

## pH Electrodes

Electrode	Part Number	Fill Solution	Specifications
TitraPRO4	PCE-80-PH1200D	4M KCl	MANTECH's most popular general-purpose pH electrode. Excellent for pH measurement of soil solutions and titration of clean and wastewater samples. pH range 0 to 14 with accuracy of +/- 0.05 pH units. Reference type is refillable, single junction. Smaller immersion depth means less sample is required to get an accurate pH measurement. 120mm length.
TitraMini	PCE-80-PH1205	4M KCl	This small 6mm diameter pH electrode is ideal for low sample volumes and skinny tubes. Takes less space in vials than standard 12mm pH electrodes. Well suited for low ionic strength as well as high pH applications. The sample pH is normally registered in less than 10 seconds, and the pH value is reproducible over the entire pH range from 0 to 14 pH with accuracy of +/- 0.1 pH units. Reference type is refillable, easy-clean double junction.
TitraGel	PCE-80-PH1012	N/A	Good general-purpose pH electrode for pH measurement or titration. Excellent electrode for petrochemical applications. pH range 2-12 with accuracy of +/- 0.1 pH units. Reference type is sealed gel providing low maintenance requirements.
TitraFill	PCE-80-PH1013	4M KCl	Fast response, longer life pH electrode for pH measurement or titration. Good for clean, inorganic water or wastewater samples. pH range 0 to 12 with accuracy of +/- 0.1 pH units. Reference type is refillable, easy-clean double junction.
TitraSleeve	PCE-80-PH1108	LiCl	Good electrode for petrochemical applications. Sleeve type as defined in ASTM methodologies. Reference type is refillable, easy-clean double junction. Note MANTECH recommends the TitraGel or TitraFill / TitraPRO2 electrode filled with alcoholic LiCl with high quality results.
TitraFlo	PCE-86-PH1105	4M KCl	High flow pH electrode with fast response for pH measurement or titration. Easy to clean outer junction. Good for dirty water, wastewater, organic, and oily samples. pH range 0 to 13 with accuracy of +/- 0.05 pH units. Reference type is refillable, double junction. Comes with electrode communication cable attached.

\*Note that all PCE-80-PH\*\*\*\* electrodes require PCE-86-EX1001, 6' extension cable for BNC connectors

\*\* All pH electrodes should be connected to a 0.5V (500mV) electrode port. Some applications may require a 2V board, see relevant method for details.

## ISE and Redox Electrodes

Electrode	Part Number	Fill Solution	Port Voltage	Specifications
Fluoride	PCE-80-FL1001	4M KCl	0.5V	Reproducibility +/-2% pH range 5 - 7 at concentration range of $1.0 \times 10^{-6} \text{M F}^{-1}$ (0.02 ppm $\text{F}^{-1}$ ) pH range 5 -11 at concentration range of $1.0 \times 10^{-1} \text{M F}^{-1}$ (1900 ppm $\text{F}^{-1}$ ). Store in fluoride standard with 1:1 ratio of TISAB
Chloride	PCE-80-CL1001	$\text{KNO}_3$	0.5V	Reproducibility +/-2% pH range 2 to 12 Concentration range 1M to $5.0 \times 10^{-5} \text{M}$ (35,500 to 1.8ppm) Store in chloride solution
Silver Sulfide	PCE-80-SS1001	$\text{KNO}_3$	2.0V or 0.5V	Reproducibility +/-2% pH range 2 to 12 Concentration range 1M to $1.0 \times 10^{-7} \text{M}$ sulfide (32,000 to 0.003ppm) Concentration range 1M to $1.0 \times 10^{-7} \text{M}$ silver (108,000 to 0.01ppm) Aqueous solutions only; no organic solvents Store in silver or sulfide solution
Calcium	PCE-80-CA1001	4M KCl	2.0V	Reproducibility +/-4% pH range 3 to 10 Concentration range 1M to $5 \times 10^{-6} \text{M}$ Aqueous solutions only; no organic solvents Store in dilute calcium standard
Ammonia	PCE-86-NH4005	$\text{NH}_4\text{Cl}$	2.0V	Reproducibility +/-2% pH > 11 Concentration range 1M to $5 \times 10^{-7} \text{M}$ (17,000 to 0.01ppm) Store in dilute calcium standard
Nitrate	PCE-80-NO1001	0.1M $(\text{NH}_4)_2\text{SO}_4$	0.5V	Reproducibility +/-2% pH range 2.5 to 11 Concentration range 1M to $7 \times 10^{-6} \text{M}$ ( $6.2 \times 10^4$ to 0.5 ppm as $\text{NO}_3^{-1}$ ) Aqueous solutions only; no organic solvents Store in dilute nitrate solution
Redox	PCE-80-OR1002	4M KCl	2.0V	Accuracy +/- 10mV Range 0 +/- 2000mV
Silver Billet	PCE-80-AG1001	4M KCl	2.0V	Accuracy +/- 10mV Range 0 +/- 2000mV

### Document Change Log

Version	Date	Author	Changes
2	25-July-2019	Heather Jasumani	<ul style="list-style-type: none"> <li>Document ID assigned, and formatting</li> <li>Part number PCE-80-PH1200B (obsolete) removed. Part number PCE-80-PH1200C added.</li> </ul>
3	20-Dec-2019	Heather Jasumani	<ul style="list-style-type: none"> <li>Part number PCE-80-1200D added. PCE-80-1200C removed (discontinued)</li> </ul>
4	22-Dec-2020	Justin Dickerman	<ul style="list-style-type: none"> <li>Part number PCE-80-PH1205 added.</li> </ul>