

QAM-I-119

# Operation and Calibration of the Fluorometer

Revision 1

Approval:

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Laboratory Manager

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Date

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**1. Applicability**

This procedure applies to the operation and calibration of the Turner Designs 10-AU Fluorometer located in the chemistry laboratory of the Texas Institute for Applied Environmental Research (TIAER), Tarleton State University, Stephenville, TX. This procedure shall be performed prior to any analysis using the fluorometer.

**2. Purpose**

The purpose of this procedure is to provide a method for operation and calibration of the Turner Designs 10-AU Fluorometer. By utilizing appropriate chemistry SOPs to perform the standard calibration for each set of samples, the analyst eradicates anomalies due to reagent mixture variations, sample preparation variations, and instrument sensitivity fluctuations. The operation of the instrument allows the analyst to determine the concentration of various chemical species which are dissolved in water samples or extracts analyzed by the TIAER chemistry laboratory.

**3. Definitions**

3.1. Standard QA/QC definitions are found in QAM-Q-101, "Laboratory Quality Control".

**4. Equipment, Reagents, and Standards**

4.1. Equipment

4.1.1. Turner Designs 10-AU Fluorometer

4.1.2. 13-mm x 100mm glass sample tube; may also be a flow-through cell

4.1.3. Sample holder (adapted for size of cuvette)

4.1.4. Optical Kit, the set of filters and lamp for each application

4.2. Reagents

4.2.1. Deionized Water (DI) or other solvents

4.2.2. Color reagent solutions- contain all color or complexing reagents, sample solvents, and other chemical species which will be added to the samples prior to analysis by the fluorometer. Refer to the appropriate chemical SOP for specific solutions and uses. Non-

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color reagents are also used in organic extractions and sample preparation.

#### 4.3. Standards

4.3.1. The standards required for the analysis of samples are determined by the analyte. Prior to performing any analytical procedure using the fluorometer, the standard operating procedure for chemical analysis are reviewed to determine all of the required parameters and standards.

### 5. Procedure

#### 5.1. Setting the Basic Operating Level

- 5.1.1. This procedure should be performed the first time the instrument is used, any time the instrument is reconfigured for a different application, or when filters or the lamp are changed.
- 5.1.2. Turn on the fluorometer and allow the instrument to warm up for at least 30 minutes.
- 5.1.3. Clear past calibrations on screen #2.6.
- 5.1.4. Access screen #2.43 and set the range control to Manual.
- 5.1.5. Set the range to the appropriate level for your standard. (For a 200 ug/L standard the High range should be used.)
- 5.1.6. Access screen #3.2.
- 5.1.7. Loosen the sensitivity locking screw using the provided allen wrench.
- 5.1.8. Insert the desired standard and cover.
- 5.1.9. Using the sensitivity knob slowly turn the knob to adjust the %FS (% Full Scale) to the value appropriate for your standard's concentration. A deviation of  $\pm 5\%$  is acceptable. (For a 200 ug/L standard the %FS should be about 80%.)
- 5.1.10. When the %FS reached the desired value, tighten the sensitivity locking screw.
- 5.1.11. The Basic Operating Level is now set. The standard can be removed. Access screen #2.43 and return range control to Auto.

#### 5.2. Blanking the Instrument

- 5.2.1. Access screen #2.1.
- 5.2.2. Insert and cover the blank.

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- 5.2.3. Press "1" to Run the blank.
- 5.2.4. Wait for readings to stabilize and press "O."
- 5.2.5. Wait for 15 seconds for the instrument to blank. If blanking is successful "BLANK %: FINISHED" will be displayed.

5.3. Calibration

- 5.3.1. Access screen #2.2
- 5.3.2. Input the actual concentration of your standard.
- 5.3.3. Return to screen #2.0
- 5.3.4. Insert and cover your standard.
- 5.3.5. Press "3" to run the standard. Wait for the reading to stabilize.
- 5.3.6. Press the "\*" key to set the calibration point.
- 5.3.7. Wait 15 seconds. If the calibration is successful "FINISHED" will be displayed.

**6. Quality Control and Safety Aspects**

- 6.1. All aspects of this procedure shall comply with QAM -Q-101, "Laboratory Quality Control", and QAM-S-101, "Laboratory Safety".
- 6.2. Quality Control
  - 6.2.1. The analyst always uses matched cuvettes, if using more than one cuvette, when performing analysis with the fluorometer. This ensures the pathlength parameters will be equivalent and the measurements are accurate and reproducible.
  - 6.2.2. The preparation of all samples, standards, and blanks are carried out using identical methods and preparatory equipment. This eliminates the majority of errors which may be introduced during sample solution preparation.
  - 6.2.3. The cuvettes, and all associated equipment are cleaned and rinsed thoroughly with DI water prior to and following use. Other cleaning solutions may be required on occasion at the direction of the Laboratory Manager.
  - 6.2.4. All instrument maintenance performed on the Fluorometer is documented in the Maintenance Logbook, QAM-Q-103-1.
  - 6.2.5. Any major modification or parts replacements initiates a new Demonstration of Performance in accordance with QAM-Q-101,

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“Laboratory Quality Control”, to ensure the instrument is functioning properly prior to data generation.

6.2.6. Calibration information is kept with each analytical run record.

6.3. Safety

6.3.1. The solvents or complexing reagents which are used during analysis of water samples or extracts may be toxic or acidic. The analyst always consults the MSDS files if he or she has any question as to the safe handling of any reagent required by the standard operating procedure for chemical analysis.

7. **References**

- 7.1. MODEL 10-AU-005-CE FLUOROMETER USER'S MANUAL, Turner Designs, April 1999, Sunnyvale, CA, Part Number 10-AU-074.
- 7.2. National Environmental Laboratory Accreditation Conference (NELAC) standards, TNI, 2016.
- 7.3. TIAER Quality Assurance Manual, QAM-Q-100, latest revision.

8. **Attachments**

None