

80.

$$r = k[A]^2 \cdot [B]^1 \quad \text{--- (1)}$$

given  $[A] \rightarrow 1.5 \text{ times}$ ,  $[B] \rightarrow 3 \text{ times}$ .  
 $= 3/2$

$$r' = \left(\frac{3}{2}\right)^2 \cdot (3) \cdot r \Rightarrow r' = \frac{9}{4} \times 3 r \Rightarrow r' = \frac{27}{4} r$$

$r' = 6.75r$

Type-III table Based.

Q.1. Given the following data;  $A + B \rightarrow P$

[A] (mol/ltr) [B] (mol/ltr) Rate (mol/ltr-sec)

	1	2	3
[A]	2	2	4
[B]	2	4	4
Rate	2	4	16

What is rate law equation.

Sol.  $r = k[A]^x \cdot [B]^y$  - (1)

Row 3 ÷ 2  $\frac{16}{4} = \frac{(2)^x}{(2)^x} \left(\frac{4}{2}\right)^y$

$4 = 2^y$

$2^2 = 2^y \Rightarrow \boxed{y=2}$

Row 2 ÷ 1

$\frac{4}{2} = \left(\frac{2}{1}\right)^x \cdot 1$

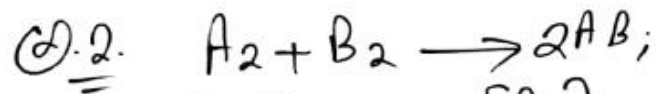
$1 = 2^x \Rightarrow 2^0 = 2^x$

$\boxed{x=0}$

$$\left\{ \begin{array}{l} 2^0 = 3^0 = 4^0 \\ a^0 = b^0 \\ (1)^0 = 1 \end{array} \right.$$

(i)  $r = k[A]^0 \cdot [B]^2$

(ii) O. of Rxn = 2 + 0 = 2



$[A_2]$	$[B_2]$	rate
0.2	0.2	0.04
0.1	0.4	0.04
0.2	0.4	0.08

- (i) What order with respect to  $A_2$  &  $B_2$ .  
 (ii) Determined rate constant.

Sol.

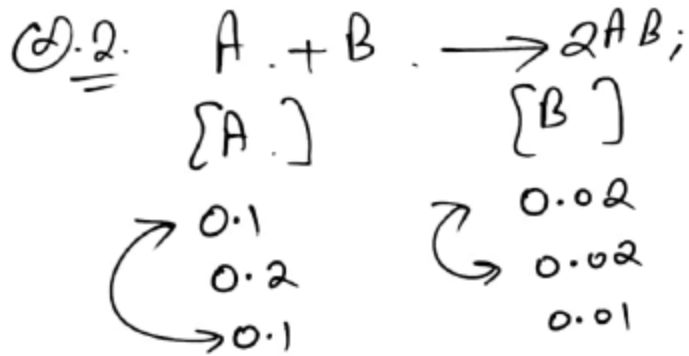
$r = k[A_2]^x \cdot [B_2]^y$  — (1)

row (3) ÷ (1)      row (2) ÷ (1)

$$\frac{2 \cdot 0.08}{0.04} = (2)^y \quad \left| \quad \frac{0.04}{0.04} = 2^x \right.$$

$$2^1 = 2^y \Rightarrow \boxed{y = 1} \quad \left| \quad \boxed{x = 1} \right.$$

(i)  $r = k[A_2]^1 \cdot [B_2]^1$   
 order of  $A_2$  &  $B_2 = 1$   
 order of rxn = 1+1 = 2  
 (ii) Put data from row (1) to rate law.  
 $4 \times 10^{-2} = k(2 \times 10^{-1})^1 (2 \times 10^{-1})^1$   
 $\boxed{k = 1} \text{ mol}^{-1} \text{ ltr. sec}^{-1}$



rate Determined order of rxn.

$0.005 = 5 \times 10^{-3}$   
 $0.02 = 2 \times 10^{-2}$   
 $0.0025 = 25 \times 10^{-4}$

Sol.

$$r = k[A]^x[B]^y \quad \text{--- (1)}$$

row 3  $\div$  (1)

$$\frac{5 \times 25 \times 10^{-4}}{5 \times 10^{-3}} = \left(\frac{0.01}{0.02}\right)^y$$

$$0.5 = \left(\frac{1}{2}\right)^y$$

$$\left(\frac{1}{2}\right)^1 = \left(\frac{1}{2}\right)^y \Rightarrow \boxed{y = 1}$$

row 2  $\div$  1

$$\frac{2 \times 10^{-2}}{5 \times 10^{-3}} = \left(\frac{0.2}{0.1}\right)^x$$

$$\frac{2}{5 \times 10^{-1}} = (2)^x \Rightarrow \frac{2 \times 10^2}{5} = 2^x$$

$$2^2 = 2^x \Rightarrow \boxed{x = 2}$$

$r = k[A]^2[B]^1$   
 O. of rxn = 2 + 1 = 3.

Ques  $A + 5B + 6C \rightarrow 3D + 3E$

$[A]$	$[B]$	$[C]$
0.35	0.35	0.35
$\frac{0.70}{0.35}$ ✓	$\frac{0.35}{0.35}$ ✓	$\frac{0.35}{0.35}$
0.70	0.70	0.70
0.70 ✓	$\frac{0.35}{0.35}$ ✓	0.70

rate  
 $8 \times 10^{-4}$   
 $3.2 \times 10^{-3}$   
 $6.4 \times 10^{-3}$   
 $3.2 \times 10^{-3}$

Determined order of rxn.

Sol.  $r = k[A]^x[B]^y[C]^z$  — (1)

row 2 ÷ 1	row 3 ÷ 2
$\frac{3.2 \times 10^{-3}}{8 \times 10^{-4}} = 2^x$	$2 = 2^y$
$\frac{3.2 \times 10^{-4}}{8} = 2^x$	$\boxed{y = 1}$
$2^2 = 2^x$	
$\boxed{x = 2}$	

row 4 ÷ 2
$1 = 2^z$
$2^0 = 2^z$
$\boxed{z = 0}$

$B < A < AB$

$r = k[A]^2[B]^1[C]^0$   
 O. of rxn =  $2 + 1 + 0 = 3$ .