

## Questions that relate to formulas

In addition to the factual content of the chapters, you must also be prepared to do calculations using the following formulas:

<p><b>Dilution (used to create a dilute solution from a concentrated stock solution)</b></p> $C_i V_i = C_f V_f$ <p>i = initial (starting)      C = concentration of solute f = final (desired)      V = volume of solution</p>
<p><b>Gibbs Free Energy</b></p> $\Delta G = \Delta H - T\Delta S$ <p><math>\Delta G</math> = change in Gibbs free energy <math>\Delta S</math> = change in entropy <math>\Delta H</math> = change in enthalpy T = absolute temperature (in Kelvin)</p>
$\text{pH}^* = -\log_{10} [\text{H}^+]$

*\*For the purposes of this course, students will not be required to perform calculations using the pH equation; however, they must understand the underlying concepts and applications.*

1. How many times more acidic is a pH of 2 compared to a pH of 3?
2. How many times more basic is a pH of 13 compared to a pH of 9?
3. Water is added to .5L of a 2.5 mol/L solution of hydrochloric acid until the final volume is 2.0L. What is the concentration of the diluted solution?
4. Write the **molecular** formula and the **structural** formula for methane, 1 carbon and 4 hydrogens.