

# OXIDATION AND REDUCTION

Syllabus reference 9.2.4

1 Classify each of the following statements as true (T) or false (F). For those statements that are false, rewrite the statement so it is correct.

- a A displacement reaction involves the transfer of protons between a metal and a metal ion. \_\_\_\_\_
- b Reduction is the gain of electrons by a substance. \_\_\_\_\_
- c When copper loses two electrons to form  $\text{Cu}^{2+}$  it is reduced. \_\_\_\_\_
- d An oxidation reaction is always accompanied by a reduction reaction. \_\_\_\_\_
- e A more active metal will displace a less active metal from a solution of its ions. \_\_\_\_\_
- f For positive monatomic ions the oxidation state is always +1. \_\_\_\_\_
- g The oxidation number of manganese in  $\text{MnO}_2$  is +1. \_\_\_\_\_
- h For any redox reaction the number of electrons lost must be equal to the number of electrons gained. \_\_\_\_\_
- i In the reaction  $\text{CuO}(s) + \text{H}_2(g) \rightarrow \text{Cu}(s) + \text{H}_2\text{O}(l)$  copper goes from an oxidation state of +1 to 0. \_\_\_\_\_
- j For any neutral compound the sum of the oxidation numbers of the atoms in the molecule must equal zero. \_\_\_\_\_

2 By referring to the Activity Series select four metals which will displace:

- a nickel from a solution of nickel nitrate  
\_\_\_\_\_  
\_\_\_\_\_
- b copper from a solution of copper sulfate  
\_\_\_\_\_  
\_\_\_\_\_

- 3 a In which direction (left to right) will the following reactions occur? If no reaction occurs write 'no reaction'.



- b Write the correct balanced equation for each of the reactions above.

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- 4 a Which is the strongest reductant out of Pb, Al, Fe and Cu, and which is the weakest?

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- b Which is the strongest oxidant out of  $\text{K}^+$ ,  $\text{Ag}^+$ ,  $\text{Al}^{3+}$  and  $\text{Ni}^{2+}$ , and which is the weakest?

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\_\_\_\_\_

- 5 Write balanced ionic equations for the following.

- a zinc is placed in a copper sulfate solution

\_\_\_\_\_

\_\_\_\_\_

- b lead is added to a solution containing  $\text{Ag}^+$  ions

\_\_\_\_\_

\_\_\_\_\_

- c iron is placed in a solution containing  $\text{Na}^+$  and  $\text{Pb}^{2+}$  ions

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\_\_\_\_\_

- 6 Give the oxidation number of each of the following elements.

- a potassium bromide \_\_\_\_\_

- b magnesium \_\_\_\_\_

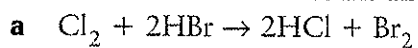
- c aluminium oxide \_\_\_\_\_

- d iron(II) chloride \_\_\_\_\_

- e iodine \_\_\_\_\_

- f iron(III) chloride \_\_\_\_\_

7 Identify the species that is oxidised and the species that is reduced in each of the following reactions. Name the oxidant and reductant.



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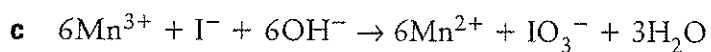
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