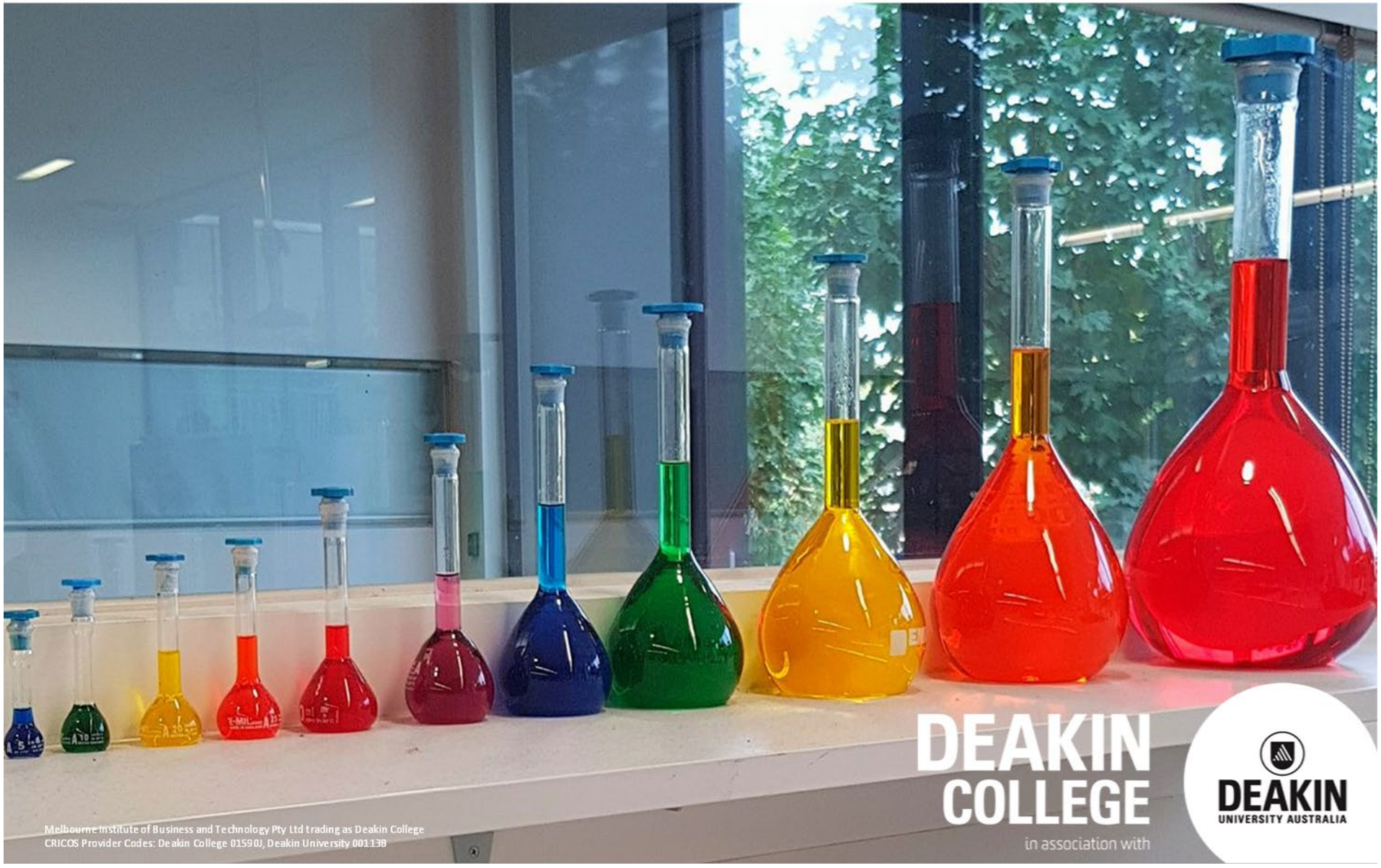
SLE155 Chemistry for the Professional Sciences

Burwood and Geelong



Practice Questions

Week 5

Electrochemistry

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Q 1

Reducing agents loose electrons.

a. True

b. False

Q 2

The reaction,

$HCl(aq) + Na_2CO_3(aq) \rightarrow NaCl(aq) + H_2O(l) + CO_2(g)$,

involves changes in oxidation number and is therefore classified as a redox reaction.

a. True

b. False

Q 3

The reaction, $NiS(s) + O_2(g) \rightarrow NiO(s) + SO_2(g)$, involves changes in oxidation number and is therefore classified as a redox reaction.

a. True

b. False

Q 4

The reaction, $Cl_2(g)$ + NaBr(aq) → NaCl(aq) + $Br_2(l)$, involves changes in oxidation number and is therefore classified as a redox reaction.

a. True

b. False

Q 5

Oxidation half-equation will *always* have the electrons on the right-hand side.

a. True

b. False

Q 6

Reduction occurs at the cathode.

a. True

b. False

Q 7

Which one of the statements below is true concerning an oxidation-reduction reaction?

a. the reactant which is being reduced is the reducing reagent

b. the reactant which is being oxidised is the reducing reagent

c. the reactant which gains electrons is the reducing reagent

d. the reactant which loses electrons is the oxidising reagent

e. none of the statements, a-d, is true for an oxidation-reduction reaction

Q 8

What is the oxidation number of each sulfur atom in the $S_2O_8^{2-}$ ion?

a. +7

b. +5

c. +3

d. +1

e. -2

Q 9

In a chemical reaction one of the reactants is MnO_2. It is transformed into $MnSO_4$. What is the change in oxidation number of the manganese?

a. there is no change in oxidation number

b. increase of +1

c. increase of +2

d. decrease by two units

e. decrease by one unit

Q 10

What is the change in oxidation number of each chromium atom in the process:
$K_2Cr_2O_7 \rightarrow Cr_2(SO_4)$

a. -1

b. -3

c. +3

d. -6

e. +6

Q 11

Balance the half-reaction, $C_5O_5^{2-}(g) \longrightarrow CO_3^{2-}(aq)$, taking place in basic media. Which answer below describes how many hydroxide ions are needed to balance the half-reaction?

a. 8 ions, left side

b. 12 ions, right side

c. 12 ions, left side

d. 20 ions, left side

e. 20 ions, right side

Q 12

Balance the half-reaction, $NO_3^-(aq) \longrightarrow NH_4^+(aq)$, taking place in acidic media. Which answer below describes how many electrons are needed to balance the half-reaction?

a. 2 electrons, left side

b. 8 electrons, left side

c. 4 electrons, left side

d. 3 electrons, right side

e. 8 electrons, right side

Q 13

Complete the balancing of the following half-reaction, taking place in basic media:

$Br^-(aq) \longrightarrow BrO_3^-(aq)$

Which answer below describes how many electrons are needed to balance the half-reaction?

a. 2 electrons, left side
b. 2 electrons, right side
c. 4 electrons, right side
d. 6 electrons, right side
e. 6 electrons, left side

Q 14

Using these metal ion/metal standard reduction potentials:

Calculate the standard cell potential for the cell whose net reaction is:

$$Cu^{2+}(aq) + Cd(s) \longrightarrow Cd^{2+}(aq) + Cu(s)$$

a. +0.76 volt
b. +0.06 volt
c. -0.06 volt
d. +0.74 volt
e. +0.20 volt

Cd2+(aq) | Cd(s)	Zn2+(aq) | Zn(s)	Ni2+(aq) | Ni(s)	Xp+(aq) | Xp(s)	Cu2+(aq) | Cu(s)
-0.40 V	-0.76 V	-0.25 V	+0.62 V	+0.34 V

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Q 15

Consider these metal ion/metal standard reduction potentials:
Based on the data below, which one of the species below is the best oxidising agent?

Cu2+(aq) | Cu(s)	Ag+(aq) | Ag(s)	Co2+(aq) | Co(s)	Nt2+(aq) | Nt(s)	Zn2+(aq) | Zn(s)
+0.34 V	+0.80 V	-0.28 V	-1.10 V	-0.76 V

a. Co(s)
b. Zn(s)
c. $Nt^{2+}(aq)$
d. Cu(s)
e. Ag+(aq)

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Q 16

Which statement is true in regard to a galvanic cell?

a. $E^{\ominus}$ for the cell is always positive.

b. $E^{\ominus}$ for the cell is always negative.

c. The standard reduction potential for the anode reaction is always positive.

d. The standard reduction potential for the anode reaction is always negative.

e. The standard reduction potential for the cathode reaction is always positive.

Q 17

Which one of the six substances involved in the reaction described in the balanced equation below is the oxidising agent?

$BrO^{3-}(aq) + 3\ Zn(s) + 6\ H^{+}(aq) \rightarrow Br^{-}(aq) + 3\ Zn(s) + 3\ H_2O(l)$

Answer: $BrO^{3-}(aq)$

Q 18

Is the process, $S_2O_3^{2-}(aq)$ → $S_4O_6^{2-}(aq)$, an oxidation or a reduction?

Answer: oxidation