2   Which of the following reactions are redox reactions?

  1      $CuSO_4 + Zn \rightarrow Cu + ZnSO_4$

  2      $HCl + NaOH \rightarrow NaCl + H_2O$

  3      $Mg + H_2SO_4 \rightarrow MgSO_4 + H_2$

  4      $Pb(NO_3)_2 + 2KI \rightarrow PbI_2 + 2KNO_3$
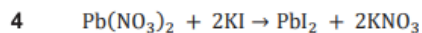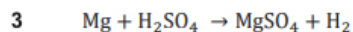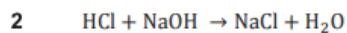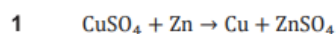
  A   1 and 2 only

  B   1 and 3 only

  C   1 and 4 only

  D   2 and 3 only

  E   2 and 4 only

  F   3 and 4 only

2014

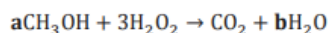10 Methanol can be oxidised by hydrogen peroxide to produce carbon dioxide and water.

$$aCH_3OH + 3H_2O_2 \rightarrow CO_2 + bH_2O$$

What is the value of **b** when this equation is balanced?

  A   3

  B   4

  C   5

  D   6

  E   7

2014

10 Inorganic builders are put into detergents to act as a buffer, i.e. to keep the pH close to 7.
    Sodium tripolyphosphate is a major one used. The equation for its formation is shown below:

$$\textbf{a}NaH_2PO_4 + \textbf{b}Na_2HPO_4 \rightarrow \textbf{c}Na_5P_3O_{10} + \textbf{d}H_2O$$

What are the values of **a**, **b**, **c** and **d**?

  A   3, 1, 1, 3
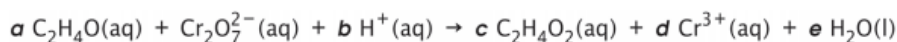
  B   6, 2, 2, 7

  C   2, 4, 2, 2

  D   1, 2, 1, 2

  E   2, 2, 1, 2

2012

22 By using standard techniques to balance chemical equations and ensuring that the net charge is equal on both sides, find the correct value for 'e' in the balanced equation below:
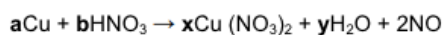
$$a\ C_2H_4O(aq) + Cr_2O_7^{2-}(aq) + b\ H^+(aq) \rightarrow c\ C_2H_4O_2(aq) + d\ Cr^{3+}(aq) + e\ H_2O(l)$$

A   1

B   2

C   4

D   6

E   8

2013

18 Nitrogen Monoxide is prepared by reacting copper with nitric acid.

What should the values of a, b, x and y be in order to balance the following equation?

aCu + bHNO$_3$ → xCu (NO$_3$)$_2$ + yH$_2$O + 2NO

A   a = 2, b = 4, x = 2, y = 2

B   a = 6, b = 16, x = 6, y = 8

C   a = 1, b = 4, x = 1, y = 2

D   a = 4, b = 10, x = 4, y = 5

E   a = 3, b = 8, x = 3, y = 4

2011

26 An impurity in petroleum is dimethylsulphide, CH_3SCH_3. When dimethylsulphide is burnt in an excess of air, which one of the following balanced equations represents the reaction that takes place?

A $CH_3SCH_3 + 3O_2 \rightarrow 2CO_2 + 2H_2O + H_2S$

B $2CH_3SCH_3 + 7O_2 \rightarrow 4CO_2 + 6H_2O + 2S$

C $4CH_3SCH_3 + 12O_2 \rightarrow 6CO_2 + 12H_2O + 2CS_2$

D $2CH_3SCH_3 + 7O_2 \rightarrow 4CO + 6H_2O + 2SO_2$

E $2CH_3SCH_3 + 9O_2 \rightarrow 4CO_2 + 6H_2O + 2SO_2$

2011

14 Which of the following ionic equations are correct?

    1 $X^+ + e^- \rightarrow X$

    2 $X^- - e^- \rightarrow X$

    3 $O^{2-} + 2e^- \rightarrow O$

    4 $O^{2-} - e^- \rightarrow O_2$

    5 $2I^- - 2e^- \rightarrow I$

    6 $Ca^{2+} + 2e^- \rightarrow Ca$

A   1, 2 and 6

B   1, 3 and 5

C   1, 4 and 5

D   2, 3 and 6

E   2, 4 and 5

F   3, 4 and 6

2010

14 The order of reactivity of four elements is J>M>Q>T i.e. J is the most reactive and T the least reactive.

A series of reactions are given below:

    1 $MCl_2 + T \rightarrow TCl_2 + M$

    2 $MSO_4 + J \rightarrow JSO_4 + M$

    3 $TO + Q \rightarrow QO + T$

    4 $QO + J \rightarrow JO + Q$

    5 $JSO_4 + T \rightarrow TSO_4 + J$

    6 $MO + Q \rightarrow QO + M$
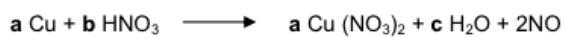
Which three reactions could take place?

A   1, 2 and 3

B   2, 3 and 4

C   4, 5 and 6

D   1, 4 and 6

2009

18 The equation for the preparation of nitrogen monoxide is:

$$\textbf{a}\ Cu + \textbf{b}\ HNO_3 \longrightarrow \textbf{a}\ Cu(NO_3)_2 + \textbf{c}\ H_2O + 2NO$$

What is the value of **b**?

A   2

B   4

C   6

D   8

E   12

F   16

2009