

Differential Equations

2nd-stage-chemistry

Lecture 2

2021-2022

Separable Differential Equations:

A separable differential equations is the equation of the form $F(x, y, y') = 0$, which can be factored $y' = M(x)N(y)$ where $M(x)$ is the function of x and $N(y)$ is the function of y , It means that separated to two disjoint parts.

To find a general solution for a first order separable D. E., we use integrate both sides of the differential equation after you have separated the variables.

$$\frac{dy}{dx} = M(x)N(y) \rightarrow \frac{dy}{N(y)} = M(x)dx \rightarrow \int \frac{dy}{N(y)} = \int M(x)dx$$

In order to find a general solution, you will have to be able to find an antiderivative on both sides of the integral equation.

Examples:

1) **Solve** $xy - 2y' = 0$

2) **Solve** $2xy + 6x + (x^2 - 2)y' = 0$

3) **Solve** $\frac{dy}{dx} + \frac{\sin x}{y} = 0$ where $y(0) = 1$

(Hint: when the question gives initial value, we must find the particular solution)