

QUESTION

2. At 518°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

ANSWER :

Solution:

$$r_1 = 1\text{ torr/sec}$$

When 5% is reacted, 95% is unreacted.

$$r_2 = 0.5\text{ torr/sec}$$

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.