K is the gain of the amplifier and AB is the loop gain. Let τ = CR.

$$A = K = \frac{R_1 + R_2}{R_2}$$
$$B = \frac{-V_+}{V_{out}} = \frac{Z_2}{Z_1 + Z_2}$$
$$Z_1 = \frac{1}{sC} + R = \frac{1 + sCR}{sC}$$
$$Z_2 = \frac{1}{sC} || R = \frac{R}{1 + sCR}$$
$$B = -\frac{R}{R + \frac{(1+sCR)^2}{sC}} = -\frac{sCR}{1 + 3sCR + s^2C^2R^2}$$
$$AB = -\frac{-sK\tau}{1 + 3s\tau + s^2\tau^2}$$

This transfer function has a zero at $\omega = 0$ and two poles at $\omega_o = \frac{1}{\tau}$. —AB($\omega_o$)— = $\frac{K}{3}$. A Nyquist plot is a plot of the frequency reponse of a system. The stability of an LTI closed-loop system is done by examining the Nyquist plot of the open loop system. If the point -1 + j0 is encircled by the Nyquist plot, then the closed-loop system in unstable. If the plot does not encircle the -1+j0 point, then it is stable. For an oscillator, the poles are ideally on the imaginary axis. This is expressed in the Nyquist plot by the loop passing through the -1+j0 point. For the Wien-Bridge oscillator, the Nyquist plot passes through the -1+j0 point when K = 3. This results in a closed loop gain of:

$$H(s) = \frac{V_{out}}{V_{in}} = \frac{A}{1 + AB}$$
$$= \frac{3}{1 - \frac{3s\tau}{1+3s\tau+s^2\tau^2}} = \frac{3(1 + 3s\tau + s^2\tau^2)}{1 + s^2\tau^2}$$

with poles at $\frac{\pm j}{\tau}$. This will produce an output sine wave that oscillates from rail to rai at a frequency of $f = \frac{1}{2\pi RC}$. There are a variety of methods that can be used to limit the output of the oscillator, however many of them will produce additional harmonics. The Wien-Bridge oscillator was the first product made by Hewlitt-Packard. Their original design used a lightbulb in place of R_2 which provided a soft rise to a limited output, reducing the amount of harmonics.