|  |
| --- |
| m.l. Goosey, m.l. King high school, detroit michiganq |
| Selected Response Items C4.7a |
| Investigate the difference in boiling point of freezing point of pure water and a salt solution. |
|  |
| **Goosey, Marco** |
| **8/10/2008** |

|  |
| --- |
| These materials were developed under a grant awarded to Wayne RESA by the Michigan Department of Education. |

Selected Response Items for Thermochemistry & Solutions

**C4.7a:** Investigate the difference in boiling point of freezing point of pure water and a salt solution.

1. Compared to the same volume of pure water, a solution of water with salt in it will boil at a
   1. lower temperature, because there is less water to heat up.
   2. higher temperature, because the salt has a higher boiling point than water.
   3. lower temperature, because the salt lowers the partial pressure of the water.
   4. higher temperature, because the salt lowers the partial pressure of the water.
2. Compared to the same volume of pure water , a solution of water with salt in it will freeze at a
   1. lower temperature, because the salt particles disrupt the ordered pattern that must exist amongst the water molecules for freezing to take place.
   2. higher temperature, because the salt particles disrupt the ordered pattern that must exist amongst the water molecules for freezing to take place.
   3. lower temperature, because the salt particles increase the ordered pattern that must exist amongst the water molecules for freezing to take place.
   4. higher temperature, because the salt particles increase the ordered pattern that must exist amongst the water molecules for freezing to take place.
3. When calculating the change in freezing point or boiling point for two different solutions as the result of the addition of a solute, if the concentration of particles is the same,
   1. but the chemical identity of the solute is different this will affect the change in freezing and boiling point.
   2. the same change in freezing and the same change in boiling will be observed no matter what the solutes are.
   3. the change in freezing point will be different for different solutes, but the change in boiling point will be the same.
   4. the change in boiling point will be different for different solutes, but the change in freezing point will be the same.
4. A solution is prepared using 3.00 moles of CaCl2 in 1.5kg of water. The dissociation of this compound will produce
   1. one particle per formula unit of CaCl2.
   2. two particles per formula unit of CaCl2.
   3. three particles per formula unit of CaCl2.
   4. five particles per formula unit of CaCl2.
5. Given the freezing point depression constant for water is -1.86°C/*m*, at what temperature will this solution freeze?
   1. . -3.72°C b. -7.44°C c. -11.2°C d. -18.6°C

Teacher Companion Notes for Selected Response Items

for Introduction to Bonding

**High School Chemistry**

**C4.7a:**

**Question 1:**

**Difficulty:** Low, all students should be able to answer this question correctly.

**Correct answer: d**, as solute concentration increases the partial pressure of the solvent decreases.

Distracter a, incorrect change and incorrect reason.

Distracter b, correct change, but incorrect reason.

Distracter c, incorrect change, and incorrect affect on partial pressure.

**Question 2:**

**Difficulty:** Low, all students should be able to answer this question correctly.

**Correct answer: a**, as solute concentration increases, entropy increases.

Distracter b, incorrect change in temperature

Distracter c, incorrect understanding of solute’s affect on entropy.

Distracter d, incorrect change in temperature and solute’s affect on entropy.

**Question 3:**

**Difficulty:** Average, a well prepared student should be able to answer this question.

**Correct answer: b**, effective application of the definition of molaoity.

Distracter a, inappropriate understanding of molality.

Distracter c, inappropriate understanding of the application of molality in the freezing point depression and boiling point elevation equations.

Distracter d, inappropriate understanding of the application of molality in the freezing point depression and boiling point elevation equations.

**Question 4:**

**Difficulty:** Low, all students should be able to answer this question correctly.

**Correct answer: c**, clear understanding of the dissociation of an ionic electrolyte.

Distracter a, b & d; misunderstanding of the dissociation of an ionic compound.

**Question 5:**

**Difficulty:** High, this question should challenge the above average student.

**Correct answer: c**, effective application of freezing point depression formula.

Distracter a, b and d; inappropriate application of freezing point depression formula.