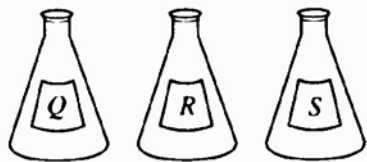


2004 D Required

In a laboratory class, a student is given three flasks that are labeled *Q*, *R*, and *S*. Each flask contains one of the following solutions: 1.0 *M* $\text{Pb}(\text{NO}_3)_2$, 1.0 *M* NaCl , or 1.0 *M* K_2CO_3 . The student is also given two flasks that are labeled *X* and *Y*. One of these flasks contains 1.0 *M* AgNO_3 , and the other contains 1.0 *M* BaCl_2 . This information is summarized in the diagram below.

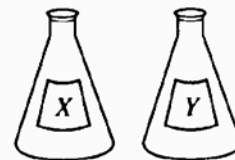
Each flask contains one of the following solutions:

$\text{Pb}(\text{NO}_3)_2$
 NaCl
 K_2CO_3



Each flask contains one of the following solutions:

AgNO_3
 BaCl_2



- (a) When the student combined a sample of the solution *Q* with a sample of *X*, a precipitate formed. A precipitate also formed when samples of solutions *Q* and *Y* are combined.
- Identify solution *Q*.
 - Write the chemical formulas for each of the two precipitates.
- (b) When solution *Q* is mixed with solution *R*, a precipitate forms. However, no precipitate forms when solution *Q* is mixed with solution *S*.
- Identify solution *R* and solution *S*.
 - Write the chemical formula of the precipitate that forms when solution *Q* is mixed with solution *R*.
- (c) The identity of solution *X* and solution *Y* are to be determined using the following solutions: 1.0 *M* $\text{Pb}(\text{NO}_3)_2$, 1.0 *M* NaCl , and 1.0 *M* K_2CO_3 .
- Describe a procedure to identify solution *X* and solution *Y*.
 - Describe the observations that would allow you to distinguish between solution *X* and solution *Y*.
 - Explain how the observations would enable you to distinguish between solution *X* and solution *Y*.