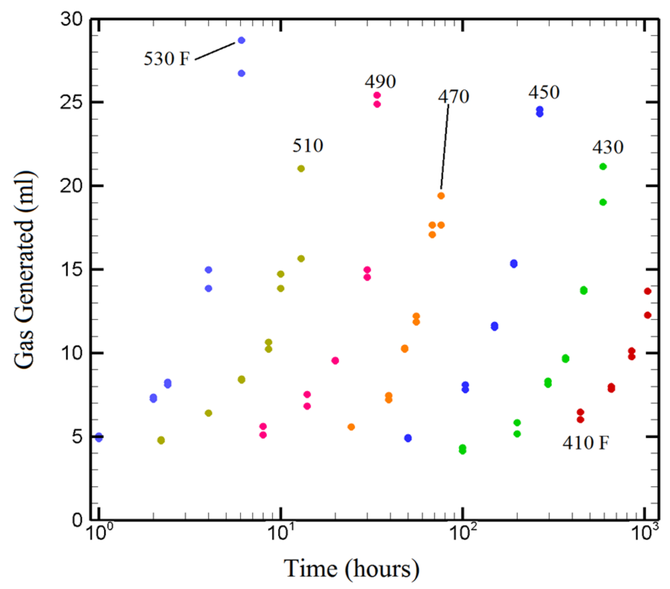
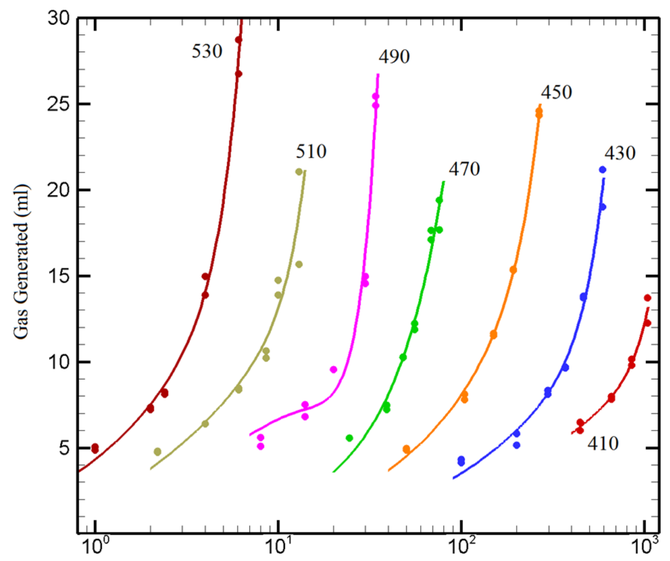
IPS-14-09

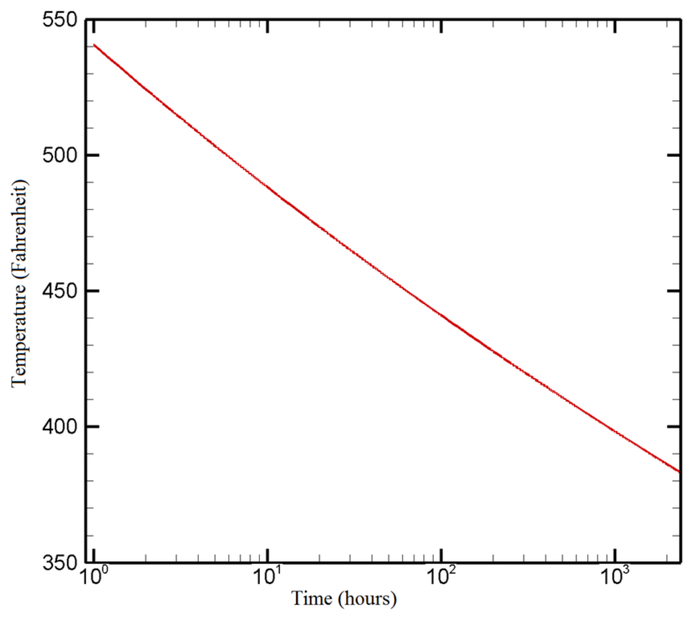
"HNS: Time-Temperature Curves Derived from Ampule Testing"

Ampule Testing :

- **monitors gas evolved when sample is held at a given temperature for a given length of time, 1 gram sample is sealed in a glass ampule, times can be greater than 1000 hours, temperatures above 500 F.**
- **thermal stability test that most closely mimics the conditions that explosives are exposed to in oil-field operations**







Challenge:

- Temperature limits
- Condensation of decomposition products
- Consistently obtaining a good vacuum tight seal between the glassware and the gauge.
- Each batch of HNS have varying levels of impurities.

Technique:

- HE was sealed in the glass ampules, the ampules were placed in a heating block
- The block was then brought to the desired temperature and held at that temperature for a given time
- Ampules were allowed to cool back to ambient temperature.
- Once cooled the glass ampules were then broken apart and the amount of gas that was generated was measured.

Result:

- Successful feasibility to calculate the total amount of gas generated by the complete decomposition of 1 gram of HNS
- Provide safe temperatures at which the charges can be exposed to at extreme well conditions.