ANPERA

Chemical Monitoring. Digitised.

CoMic™

Field & Spike Kits Instruction Manual

Contents

Regulatory Information

All substances contained within this kit present a low risk to the user, and to the environment, as long as the supplied instructions are followed. Please refer to the following pages for detailed user instructions, and to the MSDS for disposal instructions.

Used CoMic™ kits should not be returned to Anpera Technologies.

Should you require any technical assistance or have any questions about this kit, please contact Anpera Technologies, makers of CoMic™, at support@anpera.io or on +44 (0)131 564 3020.

For United States of America users only

This kit may only be used for the scientific analysis of corrosion inhibitors, as defined in the TSCA for R&D use.

See http://www.epa.gov/oppt/newchems/pubs/randdexemp.htm for further details.

1. Components

1.1 Consumable Kit Contents

	Name	Quantity	Storage
Chemical Reagents	Vial 1	5	18-25 °C
	Vial 2	5	18-25 °C
	Vial 3	5	18-25 °C
	Spike 1	5	18-25 °C
	Spike 2	5	18-25 °C
	Spike 3	5	18-25 °C
	QC Standard	1	18-25 °C
Consumables	PMMA cuvettes	32	N/A
	Black box	1	N/A
	10 mL air displacement pipette tips	5	N/A

Table 1 - Field and Spike Kit contents

1.2 Kit Box Layout

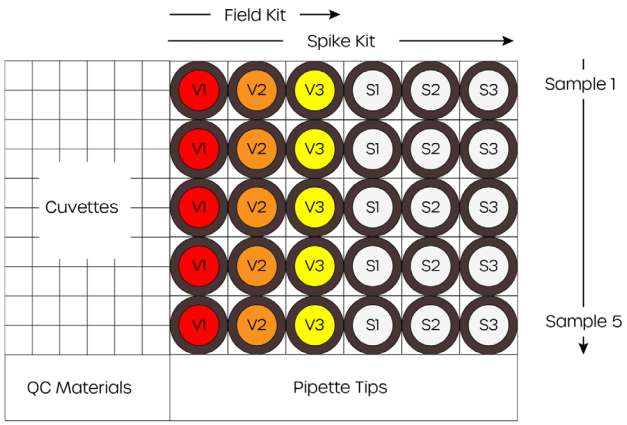


Figure 1 - Field and Spike Kit box layout

1.3 Required Hardware

The following components are required to run field and spike experiments and are not included with the kit purchase.

- Portable Analyser R352-01
- Centrifuge
- 10 mL air displacement pipette
- HDPE containers for bulk sampling
- 1000 µL positive displacement pipette (spike kits)
- 100 mL volumetric flask (spike kits)
- Deionised water (spike kits)
- Test corrosion inhibitor (spike kits)

2. General Notes

2.1 Portable Analyser

Field and Spike Kits are designed to be used in combination with the Portable Analyser R352-01.

Software is installed on the instrument to guide users through the process of setting up experiments and processing the raw data gained. See the instruction manual (INS031) for details.

2.2 Pre Field Deployment

Before deploying CoMic kits in field, it is strongly recommended that the chemical being measured is tested using concentration series kits (INS033). This process will confirm that the chemical is micelle forming and can therefore be measured by CoMic. It will also provide an estimate of the expected critical micelle concentration (CMC).

Failing to carry out this due diligence could lead to testing providing results of little or no value.

2.3 Sample Collection

The material of the vessel used to collect samples from production lines is key to minimising the loss of surfactant chemicals to the vessel walls. We recommend the use of high-density polyethylene (HDPE) when taking samples for CoMic tests, alternatively borosilicate glass can be used instead.

Samples taken from production lines are exposed to lower partial pressures and increased dissolved oxygen content upon collection, this leads to rapidly changed water chemistry and possible precipitation of insoluble materials. it is recommended that samples are tested with CoMic within two hours of collection. Accuracy outside of this timeframe cannot be guaranteed.

2.4 Using Field Kits

Field kits are used to determine the micelle population of a sample taken directly from a production or midstream sample point.

The Field Kit is composed of three individual vials, designed to provide a negative control, positive control and measurement reading. These are marked in the reagent vials as Vials 1, 2 and 3 (See Section 4).

Once mixed with CoMic reagents, all measurements should be carried out within 15 minutes.

2.5 Using Spike Kit

Spike kits are used in situations where the field kit shows no micelle signal, indicated by a micelle index of zero.

In these cases, the user can add supplemental chemical to the sample to determine how far below the CMC the sample is. Spike kits require the user to run Vials 1, 2 & 3 to provide a new baseline reading, followed by adding chemical in increasing concentration to the vials marked Spike 1, Spike 2 & Spike 3. (See Section 5).

Spike concentrations are at the discretion of the user, the downloadable spreadsheet (Section 2.6) allows for rapid calculation of the volumes of stock solution required for the chosen spike concentrations.

2.6 Concentration Calculator

A download of a concentration calculator for the Spike Series is available through the link below, Microsoft Excel is required.

https://www.anpera.io/wp-content/uploads/2020/08/Conc-series-calculator.xlsx

1. Click the tab labelled Spike Kit.
2. Fill in the stock concentration prepared for the experiment in ppm, marked in red.
3. Fill in the required spiking concentrations for the experiment, marked in red.
4. Inject the calculated Stock CI volumes to the samples using a suitably sized positive displacement pipette and tip.

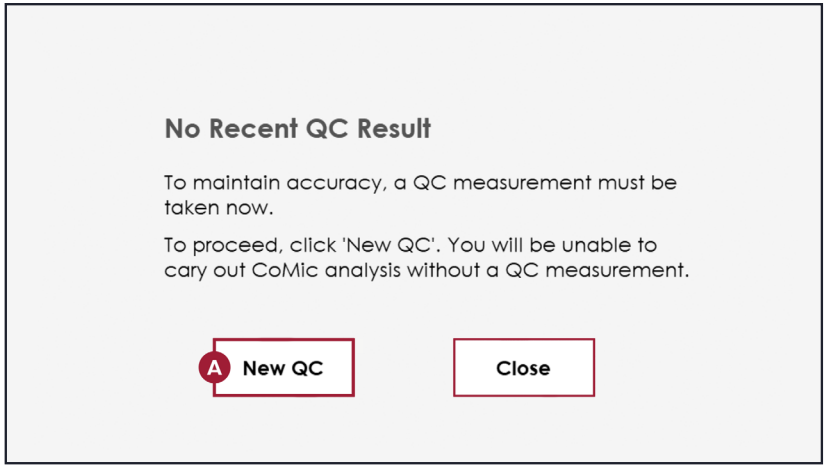


Figure 2 - QC prompt

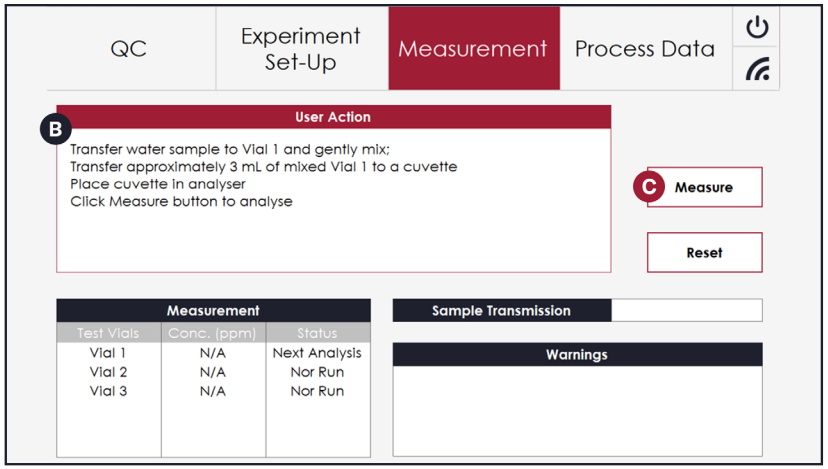


Figure 3 - QC measurement tab

3. Instrument QC

3.1 QC Procedure

The Portable Analyser (R352-01) requires a QC reading to be taken at least once a day before sample measurement. Full instructions on operating the Analyser are included in a separate document (INS031).

The following provides guidance on quickly running a QC procedure, if required.

1. Switch on the instrument and allow to boot to the CoMic Analysis software.
2. If no QC has been recorded for the calendar day, a prompt (Figure 2), click the Run QC button (**A**). If a QC has been recorded already the prompt will not appear and the user can proceed directly to the Experiment Set-Up tab to begin sample analysis.
3. Prepare a cuvette with 3 mL of deionised water and a second with 3 mL of the provided QC standard.
4. In the Measurement Tab (Figure 3), follow the instructions in the User Action element (**B**), insert the deionised water cuvette, close the shutter and press the Measure button (**C**).
5. When complete, the User Action element will update. Insert the QC Standard cuvette, close the shutter and press the Measure button.
6. A message will provide the QC reading measured and prompt the user to Review QC Data or Measure Samples, select the preferred option.

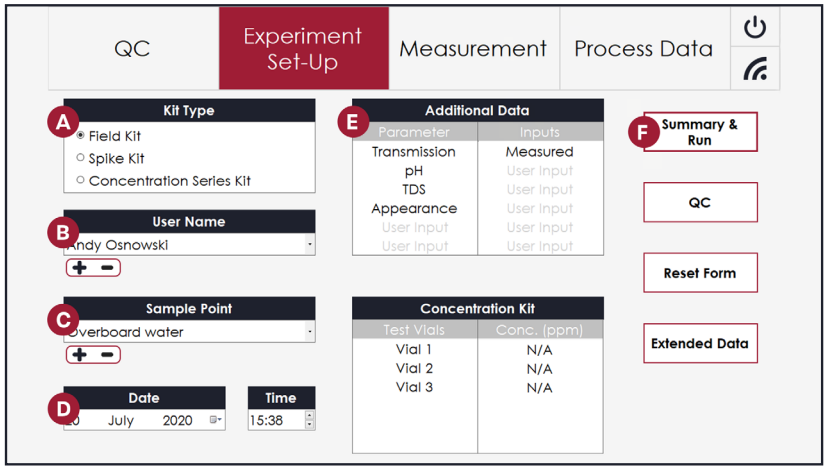


Figure 4 - Field Kit experiment set-up

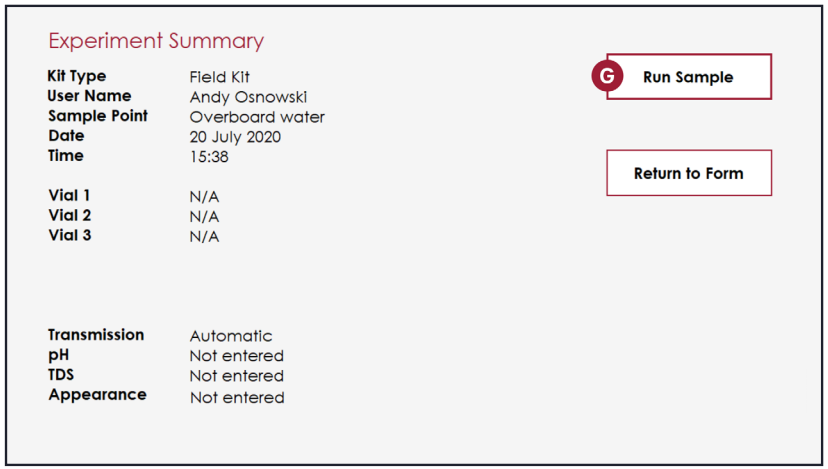


Figure 5 - Field Kit experiment set-up

Figure 6 - Field Kit and required direction of testing

4. Field Kits

4.1 Sample Quality

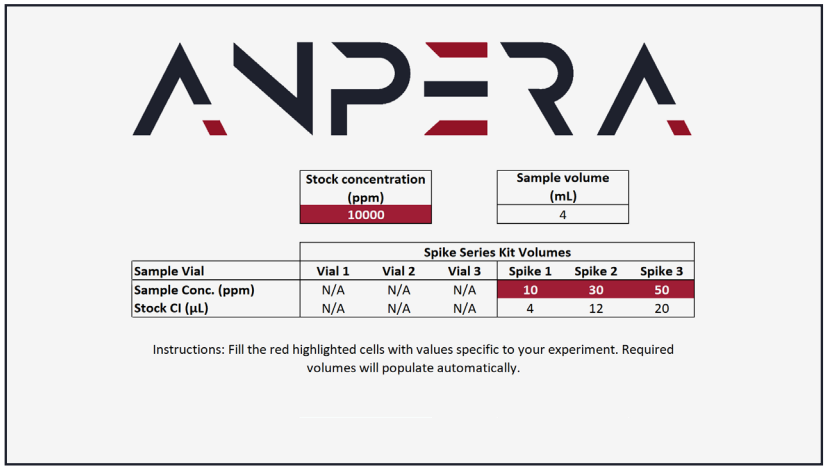
CoMic is an optical technique that relies on the passage of light through the sample, it is therefore important the liquid is as clear as possible prior to analysis. Each kit box includes a label indicating acceptable sample qualities.

Samples which are heavily opaque should be clarified before use, preferably by centrifugation. Demulsifier may be used but should be tested with CoMic prior to use to ensure that the demulsifier alone is not micelle forming.

4.2 Analyser and Field Kits

For full instructions on setting up the Portable Analyser, see INS031.

1. Select the Experiment Set-Up tab and click the radio button for Field Kit (Figure 4, **A**).
2. Fill in details for user name (**B**), sample point name (**C**), sample date and time (**D**).
3. Optional: Complete the pH, TDS and appearance boxes in the Additional Data element (**E**), if required.
4. Click Summary & Run button (Figure 4, **F**) and then the Run Sample button (Figure 3, **G**).
5. Using a 10 mL pipette and clean tip, add 4 mL of the collected sample water to Vial 1, Vial 2 and Vial 3 (Figure 6).
6. Firmly seal the vials and invert gently (× 10) to mix the reagents. To avoid foaming, do not shake.
7. Follow the on-screen instructions, carefully transferring ~3 mL of each vial to separate cuvettes for analysis. Vials are run in ascending numerical order.
8. All vials must be run within 15 minutes of mixing.
9. Repeat steps 1 to 8 for each new sample, using fresh vials sets and pipette tips.
10. Once complete, refer to INS031 on processing the raw data.



Stock concentration (ppm)	Sample volume (mL)
10000	4

	Spike Series Kit Volumes					
Sample Vial	Vial 1	Vial 2	Vial 3	Spike 1	Spike 2	Spike 3
Sample Conc. (ppm)	N/A	N/A	N/A	10	30	50
Stock Cl (µL)	N/A	N/A	N/A	4	12	20

Instructions: Fill the red highlighted cells with values specific to your experiment. Required volumes will populate automatically.

Figure 7 - Spike kit spreadsheet

5. Spike Kits

5.1 Sample Quality

Sample quality criteria are as described in Section 4.1.

5.2 Spiking Stock Solution Preparation

Stock solutions should be prepared prior to field deployment. The solutions should be made to 10,000 ppm (1%) corrosion inhibitor to solvent.

Note: in cases where the inhibitor is insoluble in brine or deionised water, a 1% stock in methanol or ethanol may be used instead.

1. Add around 80 mL of prepared brine solution to a clean 100 mL volumetric flask.
2. Using a suitable positive displacement pipette, collect 1000 µL of neat corrosion inhibitor ensuring there are no air bubbles in the pipette tip.
3. Wipe the pipette tip to remove excess chemical from the exterior.
4. Inject the corrosion inhibitor into the brine in the volumetric flask and seal the flask.
5. Gently invert the flask to homogenise the solution and minimise foaming.
6. Unseal the flask and carefully add further brine until the meniscus reaches the gradated mark on the flask neck.
7. Reseal the flask and gently invert to homogenise the solution and minimise foaming.
8. Store the stock solution at approximately 21 °C for up to one week in an amber glass or HDPE vial.

5.3 Spike Series Creation

Spikes are carried out by directly injecting the prepared stock solution into the vials marked Spike 1, Spike 2 and Spike 3 in order of ascending concentration. While spike ranges are at the user's discretion, we would recommend Spike 1 (0.5 × CMC), Spike 2 (CMC) and Spike 3 (1.5 × CMC).

1. Calculate the volume of stock inhibitor solution required for the spiking vials (linked spreadsheet).
2. Transfer 4 mL of the sample water to each of the six vials, Vials 1-3 and Spikes 1-3.

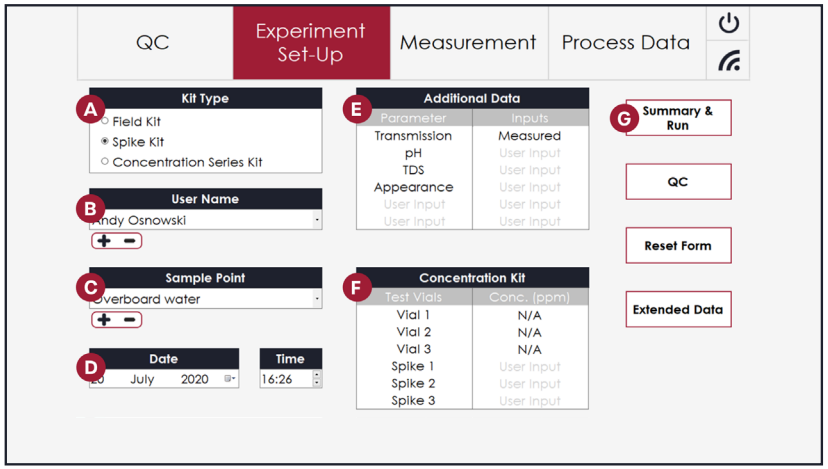


Figure 8 - Spike Kit experiment set-up

Figure 9 - Spike Kit and required direction of testing

3. Using a suitable positive displacement pipette and tip, inject the required volumes of stock solution (as calculated with spreadsheet) to the Spike 1, Spike 2 and Spike 3 vials.

4. Firmly seal Vials 1-3 and Spike 1-3 and invert gently (× 10) to mix the reagents. To avoid foaming, do not shake.

5. Analyses are run sequentially from Vial 1 to Vial 3, and then from Spike 1 to Spike 3.

6. All vials must be run within 15 minutes of mixing.

5.4 Analyser and Spike Kits

For full instructions on setting up the Portable Analyser, see INS031.

1. Select the Experiment Set-Up tab and click the radio button for Spike Kit (Figure 8, **A**).

2. Fill in details for user name (Figure 8, **B**)., sample point name (**C**), sample date and time (**D**).

3. Optional: Complete the pH, TDS and appearance boxes in the Additional Data element (**E**), if required.

4. In the Concentration Kit element (**F**), fill in the spiked concentrations in the Conc. (ppm) column.

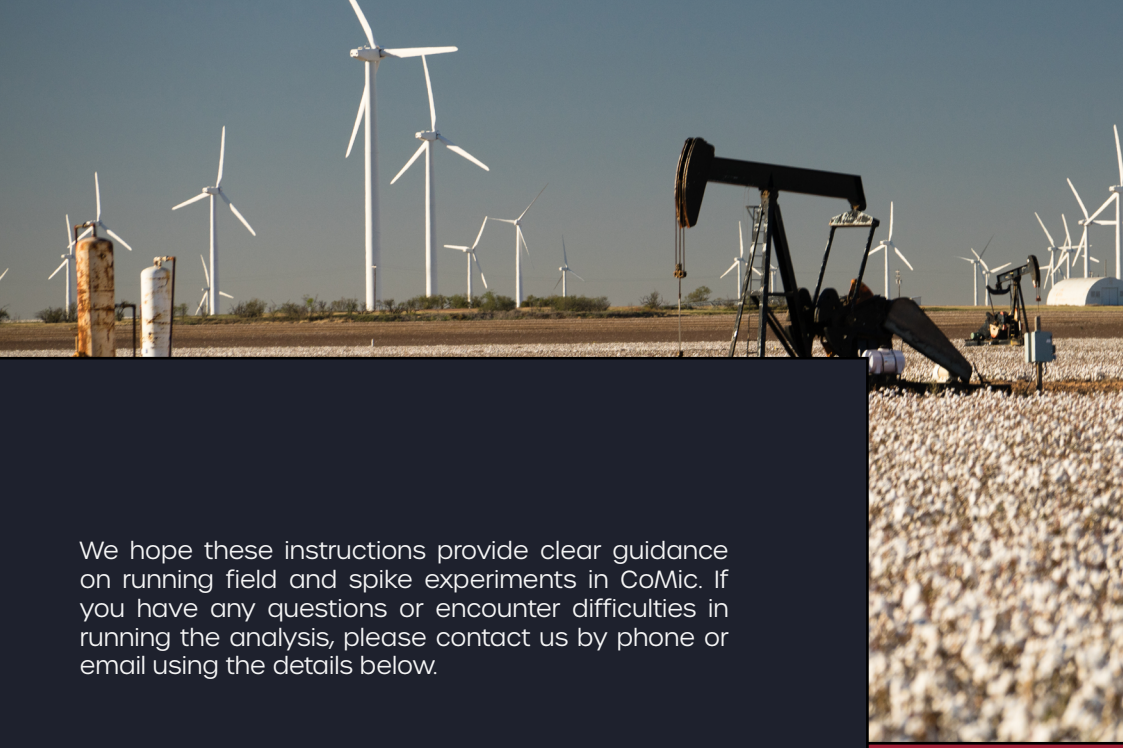
5. Click Summary & Run button and then the Run Sample button on the review screen.

6. Follow the on-screen instructions, carefully transferring ~3 mL of each vial to a provided cuvette before analysis.

7. Follow the on-screen instructions, carefully transferring ~3 mL of each vial to a provided cuvette before analysis. Vials are run in the order of Vial 1, Vial 2, Vial 3, followed by Spike 1, Spike 2 and Spike 3 (Figure 9).

8. Repeat the steps in section 4.3 and 4.4 for each new sample, using fresh vials sets and pipette tips.

9. Once complete, refer to INS031 on processing the raw data.



We hope these instructions provide clear guidance on running field and spike experiments in CoMic. If you have any questions or encounter difficulties in running the analysis, please contact us by phone or email using the details below.

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support@anpera.io