The National Orthodox School Shmaisani

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Subject: Physics **Title: Latent & Specific Heat**

Name: **Grade-Section: 9G (IB)**

Solve the following questions:

1) 1 kg of copper and 1 kg of nickel are both heated continuously at the same rate. Determine which metal will completely melt first. Use a value of 205 kJ/kg for the specific latent heat of fusion of copper and use a value of 297 kJ/kg for the specific latent heat of fusion of nickel. Explain your answer.

2) Water in a pan reaches 100∘C,but the pan is still left on the heat, so eventually all of the water turns to water vapor. Calculate the energy needed to evaporate the 1.2 kg of water contained by the pan. Use a value of 2,258 kJ/kg for the specific latent heat of vaporization of water. Give your answer to the nearest kilojoule.

3) A 10 g cube of ice at 0∘C is placed outside in direct sunlight on a hot day. The sunlight and the hot air around the cube heat it at a rate of 10 W.It takes 5.56 minutes for the ice to completely melt. Calculate the specific latent heat of fusion for water. Give your answer to 3 significant figures.

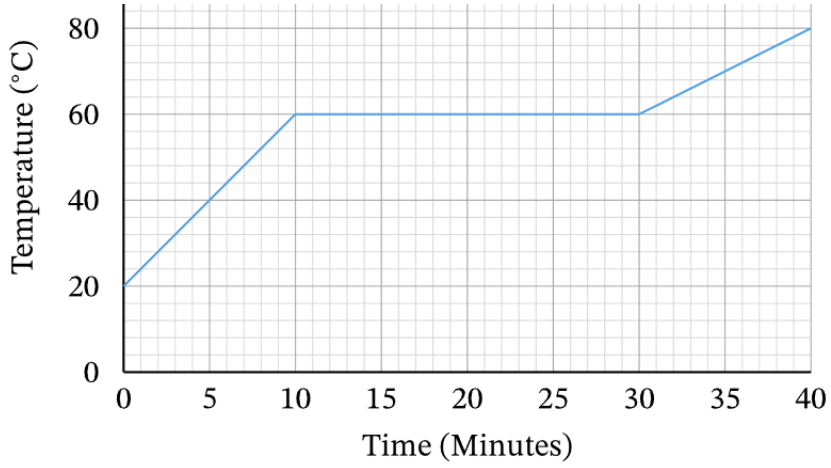
4) 565 kJ of energy is used to melt a block of zinc that was already at its melting temperature when the energy was supplied to it. Find the mass of the block of zinc, using a value of 113 kJ/kg for the specific latent heat of fusion of zinc.

5) 30 g of molten gold is allowed to solidify. It releases 1,890 J of energy to the surrounding environment as it does so. What is the specific latent heat of fusion for gold?

6) A metal at the temperature at which it melts is heated until all of the metal has become liquid. It takes 41 kJ to completely melt the metal, and its mass is 0.2 kg.What is the specific latent heat of fusion of the metal?

7) A substance, which is initially at 20∘C and solid, is heated. The temperature of the substance is recorded over time, and this data is shown in the graph.

What is the melting point of the substance?



8) A 250–g piece of gold is at 19 °C. 5.192 kJ of energy is added to it by heat. The specific heat of gold is 129 J/(kg·°C). Calculate its final temperature.

9) We heat a 25–g sample of metal from 10 °C to 100 °C. 1.082 kJ of energy is added to it by heat. Calculate the specific heat of the metal.

10) A 365–g piece of copper is initially at 220 °C. The piece is dropped into a bucket containing 535 g of water at 51 °C. The specific heat of this metal is 385 J/(kg·°C) and the specific heat of water is 4180 J/(kg·°C). Calculate the final temperature of the system and the energy transfer to the water from the metal.

11) An 845–g bar of ice is initially at –25 °C. The latent heat of fusion of ice is 334 kJ/kg, the specific heat of ice is 2050 J/(kg·°C), and the specific heat of water is 4180 J/(kg·°C). Determine how much energy is required if the final temperature of the system is to reach 39 °C.

12) A 600–g bar of ice is initially at –33 °C. The latent heat of fusion of ice is 334 kJ/kg, the specific heat of ice is 2050 J/(kg·°C), and the specific heat of water is 4180 J/(kg·°C). Calculate the final temperature of the system if 383.9 kJ of energy is added by heat.

13) A system of 480 g of water is initially at 19 °C. The latent heat vaporization of water is 2260 kJ/kg, the specific heat of water is 4180 J/(kg·°C), and the specific heat of steam is 2080 J/(kg·°C). Determine how much energy is required if the final temperature of the system is to reach 195 °C.

14) A system of 795 g of water is initially at 49 °C. The latent heat vaporization of water is 2260 kJ/kg, the specific heat of water is 4180 J/(kg·°C), and the specific heat of steam is 2080 J/(kg·°C). Calculate the final temperature of the system if 2209 kJ of energy is added by heat.

15) We want heat an 165–g block of gold from 18 °C to 190 °C. The specific heat of gold is 129 J/(kg·°C). Calculate the heat we have to add.