NHN

Ni(NO3)2*2(N2H4)

Nickel hydrazine nitrate is a potential primary explosive that shows good resistance to impact, while still being easily initiated by flame.
This means that the complex salt may likely be safer to handle than other primaries.

the sensitivity to impact (the hammer drop height value at which the sample has a 50% chance of detonation) is 84cm. It is resistant to friction up to 10N, resistant against electrostatic discharge, but is sensitive to flame and will explode in contact with a red hot wire.

Another advantage, small amounts of the compound do not need confinement to detonate. Nickel hydrazine nitrate shows excellent initiating power for a primary. The detonation velocity 7km/s.

One note of warning, nickel hydrazine **perchlorate** is dangerously sensitive to friction. An accident involving only 5 grams cracked a fragment off a laboratory table and resulted in severe injury.

An aqueous solution of nickel nitrate was prepared, containing 8% Ni(NO3)2 by weight. 50mL of the solution was poured into a steel container, which was then heated to 65degC. Separately, 100mL of distilled water was warmed and maintained at around 60degC. Gradually over the period of 30 minutes, 7cm3 of hydrazine sulfate was added into the steel container, simultaneously together with 50mL of the water that had been separately prepared, the remaining water was discarded. The hydrazine sulfate used was somewhat wet to begin with. The color of the reactants in the steel container changed from a bluish tint to purple over the course of the reaction. The reaction was stirred for an addition 10 minutes, maintaining the temperature at 60degC. After cooling to 20degC, the purple colored product was filtered out over two layers of coffee filter paper, washed once with 50cm3 distilled water. The moist caked solid was then partially dissolved in >98% alcohol (50mL ethanol was used), then the alcohol was allowed to evaporate out on an electric hot plate set to only 60degC. The evaporation should be carried out in the dark, but with plenty of ventilation. About 5 hours are required for complete evaporation. From this procedure, about 11 grams of nickel hydrazinium nitrate is obtained, which is a 90% yield. Heating of the reactants/reaction is not in any way necessary, as similar yields were obtained at room temperature, but the product obtained from heating shows better physical properties, as the salt is of a more crystalline form. The crystalline form has a density of about 0.89 g/cm3. The nickel hydrazinium nitrate thus obtained, when gradually heated, explodes at 219degC. The compound appears thermally stable even up to 200degC. Sensitivity (50% probability of explosion using 2kg drop hammer from variable heights) value of 84cm. Velocity of detonation: about 7km/sec.

The co-crystallization of NHN with silver azide, such that the resulting clathrate contains 10% by weight of AgN3, increases the drop height sensitivity to a value of 66cm. Even such a clathrate containing only 2% silver azide is not much less sensitive, having a drop height value of 68cm. As a side note, cobalt hydrazinium nitrate, which can be similarly prepared, is even more sensitive, having a sensitivity drop height value of 59cm. The cobalt salt also explodes at a lower temperature, 188degC. Interestingly, however, the cobalt salt is actually somewhat less sensitive to friction than NHN.

Kommentare