

## Application Note AN-V-219

# Sn(II) in radiopharmaceuticals

## Polarographic determination of stannous tin in sodium pertechnetate $^{99m}\text{Tc}$ injection kits

$^{99m}\text{Tc}$  radiopharmaceuticals are widely used in medical imaging diagnostic procedures. They can help to diagnose a large number of diseases affecting the bones and major organs of the body such as the heart, brain, liver, kidney, and thyroid.

$^{99m}\text{Tc}$  radiopharmaceuticals are usually prepared from so-called «cold kits». A cold kit consists of the ligand to which  $^{99m}\text{Tc}$  is complexed, a reducing agent, a buffer, stabilizers, and further ingredients. Sn(II) is a typical reducing agent. It reduces the Tc(VII) that is added to the cold kit

to a lower oxidation state which then forms the stable organic complex.

For quality control, the Sn(II) content has to be determined in the kit vial. Sn(II) can be selectively determined using differential pulse polarography. The freeze-dried content of the vial is dissolved in diluted nitric acid prior to determination.

Polarography is a straightforward, sensitive, selective, and interference-free method for the determination of mg/L levels of Sn(II) in radiopharmaceuticals.

## SAMPLE

Cold kit for preparation of sodium pertechnetate ( $^{99m}\text{Tc}$ ) injection.

## EXPERIMENTAL

After dissolving and diluting the sample with nitric acid supporting electrolyte, the polarographic determination of Sn(II) is carried out on the 884 Professional VA with the Multi-Mode Electrode pro as working electrode using the parameters listed in **Table 1**. The concentration of Sn(II) is determined by three additions of Sn(II) standard addition solution.

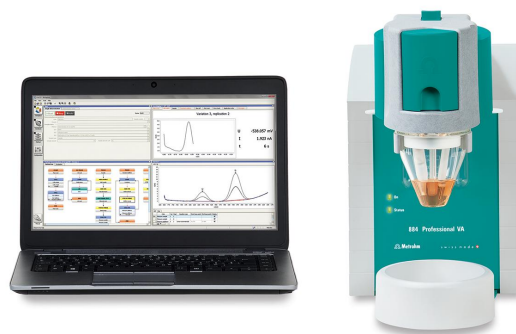


Figure 1. 884 Professional VA

Table 1. Parameters

Parameter	Setting
Working electrode	DME
Mode	DP – Differential Pulse
Start potential	-0.22 V
End potential	-0.66 V
Peak potential Sn(II)	-0.35 V

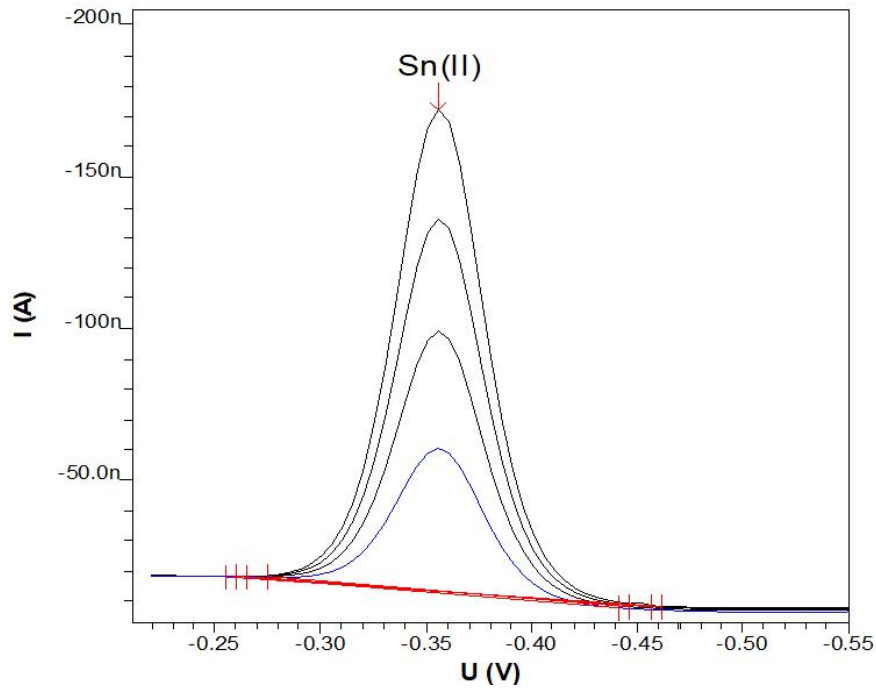
## ELECTRODES

- Working electrode: Multi-Mode Electrode pro with standard glass capillaries
- Reference electrode: Ag/AgCl/KCl (3 mol/L) reference electrode with electrolyte vessel. Bridge electrolyte: KCl (3 mol/L)
- Auxiliary electrode: Platinum rod electrode

## RESULTS

The determination of Sn(II) in cold kits for sodium pertechnetate ( $^{99m}\text{Tc}$ ) injection can be carried out in a simple and straightforward

manner. The method is selective and free of interferences. It is suitable for concentrations in the mg/L range.



**Figure 2.** Determination of Sn(II) in a  $^{99m}\text{Tc}$  injection preparation kit with 3 standard additions.

**Table 2.** Result

Sample	Concentration [mg/L]
$^{99m}\text{Tc}$ injection preparation kit	22.1

## REFERENCES

1. International Atomic Energy Agency, Technical Report No. 466 «Technetium- $^{99m}$  Radiopharmaceuticals: Manufacture of Kits», Vienna, 2008
2. Zolle, Ilse (Ed.), Technetium- $^{99m}$  Pharmaceuticals Preparation and Quality Control in Nuclear Medicine, Springer, 2007

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## CONFIGURATION



### (MME) 884 Professional VA manual

用于多模式 (MME) 的 884 Professional VA manual 是借助多模式 pro 或 scTRACE Gold 或液滴使用伏安法和法行高端痕量分析的入器。此已的瑞士万通技与高效位/恒位以及外接的活 viva 件用,在重金属定域中展了新的前景。有的校准器的恒位在每次量之前均自冲洗行校准,保可能的最高精度。

通此器也可使用旋行定,例如借助«循伏安溶出法»(CVS)、«循脉冲伏安溶出法»(CPVS)和位法(CP)定池中的有机添加。借助可更的量,可在使用不同的各用之快速切。

使用 viva 件行控制、数据采集和估。

用于 MME(多模式)的 884 Professional VA manual 供配大量附件,包括用于多模式 pro 的量。和 viva 可独。

### VA pro Professional VA

整套,用于和伏安定。包含多模式 pro、参比、助、量杯、拌器、解溶液和其它用于建工作台以及行多模式的附件。

