

Name of the project: Digitization of chemistry experiments to improve the quality and support chemistry teaching in secondary schools
Acronym: ChemIQSoc
Project number: 2021-1-SK01-KA220-VET-000027995



Title: Zinc volcano

Work instructions

Task: Water-induced redox reactions of a mixture of zinc and ammonium salts achieve exothermic explosive-pyrophoric effects.

Theory

Ammonium salts decompose violently into gaseous products in the presence of zinc metal and water, causing an explosive-pyrophoric decomposition process with the development of heat and light effects



If ammonium chloride is also present, the explosion is amplified as explosive products are formed:



Equipment: porcelain bowl, large iron bowl with sand, glass rod, spoon for chemicals, plastic syringe, fume hood

Chemicals: ammonium nitrate, ammonium chloride, zinc

Procedures:

1. Separately weigh 4 g of NH_4NO_3 , 1 g of NH_4Cl and 4 g of Zn.
2. Grind the individual components of the mixture separately.
3. Then add them carefully to one porcelain dish and mix gently. When mixing the mixture, do not lean over it in case spontaneous ignition occurs. Spontaneous ignition may be caused by moisture in a component or utensil.
4. Place the bowl with the mixture in a large iron bowl with sand in the fume hood.
5. Finally, add a few drops of water onto the mixture with a syringe and observe the rapid ignition of the prepared mixture.

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Management of chemical substances

Chemicals	Form	H-statements	P-statements
NH_4NO_3	Solid	H272, H315, H319, H335	P220, P261, P305 + P351 + P338
NH_4Cl	Solid	H302, H319	P305 + P351 + P338
Zn	Solid, powdered	---	---

Sources of risk and assessment of risk severity

Possibility of skin burns and eye damage.

Waste management method

Certified chemical waste disposal company.

Risk reduction measures

Lab coat, goggles, gloves, keeping a safe distance.