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Redox in Swimming-Pools



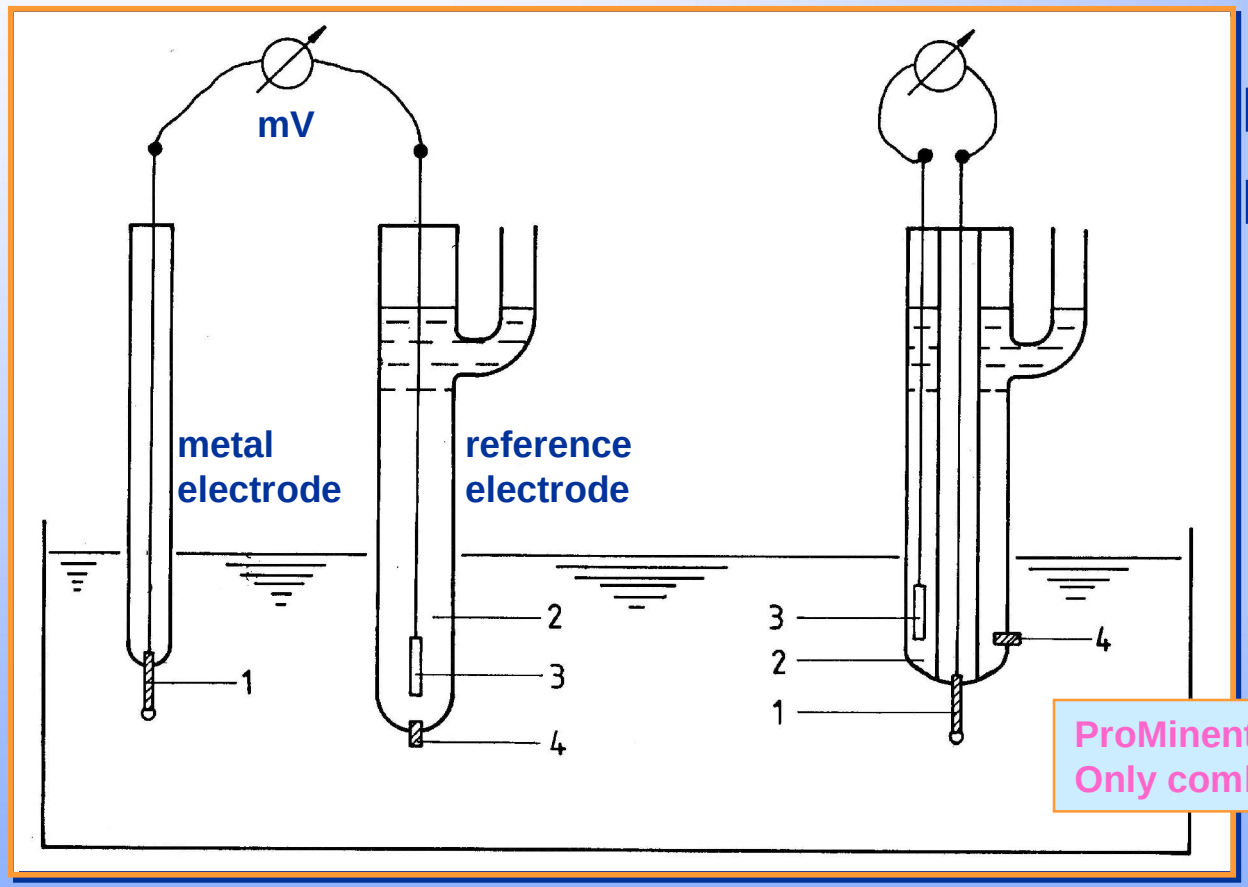


Dr. Walter Reineke

ProMinent® Dosiertechnik Heidelberg

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Redox Measurement



Design of a Redox Probe

- Ø 1 platinum electrode
- Ø 2 reference electrolyte
- Ø 3 reference electrode
- Ø 4 diaphragm

ProMinent:
Only combination probes!

Separate probe

Combination probe

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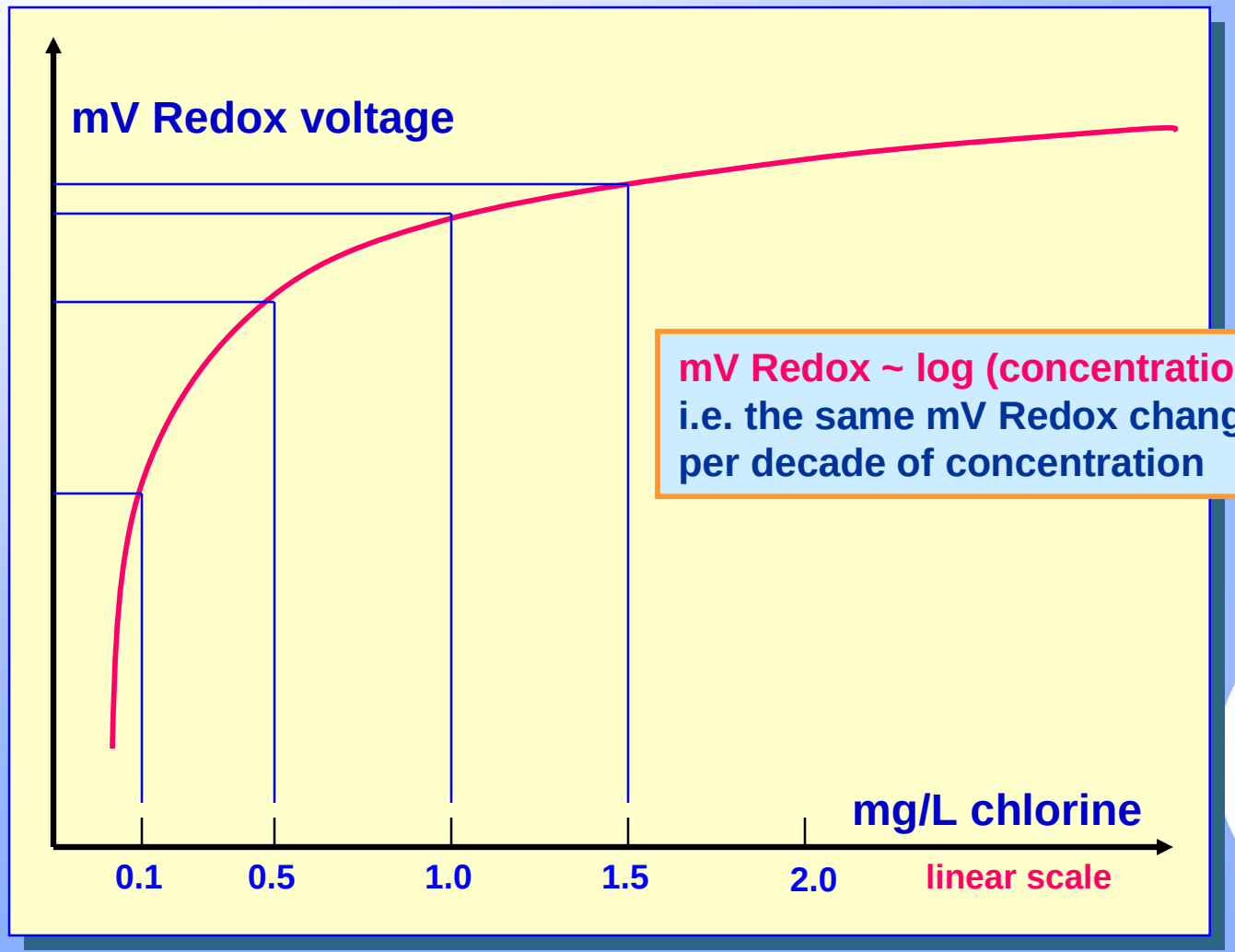
Measurement Redox voltage



- The level of the Redox voltage is a degree for the oxidizing or reducing power
- High Redox voltage = heavily oxidizing
- Oxidation = Disinfection
  - Ø the higher the Redox value, the heavier / faster the disinfection
  - Ø therefore min. 750 mV Redox in swimming-pools
    - ü then sufficiently fast disinfection
    - ü e.g. killing of 99.9% e-coli in approx. 10 seconds

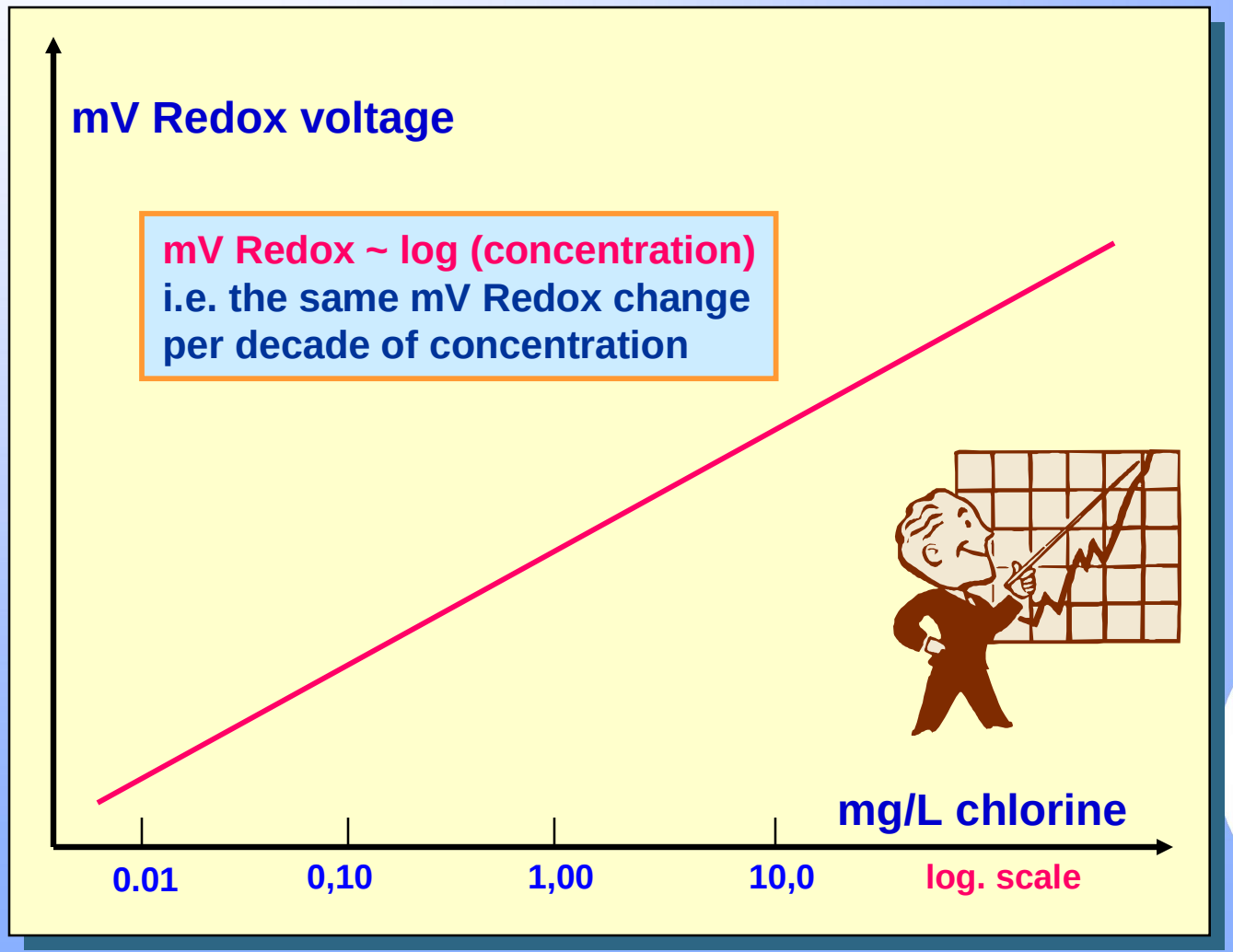
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Redox voltage and concentration



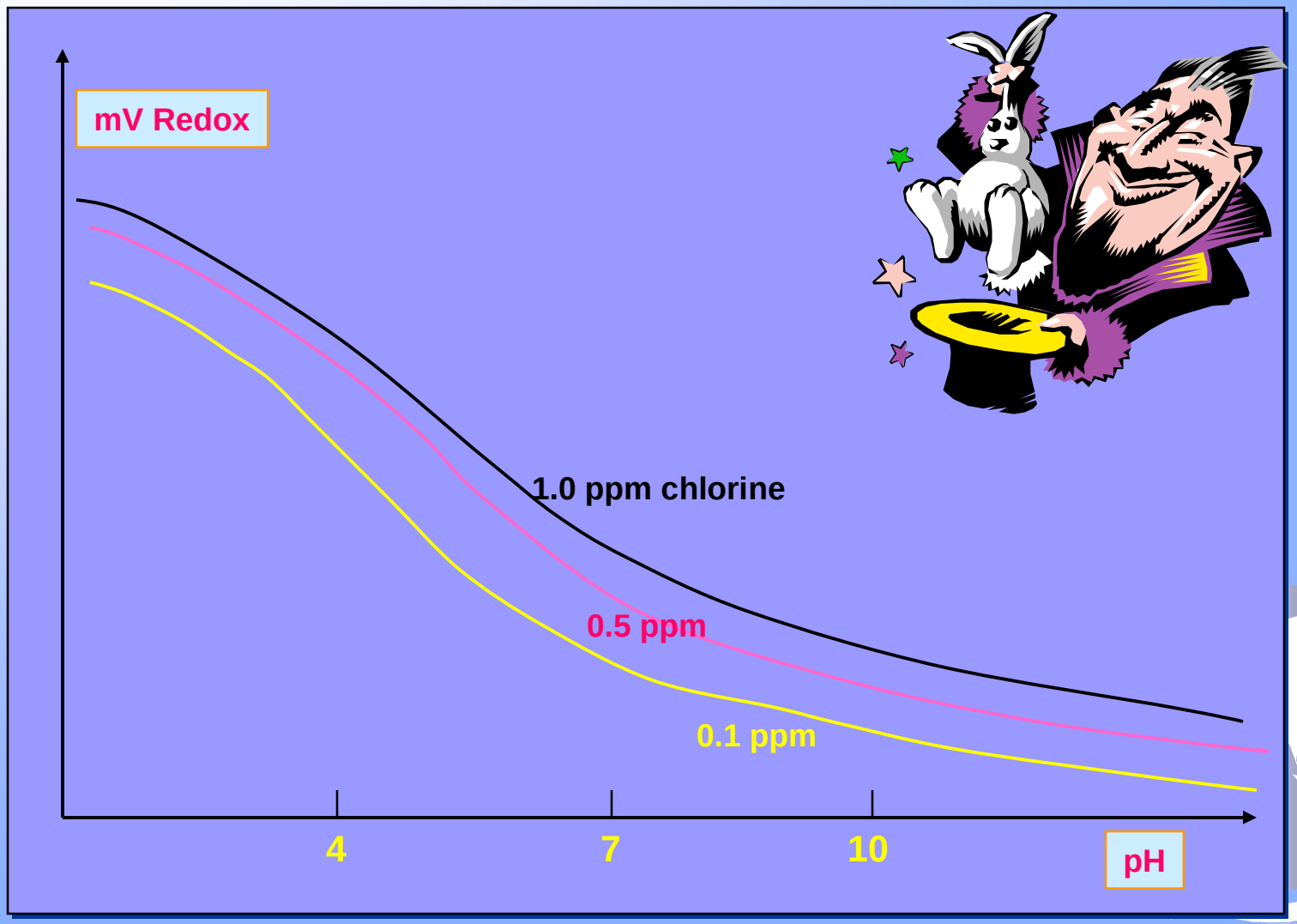
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Redox voltage and concentration



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Redox voltage and pH



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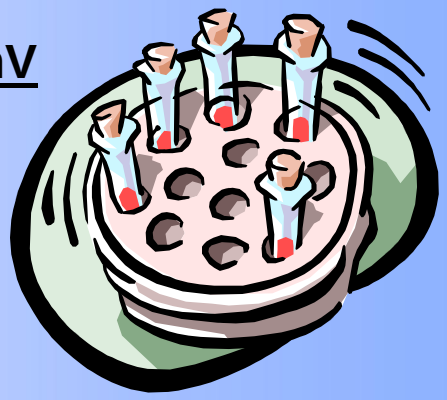
Measurement of Redox voltage

Possible measurement failures

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ØTemperature dependence of buffer solutions

	buffer 465 mV	buffer 220 mV
10°C	448 mV	245 mV
25°C	465 mV	220 mV
50°C	495 mV	178 mV



ØKCl - concentration of the reference

(measurement in 465 mV - buffer)

3 m KCl (normal conc.):	465 mV
1 m KCl (after leaking-out):	436 mV



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Cleaning of Redox probes

- **Platinum pin not mechanically – only polish**
  - Ø**Or by immersing in 465 mV buffer**
  - Ø**KCl-solution also acts activating**
- **Ceramic diaphragm also mechanically (as with pH)**
  - Ø**e.g. with key file, nail file, sand paper**
  - Ø**sometimes works wonders!**
  - Ø**sulfide (black) with thiourea/hydrochloric acid mixture**
  - Ø**inorg./org. deposits with acidic or alkaline cleaning agents, alcohol**



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Measurement in Redox buffers

- **Only one buffer should be used**
  - Ø **in swimming-pools only recommended with 465 mV**
  - Ø **if both buffers 220 and 465 mV are mixed in the porous diaphragm:**
    - ø **creation of a deep-blue dye**
    - ø **that flocculates**
    - ø **and cloggs the diaphragm**
    - ø **and blocks the measurement!**



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