

2 Iron is extracted from iron ore in a blast furnace.

(a) The iron compound in the main iron ore used in the blast furnace is iron(III) oxide.

(i) State the name of the main iron ore used in the blast furnace.

..... [1]

(ii) State how the main source of heat is provided in the blast furnace.

..... [1]

(iii) Name the gaseous reducing agent in the blast furnace.

..... [1]

(iv) Write a symbol equation for the reduction of iron(III) oxide by the gaseous reducing agent in (a)(iii).

..... [2]

(v) The main impurity in iron ore is silicon(IV) oxide.

Write **two** symbol equations to show the role of limestone in removing silicon(IV) oxide from iron ore.

1 .....

2 ..... [2]

(b) Table 2.1 shows four different isotopes of iron, **A**, **B**, **C** and **D**.

Table 2.1

A	B	C	D
$^{54}\text{Fe}$	$^{56}\text{Fe}$	$^{57}\text{Fe}$	$^{58}\text{Fe}$

Explain why **A**, **B**, **C** and **D** are isotopes of iron.

.....

..... [2]

(c) Iron can form two different ions,  $\text{Fe}^{2+}$  and  $\text{Fe}^{3+}$ .

(i) Complete Table 2.2 to show the number of protons, neutrons and electrons in the two iron ions shown.

Table 2.2

	$^{54}\text{Fe}^{2+}$	$^{58}\text{Fe}^{3+}$
protons		
neutrons		
electrons		

[3]

(ii) Describe a test for aqueous  $\text{Fe}^{2+}$  ions.

test .....

observations.....

..... [2]

(d) An oxidising agent converts  $\text{Fe}^{2+}$  ions to  $\text{Fe}^{3+}$  ions.

(i) Define the term oxidising agent.

.....

..... [2]

(ii) Explain why the conversion of  $\text{Fe}^{2+}$  ions to  $\text{Fe}^{3+}$  ions is described as oxidation.

..... [1]

(iii) The oxidising agent for the conversion of  $\text{Fe}^{2+}$  ions to  $\text{Fe}^{3+}$  ions is aqueous potassium manganate(VII).

State **one** condition needed for the oxidation to take place.

..... [1]

(e) Iodide ions,  $\text{I}^-$ , reduce  $\text{Fe}^{3+}$  ions to  $\text{Fe}^{2+}$  ions in aqueous solution.

Suggest the identity of the other product formed in this reaction.

..... [1]