

ACT Prep – Research Design

Mar 10– 13, 2014

Chemistry

Bell Work, Monday 3/10/14

Copy the data table and diagram

Table 1

Trial	Temp (°C) IV	Time (sec) DV	Distance of ring DV from HCl swab (cm) Distance of ring from NH ₃ swab.
1	20	33	4.0 $10 - 4.0 = 6$
2	30	30	4.1 $10 - 4.1 = 5.9$
3	40	26	4.1 $10 - 4.1 = 5.9$
4	50	23	4.0 $10 - 4.0 = 6$

Label the IV & DV

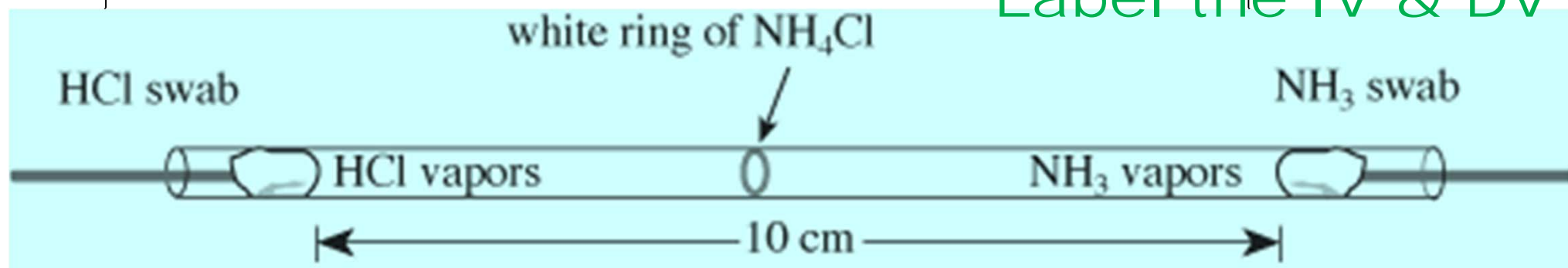


Figure 1

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1. The student concluded that NH_3 diffuses at a greater rate than HCl . Do the results of Experiments 1–3 support her conclusion?

F. No; in Trials 1–9 the HCl vapors traveled farther than the NH_3 vapors.

G. No; in Trials 1–9 the NH_3 vapors traveled farther than the HCl vapors.

H. Yes; in Trials 1–9 the HCl vapors traveled farther than the NH_3 vapors.

J. Yes; in Trials 1–9 the NH_3 vapors traveled farther than the HCl vapors.



2. The IV & DVs are:

IV: temperature

DV: time (for ring to appear) and distance (ring from HCl)

white ring of NH_4Cl

HCl swab

NH_3 swab

HCl vapors

NH_3 vapors

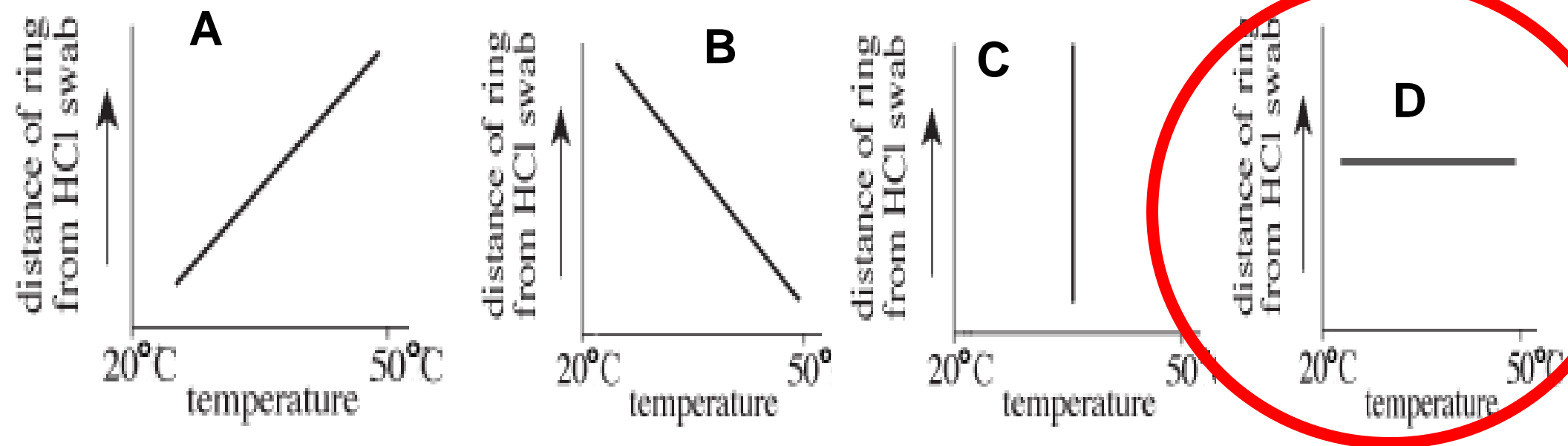
10 cm

Figure 1



Bell Work, Tuesday, 3/11/14

1. Based on the results of Experiment 1, which of the following graphs best shows the relationship between the temperature and the distance of the ring from the HCl swab?



Experiment 1 was repeated, but the temperature was held constant at 20°C and the diameter of the tube was varied for each trial. The results of experiment 1 are shown in table 2.

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2. Which of the following best describes the difference between the procedures used in Experiments 1 and 2 ?

In Experiment 1, the:



- A.** In experiment 1 temperature was varied; in Experiment 2, the diameter of the tube was varied.
- B.** In experiment 1 diameter of the tube was varied; in Experiment 2, the temperature was varied.
- C.** In experiment 1 distance between the swabs was varied; in Experiment 2, the temperature was varied.
- D.** In experiment 1 temperature was varied; in Experiment 2, the distance between the swabs was varied.

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Experiment 1



Trial	Temp (°C)	Time (sec)	Distance of ring from HCl swab (cm)
1	20	33	4.0
2	30	30	4.1
3	40	26	4.1
4	50	23	4.0

Experiment 2

Trial	Tube diameter (cm)	Time (sec)	Distance of ring from HCl swab (cm)
5	1.0	33	4.0
6	1.2	33	4.0
7	1.4	33	4.1
8	1.6	33	4.0

Bell Work, Wednesday, 3/12/14

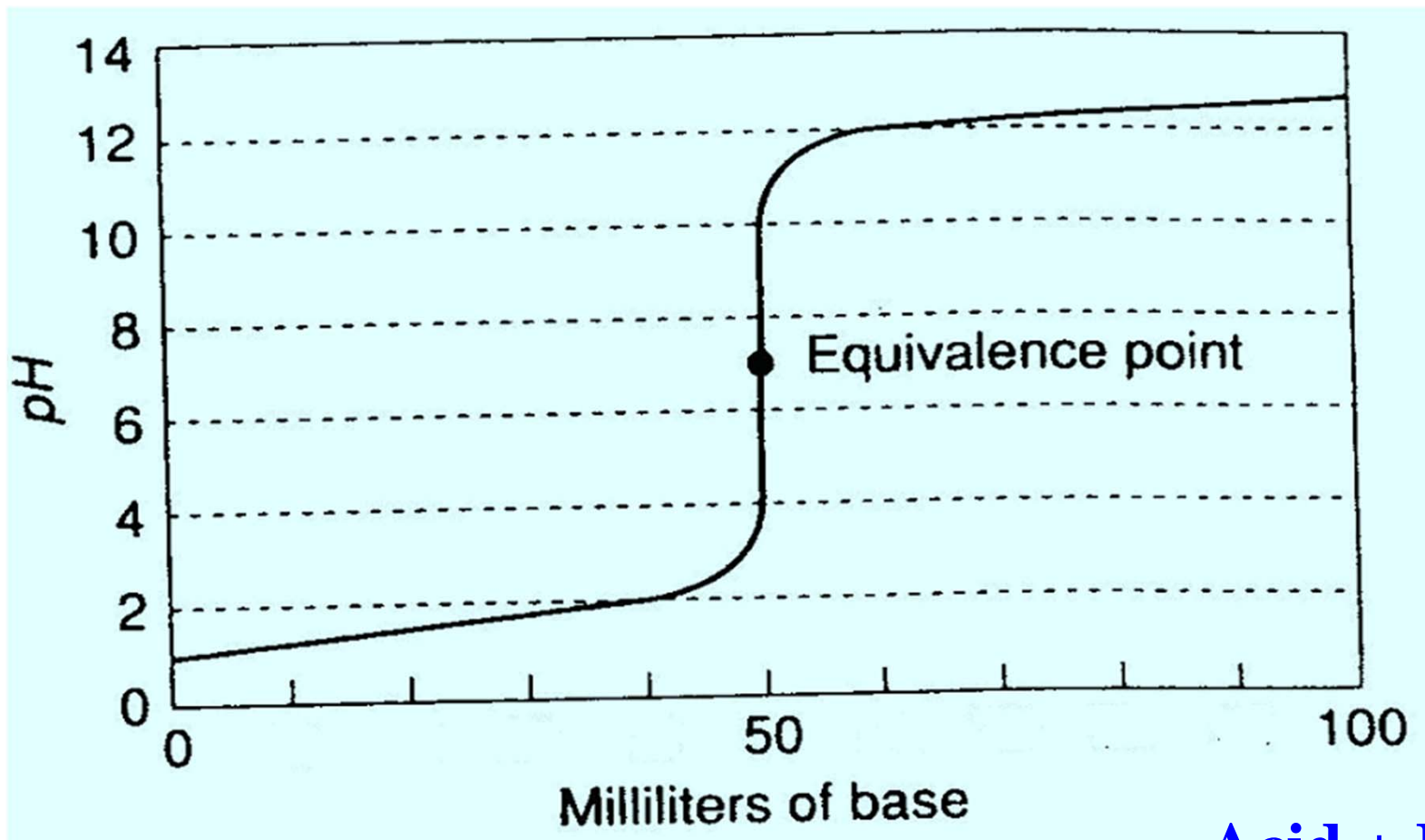
1. The number of calories and weight gain for different mixtures of dog food and dog food supplement are given in the tables below. Independent variable causes dependent variable. Label the IV and DV on the data tables.
2. What is the IV for experiment 1? **Amount of supplement (added to 0.5 kg of dog food)**
3. What is the IV for experiment 2? **(% dog food/) % Supplement**
4. What is the DV for experiment 1? **Calories**
5. What is the DV or experiment 2? **(Average) Weight gain**

Table 1	
Amount of supplement in grams (g) added to 0.5 kg of dog food IV	DV <i>Calories</i>
0	281
20	303
40	323
60	343
80	362
100	382

Table 2	
<i>Percent of dog food/ Percent of supplement</i> IV	<i>Average weight gain in kg</i> DV
100/0	2.8
95/5	3.7
90/10	4.8

Bell Work, Thursday 3/13/14

Sketch the graph.



Passage:

$$\text{pH} + \text{pOH} = 14$$

$$\text{Acid: pH} < 7$$

$$\text{Base pH} > 7$$

$$\text{Water pH} = 7$$



$$\text{pH} = 0$$



Bell Work, Thursday 3/13/14

1. A beaker contains 50 milliliters (mL) of a strong acid solution. A researcher adds 100 mL of a strong base, 10 mL at a time, and measures the pH of the solution after each addition of the base. The graph at right shows the results of this experiment. **The equivalence point on the graph is where there are exactly 50 mL of base and 50 mL of acid. Which of the following conclusions can the researcher draw from the graph?**

F. The pH of a solution is 7 when the solution contains 50 mL of a strong acid.

G. The solution is a base below the equivalence point on the graph.

H. The pOH of the solution is 14 after 100 mL of the base is added.

$$\text{pH} + \text{pOH} = 14, \text{ pH} + 14 = 14, \text{ pH} = 0$$

J. Most of the pH change is accounted for near the equivalence point.

