**Derivation: Plate Volume Method (PVM)**

Considering the decolorization of dye in the solidified media as bulk phenomena, the volume of solid plate (Petri plate) before decolorization can be calculated as;

 

Where, VP = volume of solid plate; RP = radius of solid plate; h = height of solid plate

Since, the height of the solid plate containing dye is constant before and after the decolorization reaction, only radius of the decolorized region will vary with time interval (as radius of Petri plate without solid media is constant). So, the volume of decolorized region, ‘VD’ is given by;

 

Where, RD = radius of decolorized region.

As, 

Therefore, ****

Where, ‘dP’ and ‘dD’ are the diameters of solid plate and decolorized region respectively.

Thus, putting values from equation (3) in equation (1) and (2), they can be modified as follows;

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Comparing the equations (4) and (5) and cancelling constant terms, π and h we get;

 

Percentage decolorization in terms of change in the volume of decolorized region as compared to solid plate volume can be written as;

 

Putting values from (6) in equation (7), we get;

 