Activity #1 - Sea Ice

Concepts # 1 and 2

#1 Salinity level affects the time it takes water to freeze.
#2 As salt water freezes, the salt is squeezed out of the ice crystal.

Objective:

Students will observe the freezing times and temperatures of water with varying levels of salinity and determine how icebergs form, how they act and what they may be made of.

Materials:

- one cup of ordinary table salt
- tablespoon
- plastic ice cube tray with divided water tight sections
- tap water
- thermometer
- 8 jars (at least 8 oz), beakers (at least 300 mL) or recycled (cut off) 2L plastic soda bottles

Procedures:

1. Label 8 jars two labelled "A," two "B," two "C," and two "D." In each jar mix salt and water solutions as follows:
2. Jars A - mix 9 T salt with 1 cup water in each.
3. Jars B - mix 6 T salt with 1 cup water in each.
4. Jars C - mix 3 T salt with 1 cup water in each.
5. Jars D - pure tap water 1 cup in each.

   NOTE: One set of jars A-D will be used to fill an ice cube tray. Put the second set in a refrigerator if available, otherwise set them aside in a cool, shaded area of the room.
6. Label each ¼ section of the ice cube tray as section A, B, C, and D.
7. Pour salt solutions into their labeled sections.
8. Place the tray in a freezer.
9. On data chart provided, students observe and record water temperature and conditions after 1 hour, 24 hours, and 48 hours. Water temperatures are taken in the liquid water, under any ice formations, if present. If not present, draw an "X through that data entry. Conditions include degree of solidity, color, texture, volume, layering, etc.
10. With teacher permission, have a volunteer taste an iceberg from each section and record this on your chart too.
11. Test and record how well each kind of iceberg (A, B, C, D) floats in each salt solution. Use the second set of salt solutions that were set aside for this test.
12. At the end of 48 hours, plot a line graph of your temperatures using the graph paper provided.

Evaluation:

- Did any solution not freeze? Which one? (Depends upon the experimental results. The highest salt concentration, solution A, does not completely freeze.)

- Which solution was first to freeze? (Usually solution D is the first to freeze)

- What other differences between the icebergs did you notice: taste? texture? color? volume? layering?

- Summarize what happens to the ability of water to freeze as you add more and more salt. (The higher the salinity, the longer it takes to freeze. Actually, the higher the salinity the lower the freezing point.)

- What does the graph of your data tell us about how salinity affects the temperature of the water over time?

- From your experimental results, are icebergs salt or fresh water? Explain. (Icebergs are fresh water. Solutions 2 and 3 which show partial freezing show the fresh water portion leaving as ice.)

- If the ice sank, what might happen to life on the seafloor under the Antarctic ice? Explain.

Activity #1 - Making “Icebergs”

data records:

Jar	Starting Salt/H_2O Content:	Record Your Observations Below: 1hr. temp	1hr. notes	24 hrs. temp	24 hrs. notes	48 hrs. temp	48 hrs. notes
A							
B							
C							
D							

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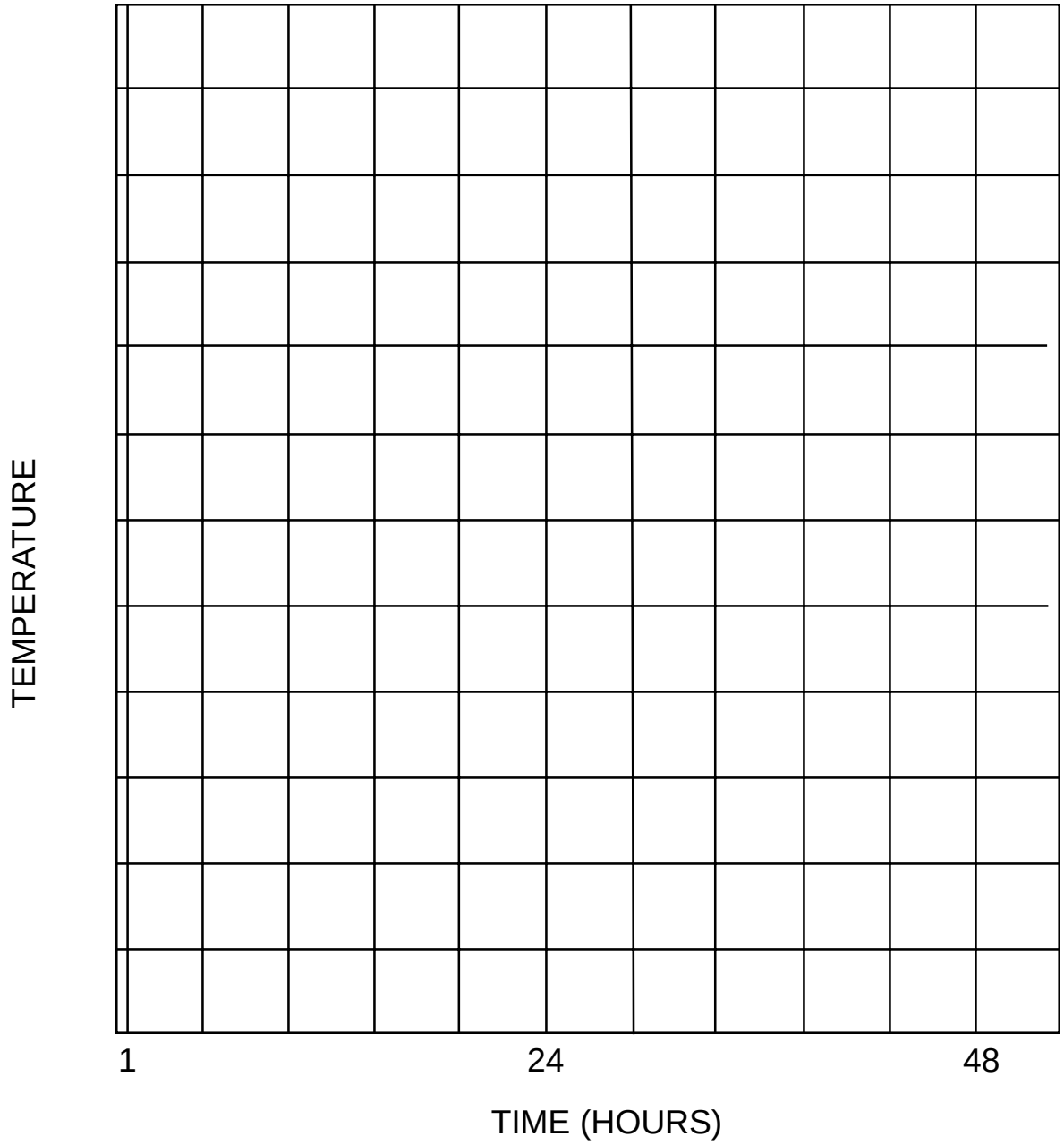
GRAPH OF TEMPERATURE DATA



Key: (color in the squares to match each of your 4 lines)

Solution A ☐ Solution C ☐

Solution B ☐ Solution D ☐