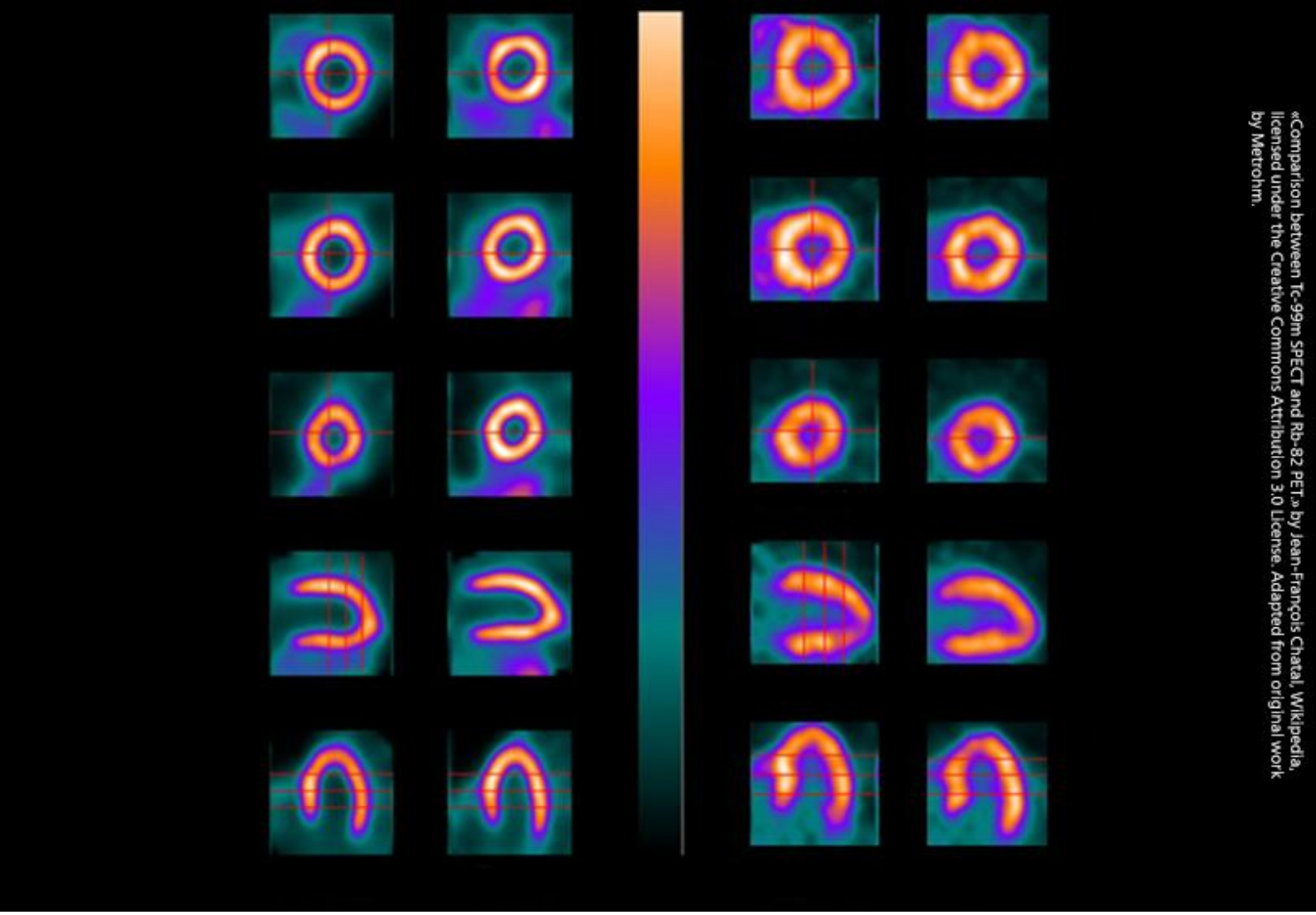

Application Note AN-V-219

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.

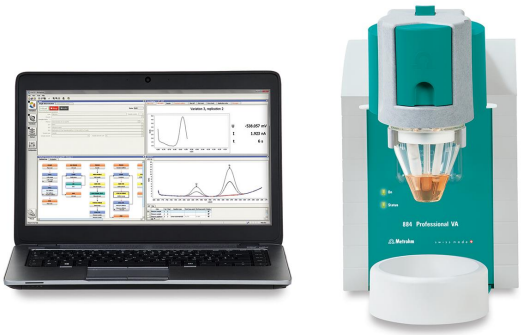

Figure 1. 884 Professional VA

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.

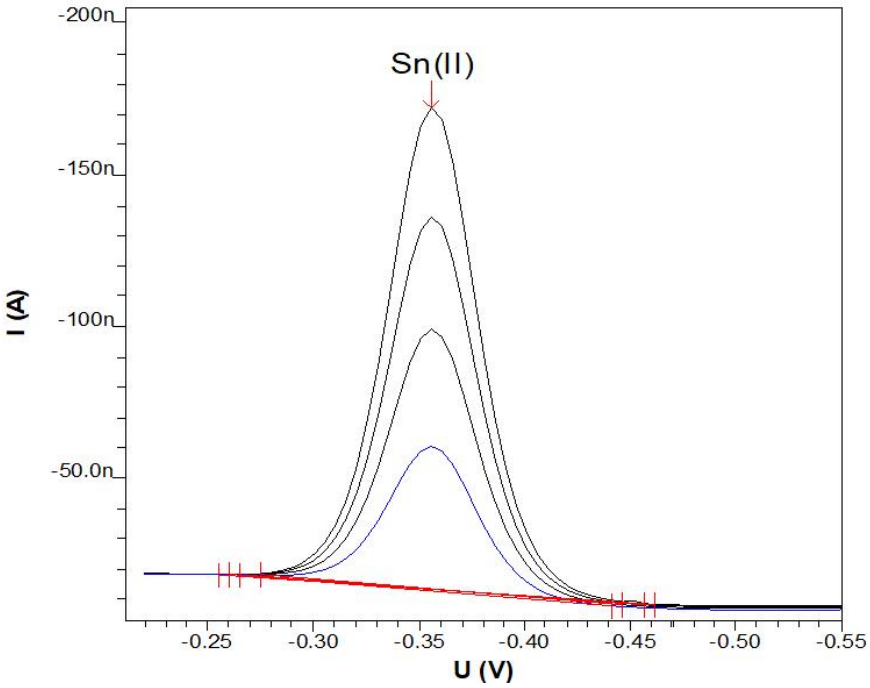

Figure 2. Determination of Sn(II) in a 99mTc injection preparation kit with 3 standard additions.

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

マルチモート電極 (MME) のための 884 Professional VA manual は、マルチモート電極 pro、scTRACE Gold または滴下ヒスマス電極を使用したホルタンメトリーおよびホーラロクラフィーによるハイエント微量分析へのエントリーレヘル装置てす。高性能のホテンショスタット/カルハノスタットと、非常に柔軟な viva ソフトウェアとのコンヒネーションにおける熟練した Metrohm の電極技術か重金属の測定に新たな展望を開きます。性能か認証されたキャリフレータの付いたホテンショスタットは、各測定前に自動的に新たに調整を行い、可能な限り高い精度を保証します。

この装置と組み合わせることて、例えはCVS (サイクリックホルタンメトリーストリッヒンク)、CPVS (サイクリックハルスホルタンメトリーストリッヒンク)、CP (クロノホテンショメトリー) による電気めっき浴内の有機添加物の測定なと、回転ティスク電極による測定を実施することも可能となります。交換可能な測定ヘットにより、異なる電極を持つ様々なアフリケーション間の迅速な交換か可能となります。

コントロール、テータ処理および評価のためにソフトウェア viva か必要となります。

884 Professional VA manual MME仕様は、多数の付属品およびマルチモート電極 pro のための測定ヘットを付属して納品されます。電極セットおよび viva ライセンスは別途こ注文ください。

VA electrode equipment with Multi-Mode Electrode pro for Professional VA instruments

Complete electrode set for polarographic and voltammetric determinations. Includes Multi-Mode Electrode pro, reference electrode, platinum auxiliary electrode, measuring vessel, stirrer, electrolyte solution and additional accessories for setting up and operating the Multi-Mode Electrode.