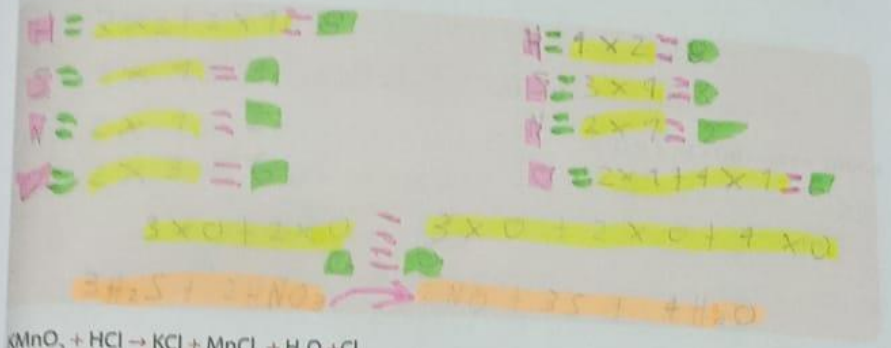
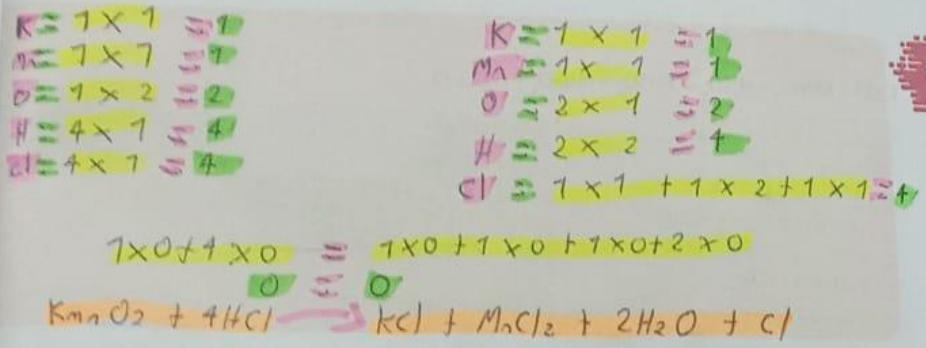
1. Balancea por óxido- reducción las siguientes ecuaciones químicas, teniendo en cuenta los números de oxidación y plantea semirreacciones para cada una, indica quien se oxida y quien se reduce.

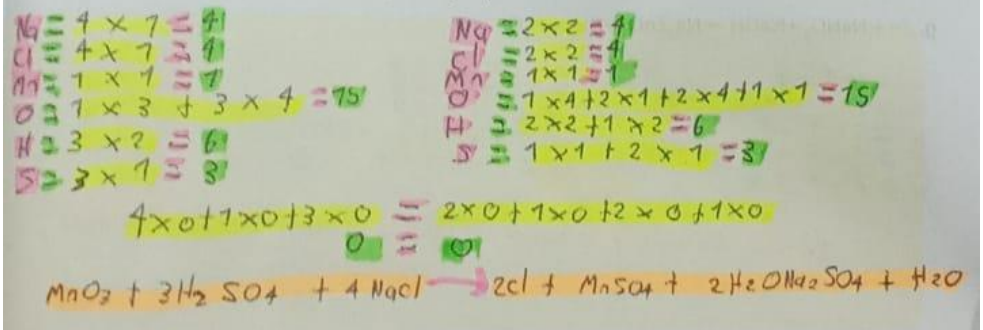
$H_2S + HNO_3 \rightarrow H_2SO_4 + NO + H_2O$



$KMnO_2 + HCl \rightarrow KCl + MnCl_2 + H_2O + Cl$



$MnO_2 + H_2SO_4 + NaCl \rightarrow Cl_2 + MnSO_4 + H_2O + Na_2SO_4$



d. $HNO_3 + P + H_2O \rightarrow H_3PO_4 + NO$

P = 3 × 1 = 3
H = 5 × 1 + 2 × 2 = 9
N = 5 × 1 = 5
O = 5 × 3 + 2 × 1 = 17

P = 3 × 1 = 3
H = 3 × 3 = 9
N = 5 × 1 = 5
O = 3 × 4 + 5 × 1 = 17

3 × 0 + 5 × 0 + 2 × 0 = 3 × 0 + 5 × 0
0 = 0

$5HNO_3 + 3P + 2H_2O \rightarrow 3H_3PO_4 + 5NO$

e. $HNO_3 + HBr \rightarrow NO + Br_2 + H_2O$

H = 6 × 1 + 2 × 1 = 8
O = 6 × 1 = 6
N = 2 × 1 = 2
O = 2 × 3 = 6

H = 4 × 2 = 8
Br = 3 × 2 = 6
N = 2 × 1 = 2
O = 2 × 1 + 4 × 1 = 6

6 × 0 + 2 × 0 = 3 × 0 + 2 × 0 + 4 × 0
0 = 0

$2HNO_3 + 6HBr \rightarrow 2NO + 3Br_2 + 4H_2O$

f. $KCl + KMnO_4 + H_2SO_4 \rightarrow KHSO_4 + MnSO_4 + H_2O + Cl$

K = 5 × 1 + 1 × 1 = 6
Cl = 5 × 1 = 5
Mn = 1 × 1 = 1
O = 1 × 4 + 7 × 1 = 32
H = 7 × 2 = 14
S = 2 × 1 = 2

K = 6 × 1 = 6
Cl = 5 × 1 = 5
Mn = 1 × 1 = 1
O = 1 × 4 + 6 × 4 + 4 × 1 = 32
H = 6 × 1 + 4 × 2 = 14
S = 1 × 1 + 6 × 1 = 7

5 × 0 + 1 × 0 + 7 × 0 = 5 × 0 + 1 × 0 + 6 × 0 + 4 × 0
0 = 0

$5KCl + KMnO_4 + 7H_2SO_4 \rightarrow 6KHSO_4 + MnSO_4 + 4H_2O + 5Cl$

g. $Zn + NaNO_3 + NaOH \rightarrow Na_2ZnO_2 + NH_3 + H_2O$

Zn = 4 × 1 = 4
Na = 1 × 1 + 7 × 1 = 8
N = 1 × 1 = 1
O = 1 × 3 + 7 × 1 = 10
H = 7 × 1 = 7

Zn = 4 × 1 = 4
Na = 4 × 2 = 8
N = 1 × 1 = 1
O = 4 × 2 + 2 × 1 = 10
H = 1 × 3 + 2 × 2 = 7

$4Zn + NaNO_3 + 7NaOH \rightarrow 4Na_2ZnO_2 + NH_3 + 2H_2O$

$KMnO_4 + HNO_2 + H_2SO_4 \rightarrow K_2SO_4 + MnSO_4 + HNO_3 + H_2O$

H = 5 × 1 + 3 × 2 = 11
N = 3 × 1 = 3
O = 5 × 2 + 2 × 4 + 3 × 1 = 20
K = 2 × 1 = 2
Mn = 2 × 1 = 2
S = 3 × 1 = 3

H = 5 × 1 + 3 × 2 = 11
N = 5 × 1 = 5
O = 5 × 3 + 2 × 4 + 1 × 4 + 3 × 1 = 30
K = 1 × 2 = 2
Mn = 2 × 1 = 2
S = 2 × 1 + 1 × 1 = 3

5 × 0 + 2 × 0 + 3 × 0 = 5 × 0 + 2 × 0 + 1 × 0 + 3 × 0
0 = 0

$2KMnO_4 + 5HNO_2 + 3H_2SO_4 \rightarrow K_2SO_4 + 2MnSO_4 + 5HNO_3 + 3H_2O$

$KI + H_2SO_4 \rightarrow K_2SO_4 + I_2 + H_2S + H_2O$

K = 8 × 1 = 8
I = 8 × 1 = 8
H = 5 × 2 = 10
S = 5 × 1 = 5
O = 5 × 4 = 20

K = 4 × 2 = 8
I = 4 × 2 = 8
H = 1 × 2 + 4 × 2 = 10
S = 1 × 1 + 4 × 1 = 5
O = 4 × 4 + 4 × 1 = 20

8 × 0 + 5 × 0 = 4 × 0 + 1 × 0 + 4 × 0 + 4 × 0
0 = 0

$8KI + 5H_2SO_4 \rightarrow 4K_2SO_4 + 4I_2 + H_2S + 4H_2O$

$K_2Cr_2O_7 + HCl \rightarrow KCl + CrCl_3 + Cl_2 + H_2O$

K = 1 × 2 = 2
Cr = 4 × 2 = 8
O = 1 × 7 = 7
H = 14 × 1 = 14
Cl = 14 × 1 = 14

K = 2 × 1 = 2
Cr = 2 × 1 = 2
O = 7 × 1 = 7
H = 7 × 2 = 14
Cl = 3 × 2 + 2 × 3 + 2 × 1 = 14

1 × 0 + 14 × 0 = 3 × 0 + 2 × 0 + 7 × 0
0 = 0

$K_2Cr_2O_7 + 14HCl + 2KCl_3 \rightarrow 3Cl_2 + 7H_2O$

$Cu + HNO_3 \rightarrow Cu(NO_3)_2 + NO + H_2O$

Cu = 3 × 1 = 3
H = 8 × 1 = 8
N = 8 × 1 = 8
O = 8 × 3 = 24

Cu = 3 × 1 = 3
H = 4 × 2 = 8
N = 3 × 2 + 2 × 1 = 8
O = 3 × 6 + 2 × 1 + 4 × 1 = 24

3 × 0 + 8 × 0 = 3 × 0 + 2 × 0 + 4 × 0
0 = 0

$3CO + 8HNO_3 \rightarrow 3CO(NO_3)_2 + 2NO + 4H_2O$