

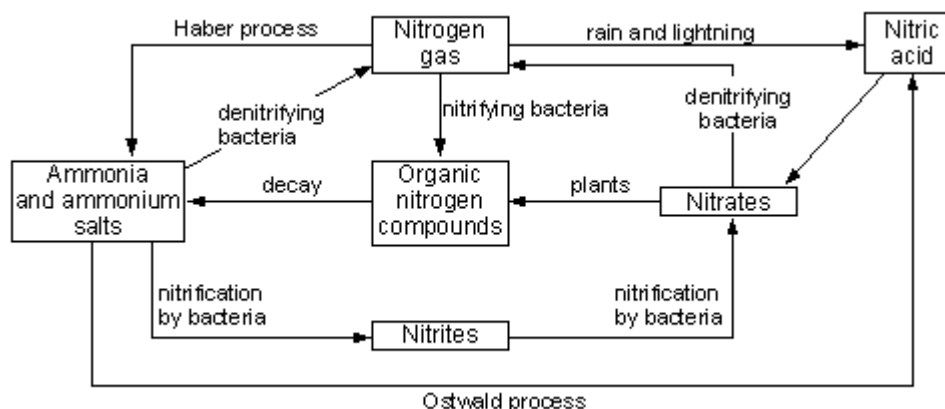
Practice exam questions for Chapter 1: Oxidation and Reduction (Write-on version)

Question 1 (Bursary 2002 Question 8)

Ammonia features prominently in the nitrogen cycle occurring in the biosphere. When ammonia is released back into the soil, it is changed into nitrates by soil bacteria.

The nitrogen cycle

A diagram showing the main processes involved in the nitrogen cycle is given below.



a Give the oxidation state of nitrogen in each of the following species. **A**

i NH_4^+ _____

iii NO_3^- _____

ii NO_2^- _____

iv N_2 _____

b For each of the following changes, state whether the nitrogen is **oxidised**, **reduced** or **neither**. **M**

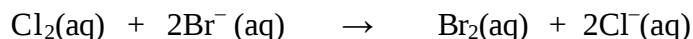
i the action of denitrifying bacteria on nitrates. _____

ii the formation of nitrate ions from nitric acid. _____

iii the Ostwald process. _____

Question 2 (Bursary 2000 Question 6)

a Bromide ions react with chlorine to give elemental bromine as shown below.



Name another halogen that can be produced from its halide ion by reaction with chlorine. **A**

b Circle the species below that is the strongest reducing agent. **A**

I_2

I^-

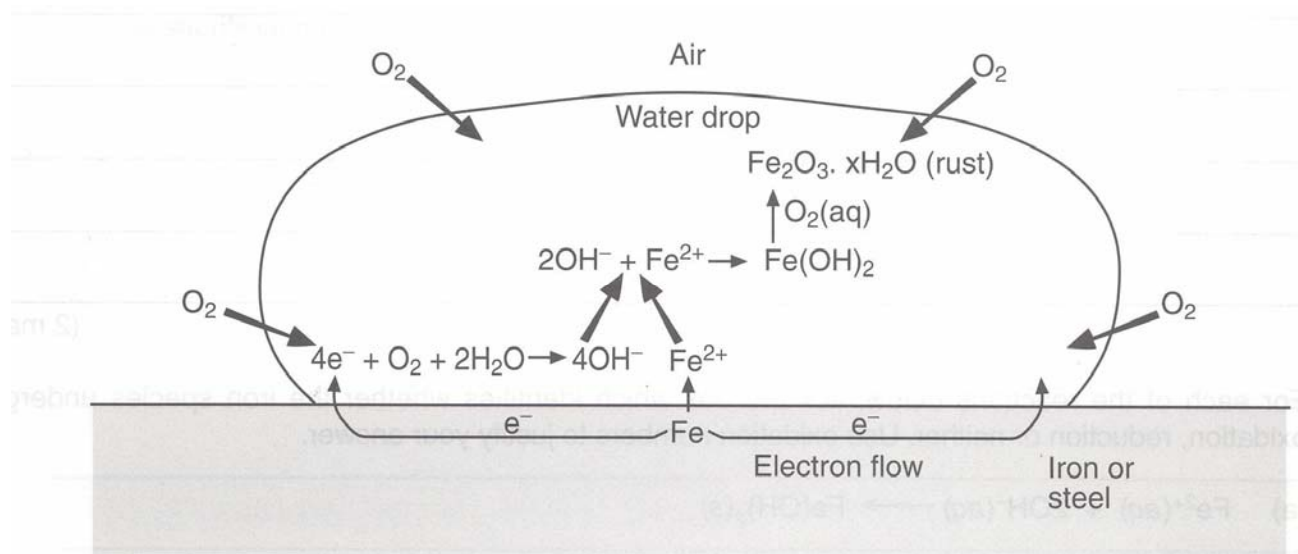
Cl^-

F_2

F^-

Question 3 (Bursary 1999 Question 6)

Iron rusts when it is in contact with moist air. The diagram represents the process of rusting in a drop of water. In the water drop, different areas act as sites of oxidation and reduction.



a Write balanced half-equations for:

i oxidation of Fe to Fe^{2+}

ii reduction of O_2 to OH^-

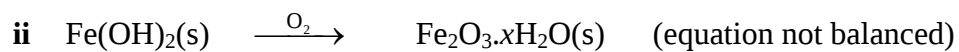
b Combine the two half-equations in **a** to give the overall equation for the reaction of Fe with O_2 . **A M**

c For each of the reactions below, state whether the iron species undergoes oxidation, reduction or neither. Justify your answers. **A M**

i $Fe^{2+}(aq) + 2OH^- \rightarrow Fe(OH)_2(s)$

Oxidation ☐ Reduction ☐ Neither ☐

Reason: _____



Oxidation ☐

Reduction ☐

Neither ☐

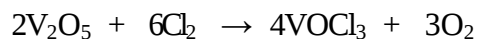
Reason: _____

d What colour change is observed when $\text{Fe}(\text{OH})_2$ changes to $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$?

Question 4 (Bursary 2000 Question 2)

a What is the oxidation state of vanadium in the VO_2^+ ion? A _____

Vanadium pentoxide reacts with chlorine as shown below.



b Which reactant is the reductant? A _____

Justify your answer. M
