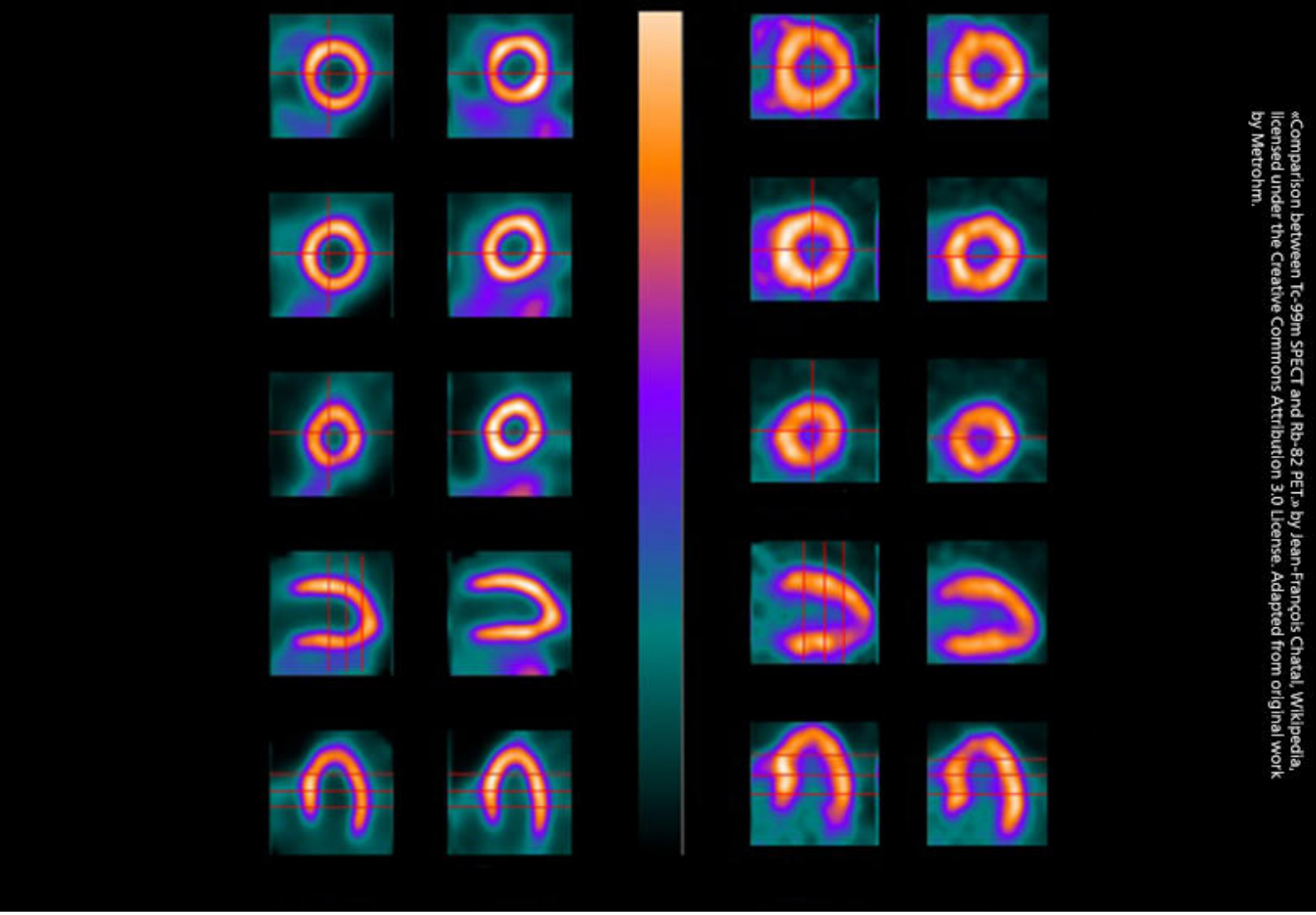

«Comparison between Tc-99m SPECT and Rb-82 PET.» by Jean-François Chatal, Wikipedia, licensed under the Creative Commons Attribution 3.0 License. Adapted from original work by Metrohm.

Application Note AN-V-219

Sn(II) in radiopharmaceuticals

Polarographic determination of stannous tin in sodium pertechnetate 99mTc injection kits

^{99m}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}Tc radiopharmaceuticals are usually prepared from so-called «cold kits». A cold kit consists of the ligand to which ^{99m}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}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}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.

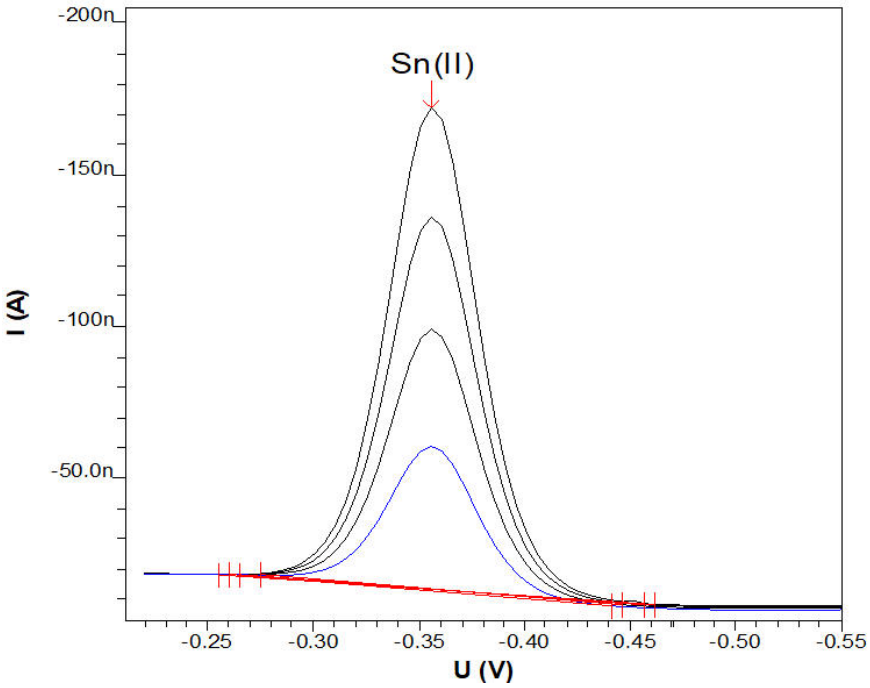

Figure 2. Determination of Sn(II) in a 99mTc injection preparation kit with 3 standard additions.

Table 2. Result

Sample	Concentration [mg/L]
^{99m}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

Internal reference: AW VA CH4-0566-082017

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CONFIGURATION

(MME) 884 Professional VA manual

用于多模式电极 (MME) 的 884 Professional VA manual 是借助多模式电极 pro 或 scTRACE Gold 或铋液滴电极使用伏安法和极谱法进行痕量分析的入门仪器。此项已经证实的瑞士万通电极技术与恒电位/恒电位仪以及外接的灵活 viva 软件联用,在重金属测定领域中展现了新的前景。带有经认证的校准器的恒电位仪在每次测量之前均自动冲洗进行校准,确保可能的高精度。

通过此仪器也可使用旋转圆盘电极进行测定,例如借助«循环伏安溶出法»(CVS)、«循环脉冲伏安溶出法»(CPVS)和计时电位法(CP)测定电镀池中的有机添加剂。借助可更换的测量头,可在使用不同电极的各种应用之间实现快速切换。

使用 viva 软件进行控制、数据采集和评估。

用于 MME(多模式电极)的 884 Professional VA manual 供货时配备大量附件,包括用于多模式电极 pro 的测量头。电极组和 viva 许可证则须单独订购。

VA pro Professional VA

整套电极组,用于极谱和伏安测定。包含多模式电极 pro、参比电极、铂辅助电极、量杯、搅拌器、电解质溶液和其它用于构建工作台以及运行多模式电极的附件。