v. availability

vi. cost

b. The variables within a storm event will dictate the material type and application rates best suited for the particular event

i. Through established guidelines and practices the selection process is narrowed to the best practice for the particular storm event

3. How Chemicals Work

a. Generally, all snow and ice removal chemicals work by depressing the freezing point of water and turning snow and ice into a liquid or semi-liquid slush

i. The function of lowering the freezing point of water is dependent upon the percent of chemical in solution

a) This means that dry chemicals do nothing until they take on moisture and go into solution or liquid form

ii. Some chemicals when dissolved into water will lower the freezing point of water below 32° F

a) We know that water will freeze at 32° F

b) If we mix certain chemicals in water (such as the anti-freeze normally used in our cars) the water will not freeze until it gets at a much lower temperature

c) This is how snow and ice chemicals work (just like anti-freeze)

b. Dilution of Solution

i. The effectiveness of the chemical depends upon the percent of chemical in the solution

a) It is well known that there is a proper mix of water and anti-freeze that will provide optimum protection to our cars from freezing in the wintertime

1) A mix of half water and half anti-freeze, or 50% solution, will provide protection down to –34° F

2) A mix of 3 parts water and 1 part anti-freeze, or a 25 % solution, will protect only to 10° F

b) Snow and ice chemicals require the proper mix to work effectively. When a chemical is mixed with water, or goes into solution, and changes the freezing point of

water, the newly created lowest temperature at which the solution will now freeze is called the Eutectic Temperature.

1) As we see from the above example on anti-freeze, this freezing point is based on the percent of material in solution

(a) It is important to remember that as this concentration changes, or as the mixture dilutes, the melting temperature also changes. This is commonly referred to as the "dilution of solution".

(b) It is also important to know that the solubility of chemicals will vary with temperature. The lower the temperature, the less the solubility.

c. Solid Chemicals

i. Solid chemicals used for snow and ice control, such as rock salt, must first mix with moisture to create brine before it has any melting capabilities

a) That is, the chemical must be in solution

ii. Rock salt will bore through snow and ice, dissolving to form a strong brine solution that spreads under the ice or hard-packed snow, undercutting and breaking the bond to the road surface

a) Once the bond is broken, the ice and snow can be plowed off

iii. By applying chemical materials prior to a storm, we can prevent the bonding to the road surface and melt the snow and ice as it comes in contact with the brine

Exercise: How Chemicals Work

1. True or False? Snow and ice removal chemicals lower the freezing point of water.