

4 Chromium is the element with atomic number 24 in the Periodic Table.

(a) The main ore of chromium is chromite. Chromite contains FeCr_2O_4 .

FeCr_2O_4 reacts with carbon.

(i) Complete the equation for this reaction.



(ii) Suggest **one** disadvantage of extracting chromium by reacting chromite with carbon.
..... [1]

(b) Chromium can be mixed with nickel and other elements to form stainless steel.

Name the type of substance formed when a metal is mixed with other elements.
..... [1]

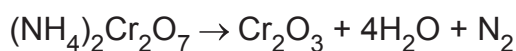
(c) $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$ is a compound containing chromium.

The negative ion in $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$ is $\text{Cr}_2\text{O}_7^{2-}$.

(i) State the sum of the oxidation numbers in the $\text{Cr}_2\text{O}_7^{2-}$ ion.
..... [1]

(ii) The oxidation number of each O in $\text{Cr}_2\text{O}_7^{2-}$ ions is -2 .
Determine the oxidation number of each Cr in $\text{Cr}_2\text{O}_7^{2-}$ ions. Show your working.
..... [2]

(iii) When $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$ is heated the following reaction occurs.



Calculate the volume of nitrogen gas produced at r.t.p., in cm^3 , when 1.26g of $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$ is heated using the following steps.

The M_r of $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$ is 252.

- Calculate the number of moles of $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$ used.
..... mol

- Determine the number of moles of N_2 formed.
..... mol

- Calculate the volume of N_2 formed at r.t.p. in cm^3 .
..... cm^3
[3]

[Total: 9]