11. Calorimetry previous year questions 2000-17

2017

1. Define heat capacity and state its SI units [2 marks]
2. Why is the base of cooking pan generally made thick [2 marks]
3. A solid of mass 50 g at 150 °C is placed in 100 g of water at 11 °C, when the final temperature recorded is 20 °C. Find the specific heat capacity of the solid. [specific heat capcity of water = 4.2 J/g°C] [2 marks]
4. (i) How is the transference of heat energy by radiation prevented in a calorimeter
   (ii) You have a choice of 3 metals A, B and C of specific heat capacities 900 $JKg^{-1}{}^{o}C^{-1}$, 380 $JKg^{-1}{}^{o}C^{-1}$, 460 900 $JKg^{-1}{}^{o}C^{-1}$ reaspectively. To make a calorimeter which material will you select? Justify your answer [4 marks]
5. Calculate the mass of ice needed to cool 150 g of water contained in a calorimeter of mass 50 g at 32 C such that the final temperature is 5 C. [specific heat capacity of calorimeter = 0.4 $Jg^{-1}{}^{o}C^{-1}$, specific heat capcity of water = 4.2 $Jg^{-1}{}^{o}C^{-1}$ latent heat capacity of ice = 300 J/g] [3 marks]

2016

1. (i) What is the principle of method of mixtures? **[3 marks]**
   (ii) What is the other name given to it?
   (iii) Name the law on which the principle is based?
2. State two factors upon which the heat absorbed by a body depends? **[2 marks]**
3. What do you understand by the following statements **[2 marks]**
   a. The heat capacity of the body is 60 JK^{-1}
   b. The specific heat capacity of lead is 130 $JKgK^{-1}$
4. Calculate the mass of ice required to lower the temperature of 300 g of water at 40°C to water at 0°C (specific latent heat of ice = 336 J/g, specific heat capacity of water = 4.2 J/g°C) **[2 marks]**

2015

1. Rishi is surprised when he saw water boiling at 115 °C in a container. Give reasons as to why water can boil at the above temperature. **[2 marks]**
2. Which property of water makes it an effective coolant? **[1 mark]**
3. (i) Water in lakes and ponds do not freeze at once in cold countries. Give a reason in support of your answer.
   (ii) What is the principle of calorimetry?
   (iii) Name the law on which the principle is based
   (iv) State the effect of increase of impurities on the melting point of ice **[4 marks]**
4. A refrigerator converts 100 g of water at 20 °C to ice at -10 °C in 35 minutes. Calculate the average rate of heat extraction in terms of watts. Given: Specific heat capacity of ice = $Jg^{-1}C^{-1}$, specific heat capacity of water = 4.2 $Jg^{-1}C^{-1}$, specific latent heat of fusion of ice = 336 Jg^{-1} **[4 marks]**

2014

1. Heat energy is supplied at a constant rate 10 100g of ice at 0 °C. The ice is converted into water at 0 °C in 2 minutes. How much time will be required to raise the temperature of water from 0 °C to 20 °C? [given: Sp. Heat capacity of water 4.2 J g^{-1} C^{-1}, sp. Latent heat of ice = 336 Jg^{-1}] **[4 marks]**

2. Specific heat capacity of substance A is 3.8 $Jg^{-1}K^{-1}$ whereas the specific heat capacity of substance B is 0.4 $Jg^{-1}K^{-1}$]
    a. Which of the two is a good conductor of heat?
    b. How is one led to the above conclusion?
    c. If substances A and B are liquids then then which one would be more useful in car radiators **[3 marks]**

2013

1. Define the term 'heat capacity' and state its S.I. unit **[2 marks]**
2. How much heat energy is released when 5g of water at 20 °C changes to ice at 0 °C. [Specific heat capacity of water = 4.2 $Jg^{-1}C^{-1}$. Specific latent heat of fusion of ice is = 336 J g^{-1}] **[2 marks]**
3. It is observed that the temperature of the surroundings starts falling when the ice in a frozen lake starts melting. Give a reason for the observation **[2 marks]**
4. How is the heat capacity of the body related to its specific heat capacity **[1 mark]**
5. Why does a bottle of soft drink cool faster when surrounded by ice cubes than by ice cold water, both at 0 °C **[2 marks]**
6. A certain amount of heat Q will warm 1 g of material X by 3 °C and 1 g of material by Y by 4 °C. which material has a higher specific heat capacity **[1 mark]**
7. A calorimeter of mass 50g and specific heat capacity 0.42 $Jg^{-1}C^{-1}$ contains some mass of water at 20 °C. Find the mass of water used in the calorimeter. [specific heat capacity of the metal piece = 0.3 $Jg^{-1}C^{-1}$; Specific heat capacity of water = 4.2 $Jg^{-1}C^{-1}$] **[4 marks]**

2012

1. Differentiate between heat capacity and specific heat capacity **[2 marks]**
2. A hot solid of mass 60 g at 100 °C is placed in 150g of water at 20 °C. The final steady temperature recorded is 25 °C. calculate the specific heat capacity of the solid [Specific heat capacity of water = 4.2 $Jg^{-1}C^{-1}$] **[2 marks]**
3. Write an expression for the heat energy liberated by a hot body **[1 mark]**
4. Some heat is provided to a body to rise its temperature by 25 °C. What will be the corresponding rise temperature of the body as shown on the kelvin scale **[1 mark]**
5. What happens to the average kinetic energy of the molecules as ice melts at 0 °C **[1 mark]**
6. A piece of ice at 0 °C is heated at a constant rate and its temperature recorded at regular intervals till steam is formed at 100 °C. Draw a temperature-time graph to represent the change in phase. Label the different parts of your graph. **[3 marks]**
7. 40 g of ice at 0 °C is used to bring down the temperature of a certain mass of water at 60 °C to 10 °C. Find the mass of water used. [Specific heat capacity of water = 4.2 $jg^{-1}C^{-1}$, specific latent heat of fusion of ice = 336 x 10^3 J kg^{-1}] **[4 marks]**

2011

1. Differentiate between heat and temperature **[2 marks]**
2. Define calorimetry **[1 mark]**
3. What is meant energy degradation **[1 mark]**
4. 200g of hot water 80 °C is added to 300 g of cold water at 10 C. calculate the final temperature of the mixture of water. Consider the heat taken by the container to be negligible. [Specific heat capacity of water = 4.2 $Jg^{-1}C^{-1}$] **[2 marks]**

5. Explain why the weather becomes very cold after a hail storm. **[1 mark]**
6. What happens to the heat supplied to a substance when the heat supplied causes no change in the temperature of the substance? **[2 marks]**
7. When 1g of ice at 0 °C melts to form 1g of water at 0 °C then, is the latent heat absorbed by the ice or given out by it? **[1 mark]**
8. Give one example where high specific heat capacity of water is used as a heat reservoir **[1 mark]**
9. Give one example where high specific heat capacity of water is used for cooling purposes **[1 mark]**
10. 250g of water at 30 °C is present in a copper vessel of mass 50g. Calculate the mass of ice required to bring down the temperature of the vessel and its contents to 5 °C [Specific heat capacity of water = 4.2 $Jg^{-1}C^{-1}$, specific latent heat of fusion of ice = 336 x 10^3 J kg^{-1}, specific heat capacity of copper vessel = 400 $Jkg^{-1}C^{-1}$] **[4 marks]**

2010

1. (i) Name the liquid which has the highest specific heat capacity
   (ii) Name two factors on which the heat absorbed or given out by a body depends
   (iii) An equal quantity of heat is supplied two substance A and B. The substance A shows a greater rise in temperature. What can you say about the heat capacity of A as compared to that of B [3 marks]

2009

1. 40 g of water at 60 C is poured into a vessel containing 50 g of water at 20 C. The final temperature recorded is 30 C. calculate the thermal capacity of the vessel. [take specific heat capacity of water as 4.2 $Jg^{-1}{}^{o}C^{-1}$] [2 marks]
2. (i) what is the principle of method of mixtures
   (ii) Name the law on which this principle is based [3 marks]

2008

1. (i) Define heat capacity of a given body. What is its SI unit
   (ii) What is the relation between heat capacity and specific heat capacity of a substance? [3 marks]

2007

2. Some hot water was added to three times its mass of cold water at 10 C and the resulting temperature was found to be 20 C. What was the temperature of hot water [2 marks]
3. In a laboratory experiment to measure specific heat capacity of copper, 0.02 Kg of water at 70 C was poured into a copper calorimeter with a stirrer of mass 0.16 Kg initially at 15 C. After stirring, the final temperature reached to 45 C. Specific heat of water is taken as 4200 $JKg^{-1}{}^{o}C^{-1}$
   a. What is the quantity of heat released per kg of water per 1 C fall in temperature
   b. Calculate the heat energy released by water in the experiment in cooling from 70 C to 45 C
   c. Assuming that the heat released by water is entirely used to raise the temperature of calorimeter from 15 C to 45 C, calculate the specific heat capacity of copper. [4 marks]

2006

1. Give two reasons, why copper is preferred over other metals for making calorimeter [2 marks]
2. Explain, why water is used in hot water bottles for fomentation and also as a universal coolant [3 marks]
3. A piece of iron of mass 2.0 kg has a thermal capacity of 996 J/C
    a. How much heat is needed to warm it by 15 C
    b. What is its specific heat capacity in SI unit [4 marks]

2005

1. Water falls from a height 50 m. calculate the rise in temperature of water when it strikes the bottom. [g=10 m/s2, specific heat capacity of water=4200 J/kg] [3 marks]

2003

1. (i) Does land cool at a slower or faster rate than water? Give one reason
   (ii) Explain why steam pipes warm a building more effectively than hot water pipes in cold countries [2 marks]

2002

2. (i) Define specific heat capacity of a substance. State its SI unit
   (ii) Give on example of each, where high specific heat capacity of water is used
        a. In cooling
        b. As heat resistor [3 marks]