1. Consider a cup of coffee at 95°C and a bath of water at 40°C.

a. By considering the molecules of water, explain why the coffee is at a

The coffee is at a higher temperature since the molecules of water have a higher average kinetic energy.

r?

The bath of water has the greatest internal energy, since internal energy is the sum total of the potential and kinetic energies of all the molecules of a substance, and there are many more molecules in the bath.

2. The diagram below shows a reverse cycle air conditioner.

a. What does the term "reverse cycle" mean

Reverse cycle means it can either heat or cool a room.

3. Explain how the air conditioner is able to cool a room?

A refrigerative air-conditioner acts as a heat pump. Inside a heat pump, a volatile liquid, known as a refrigerant, is used to remove heat. The refrigerant is circulated inside a closed circuit of pipes by a pump. Evaporation occurs inside the evaporator pipes as pressure is reduced through an expansion valve. The latent heat of vaporisation, required to evaporate to the liquid, is removed from the air, making it cooler. As the refrigerant condenses back to a liquid state outside the house, energy is released.

4. Consider the following advertisement for an evaporative air cooler. Sketch a diagram of the internal structure of such a cooler and explain how it works from a particle point of view.

5. Complete the following conversions:

a. 25.0 ^{o}C to K **298 K**

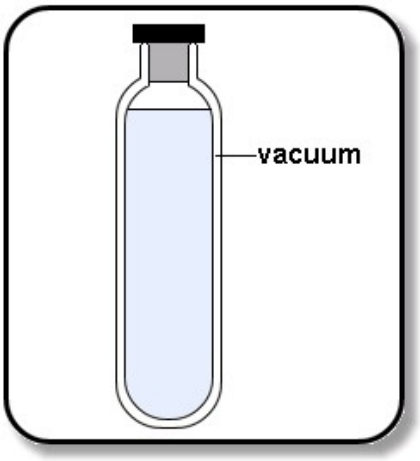
b. 4.50 x 10^{2} K to ^{0}C **177^{o}C**

Evaporative air coolers

Do Aussie summers make you feel like you're roasting in a dry oven? If you're desperate to cool down with a dash of moisture in the air, perhaps you should consider a portable

As air is passes through the moist pads it causes evaporation to increase on the water.
As the water evaporates, the most energetic molecules leave the water droplets and therefore the temperature of the water

The vacuum flask is a device for keeping liquids warm (or cold) in colder (or warmer) surroundings
of an insulate
consists of a d
reduces condu
The inner wal
which reflects
by convection



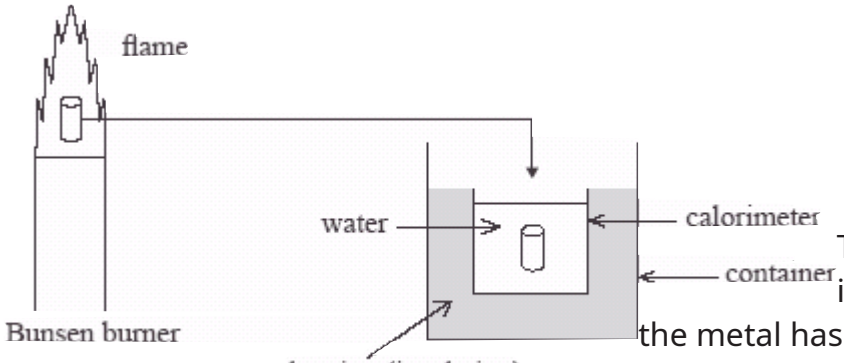
State the function of a vacuum flask and explain how it reduces heat transfer?

7 A website states that

The steam is probably at the same temperature as the boiling water, but it contains more energy. The burns from steam are much more severe since as the steam at 100ºC condenses to water at 100ºC, it releases latent heat of vaporisation. This latent heat release about 1000 times more energy per unit mass than does water cooling.
So steam burns transfer the latent heat of vaporisation first, then the kinetic energy, so more damage is done.

[12 marks]

In an experiment to measure the temperature of a Bunsen burner flame. A 250g piece of copper is held in the flame of a Bunsen burner for several minutes. The metal is then quickly transferred to 285 ml of water contained in a 40.0 g calorimeter at 288 K



The water into which the metal has been placed is stirred until it reaches a steady temperature of 353 K.

So that the metal does not lose too much heat to the environment as this would lead to a lower than expected result.✓

k]

b. Explain why the water is stirred.

To ensure that the water is evenly heated, so that the final temperature is a good representation of all the water.

k]

c. Assuming negligible energy losses in the processes involved, he

Q_{gained} = Heat gained by water + Heat gained by copper calorimeter ✓

⇨ Q_{gained} = $mc\Delta t$ + $mc\Delta t$

⇨ Q_{gained} = (0.285)(4180)(353-288) + (0.04)(380)(353-288)

⇨ Q_{gained} = 77434 + 988

⇨ Q_{gained} = 78.4 kJ (78422 J) ✓✓

d. Using your answer from c) determine the temperature of the he

Heat lost by copper piece = Heat gained by copper calorimeter ✓

$mc\Delta t$ = 78422

⇨ (0.25)(380) Δt = 78422

⇨ Δt = 825✓

⇨ Initial temp = 825 +353

⇨ Initial temp = 1.18×10^3 K ✓

From data sheet for ethyl alcohol
Boiling point = 78°C (351K) and c = 2400Jkg-1K-1

Q to boil = Heat gained by ethyl alcohol + Heat gained by copper calorimeter

⇨ Q_{boil} = $mc\Delta t$ + $mc\Delta t$

⇨ Q_{boil} = (0.285)(2400)(351-288) + (0.04)(380)(351-288)

⇨ Q_{boil} = 43092 + 958

⇨ Q_{boil} = 44 kJ ✓✓

Thus heat supplied is enough to boil the ethyl alcohol so the temp will only go to 351 K, so temp change factor is about 1 (ie unchanged) NB: about 200g of the ethyl alcohol will evaporate) ✓