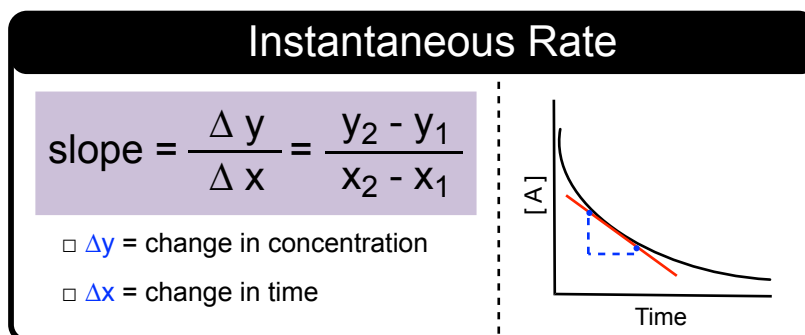
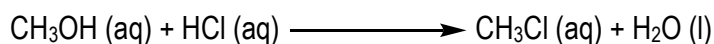


CONCEPT: INSTANTANEOUS RATE

- **Instantaneous Rate** is the rate a reaction at any particular _____ in time.
 - Calculated using the _____ of the **tangent line** to the curve of that point.
 - While the rate of reaction decreases with time, instantaneous rate is _____.



EXAMPLE: Determine the instantaneous rate for the following reaction:



Time (min)	[HCl] (M)
0.0	1.90
53.0	1.63
106.0	1.41
213.0	1.20
247.0	1.01

PRACTICE: Consider the decomposition of dinitrogen pentoxide: $2 \text{N}_2\text{O}_5 (\text{g}) \longrightarrow 4 \text{NO}_2 (\text{g}) + \text{O}_2 (\text{g})$

What is the instantaneous rate of this reaction at 20 seconds?

Time (sec)	[NO ₂] (M)
0.0	0
10.0	0.96
20.0	1.34
30.0	1.61
40.0	1.41