2. An experiment is designed to estimate the temperature of a bunsen flame. In this method a small steel ball is to be heated to the temperature of the bunsen flame, and the temperature is to be determined by the method of mixtures. A known mass m of water in a plastic cup, a thermometer and a stirrer are provided. The specific heat capacity of water $(C_1)$ and the specific heat capacity of steel $(C_2)$ are given. Heat absorbed by the cup and the stirrer can be neglected.

(a) (i) What are the three quantities that you will need to measure ? Indicate them in the order that you take these measurements ?

$X_1 =$
$X_2 =$  } ( one line each)
$X_3 =$

(ii) State precautions that you should take in this experiment to ensure accuracy of the measurements.

(1) ( one line)

(2) ( one line)

(b) (i) Write down an expression for the temperature $(\theta)$ of the bunsen flame in terms of the quantities mentioned above. ( 2 lines)

(ii) Even though the heat loss to the surrounding by conduction, convection and radiation is neglected. still there is one more process through which heat can be lost from the system due to the temperature of the ball being high. What is this process ? ( one line)

(iii) The heat loss due to the reason mentioned in (b) (ii) can be reduced by selecting a proper liquid instead of water, what is the most important property that the liquid must process ? (one line)

(c) Can you perform this experiment with a lead ball instead of steel ball ? Explain your answer .(one line)

(d) Name an instrument which can be used to measure the temperature of the flame directly, instead of the above method. (one line)