ORDINARY LEVEL CHEMISTRY PROBLEMS

PART 15: EXTRACTION OF METALS

1. Haematite is one of the ores from which iron can be extracted.
   (a) Write the chemical formula of haematite
   (b) During the extraction of iron, roasted haematite is mixed with coke and limestone. The mixture is fed into the blast furnace and a blast of hot air is blown into the furnace from the bottom
      (i) Write equation(s) for the reaction(s) in the blast furnace that lead to the formation of iron
      (ii) Explain the role of limestone
   (c) Write equation for the reaction of iron with
      (i) Water
      (ii) Hydrochloric acid
   (d) To the resultant mixture in reaction c(ii) was added dilute ammonia solution until the alkali was in excess.
      (i) State what was observed
      (ii) Write equation for the reaction that took place.

(2). (a) Name the raw materials which are used in the extraction of iron in the blast furnace
   (b) Briefly describe the reactions that lead to the formation of iron during the extraction using the blast furnace (*include equations for the reactions*)
   (c) State what would be observed and write equation for the reaction that would take place when the following gases are passed over heated iron
      (i) Dry chlorine
      (ii) Steam
   (d) Dilute hydrochloric acid was added to iron filings and the mixture warmed.
      (i) State what was observed
      (ii) Write equation for the reaction.

3. In the extraction of cast iron using a blast furnace, spathic iron ore which contains some impurities, is first roasted in air. It is then mixed with some other substances and finally introduced into the blast furnace.
   (a) Name the major impurity in the iron ore
   (b) Write
      (i) The chemical name of spathic iron ore
      (ii) An equation for the reaction which takes place when iron(II) carbonate is heated in air
   (c) Name the substances that are fed into the blast furnace
      (i) From the top
      (ii) From the bottom
   (d) Outline the reactions leading to the
      (i) Formation of cast iron
      (ii) Removal of the major impurity you have named in (a)
   (e) Name the major components of steel

(4). (a) Name one ore of iron and write its formula

(b) During the extraction of iron, limestone and coke are added into the blast furnace. Explain the role of

(i) Coke

(ii) Limestone

(*Use equations to illustrate your answers)*

(c) Write equation to show how iron(II) sulphate can be obtained from iron.

(d) Iron(II) sulphate was heated strongly

(i) State what was observed

(ii) Write equation for the reaction

(5). (a) Iron can be extracted from spathic iron ore.

(i). Write the formula of the ore

(ii). Describe how iron can be extracted from spathic iron

(b). State the conditions and write the equations for the reaction of iron with

(i). Chlorine (iii) Hydrogen chloride

(ii). Oxygen (iv) Water

(c). Name a reagent that can be used to distinguish between iron(II) ions and iron(III) ions in the laboratory. In each case, state what would be observed and write equation for the reaction

(6). (a) Name the ore from which sodium can be extracted and write its formula

(b) Sodium is extracted by electrolysis.

(i) Name the cathode and anode

(ii) Give a reason for the choice of the anode

(c) During the extraction of sodium by electrolysis, calcium chloride is added to the sodium ore. State why this is done

(d) Briefly describe how sodium is obtained from the ore you named in (a) by electrolysis method (*include equations for your answer*)

(e) Name any other substance obtained along with sodium in the process. Write equation to show how it is produced in the cell.

(f) State the conditions and write equations for the reactions between sodium and

(i) Chlorine (ii) Water (iii) Oxygen

7) During the extraction of iron from spathic iron ore, the ore is first roasted in air, mixed with calcium carbonate and coke and then fed into the blast furnace from the top. Hot air is blown into the furnace from the bottom.

(a). Iron the formula spathic iron

(b). State why the ore is roasted. Write equation for the reaction that takes place

(c). What is the role of calcium carbonate in the process? Write equation(s) to illustrate your answer.

(d). Using equations only, show how iron is obtained from the product of roasting

(e). Write the names and formulae of any <u>other</u> two ores of iron.

(f). Give two uses of iron