Checking a Rain Sensor With Blank Samples

Base your answers on the information provided and your knowledge of chemistry. Use the 2025 Chemistry Reference Tables as needed.

A class compares cups that hold rain samples for a model pH sensor. The same sensor reads a reference solution as pH 6.0 directly. Students pour matched portions into three cups, wait the same time, and read each portion. The class also uses pH 7.0 water as a blank.

Cup	Blank pH after contact	Reference pH after contact
J	7.0	6.0
K	5.9	5.5
L	7.0	6.4

1 Which cup gives the intended reading for both liquids?

(1) J only

(2) K only

(3) L only

(4) J and L

2 Use K’s blank reading to explain how the cup could affect a rain sample reading even if the sensor works properly. [1]

Answer and work

A student wants to approve a cup whenever its blank result matches pH 7.0. The class also wants the cups to work on weakly acidic samples.

3 Use one cup’s results to show why the blank result alone cannot verify a cup for weakly acidic samples. [1]

Answer and work

4 Describe a comparison to check whether a cleaning step improves cup L. Identify what should be held constant. [1]

Answer and work