

DRAFT: Key Process Skills for Analytical Chemistry

Information Processing

- Observing/recognizing
 - Trends in data
- Listening
- Estimating
- Translating
 - Making sense of a published procedure
- Predicting
 - Trends in data
 - Magnitude of results or answers
- Categorizing
 - Types or sources of error
- Systematizing
 - Data Collection
- Reading
 - Interpreting written information
- Brainstorming
 - Experimental Design
- Reviewing
 - Validity of Experimental Design
- Interpreting
 - Interpreting graphs
 - Interpreting “schematic diagrams” of instruments

Problem Solving

- Identifying the problem
- Identifying key issues
- Identifying assumptions
- Defining knowns
- Defining unknowns
- Applying prior knowledge
 - Standard laboratory tools
 - Standard analytical practices
- Integrating solutions
 - Handling complex analyte processing calculations
- Understanding the context
- Ensuring solution robustness
 - QA/QC analytical validation, representativeness
- Generalizing problem solutions

Teamwork

- Respecting
- Forming shared understanding
- Taking risks

- Managing dissonance
 - How to express disagreement constructively
- Asking for help
- Commitment to a group
 - Shows responsibility for group concept, development
- Compromising
- Collaborating
- Cooperating
- Group decision making
- Building consensus
- Sharing ideas
- Including all group members

Assessment

- Building self-esteem
- Evaluating performance
 - Judging own progress in learning (i.e. Concepts, techniques and skills)
- Validating
- Accepting peer review

Critical Thinking

- Transferring
 - Applying concepts to new situations
- Generalizing
 - Move from specifics to generalizations
- Contextualizing
- Visualizing
 - Building a model
 - Instrument design
- Building analogies
- Simplifying
- Inferring
- Identifying consequences
 - Reviewing experimental design
- Identifying similarities/differences
 - Describing details of instruments
- Making assumptions
 - Sampling and Matrix Considerations
- Combining
- Summarizing
 - Reporting results sensibly
- Making connections
 - Describing the shape and relationships in a graph
- Recognizing contradictions
 - Deciding when data is “good” or “bad”
 - Deciding when an answer is sensible

- Integrating prior knowledge
 - Ability to do sensible error analysis
 - Choose appropriate instrumentation and analysis
- Inquiring/questioning
- Challenging assumptions
- Drawing conclusions

Communication

- Articulating an idea
 - Express concepts, definitions, and explanations in grammatically correct sentences
 - Verbally express ideas to group members during activity
- Defining purpose
- Rephrasing
 - Develop concept in own words
- Writing with technical detail
 - Express concepts, definitions, results and explanations using scientifically correct language

Management

- Managing time
- Setting priorities
 - Goal setting
- Planning action
 - Directing group progress
- Implementing
- Utilizing resources effectively
 - Distributing people and material resources