

Analyzing the Elements of a Scientific Method

Read the following statements and then answer the questions.

1. You and your friend are walking along a beach in Alaska on January 15, 1996 at 8:00 a.m.
2. You notice a thermometer on a nearby building that reads -1C.
3. You also notice that there is snow on the roof of the building and icicles hanging from the roof.
4. You further notice a pool of sea water in the sand near the ocean.
5. Your friend looks at the icicles and the pool and says, "How come the water on the roof is frozen and the sea water is not?"
6. You answer, "My guess is that the salt in the sea water keeps it from freezing at -1C.
7. You go on to say, "And I think under the same conditions, the same thing will happen tomorrow."
8. Your friend asks, "How can you be sure?" you answer, "I'm going to get some fresh water and some salt water and expose them to a temperature of -1C and see what happens."

Questions

- A. In which statement is a *prediction* made? _____
- B. Which statement states a *problem*? _____
- C. In which statement is an *experiment* described? _____
- D. Which statement contains a *hypothesis*? _____
- E. Which statements contain *data*? _____
- F. In which statement is an *objective* mentioned? _____
- G. Which statements describe *observations*? _____

Performing an Experiment

Read the following statements and then answer the questions/

1. A scientist wants to find out why sea water freezes at a lower temperature than fresh water.
2. The scientist goes to the library and looks up and reads a number of articles about the physical properties of solutions.
3. The scientist also reads about the composition of sea water.
4. The scientist travels to a nearby beach and observes the conditions there. The scientist notes the taste of the sea water and such factors as waves, wind, air pressure, temperature, and humidity.
5. After considering all this information, the scientist sits at a desk and writes, "My guess is that sea water freezes at a lower temperature than fresh water because sea water has salt in it."
6. The scientist goes back to the laboratory and does the following
 - a. fills each of two beakers with 1 liter of fresh water
 - b. dissolves 35 grams of table salt in one of the beakers
 - c. Places both beakers in a refrigerator whose temperature is -1°C .
 - d. Leaves the beakers in the refrigerator for 24 hours
7. After 24 hours, the scientist examines both beakers and finds the fresh water to be frozen. The salt water is still liquid.
8. The scientist writes in a notebook, "It appears as if salt water freezes at a lower temperature than fresh water does."
9. The scientist continues, "Therefore, I suggest that the reason sea water freezes at a lower temperature is that sea water contains dissolved salts while fresh water does not."

Questions

- A. Which statements contain *Conclusions*? _____
- B. Which statements refer to *research*? _____
- C. Which statement contains a *hypothesis*? _____
- D. Which statements contain *observations*? _____
- E. Which statements describe an *experiment*? _____
- F. Which statements support the *hypothesis*? _____
- G. In which statement is the *problem* defined? _____