Daily Tutorial Sheet-13	Level - 3

147.(D) For the given reaction.

$$-\frac{1}{3}\frac{\Delta[BrO^-]}{\Delta t}=\frac{\Delta[BrO_3^-]}{\Delta t}=+\frac{1}{2}\frac{\Delta[Br^-]}{\Delta t}$$

Given, $\frac{\Delta[BrO^-]}{\Delta t}=0.056 L\,mol^{-1}s^{-1}[BrO^-]^2$ (being second order reaction)

(a) $\frac{\Delta[BrO_3^-]}{\Delta t}=-\frac{1}{3}\frac{\Delta[BrO^-]}{\Delta t}=\frac{0.056}{3}=0.019 L\ mol^{-1}s^{-1}$

Thus, true

(b) $\frac{\Delta[Br^-]}{\Delta t}=\frac{2}{3}\left[-\frac{\Delta[BrO^-]}{\Delta t}\right]=\frac{2}{3}\times 0.056=0.037\,mol\ L^{-1}s^{-1}$

Thus, true

(c) $-\frac{\Delta[BrO^-]}{\Delta t}=k[BrO^-]^2=0.056(5)^2=0.056 mol\,L^{-1}s^{-1}$

Thus, true

148.(C) $RCOOR' + H_2O \xrightarrow{H^+} RCOOH + R'OH$

	RCOOR'	RCOOH	R'OH
at t = 0 :	a	0	0
at time t :	(a – x)	x	x
at time ∞ :	(a – a)	a	a

at t = 0, V_0 = volume of NaOH due to H^+ (catalyst)

$$V_t = x + V_0$$

$$V_\infty = a + V_0$$

If ester is 50% hydrolysed then $x=\frac{a}{2}$

$$V_t=\frac{a}{2}+V_0$$

$$a = 2V_t - 2V_0$$

$\therefore$ $V_\infty = 2V_t - 2V_0 + V_0 = 2V_t - V_0$

149.(B) $\left(\frac{dx}{dt}\right)=k[A]^n$

$$\log\left(\frac{dx}{dt}\right)=n\log[A_0]+\log k$$

Thus, n = slope = order

Greater the order, larger the slope.

Thus, P = 3, Q = 2, R = 1, S = 0

150.(B) by Raoult's law.

$$\frac{\Delta P}{P^\circ} = X_{solute}$$

$$Ca(NO_3)_2 \rightleftharpoons Ca^{2+} + 2NO_3^-$$

$\therefore \quad i = [1 + (y-1)x] = (1 + 2x)$

$$X_{solute} = \frac{0.04i}{0.04i + 4} = \left(\frac{0.01i}{0.01i + 1}\right)$$

$$\frac{760 - 741}{760} = \frac{0.01i}{0.01i + 1}$$

$$\frac{1}{40} = \frac{0.01i}{0.01i + 1}$$

$0.01i + 1 = 0.4i$

$i = 2.56$

Van't Hoff factor of solute is to be included in total mole well as in individual solute.

151.(C)

$$A \longrightarrow B \ + \ C$$

	A	B	C
(t = 0)	100	0	0
(t = 10min)	100 – p	p	p

(given) $\quad 100 + p = 120, \ p = 20$

$$k = \frac{2.303}{10}\log\frac{100}{(100-p)} = \frac{2.303}{10}\log\frac{100}{80}$$

152.(C) $[H^+]_{W.A} = 10^{-3}[H^+]_{S.A} = 10^{-3}M$

$$k_a = \frac{C\alpha^2}{1-\alpha}$$

$$= \frac{1 \times (10^{-3})^2}{1 - 10^{-3}} = 10^{-6}$$