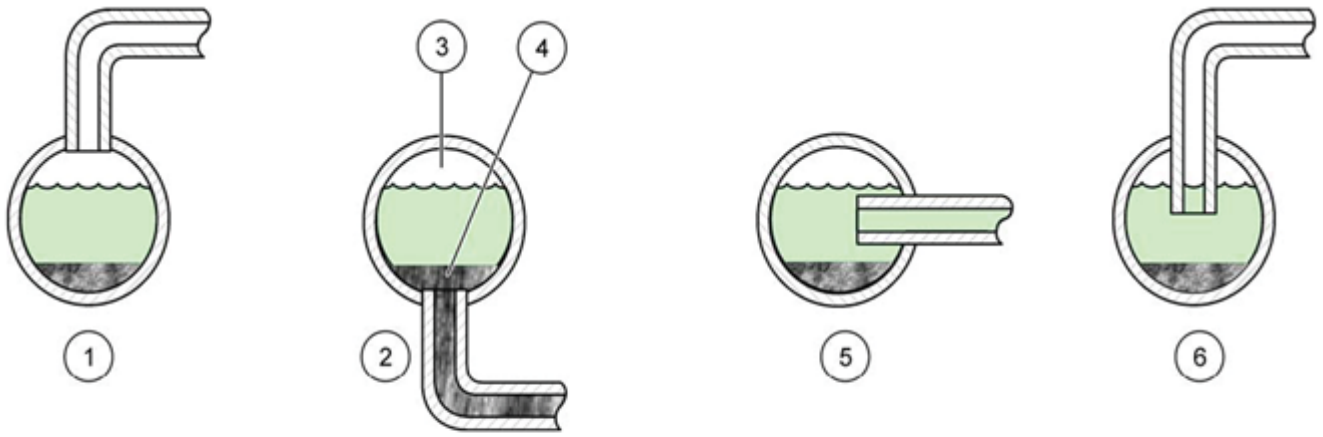




# Instrumentation Data Integrity Checklist

## Online DPD Colorimetric Chlorine Analyzer (Example: Hach CL17)

- Sample tap is a sufficient distance downstream of chemical feed points to ensure adequate mixing and sufficient reaction time (in turbulent flow conditions 10 x pipe diameters is suggested, in laminar flow conditions more than 100 x pipe diameters is suggested) and representative of process performance
- Sample tap orientation is “good” or “best” per Figure 1 in Appendix A to ensure sample is representative of process performance
- Sample tap location is appropriate for measuring desired parameters (e.g., not measuring free chlorine after the addition of ammonia)
- Sample conditioning kit is installed correctly (see Figure 2 in Appendix A; the drain tee should be installed 2’ above the instrument cabinet to ensure the needed sample pressure in the analyzer)
- Sample line length is not excessive (i.e., less than one-minute residence time)
- Sample flow rate to sample conditioning is between 200 to 500 mL/min
- Sensor cables or wiring are not damaged (i.e., properly shielded and insulated) and not installed near other electronic devices that may result in potential signal interference
- Correct reagents are installed (i.e., free chlorine indicator is installed when free chlorine is intended to be measured)
- Reagents are not expired
- Reagents bottles are connected to correct delivery tubes labeled “buffer” or “reagent” inside the instrument
- Indicator reagent is prepared as specified by the manufacturer (indicator powder is mixed and fully dissolved in the indicator solution)
- Stir bar is installed in the colorimeter cell (remove plug on the colorimeter and insert paper clip to remove)
- Pressure plate on peristaltic pump is securely attached (to avoid backflow of the sample into the reagents)
- Signal Averaging (SIGAVG) feature, which is used to average reading and prevent erratic recorder output, is disabled (default is SIGAVG = 1, which disables this feature)
- Calibration settings are at factory default (OFFSET = 0.00), the analyzer is factory calibrated and does not require recalibration unless specified by regulatory agency
- Record output span brackets the expected range of chlorine residual (i.e., factory default RECMIN = 0.00 mg/L @ 4 mA and RECMAX = 5.00 mg/L @ 20 mA)
- Verify that the reading on the display of the online analyzer is the same as what is being shown on SCADA
- Alarm settings are configured at desired trip points, if this feature is activated (i.e., toggle to ALARM menu and then RECALL WARNINGS to display active alarms)
- Colorimeter cell is cleaned monthly when temperatures are less than 80 F and biweekly when temperatures are more than 80°F with 19.2 N sulfuric acid solution and cotton swabs
- Pump tubing is replaced per manufacturers recommendation (i.e., if ambient temperature is <80° F, replace at six-month intervals; if >80°F, replace at three-month intervals)
- Remaining analyzer tubing is replaced annually, per manufacturers recommendation
- Routine calibration check of the online chlorine analyzer is performed in accordance with EPA Method 334 at least once per week (within  $\pm 0.10$  mg/L or  $\pm 15\%$  of expected value [whichever is larger], by comparison with an EPA approved grab sample method (e.g., DPD colorimetric method) that has also been verified with a routine calibration check at least once per quarter with a primary calibration check standard [ $\pm 15\%$  of expected value]. See EPA Method 334 for additional details.



Source: Hach Company (2014)

1	Poor	4	Sediment (typical)
2	Poor	5	Good
3	Air (typical)	6	Best

Figure 1: Sample Line Location in Process Stream (Hach Company)

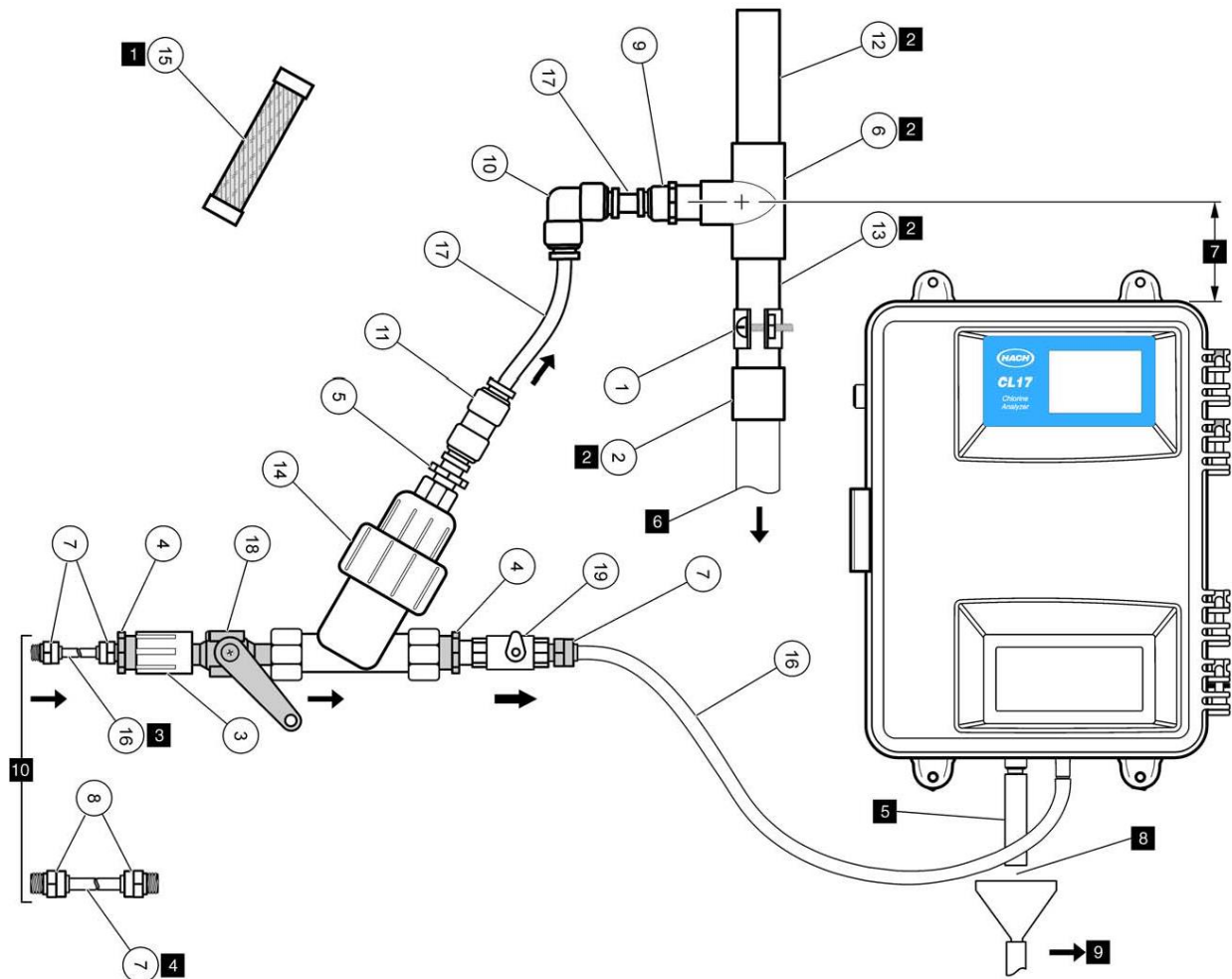


Figure 2: Sample Conditioning Kit Configuration