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Heating, Cooling, and Phase Changes

Practice Sheet #46

Give the equation used to solve each problem and answer with the appropriate units.

(1) How much heat is released when 20.0 g of liquid water freezes?

(2) How much heat is required to boil 75.00 g of water?

(3) How much heat is required to increase the temperature of 200 g of aluminum by 10.0 °C?

(4) How much heat is required to increase the temperature of 30.0 g of copper from 20.0 °C to 60.0 °C?

(5) What mass of ethanol (C_2H_6O) can be boiled with 2.93×10^4 J of heat energy? How many moles is this?

(6) What mass of iron can be heated from 100.0 °C to 150.0 °C with 3375 J of heat energy? How many moles is this?

(7) What mass of gold can be can be heated from 500 °C to 800 °C with 7.80 kJ of heat energy? How many moles is this?

(8) How much heat is released when 2.00 kg of aluminum solidifies? How many kJ is this?

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(9) What mass of acetic acid ($HC_2H_3O_2$) can be condensed with 7.9×10^3 J of heat energy? How many moles is this?

(10) How much heat is required to boil 260 g of liquid mercury? How many kJ is this?

(11) The temperature of a 20.0 g sample of iron is raised by adding 135 J of heat. If the initial temperature of the iron is 21.5 °C, what is the final temperature?

(12) A 32.0 g sample of copper is cooled by releasing 156 J of heat. If the initial temperature of the copper is 45.2 °C, what is the final temperature?

(13) If freezing 500 g of ammonia releases 1.66×10^5 J of heat energy, determine the heat of fusion for ammonia.

(14) If boiling 20.0 g of methanol requires 21600 J of heat energy, determine the heat of vapourization for methanol.

(15) A 15.0 g sample of manganese metal is warmed by adding 118.8 J of heat. If the temperature increases from 23.2 °C to 39.7 °C, what is the specific heat capacity of manganese?

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(16) A 25.0 g sample of tin metal is warmed by adding 201.5 J of heat. If the temperature increases from 24.8 ºC to 55.8 ºC, what is the specific heat capacity of tin?