What can we learn from the field of analytical chemistry?

- Sample Collection
- Sample Preparation
- Sample Analysis
- Data Reporting
What can we learn from the field of analytical chemistry?

**Sample Collection**
- Clean surfaces & containers
- Field blanks
- Keep samples covered to mitigate contamination

**Sample Preparation**
- Clean laboratory practices
- Laboratory blanks
- Reduction of plastic supplies, clothing, etc. used

**Sample Analysis**
- Chemical Identification of Material

**Data Reporting**
- Calibration standards & recovery reporting
- LOD/LOQ reporting (when applicable)
- Blank subtraction

Rochman et al., 2019 *ET&C*
Best Practices /Sound QA/QC

• Clean Techniques
• Training protocols
• Blanks & Blank Subtraction
• Spike recoveries
• Chemical analysis of particles
• Transparent and harmonized reporting
Clean Techniques

• **Avoid Dust by** –
  • Wiping benchtop regularly and mopping
  • Work in a clean cabinet
  • Get a HEPA filter
  • Cover samples whenever possible

• **Avoid procedural contamination with** –
  • Cotton lab coats
  • Brightly colored jumpsuits 😊
  • Clean tools in water between use
  • Use glass or non-plastic materials where possible

Be aware of and catalogue the type of contamination you might see in your samples – filter pieces, fibers from lab coats, hair, kim wipe fibers, rope from the boat or net, etc ...
Training protocols to standardize your lab

• Have a lab training protocol. For example:
  • Small sample volume on petri dish at a time
  • Use both white and black background
  • Use touch and feel in addition to visual

• Consider people bias – something to think about, consider, account for (better to have one person on a study if possible; two people count for some samples)
Test the recovery of the method in your laboratory

- Similar to a matrix spike in analytical chemistry
- To test efficacy of methods.
- Do this by number of particles
- Use different polymers types, shapes, sizes...

Grbic et al., 2019 *ES&T Letters*
Include field and laboratory blanks

- To account for procedural contamination
- Make sure you sample enough volume to be 3x above the amount in your blank.
- Should mimic how you sample and process the sample
- Blank subtraction -
  - By color and category
Test your extraction efficiency with chemical analysis

• Helps control any over- or under-estimation.

• Is a descriptor for how well you picked plastics versus other materials.

• Also provides an idea of the type of materials in your sample.
Best practices for reporting

• Include a section for QA/QC
  • Describe clean techniques
  • Blanks and subtraction
  • Recovery of method used, correct?
  • Report your LOD/LOQ
  • Provide subsampling strategy for chemical ID

• When you show your raw data, report:
  • Particle size (or size range)
  • Colour
  • Morphology (i.e., shape category)
  • Material type (based on subsampling strategy)

• Give plastic concentrations in # of particles per unit volume (or organism)

• Share ALL your data for synthesis studies.
Thank you!