6•1 Redox

MCQs

06-1-M-01
07ZZ06-1-M-01

A No. of moles of $NaBrO_3 = \left(\frac{20}{1000}\right) \times 0.02$
$= 0.0004$

No. of moles of $NH_2OH = \left(\frac{80}{1000}\right) \times 0.01$
$= 0.0008$

$1\ NaBrO_3 = 2NH_2OH$

No. of electrons transferred $= 3$

Half equation for the oxidation of hydroxylamine:

$NH_2^+ + H_2O \rightarrow NO + 4H^+ + 3e$ (ans)

06-1-M-02
07ZZ06-1-M-02

B For the reaction between Ce and Fe, Ce^{4+} will undergo reduction whereas Fe^{2+} will undergo oxidation as the redox potential value of Ce is more positive. By comparing the redox potentials in this way, Sn^{2+} will undergo oxidation when reacted with Fe^{3+}, and Sn^{2+} will undergo oxidation while Ce^{4+} will undergo reduction when reacted together under standard conditions. (ans)

06-1-M-03
07ZZ06-1-M-03

B Change in oxidation state of chlorine: from 0 in chlorine gas to −1 in chloride ion. There is a transfer of 2 electrons to NH_3OH^+. The change in oxidation state of N: −1 in NH_3OH^+ to +1 in N_2O. (ans)

06-1-M-04
07ZZ06-1-M-04

C The positive electrode is where reduction takes place. In this case, lead has a less negative redox potential, and will form the positive electrode. The cell potential can be increased by both adding water or by dissolution of the solid metal. (ans)

06-1-M-05
07ZZ06-1-M-05

D The oxidation number of chlorine changes from −1 to 0. The oxidation number of manganese will change from +7 to +2. The electrode potential of the reduction of MnO_4^- is +1.52V. Therefore the equation

$2MnO_4^- + 16H^+ + 10Cl^- \rightarrow 2Mn^{2+} + 8H_2O + 5Cl_2$ is correct. (ans)

06-1-M-06
07ZZ06-1-M-06

C The electrode potential of the ClO_2/Cl^- half-cell is more positive than that of the $Cr^{3+}/Cr_2O_7^{2-}$ half-cell. Therefore ClO_2 will undergo reduction while Cr^{3+} will undergo oxidation. (ans)

06-1-M-07
07ZZ06-1-M-07

C The oxidation state of the oxidizing agent will decrease. $KBiO_3$ is the oxidizing agent as the oxidation state of Bi changes from +5 to +3 in $BiCl_3$. (ans)

06-1-M-08
07ZZ06-1-M-08

C The strongest reducing agent is most easily oxidized, meaning that it has the most negative electrode potential. Thus the strongest reducing agent is Mg as it is most easily oxidized to Mg^{2+}. (ans)

06-1-M-09
07ZZ06-1-M-09

C No. of moles of $Fe^{2+} = \left(\frac{100}{1000}\right) \times 0.02$
$= 0.002$

No. of moles of $XO_3^- = \left(\frac{50}{1000}\right) \times 0.02$
$= 0.001$

$1\ XO_3^- \equiv 2Fe^{2+}$

$2Fe^{2+} = 2Fe^{3+} + 2e^-$

No. of electrons transferred to $XO_3^- = 2$

New oxidation state of $X = +5 - 2 = +3$ (ans)