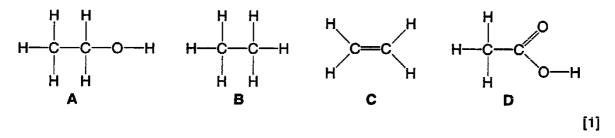
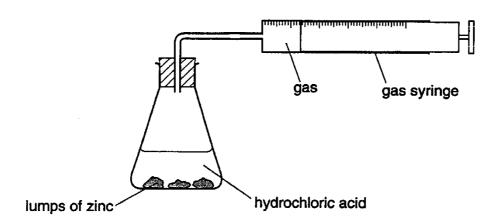
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The word acid comes from the Latin word, acidus, meaning sour. Acids corrode reactine metals and produce an effervescence of carbon dioxide gas with carbonates.

- (a) State the meaning of
 - (i) corrode,
 - (ii) effervescence.[2]
- (b) Which one of the organic compounds, A, B, C or D is an acid? Put a ring around the correct letter.



(c) The apparatus below was used to measure the volume of gas produced when zinc reacted with hydrochloric acid.



A student measured the volume of gas produced during the first minute of the reaction. The student repeated the experiment altering one condition at a time. What effect would each of the following have on the volume of gas produced during the first minute of the reaction.

- (i) decreasing the concentration of acid
- (iii) using finely divided zinc instead of lumps of zinc

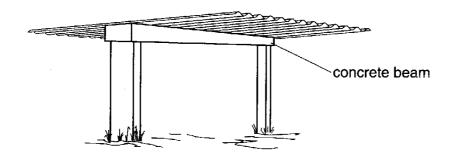
(ii) increasing the temperature

(d)) The equations A, B, C and D show some reactions of acids.			
	A	$\mathrm{Mg(OH)}_2$ + 2HC l \rightarrow $\mathrm{MgC}l_2$ + 2H $_2\mathrm{O}$		
	В	$\text{Fe + H}_2\text{SO}_4 \rightarrow \text{FeSO}_4 \ + \ \text{H}_2$		
	C	$\mathrm{CaCO_3} + \mathrm{2HNO_3} \rightarrow \mathrm{Ca(NO_3)_2} + \mathrm{CO_2} + \mathrm{H_2O}$		
	D	CaO + 2HC $l \rightarrow CaCl_2 + H_2O$		
	Ans ¹ You	wer the following questions by choosing from equations A, B, C or may use each letter once, more than once or not at all.	D.	
	(i)	Which reaction produces an explosive gas?		
	(ii)	Which reaction forms a sulphate?		
	(iii)	Which reaction gives off a gas which turns lime water cloudy?		
	(iv)	Which is a reaction between a hydroxide and an acid?		
	(v)	Which reaction involves a transition element?		[5]
(e)	Desc hydro	cribe how crystals of sodium chloride can be made in the ochloric acid and aqueous sodium hydroxide.	laboratory	from
	******		***************************************	•••••
	******		***************	•••••
				រនា

sma	all sto	ones.
(a)	Ехр	lain what is meant by the term <i>mixture</i> .
		[2]
(b)		Id is largely silicon(IV) oxide. Pure silicon(IV) oxide is a compound. Explain what is ant by the term $\emph{compound}$.
	••••	[2]
(c)	cart	nent is made by roasting clay with crushed chalk. Chalk is largely calcium conate. When cement is made, some of the calcium carbonate breaks down to sium oxide.
		$CaCO_3(s) \rightarrow CaO(s) + CO_2(g)$
		calcium carbonate calcium oxide carbon dioxide
	(i)	What type of chemical reaction is this?
		[1]
	(ii)	Which of the three chemicals in this reaction (calcium carbonate, calcium oxide or carbon dioxide) has the lowest relative formula mass?

Many buildings are made of concrete. Concrete is a mixture of cement, sand, water and

(d) The diagram shows a concrete beam supporting the roof of a shelter.



Concrete is quite porous. When rainwater soaks through it, some of the calcium oxide slowly dissolves to form aqueous calcium hydroxide. This solution is strongly alkaline.

(i)	What is another name for calcium hydroxide? Put a ring around the correct answer.	
	limestone	
	quicklime	
	slaked lime	
	soda	[1]
(ii)	Suggest a value for the pH of aqueous calcium hydroxide.	
		[1]
(iii)	How would you use litmus paper to show that aqueous calcium hydroxide alkaline?	is
		••••
		[2]

Alternative to practical 1

Indigestion tablets contain calcium carbonate. The tablets work by neutralising the excess of acid in the stomach.

calcium carbonate + hydrochloric acid ----> carbon dioxide + calcium chloride + water

You are provided with 2 different brands of indigestion tablet, **F** and **G**, dilute hydrochloric acid and common laboratory apparatus.

Plan an investigation to find which brand of indigestion tablet is best at neutralising acid. Your answer should include details of the apparatus to be used and the main practical steps in the investigation.

apparatus		 	
plan of investigation			

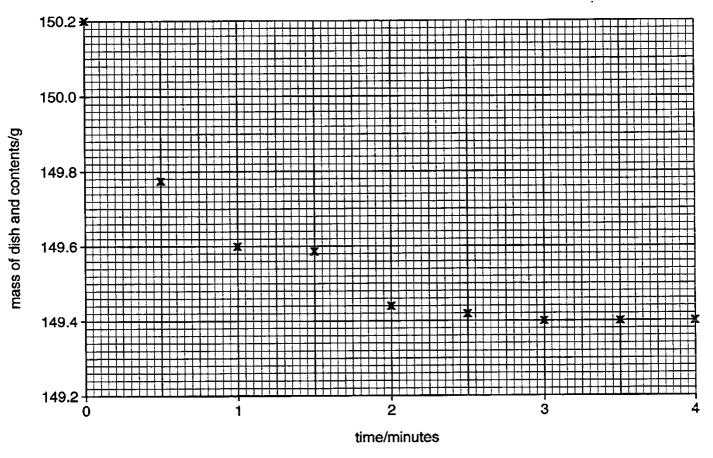
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Alternative to a practical 2

3 Hydrochloric acid reacts with marble chips (calcium carbonate).

$$CaCO_3 + 2HCl \longrightarrow CaCl_2 + H_2O + CO_2$$

A 50 cm³ sample of dilute hydrochloric acid was added to a large quantity of marble chips in an evaporating dish, which was placed on the pan of a balance. The mass of the dish and its contents was recorded every 30 seconds. The results are shown in the graph below.



- (a) (i) Draw a smooth curve through the points on the grid.
 - (ii) Which result appears to be incorrect? Why have you selected this result?

......

_____[3

- (b) Use the graph to answer the following questions.
 - (i) How long did the reaction last?

.....

(ii) What mass of carbon dioxide was produced?

.....[2]

- (c) Sketch on the grid the curve you would expect if 50 cm³ of more concentrated hydrochloric acid had been used in the experiment. [2]
- (d) What apparatus could be used, instead of an evaporating dish, to reduce any loss of acid by splashing?

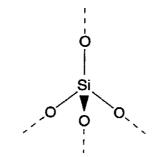
(iii) Complete the table that shows the reaction, if any, of the oxides with acid and alkali. Indicate a reaction with "R" and no reaction with "NR".

oxide	type of oxide	reaction with acid	reaction with alkali	
magnesium oxide	basic			
aluminium oxide	amphoteric			
silicon(IV) oxide	acidic			

[3]

Extension 2

(c) Two of the chemicals used to make concrete are limestone and sand. Limestone is an ionic compound, containing the ions Ca²⁺and CO₃²⁻. Sand is mainly an oxide of silicon which is macromolecular.



(i)	What is the valency of	
	calcium in calcium carbonate,	
	silicon in this oxide?	
(ii)	What is the electron distribution in o	ne atom of
	calcium,	
	silicon?	
(iii) Explain why the metal calcium forms ionic bonds but the non-metal silic covalent bonds.		ns ionic bonds but the non-metal silicon forms
		•••••••••••••••••••••••••••••••••••••••
		[6]

- a(i) idea of metals being eaten away, reacting but not rusting
- (ii) bubbling /foaming / gas produced
- b D
- c(i) decreases volume / less gas produced
- (ii) increases volume / more gas produced
- (iii) increases volume / more gas produced
- d(i) B
- (ii) B
- (iii) C
- (iv) A
- (v) B
- e add hydrochloric acid to sodium hydroxide until neutralised / idea of titrating / neutralising boil off / evaporate (some) water leave to crystallise / allow to cool

- a several different substances present (not elements or compounds) which can be separated by physical means / not chemically bonded
- b two (or more)elements / more than one type of atom, not substances chemically combined / bonded / joined
- c(i) (thermal) decomposition
- (ii) carbon dioxide / CO₂
- d(i) slaked lime
- (ii) pH above 7
- (iii) turns red litmus paper blue

Alternative to Practical 1

Plan to include five of the following points.

Measured equal amounts of tablets
Added specified volume of acid to tablet e.g. drop by drop
until stops fizzing / indicator is neutral
Repeated
Compared with other tablet
Concluded the most effective tablet requires the most acid

Alternative to Practical 2

- a(i) single smooth curve
- (ii) Incorrect at 11/2 minutes
 It does not lie on the curve.
 - b(i) 3 minutes
- (ii) 0.8 g
- c a curve parallel to the original curve levelling out at 149.8 g
- d narrow-necked apparatus e.g. conical flask / container with absorbent wool in neck

Extension 1

R	NR
R	R
NR	R

Extension 2

- (i) 2 (not 2+) 4
- (ii) 2.8.8.2 2.8.4
- (iii) calcium can lose 2e (to have a noble gas distribution) or bonds by electrical transfer Silicon cannot lose 4e or gain 4e or has to share electrons