH4Cl into about 50 mL of water.

Balanced Equation:

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Sign of ∆H :

Explanation:

Sign of ∆S:

Explanation:

Sign of ∆G

Spontaneity: