Deacon's Challenge

No 168 - Answer

In order to evaluate the recovery of a renal tubular protein in an immunoassay, 500 µL of a normal urine containing the protein at 327 pg/mL was spiked with 50 µL of protein standard, 2000 pg/mL. The measured protein concentration in the mixture was 430 pg/mL. Calculate the recovery.

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$$\% \text{ recovery} = \frac{(\text{Measured protein in mixture} - \text{Protein in urine}) \times 100}{\text{Protein standard added}}$$

Correction must be made for dilution of the urine by added standard – and vice versa:

$$\text{Corrected protein from urine} = \frac{\text{Vol urine} \times \text{concentration urine}}{\text{Total volume (urine + standard)}}$$

$$\text{Total volume} = \text{Volume urine} + \text{Volume of standard} = 500 + 50 = 550\ \mu L$$

$$\text{Corrected protein from urine} = \frac{500 \times 327}{550} = 297\ \text{pg/mL}$$

$$\text{Corrected protein added} = \frac{\text{Vol standard} \times \text{concentration std}}{\text{Total volume (urine + standard)}}$$

$$= \frac{50 \times 2000}{550} = 182\ \text{pg/mL}$$

$$\% \text{ recovery} = \frac{(430 - 297) \times 100}{182}$$

$$= \frac{133 \times 100}{182}$$

$$= \mathbf{73\%} \quad \text{(to 2 sig figs)}$$

Question 169

A direct-reading ion-selective electrode is calibrated at sodium values of 120 mmol/L and 165 mmol/L. Both calibrants contain 70 g/L of protein and also give sodium readings of 120 mmol/L and 165 mmol/L when analysed by flame photometry. Stating any assumptions you make, what sodium concentration would you expect to obtain by flame photometry for a plasma sample from a myeloma patient (containing 120 g/L of protein) which gives a sodium concentration of 120 mmol/L using the ion-selective electrode?