Looking Back to See Forward: Lessons from a Plant Explosion

April 2019

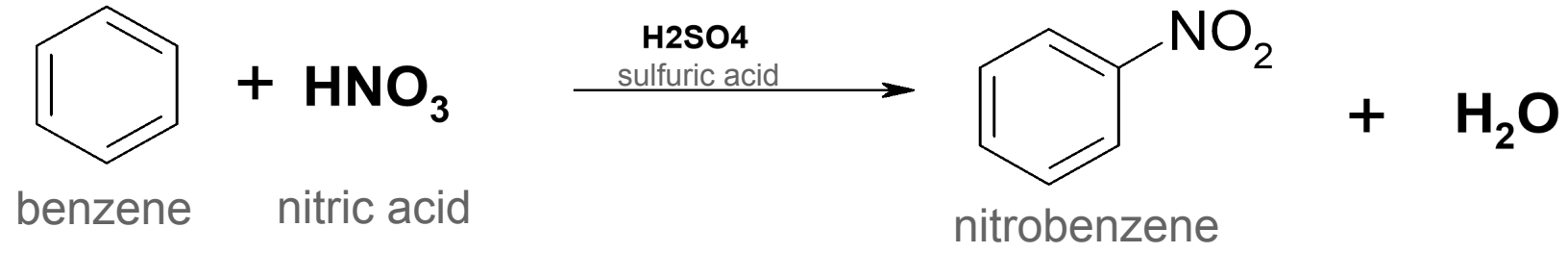
Dawn Mason

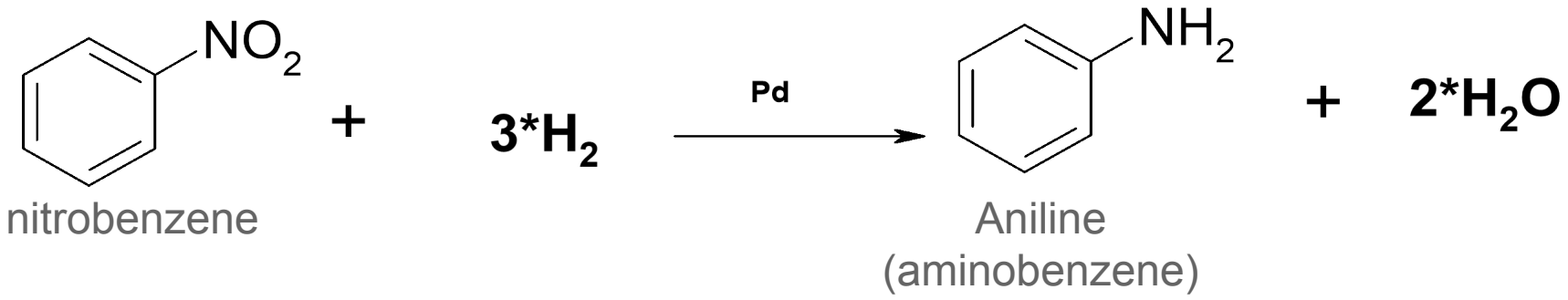
ALL IN FOR SAFETY

- Eastman is committed to enabling a safe and secure workplace for our team members, customers, and clients
- Ultimate goal of zero injuries and process safety incidents worldwide
- Safety is personal and everyone is accountable to work as safely as possible

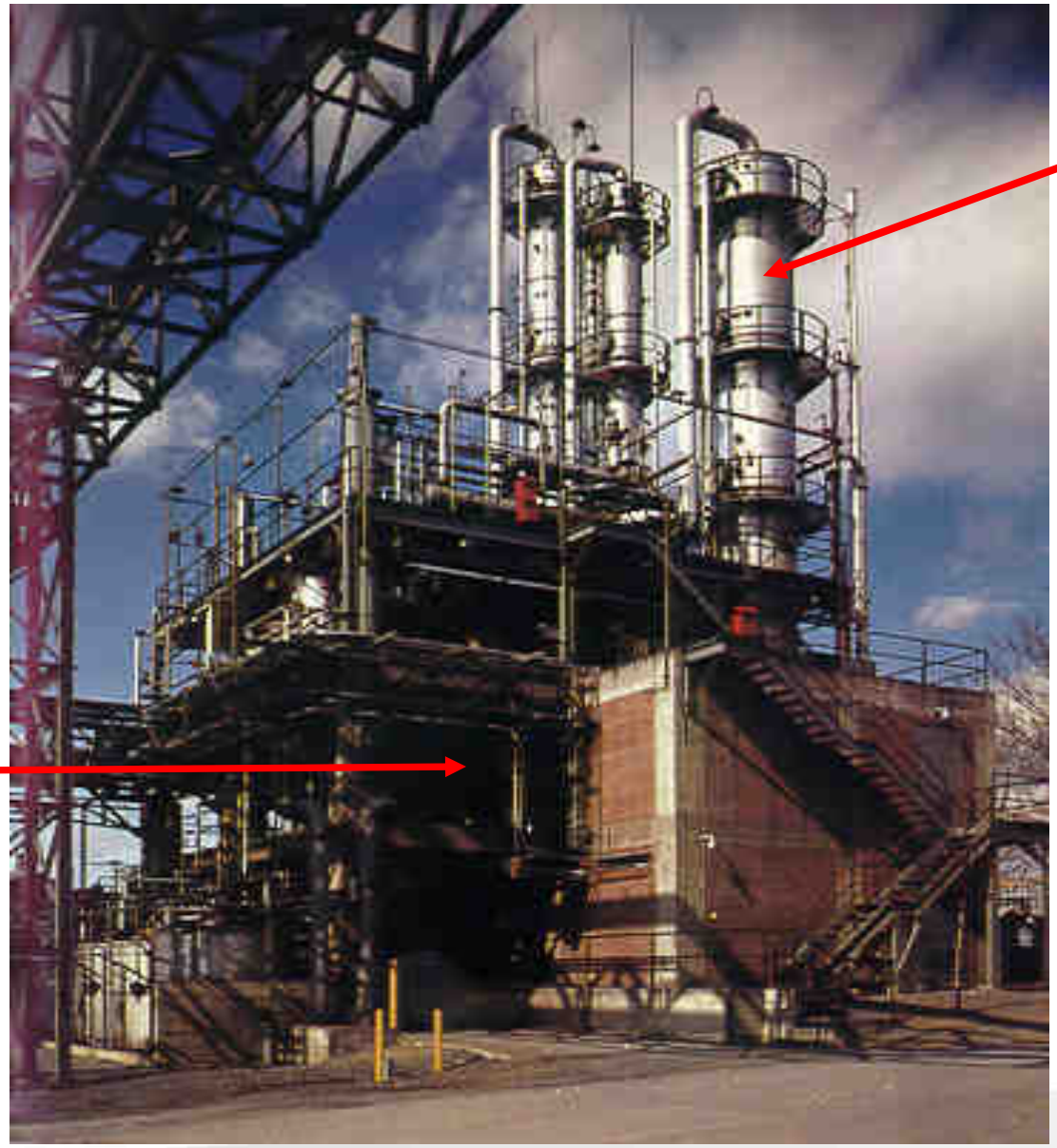
Each person is ALL IN FOR SAFETY.
Every shift, every day, here and away from work, in all activities

Aniline Chemistry





EASTMAN


Nitrobenzene
Column
Nitrator

October 4, 1960

Eastman's Aniline Plant Explosion

Lodal, P. N. *Process Safety Progress*, vol. 23, 2004, 221-228

- 16 dead
- 48 hospitalized
- >250 injured

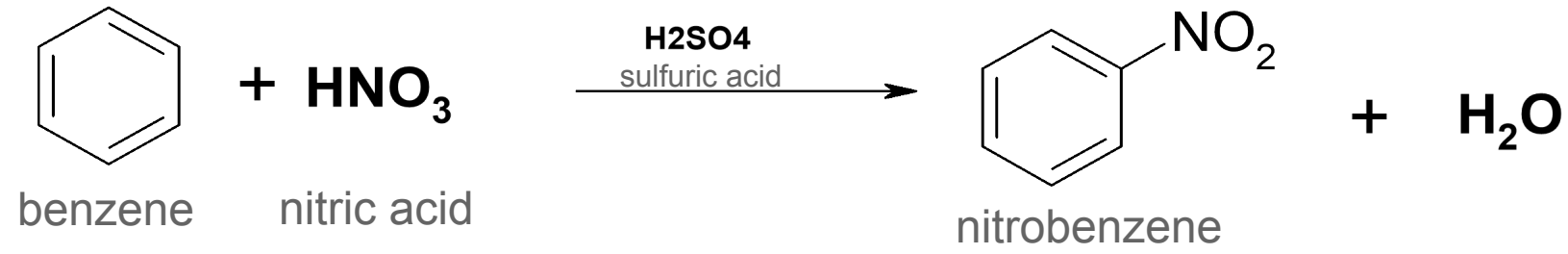
[Aniline Plant Explosion Video]

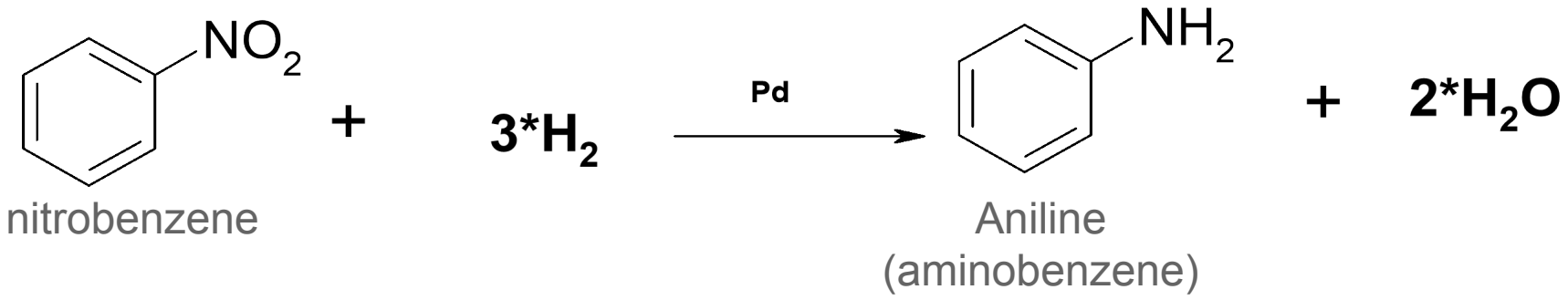

Building 156

Looking east on D Avenue

View from site Bldg. 207 looking north

Aniline Chemistry





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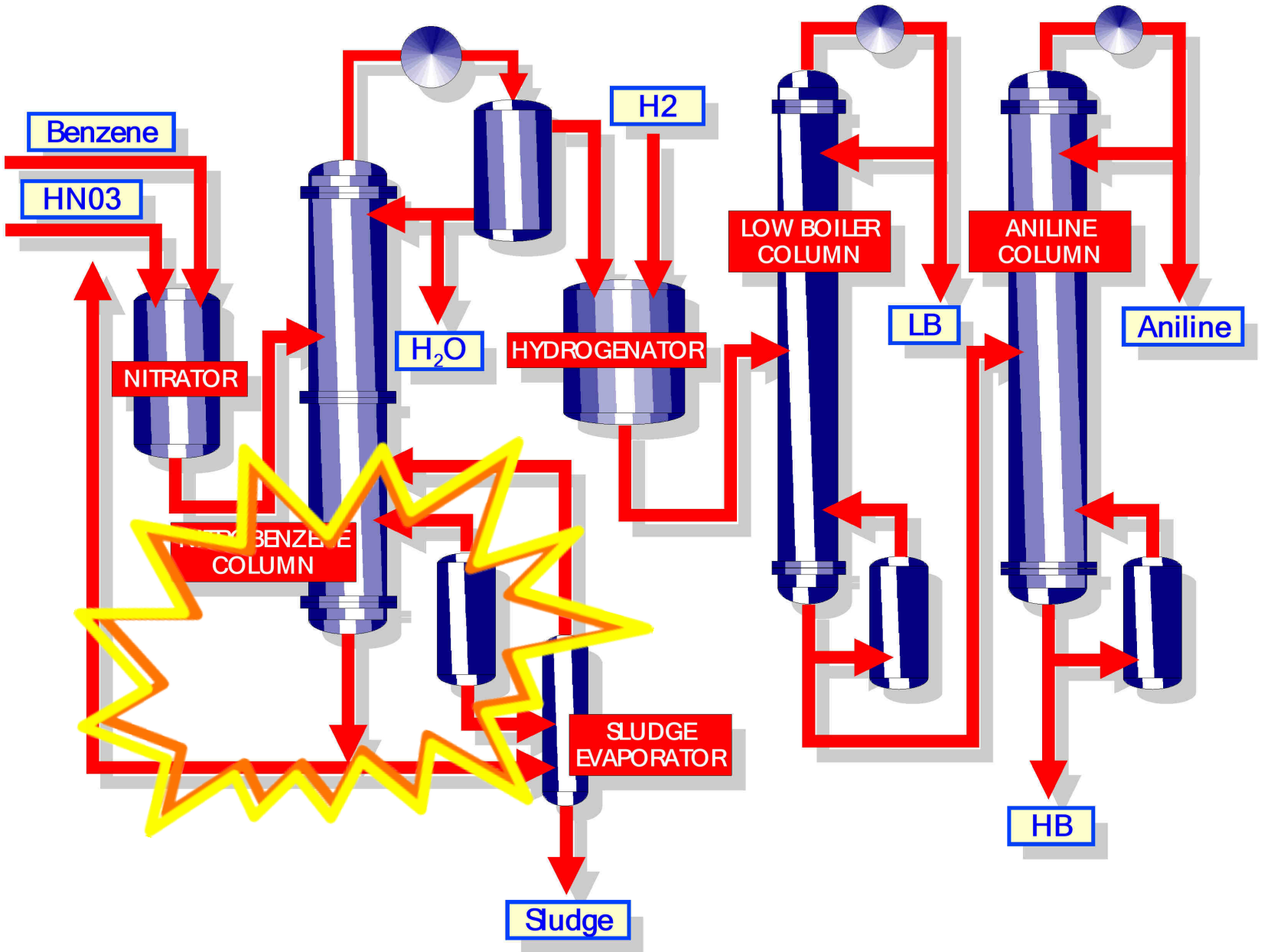


Process flow diagram

EASTMAN

"…the cause of the nitrobenzene column failure and initiation detonation is not known"

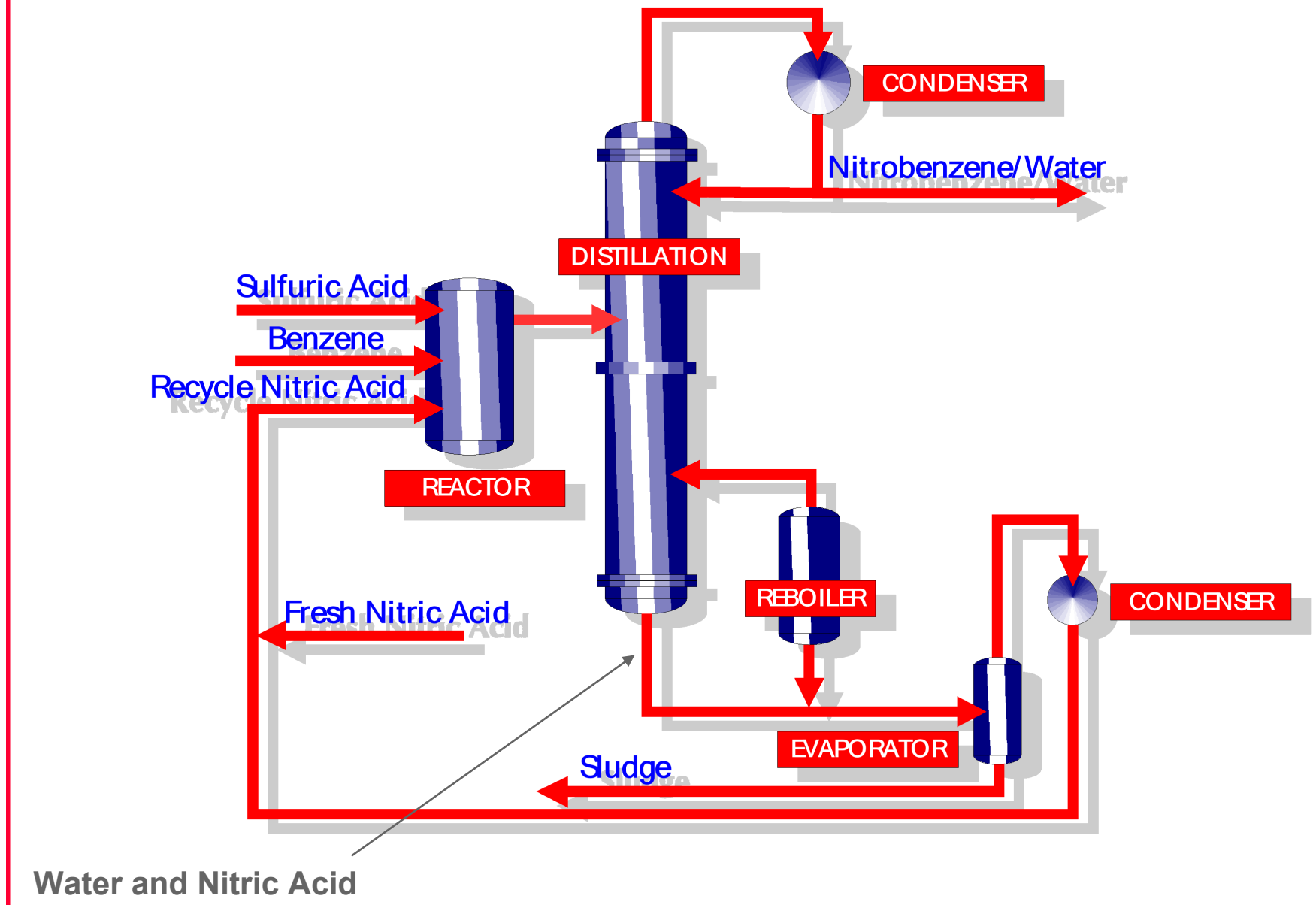
-Jan. 31, 1961 incident report

EASTMAN

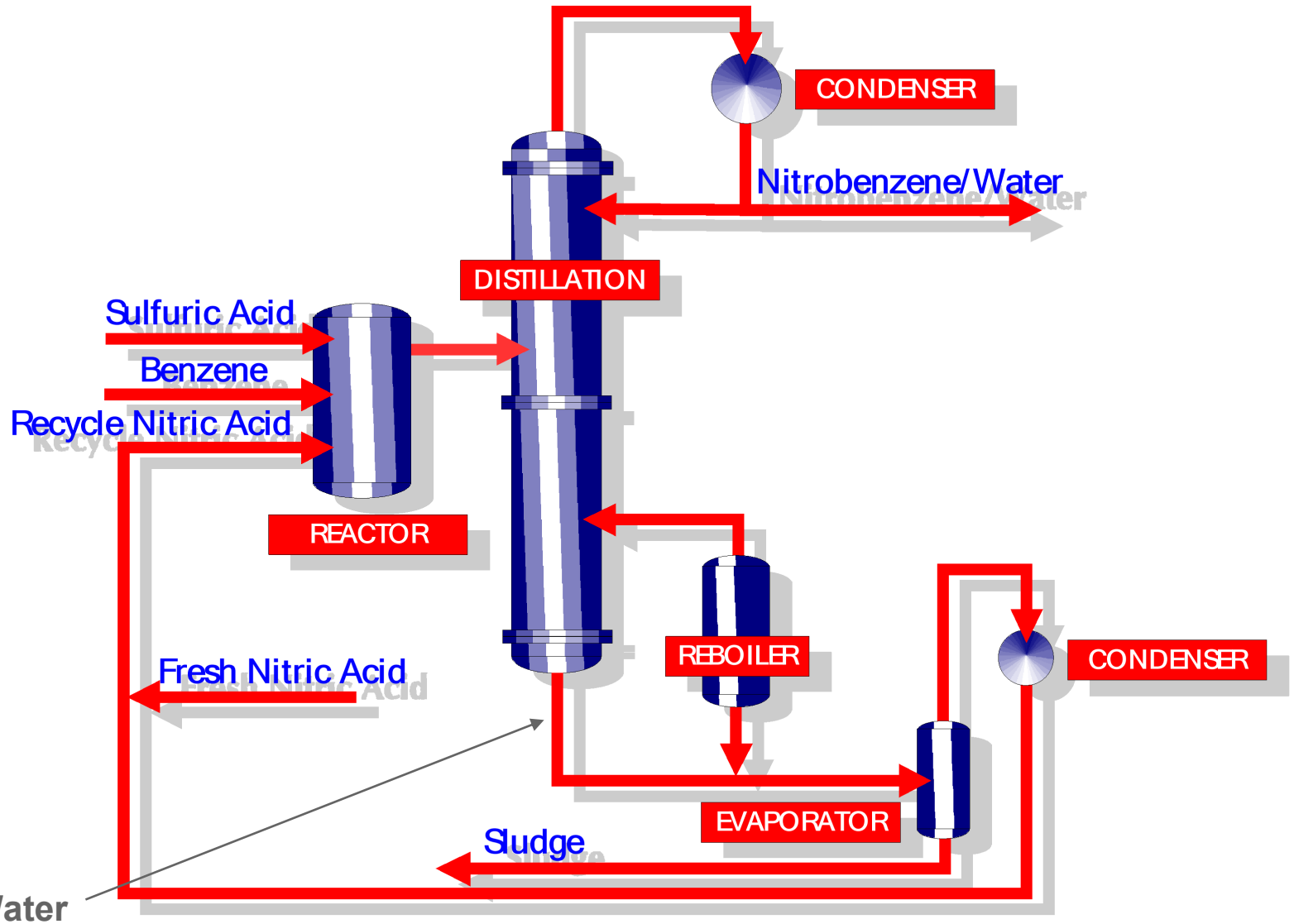
"…using newer analysis techniques and obtaining physical property data…have allowed us to piece together a possible scenario…"

-Lodal, P. N. *Process Safety Progress*, vol. 23, 2004, 221-228.

Normal Conditions



Conditions on Oct. 4, 1960



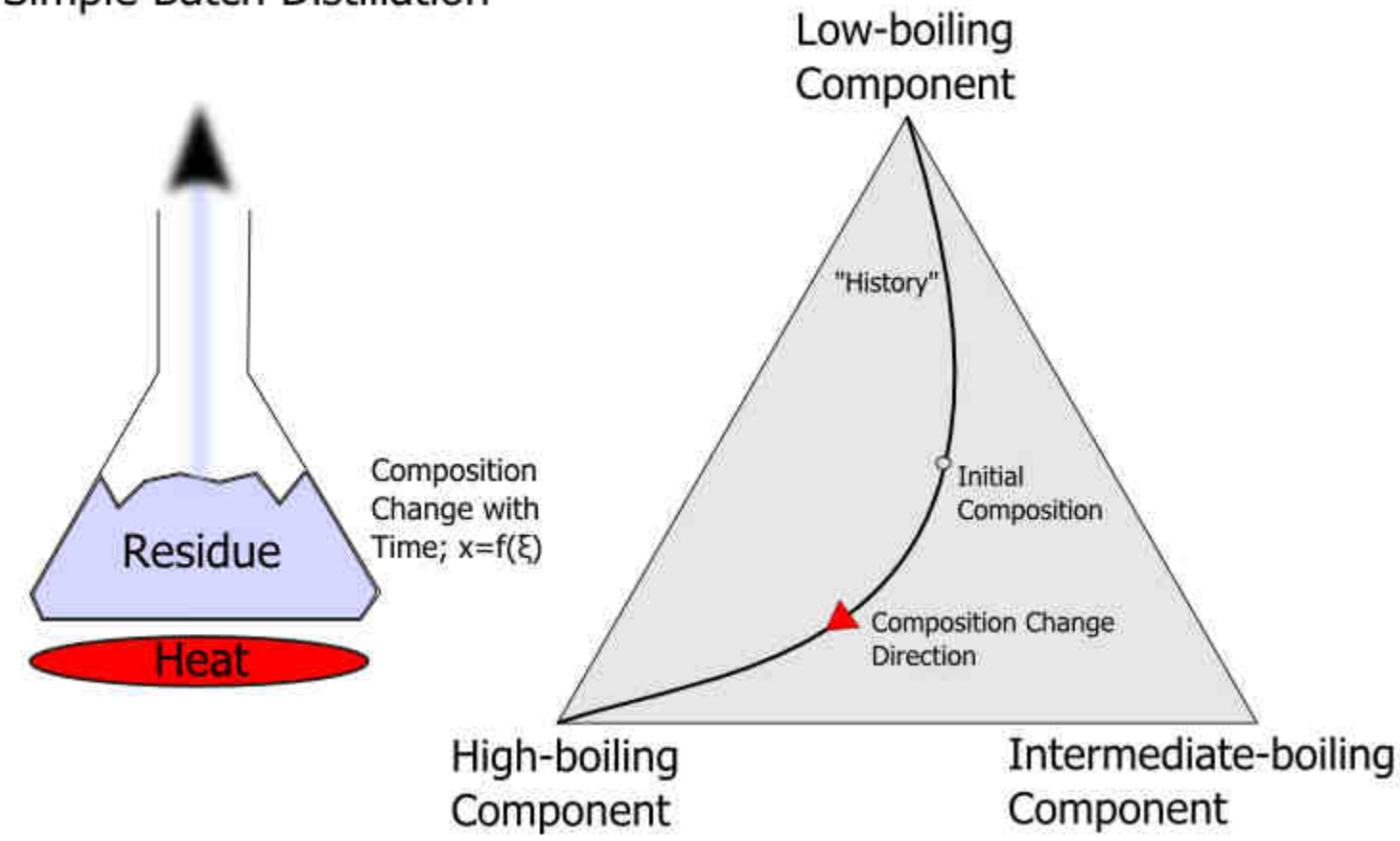
19% Water

63% Nitric Acid

18% Nitrobenzene

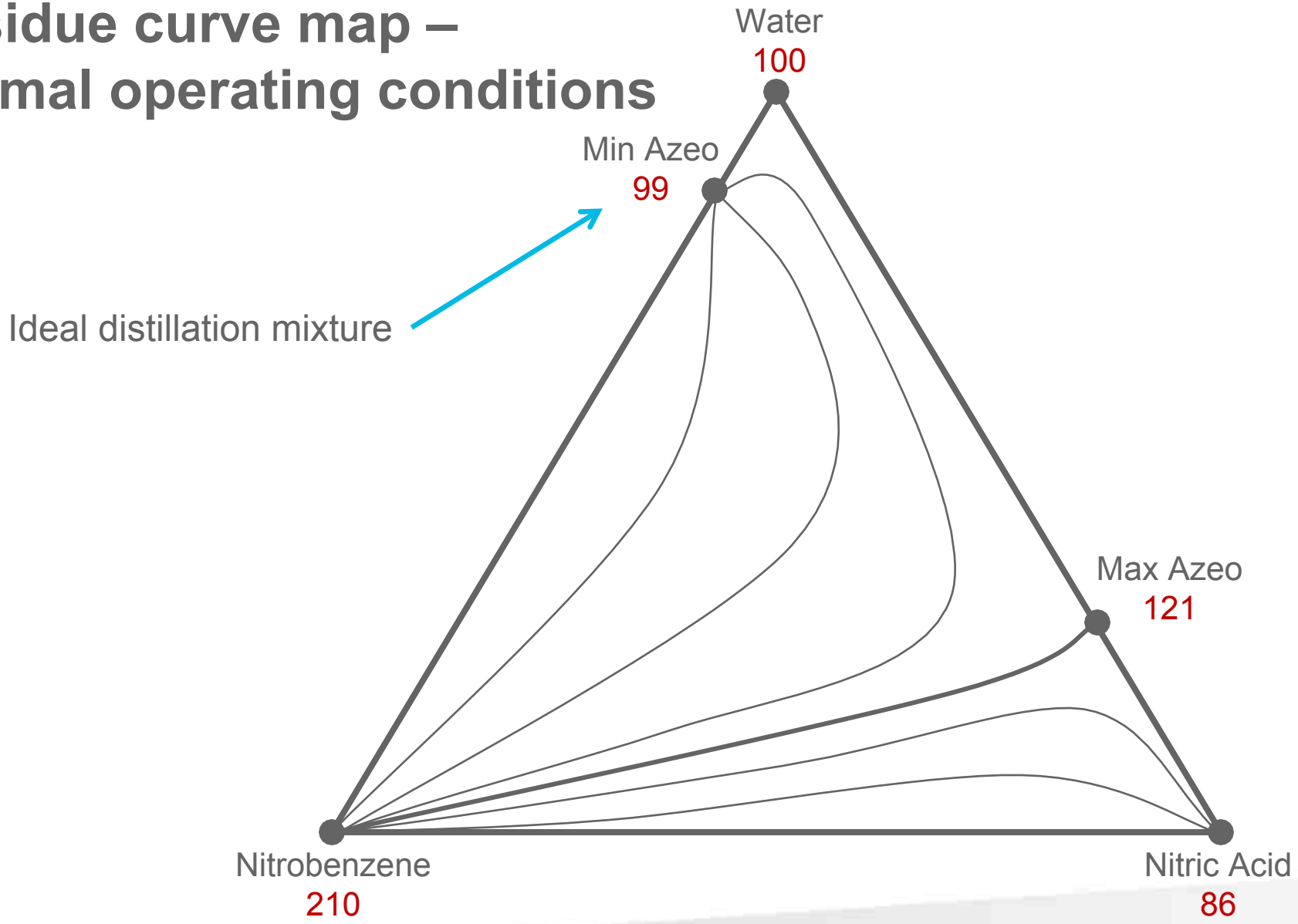
Residue Curve Principle

Simple Batch Distillation

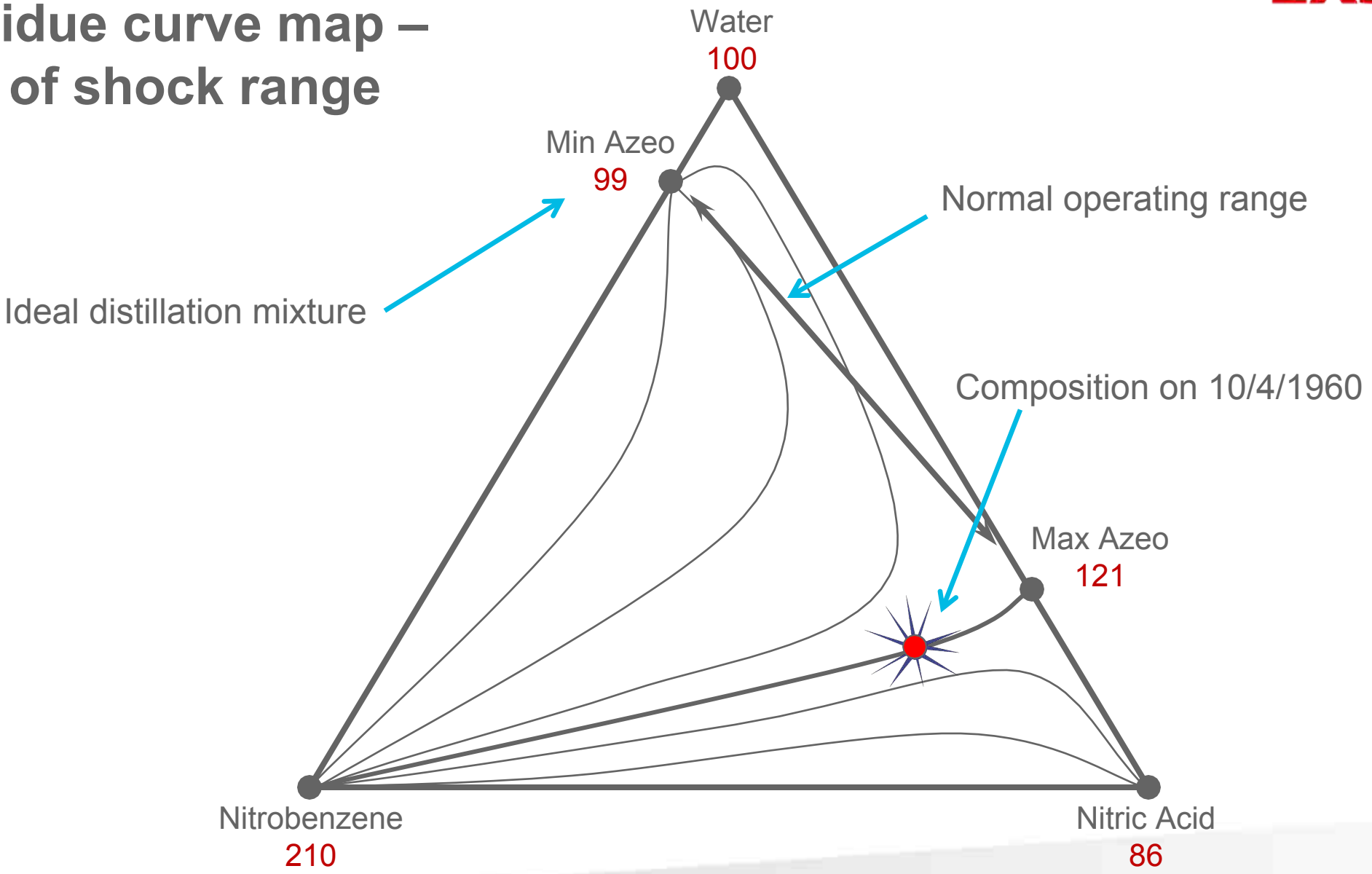


A **residue curve** describes the change of the composition of the **liquid phase** of a chemical mixture during continuous evaporation at the condition of **vapor-liquid equilibrium** (open distillation). Multiple residue curves for a single system are called *residue curve maps*.

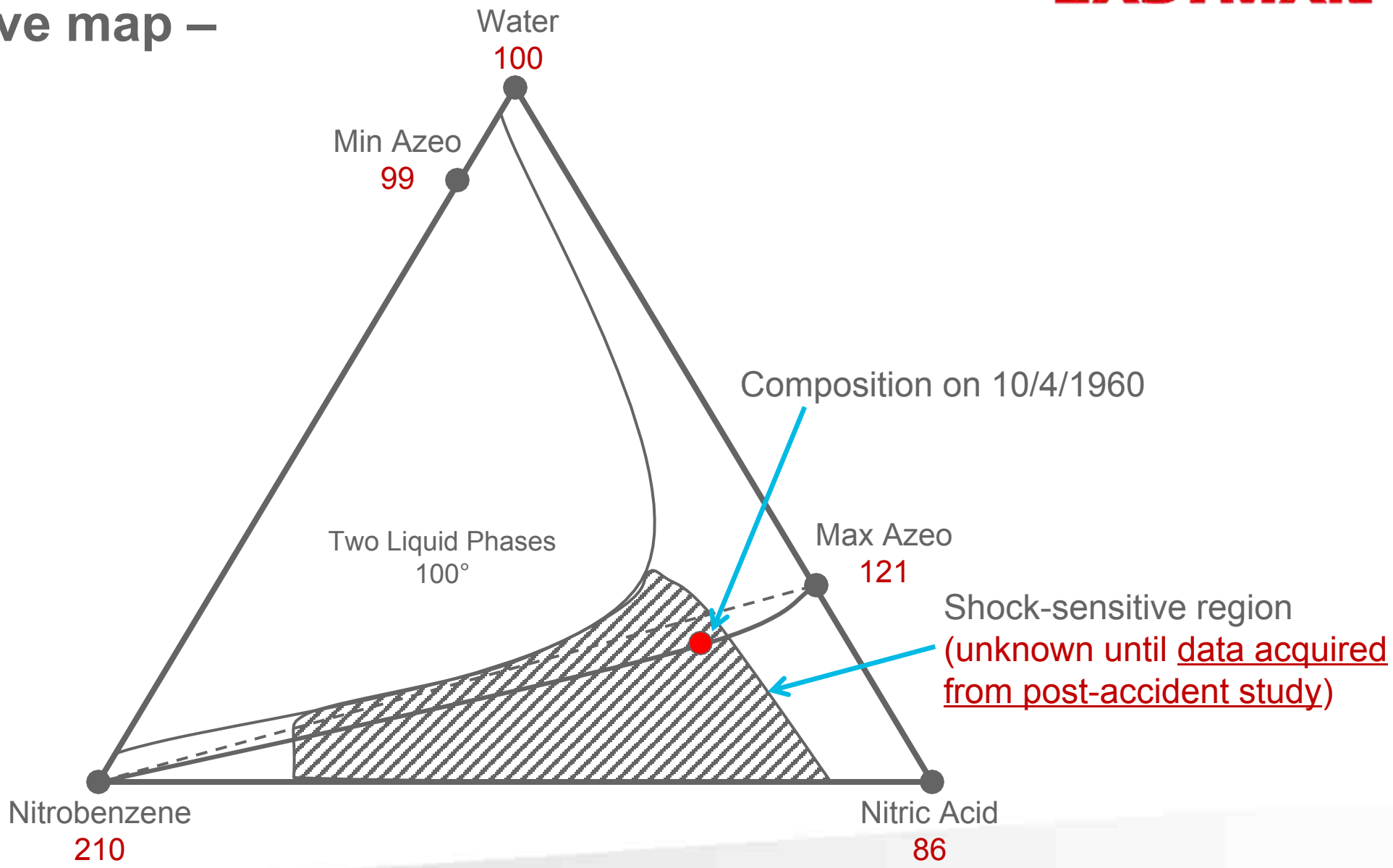
Residue curve map – Normal operating conditions



Residue curve map – Out of shock range



Residue curve map – Detonation



"The farther back one can look, the farther forward one can see."

--Winston Churchill