**Log P**:
The log of the partition coefficient between an organic solvent and an aqueous phase. In most cases, we assume the organic phase is octanol. Nonetheless, the organic solvent should be specified because sometimes it can be other organic solvents such as ether or chloroform.

**P = (Concentration of solute in organic phase) / (Concentration of solute in aqueous phase)**

- High log P means the chemical prefers to stay in the organic phase.
  - E.g. hexane or lipid
- Low log P value or negative value means the chemical prefers to stay in the aqueous phase.
  - E.g. something with lots of oxygen or nitrogen such as glucose ($C_6H_{12}O_6$) or ammonia ($NH_3$)

**Log $K_{ow}$**
The concept is same as Log P but the organic phase is specified to be octanol and the aqueous phase to be water. In other words, Log P can be same as Log $K_{ow}$ if the organic phase of Log P is set to be octanol.

**$K_{ow}$ = (Concentration of solute in octanol) / (Concentration of solute in water)**

- High Log $K_{ow}$ means the chemical prefers to stay in the organic phase
- Low Log $K_{ow}$ value or negative value means the chemical prefers to stay in the aqueous phase.

**$pK_a$ or –Log $K_a$**
A quantitative metric to compare how much $H^+$ ions are released between different weak acids (acids that only dissociate partially). The "p" means "negative log"

$$HA \dashrightarrow A^- + H^+$$
$$K_a = [A^-][H^+] / [HA]$$

- High $pK_a$ means the chemical is not very acidic, and likes to hang on its $H^+$ ion
- Low or negative $pK_a$ means the chemical is acidic, and likes to release its $H^+$ ion

**Note: pKa of ethanol is 16 and pKa of toluene is 35. So ethanol is more acidic, and is $10^{(35-16)}$ or $10^{19}$ times more acidic than toluene.