



CHEMISTRY 2.7

An assessment for AS90311

Describe oxidation-reduction reactions.

Credits: Three

INSTRUCTIONS

Answer **ALL** questions.

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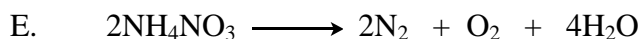
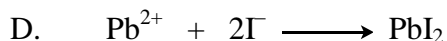
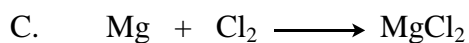
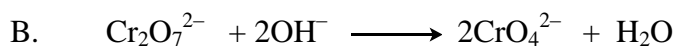
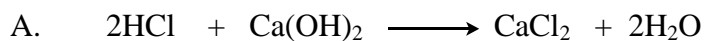
You should spend about 35 minutes on this assessment.

QUESTION ONE

- (a) Complete the following table to determine whether the underlined species has been oxidised or reduced.

		Oxidation No in reactant	Oxidation No in product	Oxidation or reduction
(i)	$\underline{\text{C}}_2\text{O}_4^{2-} \longrightarrow \underline{\text{C}}\text{O}_2$			
(ii)	$\underline{\text{P}}\text{Cl}_3 \longrightarrow \underline{\text{P}}\text{OCl}_3$			
(iii)	$\underline{\text{I}}\text{O}_3^- \longrightarrow \underline{\text{I}}_2$			

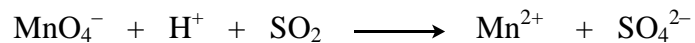
- (b) Only two of the equations below represent oxidation-reduction reactions. Circle the letters of these two equations to identify them.



- (c) Briefly explain why the two equations you circled in part (b) represent oxidation-reduction reactions. (A detailed explanation of each reaction is not required.)

QUESTION TWO

- (a) Sulfur dioxide gas is bubbled through acidified potassium permanganate.



Write the two balanced ion-electron half-equations and the overall balanced equation for the reaction that occurs.

Oxidation half equation

Reduction half equation

Overall balanced equation

- b) Describe the observations which would be expected during this reaction and link them to the species concerned.
- c) Compare the number of moles of permanganate taking part in the reaction if the hydrogen sulfite ion (HSO_3^-) was used instead of sulfur dioxide (SO_2). Justify your answer.

QUESTION THREE

Use the observations given below to

- (i) identify by name or formula **both** products for each of the following reactions.
 - (ii) identify the oxidant (oxidising agent) and its product in each reaction.
- a) When zinc metal dissolves in dilute sulfuric acid, bubbles of a colourless gas are produced which burn with a squeaky pop when collected and tested. A colourless solution remains.

(i)

(ii)

- b) When chlorine gas is bubbled through a solution of potassium bromide, the resulting solution is reddish orange.

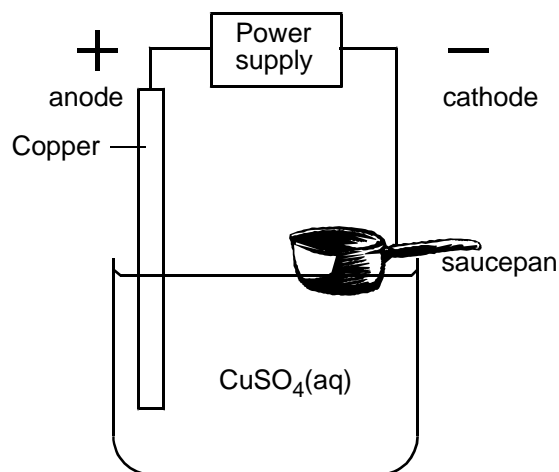
(i)

(ii)

QUESTION FOUR

Electroplating is a process similar to electrolysis where a metal object is coated with a thin layer of another metal. Some older kitchen saucepans were plated with copper in this manner.

A simple diagram of the process is shown below



- (a) At the anode the same reaction occurs in both electrolysis and electroplating reactions. Circle the type of reaction that occurs at the anode.

REDUCTION

OXIDATION

- (b) Discuss how the copper becomes plated onto the saucepan. Include in your discussion what would be observed at each electrode and in the solution. Give half equations for the reaction occurring at each electrode.

QUESTION FIVE

In each of the following reactions colourless hydrogen peroxide (H_2O_2) reacts to form water (H_2O).

- (a) Write the half-equation for the reaction in which hydrogen peroxide (H_2O_2) forms water.
- (b) Describe the observations seen when hydrogen peroxide is reacted with each of the following and link these observations to the species present before and after each reaction.
- (i) FeSO_4
- (ii) KI
- (c) Hydrogen peroxide can also form oxygen in certain reactions. Explain how the role of hydrogen peroxide in this reaction differs from that in (a) above. Include the equation for your reaction in your explanation.