Application Note AN-V-179

Iron in boiler feed water

Straightforward, sensitive, and cost-efficient determination using adsorptive stripping voltammetry (DHN method)

The iron concentration in boiler feed water must be monitored to ensure reliable and safe operation of the water-steam circuit in thermal power plants. Iron ions, even in low concentrations, are an indicator for corrosion and therefore can signal potential safety issues. Various guidelines set limits for the maximum iron content in boiler feed water.

The concentration of total iron in boiler feed water can be determined with high sensitivity using adsorptive stripping voltammetry (AdSV) using 2,3-dihydroxynaphthalene (DHN) as complexing agent. Concentrations of total iron in water samples can be determined down to approximately 0.1 µg/L with this method.

The AdSV method is simple to perform, specific, and free of interferences. It is a viable, less sophisticated alternative to atomic absorption spectroscopy (AAS) or inductively coupled plasma (ICP) requiring only a moderate investment in hardware and low running costs.

SAMPLE

Boiler feed water

EXPERIMENTAL

The water sample, DHN solution, and the buffer solution are pipetted into the measuring vessel. The determination of total iron is carried out with an 884 Professional VA using the parameters specified in **Table 1**. The concentration is determined by two additions of an iron standard addition solution.

Figure 1. 884 Professional VA.

Table 1. Parameters for adsorptive stripping voltammetric (AdSV) analysis of Fe in boiler feed water

Parameter	Setting
Working electrode	HMDE
Mode	DP – Differential Pulse
Deposition potential	-0.1 V
Deposition time	30 s
Start potential	-0.2 V
End potential	-1.2 V
Peak potential Fe	-0.7 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 total iron in boiler feed water samples can be carried out in a simple and straightforward manner with adsorptive stripping voltammetry (AdSV).

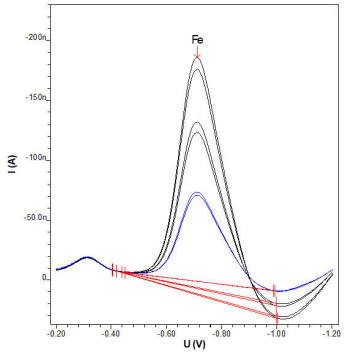

Figure 2. Determination of total Fe in boiler feed water.

Table 2. Results of total Fe determination with the 884 Professional VA

Sample	Total Fe [µg/L]
Boiler feed water	3.0

Internal reference: AW VA CH4-0513-072012

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CONFIGURATION

2 Dosino (MME) 884 Professional VA semiautomated

用于多模式电极 (MME) 的 884 Professional VA semiautomated 是一台操作方便的常规分析仪,可采用多模式电极 pro 或 scTRACE Gold 进行伏安测量和极谱法痕量测定。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。

两台随附的 800 Dosino 可在测定过程中自动添加辅助溶液,例如电解质、缓冲液或标准溶液。

使用 viva 软件进行控制、数据采集和评估。

用于多模式电极 (MME) 的 884 Professional VA semiautomated 供货时带有大量附件,以及用于多模式电极 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。