● **At 518^0 C, the rate of decomposition of a sample of gaseous acetaldehyde, initially at a pressure of 363 Torr, was 1.00 s^{-1} when 5% had reacted and 0.5 Torr s^{-1} when 33% had reacted. The order of the reaction is :**

(1) 3

(2) 1

(3) 0

(4) 2

Solution:

r_1 = 1 torr/sec

When 5% is reacted, 95% is unreacted.

r_2 = 0.5 torr/sec

When 33% is reacted, (67% is unreacted)

m = order of reaction,

unreacted = a-x

$r_1/r_2 = [(a-x_1)/(a-x_2)]^m$

$1/0.5 = (0.95/0.67)^m$

$2 = (1.414)^m$

$\Rightarrow 2 = \sqrt{2}^m$

$\Rightarrow m = 2$

So order of the reaction is 2.

Hence option (4) is the answer.