The characterization of ethine (Item No.: P7171100)

Task and equipment

Information for teachers

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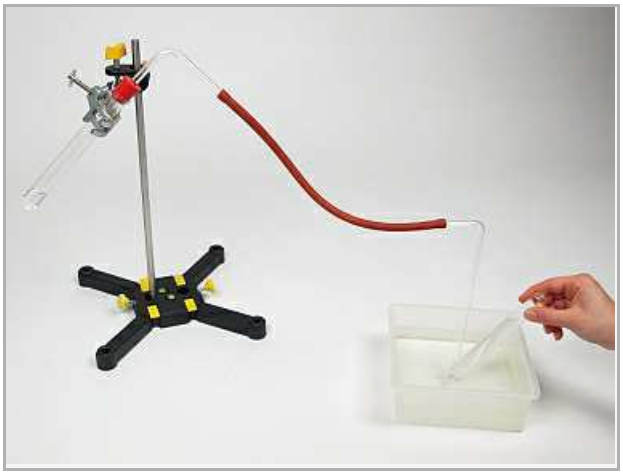
Task and equipment

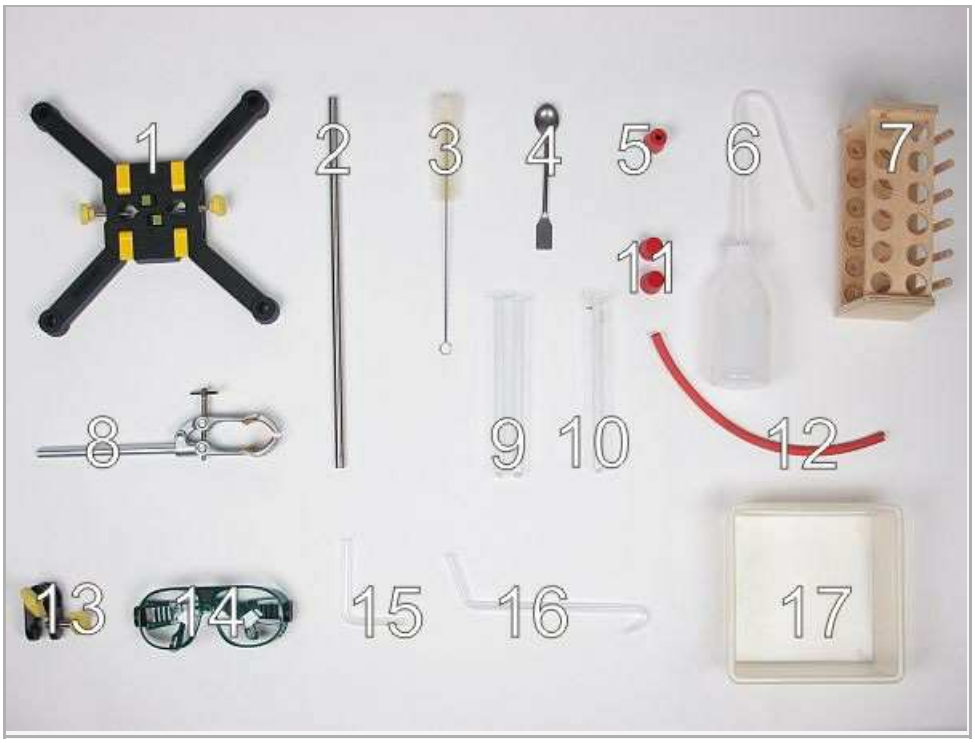
Task

What is meant by the term "unsaturated" hydrocarbons? (2)

Prepare acetylene and examine some of its properties.



Equipment



Position No.	Material	Order No.	Quantity
1	Support base, variable	02001-00	1
2	Support rod, stainless steel, l=370 mm, d=10 mm	02059-00	1
3	Test tube brush w. wool tip,d25mm	38762-00	1
4	Rubber stopper, d = 22/17 mm, 1 hole	39255-01	1
5	Spoon, special steel	33398-00	1
6	Wash bottle, 250 ml, plastic	33930-00	1
7	Test tube rack for 12 tubes, holes d= 22 mm, wood	37686-10	1
8	Universal clamp	37715-00	1
9	Test tube, 180x18 mm,100pcs	37658-10	(2)
10	Test tube,180x20 mm,DURAN, PN19	36293-00	1
11	Rubber stopper, d=22/17 mm, without hole	39255-00	2
12	Rubber tubing, i.d. 6 mm	39282-00	1
13	Boss head	02043-00	1
14	Protecting glasses, clear glass	39316-00	1
15	Glass tube,right-angled, 10 pcs.	36701-52	1
16	Glass tubes,straight with tip, 10	36701-63	1
17	Dish, plastic, 150x150x65 mm	33928-00	1
18	Butane burner f.cartridge 270+470	47536-00	1
19	Butane catridge CV 300 Plus, 240 g	47538-01	1
20	Glycerol, 250 ml	30084-25	1
21	Potassium permanganate, chem. pur., 250 g	30108-25	1
22	Sodium carbonate, anhyd. 1000 g	30154-70	1
23	Water, distilled 5 l	31246-81	1
24	Calcium carbide,granul. 250 g	48018-25	1

Set-up and procedure

Set-up

Hazards

- Explosive gases are evolved during the experiment. Air the room well after the experiment!
- Do not allow calcium carbide to get on your skin, wear protective glasses!
- During the evolution of gas, extinguish all open flames!
- To make glass/rubber connections, wet the glass with glycerol so it can be easily inserted!





Setup

Set up the stand as shown in Fig. 1 to 4.

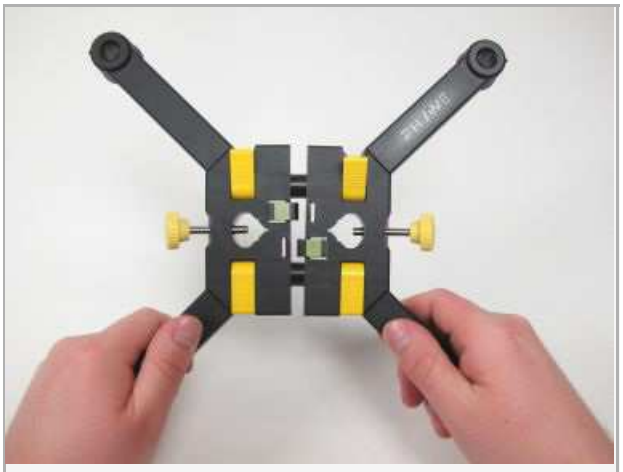


Fig. 1


Fig. 2


Fig. 3


Fig. 4

Put a spoonful of calcium carbide in the Duran test tube and fix it on the stand at a slight angle (Fig. 5).

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Fig. 5

Connect the right-angled glass tube to the untipped end of the straight glass tube with a piece of rubber tubing. Ease the free end of the right-angled glass tube through the hole of the rubber stopper (wet the glass with glycerol!) with a gentle screwing motion (Fig. 6).

Fig. 6

Fill the plastic dish two thirds full with tap water. Fill the two test tubes with water, close them with your thumb and position them upside down in the dish (Fig. 7+8).

Fig. 7

Fig. 8

Procedure

Pour water (to a height of about 2 cm) onto the calcium carbide in the Duran test tube (Fig. 9). Close the Duran test tube by fitting on the bored stopper holding the gas tube (Fig. 10).

Fig. 9

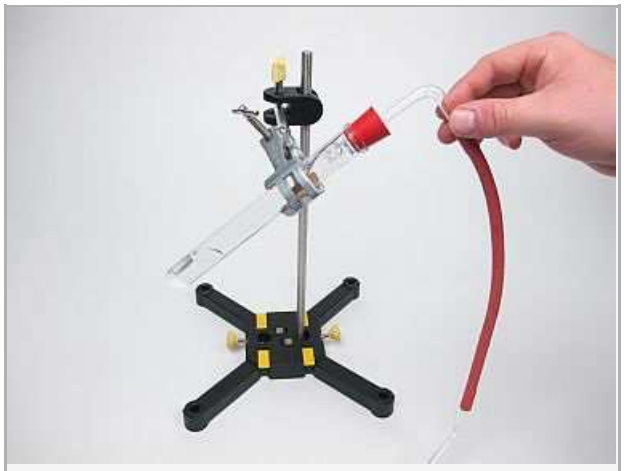

Fig. 10

Put the gas tube in the plastic dish. After about 30seconds, lead the evolved gas into the two water-filled, inverted test tubes until they are both filled with gas (Fig. 11). Close the test tubes underwater with the stoppers and place them in the test tube rack.

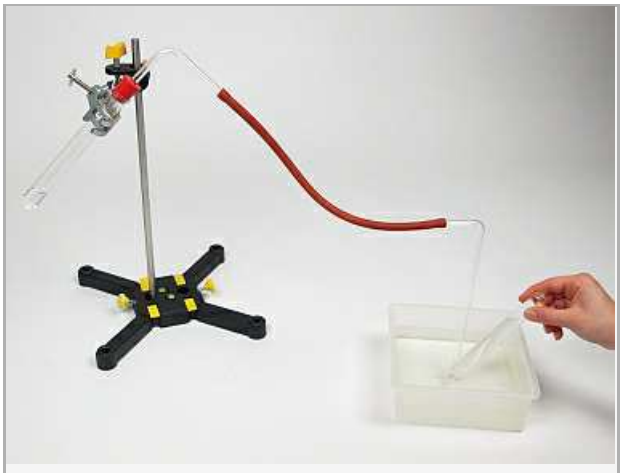

Fig. 11

Move the apparatus away from the working area, position the test tubes well away from the Bunsen burner.

Put a few drops of potassium permanganate solution in one of the test tubes containing acetylene (only slightly lift the stopper) and close it again immediately (Fig. 12). Shake the tube vigorously (Fig. 13).

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Fig. 12

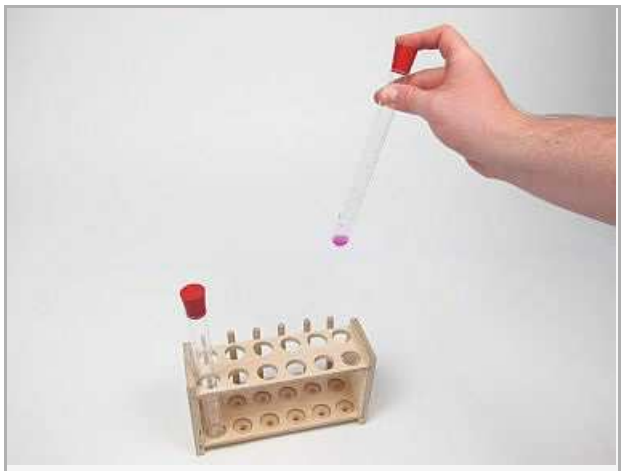

Fig. 13

Hold the second test tube upside down, remove the stopper and hold the mouth of the tube at the flame of the Bunsen burner (Fig. 14).

Fig. 14

Waste disposal

- Allow the calcium carbide to react completely (maybe add more water), then pour the liquid into the acid and alkali waste container.
- Pour potassium permanganate solution also into the acid and alkali waste container.

Report: The characterization of ethine

Result - Observation 1

Note the observations you make.

a) During the reaction of calcium carbide.

b) On the addition of potassium permanganate solution.

c) While burning the collected gas.

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Evaluation - Question 1

Draw conclusions from your observations and thereby answer the question in the header.

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Evaluation - Question 2

Formulate the equation for the reaction which took place.

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Evaluation - Question 3

Which type of bond must be present, when the formed substance has the molecular formula given in the reaction equation?

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Evaluation - Question 4

Enter the observed properties of acetylene into the general data sheet, look up missing entries in your text book to fill it in completely.

Name of substance:	Acetylene	1
	C_2H_2	1
	colourless	1
	gaseous	1
	-83,6 °C	1
	-81,8 °C	1
	combustible, eplosive in certain mixtures with air, burns with a sooty flame, reacts with potassium permanganate turning it brown	1
	produced by cracking higher alkanes; formed during the reaction of calcium carbide with water or hydrochloric acid	1
	welding gas	1

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