

# Clasa XII Test

- 1) CC(=O)c1ccccc1 acetofenona (b) (b)
- 2) (1) CC(O)C (2) CC(=O)N (3) CC(=O)O (4) Oc1ccccc1  
 $R_d = 1,8 \cdot 10^{-5}$   $R_d = 10^{-10}$   
 $1 < 4 < 3 < 2$  (c) (c)
- 3) a)  $Cu^{2+} + Fe^{3+} = Fe^{2+} + Cu^+$  c)  $Ca^{2+} + OH^- + HCO_3^- = CaCO_3 \downarrow + H_2O$  (d) (d)  
 b)  $2Ag^+ + 2OH^- \Rightarrow Ag_2O \downarrow + H_2O$
- 4) a) SR b) AE c) SN d) SE (d) (d)  
c1ccccc1 + CCl  $\xrightarrow{AlCl_3}$  Cc1ccccc1 + HCl
- 5)  $K_4[Co(C_2O_4)_3]$ ; N.C. =  $2 \cdot 3 = 6$ , deoarece  $C_2O_4^{2-}$  este ligand bidentat (b) (b)  
 $d^2 sp^3$
- 6)  $4HCl + O_2 \rightleftharpoons 2Cl_2 + 2H_2O + Q$  (a) (a)  
 a)  $\uparrow t^\circ C \Rightarrow$  spre - Q  $\Leftarrow$  deci se micșor.  $\eta$  / react. dir.?
- 7)  ${}_{94}^{242}Pu \rightarrow 2 {}_2^4\alpha + {}_{-1}^0\beta + {}_{91}^{234}X \Rightarrow {}_{91}^{234}Pa$  (a) (a)  
 $94 = 2 \cdot 2 - 1 + a \Rightarrow a = 94 + 1 - 4 = 91$
- 8) Fie  $V = 1L$ ;  $m = k \cdot t = \frac{M}{n} \cdot It \Rightarrow \left(\frac{m}{M}\right) \cdot n = It$  (c)  
 $\nu = \frac{I \cdot t}{n \cdot F} = \frac{2 \cdot 3 \cdot 3600}{96500 \cdot 2} = 0,1119 \text{ mol}$   
 $\nu_1 = C \cdot V = 1 \cdot 0,5 = 0,5 \text{ mol}$   
 $\nu_{rămăși}$  =  $0,5 - 0,1119 = 0,388 \text{ mol}$   
 $C_m = \frac{0,388}{0,5} = 0,78 \text{ M} \Rightarrow$  (c)
- 9)  $\nu(NaHCO_3) = \frac{4,2}{84} = 0,05 \Rightarrow \nu_1(Na^+) = 0,05 \text{ mol}$  (d) (d)  
 $\nu(Na_2CO_3) = \frac{10,6}{106} = 0,1 \text{ mol} \Rightarrow \nu_2(Na^+) = 0,2 \text{ mol}$   
 $\nu(Na^+)_{\text{total}} = 0,2 + 0,05 = 0,25 \text{ mol} \Rightarrow C_m = 0,25 \text{ M}$
- 10) a)  $[Pb^{2+}] = \frac{1,5 \cdot 10^{-5}}{(10^{-3})^2} = \frac{1,5}{10^{-1}} = 15$  b)  $[Pb^{2+}] = \frac{3,7 \cdot 10^{-8}}{(10^{-3})^2} = 3,7 \cdot 10^{-2}$  (d) (d)  
 c)  $[Pb^{2+}] = \frac{8,5 \cdot 10^{-9}}{(10^{-3})^2} = 8,5 \cdot 10^{-3}$  d)  $[Pb^{2+}] = \frac{1,8 \cdot 10^{-8}}{10^{-3}} = 1,8 \cdot 10^{-5}$

1b 2c 3d 4d 5b 6a 7a 8c 9d 10d

# Clasa 12 Problema 1

1)  $\rho(X) = \frac{M}{V_m} \Rightarrow M = 0,759 \cdot 22,4 = 17 \text{ g/mol} \Rightarrow \boxed{X = \text{NH}_3}$  (1p) (2p)  
 $A \Rightarrow (\text{NH}_4)^+ R$  (1p)

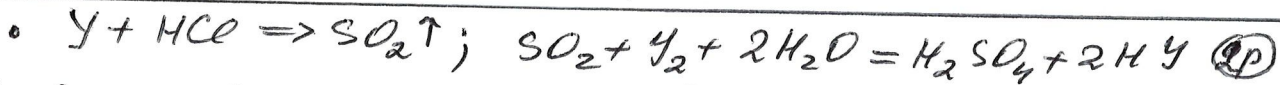
2)  $V_0 = \frac{P_1 V_1 T_0}{P_0 T_1} = \frac{1871 \cdot 273}{300} = 170,26 \text{ ml}$  (1p)  $\nu \text{NH}_3 = \frac{0,17026}{22,4} = 7,6 \cdot 10^{-3}$  (1p) (2p)  
 $\Rightarrow \nu \text{NH}_4^+$

3)  $\nu(\text{Y}_2) = 38 \cdot 10^{-3} \cdot 0,1 = 3,8 \cdot 10^{-3} \text{ mol}$  (1p) (1p)

4) Stabilem Y:  $\left. \begin{array}{l} E_2 O_x \quad 16x - 50\% \\ 2E - 50\% \end{array} \right\} 16x = 2E; \boxed{E = 8x}$

$\Rightarrow$  Dacă  $x = 4 \Rightarrow E = 32 \Rightarrow \underline{S} \Rightarrow \boxed{Y = \text{SO}_2}$  (3p) (4p)

$\Rightarrow$  A conține  $\text{SO}_3^{2-}$  (2p)



5)  $\nu \text{SO}_2 = \nu \text{Y}_2 = \nu \text{SO}_3 = 3,8 \cdot 10^{-3}$  (1p) (4p)

6)  $\nu \text{NH}_4^+ : \nu \text{SO}_3^{2-} = 7,6 \cdot 10^{-3} : 3,8 \cdot 10^{-3} = 2:1 \Rightarrow$  sarea  $\underline{(\text{NH}_4)_2 \text{SO}_3}$  (1p)

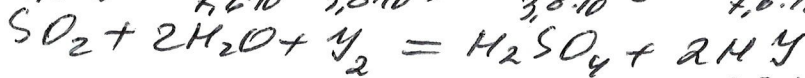
7)  $m(\text{sare}) = \nu \cdot M = 3,8 \cdot 10^{-3} \cdot 116 = 440,8 \cdot 10^{-3} = 0,4408 \text{ g}$

$\bullet m(\text{H}_2\text{O}) = 0,5092 - 0,4408 = 0,0684 \text{ g} (3,8 \cdot 10^{-3} \text{ mol})$  (2p)

$\bullet \nu \text{sare} : \nu \text{H}_2\text{O} = 1:1 \Rightarrow \underline{A = (\text{NH}_4)_2 \text{SO}_3 \cdot \text{H}_2\text{O}}$  (2p)

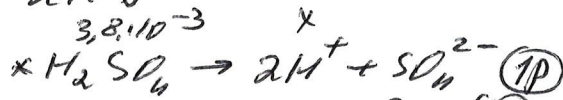


10)  $3,8 \cdot 10^{-3} \quad 7,6 \cdot 10^{-3} \quad 3,8 \cdot 10^{-3} \quad 3,8 \cdot 10^{-3} \quad 7,6 \cdot 10^{-3}$

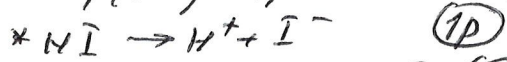


$\bullet \nu(\text{H}_2\text{SO}_4) = \nu \text{Y}_2 = 3,8 \cdot 10^{-3}$

$\bullet \nu(\text{HY}) = 2 \cdot 3,8 \cdot 10^{-3} = 7,6 \cdot 10^{-3}$



$\nu_1(\text{H}^+) = 7,6 \cdot 10^{-3}$  (1p)



$\nu_2(\text{H}^+) = 7,6 \cdot 10^{-3}$  (1p)

$\bullet \nu_{\text{total}}(\text{H}^+) = 15,2 \cdot 10^{-3} \text{ mol}$  (1p)

$\bullet C_m(\text{H}^+) = \frac{\nu}{V} = \frac{15,2 \cdot 10^{-3}}{3,8 \cdot 10^{-3}} = 4$  (1p) (2p)

$\bullet \text{pH} = -\lg[\text{H}^+] = -\lg 4 \cdot 10^{-1} = 1 - 0,602 = 0,398$  (1p)

Total: 26 p

Clasa 12 Problema 2

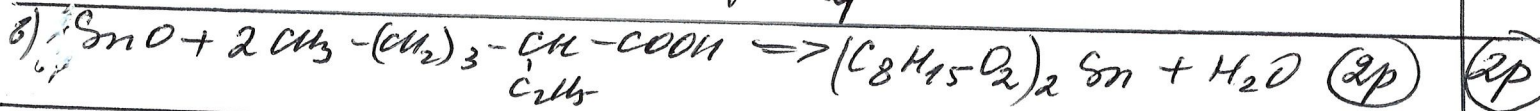
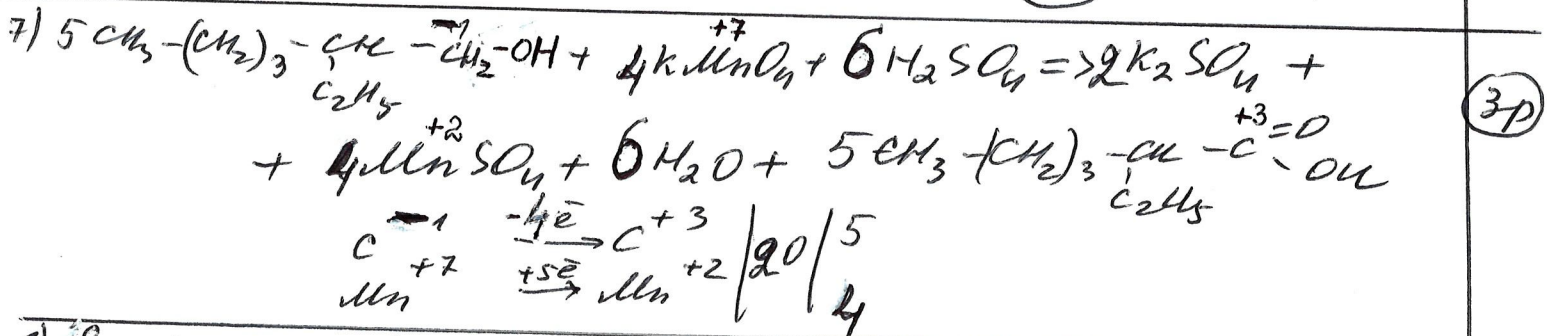
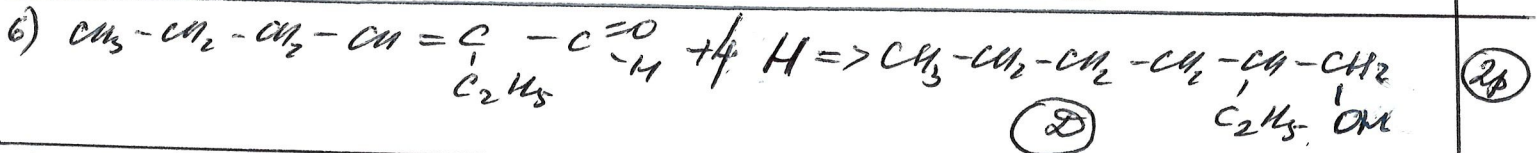
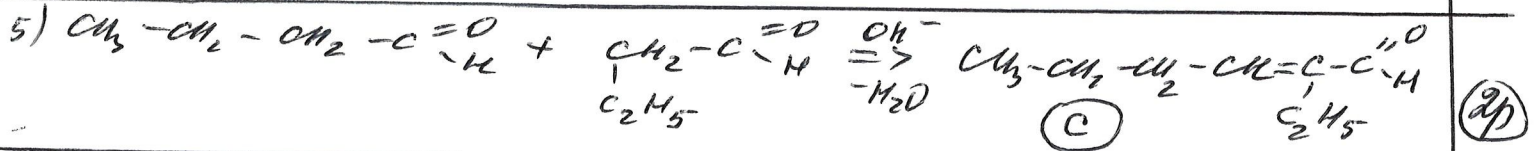
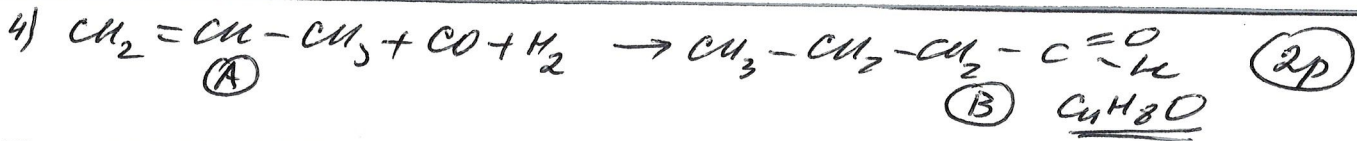
1)  $\text{Al}_2\text{O}_3$ :  $\left. \begin{array}{l} 16x - 11,878\% \\ 2E - 88,122\% \end{array} \right\} 2E \cdot 11,878 = 16x \cdot 88,122$   
 $E = 59,351x$

• dacă  $x = 2 \Rightarrow E = 118,7 \Rightarrow \underline{\text{Sn}} \Rightarrow \underline{\text{SnO}}$  (3p)

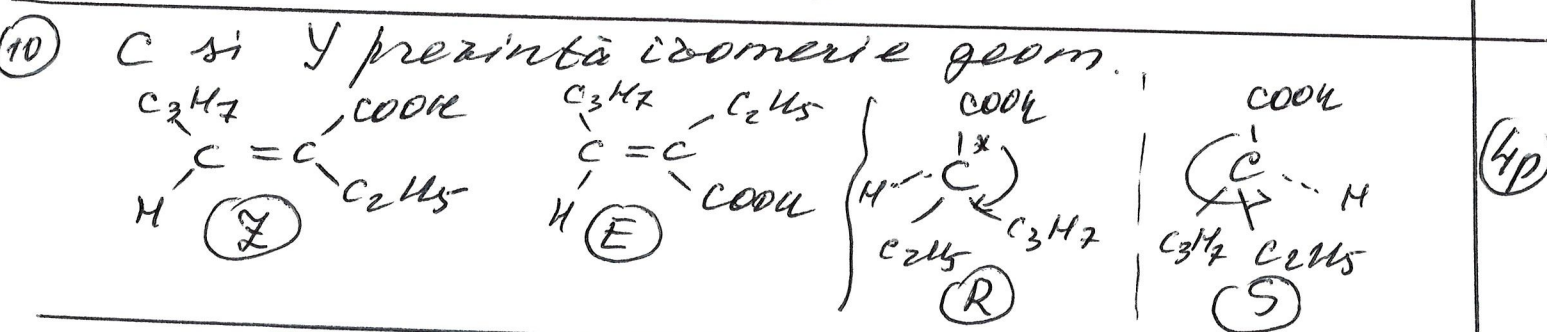
2)  $\text{C}_n\text{H}_{2n}\text{O}_2$ :  $\left. \begin{array}{l} 32 - 22,222\% \\ M_n = 100x \end{array} \right\} M_n = 144$

$14n + 32 = 144 \Rightarrow \underline{n = 8} \quad \underline{Y = \text{C}_8\text{H}_{16}\text{O}_2}$  (2p)

3)  $\text{O}(\text{A}) = 1,448 \cdot 29 = 42 \Rightarrow 14n = 42$   
 $n = 3 \Rightarrow \text{C}_3\text{H}_6$  (propena)  
 decolor. apa de brom (2p)



9) (B) butanal (C) 2-eterhex-2-enal (4p)  
 (D) 2-eterhexan-1-ol (Y) acid 2-eterhexanoic



Total 26p

# Clasa 12 Problema 3

1)  $D(\text{am}) = 0,8362 \Rightarrow M(\text{am}) = 24,2498$  (1p)

(1p)

2) Fie  $x_{\text{CH}_4} = x_{\text{NH}_3} = a \Rightarrow x_{\text{O}_2} = 1 - 2a \Rightarrow$

$M = 16a + 17a + (1 - 2a) \cdot 32 = 24,2498$

$a = 0,25$

$y(\text{CH}_4) = 0,25 \Rightarrow V(\text{CH}_4) = 0,25 \cdot 100 \text{ m}^3 = 25 \text{ m}^3 (17,857 \text{ kg})$

$x(\text{NH}_3) = 0,25 \Rightarrow V(\text{NH}_3) = 25 \text{ m}^3 \Rightarrow m = 18,973 \text{ kg}$

$x(\text{O}_2) = 0,5 \Rightarrow V(\text{O}_2) = 50 \text{ m}^3 \Rightarrow m = 71,429 \text{ kg}$

$\Rightarrow m(\text{am.}) = 108,259 \text{ kg}$

$\bullet w\%(\text{CH}_4) = 16,495\% \quad w\%(\text{NH}_3) = 17,526\%$

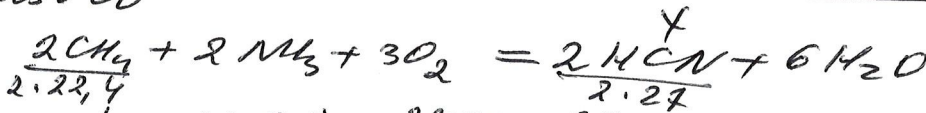
$w\%(\text{O}_2) = 65,98\%$

3)  $m_{\text{sol}} \text{ HCN} = 90680 \text{ ml} \cdot 1,089 \text{ g/ml} = 97934,4 \text{ g}$

$m \text{ HCN} = 0,2 \cdot 97934,4 = 19.586,88 = 19,578 \text{ kg}$  (2p)

(2p)

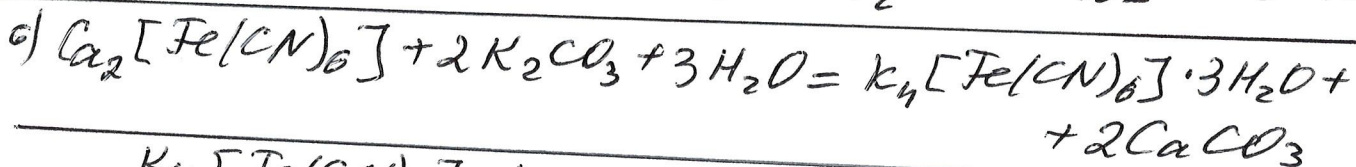
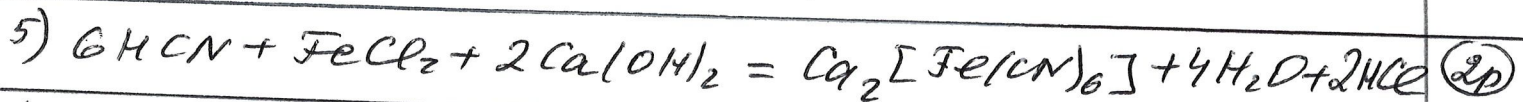
4) 25000



$\bullet m_{\text{teor.}}(\text{HCN}) = \frac{25000 \cdot 27}{22,4} = 30,134 \text{ kg}$  (1p)

(4p)

$\bullet \eta = \frac{19,587}{30,134} \cdot 100 = 65\%$  (1p)



(2p)

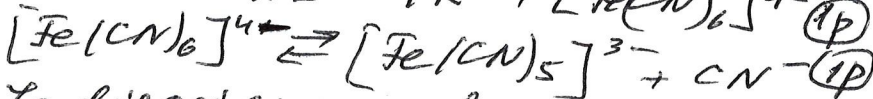
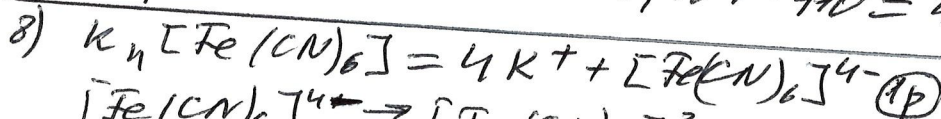
$\text{K}_4[\text{Fe}(\text{CN})_6]$  hexacianoferat (II) de potasiu.

(1p)

7)  $v_{\text{prusiat}} = v_{\text{complex}} = \frac{v(\text{HCN})}{6} = 120,907 \text{ mol}$  (2p)

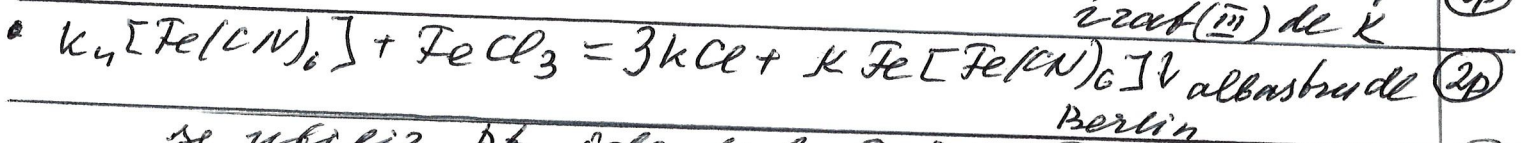
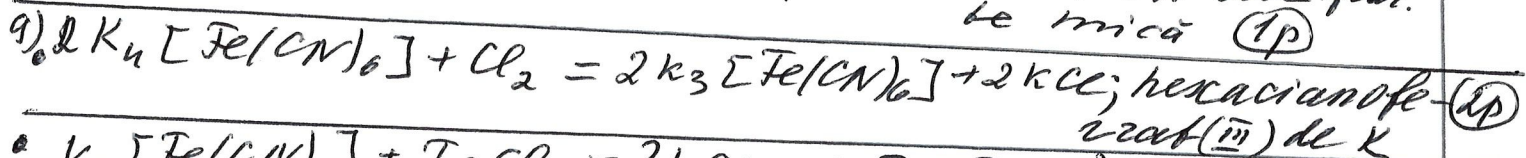
$\bullet m_{\text{prusiat}} = v \cdot M = 120,907 \cdot 410 = 49,572 \text{ kg}$  (1p)

(3p)



$\bullet$  La disociere se formează ion complex, care are stabilitate foarte mare, deci conc.  $\text{CN}^-$  este foarte mică (1p)

(3p)



se utilizează pt. identific.  $\text{Fe}^{3+}$  Berlin (2p)

(2p)