Retrieval of Thermally Stressed Nitramine (RDX, HMX) Charges

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Subject

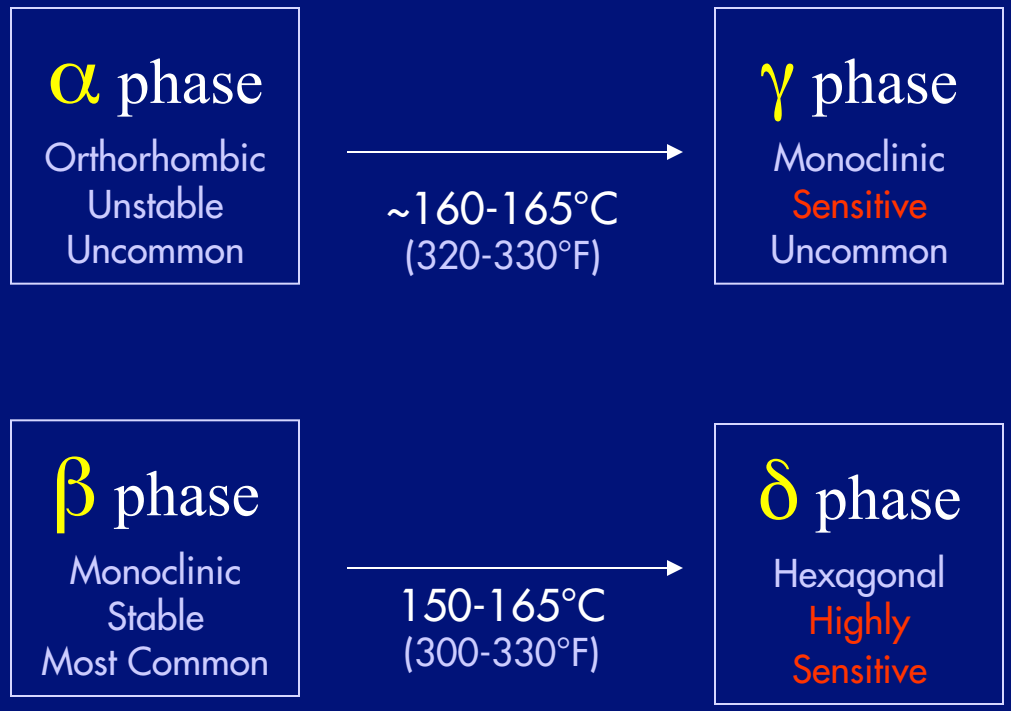
- What effect does temperature exposure have on nitramine explosives?
- Are the effects reversible?
- How should exposed charges be retrieved and handled?
  - » Service company recommendations vary
  - » Operators concerned by HSE vs. lost rig time

Summary of Effects

- No observed increase in sensitivity of RDX†, even if time-temp limits exceeded
- HMX undergoes phase transitions
  - » Crystal structure changes
  - » Sensitivity is significantly increased
  - » Changes very slow to reverse
  - » Requires special retrieval procedures

† HNS and PYX were similarly unaffected

HMX Phase Changes



HMX Phase Changes

- Primary concern is β to δ phase change
  - » Observed as low as 150°C (300°F)
  - » Significant increase in impact sensitivity (becomes more sensitive than PETN or lead azide)
  - » Slow reversal (days), even if explosive is cooled

Recommendations

- Use RDX up to 110°C (230°F)
- Use HMX up to 150°C (300°F)
- Follow special procedures when retrieving any HMX explosive device that may have been exposed to temperature >150°C
  - » Cool down period is not sufficient
  - » Only unload at service company premises under special supervision

Actions

- Acquire More Test Data
  - » Drop testing of heated guns
  - » Impact testing of heated & cooled charges
  - » To be completed by 3Q 2005
- Refine Conclusions
- Build Recommendations into API RP-67
  - » Service companies review their procedures