Question#18383

Molecular physics

1kg of water at 273K is brought in contact with a heat reservoir at 373K

1-What is the change in entropy of water when temp reaches 373K

2-what is change in entropy of

the reservoir

the universe

Answer:

Let:

$T_1 = 273K$

$T_2 = 373K$

$m = 1\,kg$

$$\Delta E - ?$$

Such as $\Delta E = \frac{\Delta Q}{T}$, were: ΔE - changing of entropy, ΔQ - changing of heat, T - temperature.

For water:

$$\Delta E = \frac{cm(T_2 - T_1)}{T_2}$$

Were c - heat capacity of water = 4.1813 KJ/kg*K

$$\Delta E = \frac{4.1813 * 1 * (373 - 273)}{373} = 1.12\,KJ$$

The entropy of water is increase on 1.12 KJ

According to the law of conservation energy:

The entropy of reservoir is decrease on 1.12 KJ,

And the entropy of universe is not change.