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An Elementary Scientific and Technical Dictionary

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LONGMANS

PREFACE TO THE THIRD EDITION

This dictionary, first published in 1952 under the title *An Explaining and Pronouncing Dictionary of Scientific and Technical Words*, is intended to help the general reader who seeks explanations of scientific terms which he may meet; it does not aim to provide delimiting definitions for the scientific expert.

In this revised edition the type has been completely reset. The opportunity has been taken to check the original text and to remove any errors or obscurities. About 250 new terms have been added, certain entries modified or extended, and a number of terms, which had little claim for inclusion in this book, eliminated. Some of the illustrations have been redrawn and a number of new ones provided. A full list of the chemical elements is now included as an appendix.

I am indebted to Mr. Nigel Calder, M.A., who selected the new items from the great number of new terms which have appeared in recent years and checked the explanations of them. He also made useful criticisms of the original text.

W.E.F.

PREFACE TO THE FIRST EDITION

The authors set themselves the following rules:

1. Every explanation must be clear to a person who knows little or nothing about the particular subject, and must be made if possible with not more than one cross-reference (shown thus ↓) to any other explanation; but references to additional information may be given at the end. (*Entries were tested and re-written as many as ten times to comply with this.*)
2. An example must always be given, and also a picture or diagram wherever it may be of any assistance.
3. Every explanation must be of such length as is necessary to give an adequate idea of the meaning (sometimes a page, or more, may be necessary); but this book is not an encyclopaedia; it deals with words not subjects.
4. Special attention must be given to word-elements (roots, suffixes, prefixes, etc.) so that the reader may be enabled to break up and interpret new scientific terms for himself.
5. Words should not be included which are adequately explained by an ordinary dictionary (but certain defining words are included).
6. No word may be omitted because it is too difficult to explain, but only because the explanation would take more space than is justified by its importance.

The explaining vocabulary used in this dictionary consists of about 2,000 words; 60 of these are definitely technical (see below). About 120 others might be unknown to a child or English-speaking foreigner; most of these 120 words are explained in the dictionary. For the benefit of the foreign reader certain bracketed explanations also are included in the text.

Acknowledgments are due to the following for their help in checking the correctness of this work: Mrs. R. Gunther (phonetics), Lt.-Commander John Anderson (nautical words), Peter West, M.B., B.S., D.P.H., D.C.H. (medical words), D. Thornton-Jones, M.P.S. (pharmaceutical words and general check); also to numerous Museums, Libraries, public institutions and commercial firms for supplying that pronunciation of words which is current among actual users of the words.


SCIENTIFIC TERMS

Before using this dictionary please look up in this dictionary any of the following words whose meaning you do not know. The more difficult words are printed in **heavy type**.

alkali/ne	mass (scientific use)
alternating current	membrane
ampere	mica
benzene ring	molecule
bond (chemical)	negative (electricity)
cavity (of the body)	neutron
cell (biology)	nucleus (of atom, of cell)
cell (electricity)	orbit
circuit	organism
compound (chemical)	oxidise
condenser (electrical)	parasite
conductor	pole (magnetic, electrical)
direct current	positive (electricity)
electrode	power (of a number)
electrolysis	protein
electron	proton
element (chemical)	quinine
equation	radioactive
ferment (to, a)	radium
field (magnetic, electric)	resin
fossil	resistance (electrical)
frequency (electrical, of waves)	salt (chemical)
generate (electricity)	seizure (= fit)
gland (of body)	soluble, solution
graph	spectrum
hydrocarbon	spore
induce (electricity)	storage battery
insulator	tissue (of living body)
ion	valve (machine, radio)
larva	volt












MEASURES:	Centigrade	metre
	Fahrenheit	centimetre (cm.)
	gramme	millimetre (mm.)

CHEMICAL SIGNS

C	carbon	N	nitrogen
Ca	calcium	O	oxygen
Cl	chlorine	Zn	zinc
H	hydrogen	CO ₂	carbon dioxide
		H ₂ O	water
C ₆ H ₆ , or 	For explanation see Benzene ring.	2H ₂ O	two molecules of water
		→	becomes, produces

For a complete table of the chemical elements and their symbols see Appendix (p. 411).

In explanations of the simplest chemical ideas the following five signs are used for the benefit of readers who are unaccustomed to chemical letter-formulae and prefer to think pictorially. Such readers may also find it helpful and interesting where ordinary chemical letter-formulae are given, to translate them into these figures:—

1.  an atom of carbon: (it has a joining power of 4).
2.  an atom of hydrogen: (joining power of 1).
 one carbon atom with four hydrogen atoms, CH₄.
3.  an atom of oxygen: (joining power of 2).
 HOH (=H₂O), water
4.  an atom of nitrogen: (joining power of 3).
 an atom of nitrogen with three hydrogen atoms, NH₃.
5.  sometimes nitrogen apparently has a joining power of 5.
 here two oxygen atoms are doubly joined to a carbon atom, i.e. O:C:O.
 two carbon atoms doubly joined (as in ethylene H₂C:CH₂).
 so also three joins (as in acetylene HC≡CH).

For further explanation, see Valency.

The sign ↓ means "Please see" e.g. ↓ watt means "Please look up the word *watt* in this dictionary."

For an explanation of the pronunciation, see inside the front or back covers.

A

absolute

A - chemical sign for ↓ argon.
α - Greek letter ↓ alpha ('ælfə).
a-, an- - not, without, e.g. a'mor-phous ('æ'mɔ:fəs) - without form or shape, not in crystal form.

A.C. - ↓ alternating current.

a.c. - ante cibum - (medicine to be taken) before food.

A.C.T.H. - adreno-cortico-tropic hormone - substance produced by the pituitary ↓ gland which causes the adrenal gland to produce ↓ cortico-sterone.

A.D.P., A.T.P. - ↓ adenosine.

A.P. - ↓ arithmetic progression.

A.U. - ↓ Angström unit.

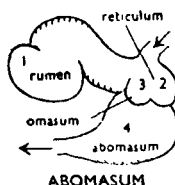
A.S.D.I.C. - ↓ Asdic.

A.W. - ↓ atomic weight.

ab'domen ('æb'doumen) - (1) the part of the body below the lungs; it contains the organs with which food is digested and the organs of reproduction; (2) the third part of an insect body - head, thorax, abdomen.

ab'ductor ('æb'daktə) - muscle which moves a limb outwards from the body.

'aber'ration ('æbə'reifən) - wandering away; (1) used of light when a lens does not bring all the light (e.g. of different colours) to the same point = **chromatic aberration**: or where the lens is not correctly curved and so bends part of the picture out of shape = **spherical aberration**. (2) When a man on the Earth is looking at a star he does not see the star where it really is: the star-light takes some time to reach him, and the Earth is moving: so he sees the star where it *was*. The difference between



the seeming and the real place is the aberration.

'abo'masum ('æbə'meisəm) - the fourth stomach of a grass-eating animal, e.g. a

cow; in it the main work of digestion is done.

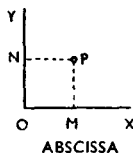
a'bortion ('ə'boʊʃən) - producing young before the proper time and not completely formed. *Contagious abortion ('kən'teidʒiəs-) - disease of cows caused by the organism *Brucella abortus*; it causes loss of the young animal in the 6th or 7th month: *(passed on, by touch, from one animal to another).

a'brasive ('ə'breisiv) - substance used for rubbing away or polishing, e.g. sand, emery, Carborundum.

'abre'action ('æbri'ækʃən) - process, in the curing of mental disorder, in which the sufferer calls back to mind and faces some unpleasant memory which he is trying to forget.

'abscess ('æbsis) - an area of the body infected with bacteria; a collection of septic matter (bacteria and dead blood-cells), e.g. under the skin.

ab'scissa ('æb'sisə) - The exact position of the point (P) can be described in map-making or mathematics by its distance from two lines at right angles: NP is called the abscissa (the cut-off part) and MP is the ordinate.



abscission layer - the layer of cells where the stem of a fruit (e.g. an apple) or a leaf breaks off from the branch.

'absolute ('æbsəluut) - perfect, pure, e.g. 'absolute 'alcohol - pure alcohol with no (or very little) water in it.

'absolute 'magnitude (-'mægnitjuud) - "Magnitude" (= bigness) here means the rate of sending out light by a star (= its brightness). The **apparent magnitude** is the comparative brightness as seen from the Earth; but a bright star far away may seem less bright than one (really

less bright) which is nearer. The absolute magnitude is the comparative brightness which the stars *would* have if they were all the same distance away.

'absolute unit – electrical unit (e.g. of current, pressure, etc.) which is based on the \downarrow centimetre-gramme-second system. A practical unit (e.g. ampere, volt, etc.) is a multiple of the absolute unit.

'absolute zero – 0° C. on a centigrade thermometer is the temperature at which water freezes; but ice has some heat; e.g. ice is hotter than liquid air. At absolute zero there is no movement of the molecules and so no heat at all; -273.13° centigrade: \downarrow K degrees.

ab'sorb (əb'sɒb) – take in; e.g. dry table-salt absorbs water on a wet day. The gas carbon dioxide is absorbed by water as in soda-water; heat and light are absorbed by a dark surface; sound is absorbed by a soft surface. **ab'sorption** – being absorbed, act of absorbing. When light passes through certain substances (e.g. a solution or gas) some of the colours which make up the light are absorbed so that there are dark lines or bands in the spectrum. These dark lines (called **absorption bands**, or **absorption lines**) tell the scientist what substance the light has passed through. \downarrow adsorb.

a'butment (ə'batmənt) – that part of the end-wall of a bridge which supports the main beams or arch above.

a'byssal (ə'bisəl) – at a great depth in the sea.

acanthus (ə'kænθəs) – plant whose leaves are seen carved on the top of Greek and Roman pillars.



ACANTHUS

'acarus (æ'kərəs) – mite = small spider-like creature. For picture \downarrow scabies.

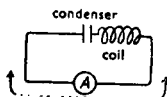
ac'cele'ration (æk'selə'reiʃən) – going or becoming faster, e.g. a thing falling down towards the Earth falls 32 feet per second faster in every second. If it starts from rest its speed is 32 feet

per second at the end of the first second, 64 at the end of the second, etc.: its acceleration is 32 ft. per sec. per sec. So also acceleration of a car, bullet – or of a process, e.g. reproduction of bacteria, spread of chemical change through an explosive, etc.

ac'celerator – an instrument for changing speed (e.g. of a car); substance used to speed up a chemical change (e.g. calcium chloride, used to make cement solidify quickly; magnesium, aniline (and many other substances) used to speed up the vulcanizing (sulphur-hardening) of rubber); instrument for producing high-speed atomic particles.

ac'cele'rometer (æk'selə'rɒmɪtə) – instrument for measuring rates of change of speed (e.g. in \downarrow inertial navigation).

ac'ceptor circuit (æk'septə 'sækit) – An electric circuit (especially in radio) may contain a \downarrow condenser and a coil as shown. If an electric current is



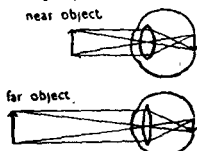
ACCEPTOR CIRCUIT

started in this circuit it flows backwards and forwards round the circuit. The frequency of these swings depends upon the sizes of the condenser and the coil, so that the circuit has a *natural* frequency. *A* is a source of alternating voltage (electric pressure), e.g. from a radio aerial. Its power acts backwards and forwards at a certain frequency. If the frequency of the source is the same as the natural frequency of the circuit, a big current flows, and the circuit is an acceptor circuit for this particular frequency. When you "tune" your radio set, you make part of it an acceptor circuit for the frequency of a certain programme.

'access time – in a computer (calculating machine), the time taken to draw out a number from the "memory" section.

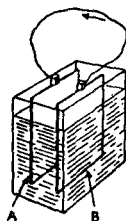
ac'cessory food factors (æk'sesəri) – substances in food (usually in very small amounts) which are necessary for health, e.g. \downarrow vitamins.

accommodation of the eye (ə'koma-'deifən) - changing the shape of the lens of the eye so as to see near or distant things.



ACCOMMODATION

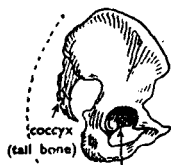
ac'cumulator (ə'kju:mjuleitə) - electric storage cell, as in a motor-car for starting and lighting. In the common lead-acid accumulator, one plate, A, is lead, the other plate, B, is lead covered with lead peroxide; the liquid is sulphuric acid solution. When the accumulator is used to supply electricity, current flows round the circuit from plate B. Gradually both plates become alike (because of chemical changes) and the accumulator loses its strength. The accumulator can now be re-charged by passing a current in through plate B. ↓ Edison.



ACCUMULATOR

accumulator (hydraulic) - large container into which water is pumped for use later in driving machinery (e.g. ↓ hydraulic press).

ace'tabulum (æsi'tæbiuləm) - the cup-like place in the *pelvis into which the round top of the leg-bone fits: *(the big ring of bone at the base of the body).



ACETABULUM

acet'aldehyde ('æset'ældihaid) - CH_3CHO , the ↓ aldehyde of acetic acid.

a'cetic acid (ə'siitik-) - The acid of vinegar is acetic acid (CH_3COOH) but pure acetic acid is colourless. **acetate** ('æsiteit) - a salt of acetic acid, e.g. lead acetate = sugar of lead, used in dyeing. **acetate rayon** - silk-like fibre made from ↓ cellulose acetate.

aceto'naemia ('æsito'niimia) - ↓ ketosis.

'acetone ('æsitoun) - a colourless liquid ($\text{CH}_3\text{CO}\cdot\text{CH}_3$) formed in the process of making alcohol. It is used to dissolve fats and resins; ↓ acetyl-ene gas is dissolved in it for storing.

'acetyl ('æsitail) - the group of atoms, $\text{CH}_3\text{CO}-$ e.g. **acetyl chloride**, CH_3COCl . **acetylsalicylic acid** = Aspirin.

'acetyl'choline ('æsitail'kouliin) - a chemical substance formed at nerve-endings; it carries over the nerve impulse from one nerve to another, or from nerve to muscle. Injected into the body, it causes activity of the ↓ parasympathetic system.

a'cetylene (ə'setiliin) - a gas which burns with a very white light; obtained from calcium carbide and water: $\text{CaC}_2 + 2\text{H}_2\text{O} \rightarrow \text{C}_2\text{H}_2$ (acetylene) + Ca(OH)_2 (slaked lime).

'achene ('ækiin) - a- = not, *chene* = split open; fruit with a thin covering (pericarp) close round the seeds. The pericarp is not fleshy or made of strong fibres, and does not open to let out the seed, e.g. a burr.



ACHENE

'achlor'hydria ('eik-loo'haidriə) - lack of hydrochloric acid in the liquid of the stomach.

a'chondro'plasia dwarf (ei'kon-drou'pleisiæk) - a person with a full-sized body but very small arms and legs: (a = without; *chondro* = ↓ cartilage; *plasia* = growth).

'achro'matic lens ('ækrou'mætik) - lens which does not produce a coloured edge in its image; made by joining two lenses of different kinds of glass. **a'chromatin** (æ'kroumætin) - substance in the nucleus of a cell which is not coloured by dyes.

'acid ('æsid) - substance with a sour, sharp taste which changes the colour of litmus dye from blue to red; when dissolved in water it gives one or more hydrogen ions H^+ . An acid (e.g. hydrochloric acid, HCl) is neutralized by an alkali (e.g. caustic soda, NaOH) to form a salt (e.g. sodium chloride, NaCl).

acid 'radical (- 'rædikəl) - a molecule of sulphuric acid is H_2SO_4 . The group of atoms SO_4 is the acid radical. Similarly, nitric acid HNO_3 ; the acid radical is NO_3 . Take away the hydrogen atoms which are replaced in the action of an acid, e.g. on a metal, and the acid radical is left.

'aci'dosis ('æsi'dousis) - a state of the body in which excessive acid is found in the blood.

a'clinic line (æ'klinik) - a line near the equator where the compass needle does not dip towards the Earth.

'acne ('ækni) - scattered spots on the face and neck, especially of persons aged about 13 to 20.

'aconite ('ækanait) - drug obtained from the plant Monkshood, used chiefly to put on the skin to lessen pain; it is the most poisonous ↓ alkaloid.

a'coustic properties of a hall (ə'kuus-tik) - the effect which the hall has on sound, so that people can (or cannot) hear well in it.

a'quired character (ə'kwaiəd) - change in the body of an animal or plant during life, e.g. because of disease or work or food, etc. ↓ hereditary.

'acri'flavine ('ækri'fleiviin) - yellow antiseptic made from coal tar; very powerful; its action is strengthened by the presence of blood ↓ serum.

acro-/ - top, furthest; e.g. **'acrocarpous** ('ækro'kaapəs) - having fruit at the end of the branch.

'acro'megaly ('ækro'megəli) - disease of the ↓ pituitary gland which causes the head, hands and feet to be very large.

a'cromion 'process (ə'kroumiən) - the part of the shoulder blade which can be felt at the top of the arm, slightly to the back.



ACROMION

a'crylic resins, fibres ('ækri'lik) - glass-like plastics (e.g. Perspex) which

are made from acrylic acid, the simplest of the oleic acids (acids which

form oils and fats): ↓ methylmethacrylate. **acrylic acid** - $CH_2:CH.COOH$.

'actin ('æktin) - a protein found in muscle fibre (in addition to ↓ myosin).

ac'tinic rays (æk'tinik) - that part of the sun's light which has an effect on photographic films.

ac'tinium (æk'tiniəm) - a radioactive element.

'actino-/ ('æktino-) ("ray, star") - e.g. **'actino'morphic** - star-shaped.

'acti'nometer - instrument for measuring the strength of sunlight.

'Actino'myces ('æktino'maisiz) - a star-shaped fungus; it causes the damp smell of underground rooms, also of earth after rain. **ac'tino-my'cosis** - disease caused by Actinomyces or similar organisms; it produces hard swellings on the tongue in cattle; also called Woody Tongue.

'activated carbon ('æktiveitid) - wood burned to charcoal without air; used (e.g. in gas masks) to adsorb gases (= to take up gas by spreading it out over the surface).

activated molecule - ↓ excited molecule.

activated sludge (- 'slʌdʒ) - Sludge = the heavier part of drainage from a town (sewage) which sinks to the bottom. Activated sludge is sludge through which air is blown to help to purify it.

'active 'immuni'zation ('æktiv 'imjunai'zeifən) - giving protection against infectious disease by injecting dead or weakened living bacteria which have been made harmless, yet are still able to cause a protective reaction in the blood; e.g. vaccination. (**Passive immunization** - injecting a protective substance formed in the body of an animal, e.g. of a horse.)

active principle - that part of a medicine which has the effect (not the colouring or matter added for taste.)

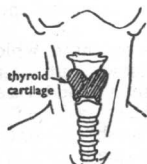
acu-/ (ækju-) - pointed like a needle; with a pin, e.g. **a'culeate** - covered with needle-like points. **'acu'puncture** - putting needles into the ↓ sciatic nerve to ease sciatic pain.

a'cute (ə'kjuut) - sharp, pointed.

acute illness - illness which appears very quickly (but not always serious).

/-ad (æd) - e.g. **monad** = a thing which is single, e.g. a one-cell organism; an element with a joining-power (↓ valency) of 1: so also diad, triad, tetrad, pentad, etc. (2, 3, 4, 5, etc.).

Adam's apple ('ædəmz -) - the small outstanding mass in front of the throat of a man; caused by the thyroid cartilage (part of the larynx = voice-organ).



ADAM'S APPLE

adaptation ('ædæp'teɪʃən) - changes made in the body-form or way of life of an animal (or plant) so as to be suited to a particular place or climate.

ad'dendum (ə'dendəm) - upper part of a gear tooth. ↓ pitch circle.

'Addison's disease ('ædisənz -) - weakness, low blood pressure, dark colour of the skin, caused by disease of the supra-renal ("above kidney") glands: ↓ adrenal.

'additive compound ('æditiv -) - compound made by joining together two substances, e.g. ethylene + chlorine → ethylene chloride: $C_2H_4 + Cl_2 \rightarrow C_2H_4Cl_2$.

additive method of colour-photography - All the red parts of the photograph consist of very small dots; so also blue, green. Other coloured parts consist of mixtures of R.B.G. dots (e.g. purple = red and blue dots). So also colour television. ↓ subtractive.

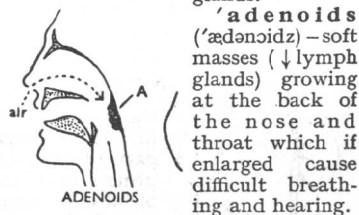
additives - substances added to oil to give it some special quality, e.g. make it less sticky; substances added to food, e.g. to give colour.

ad'ductor muscle (æ'daktə -) - muscle which brings an arm (etc.) in towards the body.

'adenine ('ædeniɪn) - a chemical substance (a ↓ purine) in muscles; it is formed by the decomposition of ↓ nucleic acids.

/-ade'nitis (-ædə'naitis) - inflammation of a gland, e.g. **'lymphade'nitis**

(limf-) - inflammation of the lymph glands.



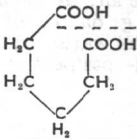
ADENOIDS

'aden'osine 'tri'phosphate (A.T.P.) - ('ædən'ousɪn -) - a substance in a living cell which stores energy and sets it free when it is changed into **adenosine diphosphate (A.D.P.)**. ↓ Krebs.

ad'haes-/, ad'hes-/ (æd'hiis) - stick (with glue, etc.). **adhesives** - substances used for sticking. **adhesions** - growth of tissue round a diseased or damaged part, e.g. the appendix: ↓ peritoneum.

'adia'batic ('ædia'bætɪk) - (a = not; dia = through; batic = going): (process) in which there is no passing in or out of heat. **adiabatic demagnetization** - method of reaching a very low temperature (e.g. below $-272^\circ C$.) by allowing a magnetized crystal to become demagnetized under adiabatic conditions and so lose energy. **adiabatic expansion** - If a gas, compressed in a container, suddenly expands, it does so too quickly for heat to get in or out. (But energy is used in expanding; so the gas cools.) **adiabatic lapse rate** - the rate of fall of temperature of the atmosphere with height such that if a mass of dry air moves upwards and expands it cools at the same rate and so neither takes in nor gives out heat in its new position.

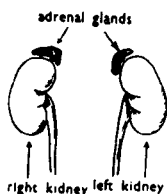
a'dipic acid (æ'dipɪk) - acid found in nature in beetroots (e.g. sugar-beet), made artificially from phenol, and used to make the plastic nylon (used for stockings).



'adipose tissue ('ædɪpəs) - fat (in the body).

'Admiralty measured mile ('æd-miralti-) - nautical mile (as in tests of speed of ships) = 6,080 feet.

ad'renal (æd'ri:nəl) - near the kidney.



ADRENAL

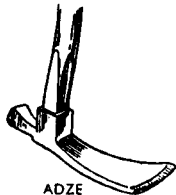
adrenal glands

- also called supra-renal; glands near the kidney. The medulla (inner part) of the gland pours into the blood a substance named **ad'renalin** (æd'renalin) which produces those effects felt in sudden fear or anger - faster heart-beat, pale face, etc. The outer part of the gland (in birds and fishes quite separate) produces ↓ corticosterones.

'adsorb (æd'sɔ:b-) - When a gas (etc.) is absorbed it is taken into another substance, e.g. the gas absorbed in a closed bottle of soda-water; when it is adsorbed it is spread out over the surface, e.g. ↓ activated carbon adsorbs gas (as in gas-masks used during the war).

'adven'titious (ædven'tiʃəs) - coming by accident, not in the regular place or at the regular time, e.g. adventitious roots of plants - not growing from the existing root but from somewhere else.

adze - axe with the blade crossways to the handle, used e.g. in boat-building.



ADZE

aer-/ - air, e.g. **'aerate** ('eɪəreit) - force air or gas into, e.g. **aerated waters** = soda-water, lemon-

ade, etc., which give out bubbles when the bottle is opened.

'aerial ('eəriəl) - of the air. **an aerial** - a wire put up (e.g. on top of a house) to receive radio waves.

aerial pers'pective (- pəs'pektiv) - distance in a picture shown not by lines coming nearer together, but by differences of light, e.g. distant things less clear and more blue.

aerial root - root of a plant formed on

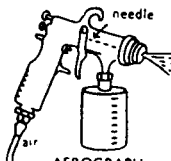
a stem and used (chiefly) for climbing. **aero-/** (eərou-) - air, e.g. **'aero'batics** (- o'bætiks) - movements made by an aeroplane to show the skill of the pilot.

'aerobe ('eəroub) - organism which can only live in air.

'aerody'namics ('eəroðai'næmiks) - study of the forces which act on (or are caused by) gases, especially the forces of the air acting on aeroplanes.

'aerofoil - ↓ air-foil.

'aerograph (- graf) - machine which blows out paint in a cloud (used instead of a brush); (trade name.)



AEROGRAPH

'aerolite (- lait) - a stone from outer space which falls through the air on to the Earth.

'aero'nautics (- nɔ:tiks) - the science of flight (by aeroplane, etc.).

'aerosol (- sol) - very small drops of a liquid (or pieces of solid matter) suspended in the air, e.g. a mist, fog, smoke.

aes'thesia (iis'θi:ziə) - power of feeling; an **'anaes'thetic** ('ænis-θetik) - substance which takes away the power of feeling, e.g. chloroform; a **local anaesthetic** takes away the power of feeling pain in one part, e.g. a tooth to be pulled out; a **general anaesthetic** causes unconsciousness. ↓ hyper-.

ae'stival (iis'taivəl) - of summer.

aether - ↓ ether.

'aeti'ology, etiology ('iiti'ɒlədʒi) - study of the cause of disease.

'afferent nerve ('æfərənt-) - nerve carrying messages in towards the brain and spinal cord.

af'finity (ə'finiti) (chemical-) - the force which holds atoms together in molecules.

'after-birth - the placenta (organ of the mother from which the unborn child gets food and oxygen) which comes out from the mother after the birth of the child; with it comes the inside lining of the uterus (organ in which baby is formed). These two form the after-birth.

'after-damp - the poisonous gas left in the air in a coal-mine after an explosion.

'after-image - If you look at a bright thing for some time and then look away at a white wall, you still seem to see the thing - but differently coloured: this is an after-image.

'aftermath ('aəftəməθ -) - grass which grows after the first lot of grass has been cut.

Ag - chemical sign for silver.

'agar-agar ('eiga-'eiga) - a jelly made from sea-weed used in making substances on which bacteria are grown in the laboratory.

'agaric ('ægərik -). **A'gari'cales**

mushrooms



AGARIC

(- 'kaaliiz) - class of fungi which contains mushrooms (eatable) and toadstools (poisonous).

'agate ('ægət) - very hard stone with coloured lines in it; naturally grey but often artificially coloured: used for ornament, also where great hardness is needed, e.g. in mortars used for grinding material to powder.

ageing, age-hardening - Certain metal-alloys (e.g. duralumin, an alloy of aluminium with copper etc.) become hard some hours or days after they have been heated and then quenched (cooled, e.g. in water). In the case of duralumin, 3½% of the copper separates out from the aluminium and so forms roughness in the layers of molecules in the metal; this prevents one layer from sliding over another and thus makes the metal hard.

'Agene ('eidʒi:n) - trade name for nitrogen trichloride used for Agenizing flour (= treating flour with nitrogen trichloride to make it whiter and to cause a larger and lighter loaf). Agene causes attacks of nervous excitement in dogs (canine hysteria). The effect on man is not fully known.

'Agfacolor ('ægfəkələ) - system of colour photography using three light-sensitive films fixed to one celluloid base. These films are blue-sensitive, green-sensitive, and red-sensitive.

The system is ↓ subtractive. The films contain substances which combine with the developer to produce a suitably coloured image in the film: (trade name).

agglomerate rock (əg'lɒməɾət -) - rock made of large pieces of stone set in a hard mass of ash, found in or near volcanoes.

agglutination (ə'gluutin'eifən) - sticking together into small masses, e.g. bacteria or blood-cells agglutinate when in a body-liquid which is poisonous to them. This is used as a test whether the blood of a certain healthy person may safely be transfused into a sick person. ↓ blood groups.

'aggregate ('ægrigeit) - (1) total, all added together; (2) closely packed; (3) mass of pieces all of the same kind and size; (4) mass made of broken pieces of rock. **aggregates** - sand and stones which are mixed with cement to make concrete for building.

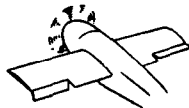
-agog, /-agogue (gɒg, gouɡ - that which leads, draws out, causes the production of, e.g. 'lactagog, 'lactagogue - substance which causes an animal to produce milk.

a'gonic line (ə'gɒnik) - line drawn through places (on a map) where a compass points exactly true north (not slightly east or west of north): ↓ declination.

'agora'phobia ('æɡərə'fəubiə) - fear of being in a large open space.

'agri-/ ('ægri-) - field, e.g. 'agriculture.

'ailerons ('eɪlənz) - movable edges on the wings of an aeroplane used to make one wing go up and the other down, e.g. in turning.



AILERON

'air-conditioning - making air just right for use in a building, by cleaning it, drying it (or adding water) and making it warmer or colder.

'air-foil (- fɔɪl) - any surface used to hold an aeroplane up or change its direction, e.g. wings, rudder, elevator.

'air-frame – the whole of an aeroplane without the engine.

air glow – faint light given out by the air due to physical and chemical processes taking place in the upper atmosphere.

'air-lock – (1) An air bubble in a pipe from which liquid is being drawn breaks the line of liquid and so stops the flow: it causes an air-lock; (2) a room between the open air and the compressed air, in a caisson (container in which men work under water): in the air-lock the pressure is raised till it is equal to that in the caisson; the door into the caisson can then be opened: for picture, see Caisson.

Al – chemical sign for aluminium.

ala- / (ælə-) – wing. **alate** ('æleit) – having wings.

al'bedo (æl'biðou-) ("whiteness") – measure of the power of a surface to reflect light, e.g. the albedo of the planet Jupiter is 0.44; that is, it reflects $\frac{44}{100}$ of the light which falls on it.

al'bino (æl'biinou) – person (or animal) who has not got the usual dark colouring matter in his (its) body; the hair is white, the eyes pink and not able to bear strong light. **Albinism** ('ælbiniŋ) is more common among dark races than among others. It is inherited, although the parent may not show albinism him (her) self.

al'bumen (æl'bi:men) – (1) the clear white substance in an egg; food-material (↓endosperm) in certain seeds; (2) = albumin. **al'bumins** (æl'bi:mi:nz) – simple proteins such as that of white of an egg; they are soluble in pure water and become solid with heat.

al'buminoids (æl'bi:mi:noidz) – substances like albumins, but not soluble; hair and nails are made of albuminoids. **al'bumi'nuria** (-'ni:ria) – albumin in the urine, usually a sign of disease of the kidneys.

al'burnum (æl'bœ:nəm) – the new growing wood of a tree through which sap (juice) is passing.

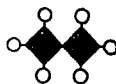
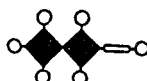
alcohols ('ælkəholz) – See hydro-

carbon. An alcohol is a hydrocarbon with one or more hydrogen atoms of

hydrocarbon

CH₄, methane

alcohol

CH₃OH
methyl alcoholCH₃CH₃, ethaneCH₃CH₂OH
ethyl alcohol

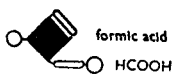
ALCOHOLS

the molecule replaced by -OH; e.g. methane CH₄, methyl alcohol CH₃OH; ethane CH₃CH₃, ethyl alcohol CH₃CH₂OH. Ordinary alcohol, as in wine, beer, etc., is ethyl alcohol.

'aldehyde ('ældihaid) – a compound consisting of a -CHO group of atoms joined to a hydrocarbon group. It may be oxidized (have oxygen added to it) to become an acid (...COOH). **acetaldehyde** – CH₃CHO; **formaldehyde** (used to harden leather and as an antiseptic), H.CHO.



aldehyde

formaldehyde
HCHOformic acid
HCOOH

ALDEHYDE

'aldol (ældol) – a substance formed by the joining together of two ↓aldehyde molecules, e.g. CH₃CHO + CH₃CHO → CH₃CHOH.CH₃CHO. **'leucone grains** (æ'liuəron-) – small pieces of protein which serve as a store of food in plants, especially in the seed.

'Alfol ('ælfol) – trade name for thin sheets of aluminium bent so as to make many small air spaces, used to keep heat in (or out).

/-alg- / – pain, e.g. **neur'algia** – pain in a nerve; **'anal'gesic** – a substance which lessens or prevents pain.

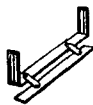
'Algae ('ældʒi) – plants which have no flowers and no true roots, though some (e.g. sea-weeds) have a part which holds them down onto a rock. They contain chlorophyll (substance by means of which plants make sugar from carbon dioxide and water). Some algae are very small, e.g.

↓ diatoms; others, e.g. sea-plants, are very large. The microscopic algae found, e.g., in standing water swim about yet contain chlorophyll.

'alginate ('ældʒineits) – substances obtained from a seaweed, used, e.g., in making ice-cream, face-cream, fireproof materials and artificial silks.

'algebraic sum ('ældʒi'brei.ik) – addition taking notice of the plus and minus signs, e.g. the algebraic sum of + 5, – 3, – 2, + 2 is 2 (not 12).

'alidade ('æli'deid) – ruler with an upright at each end, used to draw a line from a point on the paper towards some object (e.g. tree) on the land being mapped.



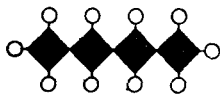
ALIDADE

alignment charts

(ə'lainmənt) = ↓ nomographs.

'alimentary ('æli'mentəri) – having to do with food. **alimentary canal** – the whole length of the pipe from mouth through the digestive organs to where the matter leaves the body.

'aliphatic compounds ('æli'fætik) –

CH₃CH₂CH₂CH₃, butane

ALIPHATIC

CH₄; ethane, CH₃.CH₃; butane, CH₃.CH₂.CH₂.CH₃. Other examples: ↓ acetic acid, ↓ acetone, ↓ acrylic acid.

'aliquot part ('ælikwət) – part (fraction) of a quantity such that the quantity contains an exact number of these parts, e.g. 2 of 10, but not 3 of 10.

a'lizarin (æ'lizərin) – important red dye, once obtained from madder root, now made from anthracene (from coal).

'alkali ('ælkəlai) – (loosely) a substance (e.g. soda) which acts against and neutralizes an acid; (properly) a substance (e.g. caustic soda, a ↓ hydroxide of an alkali metal) which dissolves in water and forms hydroxyl ions OH⁻.

alkali metals – potassium, sodium, lithium, rubidium, caesium.

'alkanes ('ælkəinz) = ↓ paraffins.

'alkaloids ('ælkəloidz) – a group of substances (organic ↓ bases) obtained from plants, e.g. nicotine (from tobacco), hyoscyne (datura), cocaine, quinine, morphine, strychnine. They all have important effects on the human body; their use to the plant is not exactly known.

'alkyl ('ælkil) – A radical (root) is a group of atoms which remains the same in different compounds of the same class. The alkyl radicals are the roots of the ↓ aliphatic hydrocarbons (chain compounds of carbon and hydrogen), e.g. hydrocarbon, CH₄, radical CH₃-. **'alkylene** – a hydrocarbon radical with a joining power of 2, e.g. ethylene: –CH₂.CH₂–.

al'lelomorphic, **al'leles** (æ'lilomɔɹfɪks, æ'lilz) – opposite characters in inheritance, e.g. tall-short, smooth-wrinkled (peas); the genes (parts of cell) which carry such characters. ↓ Mendelism.

al'lergic (ə'lædʒik) – over-sensitive to a certain protein; e.g. a person who is allergic to white of egg becomes ill if he eats even a very small amount of it. **'Allergy** may also be produced by breathing in a substance. Some people are allergic to insect-bites, horse-hairs or to the pollen of certain plants. ↓ anaphylaxis, hives, histamine.

'allo- ('ælo-) – other, e.g. **'allo'morphous** – made of the same substance but having a different crystal form.

"all or none" – the law which says that a single nerve fibre either acts fully, or not at all; it does not act weakly or more strongly. (The body,

as a whole, acts less or more strongly, e.g. in taking away a finger from a hot thing, because fewer (or more) nerve fibres are used.)

'allo'tropes ('ælo'trups) - different forms of an element, e.g. diamond, graphite, charcoal are **allotropic** forms of carbon.

'alloy ('æloi) - two or more metals mixed or combined to make a substance which is different from (and more useful than) the pure metal, e.g. copper + tin = bronze. (Sometimes an alloy contains a substance which is not a metal, e.g. iron + carbon = steel).

al'luvial (ə'liuviəl) - which has been deposited by a river, e.g. alluvial clay. **alluvium** - a substance deposited by a river.

'alma'cantar(s), **'almu'cantar(s)** ('ælmə'kæntə) - circle(s) parallel to the horizon dividing the sky into rings: when two stars are at the same distance above the horizon they are in the same **almacantar**; (2) form of telescope used for seeing the altitudes (heights above the horizon) of stars.

'alo'pecia ('ælo'pi:siə) - baldness, lack of hair on the head. **alopecia** **'are'ata** (- 'æri'a:tə) - loss of hair on small areas of the head (often due to over-work or anxiety).

al'paca (æl'pæka) - camel-like animal in S. America. It has long silk-like hair. **alpaca cloth** - cloth used especially for the lining of coats, made from cotton lengthwise threads and alpaca or other fine wool cross-threads.



ALPACA

'alpha particle ('ælfə -) - (α , first Greek letter). When some radioactive materials (e.g. radium, uranium, plutonium) break up, they send out particles carrying \oplus (positive) charges; these are called alpha particles. An alpha particle is the same as the nucleus of the \downarrow helium atom.

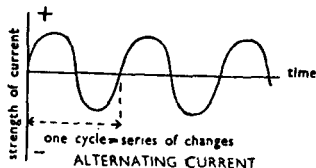
alt-/ - height, e.g. **al'timeter** (æl'timitə) - instrument used for measuring height.

alt'azimuth (ælt'æziməθ) - telescope which can be turned upwards or in a circle sideways, used to measure angles in the sky.

'altitude of a star ('æltitud) - the angle showing the height of a star in the sky.

'alto-'cumulus cloud ('æltə'kju:mjulas) - \downarrow cumulus cloud 10,000-20,000 feet up.

'alternating current ('ɔltəneitig) - an electric current which first increases to a maximum (greatest strength) in one direction, decreases



to zero, then increases in the opposite direction; and so on. In ordinary a.c. as supplied to a house, this series of changes is made 50 or more times per second. **alternator** - an electric generator which produces alternating current.

'alter'nation of generations - reproducing first sexually and then asexually (not sexually) in turn: e.g., ferns reproduce by spores (little pieces of living matter able to grow into a new plant). The little plants which grow from these spores reproduce sexually (joining of male and female cells) and so produce ferns which reproduce by spores - and so on.

'alum ('æləm) - a substance composed of aluminium sulphate and potassium sulphate which forms eight-sided crystals; it is very bitter; it draws the skin together and hardens it; used in making leather. \downarrow alums.



ALUM

a'lumina (æ'lu:mi:nə) - aluminium oxide; with silica it forms the main part of clay. In its crystal form it is the main substance of many precious stones; it is combined with water in bauxite from which aluminium is obtained.

'alums - double salts of similar chemical composition to alum and forming crystals of the same shape. Ordinary alum is $K_2SO_4 \cdot Al_2(SO_4)_3 \cdot 24H_2O$, i.e. potassium sulphate and aluminium sulphate with 24 molecules of water. In the alums, sodium or a similar atom (of joining power 1) takes the place of potassium; and iron (or a similar atom of joining power 3) takes the place of aluminium.

al'veolus (æl'violəs) - small hole, e.g. the hole in which a tooth grows.

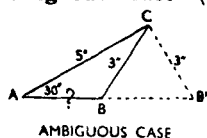
al'veoli - small air-spaces, e.g. in the lungs.

a'malgam (ə'mælgəm) - solution of a metal in mercury.

'amau'rosis ('æmæ'rousis) - loss of sight caused by injury to the brain or nerve, not to the eye.

ambi-/ - on both sides, in both ways, e.g. **'ambidextrous** - able to use both hands equally well. **'ambient air** - the air which is on both (= all) sides, i.e. the surrounding air.

am'biguous case (æm'biɡwəs) - Ambiguous = having two meanings. If we are told to draw a triangle ABC in which $CAB = 30^\circ$,



the side $AC = 5$ in., the side $CB = 3$ in., we find that we can make two different triangles (ABC and $AB'C$). The measures given are ambiguous. This ambiguous case arises when the known angle lies between the longer side and the side whose length is not known.

'ambit ('æmbit) - space round, e.g. round a house.

'ambly'opia ('æmbli'oupiə) - weak (dim) sight without actual fault in the eye, e.g. due to tobacco or alcohol.

'ambo'ceptor ('æmbo'septə) - ↓ complement fixation.

'ambul-/ ('æmbiul-) - walk. **'ambu'latory fever** (-'leitəri) - fever so light that the person can go on walking about.

'amide ('æmaid) - compound in which one hydrogen atom of ammonia

(NH_3) is replaced by the character-

istic atom group of an organic acid (e.g. the group $CH_3 \cdot CO-$ of acetic acid $CH_3 \cdot CO \cdot OH$.)

'amine ('æmiin) - compound in which one hydrogen atom of ammonia

(NH_3) is replaced by a hydro-

carbon group; e.g. ethane C_2H_6 , ethyl group, C_2H_5- , ethylamine $C_2H_5 \cdot NH_2$.

Aniline is phenylamine, $C_6H_5 \cdot NH_2$.

'amino-

acids (æ-'miino-) - acids which contain a $-COOH$ group and a NH_2 group; e.g. glycine, $H_2N \cdot CH_2 \cdot COOH$. In the process of digestion, the proteins of meat are broken down into amino-acids; these acids pass through the wall of the bowel and are built up again into proteins in the body. ↓ essential amino-acids.

'ammeter ('æmitə) - instrument for measuring the strength of an electric current in ↓ amperes.

am'monia (ə'mouniə) - a strong-smelling gas - a compound of one atom of nitrogen and three atoms of hydrogen; NH_3 . It is smelt in farm-yards because urine gives off ammonia as it decays.

'ammonites ('æmən-aiz) - fossils of sea-creatures (↓ cephalopods), usually found in flat spirals.

AMMONITE **ammonium** - the

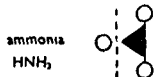


acetic acid
 $CH_3 \cdot CO \cdot OH$

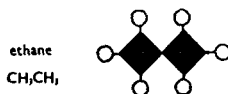


acetamide $CH_3 \cdot CONH_2$

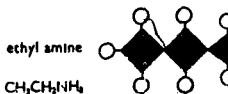
AMIDE



ammonia
 NH_3



ethane
 $CH_3 \cdot CH_3$



ethyl amine
 $CH_3 \cdot CH_2 \cdot NH_2$

AMINE

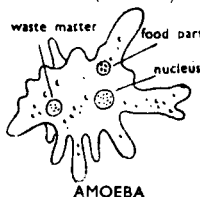
group of atoms NH_4^- . **ammonium chloride** = sal ammoniac, (NH_4Cl) , used in \downarrow Leclanché cells, also in dry cells for hand lamps. **ammonium nitrate** - NH_4NO_3 , used in explosives. **ammonium sulphate** - $(\text{NH}_4)_2\text{SO}_4$; white crystalline substance used to add nitrogen to the soil.

amnesia ('æm'ni:ziə) - loss of memory, e.g. owing to injury of the brain, or to emotional causes.

'amniion ('æmniən) - (in an egg): the inner of the two membranes (chorion, amnion) inside the fibrous shell-membrane of an egg; in a human a membrane of the same kind inside which the unborn child grows.

ammonia clock - \downarrow atomic clock.

a'moeba ('æmi:bə) - water-creature consisting of a single cell, about 1/100 inch across; it moves by pushing out a part of itself, feeds by flowing



round its food, reproduces by dividing itself in two.

a'morphous ('æmɔ:fəs) - which has not its atoms arranged in the regular shape of a crystal, e.g. sulphur when a powder (not crystalline), resin, rubber.

'ampere ('æmpeə) - unit for measuring the rate of flow of an electric current. An electric iron, for ironing clothes, has a rate of flow of about 2 amperes (on 230 volts); a small (40 watt) lamp, about $\frac{1}{2}$; a large (100 watt) lamp, about $\frac{1}{4}$. (One ampere = 1 \downarrow coulomb per second; in \downarrow electrolysis one ampere sets free 0.001118 gramme of silver per second.

ampere turn - a measuring unit of the strength of an electro-magnet; the number of turns of wire round the magnet multiplied by the number of amperes flowing through.

amphi-/ ('æmfi-) - (1) around, e.g.

'amphitheatre - theatre with seats all round; (2) in both ways; e.g.

am'phibious - able to live both on land and in water.

Am'phibia ('æm'fibiə) - class of creatures such as frogs, toads, salamanders, which live in wet places. They have moist skins, no scales or claws, and usually change from an early water-form to an adult form living partly on the land.



'amphi'boles ('æmfi'boulz) - important group of rock-forming *silicates found in deep, heat-formed rocks and in volcanic rocks. The crystals are long and are of many different forms: *(salts formed from silica (sand)).

'amphioxus ('æmfi'ɔksəs) - ("both ends-sharp"): also called Lancelet; creature, between



worm and fish in form, about 2 inches long. It lives buried in sand. It is of interest in studying the earliest development of the spine and spinal cord: its spine is an elastic rod; \downarrow notochord.

'ampho'teric ('æmfo'terik) - able to combine with an acid or to behave like an acid and combine with a \downarrow base (e.g. with a metal oxide).

'ampli-/ - wide.

'amplification factor - (of radio

valve) - First see triode. Suppose that an increased pressure of 1 volt on the grid G causes an increase of $\frac{3}{10}$ amperes

current through the valve. Suppose that we have to increase pressure on the anode A (\oplus , positive plate) of the same valve by 20 volts in order to increase the through-current by $\frac{3}{10}$ amperes. The amplification factor is 20. The A.F. is the increased anode pressure necessary to produce

