Revision Pack
Subject: Chemistry
Year 10

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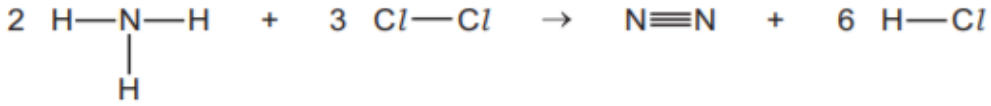
1.

Curriculum standards covered: Calculate the energy of a reaction using bond energies and explain electrolysis blast furnace and the factors affecting rate of reactions.

Skills in focus: Quantitative problem solving and making predictions

Answer the following questions carefully.

(a) The chemical equation can be represented as shown.



Use the bond energies in the table to determine the energy change, ΔH, for the reaction between ammonia and chlorine.

Bond	Energy/ kJ per mol
N-H	390
Cl-Cl	240
N≡N	945
H-Cl	430

- energy needed to break bonds

..... kJ

- energy released when bonds are formed

..... kJ

- energy change, ΔH, for the reaction between ammonia and chlorine

..... kJ

(b) Is the reaction endothermic or exothermic? Explain your answer.

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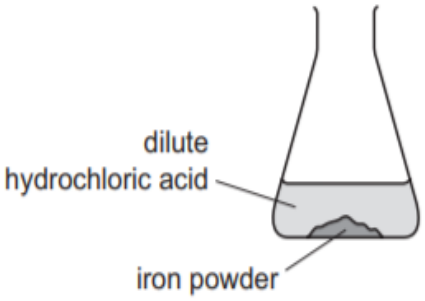
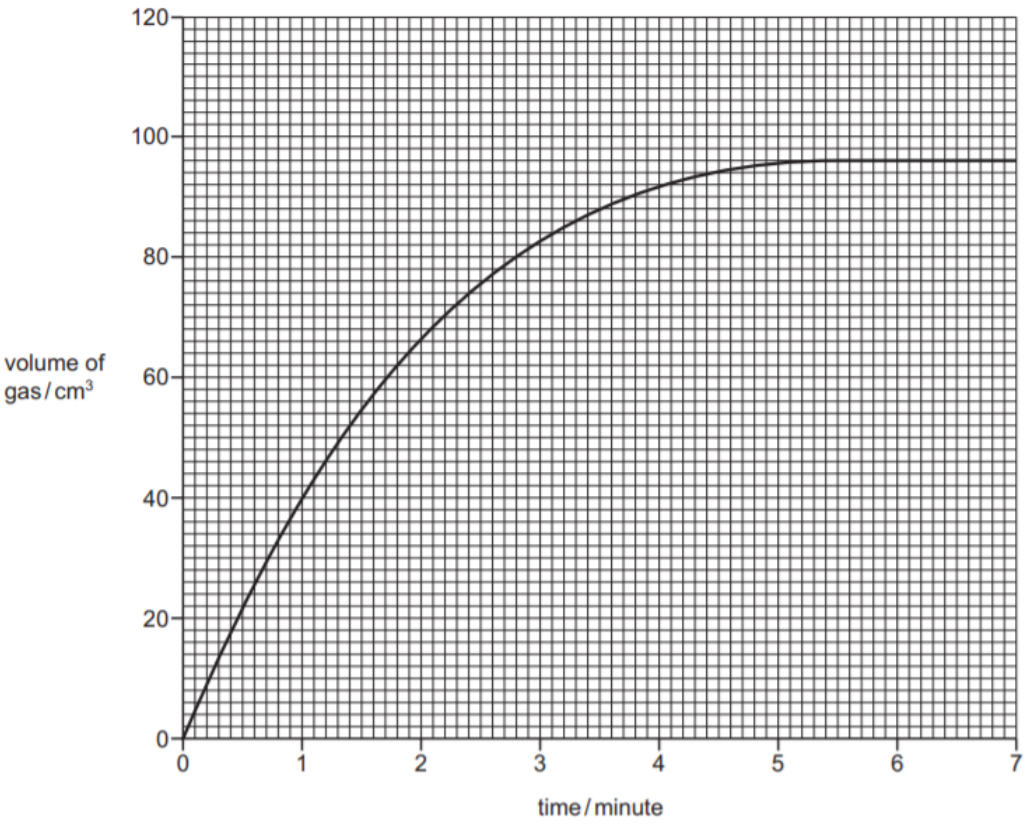
2. A student investigates the rate of reaction of iron powder with dilute hydrochloric acid.



(a) The graph shows the results the student obtained using dilute hydrochloric acid of concentration 0.2mol/dm3 and an excess of iron powder.



Use the graph to deduce:

(i) the time that the reaction was complete

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(ii) the volume of gas produced when the reaction was complete.

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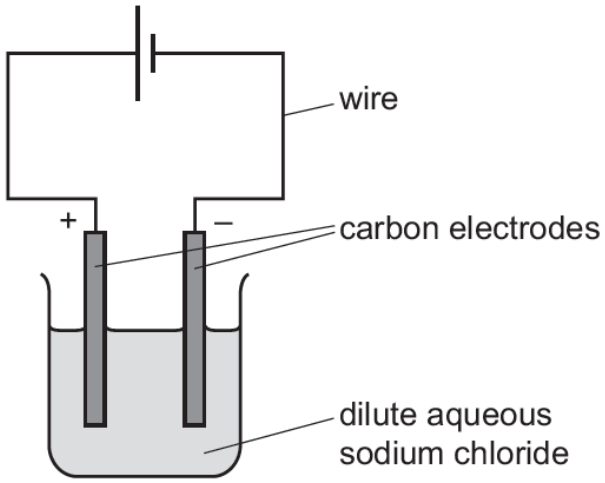
3. A student carries out an electrolysis experiment using the apparatus shown.



The student uses dilute aqueous sodium chloride.

(a) State the name given to any solution which undergoes electrolysis.

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(b) Hydroxide ions are discharged at the anode.

(i) Complete the ionic half-equation for this reaction.

$$\text{.....}OH^-(aq) \rightarrow \text{.....} + O_2(g) + 4e^- \qquad [2]$$

(ii) Explain how the ionic half-equation shows the hydroxide ions are being oxidised.

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(c) Describe what the student observes at the cathode.

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(d) Write the ionic half-equation for the reaction at the cathode.

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(e) The student repeats the experiment using concentrated aqueous sodium chloride.

(i) Describe what the student observes at:

● the cathode .....

● the anode. .....

(ii) The student added litmus to the solution after the electrolysis of concentrated aqueous sodium chloride.

State the colour seen in the solution. Give a reason for your answer.

colour of solution .....

reason.....

(f) Carbon electrodes are used because they are inert.

State another element that can be used instead of carbon.

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4. This question is about iron.

(a) Three of the raw materials added to a blast furnace used to extract iron from hematite are coke, hematite and limestone.

Name one other raw material added to the blast furnace.

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(b) A series of reactions occurs in a blast furnace during the extraction of iron from hematite.

Describe these reactions.

Include:

● one chemical equation for the reduction of hematite

● one chemical equation for the formation of slag.

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5. Some chemical reactions are reversible.

(a) Aqueous potassium chromate(VI), K_2CrO_4, is a yellow solution.

Aqueous potassium dichromate(VI), $K_2Cr_2O_7$, is an orange solution.

$$\underset{\text{yellow}}{2K_2CrO_4} + H_2SO_4 \rightleftharpoons \underset{\text{orange}}{K_2Cr_2O_7} + K_2SO_4 + H_2O$$

Solution Y is a mixture of aqueous potassium chromate (VI) and aqueous potassium dichromate (VI) at equilibrium.

● Explain, in terms of the position of the equilibrium, what you would see if sulfuric acid were added to solution Y

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(b) Hydrogen can be manufactured using a reversible reaction between methane and steam.

$$CH_4(g) + H_2O(g) \rightleftharpoons CO(g) + 3H_2(g)$$

At 900°C, in the presence of a nickel catalyst, the yield of hydrogen is 70%.

Under different conditions, different yields of hydrogen are obtained.

(i) If the pressure is increased, the yield of hydrogen becomes less than 70%. Explain why, in terms of the position of the equilibrium.

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(ii) If the temperature is decreased, the yield of hydrogen decreases. What does this information indicate about the reaction between methane and steam (endothermic or exothermic)?

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(iii) Why is a catalyst used in this reaction?

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6. a) Which two substances are essential for the rusting of iron?

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b) Give one way in which zinc can be used to stop the rusting of iron.

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c) What is sacrificial protection? Explain with example.

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7. Industrial preparation of sulphuric acid is known as contact process.

Write all chemical equation in that process.

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8. What is meant by Haber process? Explain this process with all chemical reaction.

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