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Water Pollution Through Arsenic Salts and its Control

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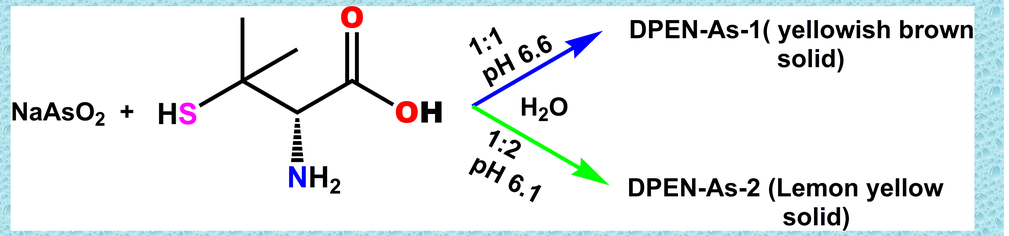
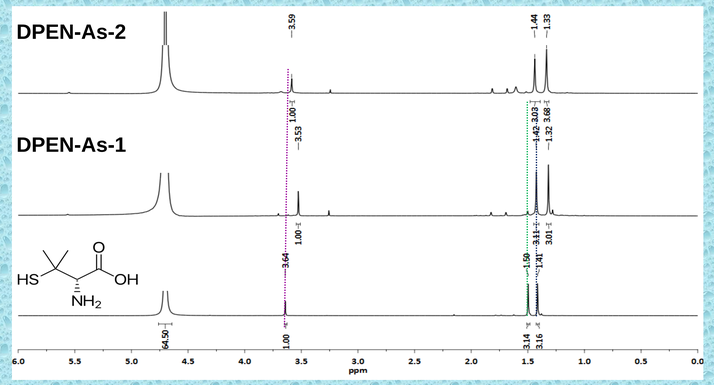
Introduction:

- ❑ Most of the countries in the world depend on ground water as a source for drinking water as well as agricultural purposes
- ❑ Literature reveals that ground water ,river water and pond water of many countries are contaminated with inorganic arsenic salts as AsO_3^{3-} and AsO_4^{3-} respectively thereby polluting natural water sources
- ❑ We are performing interaction of Sodium Arsenite($NaAsO_2$) with a drug containing pure D-Penicillamine ,a chelating agent with a view to

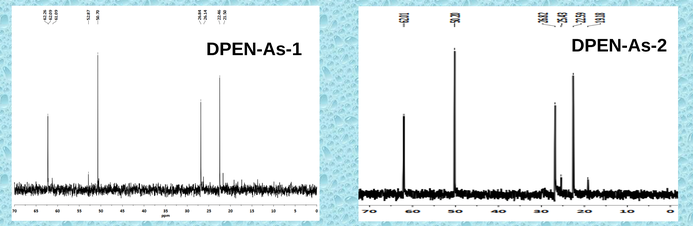
i) Control water pollution through arsenic salts in the laboratory scale and
ii) Find out the mode of binding of D-penicillamine having multiple attacking groups like –SH,-COOH and $–NH_2$ with sodium arsenite through solid state studies as D-Penicillamine is used as a secondary drug for arsenic poisoning



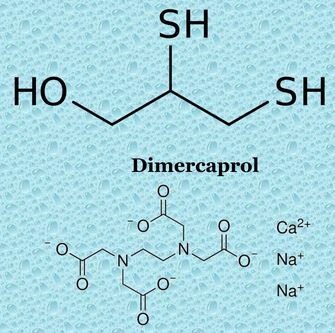
Synthetic scheme for the reaction



^{1}H FT-NMR spectra of DPEN and DPEN-As-1/2 complex in D_2O

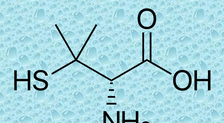


^{13}C FT-NMR spectra of DPEN and DPEN-As-1/2 complex in D_2O

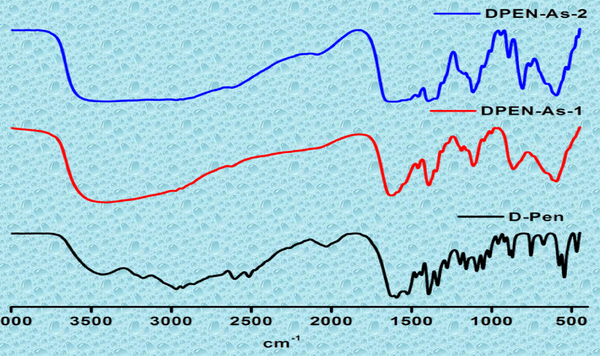


Dimercaprol

Calcium EDTA (Calcium Disodium Versenate)



D-Penicillamine
Therapeutic DRUG



FTIR Spectra is recorded in Perkin-Elmer Spetrophotometer using KBr pellet in the range of 4400 cm $^{-1}$ —400cm $^{-1}$

Important peaks:

DPEN

3400-3300 cm $^{-1}$ → $–NH_2$ bending
2950-2800 cm $^{-1}$ → $–NH_3^+$ stretching
2500 cm $^{-1}$ → –SH stretching
700-650 cm^{-1} → –C-S stretching
1650-1600 cm^{-1} → $–COO^{-1}$ stretching

DPEN-As-1/2

3500- 3400cm^{-1} → $–NH_2$ bending
1590-1550 cm^{-1} → $-COO^-$ stretching
NH_3^+ stretching vibration is absent in both 1:1 and 1:2 complexes
–SH stretching absent

- ❑ **Linking of Arsenic to sulphur (thiol) in both the complexes**
- ❑ **Complexes are formed through –SH, $-NH_2$ and -COOH linkage.**

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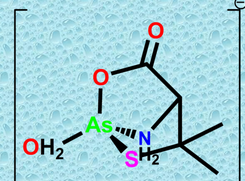

Probable basic structure of the complexes

Conclusion

- ❑ Identification of complex formed between Arsenic And D-Penicillamine
- ❑ Binding mode of the probable structure
- ❑ Mechanism of action of D-Penicillamine as an antidote against Arsenic poisoning

Further studies on this work are in progress in our laboratory

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