

بانتخابات شهرداری مرحله 2

دوره 27 (کد استی)

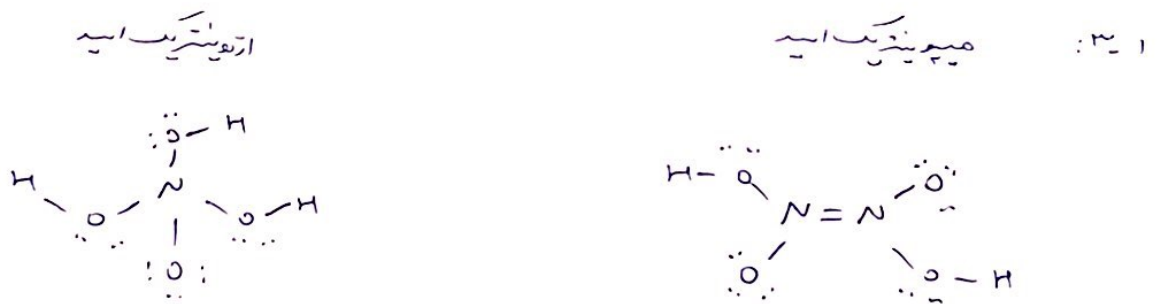
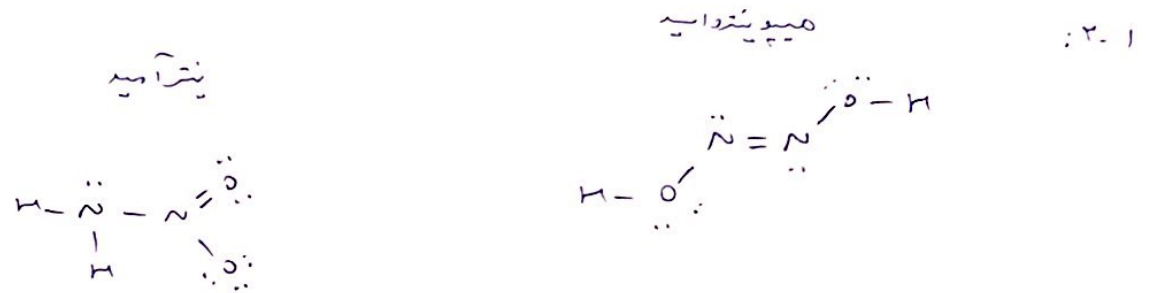
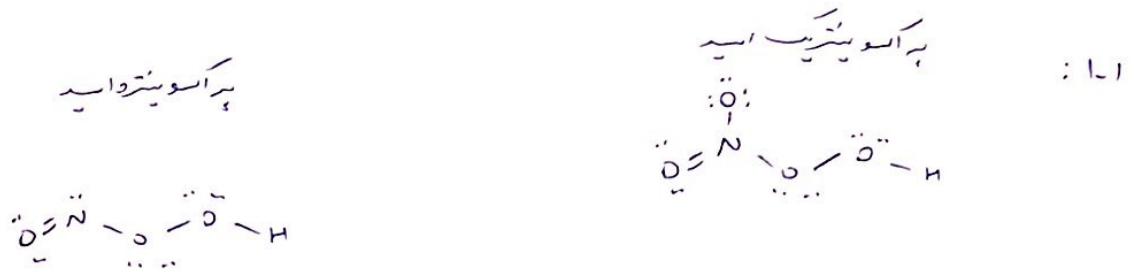
امیر عباس کاظمی نیا - امیر حسین انوش

امیر محمد علی

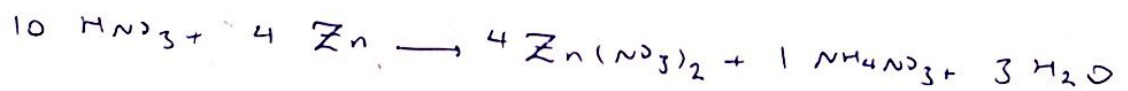
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سؤال ۱:



۴-۱: 2.5



۵-۱:

$$K_c = \frac{(0.1333)^2}{0.3^3 \times 0.2} = 3.3 \quad \text{ظرفاتل} \rightarrow \frac{0.6}{V} = 3.3 \rightarrow V \approx 1 \text{ Lit}$$

$$\left(\frac{0.6}{V}\right)^3 \times \left(\frac{0.5}{V}\right)$$

۹-۱:

$$Q = \left(\frac{V_2}{V_1}\right)^2 = 3^2 = 9$$

۷-۱:

$$Q = K = 3.3$$

(ب) : 1-1

$$\theta = 25^\circ \text{C}$$

$$k = 0.47 e^{0.095 \times 5} = 0.75576 \text{ d}^{-1}$$

$$\ln\left(\frac{A_1}{A_0}\right) = -kt$$

$$\ln\left(\frac{0.21}{4}\right) = -0.75576 t \rightarrow t = \underline{\underline{3.9 \text{ day}}}$$

$$\theta = 10^\circ \text{C}$$

$$k = 0.47 \times e^{0.095 \times -5} = 0.29228 \text{ d}^{-1}$$

$$\ln\left(\frac{0.21}{4}\right) = -0.29228 t \rightarrow t = \underline{\underline{10.08 \text{ day}}}$$

: 9-1

$$\ln\left(\frac{k_2}{k_1}\right) = -\frac{E_a}{R} \times \left(\frac{1}{T_2} - \frac{1}{T_1}\right)$$

$$\ln\left(\frac{0.75576}{0.29228}\right) = -\frac{E_a}{8.314} \times \left(\frac{1}{293.15} - \frac{1}{283.15}\right)$$

$$\rightarrow \underline{\underline{E_a = 65.561 \text{ kJ/mol}}}$$

$$1. \Delta H_f^\circ (\text{UF}_6, \text{s}) = -2197 \frac{\text{KJ}}{\text{mol}} \quad (۲-۲) \quad \Delta H_f^\circ (\text{UF}_4, \text{s}) = -1914 \frac{\text{KJ}}{\text{mol}} \quad (۱-۲)$$

$$2. \Delta H_f^\circ (\text{UF}_6, \text{g}) = -2147 \frac{\text{KJ}}{\text{mol}} \quad (۳-۲)$$

$$3. \Delta H_f^\circ (\text{PbO}_2, \text{s}) = \frac{-2}{3} \times 52 + \frac{+1}{6} \times -154 + \frac{-1}{2} \times 438 = -279.33 \frac{\text{KJ}}{\text{mol}} \quad (۲-۲)$$

$$4. \Delta S_{298}^\circ = 105.1 \frac{\text{J}}{\text{K} \cdot \text{mol}} \quad (۵-۲)$$

$$5. \Delta G_{400}^\circ = \Delta H^\circ - 400 \Delta S^\circ = 9.96 \frac{\text{KJ}}{\text{mol}} \quad (۶-۲)$$

$$6. K_{p(3)} = (P_{\text{O}_2})^{\frac{1}{2}} \quad (۷-۲)$$

$$7. \Delta G_{400}^\circ = -R 400 \ln(K_p) \rightarrow P_{\text{O}_2} = 2.5 \times 10^{-3} \text{ atm} \quad (۸-۲)$$

۸.  $\Delta H_f^\circ$  با استواء از (۹-۲)

(الف)

موازنه بار یا موازنه یون

$$[Ag^+] = [CN^-] + [Ag(CN)_2^-]$$

$$[Ag^+] = \frac{K_{sp}}{[Ag^+]} + K_f [Ag^+] \left( \frac{K_{sp}}{[Ag^+]} \right)^2$$

$$\rightarrow [Ag^+] = \frac{K_{sp}}{[Ag^+]} + \frac{K_f K_{sp}^2}{[Ag^+]} \rightarrow [Ag^+] = \underline{2.84183 \times 10^{-7} M}$$

$$\rightarrow [CN^-] = \frac{K_{sp}}{[Ag^+]} = \underline{4.223 \times 10^{-10} M}$$

$$\rightarrow [Ag(CN)_2^-] = K_f \times [Ag^+] \times [CN^-]^2 = \underline{2.8376 \times 10^{-7} M}$$

موازنه بار:

$$[K^+] + [Ag^+] = [CN^-] + [Ag(CN)_2^-]$$

$$0.008 + \frac{K_{sp}}{[CN^-]} = [CN^-] + K_f \times \frac{K_{sp}}{[CN^-]} \times [CN^-]^2$$

$$\rightarrow [CN^-]^2 \times (1 + K_f \times K_{sp}) - 0.008 [CN^-] - K_{sp} = 0$$

$$\rightarrow [CN^-] = \underline{1.1887 \times 10^{-5} M}$$

$$\rightarrow [Ag^+] = \frac{K_{sp}}{[CN^-]} = \underline{1.01 \times 10^{-11} M}$$

$$\rightarrow [Ag(CN)_2^-] = K_f \times [Ag^+] \times [CN^-]^2 = \underline{7.988 \times 10^{-3} M}$$

ماتذب

$$0.016 + \frac{K_{sp}}{[CN^-]} = [CN^-] + \frac{K_f K_{sp}}{[CN^-]} \times [CN^-]^2$$

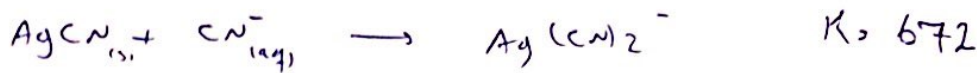
(ج)

$$\rightarrow [CN^-] = 2.37741 \times 10^{-5} \quad \rightarrow [Ag^+] = 5.0475 \times 10^{-12} \quad [Ag(CN)_2^-] = \underline{0.0159}$$

(تفاضل) ✗

بزرگتر از 0.01 M

(انبار اسهل در پشت منضم)



$$0.01 - x \quad 0.016 - x \quad x$$

$$x = 0.01$$

$$[\text{CN}^-] = 0.006$$

$$[\text{Ag}(\text{CN})_2^-] = 0.01$$

$$= 0.01$$

$$[\text{Ag}^+] =$$

$$4.9603 \times 10^{-17}$$

تمام رسوب کاملاً حل می شود و از  $K_{sp}$  بنیید در محاسبات استفاده کرد

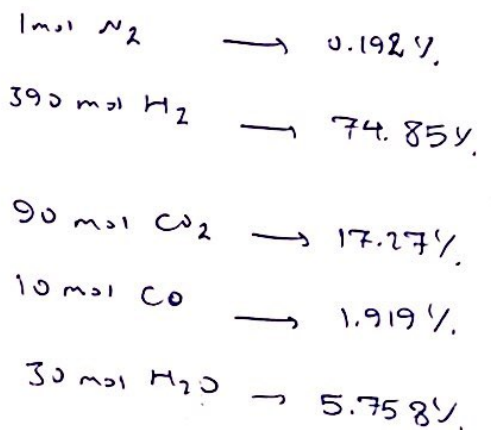
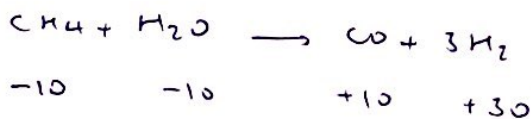
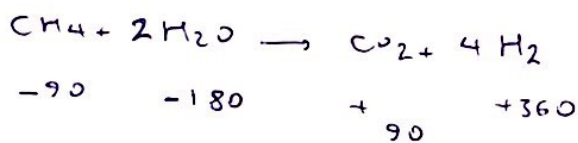
$$Q_{sp} = 2.976 \times 10^{-19} < K_{sp}$$



سؤال ۴:

۱-۴

$$100 \times 2.2 = 220 \text{ mol H}_2\text{O}$$



۲-۴

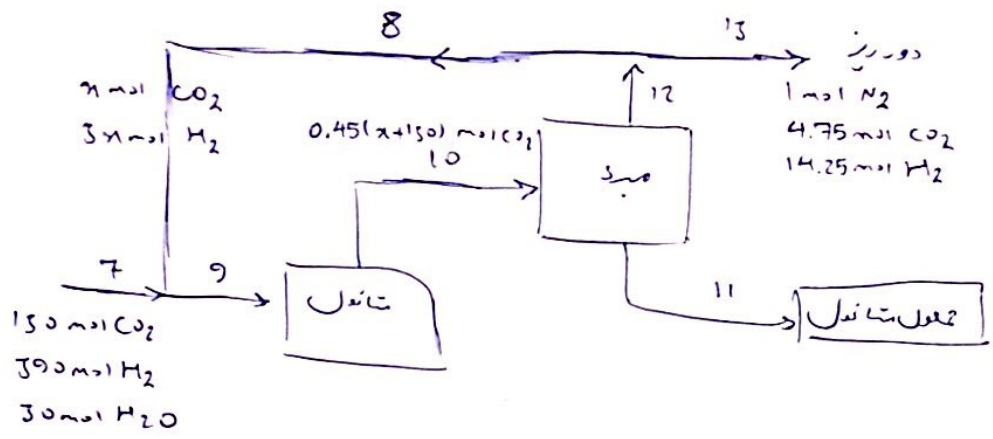
$$390 \text{ mol H}_2 \times \frac{1 \text{ mol CO}_2}{3 \text{ mol H}_2} = 130 \text{ mol CO}_2$$

$$130 - 90 - 10 = 30 \text{ mol CO}_2$$



$$1 \text{ mol N}_2 \times \frac{100}{5} = 20 \text{ mol} \text{ فرقی}$$

۳-۴



$$0.45(x + 130) = 4.75 + x$$

$$\rightarrow x = 97.49$$

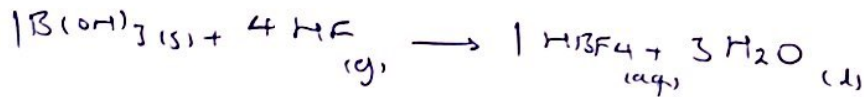
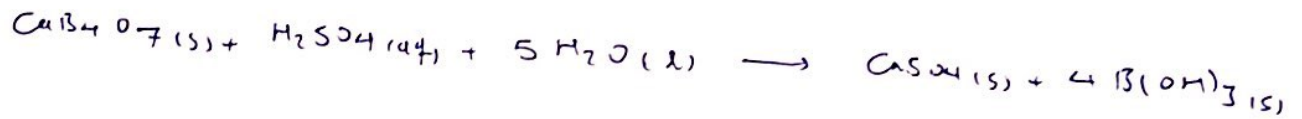
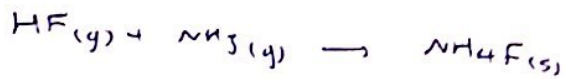
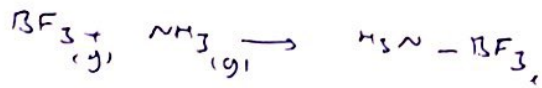
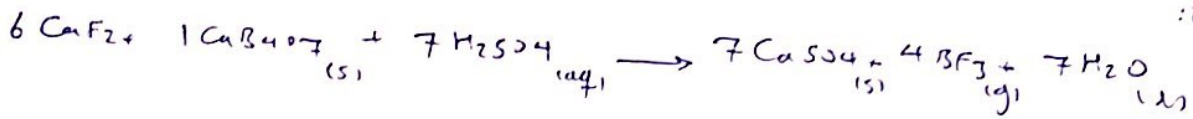
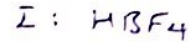
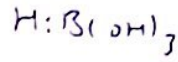
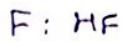
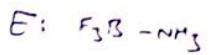
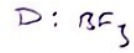
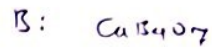
$$n_{CH_3OH} = 0.55 \times (x + 130) = 125.1195 \text{ mol } CH_3OH \rightarrow 4003.824 \rightarrow 4.003 \text{ kg}$$

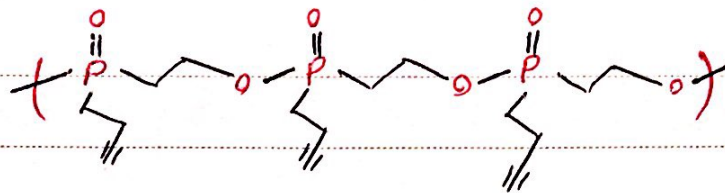
$$n_{H_2O} = 0.55 \times (x + 130) + 30 = 155.1195 \text{ mol } H_2O \rightarrow 2792.151 \text{ gr}$$

$$\frac{4003.824}{4003.824 + 2792.151} \times 100 = 58.91\%$$

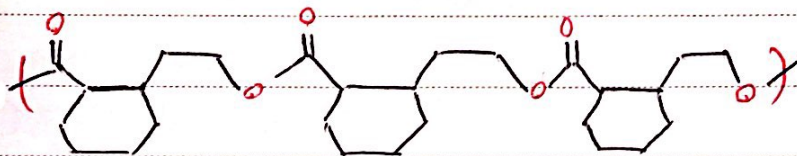


سؤال ٤:

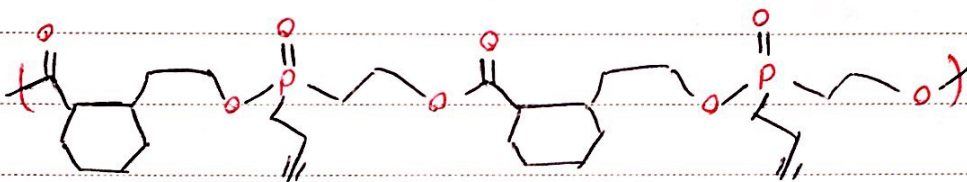




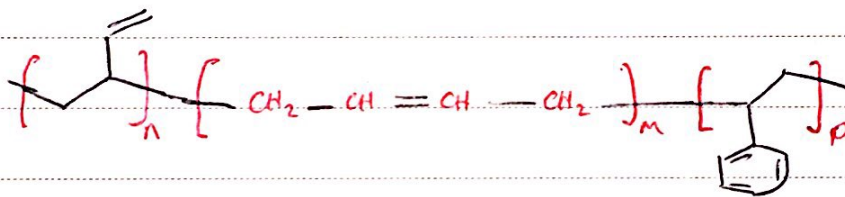
(۱-۶)



(۲-۶)



(۳-۶)



(۴-۶)

(۵-۶) فرض می‌کنیم ۱۰۰ H بنزنی داریم :

$$p = \frac{100}{5} = 20$$

H های کربن‌های  $sp^2$  غیر بنزنی :

$$\begin{cases} 3n + 2m = 132 \\ 3n + 4m = 192 \end{cases}$$

H های کربن‌های  $sp^3$  :

$$3n + 4m + 3p = 252$$

حل دو معادله دو مجهول :

$$m = 30 \quad n = 24$$

$$\frac{m}{p} = 1.5 \quad \frac{n}{p} = 1.2$$