Clasa X Test

①	$H-\overset{\square}{\underset{\underset{H}{\vert}}{B}}-H$ este acceptor, pt. că are un orbital liber	c
②	$238 — 42,349$; $Mr — 100\%$ } $Mr = 562$ $\quad 18n = 562 - 238 = 324$; $n = 18$ $\Rightarrow Cr(NO_3)_3 \cdot 18H_2O$ $\quad \omega\%(O) = \frac{27 \cdot 16}{562} = \frac{432}{562} = 76,868\%$ a	a
③	$5\overset{0}{C}H_2O + 4K\overset{+7}{Mn}O_4 + 12HNO_3 \Rightarrow 5\overset{+4}{C}O_2 + 4\overset{+2}{Mn}(NO_3)_2 + 4KNO_3 + 11H_2O$ $-4e^-$ red-r — 20 — $+5e^-$ ox-t $\quad 4+5=9 \Rightarrow$ c	c
④	$H-C\equiv N \Rightarrow 2\sigma + 2\pi \Rightarrow$ d	d
⑤	a) $\overset{+6}{Cr}O_3$ doar ox-t; b) $H_2O_2^{-1}$ si ox-t, si red-r (O_2^0, O^{-2}); c) $\overset{-3}{P}H_3$ doar red-r; d)	b
⑥	$\rho = \frac{M}{V_m} \Rightarrow M = 1,964 \cdot 22,4 = 44$ → a) $C_3H_8 \Rightarrow H_3C-CH_2-CH_3$; → c) $CO_2 \Rightarrow$ are doar leg. polare	a
⑦	$V_{sol} = 1L \Rightarrow \nu_{KOH} = 0,8 mol$ $(0,8 \cdot 56 = 44,8g)$ $m_{sol} = 1150g \Rightarrow \omega\% = \frac{44,8 \cdot 100}{1150} = 3,89\% \Rightarrow$ b	b
⑧	$\underset{\substack{34 \\ 22,4\,l}}{H_2S} + \underset{\substack{71 \\ 22,4\,l}}{Cl_2} + \underset{\substack{28 \\ 22,4\,l}}{CO} \Rightarrow M = \frac{34+71+28}{3\,mol} = \frac{133}{3} = 44,33\ g/mol$ $D_{aer}(am) = \frac{44,33}{29} = 1,529 \Rightarrow$ c	c
⑨	$\overset{+2}{Sr}_3\overset{-3}{P}_2 \Rightarrow$ fosfură de stronțiu c	c
⑩	a) $\overset{+1}{N}\overset{+1}{H}\overset{-1}{Br}_2$; b) $\overset{-2}{N}_2\overset{+1}{H}_4$; c) $\overset{+1}{H}_3\overset{-3}{C}-\overset{-1}{N}(\overset{+1}{H})-\overset{-3}{C}\overset{+1}{H}_3$; c) $\overset{+3}{N}\overset{-2}{O}\overset{-1}{Cl}$	c

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

Clasa 10 Probl. 1

1) $3Mg + 2P = Mg_3P_2$ (2p)

2) $Mg_3P_2 + 6HCl = 3MgCl_2 + 2PH_3\uparrow$ (2p)

(4p)

Dacă se degajă amestec gazos A => deci mai este un gaz => Mg este în exces și excesul a intervenit (2p)

3) cu HCl $Mg + 2HCl = MgCl_2 + H_2$

4) $\nu_{(A)} = \nu_{(H_2 \text{ și } PH_3)} = \frac{6,585}{22,4} = 0,294 \text{ mol}$ (1p)

5) $H_2 + H_2SO_4 \not\rightarrow$ $2PH_3 + H_2SO_4 = (PH_4)_2SO_4$ (1p)

Δm a vasului $= 2,586 g \Rightarrow m(PH_3) = 2,586 g$ (0,076 mol) (3p)

(1p) (1p)

6) $\nu(Mg_3P_2) = \frac{0,076 \cdot 1}{2} = 0,038$ (1p) $\nu_{(Mg \text{ pt } P)} = 0,038 \cdot 3 = 0,114 \text{ mol}$ (1p) (2p)

7) $\nu(H_2) = 0,294 - 0,076 = 0,218 \text{ mol}$ (0,436g) (1p) (1p)

8) $m(A) = \underbrace{0,436g}_{m(H_2)} + \underbrace{2,586g}_{m(PH_3)} = 3,022g$ (1p)

9) $\rho(A) = \frac{m}{V} = \frac{3,022g}{6,585\ell} = 0,459 g/L$ (1p)

10) Dacă $\nu(H_2) = 0,218 \text{ mol} \Rightarrow \nu_{(Mg \text{ pt } HCl)} = \nu(H_2) = 0,218 \text{ mol}$ (1p)

$\nu_{total(Mg)} = 0,218 + 0,114 = 0,332$ (7,968g) (1p) (2p)

11) $2Mg + O_2 = 2MgO$ (1p); $\nu(O_2) = \frac{0,332 \cdot 1}{2} = 0,166 \text{ mol}$

$V_0(O_2) = 0,166 \cdot 22,4 = 3,72 \ell$. (1p) (2p)

12) $\frac{P_0V_0}{T_0} = \frac{P_1V_1}{T_1} \Rightarrow V_1 = \frac{101,325 \cdot 3,72 \cdot 300}{273 \cdot 98} = 4,225 \ell$ (1p)

13) $\nu_{1(HCl \text{ pt } Mg_3P_2)} = 0,038 \cdot 6 = 0,228 \text{ mol}$ (1p); $\nu_{2(HCl \text{ pt } Mg)} = 0,218 \cdot 2 = 0,436$ (1p) (3p)

$\nu_{(HCl \text{ total})} = 0,228 + 0,436 = 0,664 \text{ mol}$ (1p)

14) $m(HCl) = 0,664 \cdot 36,5 = 24,24g$; $m_{sol} = \frac{24,24 \cdot 100}{21,9} = 110,67g$ (1p)

$V_{sol} = \frac{110,67}{1,1} = 100,6 \text{ ml}$ (1p) (2p)

total: 25p

Clasa 10. Problema 2

① gazul (C): $\rho = \frac{M}{V_m} \Rightarrow M = 1,4286 \cdot 22,4 = 32 \Rightarrow O_2$ (1p) — (1p)

② gazul (G) – gaz colorat, pt. gaze de culoare $\Rightarrow \underline{Cl_2}$ (1p) — (1p)

③ Dacă Cl_2 se dizolvă în pt. obț. lui (E) $\Rightarrow$ care nu colorează sol. de f/fenolftaleină $\Rightarrow$ (E) este $\underline{HCl}$ (1p) — (1p)
gaz bine solubil

④ Metal de tip S, colorează flacăra violet $\Rightarrow \underline{K}$ (1p) — (1p)

⑤ Deci (A) și (D) conțin K și O.
Dacă E(HCl) se obține din (B), iar (B) din (A) $\Rightarrow$
(A) și (D) conțin și Cl. Combinațiile sărurile pot fi: $KClO$, $KClO_2$, $KClO_3$, $KClO_4$. (1p) — (2p)

(A) $\underline{KClO_3}$ $M_r = 122,5$ (D) $\underline{KClO_4}$ $M_r = 138,5$ $\Rightarrow \frac{138,5}{122,5} = 1,13$ (1p)

⑥ ① $\underset{(A)}{2KClO_3} \rightarrow \underset{(B)}{2KCl} + \underset{(C)}{3O_2}$ (2p) — (2p)

② $\underset{(A)}{4KClO_3} \rightarrow \underset{(B)}{KCl} + 3KClO_4$ (2p) — (2p)

③ $\underset{(B)}{KCl} + H_2SO_4(c) = \underset{(E)}{HCl} + \underset{(F)}{KHSO_4}$ (2p) — (2p)

④ $\underset{(A)}{KClO_3} + 6\underset{(E)}{HCl} = \underset{(G)}{3Cl_2} + \underset{(B)}{KCl} + 3H_2O$ (2p) — (2p)

⑤ $\underset{(B)}{KCl} + AgNO_3 = \underset{(H)}{AgCl}\downarrow + \underset{(M)}{KNO_3}$ (1p) — (1p)

⑥ $\underset{(E)}{HCl} + AgNO_3 = \underset{(H)}{AgCl}\downarrow + \underset{(N)}{HNO_3}$ (1p) — (1p)

⑦ $\underset{(H)}{AgCl}\downarrow + 2NH_4OH = \underset{(L)}{[Ag(NH_3)_2]Cl} + 2H_2O$ (3p) — (3p)

⑧ $5\underset{(G)}{Cl_2} + Br_2 + 12KOH = 10\underset{(B)}{KCl} + 2KBrO_3 + 6H_2O$ (3p) — (3p)

⑨ $2\underset{(E)}{HCl} + Fe = \underset{(R)}{FeCl_2} + \underset{(W)}{H_2}\uparrow$ (2p)

⑩ $3\underset{(G)}{Cl_2} + 2Fe = 2\underset{Q}{FeCl_3}$ (2p) — (4p)

⑪ $\underset{(G)}{Cl_2} + \underset{(W)}{H_2} = 2\underset{(E)}{HCl}$ (1p)

⑫ $\underset{(2p)\ (R)}{2FeCl_2} + \underset{(G)}{Cl_2} = 2\underset{(Q)}{FeCl_3}$ (3p)

Total: 29p

Clasa 10 Problema 3

1) $CuS + 2HCl = CuCl_2 + H_2S\uparrow$ (2p)

2) $Me_2(CO_3)_n + 2nHCl = 2MeCl_n + nCO_2 + nH_2O$ (2p) — (5p)

3) $\nu(H_2S) + \nu(CO_2) = \frac{17,024}{22,4} = 0,76\ mol$ (1p)

4) $CO_2 + SO_2 \neq$; $2H_2S + SO_2 = 3S + 2H_2O$ (2p) — (2p)

5) sub. solidă $\Rightarrow$ S $\Rightarrow \nu(S) = \frac{21,12}{32} = 0,66$ (1p)

6) $\nu(H_2S) = \frac{0,66 \cdot 2}{3} = 0,44\ mol$ (1p) — (3p)

7) $\nu(CO_2) = 0,76 - 0,44 = 0,32\ mol$ (1p)

8) $\nu(CuS) = \nu(H_2S) = 0,44\ mol$ (1p)
$m(CuS) = 0,44 \cdot 96 = 42,24g$
$m(Me_2(CO_3)_n) = 89,6 - 42,24 = 47,36g$ (1p) — (2p)

9) $\nu(Me_2(CO_3)_n) = \frac{0,32 \cdot 1}{n}\ (mol)$ (1p)
$M(Me_2(CO_3)_n = \frac{m}{\nu} = \frac{47,36}{0,32} \cdot n = 148n$ (1p) — (2p)

10) a) Fie $n = 1$; $\Rightarrow M(Me_2CO_3) = 148$
$M(Me) = \frac{148 - 60}{2} = 44$ ⊖

b) Fie $n = 2 \Rightarrow M(Me_2(CO_3)_2 = 148 \cdot 2 = 296$
$M(Me) = \frac{296 - 60 \cdot 2}{2} = 88 \Rightarrow \underline{Sr}$ — (3p)

$\underline{Me \Rightarrow Sr}$ (3p)

Total: 17p