



## Activity 2. Germ Swap

### Instructions

➤ **Materials Needed**

- 1/8 cup (30ml) distilled water per participant
- 5 oz. disposable cup for each participant
- Sodium Carbonate Standard Solution 0.02N (Hach, cat. #18149) (Positive Solution) **(LABELED SC)**
- Phenolphthalein Solution 0.1% (Hach, cat. #189753) (Testing Solution) **(LABELED PH)**
- Dropper bottle
- Measuring utensils
- Disposal container large enough to accommodate liquid from all participant cups

➤ **Safety Warning:** Do NOT sniff or drink solution. If participant is exposed to solution, flush the area immediately with water.

➤ **Before participants arrive:**

1. Add approximately 1/8 cup (30ml) of distilled water to a disposable cup for each participant; filling the cup about 1/3 full. This should be done just before the activity begins, to ensure pH changes do not occur. **Do not use tap water**, as not all water sources are pH neutral.
2. To make “positive germs” add 1/4 teaspoon (~25 drops) of sodium carbonate standard solution/to one cup (more if you have a large group). Place a small, inconspicuous mark on each of the “infected cups”, to be identifiable later.
3. Add stock phenolphthalein solution to a dropper bottle for easier distribution.

➤ **Once participants arrive:**

1. Pass out one cup to each participant, explaining that each represents an animal at an exhibition. Point out that each cup and the liquid inside looks the same. Discuss animal contact within a show setting, and then instruct students to exchange water (swap germs) with two or three other participants. To complete an exchange, the participant should pour their fluid into another participant’s cup, and then half should be poured back into the original cup. As students are exchanging germs, announce that an “X” amount animal(s) came to the show already infected with a respiratory disease. The “X” amount of animals will be equal to the amount of cups with Sodium Carbonate, AKA the “infected” cups.
2. As students finish swapping, ask if they can tell who is “infected” and how many additional animals they think may now be “infected.”
3. To determine whether each individual’s animal is “infected,” add up to 4 drops (~100ul) of phenolphthalein solution to each cup. If the liquid turns pink the animal is infected, if the liquid remains clear the animal is negative. Discuss how diseases spread within the animal population and allow participants time to figure out who started as “infected” by tracking their swapping partners. Confirm using the inconspicuous marks on the infected cups.

4. Pour liquid from all cups in disposal container and thoroughly wash and rinse cups, if you plan to reuse.

➤ **Modified Version with Food Coloring:**

1. Use clear plastic cups: one per person
2. Put water (about 1/3 full) and a small amount of blue food coloring in nine of ten cups to represent healthy pigs.
3. Put water (about 1/3 full) and a small amount of yellow food coloring in one of ten cups to represent one sick pig.
4. Have each person pick a cup, but do not reveal what the colors mean.
5. Instruct everyone to find a partner. For each pair, there will be a person A and B (this is just for explanation purposes). Have person A pour the contents of their cup into person B's cup. Then have person B pour half of the liquid from their cup back into person A's cup so they have even amounts again. This act is supposed to replicate swapping germs.
6. Repeat and swap water with a different person so each person shares with two other people.
7. Afterwards, see how many people have "green" infected cups.
8. This demonstrates how one sick pig can easily spread their germs to other animals in a barn, farm, or fair.

*Protocol modified from Lab-aids Experiencing Science Kit #906 "Track the Spread of Infectious Disease"*

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