Green Chemistry Metrics Equations

- $E\ Factor = \dfrac{Total\ waste\ (kg)}{kg\ product}$

- $Effective\ mass\ yield\ (\%) = \dfrac{Mass\ of\ products \times 100}{Mass\ of\ non-benign\ reagents}$

- $Atom\ economy = \left(\dfrac{m.w.of\ product\ C}{m.w.of\ A + m.w.of\ B}\right) \times 100$

- $Atom\ economy = \left(\dfrac{m.w.of\ product\ G}{m.w.of\ A + m.w.of\ B + m.w.of\ D + m.w.of\ F}\right) \times 100$

- $Mass\ Intensity\ (MI) = \dfrac{Total\ mass\ used\ in\ the\ process\ (kg)}{Mass\ of\ product\ (kg)}$

- $E\ Factor = MI - 1 = \dfrac{Total\ mass\ used\ in\ process - mass\ of\ product}{Mass\ of\ product}$ equals waste

- $Mass\ productivity = \dfrac{I}{MI} \times 100$

$$= \dfrac{Mass\ product}{Total\ mass\ in\ process} \times 100$$

- $\%\ Carbon\ efficiency = \dfrac{Amount\ of\ carbon\ in\ product \times 100}{Total\ carbon\ present\ in\ reactants}$

- $Carbon\ efficiency = \dfrac{no.of\ moles\ of\ product \times no.of\ carbons\ in\ product \times 100}{(moles\ of\ A \times carbons\ in\ A) + (moles\ of\ B \times carbons\ in\ B)}$

- $RME = \dfrac{mass\ of\ product\ C}{mass\ of\ A + mass\ of\ B}$