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**NEAR OPTICAL (NLO) MATERIALS: SYNTHESIS OF A NEW ORGANIC-INORGANIC HYBRID MATERIAL 4- (2-AMMONIOETHYL) MORPHOLIN-4-IUM HEXACHLOROSTANNATE (IV)**

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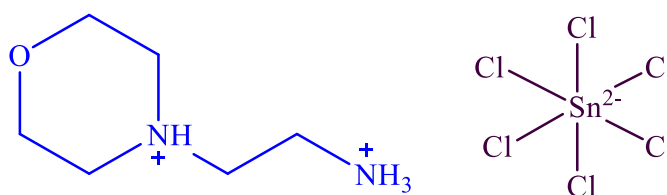
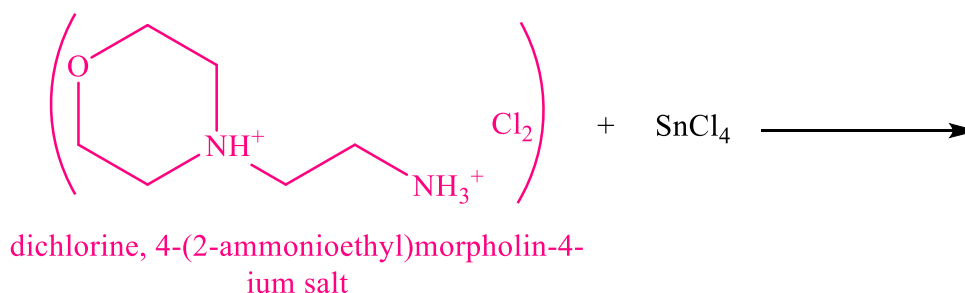
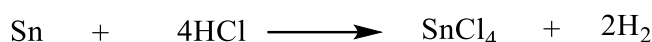
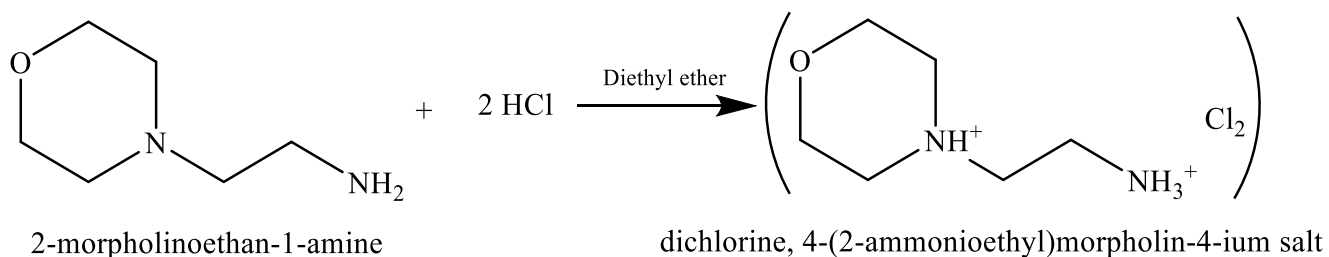
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## Synthesis:

The initial compounds 2-morpholinoethan-1-amine. All reagents and solvents used in the synthesis were of reagent grade and employed without additional purification. Yellow powder 2-morpholinoethan-1-amine [Aldrich, purum > 98% (NT)], (0.152g 10 mM) and hydrochloric acid (Aldrich, 35 % in H<sub>2</sub>O, 99.95%), (2 mL) were mixed in diethyl ether (10 mL) at room temperature to form a 4-(2-ammonioethyl)morpholin-4-ium chloride precursor solution. The solution was heated to 60 °C and kept at this temperature for 10 min. Upon cooling, 4-(2-ammonioethyl)morpholin-4-ium chloride precipitated in the solution. The precipitate was then washed with diethyl ether and dissolved in ethanol. Tin shots, weighing 0.118 g (5 mM), were dissolved in 5 ml of 37 % hydrochloric acid at room temperature over seven hours to produce form tin chloride (SnCl<sub>4</sub>). The tin chloride solution was added to the freshly prepared ethanolic solution of the dichlorine, 4-(2-ammonioethyl)morpholin-4-ium salt precursor while continuously stirring (Scheme-1).

The solution was placed in a thermostat at 25°C for 16-20 days, resulting in the formation of a new crystal.



4-(2-ammonioethyl)morpholin-4-ium hexachlorostannate(IV)

(Scheme-1). Synthesis of 4-(2-ammonioethyl)morpholin-4-ium hexachlorostannate(IV).

## References

1. Elsenety M. M. et al. Synthesis, characterization and use of highly stable trimethyl sulfonium tin (IV) halide defect perovskites in dye sensitized solar cells //Polyhedron. – 2018. – T. 150. – C. 83-91.