**EXOTHERMIC REACTION**

To provide sufficient energy for steam production an exothermic reaction is used. In this reaction sodium thiosulfate and tris-potassium phosphate is added to the reaction to capture the formed protons.

\[ S_2O_3^{2-} + 2H_2O_2 \rightarrow 2SO_2 + 3H_2O + 2H^+ + \Delta H_R \]

To prevent the formation of sulfur and sulfur dioxide in an acidic environment tri-potassium phosphate is added to the reaction to capture the formed protons.

\[ S_2O_3^{2-} + 2H^+ \rightarrow S + SO_2 + H_2O \]

A defined solution of sodium thiosulfate and tri-potassium phosphate is stirred in the reaction tank. On startup a set amount of oxidizer immediately enters the tank to fasten the temperature increase to the operating temperature of 100 °C.

More oxidizer is then added at a constant flow rate to maintain the reaction for the desired time, thereby determining the driving distance.

**POLYMER**

**SHAPE MEMORY EFFECT**

The SME of Polymers is based on the prevention of their recovery from the stretched state caused by their characteristic mechanical behavior of rubber elasticity. The SME can be divided in two steps:

1. **PROGRAMMING (elongation)**
   - The polymer (EOC*) is prepared with the crosslinking trigger temperature range of EOC* lies between 40 °C and 80 °C with an increasing restoring force at their recovery from the stretched state caused by elasticity. The SME can be divided in two steps:

2. **PROGRAMMING (shrinkage)**
   - The SME of Polymers is based on the prevention of their recovery from the stretched state caused by elasticity. The SME can be divided in two steps:

**DRIVE**

The run is initiated by opening the main valve. To deliver the starting torque a lower gear will be used for the acceleration phase. The car will shift into a higher gear automatically after a set distance.

With the termination of the reaction the steam production ends and the heat transfer to the polymer is no longer sufficient. As the temperature drops beneath the trigger-temperature the polymer stripe no longer relaxes and the ChemCar stops.

Each polymer will be programmed identical independent of the desired driving distance. By limiting the steam supply time the polymer will only be triggered a certain amount, allowing for shorter distances.

**REFERENCES:**