1

1.1.

H$_2$S (   ) (« »),

.   –   .

(« »),   ,

.   (

« »)   (« »).

) 4FeS$_2$ + 11O$_2$ 2Fe$_2$O$_3$ + 8SO$_2$

) SO$_2$ + Br$_2$ + 2H$_2$O   H$_2$SO$_4$ + 2HBr

) FeS + 2HCl   FeCl$_2$ + H$_2$S

) SO$_2$ + 2H$_2$S   3S + 2H$_2$O.

1.2.   .

FeS$_2$.   –   ,

,   .   –   ,

.   – FeS –   .

– SO$_2$ –   (IV),   ,   .

– H$_2$S –   ,   .

1.3.   ,

,   ,   ,   .   ,

,

,

«   -   »

.

1.4.   :

$$n(\text{FeS}) = 880/88 = 10 \qquad .$$

, « »

10   .

,

$$n(\text{S}) = 384/32 = 12 \qquad ,$$

8   (« »)   4   .

,   10   8   , . .

.

,   (   )

4   (« »),

.   « »,

2   FeS_2.

$$m(\text{FeS}_2) = 120 \times 2 = 240 \quad .$$

$(\text{FeS}_2) = 240/269 = 0.892, \qquad 89.2\,\%.$

(4)	8
(3)	6
(2)	4
	2
	5
	25

2

2.1.   :

      $(-)$ $(+)$

Bi^{3+}, Hg^{2+}, H_2O NO_3^-, H_2O

$Bi^{3+} + 3e^- \rightarrow Bi^0$ (*) $2\,H_2O - 4e^- \rightarrow O_2 + 4H^+$

$Hg^{2+} + 2e^- \rightarrow Hg^0$ (**)

:

$$4Bi(NO_3)_3 + 6H_2O \rightarrow 4Bi\downarrow + 3O_2\uparrow + 12HNO_3$$

$$2Hg(NO_3)_2 + 2H_2O \rightarrow 2Hg\downarrow + O_2\uparrow + 4HNO_3$$
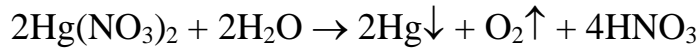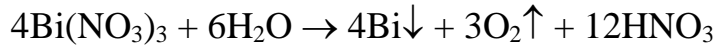
2.2. $n\{Bi(NO_3)_3\} = x$, $n\{Hg(NO_3)_2\} = y$,

$n(Bi) = x$, $n(Hg) = y$.

$$209x + 201y = 7.195 \hspace{8cm} (1).$$

,

,

$$k = \frac{It}{F} = \frac{0.9 \cdot 161 \cdot 60}{96500} = 0.090 \hspace{2cm} .$$

(*)   (**)   ,

$$3x + 2y = 0.090 \hspace{8cm} (2).$$

(1)   (2), $x = 0.020$, $y = 0.015$.

,

:

$\{Bi(NO_3)_3\} = 0.020$ / 0.16   = 0.125   ,

$\{Hg(NO_3)_2\} = 0.015$ / 0.16   = 0.094   .

		(2)	2
			2
		(2)	4
			15
		(2)	2
			25

3

3.1. .

.

. ,

,

.

.

,

.

3.2. .

) .

$$CH_4 \xrightarrow[- H_2]{1500^oC} HC\equiv CH$$

) -1 .

$$2HC\equiv CH \xrightarrow{CuCl \ (NH_3, \ NH_4Cl)} CH_2=CH-C\equiv CH \xrightarrow{H_2, \ Ni} CH_3-CH_2-CH_2-CH_3 \longrightarrow$$

$$\xrightarrow[- H_2]{Cr_2O_3} CH_2=CH-CH=CH_2 \xrightarrow{HCl} CH_3-CH=CH-CH_2Cl \xrightarrow{H_2, \ Ni}$$

$$\longrightarrow CH_3-CH_2-CH_2-CH_2Cl \xrightarrow{NaOH \ (H_2O)} CH_3-CH_2-CH_2-CH_2OH$$

)

$$HC\equiv CH + CH_3-CH_2-CH_2-CH_2OH \xrightarrow{Hg^{2+}, \ H^+} CH_3-CH_2-CH_2-CH_2O-CH=CH_2$$

$$HC\equiv CH + CH_3-CH_2-CH_2-CH_2OH \xrightarrow{KOH} CH_3-CH_2-CH_2-CH_2O-CH=CH_2$$

3.3.

$$n\text{CH}_2=\text{CH} \xrightarrow{\text{Kat}^+} -\!\!\left(\text{CH}_2\!-\!\text{CH}\right)_{\!n}\!\!-$$
$$\underset{\text{OC}_4\text{H}_9}{|} \qquad\qquad\qquad \underset{\text{OC}_4\text{H}_9}{|}$$

	5
, , ,	15
	5
	25

4

4.1. $_x\text{H}_y(\text{COOH})_z$.

M   :

$$_x\text{H}_y(\text{COOH})_z + z\text{M} \qquad _x\text{H}_y(\text{COOM})_z + (z/2)\text{H}_2 \tag{1}$$
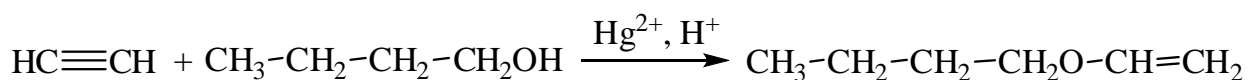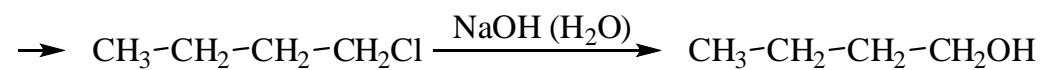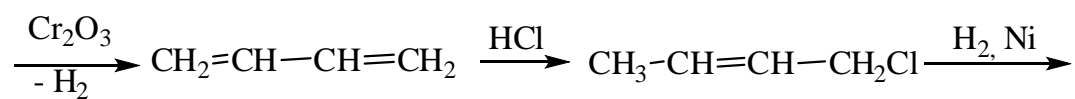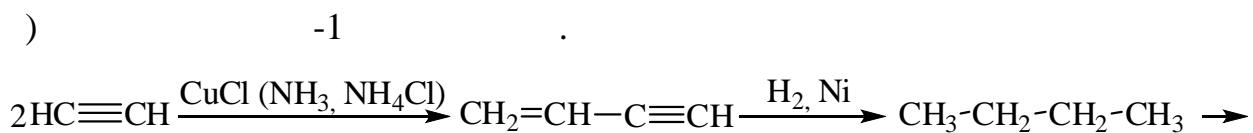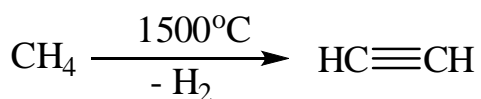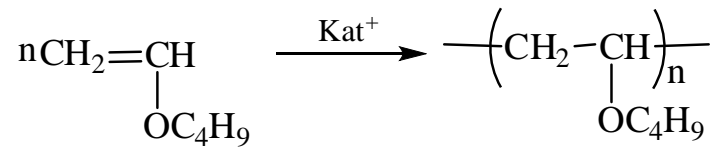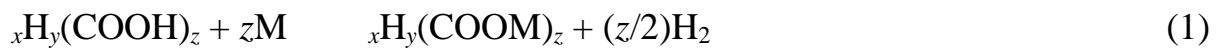
$$1.18/118 \;=\; 0.01 \qquad\qquad ,$$

$$0.224/22.4 = 0.01 \qquad\qquad .$$

(1):

$$\frac{n(\text{H}_2)}{n(\qquad\quad)} = \frac{z}{2} = \frac{0.01}{0.01},$$

$$z = 2. \tag{2}$$

$$M = 12x + y + 45z = 118 \;\;/\qquad . \tag{3}$$

(3) $\qquad\qquad z = 2,$

$$12x + y = 28. \tag{4}$$

(4) $x = 2,\ y = 4.$,

                                           $_2H_4(COOH)_2.$

                              (1)   (2)   ,

$n(M) = 2n(\quad\quad) = 0.02\quad\quad$,

              ,

$M(\quad\quad) = 0.46/0.02 = 23\ $ /   , . .   –   .

                                                            :

   $_mH_{2m}(OH)_2 + 2Na \qquad _mH_{2m}(ONa)_2 + H_2$ (5)

              :

2   $_mH_{2m} + 3KMnO_4 + 4H_2O \qquad _mH_{2m}(OH)_2 + 2MnO_2 + 2KOH$ (6)

           :
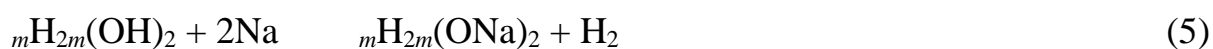
$n(H_2) = 0.224/22.4 = 0.01\quad\quad$;

$n(\ _mH_{2m}(OH)_2) = n(H_2) = 0.01\quad\quad$.

                                          :

$M(\ _mH_{2m}(OH)_2) = 0.76/0.01 = 76\ $ /   ,

$12m + 2m + 17\cdot2 = 76,\qquad m = 3.$

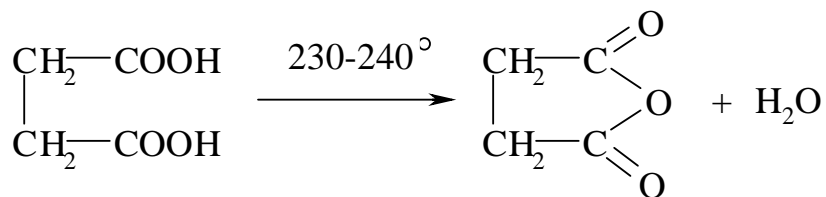   ,   –   ,   –
          –1,2.

$$CH_3-CH=CH_2 \xrightarrow{\ KMnO_4,\ H_2O\ } CH_3-\underset{\underset{OH}{|}}{CH}-\underset{\underset{OH}{|}}{CH_2}$$

4.2. $_2H_4(COOH)_2$

           :

$$\text{HOOC-CH}_2\text{-CH}_2\text{-COOH} \qquad\qquad \underset{\overset{|}{\text{CH}_3}}{\text{HOOC-CH-COOH}}$$

, **A** – ( )

2– ( ).

,

:

$$\underset{\text{CH}_2\text{-COOH}}{\overset{\text{CH}_2\text{-COOH}}{|}} \quad \xrightarrow{230\text{-}240°} \quad \underset{\text{CH}_2\text{-C}}{\overset{\text{CH}_2\text{-C}}{}} \underset{\diagdown O}{\overset{\diagup O}{}} O \quad + \quad \text{H}_2\text{O}$$

$$\underset{\overset{|}{\text{CH}_3}}{\text{HOOC-CH-COOH}} \quad \xrightarrow{t°} \quad \text{CH}_3\text{-CH}_2\text{-COOH} \quad + \quad \text{CO}_2$$

4.3.

( ) .

, :

$$k\,\text{HO-}\underset{\overset{\|}{O}}{\text{C}}\text{-CH}_2\text{-CH}_2\text{-}\underset{\overset{\|}{O}}{\text{C}}\text{-OH} \quad + \quad k\,\text{HO-}\underset{\overset{|}{\text{CH}_3}}{\text{CH}}\text{-CH}_2\text{-OH} \longrightarrow$$

$$\longrightarrow \left[\text{O-}\underset{\overset{|}{\text{CH}_3}}{\text{CH}}\text{-CH}_2\text{-O-}\underset{\overset{\|}{O}}{\text{C}}\text{-CH}_2\text{-CH}_2\text{-}\underset{\overset{\|}{O}}{\text{C}}\right]_k \quad + \quad 2k\text{H}_2\text{O}$$

	1
	1
	2
-	4
A (2)	2
	2
, (2)	4
	1
	1
	1
	1
	1
	1
	3
	25