SESSION 3: MATRIX-DEPENDENT BEHAVIOR

Exercise 1.

Two different water sources where sampled one time each, in order to determine the concentration of a pollutant. The samples are measured by a commercial SPR. The molecules of pollutants are captured on the surface of the sensor chip of the SPR by ligand molecules. The measurement of *Sample 1* (water source 1) is represented in blue in Figure 1, while *Sample 2* (water source 2) is represented in blue in Figure 2.

In gray are depicted the reference (background) measurements and in the red the signals resulting from the measurement of the standard additions, i.e. separate additions of several different concentration (10, 20, 30, 40, 50 µg/mL) of the pollutant to separate aliquots of the test solution (the final concentrations obtained are the unknown concentration from the sample + the added concentration).

1.a Based on the measurements shown, depict on a single graph the results from the two figures (x: concentration; y: biosensor response) and determine the unknown concentrations in the two water samples.

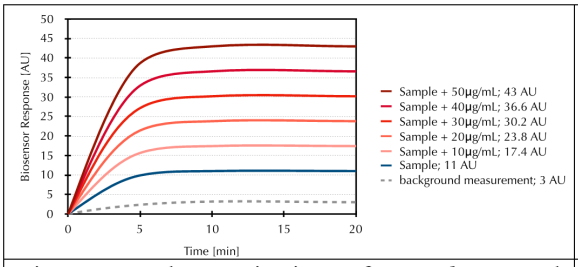


Figure 1. Characterization of *sample 1* and additions

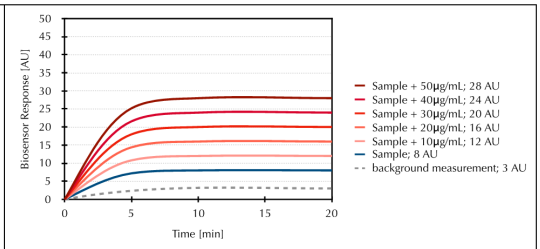


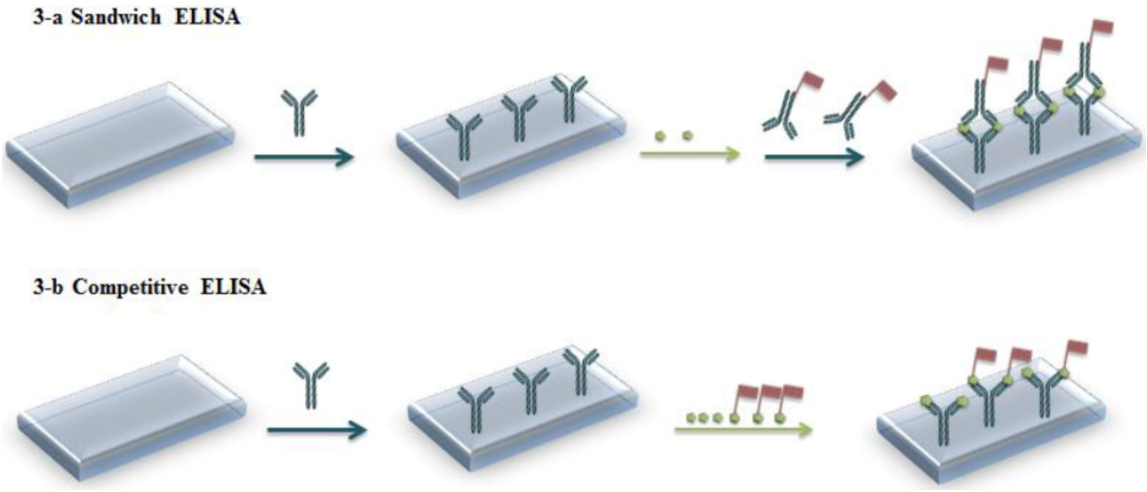
Figure 2. Characterization of *sample 2* and additions

1.b Compare the two concentrations and state which water source is more polluted. What can you say about these results in relation to the initial sample measurement? Were the additional measurements that were done, necessary? If yes, explain why.

1.c Comment on possible sources of matrix effects. How could you eliminate this effect?

Exercise 2.

2.a In many currently-used immunoassays, the so-called competitive-format is used. In the figure below, you can see two different approaches of immunoassay. Describe how these methods work and draw the calibration curves for each assay. Are the calibration curves linear or not? Please, explain.



2.b What are advantages of the competitive assay? Do you think it is less or more sensitive to matrix effects, explain.