Liquid Nitrogen Pre-Lab

Read and study the lab "LN is Cool Stuff" and then answer the following questions.

1. Define calorie.

2. Define Calorie.

3. Formula for the heat transferred (with no phase change): Q =

4. Heat energy (calories) released when one gram of water freezes: Q =

5. Heat energy (calories) required to vaporize one gram of ice at 0°C? Q =

6. Formula for the heat energy absorbed when m grams of substance with a heat of fusion, H_f, melt: Q =

7. Formula for the heat energy absorbed when m grams of substance with a heat of vaporization, H_v, vaporize: Q =

8. Formula for the mass of LN that evaporates r grams per second. Assume you start with a mass of LN equal to $m_{initial}$ and end up with m_{final} after t seconds has elapsed. m_{final} =

9. Formula for the amount of heat energy will vaporize m grams of LN in time t? Q =

10. What is the minimum amount (in grams) of steam required to raise one 300 grams of milk from 20°C to 100°C? Show your work including the formula. Assume milk has a specific heat of 1.0 cal/g-°C—milk is mostly water.

11. Calculate the temperature of a flame if a 70 gram brass ball with a specific heat 0.09 cal/g-°C warms 250 grams of 20°C water to 42°C? Show your work including the formula.

12. What is the temperature of LN?

13. What is the latent heat of vaporization for nitrogen? H_v =

14. When a 50-gram brass mass is added to a cup of LN it bubbles and boils. The boiling subsides in a few minutes when the brass and LN reach thermal equilibrium. The mass of LN that vaporizes is due to:

a)

b)

15) Construct an equation that represents the heat that causes LN to vaporize during the time it takes a 50-g mass of brass at room temperature to reach thermal equilibrium.

16) List the three activities you are going to do in the lab "LN is Cool Stuff".

Part A:

Part B:

Part C: