10-AU Turbidity Optical Kit

Turner Designs' 10-AU fluorometer can be configured as a turbidity meter using the 10-AU's Turbidity Optical Kit (10-307R). This optical kit includes:

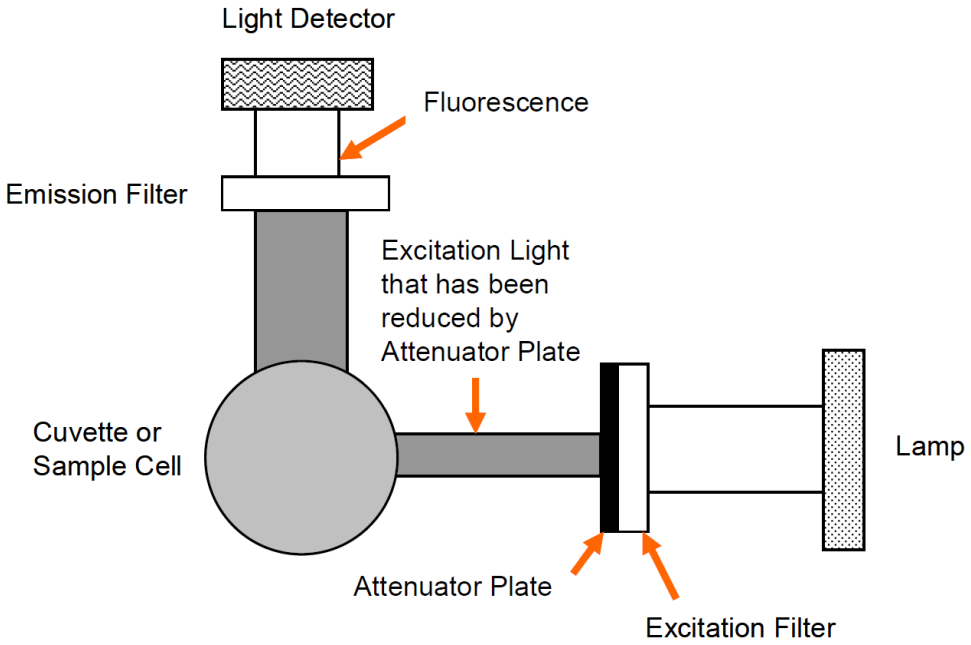
- An excitation filter (550 nm)
- An emission filter (550 nm)
- A reference filter (>535 nm)
- Two Clear Quartz lamps (10-046)
- An attenuator plate (10-318R)

Once configured with the 10-307R turbidity optical kit, the 10-AU can be used to measure scattering of light at 550 nm which gives an indication of the amount of suspended sediments or scattering particles in a given sample. The amount of light scattered is proportional to the signal detected.

AMCO Clear® turbidity standards were used to test instrument detection limits. Results from this testing are specific to AMCO Clear® turbidity standards. Other particles will scatter light differently, potentially affecting the instrument's minimum detection limit and overall range of detection. Using AMCO Clear® turbidity standards, a minimum detection of 0.3 NTU was achieved with a maximum linear range of 750 NTU. This range was tested using both 13 and 25 mm round bottom test tubes. The wavelength chosen for scatter detection is within the detection range of both Standard and Red Sensitive PMTs, therefore 10-AUs configured with either PMT can be used with the turbidity optical kit.

Installation of the Turbidity Optical Kit

The diagram below shows the position of each component in the optical kit. Follow this diagram for proper installation of the optics. ***Note: Excitation and emission filters are the same and can be installed in either position***.



Setting the Sensitivity

The 10-AU uses three ranges (low, med, high) to detect a broad range of concentrations. Each range has a maximum concentration limit that is set by changing the instrument's sensitivity (overall range of detection). The three ranges are different by factors of ten. For example, if the maximum limit of detection is set to 750 NTU, then one would expect the medium range maximum limit of detection to be 75 NTU and the low range maximum limit of detection to be 7.5 NTU. The table below lists some examples of how range maxima are affected by setting the instrument's sensitivity:

Set Overall Max	High Range Max	Med Range Max	Low Range Max	Minimum Detection
500 NTU	500 NTU	50 NTU	5.0 NTU	0.3 NTU
250 NTU	250 NTU	25 NTU	2.5 NTU	0.3 NTU
100 NTU	100 NTU	10 NTU	1.0 NTU	0.3 NTU
50 NTU	50 NTU	5.0 NTU	0.5 NTU	0.3 NTU

Users can set the sensitivity of the instrument with the sensitivity adjustment knob and a standard of known concentration. To set instrument sensitivity you will need:

- A test tube with your blank sample
- A test tube with a standard of known concentration
- The hex wrench kit shipped with your 10-AU

Follow the procedure below to set instrument sensitivity:

1) Power on the 10-AU and allow it to warm up for at least 30 minutes.
2) Reset the instrument to factory settings using screen 2.6.
   Note: You are now in RFU mode.
3) Insert your blank sample and access screen 2.1 to run your blank.
4) Remove your blank and insert your standard.
5) Wait for the signal to stabilize.
6) Loosen the sensitivity locking screw.
7) Adjust the reading on the screen to a desired value.
   Note: Adjust the signal for your standard to an RFU value lower than 999; a reading of 999 on the 10-AU's display indicates the maximum RFU value the instrument can output.
8) Tighten the sensitivity locking screw.
9) Access screen 3.2 and record the %FS value and range setting (High, Med, or Low) for the standard inserted.
10) Remove your standard, dilute it by 2x, and read the diluted sample.
    Note: The diluted sample should give you an RFU value that is ~2x less than your set RFU value.
11) Calculate the calibration coefficient for these two standards using the following equation:
    [(Concentration of Standard) / (RFU value)] = Concentration of Solution (NTU/RFU)

The 10-AU's sensitivity is now set. You can use the calibration coefficient from step 11 to calculate NTU concentrations for any sample analyzed as long as the optical configuration does not change. To calculate concentration, simply multiply the calibration coefficient by the RFU value of your sample.