Sunset Yellow FCF – substance in Irn-Bru. Few experiments that can be done...

1. Determination of Sunset Yellow FCF in Irn-Bru
    a. Construction of calibration standards and sample. Run sample and read off calibration standards. Group statistics can also be performed via pi webapp.

2. Glassware and pipetting skills
    a. Use of analytical grade glassware and glass pipettes. Making up multiple samples of Sunset Yellow and calculating RSDs via lego spec to determine the most accurate/precise glassware. Perhaps a glass pipetting competition?

3. Microbial broth assay
    a. Students can analyse pre-prepared samples containing known amounts of bacteria (building calibration line). Then perhaps we can analyse pre-treated bacterial samples (different antibiotics) and assess which is the most effective for which bacterial class. Can teach about gram-neg, gram-pos, and antibiotic conc/treatment history.

4. Enzyme kinetics of alkaline phosphatases
    a. Monitoring the conversion of para-Nitrophenylphosphate (pNPP) to para-nitrophenol (pNP). Can calculate enzyme kinetics, vmax, km, at different concentrations and temperatures. Other enzymes possible depending on lego sensitivity to response.

5. Determination of protein content in xxx (possibly milk, meth dev needed)
    a. Construction of a standard line using bovine serum albumin, and staining using coomassie brilliant blue dye (or equivalent), reading absorbance for each sample. Then estimating protein content in common foodstuff using similar assay.

6. Determination of potassium permanganate amount/concentration in tablet
    a. Construction of standard line of potassium permanganate, reading off response for each sample. Crushing of potassium permanganate tablets and extraction using water or organic solvent (availability depending on student level), filter and analyse. Can back-calculate amount or concentration in tablet.

7. Extraction of compounds from water using organic solvents
    a. Dependant on student level. Compounds in different pH environments in water (altering compound charge state), extracted in different amounts into organic solvent depending on charge state and preference for water/organic layer. What compounds are extracted/not extracted can be related back to charge state and preference for various layers.

8. Micro-HPLC
    a. Separation of simple component mixtures on SPE cartridge, visualised by lego spectrophotometer.
9. Vitamin C determination in tablets

    a. Use of folin-phenol reagent (not much experience with it, doesn't seem the friendliest – any alternatives?) to build standard line of vitamin C. Crush tablets in water, filter, analyse, back calculate etc.

10. Calculation of magnesium concentration in xxx (water, tablets, etc?)
    a. Use of Titan Yellow dye to build standard line… etc.

11. Cell toxicity testing –MTS assay
    a. Pre-prepared cell samples stained and visualised using MTS assay. Can highlight toxicity of various compounds and will also allow for group statistics and cell growth curves.

<u>Key points</u>

Assays must be in the visible light range, or use a reagent to bring the analyte into the visible range.

Enzyme kinetics can be studied but suitable regents must be identified (cheap and safe).

Ability to pre-prepare samples for analysis is possible if it aids a discussion point (toxicity testing of cells, bacteria).