

14.15 refrigeration requires electrical & mechanical work.

It cannot use the extracted heat to run the compressor.

Rather, energy must be provided from an external source

& the conversion of energy into work is inevitably less

than 100% efficient. Waste heat is always produced.

14.16 PFF heats up the surrounding space.

~~heat is transferred~~

14.22 (a) 200 g H_2O : more molecules, more microscopic rearrangements, more entropy

(b) 100% water liquid: there are 5.5 moles

liquid and only 0.004 mol H_2O vapour

(vapor has more entropy per mole)

(c) 1 mole Ar @ 1 atm: this larger volume leads to more microstates

(d) 1 mol CH_4 at 2 atm: more molecular rearrangements, more entropy.

14.23 (a) octane because it is larger

(b) CH_4 @ 300K because entropy increases with temperature.

(c) The liquid has more disorder.

(d) both have entropy = 0.

14.24 (a) A crystalline substance @ 0K has entropy = 0

(b) different substances show different amount of disorder when compared to their

hypothetical states @ 0K.