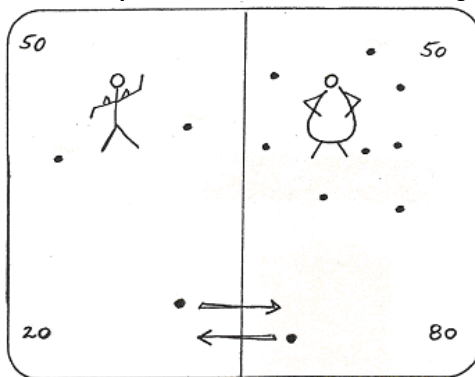


Motivation: The story of Joe & Schmo at "EQUILIBRIUM".



**Aim:** How does the concept of equilibrium apply to chemistry?

- 1) Equilibrium is reached when opposite changes occur at the **same rate** (how fast) and time.

As a result, from this point on, the **amounts** (how much) remain the same (are **constant**).

And, there's **no** observable change.

(Technically, it's called *dynamic* equilibrium b/c it appears as if nothing is happening, but, in reality, change is occurring in opposite directions at the same rate & time.)

2) Applications:

A) **Phase** Equilibrium



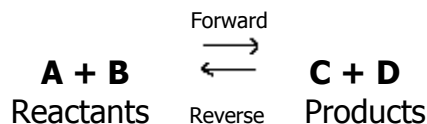
rate evaporation = rate condensation,  
amounts of water liquid and vapor are constant

B) **Solution** Equilibrium – a saturated solution



rate of dissolving = rate of crystallizing,  
amounts of dissolved & undissolved solute are constant

C) **Chemical** Equilibrium



Only a **reversible** reaction can reach equilibrium.

At equilibrium, the **rate** of forward reaction = the **rate** of the reverse reaction.

As a result, the **concentrations** of the products and reactants ( [A], [B], [C], [D] ) **remain the same**.

And, so does T, P, color, etc...